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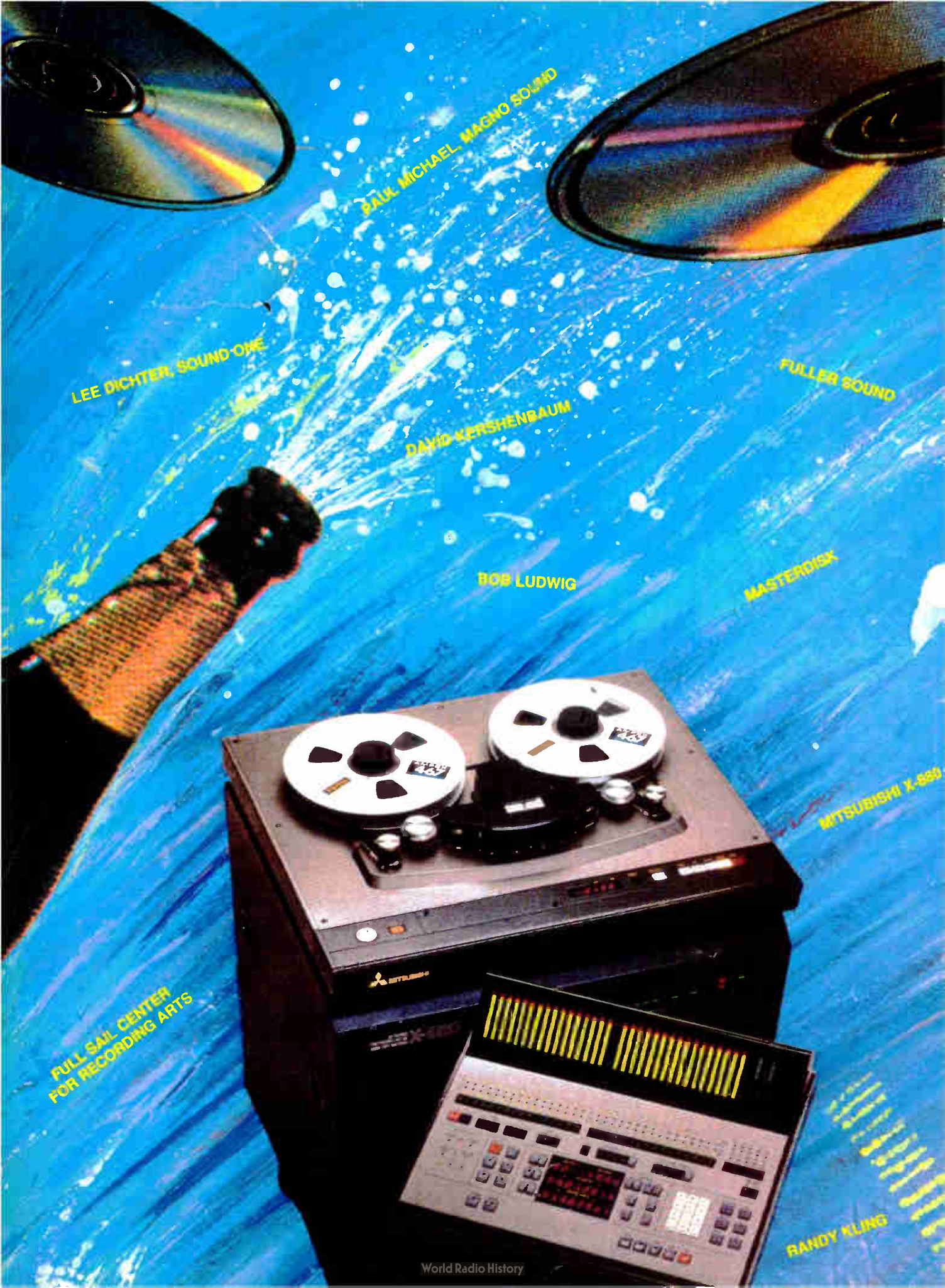
THE RECORDING INDUSTRY MAGAZINE

**A History of
NY Recording**



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Bob Clearmountain

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World Radio History

MIX

OCTOBER 1989

THE RECORDING INDUSTRY MAGAZINE

VOL. 13, NO. 10



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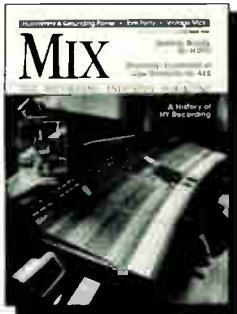
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FROM THE EDITOR

Founded 1977 by
David M. Schwartz and Penny Riker Jacob



Cover: Celebrating its 20th anniversary this year with a \$2 million renovation, Electric Lady Studios in Manhattan installed a 64-input Focusrite console with Massenburg automation in Studio A. Control room design by George Augspurger of Perception Inc. Photo: Robert Lewis

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As we march off this

month to the annual Audio Engineering Society Convention, overflowing with shiny new products and technical presentations to set the course for years to come, we'd like to offer a salute to another of our important industry organizations—SPARS, which celebrates its tenth birthday this year.

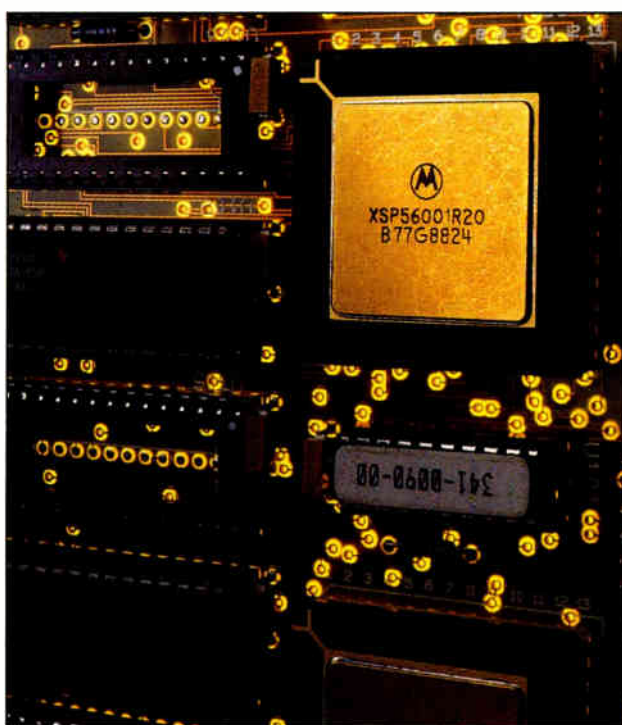
The Society of Professional Audio Recording Studios was assembled by some of the leading studio owners to be a pipeline between the industry's users and manufacturers, as well as an open forum for studio people. There is a critical need for communication and shared information among those who run studios and face the pressures of today's tight budgets and changing technologies. There is less and less room for studio professionals to make costly mistakes, whether by choosing a short-lived format or being unaware of a cost-saving business practice. It is no longer realistic to operate a studio on a limousine budget, as many disenchanted entrepreneurs have found out all too painfully.

The concept of friendly competition has never been more important in the studio business. While sharing information with the studio down the street may seem as strategic as giving away the family jewels, those who take the time to discuss mutual problems with others in the same workplace usually find there is much more to gain.

It is no coincidence that the recording industry is composed of many people who have little or no real business experience. The majority of people who start studios do so more because of their love for and involvement with music and recording than because of their love for business. For these people, as well as seasoned business professionals, it is indeed fortunate that SPARS was created, providing studio operators with invaluable assistance with the rugged business realities of the recording industry.

We wish the new SPARS Board, which is coming into office during AES, the best of luck in their efforts to improve the business and creative climate of this industry. Keep reading,

David M. Schwartz
Editor-in-Chief



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We can give you all kinds of technical reasons to buy our new AudioFrame Production System. But if it doesn't deliver excellent sonic quality, will you care? Not likely.

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CURRENT

CHRYSALIS COMPLETES RECORD PLANT BUYOUT

Chris Stone has moved out and Chrysalis Group plc has moved in, but it's business as usual at Record Plant in L.A. Exercising an option agreed to in December 1987, Chrysalis purchased the remaining 50% of Record Plant from Stone and became sole owner of the studio operation, including remote and rental divisions, on August 28.

"I have nothing but good feelings about our arrangement," Stone says. "The studio is stabilized in terms of direction, and our equipment has been totally upgraded since Chrysalis arrived. Under the supervision of George Martin and John Burgess, Record Plant is sure to grow and prosper."

Martin and Burgess manage studio operations for Chrysalis in London. The staff at Record Plant remains unchanged except for Stone. David Ellman has been appointed executive vice president and chief operating officer; Bill Dooly, general manager/chief engineer; Rose Mann, studio operations executive; Norman Dlugatch, director of technical engineering; Mark Eshelman, manager of remote division; and Dan Moskey, manager of rental division.

"It's going to be a team effort," Ellman says. "The people Chris brought together all have expertise in certain fields, so we're putting our heads together as one group and we're going to run this place like that. It's a family atmosphere because we're not only business-oriented, but we're business friends also. Clients will still be catered to as if they're part of our family."

"Our main concern is making a smooth transition," Ellman continues. "We want

everybody to know that Record Plant is still here."

STUDER ACQUIRES IMS

They're now answering the phones "Studer Editech" over at Integrated Media Systems. Studer International A.G. has completed the acquisition of the Menlo Park, California-based IMS, makers of the Dyaxis workstation.

Studer Editech Corporation, a wholly owned subsidiary of Studer International, is headed by president and CEO Lee Cochran, considered the driving force behind the merger. Gerry Kearby has stayed on as marketing manager, and Iain Everington will continue as sales manager.

"We are particularly excited about the long-term prospects for SEC," Cochran says. "Much of the future of the professional music recording, broadcast and post-production industries lies in the digital domain. The next twelve months will be an exhilarating time

for all of us at SEC."

CONFERENCE NEWS

The 131st SMPTE Technical Conference and Equipment Exhibit convenes at the Los Angeles Convention Center October 21-25. Contact Nancy T. Engel at (914) 761-1100 for more information.

Apple Computer will be on hand for the fifth annual Gand Musictech '89, to be held October 7-8 at the Hyatt Hotel in Lincolnwood, Ill. (near Chicago). Contact Gand Music & Sound at (312) 446-GAND.

More than 2,700 attendees are expected to visit the third annual CD-ROM Expo '89, October 2-6, at the Sheraton Washington Hotel in Washington, D.C. For registration information, contact Dorothy Ferriter at (508) 879-6700.

Lighting Dimensions International '89 will be held November 17-19 at the Nashville Convention Center. Contact Paula Harris or Jacqueline Tien at (212) 353-1951.

MIX ANNOUNCES INDUSTRY MARKET SURVEY

Mix has just completed an extensive market survey of the audio production industry. Called "Audio Production '89: A Benchmark Survey of U.S. Audio Production Facilities," it consists of four parts: statistics on Equipment Brands in Facilities; U.S. Music and Recording Industry Data; U.S. Consumer Audio Electronic Sales Data; and the results of *Mix's* own Audio Production Facilities Survey 1989.

The information contained in Part 1, Equipment Brands in Facilities, was compiled from a facility-by-facility analysis of the directories published by *Mix*

during 1988 and 1989. Businesses surveyed for this data include those companies identified by *Mix* as Recording Studios, Tape/Disc Mastering Studios, Tape Duplication Facilities and Video/Film Production and Post-Production Facilities.

Part 2 of Audio Production '89 contains a wealth of pertinent information to *Mix* readers, including annual sales figures for prerecorded music and musical instruments. Part 3, U.S. Consumer Audio Electronic Sales Data, consists of annual sales information on consumer products relevant to our industry.

The final part of this year's survey contains the results of the

—CONTINUED ON PAGE 9

Artists' expectations, engineering limitations, and other myths of digital recording.

Digital. The word itself conjures up visions of a totally perfect recording process where anything is possible.

Nothing could be further from the truth.

For example, if you treat your digital tape as we've shown below you'll likely end up with exactly what you'd expect. Useless tape.

And how about *sound*: that nebulous, very subjective quality that is, for each one of us, the *raison d'être*?

After all, even though we build what we believe to be the world's finest digital machine, the 32-track DTR-900B, some audio engineers would stack our analog multi-track machines up against it in terms of sound quality any day.

So why did we build the digital DTR-900, and then follow it up with significant new features and improvements in the second generation DTR-900B? And why do we believe it

may be the single most important purchase you will ever make in your business? Simple. It will solve problems for you that no other system can solve. It can cut hours from session times. And it can make your life as a professional magnitudes easier and more rewarding. Here's how.



The DTR-900B's new Locator/Remote features improved hardware and software that make the machine faster and easier to operate.

Just imagine a session where after only a few takes you can send the talent home. You got their best when they were fresh, and now you can do *your* best when you're fresh, and creative. You use the DTR-900B's session controller to *electronically* assemble the final master from the tracks with no—that's *zero*—sound degradation. (As one studio owner put it, "Often a record becomes what analog makes it—not so with digital.") And no matter how intense the mix-down, the PD format with its powerful Reed-Solomon error correction scheme means you could lose up

to 8 tracks of data and still record and play all 32 channels! So, if you were to lay a cigarette down... no, no, just kidding!

But there's a down side to digital, too. For one thing, there's no friendly tape noise to cover up mistakes, or to add that mysterious "something" to the mix. And the initial cost for a digital machine can be *scary*.

So what's the final mix, or the bottom line, if you prefer? The cost is high, and even though the Otari DTR-900B is a powerful client draw, it's important to consider your return on investment.

But then, a great sounding record is hard to put a price on, isn't it?

It's your decision, but we can help. After all, Otari can offer you the best in digital, *and* the best in analog. Call Otari at (415) 341-5900, for more information. (And if you own a DTR-900, ask us about how the new features on the "B" can be added to your machine.)

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pd The world standard Professional Digital (PD) format employs Reed-Solomon coding, mechanical dispersion, and cyclical redundancy in a virtually foolproof error correction scheme for data loss recovery.



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Whether in a near field environment or soffit mounted, the 15B possesses the unique ability to resolve the subtlest of details at both high and low sound pressure levels with music as diverse as full blown rock to a string quartet. Pin-point imaging, extended bandwidth and exceptional transient capabilities are benefits of the patented Tannoy Dual Concentric transducer known by audio experts around the world.

Of course, any primary reference loudspeaker should be able to satisfy a wide variety of musical demands, but as is all too painfully obvious, many popular monitors only perform well with certain types of music and generally must be pushed relatively hard to achieve "THEIR SOUND". Understanding the need for a true mid-sized high SPL reference monitor Tannoy engineers have achieved a design that is non-fatiguing, accurate and above all **MUSICAL**.

FEATURES

- Tannoy's **Dual Concentric** design incorporates the flare of the 15" L.F. cone as a direct extension of the H.F. compression driver. This patented design results in the **purest point source** and eliminates the need for the typical horn assembly and its associated "Non Musical" imperfections.
- Gird acoustic reinforced L.F. cone assembly with high compliance rolled surround, providing extended low frequency response with strong but **balanced punch**.
- **Sync-source** time compensated, gold plated hard-wired crossovers provide finer detail resolution and **three bands** of adjustment.
- Internally braced mediate cabinet critically damped with TF-1 lagging to eliminate unwanted resonance, and is sized to **retro-fit** existing soffets.
- High power handling capability to take advantage of today's advanced digital formats and high current super amps.

TANNOY Professional Products

Go For The

—FROM PAGE 6, CURRENT

largest, most comprehensive facilities survey ever done by anyone in the business. This Audio Production Facilities Survey asks questions never asked before, especially concerning matters of education and employment. Of the 1,000 questionnaires mailed, an impressive 42% were returned, indicative of an active, concerned industry.

Completed on July 17, the Mix Audio Production Facilities Survey 1989 was designed to gather information on trends in the audio production industry. Areas of focus include a profile of facility revenue sources, expenditures, personnel, employment hiring practices and staff education.

FACILITY REVENUE SOURCES

The survey asked respondents to compare revenue sources from three years ago to present revenue and anticipated revenue over the next three years from five general business areas: audio recording and mixing, audio post-production, film/video post-production, manufacturing and other activities. Among the facilities surveyed, audio recording and mixing continues to be a major source of income, with an anticipated upward trend in all areas except recording for demos. Recording for TV/video and for film appears to be the area of fastest growth—studios expect to make as much money from TV/video work over the next three years as from records, the traditional revenue source for audio recording. However, earnings from records are anticipated to remain at present levels in the next three years.

In the area of audio post-production, editing and A/V sound production contribute in equal amounts to the bulk of income over the entire six-year period in question. A downward trend in disc-cutting and a simultaneous upward trend in CD mastering confirms the movement of the industry away from vinyl toward

compact discs.

For those facilities that do film and video post-production work, audio sweetening provides a lion's share of total revenue. While the overall category of film and video has experienced significant growth in the last three years, the share occupied by audio sweetening has increased even more dramatically: of a total of 416 respondents, 70 reported significant revenue from audio sweetening three years ago, while today that figure has more than doubled to 162, and 187 anticipate future significant activity from this source.

Those studios engaging in manufacturing operations report that, while real-time and high-speed audio duplicating will continue to comprise most of their business, the most significant growth is expected in the area of DAT duplicating. A continued gradual decline in disc pressing again emphasizes the eroding popularity of vinyl.

Some interesting observations can be made from evidence gathered concerning other activities, particularly in the area of MIDI production. Following a three-fold increase in activity over the last three years, studios report that they expect to be doing slightly less MIDI production three years from now. Respondents also reported significant income from creative services; i.e., producer services, systems design and talent brokering, almost at the same level as for MIDI production. And finally, there is a trend toward education as a source of revenue.

When asked to describe their single most significant revenue source, facilities confirmed their continued commitment to the record industry. More than twice as many studios consider audio recording and mixing of records as their bread and butter over any other single category, not only today, but through the next three years. Evidence also indicates that the industry has seen demo work decline over

—CONTINUED ON PAGE 148

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IT'S LARGER
THAN LIFE!
IT'S
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INDUSTRY NOTES

Eelco Wolf joined **Agfa Corp.** (Ridgefield Park, NJ) as vice president, corporate communications. **Dr. Kurt Metelmann** moved up to executive vice president, administration and services. . . In Westlake Village, CA, **Guy Costa** announced the start of **Quadim Corporation**, which will specialize in real-time audio cassette duplication. . . **Crispin Herrod-Taylor** joined **Focusrite Audio Engineering** as product manager. . . **Video Services Corp.** acquired **Martin Audio Video Corp.** in Northvale, NJ. . . **Audio Video Trends '89**, formerly **Sound Stage**, will be held at the Minneapolis Convention Center from Oct. 27-28. Call (612) 832-3238. . . **Studiomaster Inc.** moved to 3941 E. Miraloma Ave., Anaheim, CA 92807. . . **Underwriters Laboratories Inc.** and **British Standards Institution** signed a Memorandum of Understanding, which will assist U.S. manufacturers who want to gain access to the European Community after 1992. . . In Redwood City, CA, **Ampex** promoted the following: **Richard A. Antonio**, vice president, sales and customer service, U.S.; **George F. Armes**, general manager, instrumentation products; **Clara R. Munley**, corporate controller; **Eugene R. Nyland**, vice president, operations; **Phillip M. Ritti**, general manager, audio/video products. . . **Shure Brothers Inc.** (Evanston, IL) changed its roster of corporate folks: **John F. Phelan**, director, technical markets; **Donald S. (Sandy) Schroeder**, manager of Shure mic lines worldwide; **Michael Pettersen**, director, mixer products; **Alan B. Shirley**, product line manager, wired microphones; **Robert Gilbert**, vice president, sales and finance. . . **Singularity Enterprises Inc.** (New York) is the new tech support and installation rep for **Audio Kinetics (UK)**. . . Participate in the **Video Expo Orlando**, Dec. 11-15, or find out about an expo near you by calling (914) 328-9157. Outside NY call (800) 248-KIPI. . . **East Side Sound** will sponsor free workshops on the new Harrison SeriesTen console, scheduled for the second week in October and supervised by **Gary Thielman** of **Harrison**. To register, call (212) 226-6365. . .

In Hollywood, **Image Entertainment Inc.** and **North Communications** plan to develop interactive programming on laser videodisc. . . Contact **W. Damian Mazur** at **Audio Market Place** (Plantation, FL) for new and used pro equipment. . . In Atlanta, GA, **Bedford Audio Marketing** will be the Southeastern rep for British companies **Amek Systems & Controls Ltd.** and **Total Audio Concepts Ltd.**. . . **Charles M. Salter Associates** moved to 130 Sutter St., 5th Floor, San Francisco, CA 94104. . . **27th Dimension Inc.** relocated to 2312 S.E. 29th St., Okeechobee, FL 34974. . . **B & B Systems** (Valencia, CA) redesigned and moved **International Video Entertainment's** post-production facility from Newbury Park to Van Nuys, CA. **David N. Bartolone** joined B & B as systems engineer. . . **Sonopress Inc.** promoted **Ron Harris** to president in Weaverville, NC. . . **Barry C. Jackson** will manage the new audio-visual division of **Audio-Video Supply Inc.** in San Diego, CA. . . The new manager of **Buena Vista Sound** (Burbank, CA) is **Christopher Carey**. . . In Quincy, IL, **Harris Corp.'s** broadcast division has a new VP of manufacturing, **Harvey Baker**. . . **Gary Taylor** joined **Amek** in North Hollywood, CA, as broadcast sales coordinator. . . In Newbury Park, CA, **Alexander Publishing** announced that **Korg MIDI School** will offer classes at various locations this fall. Call (800) 633-1123 outside CA, or (805) 499-6200 inside CA. . . **Everything Audio (L.A.)** is **Digital Audio Research's** California dealer for the **SoundStation II**. . . In Chicago, **Colnot/Fryer Music** changed its name to **Terry Fryer Music**. . . **Noel Smith** now works at **Videomix** as audio engineer in NYC. . . In Universal City, CA, **Gip E. Noble Jr.** was promoted to VP of **WEC Industries**, **Alonzo Miller** is the new president of WEC's recorded music division, and **Darryl Coit** joined WEC's recording studios as production manager. . . **JCI** relocated its corporate offices to 21550 Oxnard St., Suite 920, Woodland Hills, CA, 91367. . . **Tentel Corp.** moved to 4475 Golden Foothill Pkwy., El Dorado Hills, CA 95630. ■

S T A F F

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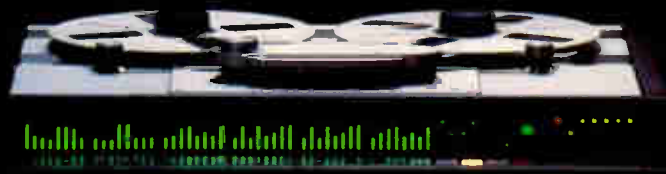
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The PCM-3324A is Sony's second generation DASH 24-channel multitrack recorder, incorporating key technologies developed for the PCM-3348. Like 2X oversampling with digital filters for enhanced sonic performance. Reduced power consumption. And upward compatibility with the PCM-3348.

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PROFESSIONAL AUDIO

World Radio History

THE POSSIBILITIES

The Flex System from Rane: A Powerful New Approach to Modular Signal Processing



F

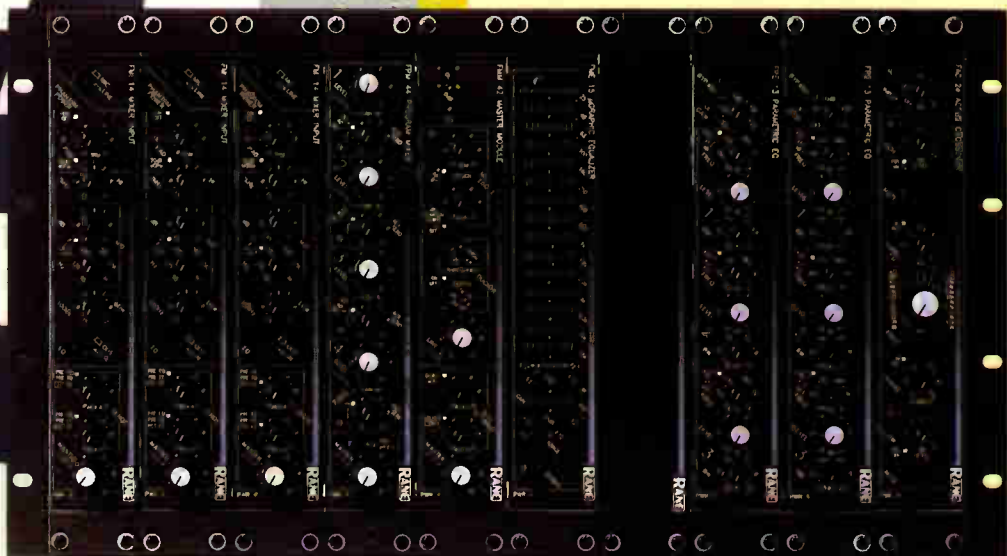
Flexibility, no matter how you spell it, means power. It's the power to meet varied needs. To meet budgets with optimum performance. To efficiently accommodate system growth. Long into the future.

Flexibility is the essence of Rane's new FLEX System. The first universally compatible, cost effective, modular approach to signal processing and routing. With no special requirements. And no dead ends.

Each Flex module is an HR (Half Rack) compatible, UL/CSA/VDE approved, self-contained processing unit. Each capable of being EIA rack-mounted either horizontally or vertically, with inexpensive, readily available hardware. Or simply set on a shelf, stand-alone fashion.

HIGH-POWERED COMPATIBILITY. Using standard 3-pin, 1/4" or barrier strip connectors, FLEX modules are directly compatible with professional audio gear. And since they are remote powered—via Rane's proposed power supply standard—troublesome ground loops, hum and agency approval problems are solved up front by design.

ENDLESS POSSIBLE COMBINATIONS FOR CUSTOM DESIGNS. The FLEX non-exclusive modular concept makes it inherently expandable



ARE STAGGERING!

and upgradeable. It boasts a large and growing number of functions and components to choose from. Mixers. Preamps. Splitters. Crossovers. Dynamic controllers. Equalizers. Amplifiers. Line drivers. And much more under development.

And thanks to Rane's efficient bus design, system wiring is greatly simplified in even complex mixing and splitting layouts.

COST EFFECTIVE CAPABILITIES. Modular flexibility. Uncompromising performance. All without a premium price. That's the FLEX System manifesto. There is no expensive main-frame to buy; you only pay for the functions you want, when you want them.

Say, for example, you only need a 3 channel mixer with one channel of crossover. The FLEX System delivers. And when your needs expand, just add more modules. No need to obsolete old equipment for a loss.

Whether you use two modules or twenty modules, the FLEX System remains cost effective. And supremely flexible. Year after year.

SUPERLATIVE PERFORMANCE, RANE RELIABILITY. The design and performance of each and every Flex module is, in a word, superlative. Every model carries top-grade studio specifications, utilizing the best components available. The result is unsurpassed performance and reliability.

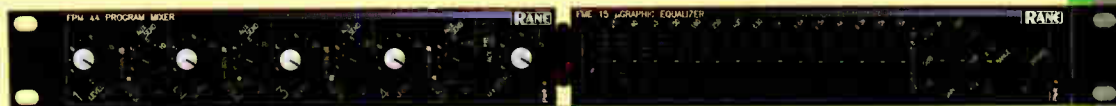
Our HR compatible modules may be compact, but they're stuffed with more top-notch features than you would have thought possible. For example, the **FMI 14 Mixer Input module** measures only 1.75" x 10.5", yet it boasts a -128dB EIN mic stage, switchable phantom power, true 20dB pad, powerful 3-way EQ section, insert loop, two source-selectable Aux sends and balanced master channel outputs. A single DIN cable, supplied with each module, routes the Master and Aux buses from unit to unit for quick and clean hook-up.

+15/-20dB boost/cut, 2-octave down to 1/30th-octave bandwidth range for notch capability, and a full 10Hz-20kHz frequency sweep range for unprecedented flexibility.

The **FME 15 MicroGraphic Equalizer** brings Interpolating Constant-Q filter performance to the Flex line, pioneered by our full-sized GE 30

current balanced outputs, and you've got a powerful, flexible new crossover standard.

This is but a sampling of the innovative Flex Modules to be released this year. We encourage you to obtain separate, detailed data sheets on the many FLEX System modules. Then compare these with the best standard equipment available. You'll discover that FLEX offers the best of all worlds: compact, cost effective, flexible, uncompromising performance.



The **FMM 42 Master Module** not only provides Aux returns and mixing, but features extra mic and stereo line inputs with ducking capability for paging and other applications.

For even more mixing flexibility, the **FPM 44 Program Mixer** allows 4 separate mic or line inputs to be mixed to 4 output programs, with pre or post fade switch selection for the Aux sends. Both the direct balanced/unbalanced terminal strip and the DIN Flex bus inputs and outputs can be used simultaneously for easy expansion and integration into larger systems.

Carrying on a fine tradition of innovative equalizer technology, Rane sets yet more new standards with the Flex Series. The **FPE 13 Parametric Equalizer** provides 3 separate bands, each capable of

model which has set new industry standards. Minimized filter interaction, smooth combined response and fully balanced three-pin and terminal strip input/output are but a few of the features. Both the FME 15 and the FPE 13 also provide an exclusive Patch I/O jack which allows direct connection to an insert loop jack with a single 1/4" TRS patch cable.

The **FAC 24 Active Crossover** is the next generation to follow in the respected footsteps of our AC 22 and AC 23 designs. In addition to the proven 24dB/octave Linkwitz-Riley performance, the FAC 24 features a true 24-position frequency selector switch to provide plug-in card accuracy and repeatability with the convenience of a knob. Add to this a built-in CD Horn EQ section, electronic phase alignment, summing LF input and three-pin high-

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"In blindfold listening tests with the best software sequencers, the Alesis MMT-8 won hands down for the best feel."

— Jay Graydon.

Producer, Engineer,
Songwriter, Studio Guitarist,
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Personal computers are great for editing notes and sorting out the MIDI spaghetti in a complex composition. But when it's time to play your latest song they often miss the beat.

There's a reason. Personal computers have to deal with many tasks simultaneously. The notes in your composition have to fight for time on a computer that's busy updating a screen, checking a mouse, and doing other non-musical tasks. Even if you quantize your music, this results in random timing errors during playback, which is readily perceived as a loss of feel. We call it *MIDI slop*. You wouldn't accept sloppy playing from a triple-scale studio band, so why accept it from your computer?

The MMT-8, on the other hand, is the best sequencer you can own because it was designed to perform only one task: making music. It plays back notes exactly as you played them in, or exactly how you want them quantized. All with pin-point accuracy, so your songs will have the exact rhythmic feel you intended. The same *meaning*.

At less than the price of the average sequencer software, you can't afford not to add the MMT-8 to your MIDI studio. Plus, its logical 8-track layout and tape recorder style controls will keep you gravitating to the MMT-8 for all your songwriting. And some astonishingly comprehensive editing too.

And now your work can be stored and retrieved instantly on 3.5 inch floppies with the Alesis Data Disk. It's a direct MIDI to disk, 800K capacity, universal data storage medium for the MMT-8 and virtually any other MIDI hardware — like Alesis drum machines and programmable effects processors.



The Alesis Data Disk

The Alesis MMT-8 MIDI Sequencer won't do your taxes or spreadsheets, but it *will* play your music in the pocket. And that's the *musical* bottom line.

See your Alesis dealer for
a demonstration.



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SESSIONS AND STUDIO NEWS

SOUTHERN CAL

Alyssa Milano, of TV's *Who's the Boss?* was at Kingsound Studios in North Hollywood working on an upcoming release for Japan's Pony-Canyon Records. Joey Carbone and Tom Milano co-produced, with Eddie King engineering and Chris Winter assisting. . . Mr. Mister stopped in at Sunset Sound Recorders in Hollywood to track their latest for RCA/BMG, with Paul DeVilliers producing and engineering and Neal Avron assisting. . . Maurice White was at Lion Share Recording in L.A. producing Earth, Wind & Fire's album for CBS Records. Paul Klingberg engineered with assistance from Jesse Kanner. . . Pop Flash Productions selected Dodge City Sound in Burbank to record the "Positive Image Awards" presentation honoring Jheryl Busby, president of Motown Records. Among those contributing their talents were Jeffrey Osborne, Stephanie Mills, Bobby Womack and New Edition. . . Producer Larry Robinson was at the Rock House in L.A. with rapper The Real Roxanne, who is appearing as a guest on the next Burt Robinson single for Capitol. Gerry Brown engineered with Donald Jackson assisting. . . Vocalist pianist Michael Feinstein was at Group IV Recording in Hollywood laying tracks for his upcoming Elektra Records release. Hank Cicalo was at the console, with Rick Winqest and Dann Thompson. . . Capitol Records artist Amy Sky was in at Skip Saylor Recording in L.A. mixing her next album with producers Kim Bullard and John Capek. Paul Lani was at the board, assisted by Chris Puram. . . The Record Plant (L.A.) reports a "record" year, with a list of projects including Wayne Newton, Diana Ross and Neil Young. . . Camper Van Beethoven was at Ameraycan Studios in North Hollywood recording for Virgin Records. Dennis Herring produced, C'Saba Petocz handled the controls, and Mark Hermann and Shawna Stobie assisted. . . Luther Vandross was seen tracking new material at Westlake Audio in Los Angeles, with Ray Bardini engineering and Steven Harrison

assisting. . . At Galaxy Sound Studios in Hollywood, French recording artists Passion Fodder finished overdubs and mixing for their fourth album. Engineering was handled by Dan Bates, with assistance from Bill Zalin and Matt Pakucko. Steve Soles produced. . . L.A. Reid and Babyface were at Elumba in L.A. tracking Pebbles' upcoming LP, with Jon Gass engineering and Donnell Sullivan assisting. . . CBS/Epic Records artist Teena Marie was at Summa Music Group in West Hollywood self-producing a project with Bobby Brooks at the faders, assisted by Paula "Max" Garcia. . . At Artisan Sound Recorders in Hollywood, engineer Greg Fulginiti mastered LPs for Rick Springfield with producers Springfield and Keith Olsen, and Randy Newman with producer Lenny Waronker. . . Producer Tim Hauser was at Devonshire Audio and Video Studios (North Hollywood) mixing a project for Manhattan Transfer. Stanley Johnston engineered with help from Larry Goodwin. . . The folks at W.E.C. Recording Studio have been busy tracking Hot Property's album release, with J. Jarrett and Gip Noble producing, Darryl Coit at the controls and Ronnie Cea assisting. . .

In West Hollywood, Larrabee Sound Studio's Taavi Mote mixed cuts for Jimmy Somerville's (Bronski Beat) solo album on London Records. Stephan Hague produced. . .

SOUTHEAST

Nashville's Sound Emporium saw producer Paul Worley and engineer Ed Seay mixing on Warner Bros. artists Highway 101's latest project. . . It was a busy month for Seay and Worley, who were also at Treasure Isle tracking and overdubbing on a project with the Desert Rose Band for MCA/Curb. . . Also in Nashville, George Jones was recording vocals for CBS at Music Mill with producer Billy Sherrill and engineers Jim Cotton and Paul Goldberg. . . Kerry Livgren, formerly of Kansas, finished up tracks on a self-produced instrumental album at The Peach Recording Studio in Covington, GA. . . The Savannah

Producer Taavi Mote (front) and L.A.'s Larrabee Studios owner Kevin Mills at a 72-input SSL G Series console, mixing tracks for Smokey Robinson's latest album. . .



Mass Choir cut an album live on the soundstage at Atlanta's Musiplex, with Larry McDuffie producing and directing the 35-voice choir and band. George Pappas was at the controls and Dale Abbott assisted . . . Bobby Bare mixed his album with co-producer Chet Atkins and engineer Mike Bradley at Soundshop Recording Studios in Nashville. . . . Niko could be heard mixing Kenneth Jackson's forthcoming album at Cotton Row Recording in Memphis. . . . Also in Memphis, The Georgia Satellites were working on their next LP for Elektra Records at Ardent Recording. Joe Hardy produced and engineered, assisted by Tom Laune. . . . Dr. Hook stopped in at New Age Sight & Sound in Atlanta to overdub vocals for their upcoming album. Engineering the session was Joe Wasser. . . . Former Cameo keyboardist Kevin Kendrick recently put down album tracks at Atlanta's Master Sound Studios. The A&M project was produced by Kendrick with assistance from Charlie Singleton. Ron Cristopher engineered the sessions. . . . New River Studios of Ft. Lauderdale, FL, reports that PolyGram Records artist Nestor Torres was in mixing the final cut for his debut release. Engineer Mike Couzzi was at the controls, assisted by Dave Barton. . . . Recent activity at Polymusic Recording Studios (Birmingham, AL) included Michael Panepento and Marc Phillips producing the soundtrack for the upcoming movie *Elvis' Grave*. Panepento engineered the project, while Dan Whiteside handled the Synclavier programming and editing. . . . In Tallahassee, FL, Bonnie Pointer was working on her new album at E Systems Technologies, with Rick Jarvis arranging, Jeff Bowen producing and Dave Engelke engineering. . . . A C Black cut a track for their MCA/Motown CD at Cheshire Sound Studios in Atlanta. Tom Wright engineered the session. . . . At Criteria Recording Studios in Miami, legendary producer Tom Dowd stopped in to oversee demos for Epic Records artists The Groove Thangs. Patrice Levinsohn lent her engineering expertise, with assistance from Roger Hughes. . . . Stevie Ray Vaughan recently returned to Kiva Recording Studio in Memphis to record for Epic/CBS. Jim Gaines produced, assisted by Kiva's staff engineers. . . . Folks from Walt Disney World were at Parc Studio at Full Sail in Altamonte Springs, FL, mixing audio for *The New Mickey Mouse Club* TV show. Dana Salyers produced with Andy DeGanahl engineering. . . . The Crossing was at Musiplex in Atlanta to work on tracks, overdubs and mixing for a self-produced project. George Pappas ran the console with Dale Abbott assisting. . . . Mississippi's newest recording facility, Delta Recording Serv-

ice (Clarksdale), reports that Rooster Blues producers Jim O'Neal and Patty Johnson were hard at work on the debut album of Arkansas singer/guitarist Lonnie Shields. . . . The Goldens were at The Bennett House Studios in Franklin, TN, cutting demos. Blake Chancey produced, Joe Scaife engineered and Roy Gamble assisted. . . . Polaris Recording Studio in Atlanta reports a flurry of activity, with R&B group Yog-E putting finishing touches on their long awaited project and rapper Bernard Holyfield completing his project. . . . Randy Everett, producer with Future Audio of Dallas, flew to Charlotte, NC, to record the Eastway Church of God with Reflection Sound Studio's remote truck. Everett engineered in the truck and back at the studio with Mike Edwards and Jim Perry. . . .

NORTHWEST

In Sausalito, CA, producer/engineer Dan Levitin was at The Plant's new Synclavier room working on keyboard overdubs for Slings & Arrows, which will be mixed by Bob Missbach at The Site (Marin County). Manny LaCarrubba assisted, with Greg Shaw serving as MIDI/Synclavier consultant. . . . A busy guy, Levitin was also mixing Rhythm Riot's second album at Starlight Sound in Richmond, CA, with engineer Ken Kessie and assistant Lynn Levy. . . . Also at Starlight, Arhoolie Records stopped by to work on C.J. Chenier's zydeco album with engineer Mike Coogan, producer Chris Strachwitz, and assistants Ray Floyd and Josh Roberts. . . . At S-R-O in San Francisco, engineer Lisa Baney turned out six 60 minute radio spots for Gallo Winery in one short afternoon, and Phill Sawyer mixed TV commercials for Nally's Stew and Chevron. . . . In Seattle, engineer Paul Scoles and producer Jan Kurtis celebrated the release of the only authentic live Ernest Tubb album in existence. Recorded in 1965 by Kurtis, the album was recently remixed by Scoles at Ironwood Studio. . . . The Celtic rock group Tempest was at Poolside Studios in San Francisco mixing their debut EP, with producer Paul Carlsen and engineer David E. Nelson. . . . Also in SE, the folks at Little Wing Recording were doing all dialog and effects editing for Kinescope Productions' film *Meet the Superberos*. . . .

SOUTHWEST

Joe Ely rolled into Fire Station Studios in San Marcos, TX, to mix a portion of his latest live album. Also, Bo-Dock, Just the Boyz and Ed Gamblin and Northern Lobo recorded tunes for a compilation album (entitled *Flow Like a River*) to benefit Native American youths. . . . Sarah Hickman

was at Planet Dallas with folk artists Mariah to lay down tracks on their upcoming album. Patrick Keel produced with Rick Rooney at the faders. . . . Rooney was also seen at Planet Dallas working on a new release for NYC band The Daylights during their stay in Dallas. . . . Engineer Steve Dady of Rivendell Recorders worked on productions for Rock 'N Learn, with Richard Caudle producing. . . .

NORTH CENTRAL

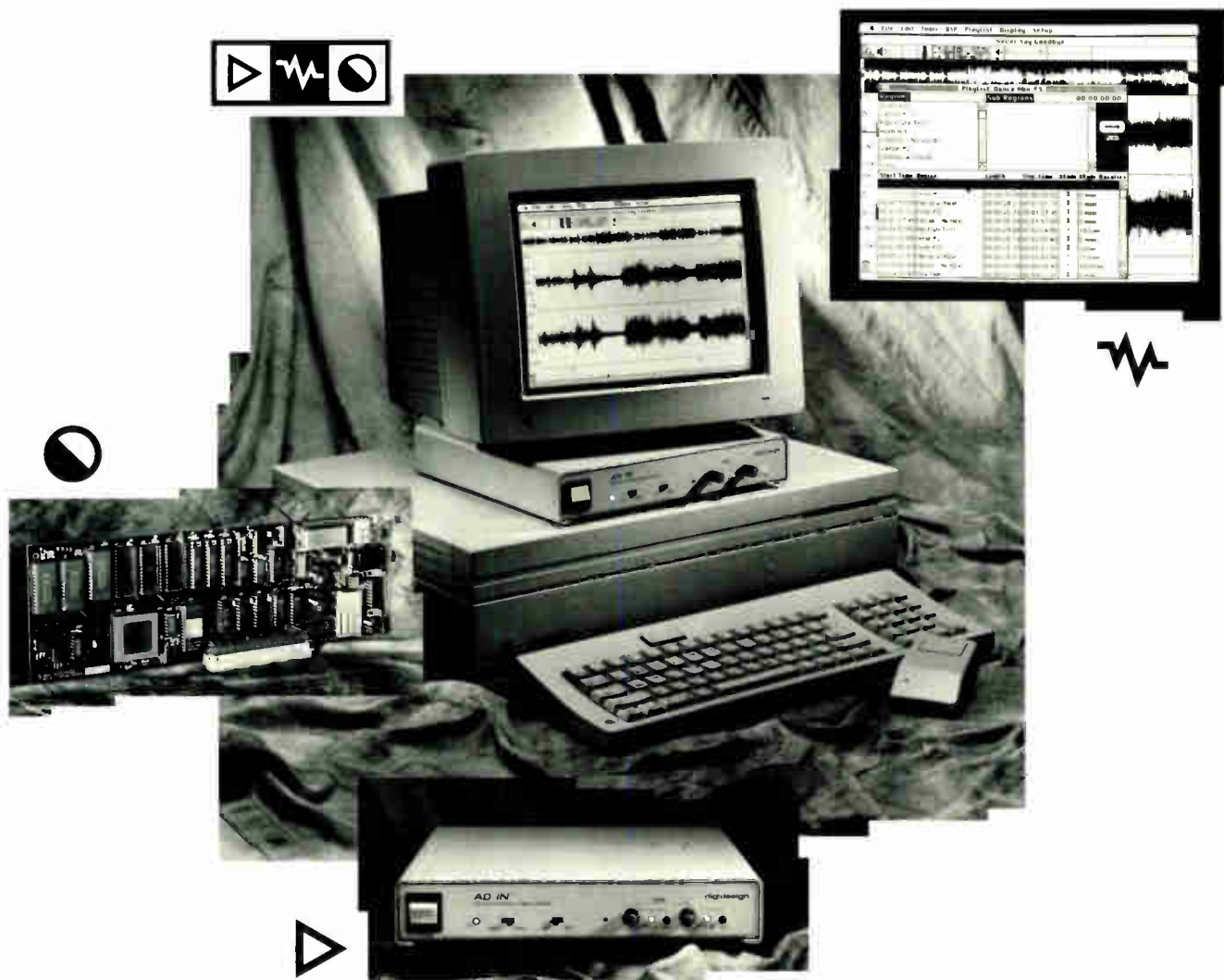
Sandi Patti was at Pinebrook Recording Studios in Alexandria, IN, doing some work on a video that was shot in Dallas during her Make His Praise Glorious tour. Mark Aspinall, Mark Hood and Jeff Aebi engineered. . . . New Chicago band Big Spender headed north to Smart Studios in Madison, WI, to record with producer Butch Vig of Atlantic Records group Firetown. . . . Batmania! Engineers at Paisley Park in Minneapolis were called in to edit the *Batman* soundtrack album and single, "Batdance," while production of the music videos was already underway on the West Coast. They finished the project in record time with a little help from an AMS Audio-File digital hard disk system. . . . Lorrie Kountz and Dawn LaRue took their new band, Surrender Dorothy, into Paragon Recording Studios in Chicago. The recent project, which reflects a harmonic and acoustic twist to their previous heavy metal endeavors, was engineered by George Warner with Andy Casey assisting. . . . Philadelphia native Tamika Patton was at Studio A in Dearborn Heights, MI, laying down vocals for her debut album on Orpheus Records. Eric Morgeson produced for EMP Productions, with John Jaszcz engineering. . . . Grrrr/Ocean recording artists Rez Band were at Tone Zone Recording in Chicago cutting rhythm tracks for their tenth album release, *Innocent Blood*. Twisting the knobs were Roger Heiss and Roy Montroy. . . . Fiction Records' new artist Destry was at Chicago Trax Recording tracking songs for his first album. Dave Sears engineered with Vince Lawrence producing. . . . Georgy Porgy tracked his hot new number, "Girl You Are the One," at Chicago's Scagrape Recording. Peter Black attended to keyboard programming, while Mike Konopka and Haban tag-teamed engineering tasks at the Neotek. . . . Temple of the Dolphins completed tracks for a new age record at Re-fraze Recording Studio in Dayton, OH. Gary King and John Hughes engineered the sessions with help from Pete Mayer. . . .

NORTHEAST

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1989 NOMINEE

guitarist **Doug Munro** recorded his debut album for Real Live Records with **Joe Ferry** producing and **Peter Denenberg** engineering. . . At **Crystal Sound Recording** in Manhattan, producer **Jack Douglas** worked with solo artist **Debra Greenfield** on her new '60s-flavored dance track, "Get Up and Go-Go." Engineer **Chuck Cavanaugh** was assisted by **Beatrice Winkler** on the project . . . Warner Bros. artist **The Skillet Turtles** stopped by **Island Media Services** to remix their new single, "Dog in the Road." **Prince Paul** produced, with **Curt Frasca** at the faders. . . Under the supervision of **Rounder Records**, **Northeastern Digital Recording** has been busy remastering portions of the historic catalog of **Folkways Records**. Already completed are CD masters from such notables as **Leadbelly**, **Phil Ochs**, **Terry and McGee** and **Ella Jenkins**. . . Jamaican singer **Sanchez** mixed *Number One* at **Lion and Fox Recording** in Washington, DC. **Ras Records** produced the project, which was mixed by **Jim Fox**. . . While on tour with the **Doobies**, **The Rainmakers** stopped in at **Trod Nossel Recording Studios** in Wallingford, CT, to record a live-to-2-track acoustic set. **Richard P. Robinson** and **Rob Cavalier** engineered. . . **K.K. Proffitt** was at **Normandy Sound** in Warren, RI, working on her new album with engineer **Bob Winsor** and assistant **Joe Pires**. . . **Murray Elias** was at **Prime Cuts** in New York City working on overdubs for **Sly & Robbie's** *Dance Hall* (Island Records). **Mark Partis** engineered and **Eric Kupper** was on keyboards. . . Singer **Melba Moore** dropped by **39th Street Music Productions** to cut tracks with producer **Gene McFadden** for **EMI/Orpheus Records**. **Ed Douglas** engineered with **Ed Oliveau** assisting. . . New York's **Power Play Studios** was proud to host **Hugh Masakela** and his internationally renowned trumpet. Two tunes were mixed for his upcoming **RCA Records** release. Assisting were **Mike Nucedner** and **Yianni Papadopoulos**. . . In **Richmond, VA**, **Alpha Audio's** creative staff was brought in to record, mix and perform a lively Cajun-style jingle for **Welch's Frozen Fruit Juice Bars**. (Jambalaya-flavored ice cream, anyone?) **Rita Mattia** produced the spot with help from engineer **Joe Horner**. . . Japan's hottest metal band, **Loudness**, locked out the **Neve** room at **Quantum Sound Studios** in **Jersey City, NJ**, to track their latest for **Warner/Pioneer**. **Max Norman** and **Roger Probert** produced, **Bill Freesh** engineered, and **Steve Sisco** and **David Carpenter** assisted. . . Trumpeter **Jon Faddis** took his lively quartet into **The Edison** in **NYC** to record and mix his new jazz album, *Into the Faddisphere*, for **Epic Records**. Engineer **Gary Chester** mixed to 2-

track digital with **Dolby SR**. . . **PSI Recording Studios** (Boston) created a 4-track accompaniment for use by **The Who** during their U.S. tour. Co-engineered by **Vin Parla Jr.** and drummer **Simon Phillips**, the session consisted of restructuring an existing tape with additional sounds from a **Korg M1** onto a **Dolby SR**-encoded 4-track master. . . In **New York**, pianist/composer **Michel Camilo** completed final production of his second album, *On Fire*, at **Clinton Studios**. . . Also in **Manhattan**, at **A&R Recording**, producer **Ruby Fisher** completed editing a **Sovereign Records** album, *Feelin' Good, Yeah*, which features jazz DJ **Al "Jazzbeaux" Collins** and **The Lew Anderson Big Band**. **Marc Fredericks** assisted in production, and **Charles "Chaz" Clifton** engineered. . . **Zanzibar Records** artists **Post Mortem** finished recording their LP *Festival of Fun* at **Alphastar Studios** in **McKeesport, PA**. The album was produced by the band and **Scott Warner** and engineered by **Nuson Gieg**. . . **Force Field's** **David Iglar** and **Shari Richards** recently finished recording and mixing their acoustic-based album, *Unbelievable Where Prohibited by Law*, at **Gamut Studios** in **Latrobe, PA**. **Robin Leachman Baluh** was at the console. . . At **Howard M. Schwartz Recording** (New York), audio mixer **John Alberts** added his expertise to complete the audio post-production for three separate video versions of last spring's Broadway success story, *Barry Manilow at the Gershwin*. . . **Omega Recording Studios** recorded the soundtrack to the **ABC** series *A Man Called Hawk*, featuring a vocal guest appearance by **Valerie Simpson** of **Ashford & Simpson**. . . **Chung King House of Metal** reports nonstop activity with **Def Jam's** *Walking the Panther*, the new **L.L. Cool J** album engineered and co-produced by **Steve Ett** and **Dwayne "Muffla" Simon**. . . At **Iris Sound** in **Royersford, PA**, **Beat Clinic** worked with producer **David Ivory** to complete mixdown of eight cuts for CD release. . . In **New York**, **Island Records** was at **Sound on Sound Recording** tracking basics for guitarist **Marc Ribot's** latest release. **Artie Moorhead** produced the jazz artist, with **Hugo Dwyer** engineering. **Peter Beckerman** assisted. . .

STUDIO NEWS

Another **Sembello** studio? **Mike** and **Danny's** older brother, **John Sembello**, recently opened **Alpha Wave Studios and Production Co.** outside **Philadelphia** in **Edgemont, PA**. . . **Ready or Not Productions** has opened a second video studio in **New York City**, next to the **Apollo Theatre**. Called **On the Spot Video**, the studio is fully equipped for music and dance videos. . .

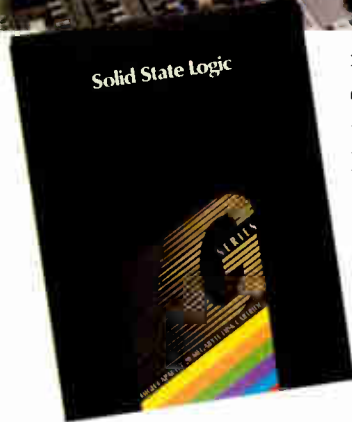
Hatchery Studios in **Warren, MI**, announced acquisition of a 28-input transformerless **Neotek** console with built-in patch bay and 4-band sweepable EQ. Also new are two **Lexicon LXP-1s**, a **Fostex 4030/35** synchronizer and a **Mac Plus**. . . In the **Big Apple**, in celebration of its 20th anniversary, **Electric Lady Studios** has completed the redesign of **Studio A**. A 64-input **Focusrite** recording console is the centerpiece of the **George Augspurger**-designed control room. . . **Body Electric Studios** in **Bolingbrook, IL**, updated their equipment list with a **Fostex 4030** auto synchronizer and **Fostex 4035** synchronizer controller. The system will be hooked up to a **PC** with **Fostex Automated Media Editing** software. . . At the recent **Philadelphia Ad Club Creative Awards** show, **Baker Sound Studios** took four awards in the **Radio** category and swept the **Media Self Promotion** category. The studio is celebrating its 25th anniversary this year and plans to upgrade its facilities. . . The **Music Factory** in **Norristown, PA**, announced installation of a **Panasonic SV-3500** DAT recorder and new **Technics 905** cassette mastering decks in its main studio. . . **Location Recording Service** in **Burbank** added CD submastering to its lacquer mastering facility with the addition of a **Sony PCM 1630** digital processor, two **DMR-4000** ¾-inch recorders and a **Sony PCM-2500** Pro DAT recorder. . . **Dreamhire** (NYC) recently took delivery of a **Sony PCM-3348** 48-track digital recorder. . . New **Atlanta** recording studio **Polaris Studios** purchased the **Casio FZ-10M** sampler, **Roland R-8** drum machine, **Audio Logic** parametric EQs and a **Roland Octapad**. . . **Nashville's** **Sound Emporium** added a **Trident 80B**, two **Tubetech PE-1Bs** and a pair of **Westlake BSSB-10** monitors. . . A **Sony MXP-3036** console and **APR-24** multitrack recorder were delivered to **Lebanon Valley College** in **Anncville, PA**, in an effort to upgrade the college's **Studio B** facility, **Blair Music Center**. . . In the **Soho** area of **New York City**, a new multitrack studio, **The Magic Shop**, has opened its doors. The facility features a custom 40-input automated **Neve** console and tons of outboard gear in an oversized control room, and an acoustically designed live room with 20-foot ceilings. The studio was designed by **Carswell Design** in **Massachusetts**. . . **Prime Cuts Studios** in **New York** has expanded to include 24-track **MIDI** recording and a 12-track pre-production studio. . . In **Bogalusa, LA**, **Studio in the Country** has completely redesigned its facilities. New additions include a 56-input, 48-bus **Neve V Series** console with **Necam 96** automation and moving faders, and a **Studer A820** multitrack recorder with **Dolby SR**. ■

“No one will ever buy a console with a television in it”

Visitor to AES, 1977

It is hard to believe that a modest VDU could attract much attention. Today, even effects processors use visual displays. Why have they become so necessary?

Quite simply, the greater the number of functions in a system, the more flexibility there must be in showing its status. In the recording studio the central piece of creative hardware is the console. To unlock its full potential, Solid State Logic gave engineers digital control of its facilities. The VDU was a side effect of this plan.



In the intervening years our designs were enhanced, incorporating the suggestions of the many leading studios who had adopted our system. Ultimately, the G Series Master Studio System evolved.

G Series offers the fastest execution of complex commands by storing the entire operating program in 2Mbytes of on-board RAM. Its removable Data Cartridges preserve mobility of data, without the capacity limitations of floppy disks. Each cartridge holds 20Mbytes of removable RAM—the equivalent of 80 floppy disks.

Because G Series software represents over ten years of evolution in some of the busiest

recording studios in the world, it incorporates an unparalleled degree of user experience. Advanced facilities like Selective Rollback and Group Set make mixing faster. Rapid comparison can be made between mixes. Large or complex mixes can be handled effortlessly on or off-line.

Throughout, SSL has preserved compatibility with earlier systems, creating a functional standard for the industry. By providing a realistic upgrade path, the investment of studio owners has also been protected. Most importantly, G Series remains at the forefront of audio production technology.

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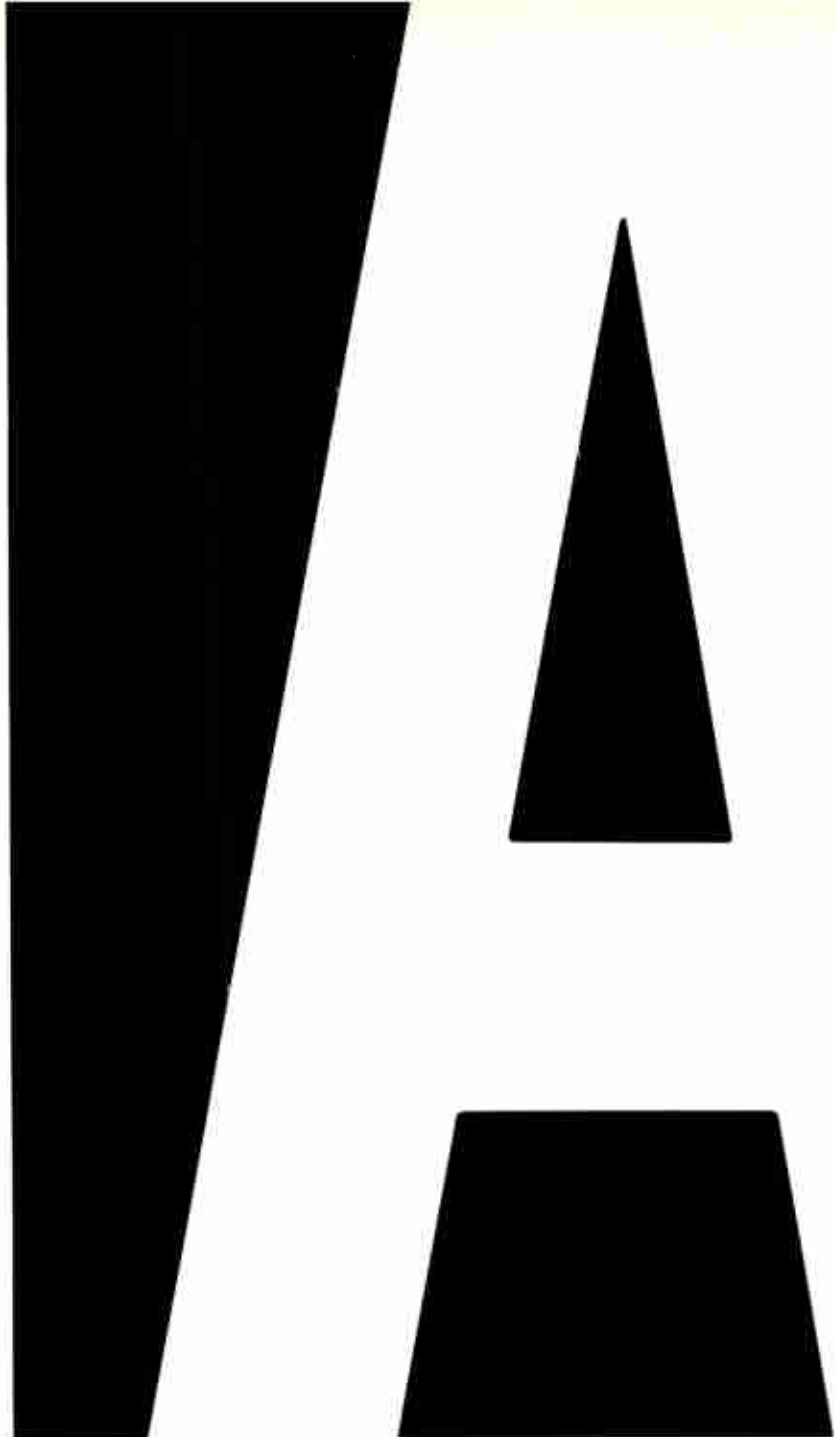
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will get you there. Either way, you achieve sound that'll please even the most discerning ear.

Once again, it's easy to see when it comes to innovation, there's nothing new about the name Yamaha.

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by Stephen St. Croix

I HAVE SEEN THE FUTURE AND IT IS LITTLE

Real little. It seems that as technology grows, displacement goes. Sony has shown its new 555 Diskman; it is essentially as small as its last hyper-condensed model, but with a difference. This CD portable has onboard

Small. Impressive.

I just got a new handheld phone again. I guess my rule seems to be that I should add one to the collection whenever the features double or the size cuts by more than half. I still have my first one, which must be 50 or so years old by now (or was that 50 weeks?). It has a handset with a coiled wire connecting to a transmitter/battery pack that is about the size and weight of a girl I dated in high school.

I looked cool with that phone. They were new, I took mine everywhere and it actually worked. It is probably that phone that got me into body-building, as some course of action was necessary to build up the left side of my body to match the right side—the side that I carried that phone on for a year or so.

Then came my second phone, a true handheld. My previous phone

A study in contrasts: at left, technician in machine room at Capitol Records in 1951; below, the new Studi 01 Synclavier production room at The Plant in Sausalito, Calif.



DSP, giving you compression, EQ, special bass boost and a "surround" stereo imaging of sorts. The control surfaces are scattered everywhere (how many square inches of interface area do you suppose you can *find* on the front edge of a miniature CD player?), and there is even a good-sized LCD display on the top door that shows EQ curves and other DSP modes. Nice.



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suddenly lost its official "portable/handheld" status and became a "transportable" on the day that the smaller handheld came out, according to the literature. I guess the real truth comes out when a manufacturer can afford for the truth to come out (both phones were made by the same company). This thing was amazing. One-fifth the power, twice the performance, all due to advancements in antenna design and conversion to digital cellular service. But by now the thrill was fading; everybody seemed to have some sort of cellular stuck to the side of their heads.

Now comes T.A.C., a new sorta-cellular system that offers phones that *literally* drop into your shirt pocket! That is what this newest one is. It has so many features and cool lights that you can use it as a handheld video game during those long airport layovers when you can't find anybody to call; and it is a phone to boot. Nice. Small. Impressive.

Cars. It's always nice to talk about cars. Today's technology promises to put engines on the public roads with more than one horsepower per 10cc of displacement, at a price less than the previous low-power, overheated heavyweights. Nice. Small. Impressive.

But we are now facing a terminal gridlock situation that is no joke.

In response, highway management committees are busily studying direct-satellite, dynamic cockpit mapping. What? You get in your car and drive around, and without doing anything at all, you show up as a little dot on your own dash-mounted screen. There you are, on a map that shows the surrounding roads. As you drive, the view updates to show new territories that you enter. Nice, but not real interesting to anybody but cab drivers and traveling salesmen (did you hear the one about the traveling salesman whose satellite tracking system failed, so he had to spend the night with...?).

Luckily for the rest of us, the real value of such a system has not been lost on these planning people: as traffic increases, and jams jam, you are automatically shown highlighted, proposed alternate routes to get you where you are trying to go—while avoiding as many jams as possible. You only have to show the system where you are trying to go by touch-

ing your target on the wide-view mode or by calling it up from memory. "Home, same as yesterday at this time," should do it. As conditions change, these escape route suggestions automatically update, and as the system tracks you, the updates are optimized from your current position!

Since it will never again be possible for the highways to be the open roads that we remember from a few years back (the government planners are only trying to slow down the increase in congestion, as they state that it is simply not possible to repair existing roads and build new ones at a rate that can hope to match the growing traffic load), a little help from above might be very welcome if you want to get home from work in L.A. before sunrise.

What does all this have to do with recording? Not much, but some.

We are at a point today where miniaturization can actually help us produce a better-recorded product *just by virtue of the miniaturization itself!*

Electronic miniaturization has benefits that we are already beginning to feel in the studio. Smaller chips mean faster chips. Today's newest 1-micron

technology means that the old electron bump and grind has only one-half as far to go to get any given job done than it did with last year's 2-micron chip. Since this game takes

■ **Electronic miniaturization has benefits that we are already beginning to feel in the studio. Smaller chips mean faster chips.** ■

place at considerably less than the speed of light, and since it may have to be played billions and billions of times before you get what you are waiting for, all of these little jumps add up real fast. Shorter jumps, faster computing—maybe even real-time

FIR equalizers.

Smaller. Smaller means that the internal electrical paths are shorter, as mentioned above. But this has *another* advantage: "coolth." Now I don't mean the newest red Nike high-tops; I mean thermal efficiency.

Since we currently do not make superconducting digital systems, all electrical paths still have some internal resistance. With all other factors constant, the longer the path, the higher the resistance. The higher the resistance, the more energy is converted to heat.

So, smaller chips with shorter paths generate substantially less heat. This means cooler-running chips (now follow along here, it gets real good real fast).

Believe it or not, it is very often the case that the physical size of an integrated circuit is *not* dictated by the actual chip that hides in the center of that plastic spider, but by the need to make the package big enough to be able to dissipate its own heat! But now, with smaller, cooler chips generating less heat, the outer surface area needed to get rid of said heat is much less. This, coupled with smaller head-

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er structures and the new super-small, surface-mount designs, makes for impressively smaller parts in general.

Now it seems we have advantages causing advantages. Smaller chips run cooler, so we can in turn make them smaller still. Right?

This in turn means that the entire product will run cooler, so now the chips can be packed together much more tightly, as there is now less need to provide space for heat-removal airflow around the chips. This means a smaller (and therefore faster yet)

overall *circuit board* layout. (Remember: give 'em an inch and they'll take a while.) Since speed is power, and power is what it is all about, we win.

Oh, yes, all this newfound efficiency reduces the power demands, so power supplies can be smaller. This, along with new concepts in switcher supplies, means that those loud 125-pound linears are but a memory. Again, less heat and less *noise*.

Noise. Did I mention that one of the great causes of noise, if not *the* great cause of noise, in audio systems is thermal junction noise? Well, it is. So even if you have an all-digital system, you must still *convert* to digital

up front. New, smaller, faster, cooler converters have much less junction noise, less current reference noise, less switching noise, and so on, with use of these smaller, faster internal structures.

Let's take a moment to make a quantum leap. We will jump from the micro to the macro. What, you might say, is all this theoretical miniaturization going to do for me? Well, let's take a fast look at the control room. Put all this new, smaller, faster, cooler technology to work in a digital direct-to-hard disk recorder/editor, and add to it a good automated control surface and a suitable virtual environment, and you have a...well, a sort of...well, recording studio. Yeah, that's it, a recording studio. Nice. Small. Impressive.

You have a dynamic, virtual working environment that outperforms all previous recording systems, edits faster and better, yields superior audio quality, is infinitely more powerful and versatile, and (here it comes) is so damn small that for the first time in the history of man, you can work in a room that is designed purely for acoustic reasons, *not* hardware reasons. You won't be forced to work in a space with acoustic properties that are severely compromised by the need to put huge pieces of heavy reflective metal in front of you.

Just think about it—working in a quiet, cool, acoustically optimized room with everything you need virtually at your fingertips. No huge console, no bulky and noisy tape transports, no...well, you get the point. Less space (more working rooms in the same old floor space), fewer bucks (these virtual studios will cost a *lot* less than all that obsolete hardware) and (just to show you that the future has arrived) they will *network*.

This next generation of direct-to-hard disk recorder/editor/DSP machines will literally redefine the recording industry. Your room will work around *you*; you will no longer be forced to work (and listen) around your room.

In fact, we are already at the point where control surface sizes are limited only by the size of human fingers. ■

All you genetic scientists take note: there is clearly a future in engineering smaller people for these smaller virtual environments. Call me when they are ready.



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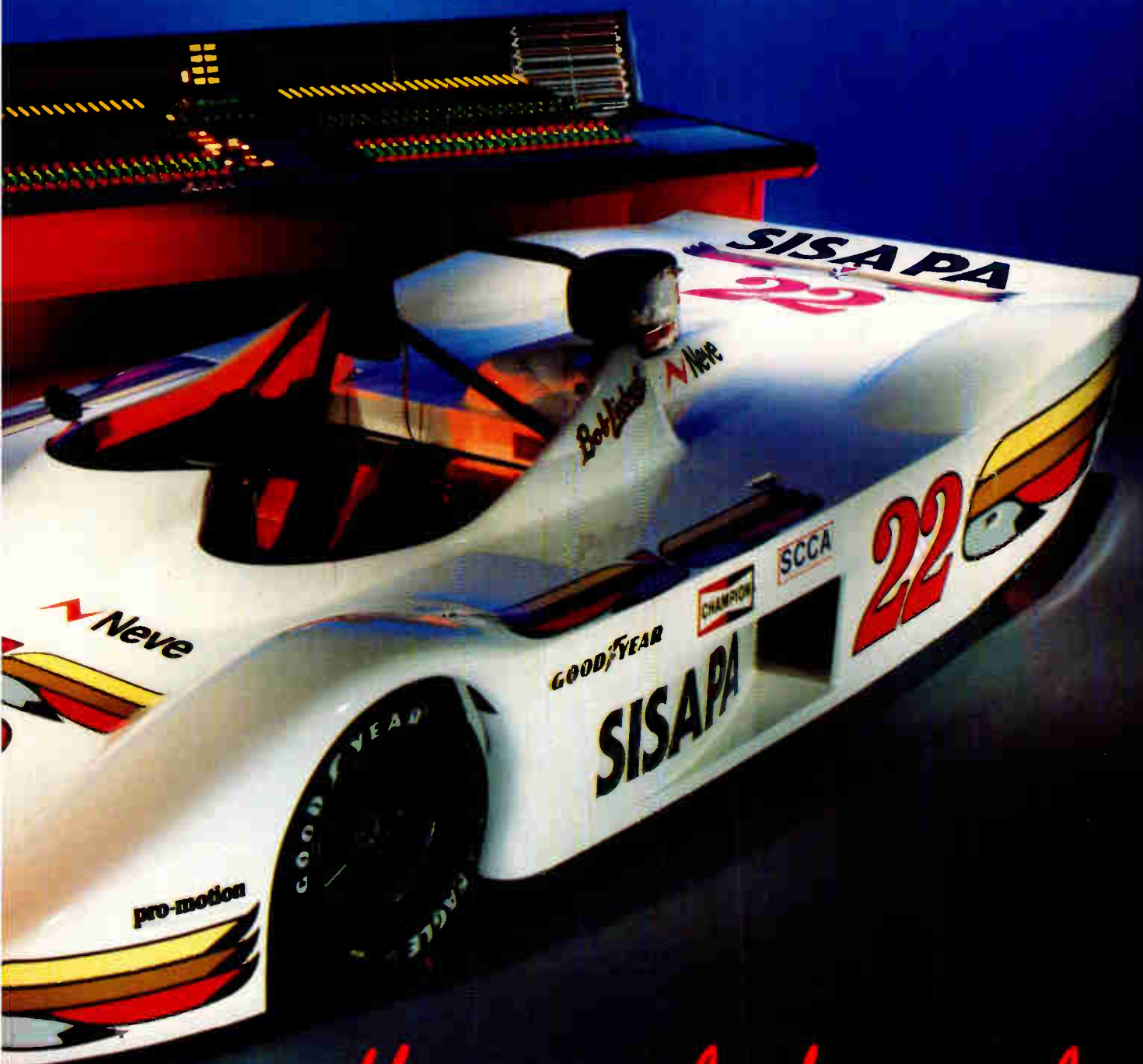
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by Mel Lambert

OUR INDUSTRY AT THE CREATIVE CROSSROADS

AN AES CONVENTION PREVIEW

Conventions are strange gatherings. In the months/weeks/minutes beforehand, manufacturers feverishly pull out all the stops to put finishing touches on the sparkling new hardware from their R&D departments. At the same time, the marketing and sales teams perfect the images that will attract you into the booth and send you on your way with a pleasant memory of the encounter. Perhaps less obvious is the task of developing a strategy for gathering the necessary feedback for the R&D crew, to allow the inevitable process of fine-tuning the "market" needs for products or services.

On a personal front, my antennae at the AES Convention will focus on hardware developments that enable

us to be more creative and efficient in the recording studio and in live sound production. In terms of consoles, I expect to see a widening in the cost/performance spectrum. Analog designs can now be produced extremely efficiently, and they can incorporate circuit topographies whose performance is truly breathtaking. Now that we know how to build a clean-sounding console, I'll be looking for designs that demonstrate a basic understanding of the way that front panel controls should be laid out, with clear labeling, sensible ergonomics and more than a hint of system integration.

With ESbus interfaces now pretty much established as the way to control audio and videotape-based transports, time code synchronizers and



PHOTOS: GEORGE PETERSEN

similar hardware, isn't it high time that a basic controller scheme was developed? I'd like to see an optional command center in the console, to issue the appropriate system wide commands, rather than having to find more space on an already crowded control surface for yet another complex box. And, while we're at it, how about a programmable, multidialect ESAM port, or something similar, that allows for audio-follows video commands?

As more digitally controlled analog designs come to market, I expect a

growing consensus about the number of assignable control blocks that we can manipulate simultaneously (for me, two ain't enough and six is too many; any ideas?). I also expect to see a growing interest in the development of "personality" modules for external control from a dedicated control surface. Why don't manufacturers publish the command protocol for all to see, and hence encourage outsiders to come up with digitally controllable EQ, preamp, dynamics and effects sections? (Who knows, your interface might even be fast enough to support total system control in the studio, thereby allowing the centrali-

zation of more functions from the logical focal point.)

I have always felt that beyond a handful of specific applications the all-digital console has a limited life-



time. In these days of affordable digital workstations, there is little distinction made between signal manipulation and record/replay functionality. If a recording already exists in the digital domain—on tape or a hard drive—then the extended creativity and sheer adaptability of a workstation makes more sense than a hardware-intensive console design.

There are, of course, exceptions—including certain 2-track mixing, EQ and dynamics functions, and multi-channel remixing—where we need simultaneous access to all channel faders, and speed of operation dictates a fixed-architecture design. However, once we begin to see rapid developments in the MIPS-per-dollar war, virtual console designs with capabilities far beyond even today's workstations will sound the death knell for hardware-based digital consoles.

I expect to see one or two innovative developments in analog mastering and multitrack transport designs. Despite the major thrust of workstations, a significant number of facilities will continue to emphasize analog technologies, primarily to satisfy their existing customer base, but also because of the high cost of current systems. We are already taking for granted the fact that microprocessor-controlled transports should offer some degree of auto-alignment potential, if only the recall of stored operating level, EQ and bias parameters for different tape formulations. With RS-232/422 and other serial control protocols now allowing us to streamline machine alignment before a session, how long will it be before the transports can hook directly into the console automation system, and the appropriate setup parameters can be stored and off-loaded from the master computer?

In addition, I expect to see a grow-

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ing trend toward placing more intelligence within the tape machine chassis, so synchronization functions can be integrated within the transport's central microprocessor system, thereby optimizing search-to-cue speeds and lockup times.

Despite their falling cost—at least for last year's models—I foresee the market for reel-to-reel digital tape machines being eclipsed by disk-based systems. Aside from those situations where you need to track a large number of discrete sound elements (during live recording, perhaps, or to lay down several simultaneous mono/stereo/surround mixes and their constituent mono/2-track DME and/or LCRS stems), random-access systems win hands down in both cost-effectiveness and versatility. I expect to see somebody offering a stripped 24/32/48-channel machine without A-to-D and D-to-A converters, to allow fast uploading and archiving of multiple digital sound elements into a central workstation equipped with the hard/optical drives.

I am still attracted to the packing density and reasonable access speed offered by ½- and 1-inch reel-to-reel digital recorders. Until low-cost magneto-optical drives appear, with or without data compression and 4/8/16 real-time archiving modes, we could do better than look at wider applications for existing technologies.

I'd also like to see more information made available about the degradation of digital tape and its projected lifespan under less-than-optimal storage conditions.

Turning to effects processors, I expect to see more digital sound benders featuring direct digital in/outs (at least AES/EBU, although I could live with a "standardized" SPDIF optical port should the idea become reality), and maybe a high-speed control protocol. MIDI is now accepted as a viable way of controlling program changes and other system commands; as long as we can run enough parallel channels from a centralized MIDI-based sequencer following (preferably) time code, real-time continuous changes of parameters can also be effected. Again, I find it bewildering that more console automation systems do not integrate additional information beyond their internally generated fader level, mute on/off and other

real-time and/or snapshot changes. How much number-crunching power would it take to have the master automation processor scan the MIDI ports every video frame, digitize and store the incoming bit stream?

I like what I see and hear from monitor speaker manufacturers. In re-



sponse to what I consider to be a realistic reappraisal of user needs, the major innovators in this market now offer a wide selection of excellent-sounding transducers and cabinet designs, including systems that work well in both the mid- and nearfield. Cable design and amplifier technologies also have advanced by leaps and bounds, and I expect the major players in this market to come to AES with some attention-grabbing offerings.

Now we come to the technology that I consider worthy of greatest examination at AES conventions: digital audio workstations. Although we have witnessed rapid developments in earlier systems, the past six months saw few extensions on the basic concepts. I would say that some designs came to market up to 18 months too early, and only now offer the reliability, user features and system integration capabilities that we need to take for granted.

A year ago in this column, I waxed lyrical about "connectivity" and the need to agree on a logical and efficient way of inputting and outputting digital data to "enhance the system's upward, downward and lateral compatibility." To date, the AES3-1985 Digital Interface Standard has gone a long way in establishing a meaningful, easily implemented hardware format for data exchange. The ongoing work of the new Sub Working Group (now examining input/output interface anomalies that users might encounter while attempting to exchange signals between pieces of digital hardware) is worthy of our support. It would be useful if we all made a point of quizzing manufacturers regarding their awareness of the Sub Working Group's deliberations, and what their experience has been in interfacing to outside hardware. With more complex systems just around the corner, who

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is going to implement MADi for workstations that currently offer, say, more than 16 channels of simultaneous record/replay from hard disk?

I still view with skepticism those workstation designs that center on a "glass console." Even elegant keyboard, trackball and mouse-driven software doesn't cut it when the time comes to adjust a full-on mixing/recording system via a monochrome or color video display. A hybrid Mac-type screen display of system status and overview configurations that connects to a companion work-surface equipped with familiar switch, fader and rotary controls for extracting real-time mixing, EQ, dynamics and other continuously variable data from the user would be more reasonable. I've examined at least three examples of fledgling systems offering such intuitive functionality; it's the only way to go.

I shall also investigate the development of standardized directories and TOC formats for hard disks, optical drives and the emergent magneto-optical recorders. I detect a strong need for our industry to develop a single disk format, so we can exchange large amounts of data from one system to another via removable platters, without the need to transfer the data digitally in real or accelerated time.

All in all, I greatly anticipate the AES Convention. If nothing else, we'll all have the opportunity to play technology pundit. But remember that all this new technology needs to earn its keep. How are you, the users of this gleaming hardware, educating your current and prospective client base about the cost-effective nature of emergent console, tape machine, signal processor and workstation designs?

Nothing will ever replace creative talent in the control room. If a production engineer wants to stay one step ahead, he or she needs to be able to do more than just run the mixing board or roll a trackball. Try to bring yourself up to speed on some other dimensions of life in the technology fast lane, and offer some alternatives for your paying customers. See you in New York! ■

Mel Lambert is the head of Media&Marketing, a high-tech consulting and marketing service for pro audio firms and facilities.

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by Ken C. Pohlmann

DAT, SCMS, CD+G/M AND CD-3

Just when you thought it was safe to summarize the state of affairs in digital audio, they had to go and shake up everything. Over the last month or so, news stories about digital audio have been popping up like crazy, in places ranging from *Billboard* to the *Today Show*, from the *Wall Street Journal* to Paul Harvey's radio show. More than anything, that's a testament to the energy of this new technology and its

ability to confound everyone, especially the experts. The most interesting aspect of the recent batch of news is its win/lose diversity—a clear indication that digital audio is mature enough and big enough to simultaneously enjoy both success and failure.

Perhaps the biggest news is the agreement reached between hardware manufacturers and record labels to at last legitimize sale of consumer DAT in the U.S. The stumbling block, of course, was fear of piracy—an issue that should rightly concern everyone in the recording industry. DAT is a damn good recording

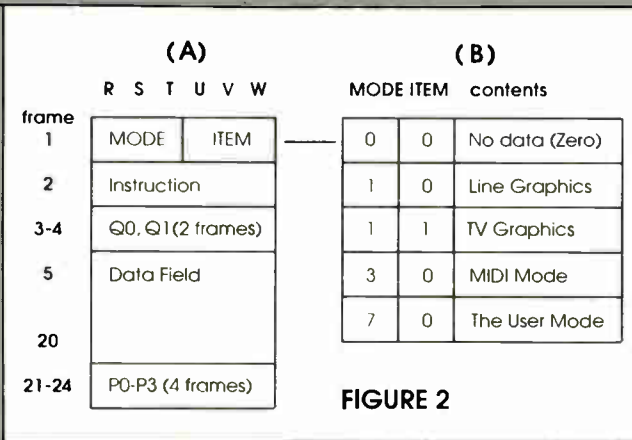


FIGURE 2

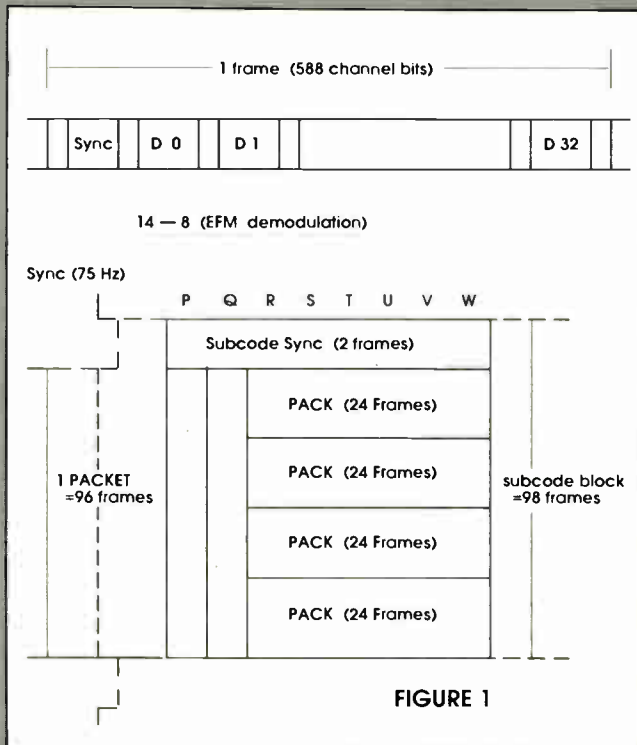


FIGURE 1

medium, and record labels generally agreed to use DAT to draw the line against home recording. Moreover, sales of DAT, both blank and prerecorded, were seen as a destabilizing force in a golden goose market of CDs and prerecorded cassettes. As Karl Marx would never have said, "When you're making billions in profit, why rock the boat?"

But finally, because the pressure from DAT makers was persistent and because recordable CD technology was looming on the horizon, the record industry decided it was time to deal with the problem. Its stall campaign had been entirely successful, but now it was time to set a precedent. The solution to the impasse was a simple technical compromise that has been on the table for years. The SCMS system, proposed by Philips, limits the number of copies that can be derived from a DAT tape. Here's how it works: you can digitally copy from CD or prerecorded DAT (for example) to a DAT, but a copy-inhibit flag is set in the DAT cassette's subcode so that it is impossible to digitally copy from that DAT to another DAT. Thus, an SCMS-equipped DAT recorder allows you to make any number of digital copies from a source, but you cannot copy the copy. That stops the digital chain short. SCMS does not affect analog copying in any way. SCMS is a good solution because it allows a user to make a digital copy of purchased software for compilation of favorite songs, but helps prevent a second party from copying music it never paid for. Moreover, SCMS solves the problem of the absence of the 44.1kHz recording sampling rate on consumer decks. This means professionals could use economical consumer DATs, with their digital inputs and 44.1kHz recording ability, for many applications—but only if the digital copy was not meant to be copied. Previously, there was talk of a tariff on blank DAT cassettes to help defray the cost of anticipated lost revenues on prerecorded music, but the hardware makers strongly opposed this.

Other news along digital audio lines focuses on compact disc technology.

After an early and premature introduction, CD subcode is back with a new name and a more sharply defined mission in life. CD+G and CD+M (known as CD+G/M) are the names for discs encoded with either graphics or MIDI software, in addition to regular audio data. Of course, a special player is required to access this data; apparently the first player reaching the U.S. market is JVC's XL G512BK. It is important that CD+G/M data is stored dig-

with 14 channel bits of subcode; in other words, subcode occupies about 3% of every disc. Following EFM demodulation, the subcode yields eight bits of data, arranged as eight independent channels of data, designated as P, Q, R, S, T, U, V and W. To provide useful information, these channels are accumulated over 98 frames; each 98-bit subcode word is output at a 75Hz rate. Subcode sync occupies the first two frames, so a subcode block con-

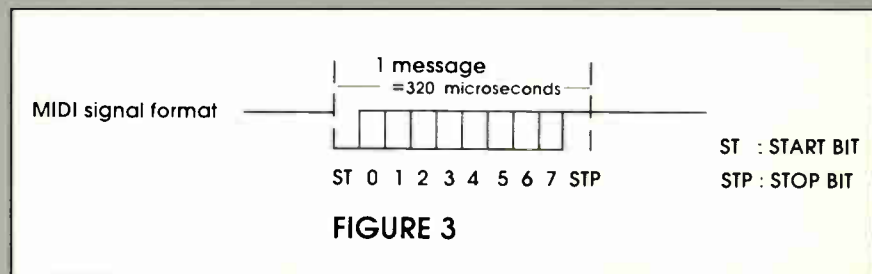


FIGURE 3

itally and uses a universal format independent of television format. Thus, the graphics on a CD+G/M disc are playable on NTSC, PAL, SECAM, etc.

Data on every CD is stored in a frame consisting of 588 channel bits, replayed at a frame rate of 7.35 kHz. Each frame contains a subcode field

tains eight channels with 96 data bits, as shown in Fig. 1. This data block is called a "packet," and each quarter of a packet is called a "pack," which is generated every 3.3 milliseconds. Only P and Q are reserved for audio control information (actually the P code is ignored by players, and only Q is used) such as track numbers, timing, copyright information, etc. The remaining channels, R through W, are used for CD+G/M.

The internal structure of each pack is shown in Fig. 2a. Both Mode and Item switches are three bits; five different Mode/Items are presently defined, as shown in Fig. 2b. Mode1/Item1 specifies TV graphics information, and Mode3/Item0 defines MIDI information. "Instruction" further defines the nature of the "Data Field," and Q and P are error detection and correction codes independent of the audio data's Reed Solomon codes. The player decodes the G/M data separately from the audio data.

The TV graphics mode displays text and graphics with image units called "fonts"; they comprise 6×12 pixel character units. A full screen consists of 50 vertical by 18 horizontal fonts. Outer rows and columns are intended for scroll action and are not visible. Thus the total visible picture contains (50-2)×6=288 vertical by (18-2)×12=

FRAME	R	S	T	U	V	W	
0	0	1	1	0	0	0	: MODE/ITEM
1	0	0	n3	n2	n1	n0	: BYTES n: Number of MIDI bytes
2,3	PARITY Q0, 1						
4	B 1						: MIDI Byte 1
5	B 2						: MIDI Byte 2
6	B 3						: MIDI Byte 3
7							
8	B 4						: MIDI Byte 4
9	B 5						: MIDI Byte 5
10	B 6						: MIDI Byte 6
11							
12	B 7						: MIDI Byte 7
13	B 8						: MIDI Byte 8
14	B 9						: MIDI Byte 9
15							
16	B 10						: MIDI Byte 10
17	B 11						: MIDI Byte 11
18	B 12						: MIDI Byte 12
19							
20							
21	PARITY P 0 - 3						
22							
23							

* Any 12 consecutive packs may contain max. 125 bytes.
* All bits of unused bytes are zero.

FIGURE 4

SOME
LOVE
THE FACT
THAT
THE AUDIO
PERFECTIONISTS
AT TELARC
CHOSE
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- Search with multiple words using "and" "or" & "not"
- Control CDs via interface to Sony CDK-006 jukebox

Effects Spotting

- Manage spotting lists referenced to reel, scene, timecode or feet/frame
- Search, copy & paste from effects catalog to spotting lists

Cue Sheet Printing

- Prints standard re-recording cue sheets in feet/frames or timecode on any size paper
- Shows title, description, ID number, position, fades, handles & internal events
- Allows 96 tracks per premix
- Extensive conformation functions facilitate picture changes
- Multiple fonts & colors

ADR Printouts

- Simply enter basic spotting information once to print standard cue/line sheets as well as a variety of other forms
- Sort and refine before printing to create specific printouts by character or reel
- Transfer spotting information into Cue Sheet program for easy Cue Sheet printing

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192 horizontal pixels. Font data is given a channel number from 0 to 15, and each channel can store individual images. For example:
channel 0: Graphics
channel 1: English lyrics
channel 2: French lyrics
channel 3: German lyrics
channel 4: Guitar chords
channel 5: Rhythm guide

Color is obtained through the use of CLUT (color look-up table), and each screen can display 16 colors from among 4,096 colors, with 4-bit gradations for each primary RGB color. In addition, CD+G instructions can preset a memory with color, preset the border with color, write a font using two colors for foreground/background, exclusive, or a font with two colors, load the CLUT and soft-scroll the screen.

CD+M adds MIDI control conformation to the subcode area for applications such as control of MIDI instruments or other music processors, music minus one, reorchestration by users, printing or display of a score and creation of a personal music database. MIDI messages are sent over any of 16 channels, using the familiar signal format shown in Fig. 3 and adhering to MIDI protocol. The hardware MIDI interface operates at 31.25 ($\pm 1\%$) kilobaud, asynchronous, using a start bit, eight data bits (D0 to D7) and a stop bit. This makes a total of ten bits for a period of 320 microseconds per serial byte. The start bit is a logical 0 and the stop bit is a logical 1. Bytes are sent LSB first. Communication uses multibyte messages consisting of one status byte followed by one or two data bytes (real-time and exclusive messages excepted). All common MIDI messages such as note off, note on, polyphonic key pressure, control change, program change, channel pressure, pitch bend, and system common messages and system real-time messages are all supported.

MIDI data is recorded into CD subcode using the same data packs as in CD+G, with MIDI data arranged in bytes 0 through 12 within packs, as shown in Fig. 4. To maintain the baud rate specified by the MIDI standard, 12 consecutive packs may contain no more than 125 MIDI bytes. If playback on equipment with up to +12.5% pitch bend is used, it is recommended that the data be limited to a maximum of

110 bytes in any 12 consecutive packs.

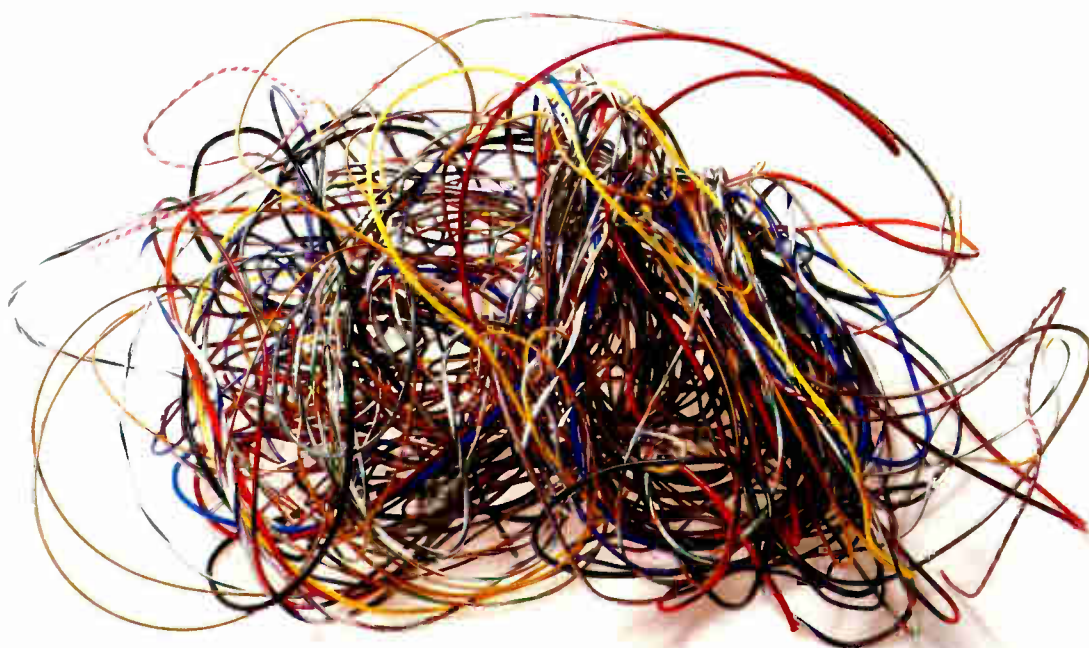
CD+G/M players have a variety of outputs, including video, S-video, MIDI out and, of course, audio. European versions will have a Euroconnector for digital RGB output. Clearly, CD+G/M is a "value-added" kind of feature; few people would buy a CD player for these options alone, but they do enhance a CD player's desirability and utility. One thing is for sure: if CD+G/M catches on, it will serve to further integrate professional audio with the video and MIDI industries, providing more projects for everybody.

An SCMS-equipped DAT recorder allows you to make any number of copies from the source, but you cannot copy the copy.

One CD format that never provided much work for anybody and will now provide none at all, is the CD-3 format. This cute little disc was supposed to compete against the 45 rpm disc and the cassette single, but was not successful in the record stores. Perhaps people thought short-play, regular CDs served the cause better, perhaps the young segment of the market buying those products just hasn't discovered CDs yet. At any rate, despite very strong sales in Japan, CD-3 was officially abandoned in the U.S. market by all concerned, including Sony, its strongest proponent. CD-3 thus becomes the first real casualty of the CD phenomenon, and earns the particularly unenviable acronym of CD-3-RIP. ■

Ken Pohlmann is author of The Compact Disc: A Handbook of Theory and Use and Principles of Digital Audio, both available from Mix Bookshelf with no strings attached.

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From
**CARUSO
TO HENDRIX**
*A Brief History
of the*

NEW YORK

by Dan Daley

Jim & Andy's was where musicians went in between recording sessions in New York in 1958. This restaurant and bar, situated on West 48th Street at Sixth Avenue, held messages, ran tabs, cashed checks when the bank wouldn't and basically made life a bit more bearable for musicians. And A&R Studios was right upstairs, so the jukebox got all the records from the studio before they were released.

Those were heady times in New York for the recording industry. The 1940s had seen the rise of major label-owned studios, and the eclipse of these grand rooms, like Decca's Pythian Temple, Columbia Studios and Capitol, paved the way for a slew of independents. Rock and roll fans were demanding records by the dozens, and everybody was talking about another passing fad: stereo. With the advent of multitrack, Local 802—alarmed at the dangerous practice of overdubs—stationed enforcers in

studios to ensure that if one player was needed, the whole orchestra was paid.

Looking further back, opera singer Enrico Caruso and RCA founder General David Sarnoff supposedly opened a recording studio in Camden, N.J., in the early 1930s. It may well have been the country's first dedicated recording facility (although New Yorkers have trouble awarding New Jersey primacy in anything except noxious odors and questionable driving habits). Nonetheless, it points up the fact that the New York studio world extends beyond Manhattan. Rudy Van Gelder built a seminal jazz studio in Englewood, N.J.; today, jazz studios as the Sandbox and Carriage House in Connecticut, and House of Music in New Jersey, can be considered part of the larger New York scene and its history.

But Manhattan is where the groundswell began and where it continues. RCA's facility on East 24th Street moved to 1133 Sixth Avenue (Avenue of the Americas) in 1967. Decca's Pythian Temple, Capitol Records' 46th Street studio, Columbia's famous East 30th Street facility and RCA's "satellite" facility, Webster Hall in Greenwich Village, are all gone now, victims of developers and economics. In these rooms the big bands made their records—live and in glorious mono. Quite often the mothers for the pressings were created in the same places where the recordings were made.

If you disregard the end of the Great Depression and the onset of World War II (which is possible if you squint hard and drink a *lot* of bourbon), it was a comfortable time for the major labels. Their own acts were recorded in their own studios, produced by staff producers and engineered by

Way back when at Webster Hall, an engineer (name unknown) runs an early rotary-knob console, sometime in the early '60s.

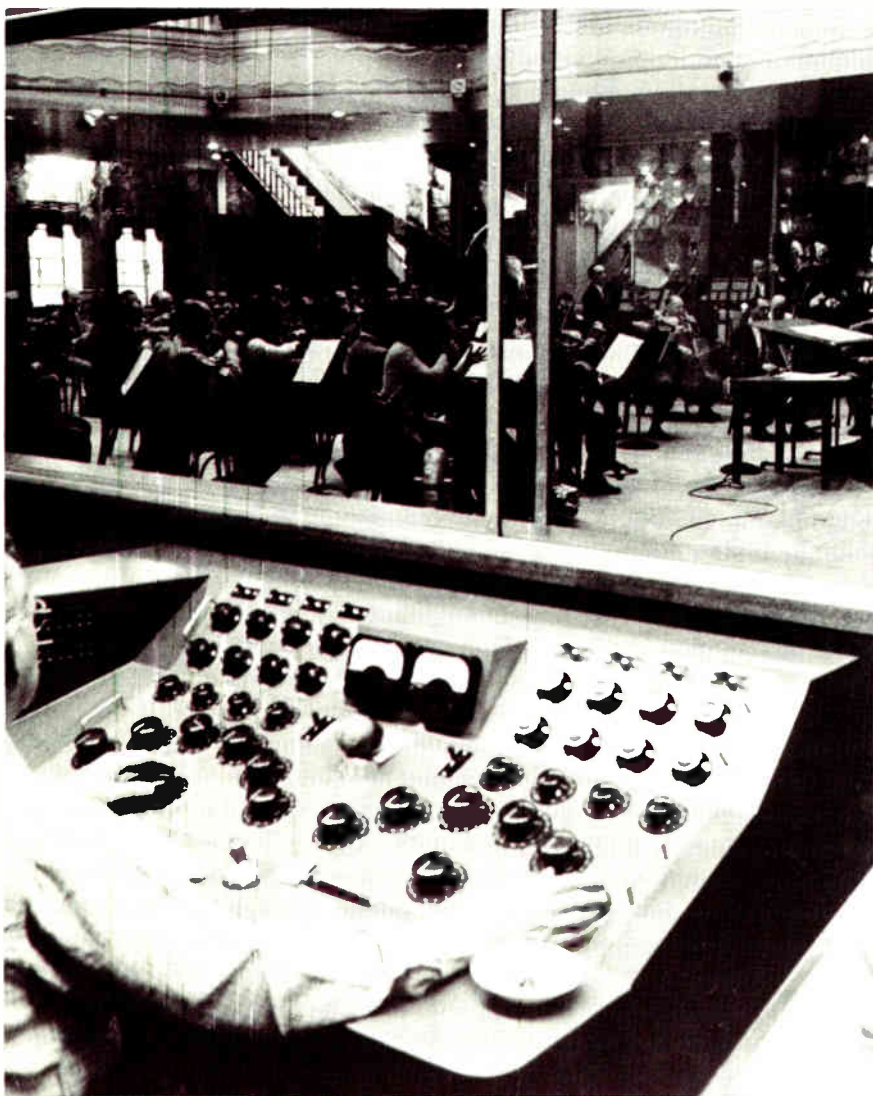


PHOTO: JOHN WORAM

RECORDING SCENE

staff technicians. Any spillover was farmed out to other label-owned studios in the way Hollywood film studios traded stars.

The only competition—if you could call it that—was from radio stations. WHOM, WNBC, WOR, WABC and WCBS all had house orchestras, which meant a plethora of gigs around town available to musicians. The stations also hired technicians to venture out with the weighty recording equipment of the time to handle remote broadcasts and recordings in the ballrooms of the hotels that were part of the Manhattan landscape and lore. (Actually, the labels did the same—Capitol had a lease on the Barbizon Plaza Hotel ballroom and recorded Fred Waring and Stan Kenton there, among others.)

These same radio stations laid the groundwork for the rise of the independent recording studio; i.e., independent of label affiliation. Some radio stations began doing jingles for other stations on electrical transcriptions on wax, the precursor to tape, and the realization began to take hold that New York's booming music market was getting too big for the status quo.

One pioneer was the late Fortune Pope, who owned WHOM, New York's premier Spanish-language radio station. By all accounts Pope was a character (a condition apparently inherited from his father, who once gave New York Mayor Jimmy Walker a check for \$1 million and later described it in a judicial hearing as "just something that was in my pocket"). Fortune Pope also owned a cement manufacturing plant, which may have been of interest to certain organized crime types Pope was reputed to associate with; one story tells of Pope walking alongside mobster Frank Costello as a spate of bullets ventilates Costello's fedora.

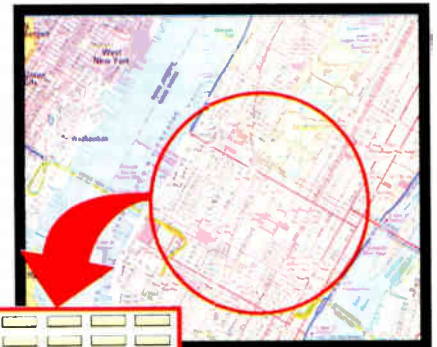
Pope opened Coastal Recorders in 1953 on W. 52nd Street, and it was

one of the early successful independent studios. He later bought Fulton Recording at 80 W. 40th Street. Known as Coastal Times Square, this second Coastal room was a favorite of early rock acts. Bill Haley, Patti Page and then-engineer Tom Dowd all worked there, and the seminal rock track "Sh-Boom" was recorded there. Bob Daugherty, who later produced The Carpenters and similar acts, started there. Many of Atlantic Records' "race records" were recorded in the large, ambient room at Coastal, as were many jingles. The room boasted a past other than music—it was originally a penthouse apartment used by publisher William Randolph Hearst and actress Marion Davies. Coastal Times Square later became Olmstead Sound, owned by Dick Olmstead.

At one point, Coastal operated in

three locations simultaneously; the third was the Audio/Video studio at Fifth Avenue and 57th Street. This room became National Recording in 1959. (Audio/Video opened in 1949 on Broadway and in 1951 moved to 730 Fifth Avenue. In a time when acetate was a leading format, A/V went to tape early on and for a short while was the sole Ampex franchise east of the Mississippi.)

In 1959 Coastal engineer Al Mirchin (with partners) bought the 52nd Street



Midtown Manhattan



1. A&R Studios, original location
2. Fulton Recording/Coastal Times Square, later Olmstead Sound
3. Coastal A/V Studio, later National Recording (until '81)
4. Fine Sound (now Parker Meridien hotel)
5. National Recording (since 1981)
6. A&R's second facility (opened '67), now Columbia Studios
7. Hit Factory (since 1975)
8. Hit Factory/Times Square (site of former Chelsea Sound)
9. Mediasound (opened 1968)
10. Power Station (opened 1957)
11. Atlantic Studios (opened 1957)
12. Record Plant (opened 1968)
13. JAC Studios (opened 1954)

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Coastal and turned it into Aura. Later, in 1972, they also bought the former Allegro Studio and turned it into Generation. In a play characteristic of New York real estate machinations, Equitable Life Insurance Company showed Mirchin how to *really* make money in the studio business, by making him an offer he couldn't refuse: they bought the building that housed Aura for a hefty sum. After Mirchin sold Generation, he bought and now operates a hotel in Haiti, perhaps an indication that voodoo economics works in New York.

Bob Fine's Fine Sound opened with two rooms in 1951 at 711 Fifth Avenue, then moved in 1959 to the Great Northern Hotel at 118 W. 57th, where the Parker Meridien Hotel now stands. A pioneer in recording techniques including stereo ping-ponging, Fine used the hotel's penthouse, ballroom and catering hall for studios. A 2-channel Gates console modified by Fine became New York's first stereo board, according to Bob "Red" Eberenz, an engineer there for many years who now runs Magna-Tech. Fine's film work led him to use 35mm film stock as a recording medium in many cases, and Eberenz maintains that film is still superior to analog audio tape because of its lower S/N ratio and absence of print-through. Fine, who died in 1984, also proposed 1/4-inch videocassettes, but lost out to the 1/2- and 3/4-inch formats.

INDEPENDENTS

In the late '50s, as rock and roll established itself, independent studios blossomed. In the '40s, 78 rpm singles generally preceded the 10-inch LP. But in the '50s and '60s the advent of the 45 rpm single and the concept of making the 12-inch LP first, then releasing multiple singles to promote it, meant a tremendous increase in the need for recordings. All these recordings received more airplay as more radio stations opened up. The cycle had begun.

The major label studios were not positioned to react quickly enough; they had union employees and those contracts were economically and ergonomically constricting. The independents had no union contracts and considerably lower overhead (this was prior to the real estate madness that envelops New York).

Bell Sound, owned originally by Al Weintraub, started out doing radio air

checks in 1950 from a one-room basement in Chinatown. According to Dave Teig, presently studio manager of Servisound and Northeast coordinator of SPARS, Bell's Magna-Tech deck was lugged around for weddings and bar mitzvahs until a less transient facility opened in 1952, uptown on 89th Street. There, Tito Puente, Frankie Lymon & the Teenagers and Mahalia Jackson cut tracks. A year later Bell moved to W. 46th Street and "came to civilization," as Teig puts it. Buddy Holly & the Crickets recorded there. In 1958 Bell landed on W. 54th Street with three studios and five editing rooms; it was later sold to the Viewlex Corp. For a brief time before closing in the late '70s, Bell was the country's largest independent studio.

Blues in the '40s centered around the old Belltone Studio in the Hotel Walcott, located in the East 30s, according to songwriter Doc Pomus. R&B found a home at Coastal Audio/Video, where engineer Hal Lustig worked nights and weekends (the fact that R&B dates tended to pay cash didn't hurt). Lustig also hired New York's first black staff engineer, Mack Anderson, to work at the stu-

dio, which by then was named National Recording. Lustig became an owner of the facility and in 1981 moved it to its present location on W. 42nd Street.

Toward the end of the '50s, places like United Recording, Herb Moss' Gotham Studios and Bob Liptin's Regent Sound Studios were regular stops for many of New York's working musicians.

A&R Studios is perhaps most emblematic of the boom days of the late '50s through the late '70s. It was founded by Phil Ramone and Arthur D. Ward in 1958, and NBC Radio mixer Don Frey came on board in the early '60s. Originally located at W. 48th Street and Sixth Avenue, A&R had one big room and one smaller. Artists such as Connie Francis, Ray Charles, Leslie Gore and Ruth Brown—Atlantic acts who preceded Atlantic's own studios—recorded there. Producers Quincy Jones, Creed Taylor and Neshui Ertegun also worked there, and Tom Hidley was its maintenance engineer.

In 1967 A&R opened a second facility on W. 52nd and Seventh Avenue (now the Columbia Studios site), the same year RCA Studios

Mediasound, a.k.a. "The Church," circa 1969; senior engineer Joe Jorgensen, president Harry Hirsch and senior engineer Fred Christie.



opened on Sixth Avenue. A&R built a new control room (designed by an ABC broadcast engineer, a last link with the past) overlooking the huge film stage recording room. There, A&R went from 8-track to 24-track by 1969. The Four Seasons recorded there, engineered by Roy Cicala, who later went on to buy Record Plant Studios. Peter, Paul & Mary and the Young Rascals were among the newer acts using the rooms. Today, the facility at 322 W. 48th still functions, though the 52nd Street facility closed in 1984. Ramone left in the early '80s to pursue his career as an independent producer.

Columbia's studios operated at 799 Seventh Avenue, while its E. 30th Street studio (located in what was once a church) worked with the

Broadway show cast albums that its large interior enticed, along with such recording artists as Simon & Garfunkel and Frank Sinatra. The church, built in the early 19th century by a German designer famous for his acoustical work, was designed so the minister's voice could be heard anywhere in the room. Columbia used it from the '40s until its closing in 1983, at the same time shutting two of the 52nd Street rooms for economic reasons. The 30th Street structure was sold to a private developer who knocked down the church and built an apartment building.

Songwriter Jerry Ragavoy opened Hit Factory in the '60s on W. 48th Street. Eddie Germano bought Hit Factory in 1975 and moved it to W. 54th Street, where it stands today.

Germano, one of the original Record Plant owners, built four rooms there and added two more to a satellite facility on 42nd Street, site of the former Chelsea Sound.

Mediasound still occupies the premises of the old Manhattan Baptist Church on W. 57th Street. Founded in 1968 by Harry Hirsch, Bob Walters and partners, Media has true cathedral ceilings with a 2,000-square-foot main room and a film room with an organ loft. The Media mail room spawned Mike DeLugg, Bob Clearmountain and Tony Bongiovi. Michael Hektoen bought Media in 1983.

Tony Bongiovi and Bob Walters started Power Station in 1977. Mediasound alumni, including Clearmountain and chief electrical engineer Ed Evans, came along. Power Station helped resurrect the live room concept that once dominated New York studio design, before the dead room effect swept in from California during the '70s.

Atlantic Studios occupied the same site on Columbus Circle from 1957 until its recent closure [see *Mix* September 1989 "Current"]. Before that, Atlantic operated a 2-track room elsewhere in Manhattan. Atlantic Studios—Ahmet and Neshui Ertegun's jewel—handled all the rock and R&B classic acts that built Atlantic Records over the last four decades, including Aretha Franklin, The Rascals, the Bee Gees and George Benson. The first studio in New York to go 8-track, it contained two main studios, a mix room, a Synclavier room and nine duplicating/mastering rooms. (Atlantic remains something of an anachronism—it still handles mastering and disc cutting for Atlantic Records, much as studios did years ago.) General manager Tony O'Brien attributes Atlantic Studio's 32-year run to a combination of piecing together appropriate technology and the vision of the Erteguns.

Jimi Hendrix originally wanted Electric Lady, on Eighth Street in the Village, to continue existing as a nightclub when he bought it. The building had housed the Generation Club and before that, the Village Barn, a big-band dance venue once owned by Rudy Vallee. But Hendrix's associates conducted a feasibility study, found that his block-booking practices at Record Plant cost staggering sums and determined it would be more cost-effective to simply build his own studio.

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Hendrix bought the Village building for \$50,000 in 1968 and initiated the trend of artist-owned studios. Architect John Storyk was brought in to design the room according to Hendrix's main directives: make it comfortable and make it round. The initial \$350,000 construction budget ballooned to over \$1 million by the studio's completion in August 1970. Storyk's structural design featured gently curving, solid concrete walls, which helped buffet the sound from an adjacent movie theater and subway line. But that was nothing compared to the construction crew's 1968 "discovery" of the underground Minetta Creek spring, which flooded the room. The aquatic nightmare sent Storyk back to the drawing board, and to this day three types of pumps—electrical, mechanical and manual—are always working or at the ready.

Phil Ramone and Bob Hansen were brought in to Electric Lady as technical consultants, and chief engineer Eddie Kramer oversaw Electric Lady's development into a state-of-the-art studio, including the implementation of what Kramer asserts was the first 24-track setup. Sixteen tracks were all

Hendrix ever worked on at his studio; however, less than a month after Electric Lady opened on August 27, 1970, Hendrix died. The tragedy initially caused financial havoc at the studio. "No one wanted to use it at first," Jim Marron, president of Electric Lady from 1968 to 1972, said in an interview several years ago. "It was like going into Jimi's living room after he was dead—it was *his* studio, after all." But a massive block-booking by Stevie Wonder saved the day. In 1977, current owner Alan Selby bought Electric Lady from the Hendrix estate, and a recent \$2.5 million renovation has left intact two Hendrix legacies: the psychedelic Lance Jost mural in Studio B's foyer and the purple carpet on the wall.

If Electric Lady's inception pulled Hendrix from Record Plant, there were plenty of other stellar names working that venerable complex, including The Who, Aerosmith, Kiss and John Lennon. Record Plant was opened as an 8-track studio on W. 44th Street in 1968 by Gary Kellgren, Chris Stone and Enke Johnson. In 1969 it was sold to Warner Communications. Roy Cicala began at Record

Plant as an engineer in 1970, and two years later he bought the studio and upgraded it to 16 tracks. (The short-lived quad recording format was also added.) In the early '70s, 24-track was implemented.

It was at the New York Record Plant that Chris Stone began experimenting with his "Living Room" atmosphere, which he transplanted to the Los Angeles Record Plant in an attempt to create an environment conducive to all-night sessions. Cicala later tightened the loose vibes, according to songwriter Lori Cicala, whose records Roy Cicala produced there for years and who now operates the studio with her ex-husband, John Lennon virtually set up shop in Record Plant, using it as a refuge during his turbulent times. Record Plant still displays the "world's largest acoustic guitar" (strung with piano strings) that was a gift from Lennon (Cicala had the 12-foot, 6-stringer built, then presented it to John after a session in which the musician demanded "a *big* guitar sound"). The studio also displays the Mellotron that Lennon played on *Sgt. Pepper*.

—CONTINUED ON NEXT PAGE

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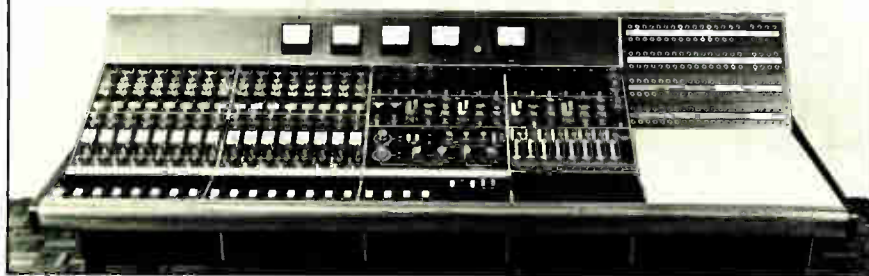
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The true meaning of "pre-fader": a Neve console, circa 1973.



EQUIPMENT

"Recording studios felt secure in the '30s and '40s because their engineers built all their own equipment," recalls Don Frey, formerly of A&R and now with BMG (formerly RCA) Studios.

According to Gene Cattani, who's spent over a quarter-century at RCA's various studios and manages the present one, "At RCA on 24th Street we had two rooms and 18 maintenance engineers, 12 of whom did nothing but build equipment. All of us independents would drool over the equipment that the major label studios could afford. We would go over to Columbia Studios [on E. 30th Street] and just sit there looking at it."

Later, in the '60s, the tables turned somewhat when the major label studios—technologically neglected as the independents garnered much of the decade's rock and roll work—looked to those independents to point the

way toward the equipment of the future. Of course, they still had the battleship budgets. "If we bought a Pultech equalizer, they bought ten of them," says Frey. "But more and more, the independents were being relied on by the equipment manufacturers to determine trends."

Early consoles were radio desks, like the modified Altec FM radio console at A&R, or you built your own, like the one built by the construction department at CBS' 30th Street room. As dedicated recording desks became available, the Langevin console was an early favorite. It was a mono desk with a wire-wound rotary knob where faders are now. But Electrodyne was considered the first dedicated recording console used in New York. Then MCI moved to the front of the pack in the late '60s. Bell Sound built its own consoles, too. In 1958 Bell was the first facility to

implement a solid-state console—20 inputs, no waiting.

Tape decks developed their own mythology over the years. Frey says that 24-track recording originated with Bob Goldman of Mira Sound, who during the early '60s picked up a pair of old Ampex 2-inch video decks and asked the company to fit them with audio heads. (The claim to 24-track primacy is made by a number of studios.)

Nonetheless, mono was king prior to the '60s. In those days you did three or four songs in three or four hours. According to Frey, those were the days of the "union cops" who guarded against dreaded overdubs, which back then were done with two mono decks. The orchestra was recorded to the first deck, then that track and the live vocalists were sent directly to the second machine, mixed live.

(Local 802 of the American Federation of Musicians was a powerful force in New York throughout the '40s, '50s and early '60s. You did it their way or you didn't do it at all. But the advent of rock and roll and self-contained bands eroded 802's influence on contemporary music, and the Local spent the next two decades wishing rock would "just go away," in the words of one union official. It didn't, and despite 802's half-hearted rapprochement attempt a few years ago, to this day Local 802 is considered a joke—if it's considered at all—by many New York rock musicians.)

Irv Joel, who was chief engineer at A&R and earlier worked at the old Capitol Studios, says he introduced stereo recording to Capitol. In 1956 he prepared a demo to illustrate dual-channel recording to the corporate powers, but found the response chilly. The irony of the high-level resistance, however, lies in the fact that EMI, a leader in stereo recording's development in the early 1930s, had recently purchased Capitol. Joel's earliest efforts involved a pair of X-Y microphones into an Ampex 352 deck, essentially a standard Ampex 351 mono deck outfitted with an extra set of electronics to achieve stereo. The recordings were made through a pair of RCA OP-7 radio consoles. Joel (who currently owns an audio consulting firm) and engineer Tom Dowd also dabbled with a Magnacord "staggered stereo" deck, which Joel recalls as "a bit of a nightmare."

Maintenance also became impor-

Tapes a'duping at RCA's East 24th Street facility, which closed in 1967.



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tant, due to the large-scale introduction of the transistor and the proliferation of new equipment it spawned. Where studios had once supported staff engineers, they now supported staffs of technologists to care for the increasingly complex, "store-bought" equipment.

Multitracks came in a dizzying array of formats during the early '60s. Bell Sound started out with a mono Magnacord and moved up to an Ampex 2-track in 1955. Bell went through 3-track, 4-track and finally to Ampex 1-inch 8-track before Mort Fuji, then Ampex's chief engineer, developed the first 2-inch machine at Bell—a 12-track deck. Like virtually all other major rooms in New York, Bell's 16-track led to 24-track by the early '70s. Mediasound also began its life as a 12-track facility. And you think there are format headaches today?

INDEPENDENT JONES AND THE RAIDERS OF THE LOST ENGINEER

"Back then, engineers were made of somewhat sterner stuff," says Irv Joel. Considerable electronic moxie was required in an era when so much equipment was quasi-experimental

Throughout the '50s, the individual sound of a studio depended less on the equipment than the engineer.


(and considerably simpler). The mid-to late-'60s saw the rise of the independent engineer, a natural outgrowth of the spread of independent studios and very much a New York phenomenon. Despite its huge population, New York was (and is) a small town in many ways, and whole new vistas for engineers could open up by simply crossing Broadway.

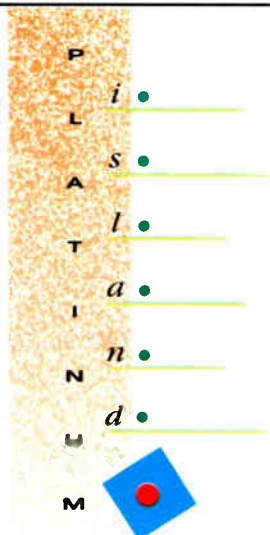
Throughout the '50s, the individual sound of a studio depended less on the equipment than the engineer.


The staff engineer became the architect of a studio's sound, aided by the acoustic qualities of the room. Studio owners were rather possessive of their house engineers, but the rise of another phenomenon—the independent producer—inevitably led to producers taking certain engineers along when they worked at other locations.

Names like Bob Fine, Bob Liftin and Phil Ramone, all engineers whose personnae intertwined with their facilities, gave way to names like Mike DeLugg, Bob Clearmountain and Shelly Yakus, who used Mediasound, Power Station and A&R as springboards to launch independent careers.

One technologist who could serve as a model of the early independent engineer is Harry Hirsch. Hirsch started JAC Studios (located next to the Plaza Hotel) with Charlie Layton in 1954. A young Phil Ramone learned his editing chops there, according to Hirsch. Jingles and jazz were the studio's mainstays; Altec mixers were ganged up to make a console. No EQ, just level. In 1956 a 24-input Langevin was added to go with the Presto tape decks as JAC got into film work.







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APC 11000

After several years, Layton and Hirsch parted company. Following various engineering and musician gigs, and a stint as a travel agent, Hirsch met Bob Walters in a band. Hirsch and Walters, along with John Roberts and Joel Roseman, opened Media-sound in 1968. Hirsch designed much of Media and engineered there as well.

Hirsch wandered again in 1973, and three years later opened Sound Mixers in the famed Brill Building located on Broadway, midtown. After the Great Disco Disaster of 1980-1981, Hirsch sold his stock and built GRP Records' corporate studio for owners Larry Rosen and Dave Grusin. He later built Sound Tracks on E. 21st Street.

Hirsch also had a brief fling as dean of the audio division at the Center for Media Arts (which still produces many of New York's several billion assistant engineers each year). He now runs a consulting company called Digital House, Ltd.

OUTBOARD GEAR

Outboard gear from the '30s through the early '70s consisted mainly of chambers, plates and ashtrays. Although ashtrays probably were used more often, the chambers and plates generally produced better reverb results. "The closest thing we had to a plate was a Hammond reverb chamber," remembers Dave Teig of Servisound.

New York has no shortage of hallways, which served as early echo chambers for countless sessions (and still do, for purists). You might be able to approximate a Brill Building stairwell in a 480L, but it just isn't the same without the cigarette butts and the roaches running over the mic cables.

Irv Joel recalls Capitol's famous echo chamber: "It was an acoustic chamber," he says. "If you listen to any Capitol stuff made during the '50s and '60s, you'll hear that chamber. It was unique in that it wasn't actually designed; it was constructed. The back hall at Capitol was where Muzak was recorded and we needed a chamber. The hallway was 26-feet high—two stories. It was fairly narrow and long. We brought in a contractor to construct an echo chamber. He had apparently done some [similar] work for another company. He said, in a broken Italian accent, 'You wanta one of those cock-eyed rooms?' He

looked and said we can't do the ceiling easy so we'll do the floor. And he unloaded some debris off the truck and put it on the floor at an angle and poured cement on top of that. They used a special thin cement used in organ chambers back then. The hall was dead-ended at one end and we left it that way. The partition wall that made this room was also installed at an angle. So both the floor and wall were at odd angles. That was the beginning of that amazing room. All kinds of measurements were taken later, and acoustic experts came in

and tried to reproduce it but they couldn't."

Harvey Radio (later Harvey Sound) was the main act in town for equipment in those days, according to Don Frey, and owner Harvey Sampson introduced the EMT plate to New York. But the plate wasn't an initial success. As Frey tells it, Sampson sold eight plates to a major studio, which simply couldn't get them to sound good. Sampson called Frey at A&R and said if Frey could get them to sound like a live chamber, Sampson would give one to A&R. Frey and Phil

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Ramone jumped at the chance. After a week, Harvey's was parading prospective customers through A&R to hear the new plate sound. Frey says the secret was in tuning the plate by tightening the springs, a procedure which to this day is part of the EMT manual.

JINGLE JUNGLE

Jingle and other commercial work has been a mainstay of New York studios since the beginning. Radio stations, the progenitors and ancestors of recording studios, used to

create spots for their own shows. As time passed, they realized that spare time could be turned to profit by doing spots for other, lesser-equipped stations.

On radio, many if not most commercial spots were done live, an announcer reading copy while the organist played an underscore or product signature theme.

According to Linc Diamant, a pioneer in recorded jingles and now president of Spots Alive, a consulting firm specializing in broadcast advertising cost management, the first re-

corded radio jingle in New York was this one, written by Alan Kent:

Pepsi—Hits the Spot

*Twelve full ounces, that's a lot
Twice as much for a nickel, too
Pepsi-Cola is the drink for you
Nickel, nickel, nickel, nickel...*

Cut sometime in the late 1940s, this ditty became the forerunner of what is now a multibillion-dollar-a-year industry with New York as the hub. Manhattan's Madison Avenue became synonymous with the advertising world decades ago; hence, New York became capital of the commercial music scene. Not that Madison Avenue embraced the jingle animal—even gray-flannel giant David Ogilvy of Ogilvy & Mather resisted the introduction of jingles on a philosophical level.

Throughout the periodic droughts that besieged the music industry, advertising work kept a lot of studios alive. The 1950s through 1970s were the heyday of jingles for independent studios.

REAL ESTATE

You can't talk about recording studios in New York—in fact, you can't talk about *anything* in New York—without the subject of real estate rearing its ugly head. New York is a vertical city by necessity. With two-bedroom condos in Manhattan going for \$1.5 million, real estate becomes a factor long before choice of console or the digital-vs.-analog debate.

Large rooms belonged to the earlier studios in town, like Nola Sound and the old Vanguard studios on W. 23rd Street, before the real estate game acquired the stratospheric stakes it has today. But New York, which was once described as being a nice town if they ever got it finished, constantly renews itself by tearing down and rebuilding.

Fine Recording disappeared when the Great Northern Hotel was demolished in 1970. Aura Sound was also a casualty of location. The security that comes with owning your location was and is only a dream to the vast majority of New York studios. ■

Dan Daley is a Mix contributing editor. He tried to pry the brass sign off the old Columbia Studios before it was torn down and damn near succeeded before the cops showed up.



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NEVE, HEIDER AND MARTIN IN TEC HALL OF FAME

Celebrating their fifth year, *Mix* magazine's Technical Excellence & Creativity (TEC) Awards will be held on Thursday, October 19 in New York City. Voted on by *Mix*'s readers, the TEC Awards this year will honor achievement in 20 categories of technical, institutional and creative achievement. Over 700 members of the industry are expected to attend the ceremonies, with record proceeds going to hearing research and audio education scholarships.

The TEC Awards will take place at the historic Manhattan Center Studios, site of the 1987 TEC Awards ceremony. Originally designed and built by Oscar Hammerstein I, and home to the Manhattan Opera, the facility now offers a world-class, dual 24-track studio along with its classic ballroom.

Besides announcing the winners in the three major categories, the producers of the TEC Awards are proud to be honoring industry legends Rupert Neve, Wally Heider and George Martin with their induction into the TEC Awards Hall of Fame. Neve, Heider and Martin have all played substantial roles in the technical, institutional and creative development of the recording industry.

Rupert Neve's name first became internationally known with the development of his state-of-the-art Neve console. The late Wally Heider was one of the first studio owners to purchase commercial 8-track and 16-track recorders when they became available. Perhaps more than anyone else, Heider defined and personified the recording studio entrepreneur. George Martin is co-owner of AIR Studios, one of the world's most successful studio operations. He is recognized as one of music's most versatile and imaginative talents, producing all of the Beatles' records and those of numerous other artists.

Fifty percent of the proceeds of the TEC Awards will be donated to the House Ear Institute, which will use the funds for hearing aid research and the exploration of ways to deliver high-frequency amplification to patients, and the Hearing is Priceless (HIP) campaign. The HIP campaign, co-sponsored by *Mix* magazine, is targeted toward young people, encouraging them to listen to music at safe volumes. The campaign's honorary chairman is musician and producer Jeff Baxter. Twenty-five percent will go to the winner of the Outstanding Recording School/Program, and 25% will be contributed to the AES Educational Foundation for audio scholarships and grants.

At press time, celebrity presenters scheduled to appear at the awards ceremony include engineer and Grammy Award-winning producer Neil Dorfsman, engineer Bruce Swedien, NARAS president Mike Greene, SPARS president Bruce Merley, synthesizer inventor Bob Moog, Power Station owner Tony Bongiovi, legendary guitarist Les Paul, and representing the House Ear Institute, Jeff Baxter. Emcee for the TEC Awards will be comic Richard Belzer.



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1989 Hall of Famer, George Martin (r), congratulates last year's inductee Les Paul.

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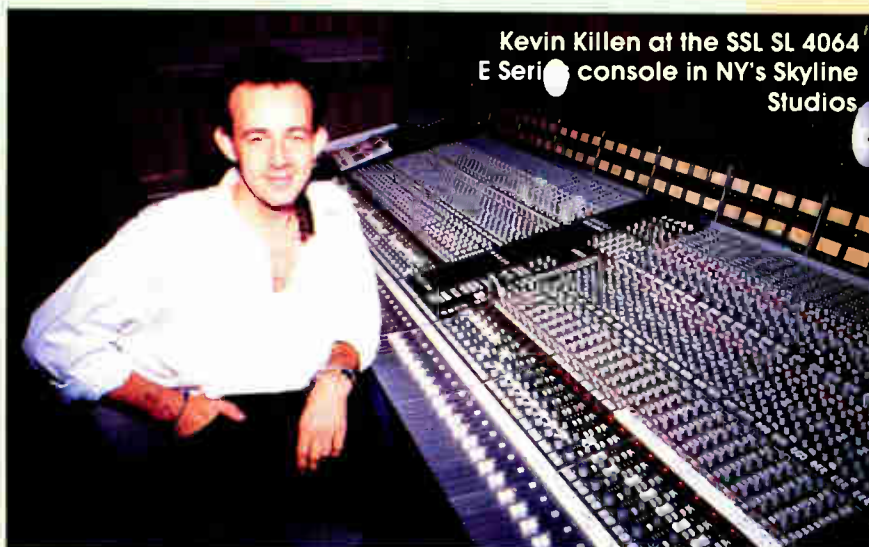
RECORD PRODUCERS DISCUSS THEIR WAYS AND MEANS

As regular readers of *Mix's* "Producer's Desk" column know, there are nearly as many styles of music production as there are producers. Some are autocratic, others "invisible." Some have great engineering chops, others leave the tech end to engineers. Some write material for the artists they produce, others are out there scouring tapes to find songs. What do Jimmy Iovine and George Martin have in common? Probably not much except the high caliber of each one's work.

In this issue's special focus on producers we take a look at five highly individualistic producers, in part to show some of the range of backgrounds and approaches found in this increasingly complex profession. In Kevin Killen we find a representative of the new breed of engineer-turned-producer, technical wizards who have worked their way up from assisting on projects to calling the shots themselves. George Duke was a highly successful session musician and keyboard ace in several bands before he got into producing himself and others. Teresa Trull, likewise, comes from the performing end; she's best known as a singer. Michael Masser is a hit-making songwriter/producer who works exclusively with artists covering his songs. And KRS-One is one of the most influential rap producers on the urban music scene.

Over the course of the five articles you'll see similarities and differences, but they all have at least one thing in common—they're doing it right.

—Blair Jackson



Kevin Killen at the SSL SL 4064 E Series console in NY's Skyline Studios

Kevin Killen: The Engineer Becomes Producer

by Dan Daley

Kevin Killen, with his light brogue, pear-shaped ears and tangled black hair could have stepped out of one of Parnell's mobs a century ago, or from any of 200 annual Saint Patrick's Day parades that follow the green line down Fifth Avenue each March. But five years ago the Dubliner came to New York with a few years at Joyce's own Trinity College and engineering

—CONTINUED ON PAGE 63



PHOTO: IRENE YOUNG

Teresa Trull Adds Some Inspirational Reverb

by Linda Jacobson

One of the San Francisco Bay Area's best-known and well-liked independent producers possesses a voice from heaven, hails from Durham, North Carolina, and manages a horse ranch.

—CONTINUED ON PAGE 64



PHOTO: HENRY DILTZ

George Duke: The Ears Have It

by Robin Tolleson

George Duke finished a stint as musical director of David Sanborn's *Sunday Night* and quickly flew back to the West Coast to remix a 12-inch single of "All Or Nothing At All" for Al

Jarreau. Dance singles are not Duke's favorite thing to do, but the 43-year-old was having fun with this funky, rapid-fire groove and the singer's solid and soulful spryness. His beef with 12-inch singles is that often real music is sacrificed for gimmickry. And Duke's musicality is well-known in the music business. Jeffrey Osborne once joked to his producer, "You know what's wrong with you? You're too musical."

Duke is now called frequently by Anita Baker for arranging ideas. Natalie Cole called him for assistance on a Billie Holiday song. Sadao Watanabe and Hiroshima had him produce recent releases. He introduced Philip Bailey of Earth, Wind & Fire to the world as a solo artist, and he's worked on several Deniece Williams projects. He did Smokey Robinson's album and a track for Miles Davis this year, before taking his old friend Jarreau into the Top Five in the jazz and R&B charts with *Heart's Horizon*.

This well-rounded musical knowledge results from training—some on-the-job—in a variety of styles. He graduated from the San Francisco Conservatory of Music, studying classical piano and trombone, but grew bored with it when instructors chastised him for wanting to change notes in classics that he learned. He received his master's in music composition from San Francisco State University and taught classes in contemporary improvisation and jazz in American culture. He led the house band at S.F.'s Half Note Club from 1965 to 1970, frequently backing a yet-unsigned Jarreau.

After moving to Los Angeles, Duke got his first taste of playing electric piano with Jean-Luc Ponty, and was soon asked to join Frank Zappa's Mothers of Invention, where his trombone skills were put to use as was his growing keyboard prowess. Zappa forced him to use a synthesizer for the first time, for which Duke is probably quite grateful. Between separate two-year stints with Zappa, Duke played with Cannonball Adderley's band from '72 to '73.

Duke began recording as a solo art-

—CONTINUED ON PAGE 66



PHOTO: JEFFREY MAYER

Michael Masser working with singer Natalie Cole.

Michael Masser: The Songwriter As Producer

by Blair Jackson

"I've just been fortunate to have found so many talented people to record my songs through the years," Michael Masser says. "Artists like Whitney and Diana and Natalie can bring so much

—CONTINUED ON PAGE 72



KRS-One—He's Fresh. Word!

by Dan Daley

We didn't know it at the time, but as KRS-One—aka Kris Parker—and I sat in his high-rise apartment on Manhattan's East Side, a huge comet hurtled past Earth at 46,000 miles per hour,

—CONTINUED ON PAGE 75

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World Radio History

credit on U2's *The Unforgettable Fire* under his belt, only to have to seek employment as an assistant engineer for the third time in his life.

Since then, though, Killen has fostered his own Irish luck and is now making the transition from engineer to producer. His console credits include U2, Bryan Ferry, Roy Orbison, Howard Jones, Patti Smith, Hall & Oates and Kate Bush. As a producer, he co-produced Mr. Mister's third RCA LP, *Go On*, Peter Gabriel's "Biko" single from the film *Cry Freedom* and Elvis Costello's *Spike*, released earlier this year. Three successive nominations as "Recording Engineer of the Year" in this publication's TEC Awards are testament to his chops.

At Trinity College, he studied construction engineering while functioning as "the world's worst drummer" in one of the many punk bands proliferating in Dublin in the late '70s. Audio engineering entered the picture in 1979, and Killen signed on as an assistant engineer at Lombard Studios in the Irish capital. He quickly moved into engineering dates on the studio's unique Helios console, doing jingles in the morning, rock and traditional music in the afternoons and scores of demos into the wee hours.

But Ireland is a small place. Killen moved over to Windmill Lane Studios—as an assistant engineer once again—where a neighbor's band was about to begin recording its third LP. "I suppose it was inevitable that we would wind up together at some point," recalls Killen of the U2 sessions for *War*, on which he assisted. "We did the whole record top to bottom in seven weeks. It was fast, but that's [producer] Steve Lillywhite's style. The first day we started at 11 a.m. and left the studio at 6 a.m. the next morning, and it went on like that virtually every day for the next seven weeks. That was my first initiation into what it took to make a great record."

By 1984 Killen moved up to co-engineer the band's *The Unforgettable Fire* LP after working with engineer Shelly Yakus and producer Jimmy Iovine on live U2 dates in the U.S. and Europe. "U2 had a reputation for using young engineers," explains Killen. "The fellow they had been using moved on to other things, and the band approached me as the engineer and Brian [Eno] to produce."

The eclectic Eno was at first reluc-

tant, but a long phone conversation with U2's charismatic singer, Bono, soon changed his mind. Eno brought along his own engineer, Daniel Lanois, and the two engineers set upon working with Randy Ezratty's mobile Effanel equipment (brought over from the States) in Slane Castle, where the band had rehearsed. They moved back to Windmill Lane for final overdubs, vocals and mixing.

Still, a band like U2 can subsume the personalities around it, and Killen acknowledged this when he decided to move across the Atlantic to New York City in 1984. "A lot of producers



"I'm not really a musician in my own right; what I play is the console, and I interpret the ideas and get them on tape. My instincts so far have been pretty good."

—Kevin Killen



were now coming to Ireland, but they were bringing their own engineers," he says. "I didn't like London, and New York seemed like a fairy tale after listening to Jimmy and Shelly talk about it. The fairy tale part changed real quickly after I arrived."

Killen knocked on doors with little success before landing a shot assisting Ed Stacey at Electric Lady. Stacey recommended him for more work, and things began to happen.

A recommendation from Peter Gabriel to RCA A&R-type Paul Atkinson resulted in Killen's co-production of *Go On* with Mr. Mister at the Village Recorder in Los Angeles. While he was at first hesitant, his attitude changed after a two-day session with the band, where he found their passion for their own music irresistible. "That's what makes it so attractive to me, really," he says. "You need a great perform-

ance and a great song, but equally you need passion for the music."

The Mr. Mister experience, and the LP's subsequent less-than-spectacular sales, also exposed Killen to the uniquely American way of marketing records. "In the U.S., radio has such a strong hold on music that people have to succumb to the formula of making commercial records," he declares. "The radio scene in England and Ireland is the other extreme: in the U.S. there are established artists who will get airplay no matter what; in Europe, people like Paul McCartney and Elvis Costello have trouble because it's all the new acts that get a lot of airplay. In England, it's a very fashionable industry, and if you're part of the trend you get the airplay."

Costello's name conjures up agreeable banshees in Killen's mind. The lyrical bad boy of British angst-rock had done a soundtrack for an English film called *The Courier*, in which his wife (Cait O'Riordan) had a role. The music was all instrumental for the film, and Costello enjoyed the freedom of not having to be constrained by lyrics. "He wanted that same feeling on the new record [*Spike*], and T-Bone Burnett recommended me to him," Killen says. "So I was sitting in my apartment one day in New York and the phone rings. I pick it up and a voice says, 'Can I speak to Kevin; this is Elvis Costello.' I put my hand over the receiver and barely suppressed a gasp. Costello was one of my all-time favorite artists, and T-Bone didn't give me any indication at all that he might be calling."

Killen found that the well-documented asperity of Costello's character is counterbalanced by a pronounced sensitivity and passion about music itself. "I went to his hotel room and spent four hours listening to him talk about music," he recalls, "and after that, I left feeling musically illiterate. That's how brilliant Costello is. I really wanted to work with him."

Killen feels Costello never made a great-sounding record up to then; he notes that most Costello records had been somewhat thin-sounding. "I wanted to make a record with some bottom to it," he says. "What frustrated [Elvis] initially about the *Spike* record was that we didn't have a really strong nucleus of players, and as a result it was rather fragmented over the first couple of months. But things picked up as players came on, and we made

a lot of rapid progress.

"Elvis didn't like to spend a lot of time on sounds and ideas," Killen remembers. "If it wasn't happening within ten minutes, he would stop and move on to the next thing. You literally had to be in 'record' at all times."

The sessions took place at AIR Studios in London, in the big room with the Neve 8078 console, a favorite of Killen's. Prior bookings forced them to move to the mix room with a Neve V Series, where they mixed for a week until they played the tracks elsewhere, and it came out sounding quite different. They stopped abruptly and returned to L.A.'s Ocean Way, where tracking had been done on an old Neve 8038, and they proceeded to mix the tracks there manually. "Me, Elvis and the assistant Mike Ross just took a group of faders each and did it."

Killen is a man whose career is on a fulcrum; the producer in him can be seen emerging from the engineer. The strong engineering and technical background, which he considers less an advantage than an essential component for production, has given him a perspective about his chosen field.

"The term production is in some respects nebulous," he says. "Making records is a team effort. Certain producers have very strong feelings about how a record should sound, and they choose their engineers very carefully because they know that those people are going to bring certain aspects to that record. And whether you call that person an engineer, a co-producer or a producer, it's all nomenclature at that point. The industry likes to put things into nice little boxes, but most engineers do feel that they play a large part in the artistic end of a record. It's difficult to quantify their roles and their input into a record."

Killen regards himself as an instinctive producer. "I'm not really a musician in my own right; what I play is the console, and I interpret the ideas and get them to tape. And my instincts so far have been pretty good."

He has his favorites when it comes to equipment, like "old Pultecs and old Neve 1076s, as well as tape slap. And the GML systems. I also like to chain effects together through a multi in the patch bay rather than individually bring them back through the faders every time. Sometimes you find certain combinations work well together that way, such as a Dimension D going into an EMT 140, or using

tape slap as a pre-delay before a reverb unit. Then you take the sum of that and bring it all back on stereo faders."

Many of Killen's credits on records list him as "mixer." But he's quick to point out that his approach to mixing is more traditional than the current perception of the mixer as the one who functions similarly to a post-producer. It's a matter of bringing a new perspective and point of view to a track, rather than a bunch of toys to a mix: "I take away rather than add in a mix. The human ear can only accept a certain amount of information." The less-is-more effect is evident on his most recent mix job, a re-release of "Great Balls Of Fire," the Jerry Lee Lewis classic from this summer's movie of the same name.

Ultimately, Killen acknowledges the influence of his ancestry, even as he pursues a career in America. "I think the Irish people are a very musical people," he says. "But they're also a lot of fun and have a great spirit. I try to bring a lot of fun to a record. The thing about making records is sometimes it gets all too serious. Sometimes people do their best work when they're goofing off. But what I think I get from my heritage is that I understand acoustic instruments and can record them well, and I have a sense of melody. That comes from being Irish. Being Irish makes you rather even-tempered. There's a lot of what I guess you'd call paranoia in America, and so far that's not rubbed off on me. And I suspect it never will." ■

Dan Daley is a Mix contributing editor. His favorite outboard effect is Jameson's.

—FROM PAGE 61, TRULL

She once hoped to live in Africa to paint and draw the continent's exotic beasts. Instead of animals, she's chased music. . . and along with blue ribbons, she's taken home gold records.

Teresa Trull has earned accolades for her vocal talents as a performer and session player (she's gigged with Sheila E., David Sanborn, George Duke and Stanley Clarke, Bonnie Hayes, Alex DiGrassi, and more). Folks rave about her songwriting capabilities, her upbeat, self-produced solo and duo records, and her productions of other artists' albums—mostly independent releases from people like Deidre McCalla and Cris Williamson.

Today, Trull only half-jokingly likens producing recording artists to working with animals. Producing an artist is like breaking in a horse, she says: "You really have to have a sense of what's going on in their mind. I've been on the other side of the glass; I'm a singer. I know what it feels like to be in a recording booth where you're doing a really difficult take and you see people in the control room laughing and carrying on. You get mad and you think, 'Damn it, somebody let me know what's going on here!' It gets blown up and your emotions fly high, because it's so important to you. So when someone's behind the glass, it's important to give them a lot of attention. And if they need it, a lot of direction so they feel like they're on solid ground. Then you put them in the right environment and people blossom. People give you as much as they can. But people have to *want* to do what you need."

Trull brings to the studio the exuberance and energy that draws adoring crowds to her stage gigs. With that she brings empathy. Trull believes a producer's top priority is to help the artist "maintain dignity" throughout the process of song selection and recording. "When you work with someone who's real talented and can make a mediocre song seem like a great one, it's harder for them to make those kinds of decisions about material, because it's so easy to please people with their talent," Trull explains. "You need to allow a person their dignity. Instead of saying, 'Don't do it this way,' it should be, 'What about if we went to *this* part of Disneyland and went on *this* ride?'"

This approach to production could be called holistic: dedication to making a record by dealing with the artist as independent of, and greater than, the sum of the session's parts; combining talent and songwriting abilities, studio acoustics and equipment, engineering chops, budget and "star potential" (or proven "chartability").

"You have to have the flexibility to allow a recording project to live and breathe," Trull advises, "and take it in the direction that's best for the song, not that's best for the market. By the time you get around to copying a fad, it's over. The only thing that makes an artist have longevity and appeal is their believability and emotional impact. I go for that every time. There might be a slightly hipper way—'hip

hop might be nice'—but it has to ring true for that song. I go first for the heart and second for the market, and hopefully the market's somewhere in the region of the heart."

Trull visited the marketplace most recently with *Country Blessed*, an album that pairs her voice with that of Olivia recording artist Cris Williamson. Trull produced. She had wanted to produce Williamson for years, she says, because, "If you're into making jewelry and you see some gold that's real special, you say, 'Ooh! I want to fashion that!'" (One of independent music's biggest successes since the mid-'70s, Williamson has performed in every major concert hall and sold about one million records.) Their spring release on Second Wave, a subsidiary of the pioneering women's music label, Olivia Records, features tastily pop-oriented country tunes and ballads. Reviewers hailed Trull for "combining diverse musical strains into a seamless personal sound" and for "recruit[ing] superb musicians and craft[ing] a deeply layered, gleamingly defined sound." The album was cut at the SSL-equipped Studio A at Fantasy Studios in Berkeley, Calif., with the help of Trull's longtime board buddy, engineer Tom Size.

Trull started out singing gospel in church and launched her professional career at age 16 when a local rock band hired her as lead singer. She hit the circuit of bluegrass, R&B and the blues, spent a year in New York and almost two in L.A., then settled in the hills of Berkeley at age 20. Before long (1977), she released the first of four solo albums (on Olivia, Second Wave and Redwood Records). Her collaboration in 1983 with Windham Hill artist Barbara Higbie (*Unexpected*) made several critics' Top Ten lists around the country. Trull earned a 1985 nomination for Best Producer of an Independent Album (Deidre McCalla's *Don't Doubt It*) at the NY Music Awards. And she won a gold record for co-writing two songs on The Whispers' *Love for Love* LP, including the title track.

In a newspaper interview, Trull once explained how she became interested in sound. As a child, she remembered, "I had an addiction to Captain Kangaroo... he would always be on television cutting paper, and his clip-on microphone would pick up and amplify the sounds of the scissors. I got hooked on that sound. It

was my first experience of the power of the P.A. system. I'd try so hard to get that sound at home with my scissors, but it never was quite the same."

Producers Trull names as her influences include Tom Bell, Jay Graydon, Jeremy Lubbock ("he's like my string arrangement person from God") and most of all, Arif Mardin ("especially his work with Chaka Khan"). Along with emotional impact in a song, she identifies her studio priorities as authenticity in the music (hence her reputation for assembling red-hot studio bands) and fidelity in the audio.

Critics nationwide have compared Trull's material and presentation to

Huey Lewis'. They use words like "enticing" and "infectious," wondering why her market exposure is limited to feminist audiences. Well, Trull's first big break came when a radio station sent her demo tape to Olivia Records. The small, collectively run company offered a job to Trull, who was barely out of her teens. She moved to the San Francisco Bay Area to take it, with the notion that Olivia was "like a women's Warner Bros." During and after the making of two well-received solo LPs and the successful Trull/Higbie release, Trull developed important working relationships in women's music circles. She says she didn't identify

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herself as feminist, but she disclaimed the often inane, sexist lyrics of Top 40 songs (especially those in the late '70s and early '80s) and aimed to present music with thoughtful, socially aware and responsible lyrics. That, and her concerts on the women's music circuit, have attracted a largely feminist, mixed-gender audience.

Trull's extensive singing experience has honed her vocal recording production chops. When the vocal is the focal point of the record, she notes, "You have to plan it from the get go. So often I see people not leave a hole for the vocal because they get so involved in the production of the rhythm tracks. When I worked with Cris, I didn't want to put her voice on last

"You have to have the flexibility to allow a recording project to live and breathe, and take it in the direction that's best for the song, not the market."

—Teresa Trull

and have to limit and compress it to make it fit in the track. If I have an up-tempo tune, I might heavily compress the snare so you can hear the impact of it being hit, but you don't need the snare to be as loud in the track to get that full effect. I work with whatever I can and plan the placements. For instance, I do some things [like accompanying solo guitar or piano] in mono to stay out of the voice's way, but throw a really wide, long delay on it so it sounds more stereo.

"I like the vocalist to have a really good headphone mix. It's crucial in the studio," Trull continues. "Even if it's a great track, if your voice sounds flat and up in your face and you're just using it so you know your pitch, it doesn't do much in terms of inspiring you to sing better. So I add what we call 'inspirational verb.' You know, you can always tell the professional jingle singers, because they come in

and say, 'Take all the effect out of my voice,' so they can be precise. But most singers still need some inspirational reverb, so they can be inspirational. When you hear your voice taking on that size—you inspire yourself." ■

Assistant editor Linda Jacobson works at Mix headquarters on days that begin with "T." On other days she runs Wordswork, an audio writing/editing service based in San Francisco. Editor-in-Chief David Schwartz interviewed Trull for this article.

—FROM PAGE 61, DUKE

ist in 1974, with time along the way in the Cobham-Duke band and Clarke-Duke project. On many recording sessions, his name as a sideman has been Dawilli Gongga. Almost overshadowed by producing credits, his solo career is again on the move with the playful and far-reaching *Night After Night*.

His producing career started in 1977 with trombonist Raul de Souza's *Sweet Lucy* and Flora Purim's *Carry On*. His first big hits were with Taste of Honey ("Sukiyaki") and Jeffrey Osborne ("On the Wings of Love"), and he's hoping for some of that same cross-over magic with Jarreau's new one. Jarreau seems quite pleased to be collaborating with Duke again. "George helped me get a breadth of material like I've never had," the singer says. "He's played this wide variety of music as an accompanist, and then accompanying himself as a soloist. There aren't any finer, you know."

I spoke recently to Duke about his work as a producer.

Mix: Do you think the groundwork was being laid for your producing career with your early solo records, the spectrum of music and the craziness like the "Dukey Stick" that you got into?

Duke: Without a doubt. Even my undergraduate years in school—all that theory, composition and ear training. All that stuff has really helped me be more flexible in what I'm doing now. I know a lot of guys don't read music, but reading has meant a lot to me in terms of my pocketbook. As a producer I don't have to go out and hire other people to write stuff out. Sometimes I don't have time and I'll get somebody to do it, but in a pinch I can sit down and write a lead sheet

out, as opposed to trying to explain to someone at a session that I want this and I want that without knowing quite how to say it. I say, "Listen, this needs to be an A, this should be a B-flat." You can actually talk music language with people that understand. And all the technical stuff really makes a difference. I learned a lot of that from watching Frank Zappa, who seemed to know so much about what was going on in the studio. The first time I worked with him I said, "Man, I want to be able to do that." He could look at the engineer and say, "This needs less 2K."

Mix: Were there other producers who influenced you?

Duke: I never really got into producers until later, because I always considered myself an artist. I started getting into production as a means of making an alternate buck during the disco era, when it looked like the music I was playing was going to be blown away. Other than Frank, I would assume that Quincy Jones was an influence in the late '70s, but I basically just drew from whatever I heard on the radio, from whatever I liked and all the experiences I had in the past from the artist standpoint. I never really had a producer. I was always in there kicking around on my own. So when I started producing other artists, I wasn't coming in like, "Okay, now sing this note here, this is a song we're going to do." It was more like, "Okay, what do you want to do with this record? Where do you want to go?" And of course each artist has a different need, so it was all kind of pliable and adjustable.

Mix: If somebody asked you today, could you pick out a Narada Michael Walden- or Keith Olsen-produced song?

Duke: Most producers have a pretty identifiable sound. The main difference between me and most of the contemporary producers is that I do so many different types of music that it would be a little more difficult to tell my productions from one another. Going from Miles Davis to Smokey Robinson, for example. If you heard the song I did for Miles and the one I did for Smokey you'd swear they're produced by different people. That's diversity. That's what I've always tried to do in my playing and my music, and I've tried to adapt that to production as well.

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great player and being able to cross over to successful producing? Not everyone can do that.

Duke: A lot of it has to do with just being able to get along with people and being able to listen and perceive what's going on in somebody's head. Sometimes you get singers in and they've got a thousand things going through their mind, and they're not putting out their best. You've got to find some way to get a spark out of them and get them into the song so they're making the decisions. Even though you may be making suggestions and guiding the ship along in a certain way, you have to convince them that they have made the right decision. And once they make a decision, it's like something clicks on in their head, something changes. As soon as that confidence comes back, it's like another singer stepped into the room. And it's the same way with horn players.

Mix: You and Jeffrey Osborne seem to work well together.

Duke: He was very involved with what was going on in the studio. I learned as much from him as he learned from me. When you're dealing with a singer like that, there's

almost nothing to say. He goes in and sings, and two takes later you've got it. He had a lot of confidence and a very innate sense about which way to go with his own career. At that time

“If you heard the song I did for Miles Davis and the one I did for Smokey Robinson, you'd swear they were produced by different people.”

—George Duke

he was very unique, and I was glad to have that opportunity to work with him.

I have to admit that the third record I did with him, *Don't Stop*, suffered from not having as much involvement from Jeffrey as *Stay With Me Tonight*

did. I have to accept blame for that, even though it was a successful record. He had gotten so hot and was flying up to perform at Vegas and Tahoe and wasn't around for enough of the record.

Mix: What do you spend the most time on in the studio?

Duke: I'll spend a lot of time on a vocal. I'll spend a lot of time on a mix, too, but in the final analysis I'd probably spend more time on a vocal. Because if the vocalist is the lead and we don't sell it with the vocal, we ain't got a shot whether the mix is right or not. A mix can be bad and the vocal can be happening and you've still got a record. So the basic pocket of the record has to be there, which generally doesn't take that much time for me. And as long as I can get the artist in that work mode, and really believing that we're going for something special, then we're generally okay.

Mix: How much of a good sound in the studio is equipment, and how much of it is the ears in the booth?

Duke: Whether you're talking about samples or live musicians, you've got to start with something that's good. If you've got a great sample then you don't need to use as much EQ or any-



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Mix: If you had to choose, would you prefer good equipment and a bad engineer or bad equipment and a good engineer?

Duke: I'd rather have bad equipment and a good engineer, because you can't replace somebody that's got an ear. In my studio I've got what I call a "Poor Man's Massenburg" setup. I have a Series 3B console, which is an old Soundcraft, before they changed over to the SSL people. The Series 3B we use for playback almost exclusively. There may be an occasion where we record through the board, but very seldom. Normally we go through George Massenburg preamps, or another kind—one that was actually built by my engineer—depending on what we're recording and what we're looking for out of the preamp; something very transparent, not quite as sophisticated or as wide, or whatever. We go through various limiters or other paraphernalia, depending on what we need for the sound we're dealing with, and go right into the Mitsubishi. I have a 32-track digital

tape machine. And on occasion I'll just record right out of the Synclavier into the Mitsubishi.

Mix: What first piece of equipment would you buy if you were starting up a studio?

Duke: A Synclavier, because that's a studio all in one. The Korg M1 is great, too. But when I recorded Jeffrey Osborne's first record, all those great songs except for a couple were done in my office, where I had my secretary working, my coffee machine and my refrigerator. I had switches put on so I could turn the refrigerator and clocks off. I used to put foam in the windows. I'd move my secretary's desk, and we would put Jeffrey over there and put a mic up in front of him and let him sing. Close the door. And I had to make sure my kids didn't walk on the floor up above. There was no Synclavier at that time. In terms of recording, you don't always need something real elaborate to make something happen. But to bring it back to the Synclavier, you've got a very strong medium for recording, a strong workstation for doing everything you need. Even without Direct-to-Disk, you can definitely do a complete track on the Synclavier. That's what I've been doing

for years.

Mix: I can understand a producer having a core of musicians and wanting to use them on a lot of different records. Do you feel any obligation to

“When I'm dealing as a producer with other people's records, I've got their money in my pocket and I don't want to experiment with it.”

—George Duke

use new guys, keep bringing in fresh players?

Duke: No, I don't feel an obligation to do that. In terms of my work, my responsibility is to the record company and to the artist. And that's pretty much where the buck stops. I have to



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give the artist, in the most efficient way possible, the product they're looking for, and that may mean using the guys that I use all the time. I admit I'm reluctant to use musicians I don't know, because I can call such and such and they'll come over here and be in and out in ten minutes. I could call somebody else who doesn't read as well or I don't know, and then I just wouldn't know. I will experiment more on my own records, because it's my budget and that's different. But when I'm dealing as a producer with other people's records, I've got their money in my pocket and I don't want to experiment with it.

Mix: Has MIDI changed things at your studio?

Duke: Oh, tremendously. Without MIDI we'd be in the Dark Ages. I remember going onstage and playing without MIDI, and I don't know how I ever did it. If we'd had MIDI when I was with Frank Zappa, can you imagine what could have happened in that band? I wonder sometimes. But in the room here it's made it much faster to do anything I want to do. I think it's just the greatest innovation of this century. [Laughs] I really think it's absolutely essential. I've got everything going through a big Cooper MIDI switcher, and everything is hooked up to the Synclavier through that, so I can switch it around any way I want to. I've got my Minimoog and all my stuff MIDIed up to this unit, and I can pretty much choose what I want to do and run it down any track that I decide to use on the Synclavier. I love the idea of rack-mounting everything and having it come through one or two keyboards.

Mix: In what ways does your own music benefit by you being a producer?

Duke: I did a couple of songs for Barry Manilow. A lot of people would say, "Wow, that's weird." But I tell you, from working with Barry you learn something. From working with Frank I learned something. From working with Miles. Whoever. From working with Smokey Robinson recently, I can see how he looks at his own music and what he's looking for. And I'll take a little piece of that and put it in my music. Other than that, it's hard for me to produce myself. I'm really an artist at that point. I don't get on myself as hard as I probably should, except about my vocals. My voice in general has gotten a lot better because

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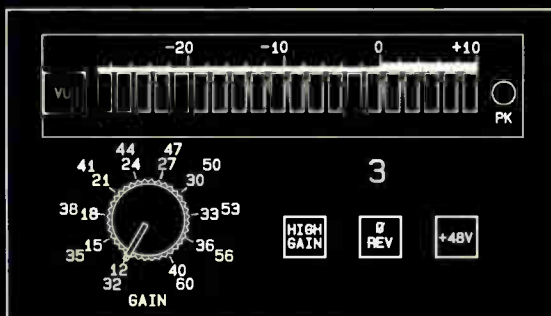
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of that, but in terms of overall concept of albums that's kind of tough, because I'm really an artist first and the producer takes a back seat. I tell him to sit down, because this is my record, and my time to get crazy and do what I want to do. ■

Robin Tolleson is a freelance writer and musician based in Marin County, California.

—FROM PAGE 61, MASSER

to a song, they make my job as songwriter and producer a real joy." That's Whitney Houston, Diana Ross and Natalie Cole, three of the singing superstars Masser has helped guide to the top of the charts over the past 15 years. Masser was one of the first successful writer/producers of the modern era—his first triumphs predate better-known names like Narada Michael Walden, Peter Wolf and Patrick Leonard.

His hits have sold in the millions and are known the world over; some are already bona fide standards. His first hit (and first co-production) was "Touch Me In the Morning" for Diana Ross and Motown in '73. The following year she and Masser teamed up for two more successes: "The Last Time I Saw Him" and "Do You Know Where You're Going To," the Oscar-nominated theme from the film *Mahogany*, which he also scored. In the late '70s he co-wrote and produced a song called "The Greatest Love of All" for the awful Muhammad Ali film called *The Greatest*, and it became a moderate hit for George Benson. But a few years later Masser heard an up-and-coming singer named Whitney Houston perform the song, and he knew he had stumbled onto someone special. He began writing and producing songs for her, and they hit Number One several times, with "Saving All My Love for You," "The Greatest Love of All," "All at Once" and "Didn't We Almost Have It All." Most recently he helped revive the career of Natalie Cole with a song he produced and co-wrote called "Miss You Like a Crazy." Not bad for a guy who had been a successful lawyer and stockbroker before turning to songwriting in the late '60s.

Though his ballads are usually unabashedly sentimental, and in conversation he has a slightly ethereal, "cosmic" air, Masser is a real taskmaster in

the studio, working long, long hours to achieve the vision he has for his songs. If the artists who work with him occasionally resent his perfectionism while they're in the studio, they don't complain about it later; his track record speaks for itself.

Mix: Can you tell me a little about how you make demos of your tunes?

Masser: I don't make demos. Except in a few cases where I've made a tape, usually if someone wants to hear my songs I'll play for them on the piano. If it's really the song you're trying to get across, even on a tape, it doesn't need a lot of instrumentation, and I'd tell young songwriters to maybe just do a piano and voice tape. I think a producer who's really looking for the

"I meet these incredible women and I fall in love with them at the highest place in music. It's very spiritual, very special."

—Michael Masser

best songs for a project—who's not just waiting for some ping-pong ball to pop up in the air saying, "That's the hit!"—is going to respond very strongly to writing that's really from the heart. That's under the theory that there's no such thing as a "bad" voice—just an honest or dishonest voice, and honesty comes through, whether it's Bob Dylan or Joe Cocker or whoever.

Mix: You have a reputation for keeping tight control over how your songs are recorded. How do you manage that?

Masser: Well, I produce them or they don't get recorded. Every hit I've had I've produced, except one, which was a cover—"Nothing's Gonna Change My Love for You" by George Benson. My songs are very important to me. They're my life, you could say. I spent two years working on this song I did

with Natalie Cole. These things take time. If you work mainly for a publishing company, they expect you to come up with maybe 15 or 20 songs a year. How about one good one? My interest as an artist is to work on something until I know it's right.

Mix: You must be quite a perfectionist in the studio since you're so close to your songs.

Masser: That's true. It's real hard to get an artist to share your vision. So when I work with an artist, whether it's Whitney or, in the early days, Diana, I spend a lot of time in the studio with them going over every line. They're not leaving. [Laughs] I want them to be serious about it. After all, it's not just me; it's in their interest to do it right. But I think a lot of producers won't take the time that a song needs after a certain point, so they take an easy way out. I won't do that.

With Diana, what I'd do—and I still do this sometimes—is have her sing the song again and again, maybe do 40 or 50 takes, and then put it together word by word from different takes. I spent weeks here on this last one [Natalie Cole] doing the same exact thing. I try as much as I can to get it in takes, but...

At the same time, I want to be understanding of what an artist is going through. With Whitney, when we first did "The Greatest Love of All" something wasn't quite right. They held the album up for it, and six months later she came in and she got it. It has to come from the artist. Sometimes it's a question of concentration, or knowing the song, or not getting dry on it. And if it's a different style than what the artist is used to—it's like a Fred Astaire move: it might look simple, but that's simple for Fred Astaire and maybe not for someone else. On "The Greatest Love of All" Whitney did two takes right before she was going to the airport to go out of town, and we managed to get most of the song from just those two takes. Sometimes an artist needs some sort of catharsis or some sort of experience that pushes them in a certain direction and makes them do their best work. Like Roberta Flack had this sound—this special sound in her voice—that she only got when she was most vulnerable. And sometimes she'd just stop; she was so open, so in touch with her feelings. I try to keep an eye and ear open for that. Sometimes it happens at the very beginning and sometimes it happens

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in later takes.

I think people pick up on it if you really care about something, and that's why these artists are willing to go the distance with me. Whitney has an incredible amount of spirit. It's like, "Okay, Masser, tell me what you want! Let's go to it!"

Mix: Is it possible to be too much of a perfectionist? I think there's a lot to be said for a '50s Sinatra session that's live in the studio, two takes.

Masser: I agree. Maybe it's an insecurity in me. People say, "Well, you're not going to hear that flat note in the strings on the radio." That may be true, but it's still flat and that bothers me. [Laughs] I think I've mellowed a little in recent years. Working with Whitney helped me in that area. We went back to some early takes that had a little rawness to them, or did some fresh takes when she hadn't been in the studio for a while. With Natalie, I've been trying a combination of things.

I think being too much of a perfectionist can use up your energy and be very expensive.

Mix: I would think that because of the way you work with artists you must establish very intense relationships.

Masser: That's true. When I'm working with Whitney, or more recently with Natalie, I just get mesmerized. I fall in love. I meet these incredible women and I fall in love with them at the highest place in music. It's a feeling that's unlike anything else. It's very spiritual, very special.

Mix: There's a growing trend among artists to use two and three producers on an album in search of a hit. Do you feel any obligation to the album as a whole, or do you only concern yourself with your songs and how they sound?

Masser: That started when I was at Motown. When I did "Touch Me In the Morning" for Diana, it sounded different from the rest of the album. Is that good or bad? Well, if the song is good, then it's good. If it's not, then it's bad.

I can see it when someone like Sade wants to get in a mood and keep in that mood. I agree totally that it can get very weird when an album is a mishmash and everything is a different-sounding single, but my job is to make the songs I do sound as good as they can, and to a degree that's where my responsibility ends. I think it

should be discussed in advance to find out how the artist feels about it.

Mix: You must have pretty good technical chops by now from running the show yourself for so long.

Masser: I try to be involved in all phases as much as I can. I'm looking after the performance end to make sure there are no mistakes, and I'm involved with the mix, of course. As soon as I record something I'll make slaves of it; I won't touch the master.

Mix: Is there a danger of being too close to it on a compositional level that some of the technical aspects might slide by you?


Masser: That is a danger, but I've been doing it so long now I trust myself a lot, right or wrong. I've worked in so many different studios with so many different boards that I have a pretty good idea what I like and don't like, and what I need in a given situation. I would say, however, that it's probably not a good idea to go in with an engineer who's not familiar with a room. I find that my training at Motown was invaluable because I worked with the best musicians, and people really knew how to make great records. I work differently than most of the people who were there, but I've kept some of it with me. Mainly, it's knowing how to listen for the best and to not stop until you've gotten the best from the artist and yourself. ■

Mix managing editor Blair Jackson spliced this article together from three different takes.

—FROM PAGE 61, KRS-ONE

coming within a mere half-million miles of the planet. Had the comet struck, it would have done so with an impact of 20,000 megatons, enough to make New York City a crater ten miles wide and a mile deep. This is the sort of news that makes one feel small and vulnerable, at the mercy of forces beyond control or comprehension. It's a sensation one suspects is not totally alien to Parker; he was a runaway at age 13, lived homeless on the streets of New York for six years and had his close friend and mentor gunned down in a hail of bullets on a hot city night.

So the anticipated impression of Parker has a certain urban consistency; on the cover of his record *By All Means Necessary*, completed under



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the auspices of his *nom d'industrie*, Boogie Down Productions, Parker peers cautiously through venetian blinds, wearing a desensitized, determined expression on his face that is as chilling as the Uzi submachine gun he holds cocked above his head.

This is somewhat at odds with the impression upon meeting Parker in the flesh. Sprawled on a couch in a pair of gray-patterned slacks and a T-shirt, he is unthreatening despite his husky, 6-foot-plus frame, and he is garrulous and eloquent, with little of rap's patois in his speech.

Asked about that LP cover pose, modeled after a photograph of assassinated civil rights leader Malcolm X, Parker responds that it's an image understood immediately by his audience and as integral to his approach to creating and producing rap music as a sampler might be. "The concept is simple," he says. "Are we for war or for peace? War is stronger than peace. Peace can't win with a flower in its mouth. For peace to win it has to annihilate war. It's a common biblical philosophy: stop the ignorance with intelligence. Stop the stereotype of peace being Edie Brickell [of New Bohemians] and war being Run-D.M.C.

I'm talking to ghetto kids, and they can make the distinction between the image and what I'm saying."

Parker is one of a very few major-league rap producers. Signed to RCA/Jive Records with an open-ended production deal, Parker's centerpiece thus far is the record *Self Destruction*, made by a stellar group of rappers (under the aegis of "Stop The Violence") who assembled to raise consciousness and promote rap as a socially aware genre, and to counter the negative perception fostered by the violent episodes that have become a trademark of rap performances. Kool Moe Dee, Doug E. Fresh, Chuck D, Public Enemy, M.C. Lyte and Flavor Flav are among the heavy rap hitters on the record. Leading up to that is a production discography that includes Parker's own *Criminal Minded*, Justice's *Ghetto Music, Cool and Deadly* and *The Desolate One*, Sly Dunbar and Robbie Shakespeare's *Silent Assassin* and the upcoming debut album by Ms. Melodie.

THE SOUND'S THE THING, MAYBE

Rap as an art form has established itself unequivocally. But as a technical medium, rap is a different entity. And

my first question to Parker (after establishing the fact that I genuinely like rap) is: why do most hard-core rap records seem to revel in poor sonics? Drum machines are totally unprocessed usually, and the sounds tend to reflect older drum machine technology. In many cases, technical deficiencies in the recording process are obvious. On the other side of the coin, Run-D.M.C.'s collaboration with Aerosmith a couple of years ago boasts the sheen that most pop records achieve.

"It all comes down to money," says Parker, rubbing his thumb and forefinger together. "The sound [of rap] basically comes from a very poor place. It was from a time when kids never had a thought about actually making a record. You'd create your whole song by a DJ bringing back a piece of somebody else's song. So these inexpensive ways of making records cropped up. And record company executives saw this and said, 'Why spend more than we have to?'" Parker estimates the budgets of most rap LPs to be between \$20,000 and \$30,000 for independent label acts and \$40,000 to \$50,000 for major labels (including producer's fees), a far cry from the \$120,000-and-up budgets for major label rock and pop acts.

"You wind up with a subculture," Parker says, "a world within a world. Rap doesn't try to coincide with pop and rock. It has, on a commercial level with Run-D.M.C., but that was the first time a rap group got what I call even adequate engineering."

Parker agrees with the notion that rap exists in a technological ghetto for many of its performers. "It's like a rose trying to be a leaf. The rose never gets to understand the leaf, and the two worlds of rap and pop don't understand each other."

But then, part of rap's charm lies in its very lack of technological sophistication. What an old, beat-up, six-string Gibson box was to Robert Johnson, an old Roland 808 is to rappers. If you were to spend \$100,000 on a rap record, would it still sound like a rap record? Parker's emphatic reply: "Nope."

THE ENGINEER IS DEF—WE HOPE

Parker skips pre-production in most cases, heading directly into the SSL room at Power Play Studios in Queens, N.Y. This room, he says, is really the only one built with rap in mind. He likes the SSL automation and com-



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ments, "It makes you lazy, but it makes things quick, and with rap it's the feeling that you want to capture." The SSL provides what he calls an "authoritative" sound. There is no shortage of SSLs in NYC, but Parker is comfortable at Power Play and feels he is in the process of mastering it. And given the budgets he's constrained with typically, speed is of the essence.

Parker says that engineers who work rap dates should "take 75 percent of what you've learned as an engineer and throw it in the garbage." As an example, he proudly cites one of his favorite recording techniques: "I like to distort the bass levels. I know it causes the engineer some problems but that's his problem. There's actually an art to distortion; there's an art to a kick drum that's too loud. If the kick isn't 'boom, boom, boom' you're not in the competition."

Parker's sound is self-defined as "a reggae, hip hop type of sound, hard-based with social lyrics, and not played on radio except for really commercial stuff, like 'I'm Gonna Get You, Sucka.'"

Rap sounds seem to undergo periodic evolutions, driven less by tech-

nological changes than by the intensely personal aspect of what a sound represents to an artist. Not that trends don't manifest themselves as clichés—James Brown's "oww" is perhaps the most sampled piece of sound in creation. But, as Parker puts it, "Everyone is always hunting for the new

"The people who put out rap hits need to be in a positive setting and make it respectable... We want to give rap a better name."

—Kris Parker

boom. In the rap industry, not having an SP-12 [E-mu sampling drum machine] is like going to school with no books. Get outta here!"

RAP AS BIZ

Parker says that Run-D.M.C.'s forays

into rock were fresh, and as novel as they were a novelty. However, he won't disagree that "Walk This Way" was as much a marketing move as an artistic one. "You're either going for the gold audience or the platinum audience," he remarks, "but usually those who go for the platinum audience will lose the respect of the core rap audience." Parker says some astute legal moves by his attorney in negotiations with RCA/Jive give him complete creative control over his productions, thus insulating him to a large degree from record company whims.

Interestingly, rap has responded to the monolithic pop machine in the form of a loose cartel that presents a semblance of a unified front to the biz while allowing for enough internecine rivalry to keep things lively. Parker sees the rap production world divided into three "families": his own Boogie Down Productions, the estimable Def Jam and Cold Chillin'. But he says that aside from the standards of good ol' American capitalism and survival of the economically fittest, they pull together under the philosophy that, "If we don't put rap out right, it's destroyed."

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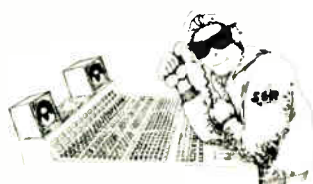
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tee set themselves up as arbiters of what's politically correct in an art form? "We have, and we have to," Parker replies. "The people who put out rap hits need to be in a positive setting and make it respectable."

Parker sees Def Jam—producers of Run-D.M.C.—as the most conservative of the rap operations. But rap, like rock, is renewing itself with an infusion of new blood. The latest comes from the West Coast: Delicious Vinyl, a homegrown, hometown, homeboy operation that has scored the biggest hit of all, Tone Loc's multiplatinum, Top 40 "Wild Thing." But its very success to Parker is an indication of a smudge on its purity. "Delicious Vinyl became very big, very fast, but they've already sold out to Island [Records], so now Island can become very big [in the rap field]. I'm still the only one that doesn't own his own label."

Parker says the difference between East and West in rap is clear, and manifests itself in nuances like attitude and accents—in vocals, that is. To Parker's ears, the difference between "y'all" and "yaw'll" is critical in telling one coast from another. "The way your voice sounds means a lot in rap," he says. "You can't fake that attitude. Another thing is that West Coast beats are harder."

Rap is music of the ghetto, but Parker acknowledges that rap also exists in a parallel musical ghetto of sorts, as heavy metal once did. While the hard-core elements of both genres still reside in that ghetto with only the (large-budgeted) tips of the icebergs showing up in the mainstream, Parker says that country music might serve as a better analogy for rap's status. Both are music of class and economics rather than race and color. "There's such a thing as blacknecks as well as rednecks, you know," says Parker.

As a producer, Kris Parker isn't going to let things like the laws of acoustical and electrical physics, or the orthodoxy of the record industry, or time-honored production and engineering approaches get in the way of his personal Holy Grail—to get a jagged-edged, emotional reality into his records and, in the process, change the perception of an entire genre of contemporary music. "Rappers have a longer way to go because we have to knock off this negative image," concludes Parker. "Just getting past the party image is tough, let alone the violence thing. That's the reason for

doing *Self Destruction*. I hope that a record that powerful will get played and cut through the emotional red tape. We want to give rap a better name." ■

Dan Daley is a Mix contributing editor. He lives in New York City.

Room for Rap at Power Play

Rap has found a home at Power Play Studios in Long Island City, N.Y. (across the river from rap's lower Manhattan home, Chung King House of Metal). The owner of Power Play, Tony Arfi, says the facility—especially his new SSL 4000E-equipped studio—is conducive to all kinds of music. But rap works here because the control room is designed with lots of instruments in mind. Rap doesn't need a big, live, recording room; it needs a spacious control room for playing synths, samplers and drum machines comfortably, and for the crew to do the hang without jostling.

According to Arfi, the 10-year-old Power Play was the first studio to develop the loop sampling technique, in which a portion of a record is sampled, looped within the Publison Infernal Machine and then synched to a drum machine, using the Publison's time compression to change the tempo without changing the pitch. Arfi says he first used it with rappers Eric B & Rakim. He believes it is because of these sorts of innovations and a willingness to experiment that rap artists make up over half his clientele. "They come in expecting a staff in tune with rap music," he says, "and they get it."

As an engineer and studio owner, Arfi says he tries to discourage overloading equipment because of the potential for damage. "But then it's played over a boom box where it gets distorted in the end anyway," he adds. "I think rappers have gotten so used to hearing the music distorted that the distortion becomes a natural part of the music. Rap has taken the cheap sounds—the Roland 808s—and made them popular. I try to give clients what they want, but I know what it's like to have to repair a VU meter after it gets slammed constantly."

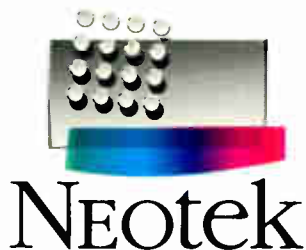
—Dan Daley

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LOOKING TOWARD HIGH-DEFINITION

TELEVISION: *Great Sights and Sounds Awaiting FCC Approval*



by J.T. Way

Rebo Studios in New York is a harbinger of the high-definition television world to come. By producing HDTV programs like *Hurricane Irene*, last year's ITS Monitor Award-winner for best documentary, the company is forging ahead in high-def production, a practice sure to affect the audio community greatly as soon as the Federal Communications Commission decides which of the many competing broadcast standards will predominate in the United States.

Hurricane Irene mixes politically aware documentary with the music of Peter Gabriel, Little Steven Van Zandt, Jackson Browne and Lou Reed, to name a few. The production is evidence of the growing importance and prevalence of audio-for-video. HDTV is the epitome of this trend.

Surely a television standard that can deliver pristine images with twice the resolution in a wide-screen format must pack the sonic punch to match. In fact, many of the compet-

ing, proposed broadcast standards have allocated space for digital audio, which should have repercussions on audio recording studios and the music industry.

Actually, the changes are already happening among the few HDTV production pioneers. Rebo currently uses first-generation Sony HD video decks that offer 2-track analog audio, and soon will upgrade to the latest-generation decks with 8-track digital recording capability. It is now possible to record digital audio right onto the HD video tracks. The question remains, however, how to deliver that digital audio over the airwaves to consumers.

This is only a small part of a raging broadcast controversy that pits the major players in television technology against each other in a battle for format control of tomorrow's broadcast standard. In Japan, the MUSE 1,125-line format has already become the *de facto* standard. The Europeans, meanwhile, have proposed a higher-definition, 1,250-line standard under their own Eureka grouping. And in

the States, while a sizable contingent pushes for 1,125 lines, others are pushing NTSC-compatible systems that will feature 1,050 lines.

WHO ARE THE MAJOR PLAYERS?

Major HDTV systems on the drawing board include Sony's 1125/60 standard, Philips' HDS-NA (High-Definition System for North America), Zenith's Spectrum Compatible HDTV System, Faroudja's SuperNTSC, and two systems known as ACTV-1 (Advanced Compatible Television) and ACTV-2, which are being developed in a joint project by Sarnoff Research Labs, NBC and RCA.

Fortunately for audio recording, most of today's proposed HDTV standards feature digital audio, in anticipation of that historic day when digital, stereo sound becomes a broadcast standard and consumers have the receivers to tune it in.

"Digital audio broadcasting has already been seen on a small scale by satellite companies," says Dale Cripps, publisher of *The HDTV Newsletter* in Portland, Oregon. "But receivers are few and far between. We'll probably see digital audio radio broadcasts before we see it in HDTV. Audio has always been ahead of video; really, FM is 'high definition' audio, and digital is 'highest definition.' The video world is just beginning to catch up."

Wherever digital audio transmission takes off, it will necessitate all-new receivers, new noise reduction and new signal processing technology. It is sure to accelerate the trend of digital recording in teleproduction and post.

But before the industry rejoices over a potential new profit center, the ramifications of such trends need to be considered. Digital sound broadcasts will affect recording artists and record companies, who will have to combat a new wave of copyright pirates. With consumers getting dig-

ital masters piped into their homes via HDTV sets, horizons will open up for the capture and unauthorized duplication of copyrighted material in an ultra-high-quality medium.

Not only will consumers be able to capture master-quality audio with recently legalized DAT recorders, they will also have access to a video format suitable for creating VHS masters.

"This is a major concern," Cripps says. "The motion picture industry is very strong, but still, HD is a viable VHS master. There has been a lot of contention. The whole concept of copyright is under strain; people are saying it's restrictive to progress."

Today, however, the issues remain more fundamental: What will the FCC decide? Which system will predominate? What can we do to make this technology work for us today?

RIGHT NOW AT REBO

Rebo Studios is producing HD videos, documentaries, commercials and specials destined largely for Japan. Rebo uses the 1125/60 high-defini-

tion production standard, which generates 1,125 video scan lines at a 60Hz field rate. The people at Rebo provide insight into the audio facet of current HD production:

"The industry needs an HD sweetening house," says Rebo editor and engineer Bill Davis. "We would need to buy a 16- or 24-track to do it ourselves. We're even leaning in that direction."

Davis faces a sonic situation that involves the difference between the HD frame rate and that of standard NTSC video. NTSC runs at 29.97 frames per second; Rebo's Sony 1125/60 HD decks run at 30 fps. While the difference is not a problem, it is imperative that the speed be changed appropriately when downconverting from HDTV to NTSC, or vice versa. Any slight changes in pitch must also be addressed.

The current Sony decks, offering only two tracks of analog audio, force the Rebo staff to sometimes string long rows of slaves together to mix productions for the Japanese market, where high-definition television is being broadcast experimentally on a

daily basis.

Not that Rebo doesn't use audio post houses. When they send out a job, it's often to Howard Schwartz Recording or Sync Sound in New York City. John Alberts, engineer at Howard Schwartz, has handled several Rebo jobs, including a recent image campaign for WNBC local news and a Fuji copier industrial. Alberts builds the soundtracks using a Solid State Logic 6048E console with G Series automation and a Sony 3348 48-track digital tape machine.

"We were using a 3/4-inch workprint and delivering locked, 1-inch NTSC tape with Dolby A. It was all in NTSC," Alberts reports. "They sent it to Japan for HD transfer, so synchronizing was no problem."

"I don't think HDTV will change the audio engineering world that much," Alberts continues, summing up the general consensus of audio engineers who have done audio-for-HD video. "We'll get into 'the big digital'—48 tracks." He explains that it is not problematic to adapt audio to HD video because "the audio and video are running on parallel courses."

CREED TAYLOR'S JAZZY LEAP INTO HD

Even though the U.S. has been slow getting into the HD sweepstakes, some forward-looking American entrepreneurs aren't waiting for manufacturers and legislators to embrace the budding technology. One big name from the world of record production who has made the leap is Creed Taylor, whose CTI label helped popularize such names as George Benson, Stanley Turrentine, Deo-

dato and Astrid Gilberto. Taylor's latest project is *Rhythmstick*, a one-hour HD special that showcases what he calls "the cream of the crop of contemporary jazz improvisors," including Dizzy Gillespie, Tito Puente, Phil Woods, Flora & Airto, Benny Golson, John Scofield and others. Besides airing in HD in Japan, the program was designed with other formats in mind, so a longer (90-minute) 35mm version

will be available on CD V LaserDisc and VHS, and audio versions will come out on CD, DAT and chrome cassette.

"I wanted a complete project with as many formats as possible to show that jazz should not be treated as a stepchild," says Taylor, whose CTI label financed the project. "No one has ever seen these players in such intimate detail before. It's very striking."

"You know how impressed we all were with digital sound in the beginning. No modulation problems, no hiss—just nice, quiet, open space. Well, the same thing

—CONTINUED ON PAGE 85

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World Radio History

From Alberts' perspective, HDTV could accelerate the post-production switch from analog to digital. "Really, digital lets you be more flexible in post-production. It's easier to work with, and it's cleaner, faster. We're developing the techniques of being able to maintain the first generation with more layers."

Rebo mixed an HD feature film production, *White Hot*, starring Robby Benson, at Sync Sound. Studio co-owner and mixer Ken Hahn talks about the process: "My partner Bill Marino and I posted it completely on HD tape. We used Sony 3324s and edited the job on the AMS AudioFile. Then we did a surround mix. Rebo provided us with 3/4-inch NTSC copies; we were completely in NTSC and then slaved to the HD machine, so synchronizing was no problem."

"We tend to handle the audio digitally; we used an SSL E Series console with G Series software, and we automated everything we could," Hahn continues. "Some of the chase scenes had 100 tracks, but most of the job was about 40 tracks."

"How will HD change things in the audio business? We'll all have to buy high-def machines. We'll use broader stereo for the big screen. And you'll have to find audio people who know the difference between posting on film and posting on high-def mag. Basically, you're talking about a sophisticated medium, a sophisticated audience and a sophisticated budget. People expect the best."

HDTV also offers benefits for audio-for-video production. Hugo Gaggioni, manager of product planning for Sony 1125/60, says the new-generation Sony decks solve a digital audio problem commonly encountered in NTSC video. "Traditional video is not friendly to the 48kHz sample," he says. "Digital audio is not easily adaptable to the 59.94 field frequency. Now, at 60 Hz, the video and digital audio mix beautifully."

It sounds like a production dream come true. Here's a production standard that generates "higher visual eyefare" and easily integrates digital audio. Yet Sony's 1125/60 production format is not necessarily the broadcast standard that will ultimately gain FCC approval—and it is not the only one to offer digital audio.

In fact, SMPTE has decided recently to deal with this issue by forming the Ad Hoc Group on Audio for High-Definition Electronic Production

(HD-EP). The ad hoc committee is dedicated to defining the needs of producers and the production applications of HDTV, and recommending the most effective audio practices on HD-EP masters, according to Richard Stump, committee chair. The group is expected to submit its recommendations by January 1990.

While some HDTV systems, like Sony's, are concerned primarily with a production mastering system, others directly address the means of transmission to be used in the United States. Some contain all the HD information in a single channel; others keep the NTSC signal compatible

with today's television sets in one channel and augment the data with a low-power transmission over "guard-band" channels.

Philips is proud that its HDS-NA system can not only provide full NTSC reception but can keep a low-power digital augmentation signal in a guard-band channel in a way that prevents interference. Furthermore, the HDS-NA 1,050-line, 59.94Hz field rate signal can be delivered by terrestrial broadcast, by satellite (DBS), cable, tape or disc.

Currently, HDS-NA offers 4-channel digital audio capability, but Arpad Toth, chief scientist of advanced tech-

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nology planning for North American Philips, says Philips' top priority in audio is "reaching an industry consensus acceptable for everyone." He explains that Philips is currently following the Dolby audio parameters; in fact, Dolby SR is a common denominator between most of today's high-def systems.

Larry J. French, vice president of technology for NAP, says, "We get real HDTV resolution and CD sound. Our design objective is efficient in spectrum, so there shouldn't be intermediate steps. But that doesn't mean there can't be a whole range of products. If our HDTV signal were broadcast, then TV manufacturers would have options. We could build a traditional NTSC set that receives the CD-quality sound, for example. It can evolve."

Philips' low-power, 3MHz augmentation channel is one solution. Other HDTV proponents, however, have concentrated on keeping all the information in a single 6MHz channel. For instance, Zenith's Spectrum Compatible HDTV System (SC-HDTV) offers a 787.5-line progressive scan system visually similar in effect to an 1,125-line interlaced scan picture. The 59.95Hz signal is exactly three times the rate of today's 262.5-line field rate of current NTSC scan. With digital-quality audio, SC-HDTV can be compressed into a single 6MHz channel and aired simultaneously with a standard NTSC broadcast on another channel.

Zenith's John Taylor explains, "We wanted to start with a clean slate. The Spectrum Compatible system works by digitizing all the information under 200 kHz. The digital audio is included in this portion of the signal and is transmitted in the channel's vertical blanking interval." Typically, information such as teletext, sync pulses and motion correction are broadcast in the VBI.

Because NTSC transmission will continue as is, unchanged, under the Zenith plan, no FM audio information need be broadcast on the HDTV channel. "Essentially, we figured out how to get 30 Hz out of a 6Hz channel," Taylor says. He reports that the audio will be digital stereo with at least two channels and SAP. Zenith is developing a receiver with a chip capable of digital audio reception as part of its current Spectrum Compatible program.

Another proposed system, Su-



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-FROM PAGE 81, CREED

applies visually to HD. I saw it in the truck while we were filming, and the color saturation was just amazing. It really is like looking at the highest-quality 35mm projector."

The *Rhythmstick* project was shot and recorded at Van Gelder Studios in Englewood Cliffs, N.J., with veteran jazz producer Rudy Van Gelder handling the audio end, using Sony digital multitracks brought in for the occasion. Directing the video was Tony Edgeworth, with three Sony HD cameras at his disposal. "They're completely electronic and have no moving parts at all," Taylor says of the cameras. "Because the image is sent through cable directly to the truck, there's no film or tape in the cameras; they're absolutely silent." Gary Scheffrin handled the editing at Rebo Studios and Laser Edit, both in Manhattan.

Clearly, Taylor's been bitten by the HD bug, and his enthusiasm for it is contagious. "The way I see it, if the U.S., Europe and Japan ever get together on HD, look out!" he



Dizzy Gillespie (left) with producer Creed Taylor during making of HD special.

says. "But even if the U.S. and Europe don't, Japan is going full steam on it. It's still just getting going, but it's definitely here to stay. I don't think there's any question it will

be accepted in the U.S.; the only question is, "When?"

For Creed Taylor, the answer is "now."

—Blair Jackson

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perNTSC from Faroudja, also concentrates on keeping the signal within a 6MHz channel. Faroudja marketing director Ron Zimbrick says, "The system consists of encoding the signal before it goes to transmission, reprocessing it at the transmitter and demodulating and decoding at reception." The picture can be a full 525-line progressive scan or can be doubled via interpolation techniques to a 1,050-line, 2:1 interlaced picture with a 15 to 17MHz bandwidth.

SuperNTSC was transmitted and received on a TCS-owned cable television station in Sunnyvale, Calif., last April, and was first broadcast the same month. While SuperNTSC is capable of transmitting digital audio, current tests involve only analog, Dolby-encoded stereo transmissions.

Meanwhile, Sarnoff Research Laboratories in Princeton, N.J.—working in conjunction with NBC and RCA—is proposing a two-phase approach to NTSC-compatible, high-definition television called Advanced Compatible Television. The first step is ACTV-1, a wide-screen system designed to fit in a single 6MHz NTSC channel. When the FCC frees the spectrum, ACTV-2—which uses two full 6MHz channels—will be unleashed. Both ACTV-1 and 2 will offer CD-quality digital audio.

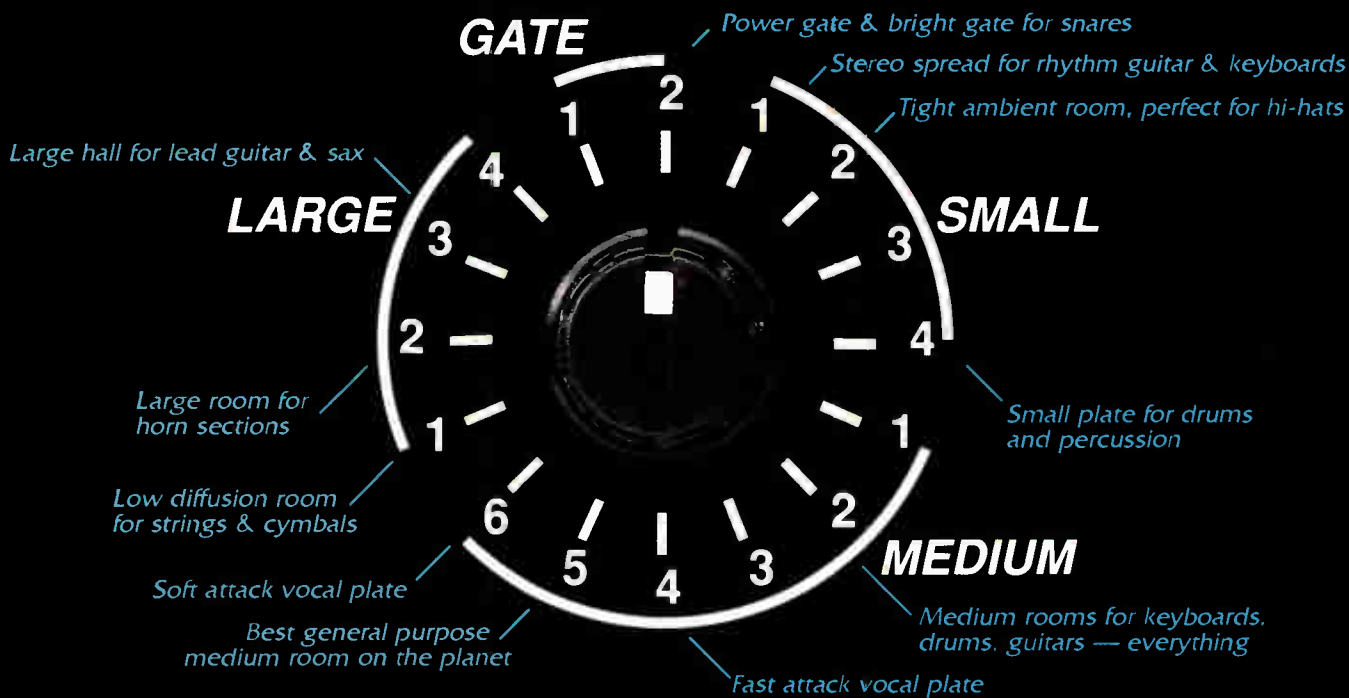
Sarnoff's 1,050-line, 59.94Hz field rate system was first demonstrated in Ottawa in 1987. ACTV-1 was first commercially broadcast (for the news program *Live At 5*) on April 20, 1989, from NBC's transmitter atop the World Trade Center in Manhattan to Sarnoff in Princeton.

No matter what system eventually prevails in HDTV, the common denominator is sure to be top-quality audio to match the top-quality video. As studios such as Rebo demonstrate, audio/video integration is the key to the new age of entertainment.

Fortunately, audio transmission for HDTV is not a problem; the technology exists to make it happen. It is simply a matter of waiting for the FCC to choose a video transmission standard for North America—and coping with the issue of consumers having ready access to master-quality audio and video. However it irons out, the result will be richer, more complex audio-for-TV. ■

J.T. Way is a consultant and industry analyst specializing in high-definition television.

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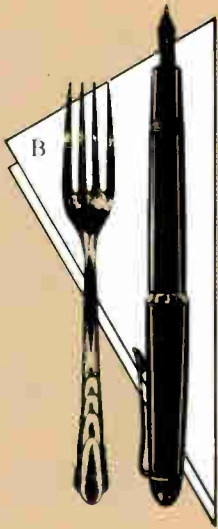
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by Mr. Bonzai

BOB CLEARMOUNTAIN

SOUND IDEAS



For those of you who have been lunching elsewhere for more than a decade, Bob Clearmountain is a double-Grammy winner for his work with David Bowie and Tina Turner. He's the fellow who mixed the epic ten years of live Springsteen. Bob's a hybrid producer/engineer known for myth-defying stunts in the mix.

Produce a Bryan Adams or a Hall & Oates over here, mix a Prince's Trust Concert over there, *Saturday Night Live* here, a Huey Lewis song for *Back To the Future*, some Rolling Stones, some Crowded House and how about Laurie Anderson? Sit down at the desk with months, even years, of recorded raw tracks and mix up a batch of hits.

How do you land such a job? Well,

tomorrow to mix around in London for a few weeks, so no time for lunch this time, folks. But we hooked up by voice at one this afternoon.

Bonzai: Where are you?

Clearmountain: I'm in my apartment.

Bonzai: In New York City?

Clearmountain: Yes, overlooking beautiful Central Park.

Bonzai: You're leaving for London tomorrow.

Clearmountain: Yes, I'm going over to mix a few things. I'm mixing Paul Young, Climie Fisher, Paul Carrack, and a band called Wet Wet Wet—they're really big in Europe.

Bonzai: How do people get a strong reputation as a mix engineer, as



Bob's dad brought home one o' them newfangled tape recorders when the lad was just four years old...he grabbed the knobs and wouldn't let go. As they say, you start young and the rest is mystery.

Bob Clearmountain is leaving to-

opposed to a tracking engineer?

Clearmountain: In my case, I think part of it is that I am also a producer. People probably figure that if this guy produces records, then he must be more than just an engineer and is able to add something. Also, people hear

records they like. When people call me, I ask them what turned them on to me. They say, "I heard Springsteen's record," or "Roxy Music, and I want that vibe." It seems to be that more than anything else.

Bonzai: Do you ever get taken by surprise by an artist you never thought you would mix, but perhaps they or the producer said, "Let's change our sound"?

Clearmountain: Yeah, that's happened a few times. I just finished mixing a couple of tracks for Laurie Anderson, which was fantastic. When she called me, I thought, "Great," 'cause I'm a fan and have a good deal of respect for her. I figure people usually associate me with Springsteen, Bryan Adams and mainstream pop artists. Laurie Anderson is a bit left of center, the kind of thing I would like to be known for as well, although I did it because I like her music and I thought it would be an interesting mix.

Bonzai: What are your long-range goals?

Clearmountain: I'm pretty happy with what I'm doing. There aren't a whole lot of artists I haven't worked with, other than Peter Gabriel, that I can think of who I'm really dying to work with. I just like to make good records. I'd like to build my own studio, because I have ideas about what the ideal recording studio should be.

Bonzai: Let's backtrack a little before we get to that. You started out as a musician in bands, right?

Clearmountain: Yeah, I played bass.

Bonzai: As a kid, did you feel you would have a life in music, or did it happen as a teenager?

Clearmountain: I always thought so. My older brother was a musician, played guitar. I was always hanging around his band practices, and I loved listening to records and the radio. When I was about four, my dad bought a tape recorder for my mother. She was an English grammar teacher and wanted something to record her kids speaking to show them how badly they spoke. As soon as that thing came in the house, I was totally fascinated.

When I started playing bass, I was the guy who had to record the band because I had the tape recorder. Then one day it hit me. I think I was a senior in high school. I was looking through a copy of *dB* magazine and

suddenly I thought, "Wait a minute, there's a profession here! There's someone other than the musicians involved in the recording process. Someone's making the guitar fly across the speakers and the drums and bass sound like they're under water. This is a job with my name on it!" Actually, I hope my drums don't sound like they're under water.

Bonzai: Has your musical background helped you as an engineer and producer?

Clearmountain: It's helped a great deal. I don't see how people try to be-



come producers or engineers with no background in music. I can't imagine how I would have approached it, especially when it comes to editing and production. You have to know something, otherwise you'd just get lost. I remember an engineer who had the hardest time editing. He'd edit a "two" to a "three," because he wasn't a musician and couldn't visualize it.

Bonzai: You started at Media Sound in New York, 1972. How did you get your foot in the door?

Clearmountain: Well, the last band I was in... the lead singer was friends with Michael DeLugg, a top engineer at the studio. They wrote songs together and Michael wanted to get his songs recorded. We were brought in as an in-house production team for making demos. The band split up, and I started hanging out with Michael. He recommended me for a job there and they hired me.

Bonzai: You were the chief engineer

at Power Station when it opened in 1977. Were you involved with the design of the facility?

Clearmountain: I helped them find the building, and I was in on the ground floor when we were laying it out. I can't take all the credit, but I got a few ideas in there. There are two studios on the first floor. Originally they were going to put the control room for Studio A where Studio B is. There were some columns in the way, so if they had done that, Studio A would have been bigger, but you wouldn't have had good visibility. I wasn't a producer at the time, but I always wanted to be able to see ev-

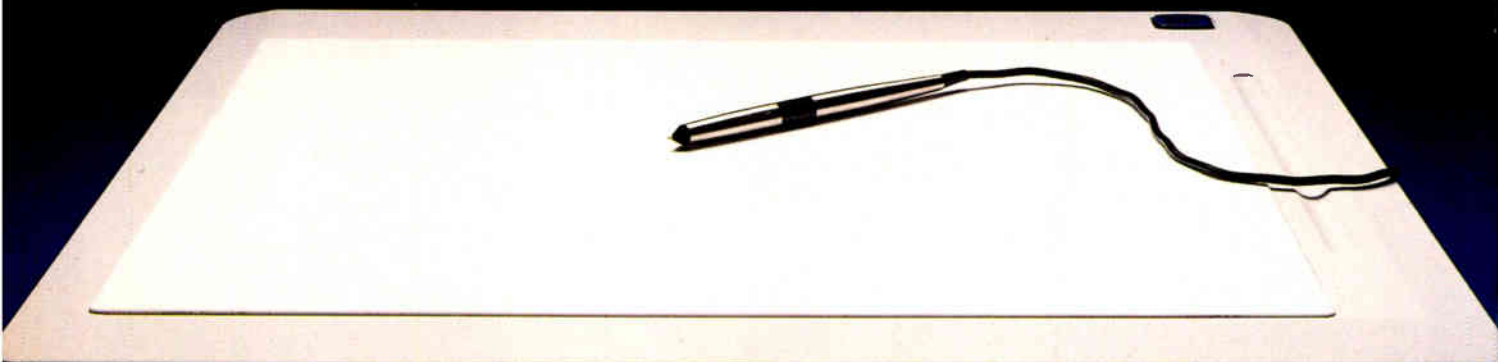
eryone in the studio. My suggestion also allowed for another studio space.

Bonzai: You mentioned that you plan on building your own studio some day. What would you like in the ideal studio?

Clearmountain: I like a place that doesn't feel like a factory. It should feel like home. One big room with a high ceiling so you get the big drum sound. Another room that's smaller, where you don't need all that space, for a smaller band or overdubs. Large, comfortable control rooms. Good lighting and visibility—90 percent of the studios I go into have had lighting, like glare off the console so you can't see the controls and you get eye fatigue. It's a lot of little things that people don't pay attention to.

This is going to sound silly, but I think it's important that the bathrooms are nice. You have to go in there, and there are some studios in New York where I feel like I've walked into the South Bronx when I go into

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the men's room. How much can it cost to make the bathrooms pleasant? How much does it cost to have a comfortable lounge for the musicians and the people you try to kick out of the control room while you're mixing? There should be a good place for them, with good coffee and tea.

Obviously, I feel technical things are important. A lot of studios technically are very good, but you can do it with much more class.

Bonzai: Proper maintenance must be a priority with you.

Clearmountain: Maintenance is unbelievably important. The two things besides the place itself are the maintenance and the assistant engineers. The assistant engineers are a lot more important than most studios realize. They're the reflection of the studio, the part of the studio the client must interact with. Studio owners and managers should listen more to their assistants' suggestions. And maintenance guys should be creative. I don't think it's enough for the maintenance department to be able to set up tape machines efficiently, or fix a microphone or run wires under the floor. It's nice when they think creatively and say things like, "What would you think if we had infrared remote controls for the tape machines?" or some crazy idea. You want them to come up with those kinds of ideas, to try to make it better. It also keeps a vibe happening.

Bonzai: Tell me about your transition from engineer to producer.

Clearmountain: I think it's a natural transition. Who spends more time in the studio recording and mixing and doing all the things that producers are involved in?

Bonzai: Did you get any flack at first? "This guy's an engineer; he's not a producer." How did you establish yourself? What artist made you recognized as a producer?

Clearmountain: When I started at Power Station, Tony Bongiovi wanted me to get involved as a producer. He had a deal with Sire Records at the time, and they were giving him punk rock bands. This was around '77 to '78. He said to me, "If you'd like to co-produce one of these bands, it'd be great." It was good for him because I was the engineer, so he didn't have to worry about that part, and it took some of the pressure off of him. Tuff

Darts was one of those bands; The Rezillos was another, and Jorge Santana, Carlos' brother. So Tony got me involved in these projects and I started learning. I figure the first ten albums I produced were part of the learning experience, although I'm still learning and hope to continue.

Bonzai: Let's talk about some well-known artists you've produced. Hall & Oates... a pretty heavyweight act.

Clearmountain: They did two tracks with me for a greatest hits album called *Rock and Soul, Part Two*. Two songs called "Adult Education" and "Say It Isn't So." I don't know how they got turned on to me, but it might have been through their drummer, Mickey Curry, who I had worked with on the G.E. Smith and Bryan Adams albums. So we did those two tracks and it just went so well; we had a great time. So they said, "Great, let's do an album together."

They had this great band—T-Bone Wolk, G.E. Smith, Charlie DeChant and Mickey Curry, one of the best rock drummers in the world. We ended up doing the whole album [*Big Bam Boom*], except for one-and-a-half tracks, with LinnDrum machines. Drum machines are good in their place; for many songs they're great. But I had a lot of trouble with it. There are a few songs on that record that I thought could have been so much better if they just had the band go into the studio and play them. Don't get me wrong—I think it came out well anyway, thanks to Jimmy Bralower, who was programming the Linn.

Bonzai: In my experience in the studio, the drums were the most difficult to record—hardest to get a good sound that would satisfy the producer, the drummer and everyone else.

Clearmountain: To me, the drums are about the easiest thing. I think guitars are when it starts getting difficult.

Bonzai: Do you use a lot of mics on drums?

Clearmountain: Yeah, maybe that's why it's easy. I use about 16 mics: I top- and bottom-mike the tom-toms, two mics on the snare drum, two mics on the bass drum. I will find two different mics that sound different, but I like certain characteristics of each one, so I will use them both.

Bonzai: Would you like to give away a secret or two?

Clearmountain: Well, for a snare

drum I will use a Shure SM57, 'cause it's got that "crack" to it, a midrange kind of crack. But it doesn't have a high top end on it—you don't get much snare. So I combine it with an AKG 451, which has a real crispy, bright top end. I put them both on the top, because when you mike a snare drum underneath, very often it just sounds distorted, like the head is broken.

On bass drum I'll use a Sennheiser 421. I like the slap of the 421 on the bass drum, but I also like the meaty sound of an AKG D-12. I use both mics, with only one head on the drum. And then it's a matter of placing the mics, moving them around to find what works the best with which one closer and which one farther away. You can't place them too far apart, because you'll get into phase problems.

But sometimes you can use the phase difference, the time between the sound getting to one mic and then getting to another mic placed farther back, to your advantage. On guitar amps, that comes into play a lot.

Bonzai: When most people mention your name, they associate you with Bruce Springsteen. You started with him when you mixed "Hungry Heart" from *The River*.

Clearmountain: Yes, and the next album I worked on was *Born in the USA*, following *Nebraska*, which he did at home.

Bonzai: The massive live collection must have been quite a challenge, using tapes from all over the place, lots of engineers...

Clearmountain: Not that many engineers, actually. Toby Scott recorded most of it. Jimmy Iovine recorded some of the early stuff. Generally, it all sounded pretty decent. I did a lot of snare drum sampling—just about every song has a snare sample—which is really a challenge.

Bonzai: Triggered by the original snare?

Clearmountain: Yes, which is tricky with someone like Max Weinberg, because he's an incredibly dynamic drummer. He plays a lot of very fast snare rolls. It can be tricky, especially with all the monitor leakage and stuff that goes on onstage.

Bonzai: Did you feel that you tampered with the original sound in creating the collection?

Clearmountain: No, because I know Max well, so I know the kind of

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sound he likes and what he was trying to get. Because the mics were being shared by the P.A., I don't think it came across in the recording. Very often I used his sound that came from maybe *Born in the USA* or various things I recorded him on. I try to be very careful to keep it consistent. I don't want it to sound like a machine. I take incredible pains to make it sound as real as possible, to keep it in character and follow the dynamics of the original snare drum.

Bonzai: Have you worked closely with Bruce through all these years of mixing?

Clearmountain: Oh, yeah, Bruce doesn't let much get by him. As most producers do, he gives me a few hours to get my mix together and listens to my concept. If he doesn't like it, he'll just tell me it isn't what he had in mind. He'll point me in a new direction. But usually he likes what I come up with and he'll just go through a bunch of different options. He'll ask for a little more echo on the vocal, or less echo on the guitar, things like that. We'll end up with 20 or 30 mixes on tape, so he can listen to them on his drive back to New Jersey and decide which version he likes best. He does really get involved, and is always there.

Bonzai: Let's talk about digital audio. What were your first experiences?

Clearmountain: I think my first experience was recording a Dire Straits show in London, at Wembley in '85, which I mixed. We had two 24-track Sony machines for a 48-track recording. I learned a lot—first, that the machines must be synchronized properly while you're recording 48-track. When you're recording digital and it will be locked to picture later, the machines should be locked to video sync.

Bonzai: What's happened since?

Clearmountain: There are a few reasons I didn't go headfirst into digital. First, there is the expense. It's hard to justify digital in a recording budget, because the machines rent from \$400 to \$1,000 a day. Many times I'd rather spend the budget on an extra two weeks of recording than doing it digital. But the prices have come down lately. I bought my own machines, so it's a lot easier for me now.

Bonzai: What did you buy?

Clearmountain: I bought a [Sony PCM-] 3324A and a 3348. They're fantastic, especially the 3348—the ultimate in tape recorders. The transport is amazing. My only complaint about the 3324 is that the transport is sluggish. That put me off, because I like to work fast and I like the tape to rewind right away. Sony and I have a very good relationship; we have meetings all the time. The first time I used the 3348, I talked at length [with Sony] about things I thought could be better. Nothing major, just a few little things.

Bonzai: Like what?

Clearmountain: My big bone of contention is that they have changed the format of the analog tracks. Most people, when they edit, don't really bother with the analog tracks, so it's not a problem. They just edit on the fly, then find their edit point by hitting a button on the locator that stores a number as the edit point goes by. Then they just locate to that number and do their edit.

I like to do that, but I like to scrub the tape—rock it back and forth—like you would with an analog tape, which you do using the analog cueing tracks. With the 3324 it works well because it has analog cue tracks and you just listen to those. You record your monitor mix on those tracks, then switch to them and rock it. On digital, of course, you can't cue-rock the tape; you don't hear anything. With the 3348 they changed the format of the analog tracks to a "pulse width" recording, which is similar to VHS Hi-fi. With that, you can rock the tape, but it mutes when you're rocking it really slowly and homing in on the edit point. It mutes because the signal degrades so much at very slow speeds.

Bonzai: When you refer to editing, are you doing an electronic edit?

Clearmountain: Yes, I'm not actually cutting the tape; I'm recording from one tape to another. You record your first segment over to the new tape and when you get to your first edit point, you record past it and stop, then find where you want to edit to ... say, a different take. Then you cue to your spot on the piece you want to edit in from the playback machine. You synchronize the two machines, which is very simple with the Sony machines. You just press the "slave" button and they find an offset right at the spot where they're parked. The

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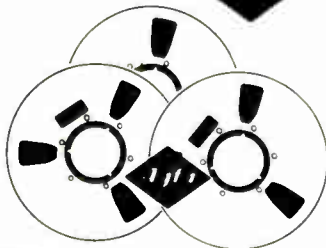
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two machines lock at that point and then you can store that as a drop-in point. Then you press auto-punch, the machines rewind a bit, lock up and when they get to the edit point, just drop in automatically.

Bonzai: What will happen in digital during the next few years?

Clearmountain: I think the next thing is recordable CDs. If the record companies thought that digital cassettes were a threat, wait 'til they get a load of recordable CDs. If they can somehow work out the bootlegging problems, it'll be nice to be able to take a CD home from the studio.

I own four DAT machines, which have been wonderful. I actually mix albums on DAT, transfer to Sony 1630 and do my editing in the mastering room. They're so convenient, and I can have my machine at home to listen to the mix. It's exactly right; no more listening to a cassette that's running slow, or the top end isn't quite the same. I listen to DAT and my mix sounds exactly as bad as it really is!

I think Sony has taken linear tape as far as it can go, with 48 tracks on half-inch tape. Past that is solid-state memory, hard disk, optical disks... other types of storage.

Bonzai: With all this new technology, do you think you'd like to go back and redo one of the records you gained fame for in the past?

Clearmountain: No, not really, because those records are what they are. I don't like the idea of redoing history. If someone asked me to remix a Beatles record I'd probably do it, just because it's the Beatles, but I don't think it's really right. I was a huge Traffic fan, and their first album was pretty weird-sounding. I used to think if the album were mixed better, it would be great. I listen to it now, and it's just great for what it is. If it was mixed differently, it wouldn't be that album anymore. It's history and it should be left alone.

Bonzai: I would imagine that any newcomers reading this would start salivating, wanting to become an engineer. Is it getting harder to get into the business because of the technical leaps? You can't just roll in off the street and become an engineer. Any words to the wise?

Clearmountain: Yeah, forget it. [Laughs] First, you should have a bit of musical background. You don't

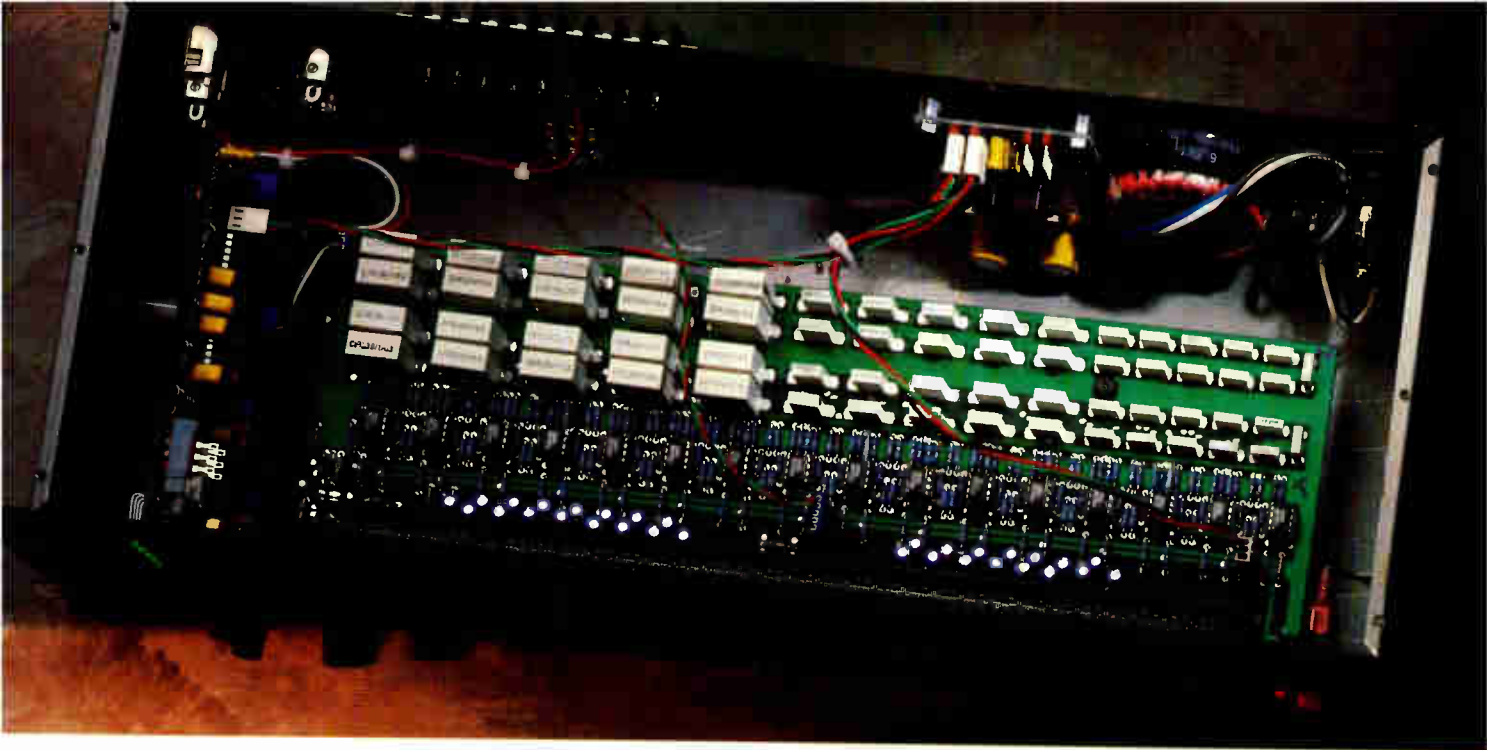
have to be able to sight-read, you don't have to be a virtuoso on the violin, but you should have some background. You should know about time signatures and keys, basic stuff. Music is what you are dealing with, and that is more important than the technology. The technology is easy. They make it easy for you nowadays. It's just a matter of pushing buttons, and you turn the knobs until it sounds right. Don't get me wrong, it's good to know about the technology, but just going to an audio engineering school isn't enough. You should take some music classes as well.

Also, there's something I'd like to bitch about. I've come across a couple of assistant engineers who didn't know their job. I'll look at their track sheet and it has no information on it. They haven't paid attention. "This is the song from yesterday, this isn't what we did today. Can't you see we don't have a guitar? There's a keyboard on this track. Put more information down. Put the date down and what kind of mic we used." I'll ask if they just started, and they tell me they spent \$5,000 on an audio engineering course. They say they were taught about capacitors and Ohm's Law. "Yeah, but they didn't teach you how to fill out a track sheet? You don't know how to do a Total Recall setup on an SSL?"

Bonzai: Any other gripes?

Clearmountain: One last thing. If you buy a Warner Bros. CD that was recorded on analog equipment, they put this disclaimer on the back: "The music on this compact disc was originally recorded on analog equipment. We have attempted to preserve as closely as possible the sound of the original recording. Because of its high resolution, however, the compact disc can reveal limitations in the source tape." I bought the Pretenders CD, which I produced, for my brother. He opened it and read this disclaimer and said, "Does this mean that this CD isn't as good as this other one that was recorded digitally?" My God, people probably pick these things up and read this and maybe don't buy the CD because they think there are "limitations in the source tape," whatever that means. Why do they have to do that? It's really the producer's choice, the artist's choice. A lot of people prefer to record analog. It doesn't mean that there is anything wrong.

- CONTINUED ON PAGE 222



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by Richard Elen

APRS 1989

A PERSONAL VIEW

Editor's Note: Richard Elen provides an overview of the highlights of this year's APRS—now generally recognized as one of the leading pro audio exhibitions in Europe. It should be pointed out that this overview makes no attempt to be comprehensive; it does not claim to cover all new products, only those that stood out in the author's mind.

Britain's Association of Professional Recording Studios has been holding annual exhibitions of professional audio equipment for 22 years, and every year the show seems to get bigger. For the fourth year running it was held

at Olympia 2 in Kensington, West London, and this year it attracted a record 180 exhibitors. Attendance was on par with last year despite the UK's current exorbitantly high interest rates, making loans for reequipping very expensive.

Despite its increased size, the show did not see a vast number of innovations on the hardware front. Some items were on show for the first time in the UK, but they had generally been seen at the European or Los Angeles AES conventions or at NAB over the last few months.

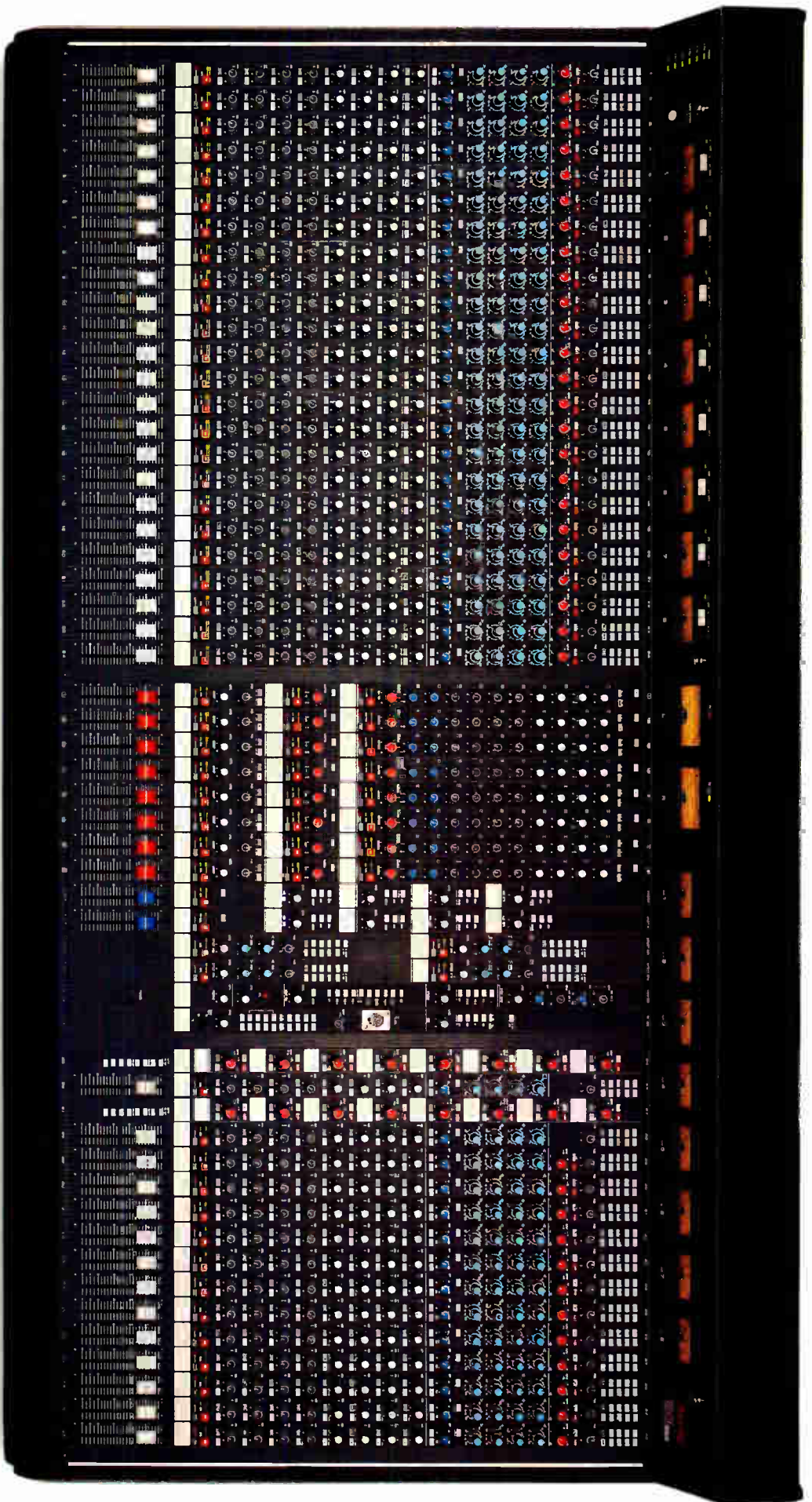
APRS was taking up some space of its own on the expanded third level, showing its new Tape Labelling System



Studio Spotlight: Rockfield Studios

Generally acknowledged as the world's first residential facility, Rockfield Studios was established in 1965 in Monmouth, Gwent, England. A recent upgrading of its two

separate areas, each with its own control room, live room and studio, features the world's first 60-input Neve VR Series console with recall and Flying Faders automation. Accommodations consist of 18 apartments with whirlpool baths and power-showers. An indoor leisure complex is currently under construction.



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and promoting associate membership in the British Record Producers' Guild. The TLS enables everyone handling a studio tape to know exactly what it contains, avoiding confusion. There's also a "tape history" label. The TLS forms part of a comprehensive APRS "Code Of Practice" to be released later in the year.

TAPELESS RECORDING

Located on the top floor was Sypha, a consultancy partnership operated by Stella Plumbridge and Yasmin Hashmi that is dedicated to supplying information on tapeless recording systems. As well as selling copies of their report on the subject (which sounded expensive at £100 until you saw how much hard research there was in it), the pair were providing guided tours of the dozen-and-a-half tapeless systems on view at the show. David Whittaker, formerly of New England Digital, was sharing a booth with Sypha to promote Digital Solutions, his new company specializing in the development of custom hardware and software for digital audio.

The most interesting of the tapeless systems at the show was the Sonic System from San Francisco's Sonic Solutions. The setup is based on an Apple Macintosh—at least a Mac II and preferably a IIX—with two NuBus cards. It was expertly demonstrated by Mary Sauer at the FWO Bauch stand.

The first card is the so-called SSP (Sonic Solutions Processor). It contains four signal processors to provide four digital I/O channels in AES/EBU or Sony Digital Interface Format (SDIF). The data paths and processing are 24-bit, while the mixdown buses sport 56-bit capability. The SSP runs at 44.1 and 48kHz sampling rates. It also controls large hard disks for digital audio storage and editing. The second card is named NoNoise. This astonishing bit of circuitry enables the system to remove clicks, pops and even drop-outs—and ultimately tape and disk noise, too—without damaging the original.

But the hardware is invisible in normal use: it's inside the computer. What you do see is some stunning software design. The Sonic System is the simplest "desktop audio" setup to use that I've ever seen. Thanks to the power and accessibility of the Macintosh system software, coupled to some

very tight programming by Sonic Solutions, it is truly intuitive.

In the U.S. the system sells for a good price: Sauer quoted me \$44,100 (easy to remember!) for a 56-minute system including the Macintosh. Bauch was a little cagey about the UK price, but it looks as if the same system would sell for UK £38,000. The price difference is due partially to the fact that Bauch never skimps on user support, but also because the company buys the Macintosh machines in the UK, where they are considerably more expensive than in the States. There is a furor going on in Britain right now over "gray importation" because of that price difference, and to avoid seeing its users ending up with no support, Bauch has become one of only four music/audio VARs for Apple in the country.

Sharing some of Sonic Solutions' basic operating principles is the Sound Maestro from Audio Design. The Atari-based system is aimed squarely at the CD premastering market and is already having a good deal of success there. It

signer II—with an audio accelerator board for the Macintosh and a custom A/D interface.

On the subject of external A/D converters, Cambridge, UK-based Data Conversion Systems launched its new DCS-900 A/D converter system at APRS. The 900 is an oversampling system, operating at 128-times the final output rate. The unit features transformerless, balanced analog inputs and two serial SDIF-2 and AES/EBU digital outputs. External word-clock sync is provided as well as internal 44.1 and 48kHz on-board crystal clocks. The 900 is designed to replace the converters on the front of existing digital gear. It's handled by Syco/Stirling in the UK.

Also running on the Macintosh was the Dyaxis system from IMS. While the system is well known to Stateside engineers, it is now available in the UK via SSE Marketing, and made its first appearance at a UK show.

ANALOG RECORDERS

Have you ever seen a professional tape recorder assembled in under 15 min-



Lyrec, of Lyngby, Denmark, debuted "Frida," a portable broadcast recorder that features a modular design.

doesn't have the facilities that the Sonic Solutions system offers, but it does the job well and is under half the price. The company also showed its range of Sony DAT recorders modified to allow 44.1kHz sampling and a range of digital I/O options, and has introduced a series of portable, low-cost digital interface boxes.

Back on the Macintosh again, Sound Technology showed a new addition to the range of music and pro audio products it distributes in the UK: Sound Tools from Digidesign. If you saw this unique system at the Anaheim NAMM earlier this year, you know that it combines the latest version of the company's immensely successful sample management program—*Sound De-*

utes? Neither had I until I went to the Lyrec Frida demo. As one engineer described the modular parts for this uniquely compact and lightweight machine (under 25 pounds and only 16×18×3 inches), another put them all together with a set of screwdrivers and some nuts, bolts and washers. The machine's features include accessible trimmers for alignment; three-speed NAB/CCIR operation; Dolby HX Pro as standard; search and locate functions; vari-wind and a single-handed edit mode. The machine is obviously portable, but you can also rack-mount it... or even hang it on the wall!

Also showing analog recorders were Bauch with the new Studer A827—designed as a replacement for the A80

—and Sony with its new analog 24-track, the APR-24.

DIGITAL RECORDERS

Mitsubishi UK celebrated its move to new premises by launching the X-880 32-track digital machine, successor to the X-850. The primary features are reduced size and weight with no sacrifice in sound quality. The X-880 is fully compatible with the 850. Optional extras include the new CS-1 chase synchronizer and a digital interface unit.

Mitsubishi machines were also used extensively on the charity record "Spirit of the Forest"—made in support of the Brazilian rainforests—which was used as part of the demo at the company's booth. The single, written and produced by A&M artists Gentlemen Without Weapons—responsible for arguably the most original album of 1988—along with more than 50 celebrities, included recording in New York, Los Angeles, London, Rio de Janeiro and even the rainforest itself. Eleven X-850s were used on the project, and the final mix involved more than 90 tracks.

Sony, of course, was showing the other major new machine on the digital tape recorder front: the 48-track PCM-3348. Although APRS was the UK show debut for the machine, there are already several in place here, and they have already been put to use on a variety of projects.

But far from the madding DASH-ProDigi wars, another digital multitrack was making an appearance at booths all over Olympia: the Akai DR1200 12-track digital recorder. This machine is compact, cheap and works exceptionally well...and now it is on sale. By the fall, Dave Caulfield of Akai UK expects more than 150 machines to have been shipped in the UK alone. He rightly points out that this figure is about twice the total number of DASH and ProDigi machines ever sold in the UK. The DR1200 makes a lot of sense to a lot of people, particularly paired with a high-quality console like a DDA D Series (as shown on Syco's stand) or a bunch of Yamaha DMP series digital mixers (once Akai has finished the interface). And at various points around the show, several exhibitors were showing Akai's S1000 sampler, complete with removable hard disk storage hooked up via SCSI—an apparently ideal combination.

CONSOLES & AUTOMATION

An impressive-looking product was the Alpha console from a new British company, Novation. While not entirely new in concept, the Alpha is certainly new in execution. The principle is simple: instead of a vast automated console you have a compact, lightweight digital control surface (in this case, just over five feet long for a 32-track board) connected by a thin serial cable to a rack of digitally controlled, analog electronics somewhere out of the way.

Console designers such as Dick Swettenham and writers (including myself) have proposed similar systems for years. Advantages include the ability to use continuously rotating rotary-shaft encoders for knobs; turning the control generates a stream of pulses, which drive a signal processor. Automation is simple in concept: you just stick some memory in the line from the control surface to the rack, and use a processor to manage it and the user interface. Novation's TDA (Total Dynamic Automation) is made possible by the latest 32-bit RISC chips and custom ICs, and it turns a concept that's simple in theory but complex in reality into something that is not only practical but, if Novation meets its goals, cheap. At around \$80,000 (£50,000) for the 32-track board there will be plenty of takers when the system is available in the fall.

Operationally, most of the TDA's control systems will be familiar to anyone who has seen Calrec or Neve assignable systems, such as on the UA8000 or the DSP. Facilities are assigned to channels with an "access" button, and you can "interrogate" a group to show the channel routing involved. Multiple channels can be controlled at once, or settings can be copied from one channel to another.

Given Neve's pioneering work on the DSP, it is perhaps strange to think of that company as "conventional" once more, but in contrast to the No-

vation, the latest Neve VR Series is a straightforward console with a remarkable pedigree. It was the V Series that brought Neve back into the spotlight four years ago, and since then the console system has shown itself to be one of the leaders in the field. The latest VR Series was on show at APRS, replete with Flying Faders automation. Launched at AES Hamburg, the company has delivered no less than nine VRs, and there are another two dozen on order.

Also first shown at AES Hamburg, Soundcraft's newest offering is the vast 3200, nicknamed "Bigfoot," not so much because of its overall size but because it has large feet, both to offer stability and to contain cables. The 3200 is a classic split console, with full 32-bus routing and 68 line inputs. Each input and monitor channel has a built-in noise gate, and the console features a good degree of centralization. The system has been very well received, especially on the technical front, thanks to the fact that Soundcraft's veteran audio electronics wizard Graham Blyth, well-known for designing some of the best-sounding and most cost-effective circuitry in the business, still has his hand in the company's designs.

Graham's erstwhile colleague Phil Dudderidge is now back in the industry, with his surprise purchase of Rupert Neve's collapsed Focusrite company. In an astute move, he has brought in former Soundcraft technical man John Studwick to look after future developments. To begin with, the company will be consolidating its position and selling its existing range of products.

Focusrite began by making a range of excellent-sounding signal processing channels, and went on—possibly overextending itself—to tackle full-scale consoles. The first two went into New York's Electric Lady (featured on the cover of this month's *Mix*) and London's Master Rock studios.

Unfortunately, the collapse of the company left a number of customers-to-be with lost deposits. Dudderidge has been careful not to take on the debts of the old company, of course, but he has said that customers who lost their deposits will get first option on a new console—and, rumor has it, a good price. But things have been moving quickly. After just eight weeks, the company is in full production on the modules front and is turning its attention to the consoles. Pete Town-



Amek Mozart

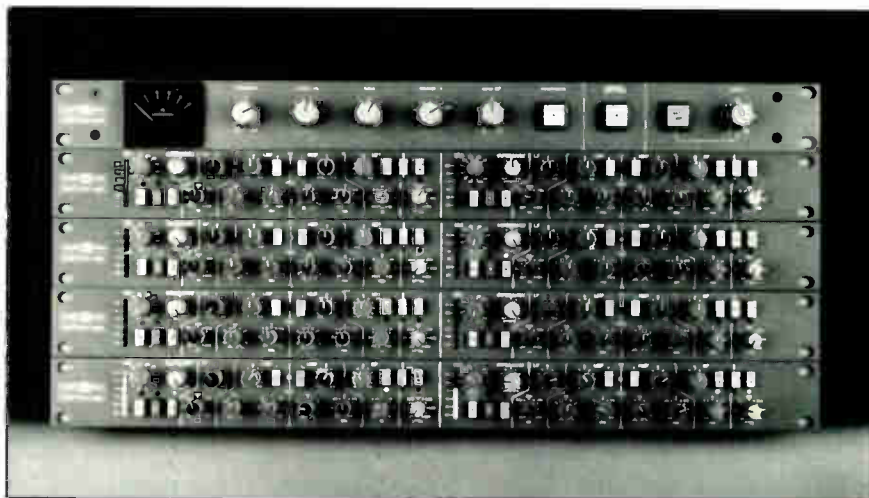
shend has ordered 16 new modules for Eel Pie, while other orders are coming in.

There was certainly no shortage of consoles at APRS. The Amek Mozart was on show for the first time in the UK, having been introduced at Hamburg. It's a development of the successful APC1000 assignable design, and adopts its "all-input" approach, where all the channels can accept any type of input. The console can be supplied with up to 80 inputs and offers 32 mix buses, 12 aux returns and 16 aux sends. A feature of the console is an onboard grouping computer, which allows the saving of configuration "pages" that can be loaded and executed under time code control. The console can be supplied with one of several types of automation systems.

Also on the automation front, DDA and Alpha Audio took the opportunity to announce preliminary results of a collaboration to integrate Alpha's Boss/2 automated audio editor system into the DCM232 production console. Data is transferred back and forth via a serial link, although the systems currently need their own control keyboards. A novel feature is the facility for capturing a few seconds of sound and scrub-

bing it to find the exact moment for a mute, sync point or other automation setting change. Track lists, edit decision lists and CMX-compatibility—even

VCA fader units from Mastermix and the MX844 computer and color monitor from Reflex. Users of both systems can upgrade.



SSL's Logic FX is a series of rack-mount signal processors based on the G Series console electronics.

record track selects—can all be performed with the system.

Also on show for the first time in the UK was Audio Kinetics' Mastermix II, combining the best features of its predecessor, Mastermix, with Audio Kinetics' Reflex automation system. The system brings together the AK2

OUTBOARD GEAR, ET CETERA

Solid State Logic released some outboard gear at APRS. The Logic FX range is a family of 1U processing units containing G Series electronics. The first two units are a dual mic amp/EQ unit and a quad/stereo compressor. Other units are to follow. The company has

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INTERNATIONAL UPDATE

also produced a parallel, bidirectional interface to link the company's G Series studio computer and Timeline Lynx synchronizers. The project is a collaboration between the two companies and allows the G Series to control up to five Lynx modules.

SSL also showed the first results of a new collaboration with Dr. Stephen Smyth of Queens University, Belfast, who has developed some unique digital audio compression techniques. APT is a new company set up to exploit these developments, and the first result was on show: the APT-X100 digital audio compression system, first shown at NAB this year. The system compresses 16-bit PCM data into four bits per sample with no apparent loss of quality. It is aimed at the broadcast market.

Audio Design showed some interesting modules from the German company SPL, including a novel kind of equalizer, the SX-2 "Psychodynamic Processor." There are two primary bands of operation, a "subsonic" band (around 20 to 250 Hz) and a mid-high band at 1 to 22 kHz. A processor in the unit evaluates the input signal and corrects phase relationships, and can be used to enhance aspects of the harmonic structure. Unlike exciters, which create harmonics, the SX-2 manipulates existing ones and is a good deal easier to use than to talk about! It sounds excellent.

Bruel & Kjaer used APRS to introduce the 4012 cardioid microphone. Described as a logical progression from the 4011, it offers even higher specifications. It can handle 168 dB before clipping, for example, which is 10 dB better than the 4011.

And finally, to return to the subject of rainforests, it is perhaps time for console manufacturers and others in our industry to think carefully before they clad their gear in exotic hardwoods. It's now entirely practical to get wood from sustainable forest sources and still have a piece of pro audio equipment look good: manufacturers should at least be conscious of what they are doing when they order materials of this type. ■

Hailing from Glastonbury, England, Richard Elen is a highly respected engineer, producer, journalist and consultant with 20 years of experience in professional audio.

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by Guillaume J. Schouker

JEAN-MICHEL JARRE'S CROISSY-ON-THE-SEINE

French composer and synthesist Jean-Michel Jarre, the son of famous film-score composer Maurice Jarre (see *Mix*, November '87), has attained his own international fame. He started his career in the late '60s, experimenting with electronic music and later composing soundtracks. In 1976 he released his first album, *Oxygene*, which had been recorded on 1-inch, 8-track at his home studio. The album was a worldwide success. Then came his big-selling *Equinoxe* LP in 1978, also recorded in his Paris home studio, this time on 2-inch, 16-track. A year later, Jarre performed at an outdoor concert in the center of Paris, attracting more than one million spectators—enough

to put him in the pages of the *Guinness Book of World Records*.

Jarre released his third album, *Les Chants Magnetiques*, in 1981, and also embarked on a Chinese concert tour through Beijing and Shanghai. His 1984 album release, the globally successful *Zoolook*, was recorded in New York City and featured guest appearances by Laurie Anderson and Adrian Belew. His American concert debut, "Rendez-Vous Houston," a mega-event that involved pyrotechnics and video projected onto the skyscrapers in that Texas city, was attended by over one-and-a-half million spectators (see *Mix*, August '86).

Jean-Michel Jarre is known around



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the world, but few know about the workings of his unusual home recording studio.

Situated in a residential neighborhood in the suburbs west of Paris, Jarre's Croissy Studio (named after the town it's in) borders the Seine River. "Formerly, it was a stone garage," says Michel Geiss, Jarre's partner and keyboard consultant. "In 1979 the studio was put in, in its first configuration, with a Tom Hidley design. It was only one big room with the MCI 600 Series console and automation system in the middle, an MCI JH-24 tape recorder, UREI Time Aligned 815 monitoring and various synthesizers all around the same room." Three years later, Jarre decided he would prefer a more conventional studio arrangement with a separate control room.

Jean-Pierre Lafont, well-known French acoustician and console maker, was hired to redesign the studio. "The ceiling was not tall enough and could not be raised, so it required digging deep into the ground. We also had to pull down the partition walls and divide the large room into two distinct rooms," Lafont says. The work lasted six months, finishing in March '83. "Knowing that Jarre is rather exacting, the acoustics as well as the finishing touches had to be perfect. Everything was important," recalls Lafont. "Jarre was hunting every little sound that was somewhat of a noise; any air conditioning system or lighting source that could vibrate had to be eliminated until we had complete silence."

A triple partition made of three floating walls separates the studio and control room. In the control room, the floor floats on separated concrete slabs. The studio's oak floor embraces two different acoustic concepts: beneath one part are floating concrete slabs, which give a muffled sound; beneath the other part are cushioned rafters on rubber studs, which provide for a more reverberant floor.

Lafont explains the acoustical principles of the control room: "The side walls absorb direct sounds and prevent interferences from primary reflection. The sound goes straight to the engineer. But there are also wood-covered panels that re-echo local resonances in order to have rather long reverb time. This is the reason we have this clear, live-sound feeling."

Similarly, the serrated ceiling reflects the ambience above the console. In the back of the control room, polycylinders (some filled with fiberglass wool) absorb the low frequencies and reflect high frequencies in all directions. "There are no phase nodes. If we put the microphone of a spectrum analyzer here and in the back, we have a steady graph," Lafont says. The polycylinders are covered with acoustically transparent fabric.

The 13 x 23-foot control room contains an MCI 636 Series mixing console with eight auxiliary sends per channel, added by Lafont. The automation is the Diskmix system by Digital Creations, an IBM PC package based on SMPTE time code. Monitoring is via a Quedsted system, ordered directly from Roger Quedsted in England, along with Auratones and Yamaha NS-10Ms. To the right of the board is a small, air-conditioned room housing two Studer A820 24-track recorders, both fully equipped with Dolby SR (synchronized with the Adams-Smith 2600 system), and three Quedsted power amplifiers. In the control room and on both sides of the console are racks with plenty of outboard gear, including AMS digital delay and reverb, Yamaha REV7, Lexicon PCM70s, Korg SDD-3000 digital delays, Roland DEP-5s, a TC Electronic 2290 sampling delay, Lexicon 480L, plus much more. Other equipment includes a Studer A820 1/2-inch/1/4-inch convertible tape machine with Dolby SR, Sony R-DAT DTC 1000, Sony Beta-max for F1 transfer to Beta and a Sony U-Matic deck. Mics include Schoeps, Neumann U87, AGK D-222, Electro-Voice RE20 and Sony C-48.

Jarre says, "The studio I own today is not a studio that I had hoped and decided to build one day. It [developed] year after year. Even when I was living at my parents', I had Revox tape machines in my bedroom. Since then, I always worked at home. Little by little I changed my equipment. Technology does not necessarily help to be clearer. The more advanced the technology, the more you need to know precisely what you want to do."

The control room is separated from the music room by two sliding, double-glass doors. The acoustic design in the 16 x 28 x 9 studio, like the control room, involves polycylinders and paneling. In addition, one wall with a reverberating surface can be covered by an electrically controlled curtain to

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In this room, a multitude of analog and digital synthesizers are ready for use. Jarre's master keyboard is an Elka MK 88, "because it is a plastic keyboard," he says. "I am against the idea of having a piano touch. If I want a piano sound, [a piano] is of course better, but if I want to play strings or chord sounds, I prefer a plastic touch. At present, I am working with the Elka company on a varying keyboard touch in order to be able to adjust it according to what I am playing."

With Peter Gabriel, Jarre was one of the first in Europe to purchase a Fairlight CMI Series I a few years ago, then a mono system. Now he also has the Fairlight Series II and Series III. Jarre says he often works on the Akai/Linn MPC-60 sequencer/sampler/drum machine and the Geiss Matrisequencer 250. Built by Michel Geiss in 1979, the Matrisequencer is a matrix sequencer conceived by Geiss and Jarre at a time when microprocessors did not exist.

"It is a 100-note mono sequencer or 2 x 50-note duophonic. Notes are programmed with small plugs that set pitch and length. The slurs and attack

of notes are also programmable in columns. Even if technology is [now] beyond that, it is a system Jarre likes using a lot because it is very visual," says Geiss.

"We can change the matrix in real time, go from one matrix to another, loop it if necessary, reverse it and so

"The studio I own today is not a studio I had hoped to build one day. It developed year after year."

on," says Jarre. MIDI out has been added to the original configuration.

Jarre's extensive collection of electronic sound producers includes: three Elka Synthex; Emulator II with CD-ROM drive and Optical Media's sound bank, *Universe of Sounds*; Roland D-50 and D-550; Yamaha DX7II MD; Roland GM-70 MIDI converter and SPX-80 SMPTE/MIDI synchronizer; Dynacord ADD 1 and ADD 2 Advanced Digital Drums; Roland M-160

16-input mixer for the synth premix; Simmons RDB 400 rack; Moog analog synths; ARP 2600 and ARP 2500. His Atari ST computer uses *Notator* software for editing and printing out scores; his Apple Macintosh II works with *Sound Tools* software from Digi-design. The most recent purchase is the Akai S1000 stereo digital sampler with the 8MB memory extension and hard disk option.

You also can find an Elka AMK-800 with special keys, an exact replica of an accordion with the Italian button system, and a unique synthesis machine called Acxel from Technos. This last device allows additive synthesis and resynthesis. The principle is to draw sounds on a touch-sensitive graphic tablet. Harmonic amplitude envelopes and frequency envelopes appear in red. "This machine has 512 oscillators, but it can go up to 1,000 with two additional internal modules," Geiss says.

When asked why he uses digital outboard equipment but not digital multitrack recording, Jarre responds, "I am not a technology maniac ostensibly to buy every new [piece of] equipment. Today, digital recording is still heavy-handling. To have to add

—CONTINUED ON PAGE 288

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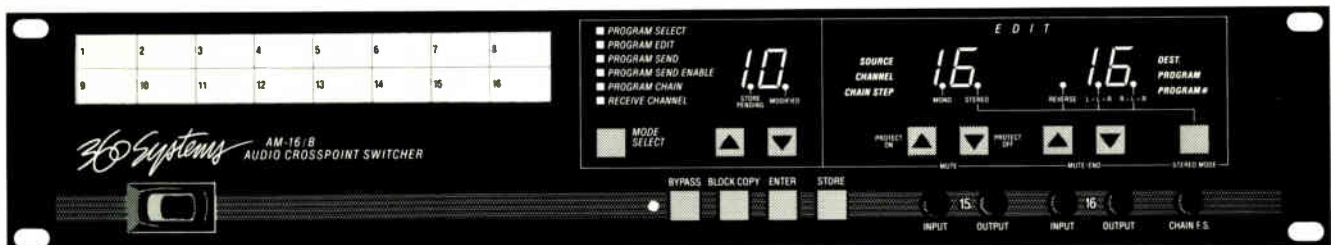
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by David Goggin

SPARS AT 10

AN INTERVIEW WITH JOE TARSIA

Joe Tarsia is the founder of Sigma Sound and was the first president of the Society of Professional Audio Recording Services.

Mix: Can you take us back to the founding of SPARS?

Tarsia: In the '70s, it was not unusual for studios to be solidly booked for months in advance. That was the state of the studio business in June of 1979 when 15 studio owners met in Ft. Lauderdale as the guests of MCI. It was from that meeting that SPARS be-

gan to take shape. At the time, *Billboard* listed 314 24-track studios in the U.S., and it was safe to say that most of them were busy. Our reason for forming SPARS was not for the purpose of drumming up more business, but rather to open a collective dialog with our customers—mostly record companies—and with our suppliers and the pro audio manufacturers. We believed that the studio was the one who could be most sensitive to our clients. We should be the ones to dictate the form of recording equip-



SPARS board members, 1988. (Front, L to R): Joe Tarsia, Sigma Sound; Howard Schwartz, Howard Schwartz Recording; Murray Allen, Universal Recording. (Rear, L to R): Nick Colleran, Alpha Audio; Mack Emmerman, Criteria Studios; Chris Stone, Record Plant; Bruce Merley, Clinton Recording; Guy Costa, former vp Motown Records; David Porter, Music Annex; Gary Helmers, former SPARS executive director; Dwight Cook, Cook Sound & Picture Works; Shirley Kaye, SPARS executive director; Richard Trump, Triad Productions.

ment and the direction of new studio technology. To that end, I feel that SPARS has been very successful. Many technical features and practices that are commonplace today in the studio are a direct result of SPARS input and interfacing with our clients and suppliers. The studio owner was no longer subject to abstract views of the manufacturers, and the industry grew and prospered because of it. The need for professional audio services exploded.

Sophisticated audio is now an indispensable part of film, video, multi-

image programs, advertising and corporate communications. But with all this growth, today many studios are in a constant struggle to survive. SPARS has consistently paralleled changes in the industry, and our challenge is to continue doing so in the '90s.

Mix: How did it feel to be elected the first president?

Tarsia: I was thrilled, particularly because I was chosen by 15 people whom I respected so much. It was great to be heading an organization whose members were genuinely excited about taking a new stand in pro audio.

My first goal was to create an indus-

try awareness of SPARS and its purpose, then to establish a communication network among its members. Establishing a network was easy, as we all felt we gained by just being in each other's company—especially in discussions of new technology, client relations and studio business in general. We could informally get together and discuss simple, everyday studio practices such as phone and catering charges, how we handled cancellations, downtime, rates, late starts, what auxiliary gear qualified as a chargeable rental, and so on.

You know, it wasn't so long ago that the hourly rate went up if you went past 6 o'clock, and if you went past midnight the rate went up again. Nowadays, studios look to give a client a break if they record late at night. In just that respect, the business has changed a great deal.

Mix: A complete reversal.

Tarsia: Exactly, because we have reached a point in this industry where there are more studio hours available than people who want to use them. As long as this situation exists, there will be downward pressure on rates. Another problem is the practice of labels advancing budgets to producers instead of paying studios and musicians directly. This practice has led to some producers cutting corners and skimming budgets. The result is studios lose the work and labels get less than they paid for. It's a problem I believe SPARS should address.

Mix: Could you elaborate on the SPARS interface with manufacturers?

Tarsia: This was one of our initial concerns. We wanted the money manufacturers spend on product development to be spent on products we really needed, rather than on some idea for a device from an electronic engineer who may never have attended a recording session. It was common for new products to be way off-base. We felt that if we had a better dialog with the tape recorder, console and other equipment manufacturers, we could get better product. I remember one meeting where Chris Stone was almost screaming, "We need more sends on these consoles!" We were starting to use different types of echo and more effects, and we needed more sends. Before that, if you had one echo send and a cue send, it was enough.

Mix: Was SPARS successful?

Tarsia: Absolutely. In some cases we

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asked for and anticipated changes that are still coming to fruition. We wanted to be close to the manufacturers and work with them to push the technology to the next level, while still maintaining a realistic view of the market and what our clients could afford.

Mix: How would you compare today's operating expense versus profit with ten years ago?

Tarsia: The studio owner doesn't have it easy today. If you want to be in the big leagues, it's a lot tougher than in the past. On the other hand, a lot of smaller operations are doing a hell of a good job and making an impact. In the '70s, there was a great delineation between a semipro and a pro studio. They were worlds apart, and you could recognize it the instant you pushed the play button. Today, the difference is not as defined for two reasons: these new small-studio operators know a lot more than their predecessors; and low-end recording equipment generally is much better today. I think SPARS can take some of the credit on both counts because of its communication with the industry

at large and its interface with manufacturers.

Anyone who is aware of what SPARS is doing knows that our membership has expanded to include every level of studio that strives to provide quality audio services. The mix really works, the fresh blood brings new ideas and techniques, and us old-timers help prevent them from reinventing the wheel. Both benefit. All of us must be sensitive to what the client wants. It seems today that many producers, at least for part of their productions, will settle for less studio sophistication in exchange for more studio hours. If a lower-end studio owner believes he can up his rate by installing a high-end console, he may be in for a sad surprise. Know your niche, and if you want to raise your niche, make sure the market exists before you take on the debt. To get back to your question: in 1978, a top-of-the-line console cost under \$100,000, and Sigma was getting \$150 an hour for studio time. Need I say more?

Mix: What have you learned in ten years?

Tarsia: There is no such thing as a

pat hand. If you are going to survive, you've got to be ready to change with the times. As a studio owner, it was my intention to be on the leading edge no matter what the cost, or in some cases, the state of the product's development. We had to be first. For example, we were one of the first studios on the East Coast to offer 24-track recording and Dolby. We were the first studio in the nation to successfully introduce automated mixing, we had the second SSL installed in a New York music studio, etc., etc. As the business became more competitive and rates stagnated, there were obviously fewer dollars that could be risked on innovations. We had to learn to be careful. We could not make a wrong purchase, and we could no longer be as involved in the manufacturers' R&D.

Mix: What's your advice for survival in the '90s?

Tarsia: I would caution anybody against spending too much on new equipment. The key to success is more than just technology. It's service and competent staffing that gains the trust and the confidence of the clients. Technology is not the sole way to

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success, and you should never invest beyond what you can comfortably support. At Sigma I've learned that while clients tell you they want every new bell and whistle, they may not be willing to pay for it. You must carefully choose your purchases to suit your clients and provide a fair return on investment. I have always believed that as important as the hardware is, it's the people that matter—without a dedicated staff, you're lost.

Mix: Who do you look for?

Tarsia: I want people who are like me. I'd rather be in the studio than any other place. You want people who love what they do and love being in a creative studio environment. A good studio person is like a good doctor—you've got to have a good bedside manner in addition to the talent. You must know how to deal with people.

Mix: How are you adapting to change?

Tarsia: I love the recording studio and being in it. I've always enjoyed making records. At last I have the opportunity to put the two together. As you may know, Sigma recently sold the assets of its New York studios. We did this as part of a reorganization and expansion. I should say here that Sig-

ma's studios are alive and well and will continue to go on. My partner of two years, Peter Pelullo, and Tony Bongiovi have come together to form Alpha International Record Co., to be distributed in the U.S. by CEMA (Capitol EMI Associated Labels). I'm excited about the prospect of doing for myself what I've helped others do for the past 30 years—make hit records.

Mix: Why should people join SPARS?

Tarsia: SPARS is stronger than ever, and a lot of the credit should go to Shirley Kaye, our executive director, and her predecessor, Gary Helmers. We have a good grass roots organization that includes the smaller markets as well as the big, and the smaller operations as well as the majors. I only hope that I have given ten percent of what SPARS has given me in return. I got an awful lot, and one of the greatest values is the networking SPARS provides.

For example, Bob Liftin recognized early the potential for audio studios in audio-for-video post-production. As he developed his own business, he lectured to SPARS members and helped some get started in what was then a new business. Having the

opportunity to anticipate changes, through conversations with colleagues and manufacturers a bit ahead of everyone else, can be very valuable. You get hints of new technology—insights into the business and where the trends are going.

This is a small industry and SPARS has a major voice in what we are going to see in the future. Just look at the impact SPARS had on the tax laws across the country. That in itself has done much for shaping the industry we have today.

Mix: Some folks say that SPARS is just an "old boys' club"...

Tarsia: At first, SPARS was elitist—but it was an open-minded elite—and looked for ways to make the industry prosper. The membership has changed, but some of the "old boys" still have a lot to share and teach. But what would SPARS be if it didn't have the industry leaders? It's a positive element, as long as we continue to grow and make sure that every segment of the recording industry has a voice.

For information on SPARS contact: Shirley Kaye, Executive Director, 4300 Tenth Avenue North, Suite 2, Lake Worth, FL 33461; (407) 641-6648. ■

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by George Massenburg

[Editor's note: This concludes noted engineer/producer George Massenburg's series on "Recording, Automation, Console Design and the Future."]

It's not difficult to imagine new applications for advanced technology in the recording studio of the future. One need spend only six or so months of 16-hour days in the studio slogging through repetitive chores, fighting to preserve acoustic integrity and acquiescing to a coexistence with all sorts of vile minutiae (mostly incomprehensible and bizarre audio aberrations and distortions). In this setting ideas for improvement leap to the forefront of the conscious mind.

In Parts I and II (see *Mix*, August, September, 1989) of this series I've observed the need for a user-cuddly adaptive work surface and vastly improved resolution in future digital audio control systems.

Now, let's head out onto thin ice.

Does anyone remember the old curse where you could get everything you asked for with the stipulation that you were then *obliged* to make use of what you had asked for in perpetuity? Were you to take that risk and imagine the music generation and processing environment of the far future, what would you ask for?

Currently, the most oft-used tools in the engineer's standard "paint box" are mixers and panners, equalizers, automatic gain control devices, all sorts of reverberators, and special effects such as harmonos, delays and the like. Not to mention digital editors and sound generators such as synthesizers and samplers.

Quite a few people are addressing the last few items, but all could stand improvement.

THE PALETTE OF THE FUTURE: MANIPULATING TEXTURE

The equalizer of choice in most of today's consoles seems to be the parametric EQ. It offers flexible control over those sources that require corrective equalization: musical instruments with fixed-frequency artifacts, rooms or surfaces with prominent modes, imperfect transducers, poor transmission media, or nonflat processing elements. For applications ask-

THE CONTROL ENVIRONMENT OF THE FUTURE

ing that we address musical values primarily, we must either accept broad approximations (such as equalizing with broad curves and low Qs, or simply accepting inharmonic anomalies) or we must do it another way (as in fixing the situation at the musical source).

In the future, one might be better served musically by equalizers that could refer to harmonic fundamentals for either polyphonic or nonpolyphonic sources. For instance, one might expect to not only be able to raise the area around the second harmonic of an existing trumpet solo, but also to vary the envelope of the level of the correction in tracking the absolute level of the instrument.

For all but live performances, the signal processor of the future would have no problem with slow attack times because it would have built-in prescience; the processor could easily look ahead and exhaustively analyze dynamic patterns. Put more simply, you wouldn't necessarily set an equalizer to a value of, say, +4 dB at 3 kHz. Rather, you would be able to say, "Boost the second harmonic with respect to the fundamental of the actual signal, and compress the dynamics so there is less EQ as the instrument plays louder." You get the picture.

Likewise, unlike today's limiter/compressor, the automatic gain control of the future would accurately de-



While audio workstations are common today, this SoundDroid system debuted nearly five years ago—perhaps too far ahead of its time.

The folds and creases of the outer ear form an elegant acoustic delay line and filter that aid the brain in determining the horizontal and vertical location of an incoming sound.

termine level trends in advance of the actual event. Available processing power would allow a more accurate determination of the effective loudness of a source. Also, with a complete idea of the past and future of any given sound, a truly civilized controller would avoid introducing upper-order artifacts, pumping and breathing.

THE PALETTE OF THE FUTURE: CREATING AMBIENCE

The ear, together with the brain, has the extraordinary ability to "place" a sound source. The mechanics of the outer ear, the folds and creases, form an elegant acoustic delay line and

filter, and serve to aid the brain in determining both the horizontal and vertical location of an incoming sound element. As the ear gets familiar with the acoustic space, it may fairly accurately interpret the sound's range in an acoustically live space. We characterize the ear's arrival paths and the filter function that emerges in terms of Pinot delays.

In the last few years, some engineers, notably Doug Jones at Northwestern University, have been able to program a computer to generate a series of filter functions that simulate sounds that seem to move up and down. One hopes that in the near future this feature alone would be

insertable in the same fashion as adding any other processing element.

But peering farther over the horizon, one is also tempted to imagine the logical evolution of that class of devices currently known as reverberators. Most current reverberator topologies are relatively primitive algorithms incorporating some number of fixed delays and some small number of all-pass filters with feedback. Although many reverberators can sound pretty impressive, to the discerning ear none have the detail of a good old plate, and none come close to simulating a great-sounding live room.

Not too long ago, John Walsh of Artec Consultants in Vancouver, B.C., designed a computer program to assist performance (concert) hall designers in the construction and decoration of buildings. The program allowed the designer to graphically construct a hall in wire-model form to decorate the model's surfaces (by describing appropriate filter factors and absorption in Sabines) and to specify a source location and a listener location such that an external signal to the computer could be heard on monitor loudspeakers as if you were sitting at the listener location.

By looking at the current trend in music mixing, one can imagine the ideal ambience generator. Currently, some multitrack music mixers—Greg Ladanyi comes to mind—are trying as much as possible to vary at least the predelay between many processors (often reverberators), the better to separate instruments in the mix. Wouldn't it be logical to imagine an ambience generator (a custom-constructed "room") built into a mixing desk whereby one might be able to effectively move a signal around within a three-dimensional environment?

Again, the requirements are addressed best by one extremely powerful machine.

THE PALETTE OF THE FUTURE: INTERCHANGEABLE DATA

First, I'd want a unified control language for the generation and modification of recorded music, to ultimately be able to share a great deal of standard data from every articulated operator in the recording studio.

New paths have begun to form in the evolution of the musical work. Until relatively recently, music for performance was published and archived by way of ink on paper, and a

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well-detailed system of notation conveyed enough musical detail to allow others to convincingly reproduce even complicated orchestral works; and while we have not actually heard Beethoven conduct one of his symphonies, we think that we have gotten to know what he was trying to say by listening carefully to interpretations of his scores.

With the advent of the MIDI protocol, most new electronic musical instruments communicate, store many types of musical data and allow sophisticated performance editing. But MIDI is limited in too many respects and supports relatively few devices. Even ignoring electronic musical instruments for the moment, many innovative processing devices—pitch shifters, exotic reverberators, multiple delays—that appeared in the 1970s have become standard tools in all sorts of music recording. Few have the capability to share control parameters among different processors of the same family. And many more tools, such as old or exotic mics, tube limiters and mic preamps, and even strange nonlinear devices like guitar amps, have been reappraised with a less parochial... a more *musical* ear.

Exotic devices are regularly used in a large body of modern work; the assessment of their performance (in terms of useful parameters) is wholly empirical. Although many attempts have been made to expand notation, what seems to be missing in the commercial musical/technical community is the ability to thoroughly notate a musical/technical work such that it may be effectively interpreted and refined by other performers. Whether due to the increasing complexity of modern works, or to the ever-flourishing role of various new instruments, processors and methods, the need for a universally consistent technical description language can only grow.

More than likely, this extensive new notation system would be machine-readable and machine-realizable. Even if you had accurate knowledge of all of the processes involved in the mix of, for instance, the Beach Boys' "Good Vibrations," you would be hard-pressed to shop around for the witch's brew of ingredients that went into it. One would rather have automatic, accurate simulations of all possible processing elements (including distortion).

The effective application of such a

Many tools, such as old mics, tube limiters and even guitar amps, have been reappraised with a more *musical* ear.

language will no doubt require a signal processor many magnitudes more powerful than what is now realizable—a processor that is not only able to remember detailed algorithms for many standard devices and custom processors, but one that is able to "learn" an existing effect within a class of devices and duplicate it.

Andy Moorer was the first technologist I know of to envision and then attempt to execute a fully integrated music generation and production environment: the SoundDroid. Although his physical device was not successfully manufactured, and only one piece of commercial music was ever performed on it (the THX trailer), his concept of what might be possible provides us with a direction.

His concept was an integrated

music generator/processor built around an extremely powerful computer.

Will this ever happen? Well, when we get to dreaming about it, the answer is "Yes, eventually all these functions will be in one processor." To go even further, we can dream that all unique processors that are now separate pieces of equipment will be contained on a series of 3.5-inch floppy disks, holding your unique algorithms, so instead of bringing your rack to a session, you bring in a stack of floppies that you stick in your limiter. That's utopian. And like any other utopian ideal, it's a goal and a focus that I'm not sure will ever really happen.

But it wouldn't be a bad goal. ■



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by Greg Hanks

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Various sources contribute to noise interference. The source of hum and noise may be electrostatic radiation to unshielded conductors, magnetic induction in transformers, spikes in the electrical service, currents flowing in shield wiring or other fault conditions. Noise and distortion performance of any given system can only be as good as that of the components and the interconnection scheme employed. To obtain maximum performance with a given equipment installation, each of the contributing hum, buzz and noise sources must be addressed: electromagnetic interference (EMI), electrostatic and radio interference (RFI) and power line noise.

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rectly proportional to the amount of current flowing in the conductor. The magnetic fields that cause us concern are those from utility power, transmission lines, internal utility feeders and power supply lines.

A magnetic field can be described in terms of lines of flux or tubes of flux. The study of magnetism and magnetic radiation is not our intention here, but some fundamental principles bear examination:

1. Currents can be made to flow in a conductor by moving it past a magnetic field. Changing the magnetic field and having a stationary conductor produces the same phenomenon. Experimentation reveals the following: the current is dependent on the

loop area, described by the physical layout of the conductors. The current is greater if the magnetic field changes more rapidly. The rate of increase is 6 dB/octave. When a multiturn coil is the conductor, the current is proportional to the loop area, the number of turns and the rate of changing flux. The strength of the field is inversely proportional to the distance from the field. The field decays geometrically, and any currents generated by the field follow the inverse square law.

2. The permeability of a material, or the index of magnetizability, can be expressed as the ratio between a given flux density and the ampere-turns per unit of length required to establish that given flux density. This

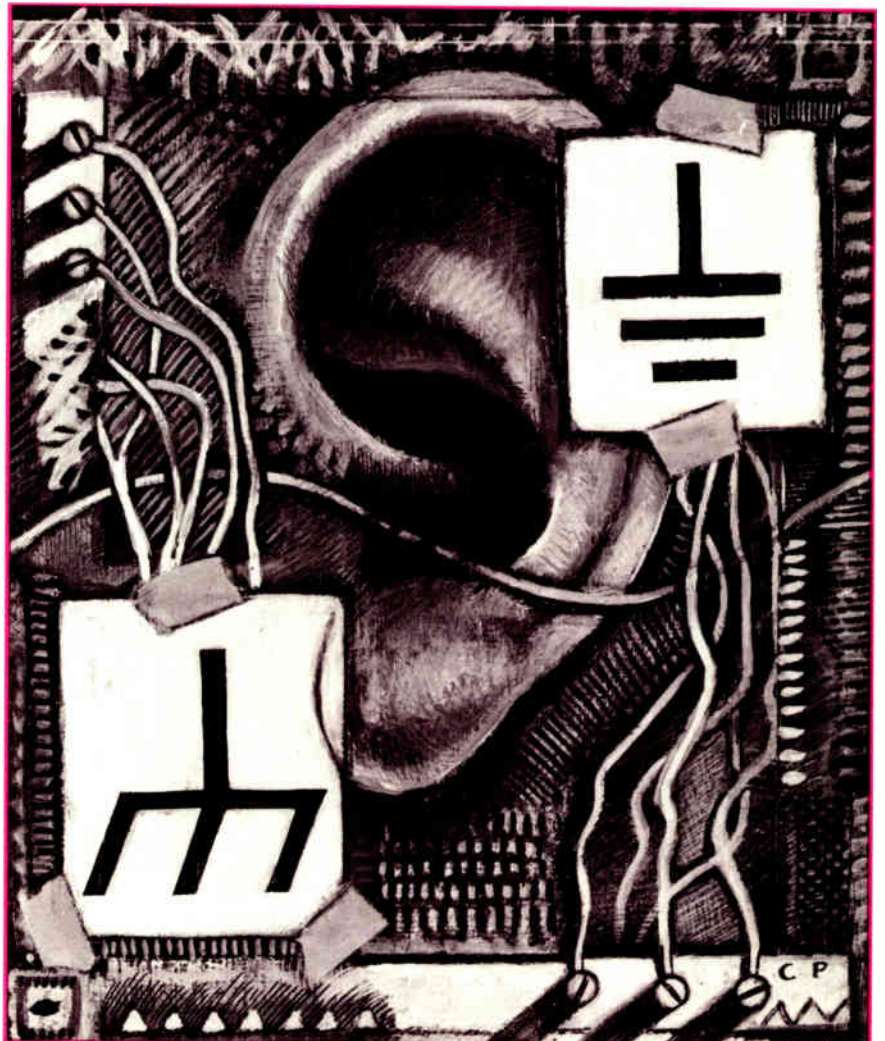



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reduces to Ampere's law: the sum of the products of magnetization force ("H") multiplied by the length equals the ampere-turns threading that loop. A resultant concept is that a very large loop of current will produce a very large magnetic field (such as when the neutral of a utility feed is run to a load along a much different path than the hot lead). Coaxial current flow produces an external magnetic field of zero; in fact, the magnetic field is not absolute zero, because the currents cannot remain truly coaxial at either terminus. The flux field propagates tangentially to the orientation of the conductor. Parallel conductors carrying equal and opposite currents will have a small external field. Symmetry does not exist near the conductors, but at a large distance this is not important. Parallel conductors often are twisted to maintain proximity and minimize residual loop area effects to reduce the external field even further.

3. Whereas electrostatic charge is a potential caused by a different charge level of two surfaces, electromagnetic flux lines are force lines that do not respect surface charges but follow permeability. A magnetic field's behavior depends upon the conductor geometry and the materials near the conductors. For example, if these materials are iron, the fields tend to concentrate in the materials, indicating that they prefer the simplest path. More accurately, the energy stored in the system is minimum when the field follows the path of the magnetic material. Therefore, a magnetic field cannot be eliminated by shielding because of the conservation of energy. Thus the magnetic field can only be reshaped and redirected. The shielding material must be permeable in order to conduct the magnetic field. The higher the permeability, the better the magnetic path redirection.

The performance of the components in many electronic circuits can be impaired by interference from magnetic fields emanating from other nearby components or originating from external sources. These fields can be produced by motors, generators, solenoids, transformers, permanent magnets and other devices.

Some components are especially sensitive to magnetic fields. For example, a cathode ray tube's electron beam will be distorted by the field(s) generated by the power and flyback transformers located in the same area. A large console's summing buses

prove especially sensitive to current demands from nearby power transformers or from utility feeds that run parallel to the orientation of those buses. Perhaps the most sensitive devices are multitrack tape recorder heads. They are constructed on highly permeable forms, using multiple turns of fine wire. In fact, when I'm chasing down the source of an electromagnetically based hum, I often use a cassette machine as a hum detector.

Several methods or approaches (not including component modifications) can minimize the interference problems associated with EMI:

Double the distance. Since the flux field density around a current-carrying conductor follows the inverse square law, as we double the distance

**ORIENTING
A MULTITRACK
RIGHT NEXT TO
THE POWER AMP
RACK RESULTED IN
12 dB OF HUM IN
THE PLAYBACK
CIRCUIT.**

between the offending conductor and the receiving device, we see the square root of the original level. Simply put, keep as much distance between hum fields and sensitive devices. I once made the mistake of orienting a multitrack tape recorder area right next to the power amp rack. This resulted in an additional 12dB of hum in the playback circuit (before we moved the amplifiers).

Orient properly. A flux field is circularly polarized and oriented tangentially to the current-carrying conductor. To minimize the influence of the flux field on the component picking it up, move the source or the receiver so as to minimize the field influence. (In our previous example we determined that the hum source was magnetic by moving the machine around, and we were able to achieve a 4dB to 6dB reduction in hum by rotation.)

Shield the source. The best time to consider the prime EMI sources within the control room is during the pre-construction stages. Common problem areas include the path of the

building utility feeder cables and the path of the sub-panel lines. The most cost-effective shielding for these lines is steel conduit. Standard aluminum and PVC tubing may provide for electrostatic shielding but provide little in the way of magnetic protection. When coping with power lines, the best method is to put distance between your receiver and the conductors, but a suitable alternative is to cover the lines with 1/4-inch, "diamond plate," steel plating. When coping with large power supplies, such as power amps and console power supplies, use a steel rack with enclosed sides. (With our power amp rack, we achieved approximately 3dB of hum reduction by employing a steel rack instead of a wooden one.)

Shield the receiver. The receiving device is usually shielded by the manufacturer. However, this does not mean the shielding is sufficient. In my experience the manufacturer can offer suggestions and materials so you can more effectively shield a sensitive circuit. (We were provided with a new head and nest shielding assembly, offering a hum reduction of about 4 dB.)

In practice, each of the above four approaches must be applied in concert with each other. Usually, it is not sufficient to experimentally apply a single method. Optimize each of the different situations. In the example above, our overall improvement in hum was in excess of 12 dB, and at the same time we ended up with a machine that was almost impervious to external hum fields, a power amp rack that generated a minimal field and—most importantly—a quiet system.

DEFINITIONS

Next, let's discuss electrostatic shielding. This is the protection provided by a conductive surface that surrounds our electronic systems and keeps out the buzz. We face a few problems when we discuss "grounding." The first is the relative flippancy with which we bandy terms about, so let's clarify some definitions.

Ground is the material that we live on. It is also the connection point between the power company's neutral line of incoming AC service and the earth. Practically speaking, we refer to the point where the electrical company's common (the third pin), the conduit and all other electrical-service metal enclosures bond to the

big ball of dirt, referred to as *the earth*. Conceptually, this is done to ensure that the maximum voltage existing at any point in the electrical service is the voltage between the conductors of the incoming service. Therefore, the term “ground” refers to the actual location of the connection between the power company neutral and the conduit. The National Electric Code (NEC) requires that this be a cold-water pipe or a separately driven grounding rod.

Technical ground is the location where the audio common(s) and electrostatic shielding system are brought together. This is a location, not a “system” or wiring point. Technical ground may or may not be taken to “ground.”

Earth, when used in this article, does not refer to the circuit point described above but to the “screening” or enclosure connection. We also use this term as “the earthing wire” to refer to the conductor used to bring an equipment enclosure to the studio “zero reference,” or technical ground. When discussing the electrical system, the third pin is the earth connection.

Shield describes an enclosure that is designed for electrostatic or electromagnetic protection. In this article, the electrostatic shield refers to the screen, or the “drain” wiring. Electrostatic shielding is what the shield wire addresses. When we refer to wiring, the shield is the conductive braid or foil that surrounds the signal conductors, whereas in theory, the shield is the electrostatic barrier composed of the given equipment enclosure coupled with the screening provided by the conductive sheath of the cable.

Common, often called “the audio common,” is the circuit point shared by both the input and output of a circuit. In the past, when transformers commonly were used for both input and output, the audio common was brought out as a connection for use in conjunction with the shield.

Neutral is the wire that feeds your electrical outlets that is most often taken to “ground” at the electrical service entrance. The neutral wire provides the return path for the “hot” lead(s) and carries any load imbalances.

THEORY

With these definitions in mind, we’ll provide a system of shielding that prevents interference from the elec-

trostatic hum field(s) in a room. Another area of “grounding” confusion concerns the difficulty that exists in drawing the equivalent circuit of a grounding system, then differentiating that from a shielding system. The most often used representation of signal common is \perp ; for earth, or chassis connection, we use \downarrow . All too often the chassis connection (earth) and signal common are both referred to with the \downarrow symbol, and where they are tied is never indicated! Here we only refer to \downarrow when dealing with wire, and \perp when describing a circuit return or audio common.

Static charge must be understood when investigating electrostatic shielding. Whenever an excess of electrons exist on a body, that body is negatively charged. If there is a lack of electrons, that body is positively

**GROUNDING
THE SHIELD
CONDUCTOR
IS NOT
NECESSARY FOR
THE SHIELD TO
FUNCTION.**

charged. Oppositely charged bodies attract each other and like-charged bodies repel. When we have two charged bodies near one another, a force exists, an electrical field. And the field that radiates from a charged body produces electrostatic force. Because the earth is at zero potential, any charged body has a field that possesses force. This force exists because the earth—for practical matters—is considered an infinite source of charge because it is at zero potential. This force radiates from a charged body and terminates at infinity, or another charge.

When surrounded by another conductor, a conductor with a charge on it radiates a field that terminates at the surrounding conductor. Any fields outside of this surrounding (shield) conductor also terminate at this conductor. If this shield conductor is taken to the earth, the (signal-carrying) conductor(s) surrounded won’t be affected by any charges outside of the shield conductor. Since the earth is at zero potential, a conduction path

to the earth brings the shield to zero potential.

Be aware that grounding the shielding conductor is not necessary for the shield to function. The potential that exists between two shielded conductors remains unaffected by any fields outside the shield, and the fields outside the shield will not be modified by the potential(s) within it. The purpose of taking the shield to ground is to make the mutual capacitance of the conductors to the conductors outside of the shield zero. What occurs in the real world involves many conductors within shielding enclosures whose mutual capacitance is not zero. The mutual capacitance is defined by the geometry of the conductors and the shielding system itself, but optimized when the topology identifies the power supply common as the ground point from which the shielding center emanates.

Capacitance, in this discussion, is multi-influential. It is the self- and mutual-capacitance of shielding and shielded conductors that make electrostatic shielding work. When a potential is impressed upon a single insulated conductor, and that potential is varied, the charges existing between that conductor and surrounding conductors vary. When a charge varies, current flows. This seems to defy the law that a circuit must be closed for current to flow. The capacitance that couples these systems provides the path for current flow. One primary source of hum in our audio signal is the capacitive coupling of the power mains to our audio commons through the primary windings of the power transformers in the system.

The other primary source of hum is “room pickup.” An electrostatic field at power frequencies exists in all inhabited areas. The field originates on unshielded wiring and terminates on the lower potential conductors in the vicinity. The room can be considered a large capacitor, with the signal-carrying conductors as one plate and the lowest potential conductor(s)—earth—as the other. A typical room’s induced reactive current flow is about 100na per square foot at 60 Hz. This is the source of the buzz that occurs when you touch an amplifier input. This brings us back to why we’re discussing this in the first place—to keep buzz and RF out of our audio lines.

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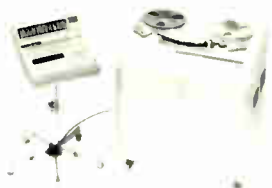


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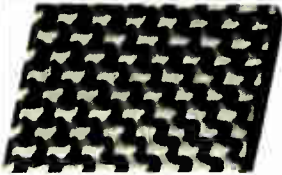
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trostatic shielding. The individual components used in a studio installation will achieve this through their own chassis. As we interconnect the system's individual components, we must bring all these enclosures to the same potential. Minimizing current flow within this interconnection is the goal, accomplished by making the audio signal "see" this shield charge as being the lowest potential. In almost any studio environment, the most desirable point to consider as the technical ground (the point of lowest potential) is the electrical point where the console takes audio common to the console chassis. When all chassis are brought together at this point, we reach our goal of providing electrostatic shielding.

Common sources of interference in studio installations are due not only to electrostatic coupling from external fields to the audio wiring, but to coupling from the currents flowing within the shield itself, to both the shielded conductors and to the audio common. Current flowing through the shield structure is not necessarily only at AC power frequencies, but has a broad power-spectrum response, and as a rule the system noise suffers from current flowing in the shields.

To optimize the operation of each component, the audio common and the audio shield must be tied together. If not, all the conductors within the shielded enclosure will be tied together through the mechanism of distributed mutual capacitance. This phenomenon results in excessive crosstalk at high frequencies and an overall reduction in high-frequency performance (ringing, oscillation, premature roll-off and the like).

Ideally, all the different audio commons return to the technical earth independently, and the shields also return to this same point independently of the audio commons. Carried out to the extreme, all digital commons, video commons and the digital shields, video shields and the electrical service neutral terminate at this one point with independent runs. Yet this is difficult—if not impossible—to achieve. We do not attempt to make these runs independently. We look at each component as an individual common-to-shield connection and take the shields to the technical earth individually on a "star" basis.

Achieving electrostatic shielding and providing an interconnection of

the audio commons requires the following:

1. The "system" audio common and the shielding system must be tied together at some point;
2. Each component connects to technical ground at one point only;
3. Earthing wires all terminate at the technical ground bus and do not daisy-chain in a serial manner to get to technical ground;
4. The third pin of every AC cord is lifted whenever an independent earthing wire is employed;
5. Every signal line has its own shield (the only acceptable exceptions are data and control lines);
6. The shield wire is not shorted to other shield wires at any point other than the signal source reference;
7. Only equipment that provides true power transformer isolation from the chassis is used;
8. Shields connect at one end only, and the connection point is at the signal source;
9. The technical ground is located at the power distribution panel or at the terminus of the audio cabling (usually at the console termination area).

In the above scenario we're trying to reach three different goals with the same wiring system. The first goal is to provide a *safe* system to use. A professional installation provides for operator safety, free of shock hazards. When we follow the above rules, we assure that there is no possibility of any voltage existing between two interconnected devices. Another way to look at it is that a quiet system is a safe system. Whenever a shock hazard exists, there is a considerable amount of hum and buzz present.

The second objective is to bring all the different signal commons together at one point only. This practice minimizes noise and provides greater system stability. This is traditionally the area that results in "ground loops." A considerable problem exists when we encounter a single-ended input. The signal common is brought from both the source and the receiver within the signal wiring. At the same time, the signal commons are both referenced to the technical ground through the chassis shield connection. If both these paths are made, then we have a ground loop.

The last objective is to complete the conductor paths of each piece of equipment for an effective electrostatic shield that must exist around

the wiring system.

POWER LINE NOISE

Every audio system requires "juice." The AC supply lines that feed provide the path for corruption, which takes the form of spikes, hash and general nastiness. Brownouts and overvoltage surges cause the system to sag, then bounce. These anomalies impress considerable noise upon the shield lines, and if they're of sufficient amplitude when the line voltage is low, they can come sliding right through the regulators of the power supply and end up in the audio. This problem must be addressed carefully, because brute force protection is expensive. If not judiciously applied, this same expensive brute force can be highly ineffective.

If you are starting out, there is no guarantee that what is now good power will stay that way. The ideal condition would provide a separate transformer feed for the studio(s) and control room(s). This would be used only for technical power. All lighting, refrigeration, office equipment and other dirty stuff would be fed from the "other" building utility supply. This would be fairly close to the head end of the high-tension distribution, so any other users of the utility would affect your supply minimally. Hopefully, the zoning of your area is mature enough that heavy power use further down the utility line is limited.

Unfortunately, the aforementioned situations rarely apply. Fortunately, power is not a common source of problems. To determine if you have a power problem you must look for some common signs: ticks and pops in the monitor and on tape that do not directly relate to any switching action in the control room. Usually you can trace these noises to a copier, elevator, refrigerator (including a soda machine!) or some other form of high switch-current device. Another obvious giveaway is intermittent "hash."

Exercising proper care in the original electrical wiring and wiring design goes a long way toward eliminating power problems. The following rules illustrate how to stay out of trouble when installing the electrical system:

- Keep the control room, and all equipment used in it, on the same phase of the AC line.
- Isolate the electrical feed from everything else. Keep the audio power separate from copiers, fluorescent

lights, refrigerators, etc.

- Shield all AC power lines with steel conduit.
- Never run the power and audio lines in the same conduit.
- Bring the third pin of each outlet back to technical ground separately. Only use multiple-outlet distribution strips if the third pin connections are independent of their enclosure.
- Never allow the third pin to contact the conduit.
- Never let the technical ground bus touch any building conduit, *except* at the point where technical ground is taken to ground.
- If the technical ground is to be taken to ground, then make sure that the ground bar, the neutral-to-ground, conduit bond-to-ground, and technical ground-to-ground connections are all clean and tight. Take technical ground to earth with a single, very large conductor.
- Never use the electrical conduit for technical ground.

The first thing to do when you suspect power problems is monitor the line with an RMS-reading voltmeter and an oscilloscope. You can buy the meter from most test equipment houses; it's a good thing to set in the amp closet as a handy monitor. Look for spikes on the line and see if the 'scope will trigger whenever you hear some of the offending noise. If the problems are more intermittent in nature, you can rent a dedicated line monitor from a test equipment rental house and leave it unattended on the line for a week or more. This yields a "histogram" of power line activity that can be analyzed later.


The solution to these power problems is often as simple as moving the offending device(s) off the studio power and onto another system or another phase. Most electricians try to put the outlets of the control room and studio on both phases of the power line. Don't let 'em. Put your lights, heaters, pumps and the like on one side and use the other for your audio. If the imbalance is too great, then find a solution that does not require splitting the audio power or corrupting it with other stuff. Lights can go on the audio supply, as long as the only dimmers used are the Variac type and the lighting is incandescent.

Power problems that are not cured by the above "remedies" may result from a dirty neutral-to-earth bond, a

— CONTINUED ON PAGE 216

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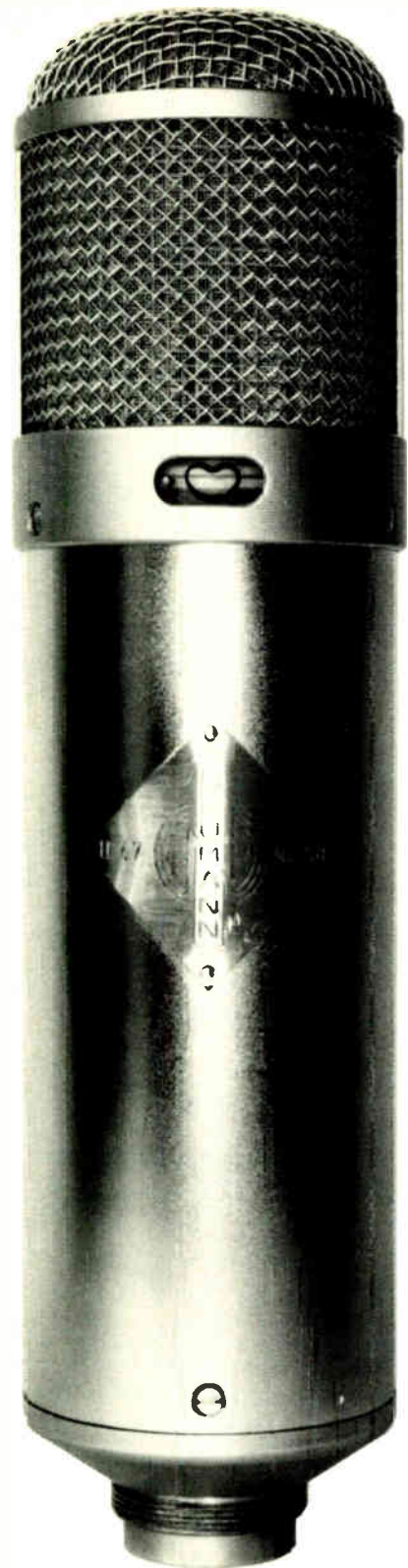
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THE
NEUMANN
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VINTAGE

PART I

by Stephen Paul

Ah, the great vocal mics. What music they make. But how come it's so hard to choose the right mic for the singer at hand? One performer's meat is another's ugghh! This is certainly a question that has troubled us since the dawn of time. Since we first wandered out of the cave, we have gazed at the night sky and wondered, "Do I use a C-12 or a 47?"

We will desperately try to answer this age-old question using a combination of high technology, modern measurement methods and sheerguts. No hearsay in this corner.

Okay, so what's the first thing we have to consider? These days, "How much does it cost?" might come to mind, what with C-12s and the like going for \$2,800 up into the \$3,500 bracket. But we will pretend we didn't hear that crass question and simply concentrate on what it is that makes these damn things so expensive. My old friend Dick Rosmini is fond of saying, "The only thing that don't wear out on a Rolls-Royce is the charisma." I suppose the same thing might be said of a U47. Actually, in this case, I'm happy to say there are other things that don't wear out in a classic, vintage tube microphone. Not the least of which is the thrill from the shock you can get if you pull the mic off the stand before the supply has been shut down and your hand strays into the wrong grotto. Whew!

Now then, what was the question? Ah yes. Things to consider. I suppose the thing to do would be to go on a little excursion into The Unknown. (That is, for people who don't build

mics, it's unknown.) Let's look at some of these old classics and get acquainted with the antique wonders of their secret interiors.

The first microphone we will investigate is that grizzled old King of the Kondensers, the Neumann U47. Ol' grandpa's a bit timeworn and his condensers are dusty, but he's still in the saddle, by gum. Ee-hah! This is truly one of the great vocal mics of all time. The neat subjective thing about these U47s is that they go off like a Howitzer. I mean, we are talking about serious pressure-gradient proximity effect here; only true "size" junkies need apply. If that last statement sounds odd coming from a more-or-less scientific kind of guy, I think a little elucidation is in order.

TWO DOORS

What is a "pressure gradient microphone," anyway? That's a darn good question. Glad I asked it. A pressure gradient-operated mic is one in which the difference in pressure between two physical points provides the driving force for the diaphragm. Or so the textbooks tell us. It's actually a hell of a lot more complex than that, but initially this explanation will do.

For instance, say we are in a house on top of a hill, and a slight breeze is blowing broadside. If we stand outdoors off to the side, we feel only this gentle movement. Now, let's imagine there are two doors in the house that are on the front and rear broadside, respectively. If we open both doors and stand inside the house, we find that the breeze seems to be much more active. This is caused by several factors—one is that the house is an obstacle to the wind, and the pressure on the side of the house that faces the wind is greater than the pressure on the rear side, which is in

MICROPHONES

the shadow of the house.

Have you ever driven behind a semi to save fuel? Dead calm right in back, ain't it? Same principle. This difference in pressure from front to back (this is also a phase difference, as it involves a transit time delay) creates a driving gradient across the house that can be felt strongly inside. The wind coming in is accelerated into the lower pressure area vented by the rear door, just as the high pressure in a helium tank floods into the relative void of your lungs and makes your voice go all funny. This effect (the flooding in, not the funny voice), coupled with the increase in velocity that occurs when the stream encounters a constricting area such as our door, drives the accelerated wind through the house at a higher velocity than in the open area around it. The condition holds true for wind moving in either direction, as this is what constitutes the AC component of the sound pressure.

Essentially, this is how the pressure gradient microphone works in principle. Vents in the back plate approximate the doors in our example, and the capsule itself is the house. The wind is sound pressure, and the gradient drives the little engine of the stretched membrane. Now that we've got that under our belts, we can look with a little more understanding at the U47, the granddaddy of them all. (There was a great-granddaddy, but that's really getting esoteric.)

SONIC FOOTPRINTS ON THE SANDS OF TIME...

The first thing our delicate little sounds encounter when they hit this massive edifice is the famous 47 grille. Famous because the steaks are huge and the drinks are great. Whoops, that's the 47th *Street Grill*. Sorry. Good

place for lunch, though. Anyway, lest any of you doubt that the grille is a major influence on the 47's sound, see Fig. 1, which shows the never-before-published difference between the 47 as measured with and without its grille. Astonishing, isn't it? It is im-

portant to note that not all mics are affected the same way by their grilles, and therefore, this particular change in the curve only applies to the 47 design.

Imagine that. And all this time we thought it was the emblem that was

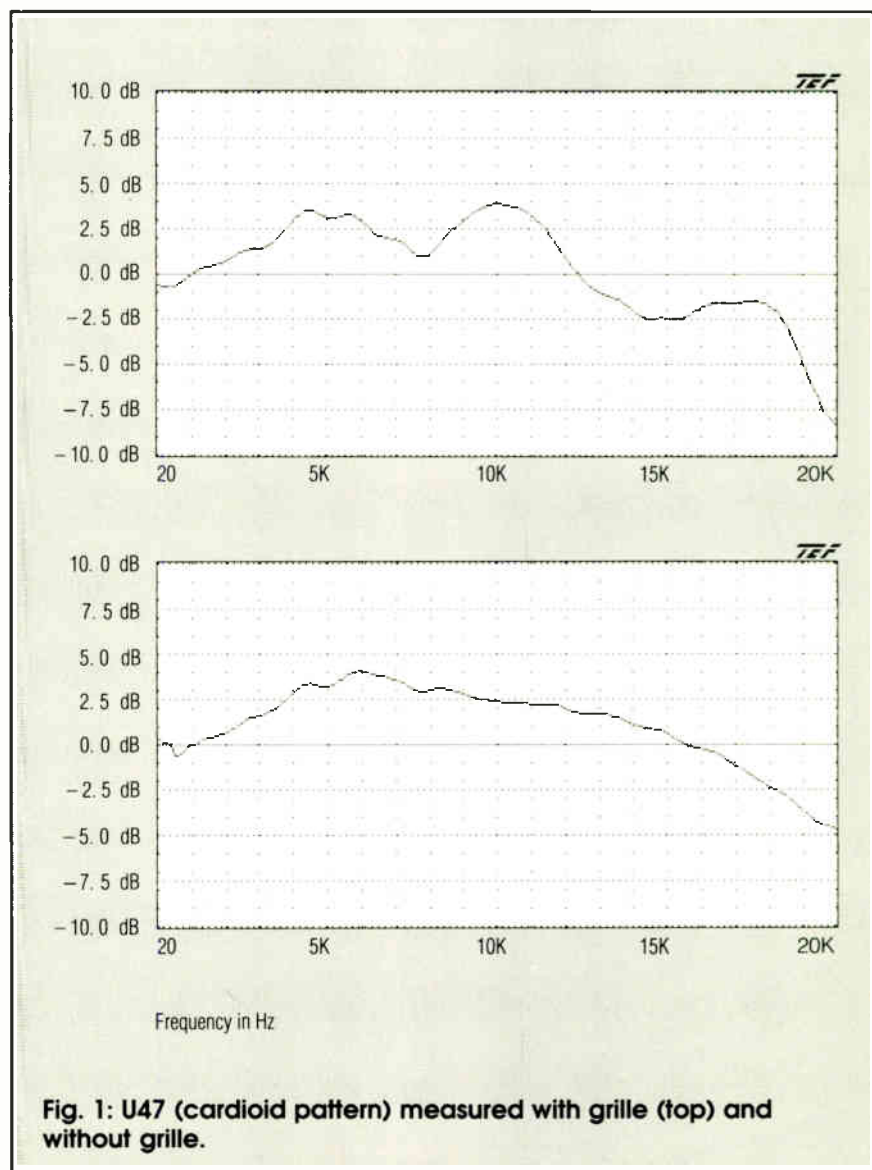
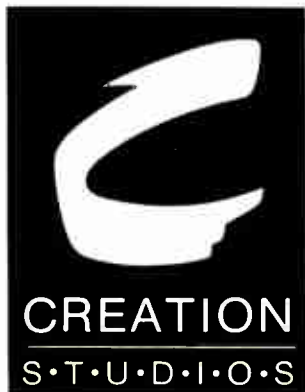


Fig. 1: U47 (cardioid pattern) measured with grille (top) and without grille.

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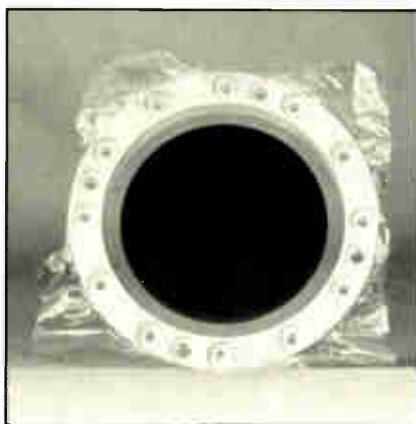


Fig. 2: Backplate of the U47 capsule.

the problem! There are people who think the 47 that says "Telefunken" on it is different than the one that says "Neumann." Well, they're right. One says Telefunken and one says Neumann. Other than that, I'm afraid, the differences could only be detected with a scanning-tunneling electron microscope most likely, and even *I'm* not crazy enough to think that would change the sound.

Let's look closely at some of these differences. This graph has been printed on a linear chart to expand the range above 1 kHz. This means that 20 Hz is at the extreme left of the scale, and the dotted divisions represent 1kHz increments. The dot's vertical value is 1 dB. It is also important to note that the U47 shown has been modified with a 3-micron diaphragm. As a result, the extreme high frequencies above 15 kHz are supported, unlike the 7-micron stock model where response falls rapidly above this point. It's interesting that with the grille on we find some frequencies actually higher in amplitude, as well as the decreases we would intuitively expect.

The first thing we can see is that the grille allows the 5kHz presence area to sail on through, but depresses the sibilance range in the critical 9kHz slot. Now look at the 10kHz area and notice the additional energy—up to 1.5 dB of increase at this frequency. When we remove the grille, the response of the capsule itself can be seen. This is represented by the lower sweep in Fig. 1. Also, the frequencies above approximately 11.5 kHz are depressed by the action of the fine mesh in the grille. And a fine mesh it is, too. The capillary activity of this very closely spaced wire cloth reaches maximum attenuation as we near and exceed 20 kHz.

Let's pause here briefly to consider the fact that *all* microphones currently in existence are highly complex echo chambers inside. Some, just like other acoustic echo chambers (including all acoustic musical instruments), have a wonderful character, while some are inherently annoying, or less useful for certain jobs. This is certainly one thing that has a tremendous influence on our reaction to a given microphone. The interior reflections that occur as complex sound waves hit the surface of the capsule and the capsule holder, and are diffracted (bent) and dispersed around the physical objects in the microphone head, create a fantastically complex set of interference patterns. Some of these are measurable in the frequency domain. These characteristics are part of what give the 47 its "sonic footprint" and make it desirable for its presence.

By modern design criteria these grosser aberrations are considered "defects." Incredible, isn't it? In the '40s this system was hailed as the ultimate solution to all our miking problems; it is now worth up to five times its original selling price in stock trim, and these are *defects!* This is why life is beautiful. This is not to say they aren't defects. Indeed, they are. But they are beautiful defects that we love, and so they transcend the normal connotations of the term.

THOSE GOLDEN DIAPHRAGMS

So much for the grille. Once the sound gets past the grille, it moves on to that temple of ultimate mysteries, the capsule. Fig. 2 is a photograph of the back plate of the U47 capsule. This little baby contains more than 100 holes per side, located with great precision. The body is made of brass, and the diaphragm fits over it with a minute spacing of less than two-thousandths of an inch. The diaphragm is made of polyester film that is placed in a vacuum chamber where a thin layer of gold is evaporated onto its surface in a masked-off circular pattern. This places a conductive layer on top of the plastic so a voltage can be impressed thereon, thus forming one of the plates of a capacitor, which after all is the principle of operation here. The now-conductive film is stretched to a specified tension and glued to a ring, which is then attached to the back plate with screws. Imagine doing this for a living!

The photograph in Fig. 3 shows

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Neve SESSIONS

NORTH AMERICAN EDITION • AUTUMN 1989

Neve On The Move At 87th AES In New York Flying Faders & X-880 Nominated For TEC Awards

As a tribute to their continuing commitment to providing innovative technology for today's demanding artists, engineers, and producers, both the Neve Flying Faders Automation System and the Mitsubishi X-880 32-Track Digital Tape Recorder have been nominated for 1989 TEC Awards. Neve was named the North American distributor of Mitsubishi Professional Digital Audio Products in April.

Acknowledged as a breakthrough in console automation technology, Flying Faders, designed in cooperation with Martin-sound Technologies, redefines the state-of-

the-art by providing 12-bit resolution and unparalleled accuracy with more than 4,000 digital steps.



The Mitsubishi X-880, which was introduced at the AES in Los Angeles, CA, last year, builds on the success of its fully tape-compatible predecessors – the X-850 and X-800 – machines that have proven themselves over the decade as the most reliable and best-sounding in the business. This new Prodigy (PD) format machine incorporates the latest digital technology. ☑

The Morgan Suite AES Preview

Neve will be exhibiting its latest products at the 87th (AES) Convention in New York. Neve will be in the Morgan Suite (Booth 727) at the New York Hilton Hotel.

The focus of the display will be the new 60-input VR Console, offering the ability to store console settings and to restore these configurations from memory.

Also on display in the Neve booth will be the Flying Faders Console Automation System, the 8232 multitrack recording console, the DTC digital mastering console, and the Prism Series of rackmount units.

Neve will also be exhibiting the full range of Mitsubishi's Prodigy (PD)-format digital tape machines – the 32-track X-880, the two-track X-86HS (high sampling), and the two-track X-86 series. ☑

Flying Faders' Rapid Worldwide Acceptance

Neve Sells 40th System

Flying Faders, Neve's fourth generation console automation system, has rapidly gained worldwide acceptance since it was introduced at the Audio Engineering Society (AES) Convention in Los Angeles, CA, last year.

In the U.S. alone, Neve has installed more than 26 Flying Faders systems, while Neve International reports 14 systems installed.

Flying Faders has received universal praise from its initial users. For example, Dee Robb, owner of Cherokee Recording Studios, Hollywood, CA, said, "The system has been in constant use, literally, since the day it was installed. Our clients find it easy to adapt to, and it allows them to work more efficiently. It works all the time. What more could one ask for?"



In addition to Cherokee, other recent Flying Faders customers include: Capitol Records, Cornerstone Recorders, The Enterprise, Pacificque, Todd A/O and producer George Tobin in CA; Chung King, BMG/RCA and Sigma in NY; Digital Recorders (TN); Chicago Recording Co. and Streeterville (x2) in IL; LA Sound (Trinidad) and The Bee Gee's, Estefan Enterprises, The Chase Group, and CPN-TV (FL).

Initial Flying Faders customers include Full Sail, Rumbo, Rock Video International, New Age Sight & Sound, PowerTracks, Jackson Browne and Debbie Gibson.

Nominated for a 1989 TEC Award, the revolutionary Flying Faders Automation System was designed in cooperation with Martin-sound Technologies. ☑

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THE POWER PACKAGE

NEVE VR SERIES • FLYING FADERS™ AUTOMATION • MITSUBISHI DIGITAL TAPE RECORDERS

'Power Package' For Chicago Recording: Neve VR 72/Flying Faders Joins X-850 & X-86

Chicago Recording Company (CRC), one of the largest studio complexes in the U.S., is now fully equipped as one of the first "Power Package" facilities in the world. CRC has just installed a new Neve VR Console with the Flying Faders Automation System to complement its Mitsubishi X-850 32-track and X-86 digital tape machines.

The new 72-input VR Console – one of the largest ordered to date – will be the focal point of Studio D, which also includes the Mitsubishi machines. Designed for any type of tracking, Studio D offers a 67' by 37' live room and a 28' by 28' control room.

According to CRC Operations Manager Hank Neuberger, the combination of the Neve VR with Flying Faders and the Mitsubishi X-850 puts CRC into an elite new category of facilities.

"We've always prided ourselves on offering the very best world class facilities," Neuberger explained. "Today, the best console/automation/tape machine combination is the Neve 'Power Package' – the new Neve VR Console with Flying Faders and Mitsubishi digital tape machines. We're delighted that we can offer our clients such sonically pure equipment."

"The addition of the automation system and the reset and restore capabilities to the V Series – resulting in the VR Console – was the key for us," Neuberger noted. "For our type of clients, we need a great automation system, the ability to reset the console quickly and easily, and a lot of inputs."

Opened in 1975 with one room, CRC has grown to 15 studios boasting many Grammy & Clio Awards and gold albums. ☒

First Neve VR In Nashville: Digital Recorders Installs VR With Flying Faders

Norbert Putnam's Digital Recorders has become the first recording studio in Nashville, TN, to install a new VR Console from Neve. The 48-input console, which was installed at the end of August, is fitted with the Flying Faders Console Automation System.

The new Neve VR is the centerpiece of Studio B, the multi-purpose tracking, overdub, and mixing room at the four-room facility.

According to Don Cobb, Chief Engineer at Digital Recorders, the decision to add the Neve VR Console was based on their desire to offer their major label clients not only the best sounding console, but also the most flexible console on the market today.

"We have seen the console become very popular over the past few months," Cobb explained. "It's great for tracking, but it's become very popular for critical mixing dates, particularly with the great new Flying Faders automation."

"With this type of flexibility, we felt the Neve VR would be perfect for us," Cobb continued, "and we wanted to establish ourselves as the trendsetters in the Nashville market."

"The initial response to the new VR Console has already exceeded my expectations. Since its installation, I'm getting a tremendous amount of interest from clients who can't wait to use it," Cobb added.

Recent clients at Digital Recorders include Quincy Jones, Etta James, and Dolly Parton. ☒

Former Hitsville Facility: Soundworks West Adds Two VPR Consoles, X-880, X-86HS & Prism Racks

Hitsville Recording Studios, the facility where Motown artists like Diana Ross, Marvin Gaye, the Temptations, and Smokey Robinson cut many of their hits, is being reborn as Soundworks West. And Neve and Mitsubishi are playing key roles in the modernization of the 20-year-old facility.

The sale of the legendary facility by The Gordy Co. to Alan Ramer and Charles Benanty, who opened Soundworks Studios in New York in 1979, was completed in July.

As one of the key ingredients in the renovation, two new Neve VPR Consoles are being added – a 72-input console and a 60-input console – as well as three Neve Prism racks, a Mitsubishi X-880 32-track digital tape recorder, and an X-86HS two-track tape recorder with 96 kHz sampling.

"We are keenly interested in the best sound and sonics," Ramer explained, "and Neve is the very best there is; no one does it better. We want to attract the creative, quality-conscious producer, whether he or she is involved with record, film, or television work. We can assure that with the Neve consoles and the Mitsubishi digital machines."

Benanty, who will continue to devote most of his time at the New York facility, added that the new Neve and Mitsubishi equipment will be a perfect complement to the 20 years' worth of classic equipment that came with the sale of the facility. For example, the new three Prism racks will be used with an existing Neve 8078 Console, as well as with the two new Neve VPR Consoles.

Continued on Page 4

Streeterville Installs First Of Two VR Consoles

Streeterville Studios of Chicago, one of the most sophisticated full-service facilities in the U.S., has recently installed the first of its two new Neve VR Consoles. The first console – a 60-input VR with Flying Faders Automation System – was installed in Studio 1 in July.

Jimmy Dolan, President of Streeterville, noted that the new VR Console continues his tradition of satisfaction with Neve products.

"I was very happy with our Neve 8108 Console," Dolan revealed, "but the new VR is steps beyond it sonically and in ease of operation. In fact, I've heard nothing but praise for the VR from everybody who's come in contact with it – engineers, producers, musicians, and technicians.

"The console commissioning was also one of the cleanest and fastest I've ever been associated with," Dolan added.

Dolan noted that, in its first few weeks of operation, the VR was used on a host of commercials, including Budweiser and McDonald's, as well as on a 20-piece big band date that went directly to three formats – AMS AudioFile, digital audio tape (DAT), and Dolby SR. ☒

PLAYBACK

MITSUBISHI
DIGITAL PRO AUDIO

PD
PRODIGI

Mitsubishi PCM Sales Explode

Since Neve was appointed the exclusive North American distributor of Mitsubishi Professional Digital Audio Products in April, sales of the entire Mitsubishi Prodigy (PD)-format product line have exploded.

"It has been very satisfying to see the number of facilities that have made the commitment to Mitsubishi digital in the few short months that we have been handling the product line," said Rick Lushner, National Sales Manager For PCM Products. "The Mitsubishi machines are simply the best sounding and the most reliable digital tape machines in the marketplace today."

Some of the most recent Mitsubishi digital orders in the U.S. include Cherokee Recording (two X-880's), Soundworks West (X-880 and X-86HS), The Castle (X-880), El Dorado (X-880), Newbury Sound (X-850), Media Ventures (X-850), Front Page Records (X-400, X-86), The University Of Arkansas (X-400), Ampex (X-80), Soundworks NY (X-880), Harmony Records (X-80), Audioforce (X-880, X-86HS), LA Sound - Trinidad (X-880, X-86HS).

The Mitsubishi product line includes three 32-track digital tape recorders – the X-880, X-850, and X-800, the 16-track X-400, and four two-track recorders – the X-86HS, X-86C, X-86, and X-80. ☑

Neve Retains PCM Personnel

In case you were wondering what happened to the Mitsubishi tech and service staff once Neve pacted with Mitsubishi to distribute



X-880 and X-86HS — Great successes since Neve was named exclusive North American distributor of Mitsubishi Professional Digital Audio

the PCM product line, your Mitsubishi PCM friends are now on board with Neve in North America.

Let's take a quick tour around the Neve regional offices in New York, Nashville, TN, Hollywood, CA, and Canada.

New York City (212) 956-6464

Ed Krupski (Technical Service Engineer Of PCM Products) and *Peter Kehoe* (Eastern Regional Sales Manager): Everybody in New York knows Ed, but Peter is a new face at Neve. Prior to joining Neve, Peter was with Studer Revox. He will be selling Mitsubishi PCM products as well as Neve consoles in the Northeast.

Nashville, TN (615) 329-9584

Bill Heath (Technical Services For PCM Products): You all know Bill around the Nashville area. Bill is responsible for all those Mitsubishi's down there.

Hollywood, CA (213) 461-6383

Joining the Neve staff at the Mercedes-Benz Building are a host of pros who were formerly at the San Fernando offices of Mitsubishi Pro Audio: *Teri Pennington*, Office Manager; *Michael May*, Western Regional Sales Engineer for Neve and PCM Products; *Peter Germansen*, North American Technical Services Manager For PCM Products; *Robbie Hidalgo*, Senior Technical Services Engineer and *Thor Thorsteinsson*, Technical Services Engineer for PCM Products.

Canada (416) 365-3363

Steve Sergeant, our Customer Support Engineer For PCM Products, is currently in Canada assisting the new sales and support team. ☑

Mitsubishi International News

The U.K. staff of Mitsubishi Pro Audio has also had a very successful past few months, including deliveries of seven X-880's in the month of August alone. Three new X-880's were sold in the Italian market – Morning Studio, Nuovo Fonit Centra, and Water Melon Studios.

Starstruck: Superstar George Michael has bought an X-850, having been a long-term user – along with his engineer, Chris Porter – of the Mitsubishi 32-track digital format.

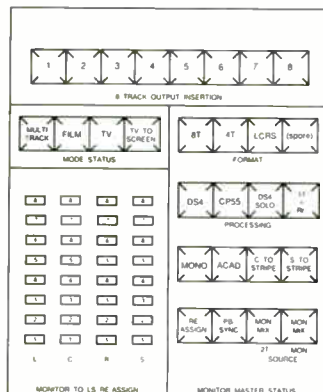
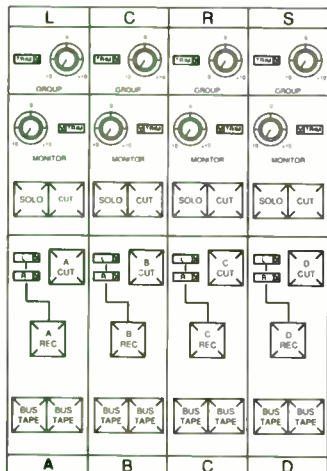
PD For PM: Paul McCartney has recently purchased his own X-880, which he will take with him on his year-long world tour including stops in Japan, Australia and North America.

TechTalk

The Neve Post Production Series

First announced at the National Association Of Broadcasters Convention (NAB) in Las Vegas, Nevada, earlier this year, the Neve Post Production Series Console was designed to fulfill the sophisticated needs of the post-production and film industries.

Offering video, film, or multitrack style mixing, the new VP Console embodies clever console routing to eliminate extensive patch rerouting, multiple push-button switching, and complex operator moves. Other features include optional Dolby matrix monitoring for 4 and 8-track video post work.



Multitrack sources are directed to four- or eight-track dedicated post-production monitor. Mono, stereo, or LCRS monitoring can be selected from four- or eight-track sources. Controlled locally or via Neve's moving fader automation system.

Post-Production News

Post Sales: Magno & N.E.P.

Sales of Neve products continue to be strong in the post-production market. Magno Sound & Video has ordered a new VP Console for its busy New York City facility, while N.E.P. Productions has ordered a 48-input V Series Console with a custom remote.

Late Breaking News!!

The new Sigma Sound Studios of New York has recently installed the first Neve VR-60 with Flying Faders Automation in New York City in their Studio B. Demonstrations will be given during the AES. Stop by the Neve booth for details.

Soundworks West Article (Continued from Page 2)

Soundworks West, which is located on Romaine Street in West Hollywood, CA, includes four studios, three MIDI production suites, lacquer and Compact Disc mastering, and telecine facilities.

Robert Diez d'Aux is Ramer's partner in Soundworks West, and Paul Sloman, formerly Studio Manager at A&M Studios, is Managing Director. ☑

Neve International

Neve U.K. reports a number of recent sales of the new VR Console to major facilities in the U.K. These recent customers include Metropolis Studio, which has also purchased two Mitsubishi X-850 32-track digital tape machines, HSH Studios (which was formerly The Mill, Robert Plant's studio), and Ezee Studios. In addition, a new VP Console was ordered by Lansdowne Recording Studios.

From down under in Australia, the Queensland Conservatorium has purchased a 36-input Neve V Series Console. ☑



Metropolis Studio, London

Who Uses Neve

It has just been reported that Peter Townsend has purchased a Neve VR Console with Flying Faders Automation for his Eel Pie Studios.



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JOHN WORAM'S BASICS

THE CAPACITOR MICROPHONE

In contrast to microphones with dynamic design principles, a microphone may also be designed in which the diaphragm is one of the plates of a capacitor. As the diaphragm vibrates, the distance between it and the other plate of the capacitor varies, and therefore so does the device's capacitance.

In order to function, the capacitor/diaphragm must be biased with a polarizing DC voltage across its plates. And, unlike the dynamic moving-coil microphone, the circuit output voltage and impedance are both high. Consequently,

a special preamplifier must be inserted between the diaphragm and the console or tape recorder input. This preamplifier is part of the microphone system itself, and is an addition to—not a substitute for—the microphone preamplifier found in the console.

Some years ago, the term *condenser* was used to describe the circuit element now called a capacitor, and a microphone designed around this element was known as a condenser microphone. Although the term *capacitor* is today used almost universally in circuit design descriptions, either term may be found in descriptions of microphone design.

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one of our 3-micron diaphragms after mounting on its ring, but before being trimmed. Note the masked-off circle of gold in the center.

DON'T STAND, DON'T STAND, DON'T STAND SO CLOSE TO ME

Another contributor to the 47's characteristic sound is proximity effect. Most of us know that "proximity effect" is the boost in bass response that occurs when a sound source comes within inches of any gradient-operated mic, be it condenser, dynamic, ribbon or what-have-you. So far, so good. "But...why?" comes the inevitable, wide-eyed question.

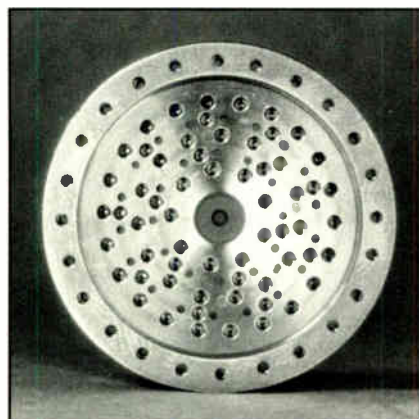
Here's my best shot at an explanation. It gets a little like the cabinet of Dr. Caligari in here, so leave a trail of bread crumbs to keep from getting lost. Remember that our microphone is driven by the gradient, or the difference in pressure caused by the time delay formed by the physical distance between the front and rear of the capsule. (If you don't remember this, please see a memory specialist.) The gradient's effect is straightforward when we are dealing with a plane wave. Waves emitted by a point source, such as a humanoid, generally become plane in shape when we are some distance from the source. Plane means like a flat surface. The entire wave hits at the same moment in time.

Now, sound pressure decreases as the reciprocal of the distance from the source, or in other words, $1/d$, where

"d" is distance. When we are in proximity to the source, however, the waves start out with a spherical geometry. This means that not only will there be a pressure difference resulting from the phase delay of the front-to-rear capsule distance, but also a pressure gradient created by the physical separation in space of the protruding, curved front of one wave, and the bent-away side of the next one, which is slightly closer to the source at that moment. Because one wave is at a higher pressure due to its lesser distance from the source, a difference in pressure—or a gradient—is created between the waves.

The reason the low end is affected most is that the phase-related gradient is *frequency dependent* (small at low frequencies and rising with rising frequency, until the length of the path

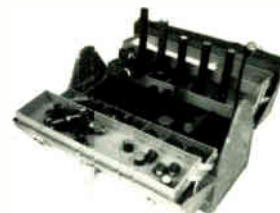
Fig. 3: Stephen Paul's special 3-micron diaphragm.



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around the capsule equals one-half wavelength [$\Theta=180$ degrees] and it starts to fall), while the distance-related gradient is *non*-frequency dependent; as we approach the mic, the phase-driven gradient (which is a function of the particle velocity) changes very little, while the distance gradient increases with decreasing distance from the microphone. As the distance-driven gradient increases, so does the low-end response where the phase-gradient drive is weak. Woof! I don't think I could say that again! (Where are those bread crumbs?) The degree of boost in cardioid can become quite extreme when we are very close, up to 15 dB at 100 Hz! Some mics built recently try to control this effect, but have not won a great following with the vocalist crowd.

Proximity is one of the U47's greatest defects. Or I should say, one of the most popular defects. The 47 has an earthshaking boost in the bass region when it's switched to the cardioid, or unidirectional, characteristic. When we switch to omni, this effect is greatly diminished since we have electrically shorted out most of the gradient effect by connecting the rear capsule in phase (in polarity, actually) and summing its energy into the amplifier. If, as is possible on the U48 model, we switch to figure-8—essentially two cardioid mics back to back—we get an even larger amount of proximity, as we have summed the output of both sides in their directional mode.

OF TUBES AND SHIPS AND SEALING WAX

So there's a basic look at the U47's operation principle. The only mysteries left are the tube and the variations on the tube. Many people ask me, "That big black thing in there, is that the tube? How come it doesn't look like a tube?" For the answer, let's refer to Fig. 4. It shows the original electronics in the 47. Just for the archives, the tube in the 47 is famous first for the reason just quoted—that it looks odd—and second for the price of a replacement, which can run up to \$500 depending on who you ask. \$500 for a tube? It does sound kind of unbelievable. Yet some people pay more than that for a bottle of wine. And you can't even cut a vocal with a bottle of wine. The VF-14 (that's the name of our little black friend) was once a very common tube used in field radios during World War II. After the war, not much else was left, and it happened to sound good, so Neumann decided to use them in the 47. Of course, the factory selected them for low noise, and you can tell you have a factory tube if it has a little white "M" stamped on it. If it doesn't, then at some point in the mic's history someone pulled the old switcheroo.

The sad thing is that the tube was never manufactured after the war, although a strange recent rumor has some Italian company tooling up to make them again. But I have seen neither hide nor hair of one, so who

-CONTINUED ON PAGE 215

JOHN WORAM'S BASICS

MICROPHONES

Whether on stage or in the recording studio, the microphone of choice is rarely selected after a careful reading of its specification sheet. Instead, the engineer makes a decision based on a mixture of previous experiences, what's available at the moment, and—sometimes—on the wishes of an artist who has discovered a favorite microphone.

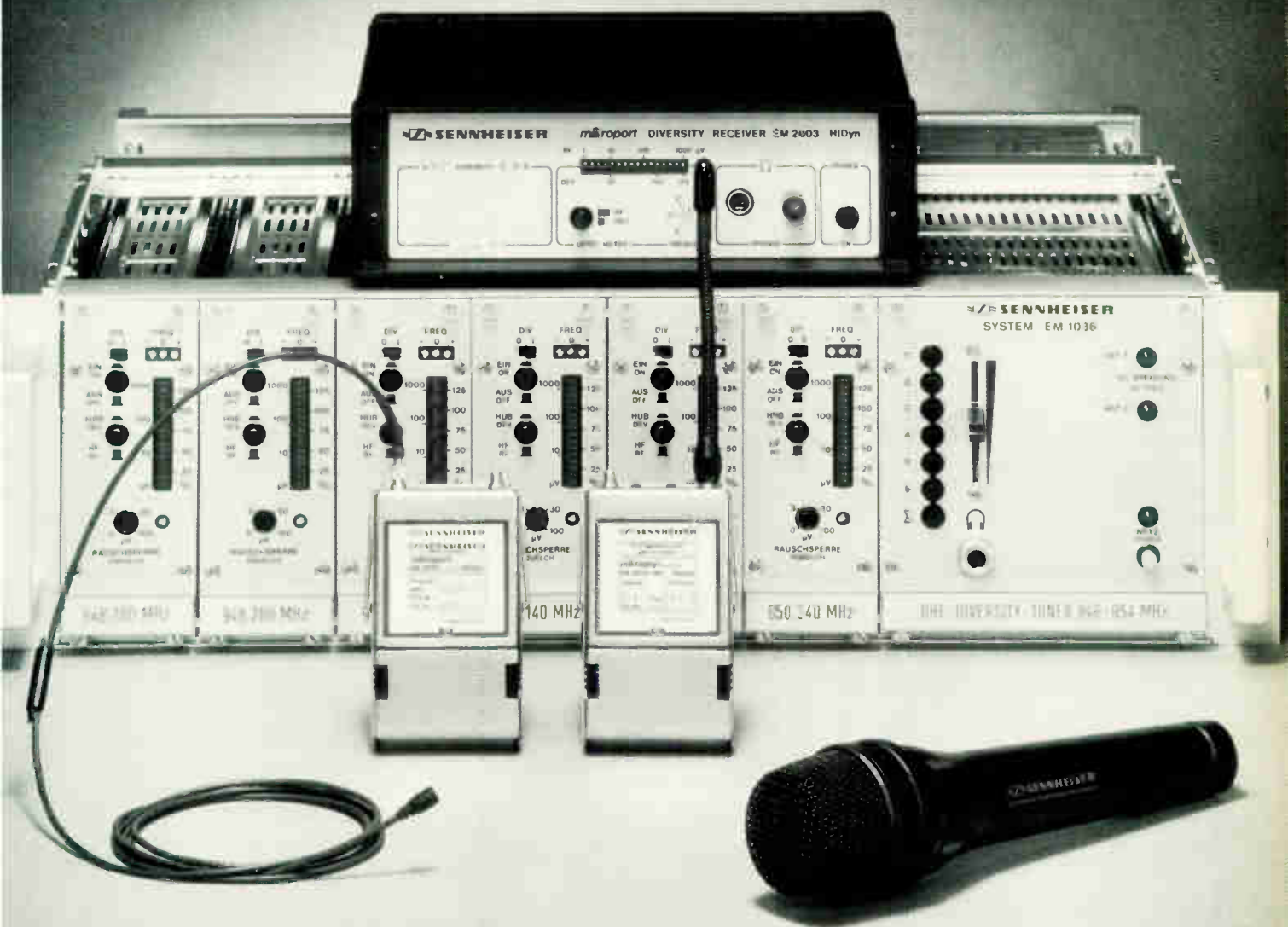
The recording studio beginner often wastes time searching out the definitive list of preferred microphones, in the hope that some-

where, someone actually has such a list. Of course, every seasoned engineer does indeed have a list of his or her own, but although it is a preferred list, it is certainly not the definitive list. And in the wrong hands, it is a useless list—or worse.

In short, and notwithstanding the occasional overtly enthusiastic ad copywriter, there is no "correct" microphone for any application. Microphone choice is mostly a matter of taste, and as in choosing just about everything else in the world, we don't all share the same taste buds. That's why restaurants have menus, and why microphone manufacturers make more than one model.

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UNDERSTANDING MICROPHONE SPECIFICATIONS

by Bruce Bartlett

Some recording engineers choose a microphone based on the opinions of respected colleagues. Others use their ears and audition several mics for various vocal, instrumental and sound gathering applications. Still others rely on data sheets as well as sound quality.

If you've looked at a microphone data sheet, you may have been confused by the strange specs and graphs. To compound the problem, different manufacturers use different methods of specifying the same thing. Choosing a suitable microphone for a particular application is easier if you understand what all those specifications mean and how they relate to a mic's sound.

ELEMENT OR TRANSDUCER TYPE

Microphones for professional applications can be grouped into two types depending on their operating principle: dynamic or condenser. In a dynamic microphone, a moving conductor cuts magnetic lines of force to generate electricity. Two types of dynamic microphones are moving-coil microphones and ribbon microphones.

A moving-coil microphone (popularly called a dynamic microphone) is shown in Fig. 1. A coil of wire attached to a diaphragm is suspended in a magnetic field. When sound waves vibrate the diaphragm, the coil vibrates in the magnetic field and generates an electrical signal similar to the incoming sound wave. In a ribbon microphone (Fig. 2), a thin metal foil or ribbon is suspended in a magnetic field. Sound

waves vibrate the ribbon in the field and generate an electrical signal.

In a condenser or capacitor microphone (Fig. 3), a conductive diaphragm and an adjacent metallic disk (backplate) are charged to form two plates of a capacitor. Sound waves striking the diaphragm vary the spacing between the plates; this varies the capacitance generating an electrical signal. The diaphragm and backplate can be charged either by an externally applied voltage or by a permanently charged electret material in the diaphragm or on the backplate. The first type is called an externally biased, or air condenser, microphone; the second type is called an electret condenser microphone.

Each of these has been stereotyped to have a certain sound. Condensers are generally bright and detailed; ribbons are usually warm and mellow. But the sound depends more on the particular microphone's frequency response, transient response and distortion characteristics than the transducer type. It's possible to tailor a condenser mic's frequency response to sound like a ribbon, and vice versa.

POLAR PATTERN

Microphones also differ in the way they respond to sounds coming from different directions. An omnidirectional microphone is equally sensitive to sounds arriving from all directions. A unidirectional microphone is most sensitive to sounds arriving from one direction—in front of the microphone—but discriminates against sounds entering from the sides or rear. Bidirectional mics are most sensitive to sounds arriving from two directions—in front of and behind the micro-

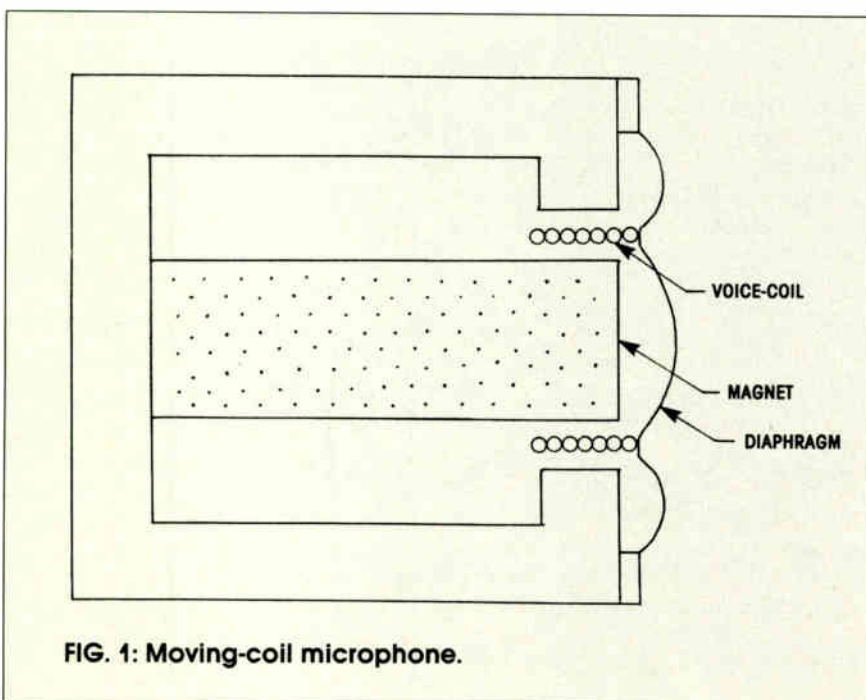


FIG. 1: Moving-coil microphone.

phone—but reject sounds entering the sides.

The unidirectional classification can be divided into cardioid, supercardioid and hypercardioid pickup characteristics. Cardioid mics are sensitive to sounds arriving from a broad angle in front of the microphone, about 6 dB less sensitive at the sides and about 15 to 25 dB less sensitive at the rear. The supercardioid pattern is 8.7 dB down at the sides and has two nulls of least pickup at 125 degrees off-axis. The hypercardioid pattern is 12 dB down at the sides and has two nulls of least pickup at 110 degrees off-axis. Various polar patterns are shown in Fig. 4.

Polar patterns are plotted on polar graph paper as follows: in an anechoic chamber, the microphone is exposed to a single frequency tone and is rotated as its output voltage is measured. The voltage at 0 degrees (on-axis) is called "0 dB," and the voltages at other angles are referenced to that. In other words, the polar-response graph plots relative sensitivity against angle of sound incidence, at various frequencies. Polar plots can also be generated by running a TDS (Time Delay Spectrometry) frequency sweep every 10 degrees or so, and then processing the data with a program that draws a polar plot at selected frequencies.

Polar plots are not geographical maps of a microphone "reach"; microphones do not suddenly become dead outside their polar pattern. There is no outside. The graph merely plots sensitivity as distance from the origin. This is not the spatial spread of the pattern.

With most microphones, a consistent polar pattern at all frequencies is desirable. Otherwise, the mic will sound tonally different on- and off-axis, a condition known as off-axis coloration.

Note that either the condenser or moving-coil types mentioned earlier can be obtained with any kind of directional pattern (except bidirectional moving-coil). Ribbon microphones are either bidirectional or hypercardioid. Some condenser mics come with switchable polar patterns.

An omnidirectional boundary microphone (such as a Crown PZM) has a half-omni, or hemispherical, polar pattern. A unidirectional boundary microphone has a half-supercardioid or half-cardioid polar pattern. The boundary mounting increases the direction-

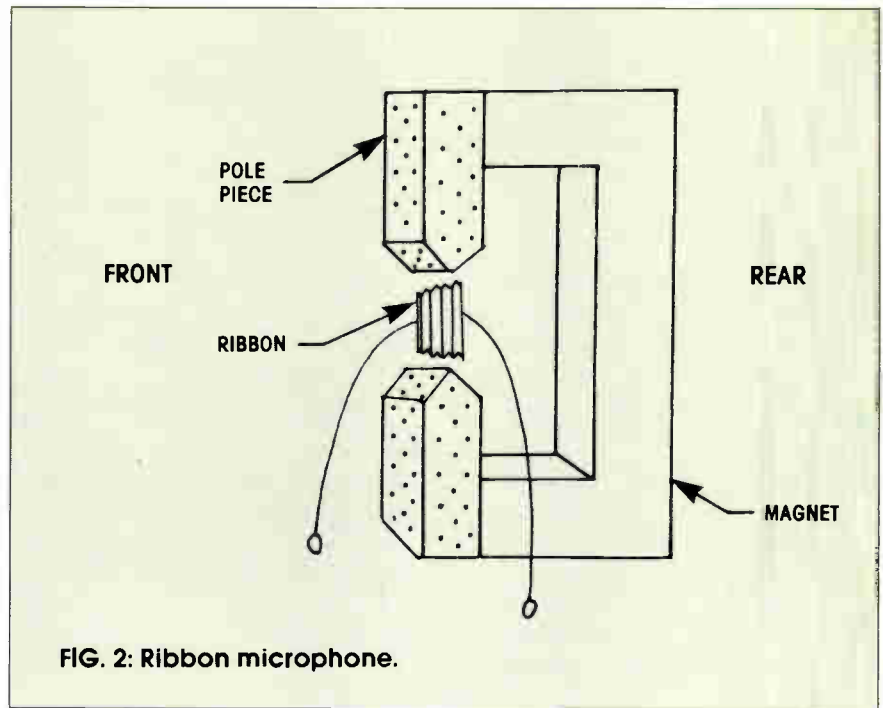


FIG. 2: Ribbon microphone.

ality of the microphone, thus reducing pickup of room acoustics.

FREQUENCY RESPONSE

As with other audio components, a microphone's frequency response is the range of frequencies that it will reproduce at an equal level (within a stated tolerance, such as ± 3 dB).

If an accurate or natural sound is desired, the frequency response of the mic should cover the spectral range of the instrument to be recorded. A frequency response from 80 Hz to 15 kHz is adequate for most instruments; a response from 40 Hz to 9 kHz covers the range of bass instruments; a high-end response up to 12 kHz is sufficient for brass, voice and piano; and a response out to 15 or 20 kHz is necessary for cymbals and some percussion instruments, such as triangles and chimes.

The low-frequency response of the microphone should be limited to the lowest fundamental frequency of the instrument to be recorded, if possible. For example, the frequency of the low-E string on an acoustic guitar is 82.41 Hz. A mic used on the acoustic guitar should roll-off below that frequency to avoid picking up low-frequency noise and room rumble. Some microphones provide a low-frequency cutoff switch for this purpose. Or you can filter out the unneeded lows using console or outboard equalization.

To test frequency response, the microphone is usually placed in front of

a coaxial (point source) loudspeaker in an anechoic chamber, and a constant-amplitude sine-wave sweep is run from low to high frequencies. The output level in dB is plotted at all frequencies, resulting in a frequency response curve. The output level at 1 kHz is placed at the 0dB line on the graph, and the levels produced at other frequencies are so many decibels above or below that reference level.

Alternatively, the microphone can be tested with Time Delay Spectrometry in a non-anechoic room. The TDS device removes the room reflections from the measurement. The output of the test microphone is referenced to that of a laboratory calibrated flat-response microphone in the same position.

The shape of the response curve usually indicates the tonal balance of the microphone pickup at a specified distance from the sound source. (If the distance is not specified, it's probably two to three feet.) For example, a microphone with a flat, extended response reproduces the fundamental frequencies and harmonics in the same proportion as the sound source. Thus, a flat-response mic tends to provide accurate, natural reproduction at that distance.

A microphone with a rising high end, or a "presence peak" from 5-10 kHz, emphasizes the higher harmonics (Fig. 5). The subjective effect is a crisp, articulate sound. This type of response is sometimes called a "tail-

ored" or "contoured" response, which is popular for guitar amps and drums because it adds punch and emphasizes attack.

Most unidirectional and bidirectional microphones boost the bass when used within a few inches of a sound source. You've heard how the sound gets bassy when a vocalist sings right into the mic. This low-frequency boost related to close mic placement is called proximity effect, and it's often plotted on the frequency response graph. It occurs in single-D (single-distance) directional microphones, which have a single distance between the front and rear sound entries.

Note that microphone placement can greatly affect the recorded tone quality. A flat-response microphone does not always guarantee high-fidelity sound, because mic placement has such a strong influence.

IMPEDANCE

A microphone's impedance is its effective output resistance at 1 kHz. A microphone impedance between 150 and 600 ohms is considered low; 1,000 to 4,000 ohms is medium; and above 25 kilohms is high. Low-impedance microphones are used for recording

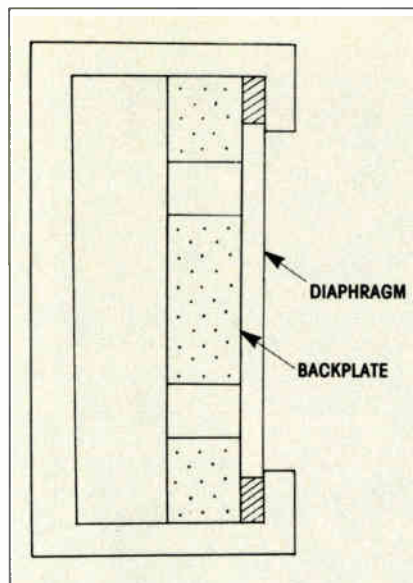


FIG. 3: Condenser microphone.

because they allow long cable runs without hum pickup or high-frequency loss. Nearly all solid-state mixers are designed to accept low-impedance mics.

Normally, mixers are designed to have an input impedance at least seven to ten times the microphone im-

pedance to avoid loading down the microphone. That is, a bridging input is used, rather than a matched-impedance input. A typical mixer mic input has an impedance around 1,500 ohms.

SENSITIVITY

A microphone-sensitivity specification tells how much output (in volts) a microphone produces for a certain sound pressure level (SPL) input. Microphone sensitivity is specified in several ways: dBV per microbar; millivolts per pascal; dBm per 10 dynes/cm; dBm; and EIA rating. We'll explain each of these, but first note that: 0 dynes/cm² = 10 microbars = 1 pascal = 94dB SPL; and 1 dyne/cm² = 1 microbar = 74dB SPL. For reference, conversational speech at one foot measures at an SPL of about 70 dB.

An example of a microphone sensitivity specification is: "Open-circuit voltage: -60 dB re 1 volt per microbar." That means, when the mic is unloaded (working into a high-impedance input), and the mic is exposed to a sound pressure level of 1 microbar (74dB SPL), it produces -60 dBV. You put 74dB SPL in; you get -60 dBV out.

Typical sensitivity specs are -65 dBV/microbar for a condenser micro-

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phone and -75 dBV/microbar for a moving-coil microphone. Another way to express the same sensitivity is: open-circuit voltage, 10 millivolts per pascal. That is, the mic produces 10 millivolts, unloaded, when exposed to a sound pressure level of 1 pascal (94dB SPL). You put 94dB SPL in; you get 10 millivolts out.

Here's still another, less common, way to specify the same sensitivity. "Power level: -38 dBm per 10 dynes/cm²." In other words, the mic produces -38 dBm into a matched load when exposed to an SPL of 10 dynes/cm² (94dB SPL). "Matched load" means that the load impedance equals the microphone impedance. If the mic impedance is 150 ohms, the load impedance of the mic preamp input is also 150 ohms. This is unlikely to occur in practice; usually the load impedance is at least seven to ten times the mic impedance so that the microphone is effectively unloaded. The Electronics Industries Association (EIA) Gm rating is useful for calculating the microphone output into a matched load for a given SPL. SPL + dB (EIA) = dBm output into a matched load.

To compare the sensitivities of two microphones specified in different ways, convert them to the same reference using these formulas:

Millivolts per pascal = $10 \left(4 + \frac{\text{dBV/microbar}}{20} \right)$
 dBV/microbar = $20 \log \left(\frac{\text{mV per pascal}}{1000} \right) - 20 \text{ dB}$
 dBm/10 dynes/cm² = dBV/microbar + 22.2 dB (if mic impedance equals 150 ohms)
 dB (EIA) = dBm/10 dynes/cm² - 94 dB.

If you put a microphone in a 20dB-louder sound field, it produces 20 dB more signal voltage. For example, if 74dB SPL in gives you -75 dBV out, then 94dB SPL in gives you -55 dBV out. And 150dB SPL in gives you +1 dBV out, which is approximately line level! That's why you need so much input padding when reproducing a kick drum or other loud source.

The sensitivity of a microphone doesn't affect its sound quality. Rather, sensitivity affects the audibility of mixing-console noise. To achieve the same recording level, a low-sensitivity mic requires more mixer gain than a high-sensitivity mic. More gain usually results in more noise.

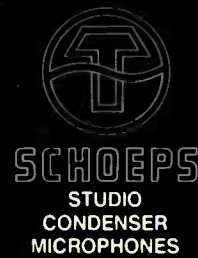
If you record quiet, distant instruments such as a classical guitar or chamber music, you'll hear more mixer noise with a low-sensitivity mic than with a high-sensitivity mic, all





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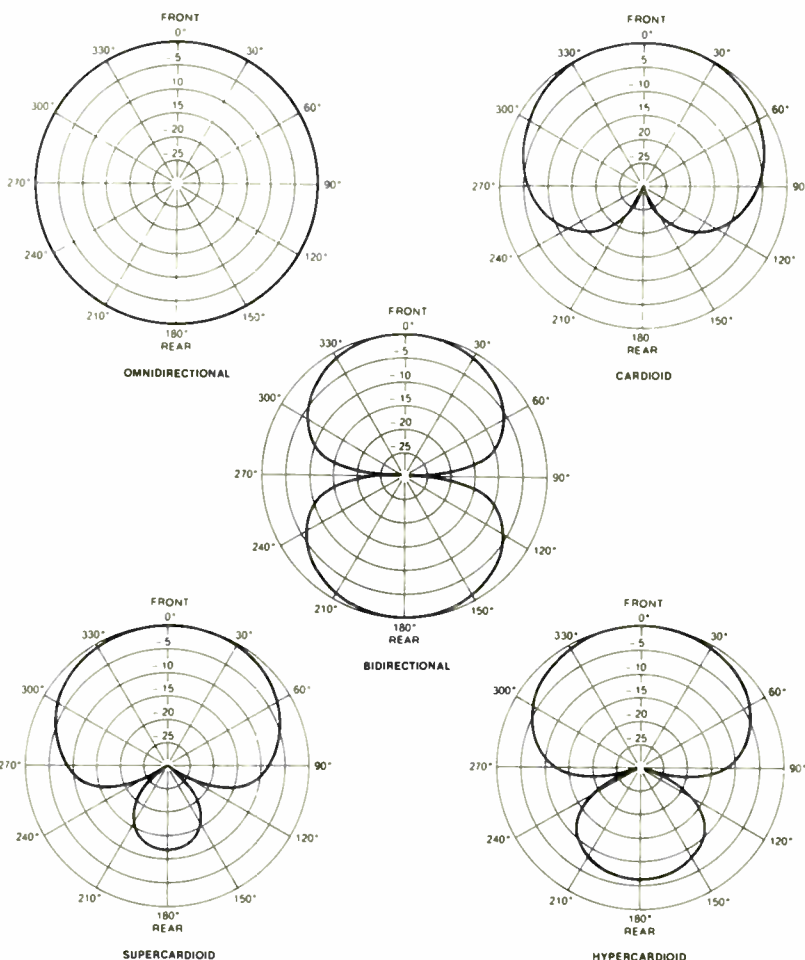


FIG. 4: Various polar patterns (courtesy Howard W. Sams & Co.).

else being equal. With close-miked pop music, however, sensitivity matters little, because the microphone signal level is well above the mixer noise floor. That is, the signal-to-noise ratio is high.

MAXIMUM SPL

Maximum SPL is the sound pressure level at which a microphone's output signal starts to distort; usually the SPL at which the microphone produces 3% total harmonic distortion (some manufacturers use 1% THD). If a microphone has a maximum SPL spec of 125dB SPL, that means the microphone starts to distort audibly when the sound pressure level produced by the source reaches 125dB SPL. A maximum SPL spec of 120 dB is good, 135 dB is very good and 150 dB is excellent.

A well-designed dynamic microphone can accept very loud sounds without overloading. Even high sound pressure levels move the diaphragm only slightly. But a condenser microphone has electronics that can be over-

loaded by the capsule signal. If an attenuator is placed between the capsule and electronics to prevent overload (that is, to increase maximum SPL capability), the signal-to-noise ratio is degraded.

SELF-NOISE

Self-noise, or equivalent noise level, is the electrical noise a microphone produces. The microphone is put in a soundproof box and its output noise voltage is measured. Self-noise is specified as the SPL in decibels of a source that produces the same output voltage as the noise.

The self-noise spec is usually A-weighted, meaning that the noise was measured through a filter that closely correlates the measurement with the annoyance value. The filter rolls off low and high frequencies to simulate the frequency response of the ear. An A-weighted, self-noise spec of 20dB SPL or less is excellent (quiet), a spec around 30dB SPL is good and a spec around 40dB SPL is fair.

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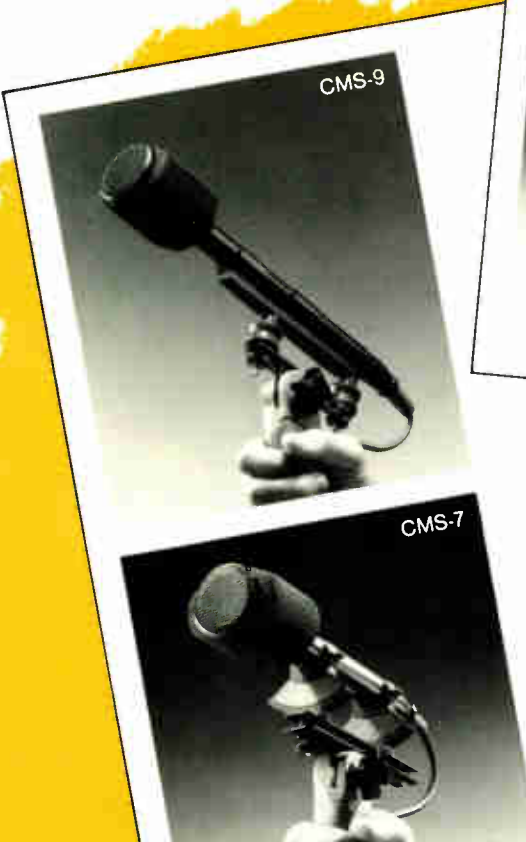
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Because dynamic microphones have no active electronics to generate noise, their self-noise is much lower than condenser mics. Because of this, self-noise for dynamic mics usually is not specified.

The open-circuit noise voltage generated by a dynamic microphone is given by the formula:

$$E = \text{SQR} (4kRT \text{ dF})$$

where,

E = Noise voltage in volts

k = Boltzmann's constant (1.38 x 10⁻²³ joules/deg. K)

R = Source resistance of the microphone

T = Temperature in degrees Kelvin

dF = Frequency bandwidth

The higher the microphone output resistance (measured across its connector terminals), the higher the self-noise. At 300 degrees Kelvin, a microphone of 150-ohm impedance (resistance) produces a noise voltage of 2.23x10⁻⁷ volt, or -133 dBV. The self-noise is calculated by the formula:

$$\text{Self-noise (dB SPL)} = V_n - S + 74 \text{ dB}$$

where

V_n = noise voltage in dBV

S = microphone sensitivity in dBV/microbar

If the microphone sensitivity is -75 dBV per microbar, the self-noise of this microphone is 16dB SPL. That figure is unweighted.

In contrast, the self-noise of an extremely quiet condenser microphone is 14 dB A-weighted. A condenser microphone self-noise specification under 20 dB is considered excellent; under 30 dB is good.

SIGNAL-TO-NOISE RATIO

This is the ratio in dB between the microphone's output voltage (for a given SPL) and the microphone's self-noise voltage. The higher the SPL of the sound source, the higher the S/N ratio. For an SPL of 94 dB, a S/N spec of 74 dB is excellent; 64 dB is good. The higher the S/N ratio, the cleaner (more noise-free) the signal, and the greater the mic's "reach."

Reach is the clear pickup of quiet, distant sounds due to high S/N. Reach is not specified in data sheets, because any microphone can pick up a source at any distance if the source is loud enough. For example, even a cheap microphone can reach several miles if the sound source is a thunderclap. A microphone doesn't reach out; sound comes to the microphone. Whether or not that sound is clearly reproduced depends on the S/N of

the source in its acoustic environment, and on the S/N of the microphone.

OTHER SPECIFICATIONS

A condenser microphone requires a power supply to operate, such as a battery or external phantom-power supply. Simplex phantom power is 12 to 48 volts DC applied to pins 2 and 3 of the microphone connector through two equal resistors. A-B powering (used in Sennheiser RF shotgun microphones) is a positive voltage on pin 2 and a negative voltage on pin 3. The microphone receives phantom power and sends audio signals on the same two conductors. Many mixing

consoles supply phantom powering at their mic input connectors; the microphone simply plugs into the console for its power supply.

The current drain spec tells how much current in milliamps the microphone draws, which is useful for calculating battery life based on the battery's milliamp/hour specification.

ARE SPECS RELIABLE?

Based on measurements I've made and compared to published specs in data sheets, most microphone manufacturers are supplying accurate data, with the following exceptions: a frequency

—CONTINUED ON PAGE 287

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SEVEN DAYS IN MAY

*The
Recording
of*
"In Concert
Against
AIDS"

by Robert L. Missbach

[Editor's Note: Bob Missbach was the audio recording producer, one of several recording engineers and the primary mixer/sound designer for the major benefit concert series he describes in this report. Two years in the making, the benefit's goal was to raise money for (and awareness about)



TRACY CHAPMAN

PHOTO: JEFF REINKING



HUEY LEWIS

PHOTO: JAY BLAKESBERG

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BOOK OF LOVE

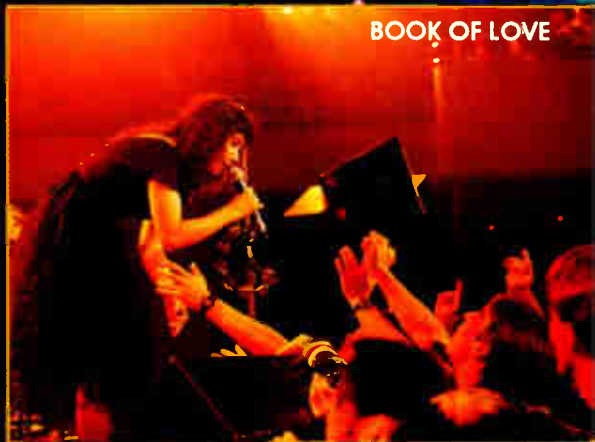


PHOTO: JAY BLAKESBERG

fighting the AIDS virus. The idea for this was Zohn Artman's, who was the "charge d'affaires" at Bill Graham Presents for many years. Zohn Artman died two years ago from the AIDS virus.

Missbach is a Bay Area-based, independent engineer/producer who's worked with Huey Lewis & the News, Santana and Journey.]

For seven days in May, the San Francisco Bay Area participated in a musical benefit to raise funds for regional AIDS organizations that provide health services and education. "In Concert Against AIDS" (co-sponsored by NBC affiliate KRON-TV and the *San Fran-*



AGAINST AIDS

GRATEFUL DEAD



PHOTO: JAY BLAKESBERG

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cisco Chronicle, presented by Calif. AIDS Education & Support Foundation) brought together many diverse businesses, artists and technicians—all volunteering their time—to produce the first full-scale benefit of its kind. With promotion by Bill Graham Presents, staging, lighting and video production by Nocturne Productions, Lucasfilm Ltd.'s audio post facilities, and the collaboration of dozens of California's best camera operators, video and audio engineers, lighting designers and crews, editors, mixers, tape technicians, maintenance and systems engineers, "In Concert Against AIDS" was truly a special event.

The concerts themselves represented widely divergent production styles. Beginning with a dinner dance with Huey Lewis & the News, climaxing with a ten-hour rock extravaganza at Oakland Stadium, and concluding with an evening of Latin/salsa music, the week's activities spanned every social stratum and showcased such varying artists as the Grateful Dead, Linda Ronstadt, Los Lobos, Ben Vereen, the Los Angeles Mass Choir, Tracy Chapman and comedian Bob Goldthwait.

All shows were recorded and videotaped, then wrestled into a six-hour TV special in less than three weeks. All editing, mixing and conforming was accomplished without benefit of hindsight or afterthought; it was more like, "This part's done; let's move on to the next!" KRON-TV aired the results on a Saturday evening in June (and again in a shortened version last month). Proceeds solicited throughout the program brought the total funds raised to over a half-million dollars. At this writing, In Concert organizers are looking into cable TV syndication possibilities.

THE SCHEDULE VS. THE EQUIPMENT

The kickoff event on Sunday was the first of three nights of Huey Lewis & the News performing at Slim's, the blues nightclub co-owned by Boz Scaggs and Huey's manager, Bob Brown. However, the first recording took place at the cabaret show at a small venue, Club Fugazi in San Francisco. This was on Monday (Huey's second night at Slim's). The second recording took place at Slim's on Tuesday, the same night of the comedy show across town at the elegant Warfield Theater. Bob Skye and "Rover," the mobile recording bus from The

Plant Studios in Sausalito, Calif., drew the assignment for the first two music shows, while KRON's Ron Middag and video crew covered audio recording of the comedy show.

Neither Club Fugazi nor Slim's could provide enough electrical service to support the audio truck, the video machine truck, the video "fly pack" monitoring/switching setup and the additional lighting needed, so two mobile generators were used at Fugazi and one at Slim's, turning already crowded sidewalks into circus sideshows.

After one day off, Thursday's schedule combined a gospel/soul concert at Berkeley Community Theater with the truck load-in at Oakland Stadium. Westwood One's L.A. truck and Le Mobile were the heavies at the stadium, while Rover covered Berkeley.

On Friday we had rehearsal and soundcheck at the stadium. Both audio trucks hooked up to Unitel's video truck for audio/video/time code feeds. I decided to use Westwood for my command center (it has a large lounge) and also as primary audio distributor. For instance, the six audience mics were submixed in Westwood, then fed to Westwood's and Le Mobile's machines so we would have the same blend on all the tapes. Le Mobile returned their stereo monitor mix to Westwood, and in turn we fed the video truck with the proper source. In addition, time code and pilot tone from Unitel went first to Westwood, then to Le Mobile.

The stadium recording assignments were determined primarily by the sound crews. Ultra Sound and Sound On Stage (SOS) combined resources and crews, with two separate monitor mixers/splits and two house mixers. Westwood took their split from the SOS system, while Le Mobile plugged into Ultra Sound. The lineup: Tower of Power opened, followed by Joe Satriani, both recorded by Biff Dawes in Westwood One. We had a half-hour between sets, so the changeover wasn't too painful. Los Lobos played next, and Guy Charbonneau handled them in Le Mobile with help from Dead team members John Cutler and Jerry Garcia, who had taken an interest in the group's endeavor. Then it was back to Westwood for John Fogerty's set—engineer Jeffrey Norman (who has recorded Fogerty for the last few years) was on hand to advise Biff, although with the Dead's Bob Weir and Jerry Garcia in Fogerty's band, it

wasn't quite what Jeffrey was used to.

Next, Tracy Chapman filled the hour before the Grateful Dead's first set. Since she had just two inputs, Le Mobile recorded her while continuing their setup for the Dead. Cutler and Charbonneau have worked together on the Dead's dates, so their procedures were well-rehearsed. From this point on, it was cruise mode, for the Dead played their normal 2½-hour show with a 30-minute break. By the end, nine hours had elapsed, but no one had been overworked and almost everyone was happy. It was a good thing, because some of us still had two more days to work!

Sunday's show was tough: a dance concert at the S.F. Giftcenter Pavilion. This six-story structure features an open "courtyard" from ground floor to roof that doubles as stage and dance floor. It is loud, resonant and not designed for the use it gets. We brought in the fourth audio truck: Pacific Mobile Recorders (from Sacramento) operated by Jim and Kat Hibbard. The acts really differed. The opener was a solo vocalist who sang to a tape; next was a seven-piece Latin jazz group; then the headliner, Book Of Love, a sampler/sequencer band from New York. The good news was that with all those direct inputs, Book Of Love seemed fairly easy to record. The bad news was that the monitors were so loud I could have mixed the band through the vocal mics (and that's almost what I did). We had to hurry through soundcheck because the doors opened at 4 p.m. Fortunately, Monday's Latin show was at the same venue, and we would have more time.

The Latin show lineup was also diverse: Viva Brasil (Latin jazz and Brazilian funk), Bandito (more than a dozen raucous Latin rockers), the Pete Escovedo Orchestra with an exquisite set of jazz/salsa, and Linda Ronstadt and her Los Comperos de la Fonda show with Danny Valdez: six violins, two guitars, two vihuelas (a 4-string, ukelele-like instrument), two trumpets, a gitarone (4-string acoustic bass) and a harp. The four-hour show ended somewhat anticlimactically when Ronstadt lost her voice and shortened her set. But after seven days, six venues, four trucks and 42 reels of tape, we had completed Phase One: the shows were on tape!

Phase Two started immediately: mix all the music segments for the TV program—in the next six days.

WHAT WE'VE LEARNED SO FAR

That first show at Club Fugazi presented interesting problems. We had our obligatory power failure. The video machine truck popped the breaker on the Stabiline (a power conditioning transformer for AC distribution) it was connected to during. . . the first song! Not only did the video machines stop (except for the 3/4-inch program deck inside the club), but so did the time code generator. We didn't choose any songs from *this* portion of the show. And the house audio snake from stage to P.A. board (where we took our split) picked up a hum from the lighting on some channels—yep, including the lead vocal mic. Of course, we used a song for the TV show that was. . . *a capella!*

The craziest problem didn't surface until we checked the tape the next day at Lucasfilm. We had inserted an Adams-Smith Zeta-3 synchronizer in the time code feed from the video truck and patched its output to the two multitracks. The pilot tone was split and patched without any such detour. (I know some of you are already shaking your heads.) Now, I should know better—always monitor the output of the tape machine. Well,

what we got *looked* like time code and *sounded* like time code, but somehow the Zeta-3 got switched to a "hold" mode—we printed the same time code number all night long! I can laugh now, after Lucasfilm tech engineer John Harkin managed to jam-sync over the songs we needed, using the pilot tone as a sync reference.

Our next scramble came at the gospel show. We flew four Neumann U87s in front of the three risers, intending to supplement the stand-mounted condensers used by the house. Each choir was accompanied by its own stage band, anything from solo organ to six-piece rock group. Early in the evening, the bass amplifier quit, so the bass DI was mixed into the monitors. . . all the monitors. At this point, all the U87s heard was *bass!* So we tried using the stage mics, which were phantom-powered from the monitor board. But the phantom power wasn't stable, and we were half-way through the show before the mics were repowered from the house board. So guess which songs were picked for the TV show? Only one from this first half and one from the second half, by which time we had all

the mics working properly and at least had a choice.

The stadium show started off a little wobbly. We had checked and rechecked our time code since the previous day's rehearsals, and the video truck had left the code generator running constantly since then. As the show began, Bill Graham took the stage to introduce Tower of Power. Then someone in the video truck noticed the time code wasn't set to "time of day." So in the five seconds between Bill's intro and Tower's downbeat, they reset the time code generator! Six jaws dropped simultaneously in the Westwood truck—we had all been watching the counter. Now, you know we're going to use that first song, right? Thanks again, John Harkin. This time he had to reverse jam-sync (yes, they can do that now), again using the pilot tone for sync reference. For years I'd complained about giving up a precious track for that seldom-used pilot tone. I'll never work without it again!

The rest of the stadium show was virtually flawless. The only thing that wasn't perfect was when Le Mobile ran short of tracks for the Grateful Dead (a common occurrence) and recorded the audience tracks on 1/4-inch with center-track code. But hey—no problem! And on two of the three Dead songs chosen for the TV show, one of those audience tracks was sacrificed for a vocal mic that nobody used! But what's a little mono audience between friends, especially on a Dolby Surround presentation? We made up for it by giving Tracy Chapman a 24-track tape for both of her inputs, with audience and pilot tone at no extra charge.

The worst part about the Giftcenter shows, besides the awful acoustics, was electrical. The audio truck ended up on a different service leg than the house system, with over 100 feet between choices. The result: a ground differential we couldn't solve in any of the usual ways. Whenever we cross-patched in the audio truck, it sent a pop to the monitors that the channel and submaster mutes wouldn't prevent. So we didn't crosspatch.

THE MUSIC MIXES

On the day after the Latin show, I showed up at Fantasy Studios with my "thirtysomething" reels of 2-inch tape, mostly 5,000-foot (14-inch reels), Dolby XP24 SR rack, Dolby SDU-4 Surround Decoder, my Macintosh com-

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BOSE
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puter and a couple of cases of ½-inch tape, prepared to mix 33 songs by 15 artists in six days. "Walk in the park. . ." you say? It was, actually, after all the work of the previous seven days. At least mixing took place in one venue.

Mixing the music segments for Dolby Surround wasn't tricky at all. We had carefully recorded everything, so I didn't have any lurking phase phantoms. The nature of Surround [see sidebar] is that the system compares Left and Right and diverts anything out of phase between them to the surround channel. The most obvious element from these live tapes was anything mixed in stereo from mics—primarily drums. If the Left/Right drum tracks were panned hard left and right, then the monitor leakage (which shows up as random phase) starts showing up in the surround channel. But a live audience doesn't perceive the drums in a wide stereo, anyway, and I mixed from an audience's perspective. My intention was to place the listener in the hall or stadium, with the music coming from the front and the ambience and crowd sounds from all sides; a drum set 12-foot wide doesn't support that. Closing up the panning gave the proper results. For the rest, the mixes were like any other—make it sound good in stereo and mono. These were music premixes, because they would be assembled to picture later with all the other elements.

At this stage I mixed very little Surround—just the audience mics mixed the way you would like to hear it in stereo. The mix format was ½-inch 4-track, 15-ips Dolby SR—standard stuff. The only other consideration was effects. It seemed the best approach was to do what the music needed to sound good, so I freely used reverbs and delays. Also, I didn't try to make a small club sound small, or the stadium sound huge; the surround ambience added later would give us the space.

THE FINAL MIX TO PICTURE

With only 13 days until the broadcast, I was forced against my will to take a couple days off; I had caught up with the video editing schedule. They hadn't assembled the first hour's reel, so I had nothing to mix to. Instead, I spent two low-key days at Lucasfilm's Sprocket Systems with ace film mixer Gary Summers, setting up for Phase Three. Now, what they call a "mix room" and what I call a "mix room"

is quite different. At Lucasfilm they mix in a theater, where the nearest loudspeaker is 25 feet away and the surrounds consist of at least a dozen "diffuse array" speakers behind and to the sides. But our audience would never hear this show in a theater, so we eschewed their normal setup for something more home-like. We commandeered a "Home THX" prototype system that Tom Holman had developed, setting the front speakers on stands in front of the SSL 5000 console, with two X-Y surround pairs behind us on the outboard credenza. We used no center channel because we felt most home systems wouldn't. We set up a video monitor so we'd feel like we were watching TV, but eventually gave that up for a full-size projection screen.

In the first stage of our mix, engineer Scott Chandler transferred all the audio elements to a fresh 24-track reel in Dolby SR, striped with the time code for each hour. The Dolby SR music premixes were transferred without decoding, while the other elements came with the videotape. Video supervisor Norm Levy was editing the show masters onto a Sony D2, the digital video format that carries four channels of PCM digital audio. As he edited, he gave us discrete audio elements such as the emcee's dialog and interviews, KRON's AIDS reports, various PSAs and celebrity pitches, and even the edited comedy show, masterfully mixed in wide (i.e., surround) stereo.

After Chandler transferred these elements according to their proper time code location, Summers and I added other ambiences. For the music segments, we went to the original 24-track master for each song and transferred the audience tracks to our assembly reel. For the backstage interviews, we flew in some wild ambience recorded backstage. As we mixed the show, we panned these audience/ambience tracks to the surround channel only—remember, the music premixes were already as we wanted them in stereo. We could add as much as necessary to place the listener at the scene.

This phase was perhaps the most fulfilling, since we could see the entire show take shape. Gary Summers' expertise with dialog and effects was invaluable. Our final mix format was to Sony 3402 digital 2-track, from which we laid back digitally to the D2 video machine. We experienced sev-

eral dropouts on the 2-track; some were tape-related, as they dropped out on the analog cue tracks as well, and others were simply random, intermittent digital errors. In these cases, we went back and dropped in over these sections. Summers has done this before.

If it sounds like things were moving along too smoothly, you're right. The day before the broadcast, we finally received approval to include one of Tracy Chapman's songs in the show, and we brought up her tapes from L.A. I did a full surround-encoded mix of the song to Dolby SR 2-track with center-track code, and headed into the video editing session that evening, where we edited and mixed right to the D2 video to create a Show Reel 2A, which was cued up and inserted during the broadcast. End of Phase Three.

IT'S NOT OVER 'TIL IT'S OVER

On the evening of the broadcast, KRON hosted a party for the production volunteers. They set up three rooms for watching the show in various levels of fidelity. One studio had been emptied and turned into a dance floor, with video monitors overhead. A second, living room-style setting offered a large-console stereo television in one corner. But the most popular was a conference room with a rear-projection TV and consumer surround audio. However, someone had decided to set up a center-channel speaker that was 3 dB louder than the Left and Right. This destroyed the imaging I had been so proud of, so here I was on a busman's holiday, on my knees with a flashlight trying to recalibrate the decoder while the show was running. Just can't leave it alone. . .

So this was it—the one and only scheduled broadcast. It had taken me three months to plan the audio portion. We had recorded 37 artists in seven shows at six venues in seven days with five trucks. We then mixed the 33 songs by 15 artists in six days at one studio, and assembled the six-hour show in eight days, in two more rooms. We used 40 reels of 2-inch tape, 11 reels of ¼-inch, ten reels each of ½-inch analog and ¼-inch digital tape—a total of 71 reels. We used nearly 100 cassettes. And this was just for audio!

Tremendous planning and a concerted effort by all the crews brought the entire Bay Area together for this

Arrays, Arcs & Point Sources

Sound reinforcement systems use multiple loudspeakers to increase the power of sounds, so that artists can communicate with large audiences.

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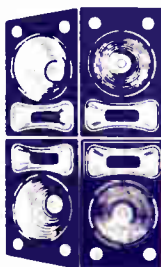
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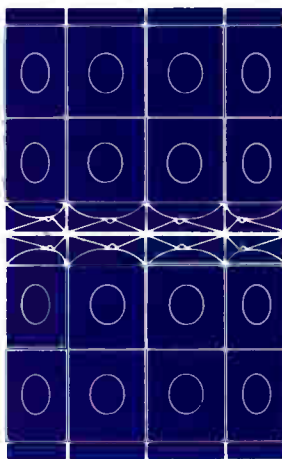
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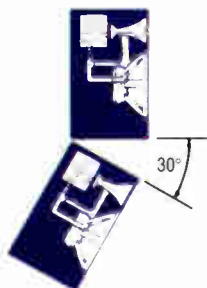
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—FROM PAGE 9, CURRENT

the last three years, with an anticipated continued future decline. This last conclusion, together with other observations on MIDI production, indicate that demo work is migrating to the home environment, where cost-effective equipment makes quality demos possible.

FACILITY CONFIGURATIONS

When asked to describe their facilities, respondents were divided almost equally between private recording/post-production and commercial recording/post-production companies.

Regarding studio configurations, 21% have a single control room/sound studio. In addition, half of those surveyed reported having a designated music/MIDI production room. The average number of separate sound studios per facility was 1.1, with an average sound studio/scoring stage capable of handling two to ten musicians.

BUSINESS PROFILE

Over 60% of facilities surveyed have been in business at least four years, with the bulk being between four and six years old. Thirty-one percent never use freelance (non-payroll) staff. Another 20% use freelance for 10% or less of their work. Only 15% use non-payroll for more than half of their production work.

Almost three-fourths of the facilities reported a full-time production staff of between one and four employees. In addition, 29% employ a full-time maintenance staff. These observations are also supported by the fact that survey participants saw themselves as performing 4.6 jobs: 69% described themselves as facility owners or partners,

77% as engineer/mixers, and 51% as managers. These figures are consistent with previous *Mix* research.

REVENUES AND EXPENDITURES

For many it's still a small business, with 27.5% reporting less than \$25,000 in annual revenues, and another 13% reporting between \$25,000 and \$50,000 annually. However, it's significant to note that 11% report annual sales in excess of \$1 million, and another 28% report sales figures between \$100,000 and \$500,000.

There was a tendency to spend more money on equipment than on acoustic improvements: almost 15% spent more than \$250,000 on equipment over the last 12 months, while a scant 2.2% spent more than \$250,000 on acoustic improvements over the same period.

While 20% didn't make any major capital equipment purchases in the past year, of those who did, 77% bought consoles and 50% bought digital audio workstations. While manufacturers generally regard digital audio workstations as self-contained units, evidence from the survey indicates that facilities don't necessarily accept such a narrow definition. Respondents interpreted that phrase to mean a number of broader configurations, predominantly consisting of a general-purpose personal computer and accompanying third-party hardware and software.

When they do go shopping for equipment, studios prefer new over used goods. Almost half purchased only new equipment in the last year, while only 10% of those surveyed reported spending more than half their budget on used equipment in that period.

Anticipated purchases for the next 12 months appear to be slightly above that of the previous 12 months, especially in the \$25,000-\$100,000 category. More than 35% expect to buy equipment in that dollar range in the upcoming year compared to 29% in the last 12-month period.

However, the number of respondents expecting to spend under \$25,000 remains constant. Of the total 416 responses, 387 (93%) expect to buy at least one major equipment item in the next 12 to 18 months. The digital audio workstation appears to be a hot item on the wish lists of many studios, with 37% anticipating such a purchase in the near future. The only equipment item deemed more desirable was the ubiquitous recording/mixing console, planned for purchase by 44% of surveyed facilities. It is significant to note that the vast majority of those who filled out the survey (75%) described themselves as authorizing purchasers for their facility.

BUSINESS CLIENTELE

When asked how they promote and acquire new business, studios reported an average of 3.8 different approaches. Seventy percent responded that they use brochure/direct mail methods, and 64% use Yellow Pages ads. Roughly half advertise in local trade publications, while one-fifth included word-of-mouth as a means for acquiring business.

Studios showed a very broad range of client profiles. The average studio draws 65% of its business from local clients, with the remainder in equal proportions among state, regional, national and international clients. Twenty-six percent indicated that they serviced 10 to 25 different clients over the past 12 months. However, a significant number (24%) claimed to see more than 100 clients in that period.

COMPUTERS IN THE STUDIO

The use of computers for creative/musical/production activities in studios is widespread and reflects a bias toward Macintosh in the pro audio industry. Eighty percent of studios reported using some kind of computer for such tasks, with 51% of those computer-equipped facilities using Macs. IBM PCs and compatibles were runners-up in the tally at 45%.

—CONTINUED ON PAGE 296

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by Mark Herman

SOUND REINFORCEMENT NEWS

Feeling Fine in '89... What a great summer and early fall season for the live sound industry. Almost all the national, regional and local sound reinforcement companies across the U.S. reported increased corporate work, an abundance of tours and a general increase in local area sound work, resulting in the third straight excellent year for the live audio industry.

The **Rock Torhout/Werchter '89** outdoor rock festival held in early July in Europe saw a large Martin F2 P.A. system that was assembled at two concert sites. An estimated 45,000 fans were at Torhout (70 miles west of Brussels), and 53,000 at Werchter to see **Lou Reed, Joe Jackson, R.E.M., Elvis Costello, Robert Cray, Nick Cave & the Bad Seeds, Tanita Tikaram, The Pixies** and **Texas**. Even though they were separated by over 100 miles, the two festivals used the same audio gear provided by Holland sound reinforcement company **Ampco Sound Systems**. This was no mean feat considering that the sound system was comprised of 160 Martin F2 cabinets, 36 sub-bass cabinets and a 36-box Turbosound TMS-3 delay tower. At Torhout the TMS-3s were stacked in a 6 x 6 single-tower configuration, while at Werchter two delay towers were positioned 30 yards behind the house mix area and separated by 70 yards. Ampco's people struck the 232-box P.A. beginning at 12:30 a.m. and had it up and running in Werchter at 6 a.m. with plenty of time before the 10 a.m. start. Yamaha PM-3000, TAC SR 9000 and Midas Pro 40



mixing consoles were used at both events.

With the addition of another Gamble Series EX 56 house console, **Schubert Systems Group** (North Hollywood, CA) fielded three of these expensive babies on the road this summer and fall. That's a big chunk of change in FOH electronics. Owner **Dirk Schubert** also reports that he had all his main P.A. enclosures and stage monitors loaded with JBL's new 2450 neodymium high-frequency compression drivers. SSG's subwoofers also got a lift with new JBL 2241 bass speakers. SSG had five complete touring systems out at one time through part of the summer and fall...The **Doobie Brothers** have extended their tour through February and now plan to travel

In Belgium, the Rock Torhout festival featured a system comprised of 160 Martin F2 cabinets.

to Australia and Japan. They are carrying a 72-cabinet SSG Steradian system...**George Thorogood** just finished a five-week tour that began in August...Jazzy **David Sanborn** and **Al Jarreau** each had systems out...Reggae star **Ziggy Marley** (see "On the Road") toured in August and September with a 40-box main P.A. system.

SSG's **Power Plant** studios reported that **Don Henley, Michael McDonald, Stevie Nicks, Billy Idol, Bad English** and **Little Feat** were some of the artists recently passing through the three-room rehearsal facility...SSG is one of the five

nominees for best sound reinforcement company in the 1989 *Mix* TEC Awards show being held this month in New York.

Universal Studios (Hollywood, CA) uses six Intersonics

SDL-5 ServoDrive subwoofers to help simulate a powerful 8.3 (Richter scale) earthquake, which is part of the wild new amusement attraction called "The

Big One." The intense low-frequency sounds are repeated up to 200 times a day.

Showco (Dallas, TX) landed the **Rolling Stones'** North American mega tour that began

ON THE ROAD

SOUND COMPANIES, EQUIPMENT, ARTISTS & PERSONNEL ON TOUR

Artist Sound Company Tour Dates Region	House Console #1 House Console #2 Monitor Console #1 Monitor Console #2 House Crossover	Main Speakers Main Speakers Subwoofers Monitor Speakers Monitor Speakers	Main Amplifiers Main Amplifiers Sub Amplifiers Monitor Amplifiers Monitor Amplifiers	Engineers: (B) = band (H) = house (M) = monitor eng. (T) = tech (a) = assistant (C) = crew chief
Barbara Mandrell Sound Image August - December U.S.	Ramsa WR-S840 40x8x2 Ramsa WR-S840 40x18 BSS FDS 360	(16) Phase Loc Series 4 (8) Phase Loc Series 4 Sub Phase Loc 215	QSC 3800, 3500 QSC 3800 QSC MX200, 3200	Jeff Cowan (B,H) Tony Distefano (B,M) Greg Alexander (aH) Rob Mailman (aM)
Debbie Gibson Maryland Sound Ind. July - December International	Yamaha PM-3000 40x8x2 Yamaha PM-3000 40x8x2 Ramsa WR-S840 40x8x2 MSI HS 301	(42) MS 12 (30) MS 12 B (12) MSI 18 Sub MSI 2x12, 2x15 Meter UPA-1, UM-1	Ramsa 9220, SAE250, P500 Ramsa 9220, SAE250, P500 Crest 8001 SAE P50, Crest 3501 SAE P50, Crest 3501	David Morgan (B,H) Vish Wadi (M) David Callahan (C,T) John Mucciardi (aM) George Schwartz
Love & Rockets Delicate Productions June - July North America	Yamaha PM-3000 40x8x2 Soundcraft Series 4 40x16 SG Engineering	(32) Martin 215 (24) Martin 212 (8) DP 218 Sub Martin LE-400	Crest 8001, Carver1.5 Crest 8001, Carver1.5 Crest 8001 Carver 350	Colin Ellis (B,H) Bobby Daniels (B,M) Chuck Becker (aH) Mike Horn (aM)
W.A.S.P. Linear Sound Systems July - August U.S.	Yamaha PM-3000 40x8x2 TAC Scorpion 30x12 BSS FDS 360	(24) Turbosound TMS-3 (8) LSS Sub LSS 514 Turbosound TMS-3 sidefill/drums	Crest 7001 Crown MA2400 LSS Mosfet LSS Mosfet	Graham Thornton (B,H) Michael Rugis (C,aH) Keith Finch (aM) Philip Imbrie (T)
The Who Clair Brothers June - September North America	Yamaha PM-3000 40x8x2 Yamaha PM-3000 40x8x2 Harrison SM-5 32x16 (*with 20 ch. extender) Clair Custom	(144) Clair S-4 (24) Clair Sub Clair 12AM	Clair/Carver 2.0 Crown MA10000 Clair/Carver 2.0	Clive Franks (B,H) Bobby Pridden (B,M) Joe Ravitch (C,aH) Ed Dracoules (aM) Pete Pelland
Ziggy Marley & the Melody Makers Schubert Systems Group August - September North America	Gamble HC 40x16x2 Gamble SC 32x16 SSG	(32) Steradian (8) Steradian Sub SSG 115	Crest 8001, 7001 Crest 8001 Crest 7001	Errol Brown (B,H) Tony (B,M) J.D. Brill (C,aH) Mike Gonzales (aM) Mike Manasa
Rolling Stones Showco September - December North America Showco	Harrison HM-5 32x16x2 Harrison SM-5 32x16 (*with 20 ch. extender)	(168) Prism (24) Prism frontfill (64) Prism Sub Showco BFM 600, 450	Crown PSA-2, MT1200 Crown PSA-2, MT1200 Crown MA2400 Crown MT1200	Benjamin Lefevre (B,H) Chris Wade Evans (B,M) Gary Epstein (C,aH) Dan Huffman (aM,T) Ron Reeves (aM) Eddie Harbin (aT)
Rolling Stones Showco September - December North America Showco	Harrison HM-5 32x16x2 Harrison SM-5 32x16 (*with 20 ch. extender)	(168) Prism (24) Prism frontfill (64) Prism Sub Showco BFM 600, 450	Crown PSA-2, MT1200 Crown PSA-2, MT1200 Crown MA2400 Crown MT1200	<u>Red Team</u> Jeff McGinnis (C) Pete Buess (aM) Jim Putnam Dan Machado Tim Hatfield David Moncrief
Rolling Stones Showco September - December North America Showco	Harrison HM-5 32x16x2 Harrison SM-5 32x16 (*with 20 ch. extender)	(168) Prism (24) Prism frontfill (64) Prism Sub Showco BFM 600, 450	Crown PSA-2, MT1200 Crown PSA-2, MT1200 Crown MA2400 Crown MT1200	<u>Blue Team</u> David Conyers (C) Mike Allison Mark Newlin Randy Willie Todd Garrett Kevin McCarthy

this September (see "On the Road"). Two separate Prism P.A. systems, arrayed with 28 columns hung six deep and totaling 168 cabinets each, are leapfrogging from site to site. Due to the massive production on the tour, three audio teams are employed by Showco. The Universal team works all the concerts, traveling with consoles and electronics and alternately joining up with the Red and Blue teams that handle the giant P.A. setups.

Showco Shorts...Besides

doing the Stones, Showco—another 1989 TEC Award nominee—has stayed busy fielding up to 14 separate systems at once in what has been a rip-roaring summer and fall season...**Diana Ross** is almost finished with her long tour that stopped at many sheds and several casinos...

Stevie Ray Vaughan & Double Trouble toured sheds until late August with a 32-box Prism system...**The Bee Gees** toured North America through September before heading over to Australia and Japan...Showco

continues to provide a Prism P.A. for the **Chicago/Beach Boys** tour...As usual, hard-working **Willie Nelson** is carrying a 12-box Prism system...**Little Feat** and **Melissa Etheridge** were scheduled to continue touring until late this fall...**Mike & The Mechanics** were out, with **The Outfield** opening. Mike Ponczek mixed the house...Showco provided a Prism P.A. for the **Club MTV** concert series that highlighted several bands, including **Paula Abdul**, on a tour that stopped at various sheds and amusement parks...**Aerosmith** began a tour stint with a Prism P.A. this month in Europe...Ice skaters **Torvill & Dean** employed a custom 360-degree Showco sound and lighting system for their show...**Edie Brickell & New Bohemians** were due to end touring this fall...Showco also had tours with **Dwight Yoakam**, **Carole King** and the **Moody Blues**, as well as work at the **Illinois State Fair** and the **Duquoin State Fair** in Illinois...At presstime Showco was scheduled for the world tour of **Paul McCartney**.

Andrews Audio Consultants (NYC) provided the sound for the **Mike Tyson-Carl "The Truth" Williams** boxing match held at the Atlantic City Convention Center. Twenty Meyer MSL-3s and eight UPA-1s were used for the 93-second championship fight.

Apogee News... Seeking more gain and intelligibility, the NBA's **Golden State Warriors** installed 32 Apogee loudspeakers at the **Oakland Coliseum Arena**. Eighteen AE-5s will now be mounted under the scoreboard in the center of the arena, and a delay system with 16 wide-angle AE-2s was installed in a concentric circle 75-feet out from the center cluster. Six AE-12 subwoofers were placed above the scoreboard for special effects enhancement...Apogee Sound now has polar response plots for its entire range of products. The project is intended to aid sound designers who specify and configure large-scale loud-

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The 36 and 56 input MXP 3000 consoles are a great match to the APR-24. With flexible configurations, this is the custom board at a production price. Third parties are so impressed with its build quality and sonics that they offer custom modules. And its the quietest board ever built in its size range.

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speaker arrays and clusters...A program called "Apogee Access" helps participating rental companies supplement their stock of Apogee loudspeakers. A computer database provides information on the worldwide availability of Apogee inventory.

Aloha mon ami...Hawaii's **Baus Engineering** reports installing a Meyer sound system along with an ATL house console in the new **Le Nouveau Monde des Schtroumps** theme park in France. Local island work for Baus included the Starlight Pops Series featuring the **Honolulu Symphony** at the **Waikiki Shell Amphitheater**. Levinson amplifiers powered the Meyer MSL-3 and UPA-1 cabinets.

Loudspeaker manufacturer **Renkus-Heinz** has a software package with graphic displays that reportedly provides a means of predicting the direct far sound field of both rectangular and circular arrays. Currently, the program is compatible only with IBM-type computers, although a

Macintosh version is expected soon. The program will be especially useful in predicting direct far-field lobing patterns.

Northeast Community College (Norfolk, NE) has a hands-on sound reinforcement audio training educational program. A 10kW portable sound system with EAW P.A. boxes, Grundorf monitors, BSS crossovers, Yamaha consoles and Crown amps was recently purchased to use at local and regional venues. Students may choose a two-year associate of applied science degree or an associate of arts degree.

Maryland Sound Industries—also nominated for a 1989 TEC Award—has enjoyed a tremendous season in the touring, corporate and installation markets. Spokesman **Ronnie Smith** says, "It's been the busiest season we have ever had. We picked up several new accounts." MSI's industrial sound division has worked with many major corporate clients as well.

Smith also states that MSI's permanent installation department has experienced a large increase in business. "We've had a 250 percent increase this year alone. Examples are the completion of the Disney Pleasure Island project, sound consulting for a theme park high-rise building in Japan, and a large theater project in Guam."

MSI Briefs...It's hard to make it short when a company has so many clients, but here we go:

Debbie Gibson (see "On the Road") is now touring with MSI for the first time. The talented teen queen is carrying an 84-box arena P.A. system until the end of the year...**Sheena Easton** began a national shed tour July 6 and carried a 40-box MS10/10B system...**Dolly Parton**, who has been out since late May, is running a 32-box MSI NorthWest system...A large JBL Concert Series P.A. accompanied **Neil Diamond** on his highly successful U.S. summer arena tour that broke many box office records.

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This October and November, Diamond will be playing Europe...The fiery **Pointer Sisters** toured nationally...**Steve Miller** completed his summer tour in late July. A Yamaha PM-3000 was used for the FOH mix and a Ramsa WR-S840 on the monitors...MSI monitor engineer **Mike Kelly** is out touring with the Doobie Brothers...**Joe Jackson's** U.S. theater/shed tour leg went from July 25 to mid-August. He is now in Europe. Veteran engineer Al Tucker is mixing house...**Patti LaBelle** will be touring to the end of the year...**Frankie Valli** continued to hit small theaters-in-the-round, fairs and the Vegas circuit...MSI provided sound for the gala **Kingdom of Saudi Arabia** traveling show that promoted Saudi Arabia to the American public...**Roberta Flack** had dates in the U.S. and Japan...**Anne Murray** is running a 32-box arena NW2 system...**Gloria Estefan & the Miami Sound Machine** are now in Europe and are scheduled to arrive in the U.S. late this month to complete part of their 16-month world tour...**Daryl Hall & John Oates** had sporadic dates.

Pink Floyd, out with a 185-cabinet main P.A. outdoor stadium system, finished their summer European tour July 19 in Marseille, France, after a jaunt through Russia and an outrageous concert in Venice, Italy. Floyd performed on a moving floating barge with the gigantic P.A. and stage. The house mixing position was on a separate floating barge. I still can't figure out how MSI ran the house snakes. Worried that the P.A. could cause Venice's historic buildings to crumble, city officials insisted that the decibel output be kept at lower levels. Floyd did their normal show anyway. The consoles and electronics were transported back to the U.S. via air while the bulkier P.A. gear traveled across the Atlantic by ship...**The Cure** ran a 110-box MS12 system on a European tour that ended July

28. Their U.S. leg began August 20 at Giants Stadium with the same 185-box P.A. used on Pink Floyd's European tour.

Beyer microphone dealers and users will now have the services of the new Beyer Microphone Clinic, which features a computerized, portable anechoic chamber. Customers can have their mics tested free of charge with hard copy results, for frequency response, polar pattern and output level.

Mark IV Industries acquired the audio tape duplication assets of Electro Sound Inc. (not to be confused with Electrotec Productions) and now operates a group of professional audio companies including Gauss, Electro-Voice, Altec Lansing, Vega, University Sound and Ivie.

Kimball's East—a new nightclub just around the corner from this writer's office in Emeryville, CA—installed an all-Meyer sound system. This wonderfully intimate 350-seat jazz club sounds and feels good. The Meyer's SIM equalization process was used to maximize the audio quality.

Hailing from the Southern California town of Calabasas, **Audio Techniques'** work included a six-week run with **Disneyland**. Three stages were used by a variety of national acts playing primarily for the amusement park's popular high school grad night celebrations...The company reports completing a two-and-a-half month North American tour with **The Imperial Bells of China**, a group who played ancient Chinese instruments found in a tomb dated over 2,400 years. Some of the unique instruments (two-tone bells weighing up to two-and-a-half tons, resonating granite chimes, various clay and reed devices, etc.) have never been seen or played in this side of the planet before. Audio Techniques' owner, **Bob Ludwig**, said, "We used a lot of Shure SM98s and 101 Countrymans, along with six wireless mics for vocals and instruments in the show's ten different scenes. It was a very interesting show: besides the

microphone placement, getting equipment on and off in the 30-second set changes was quite a challenge..."Long-time client **Chicago** is using an Audio Techniques' monitor system, distro, house drive gear, snakes and consoles on the Beach Boys/Chicago tour. Showco provided monitors for the **Beach Boys** and the main P.A. for both groups...AT has also been providing audio equipment support for **Maryland Sound** on several projects.

Atlanta Sound and Lighting (Atlanta, GA) began in '77 and now offers complete event production with sound reinforcement, lights and staging services. Owner **Scott Waterbury** said they primarily work industrials and national one-offs. "Concerts have been our mainstay over the past ten years. We do a lot of work for the city of Atlanta, Piedmont Park and the Fox Theater. The Atlanta Jazz Festival has been a regular client for the last six years. Past events we've handled include sound for the Pope's first U.S. date in '87 in Miami, lights for the '88 Democratic National Convention in Atlanta and sound for the most recent national Governor's Conference."

AS&L's modular P.A. system can be split into five separate setups and complements the five lighting rigs. The main P.A. speaker inventory, powered by Crest 8001 and 7001 amplifiers, is comprised of 16 EAW KF500s, Meyer UPA-1s, 36 custom Cerwin-Vega D-32s and 16 L-36 bass bins. Monitor speakers are RCF-loaded wedges powered by Yamaha P2200 amplifiers. House consoles are Soundcraft 800B 32x8x2, 500 and 400B; the stage uses Soundcraft 400B and Yamaha 2408 consoles.

Probably the largest sound reinforcement company in Wisconsin, **Clearwing Audio & Case Company** can field up to ten complete systems at a time. A road case division adds to its overall scope. Owner **Greg Brunclik** says, "Clearwing has concentrated on the regional market over the past few years,

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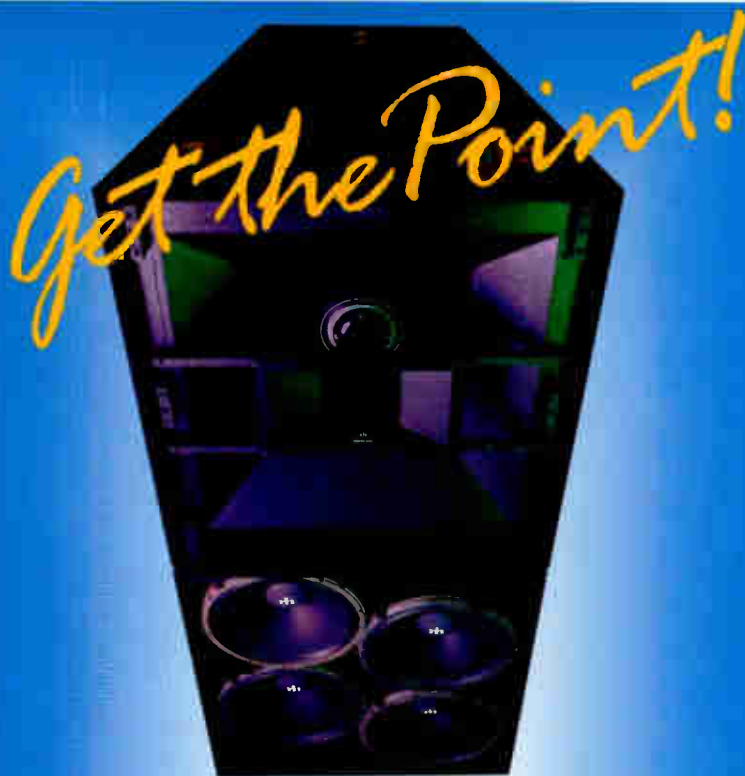
Technical Staff (1 to r): Tony Pekler, Rik Shannon, Jim Albert, Paul Hulse, Greg Dougan, Steve Smulian



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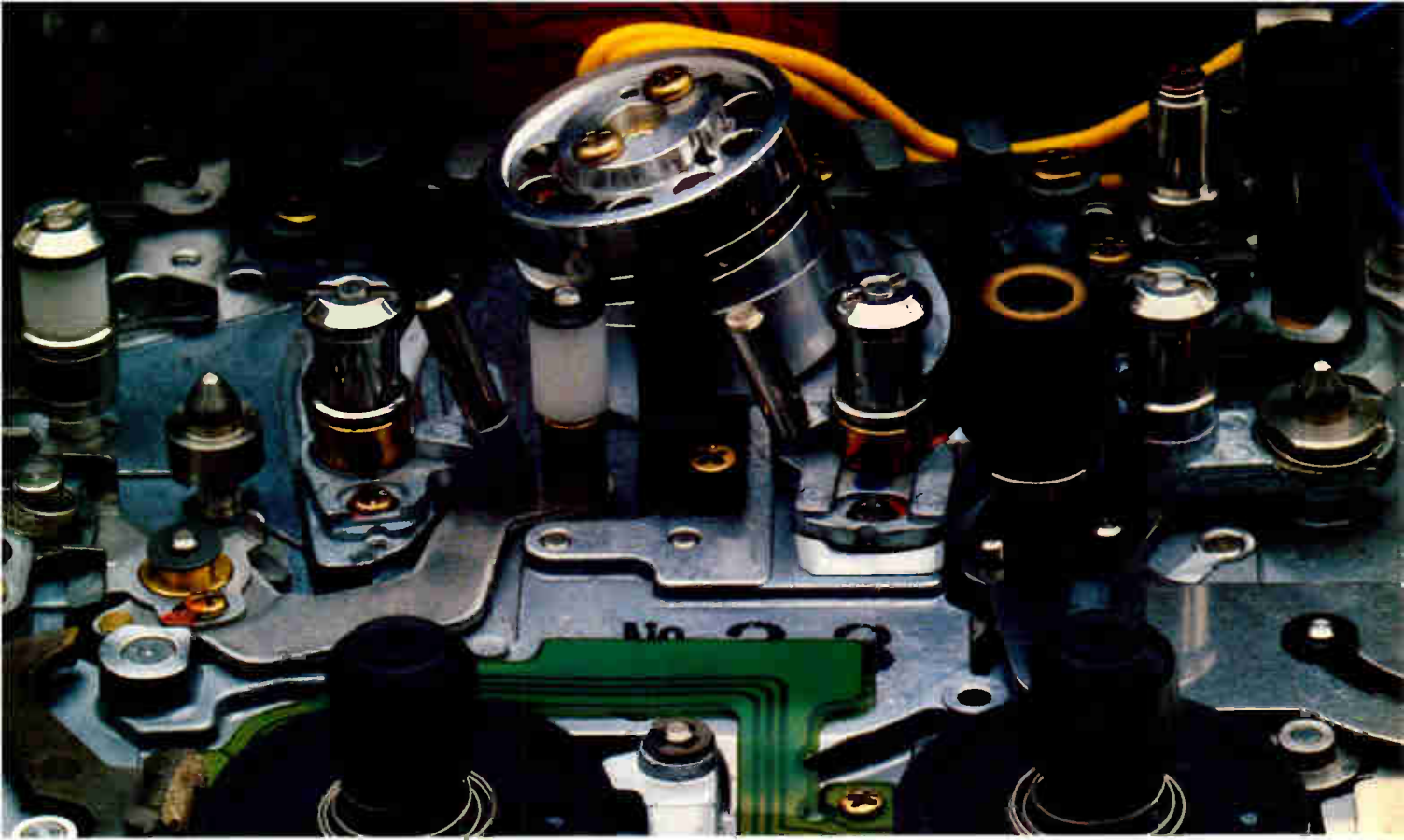
LIVE SOUND

but in the past we toured nationally with **Blackfoot**, early **Def Leppard**, Chicago and four years worth of **Eddie Rabbit**. We pick up a lot of national one-offs and occasional industrials. Our P.A. needs have evolved over the years. We've gone from a 4560-type system into a proprietary front-loaded cabinet, and have now progressed into a Martin main P.A. system." Clearwing is now building a Martin VRS800 system with ten boxes and several Martin 1200 enclosures. The monitor system employs Martin LE400 wedges. Its proprietary LRC system has 16 flyable boxes with double 18s, double 12s, a 2-inch and a bullet tweeter. Amplification is provided by Carver 1.5s. A custom 36x8x2 DAO1 Midas house console recently purchased from **Delicate Productions** was formerly **Supertramp's** touring board. Other house consoles are Soundcraft 800B, 500 and 600 consoles. Stage mixing is done with a Midas Pro 4 36x10, a Soundcraft 400 and an Audy 16x6.

Summer work included **Milwaukee's Summerfest**, with a different ethnic theme every weekend from late June through mid-September at Henry W. Maier Festival Park. Up to eight separate stages were active in a day...Every three weeks Clearwing does sound reinforcement for the **World Wrestling Federation** TV show using its LRC cabinets flown over the ring. Clearwing is in its third year with this immensely popular program that films three episodes in one day...Other work includes productions with **Festival Events**, a company that presents many multistage food festivals in the area, and plenty of business with the numerous breweries located nearby.

Recent Clearwing equipment purchases include Martin VRS800 main cabinets, eight Martin LE400 bi-amped wedges, two Martin RS1204 cabinets, 46 Carver 1.5 amps, a dozen Klark-Teknik DN360s, six Martin MX-4 control

—CONTINUED ON PAGE 182



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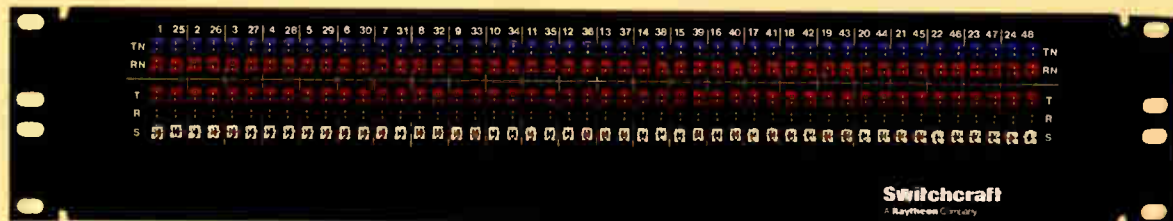
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WHO YA GONNA CALL FOR YOUR NEXT INSTALL

RENTAL SOUND COMPANIES ENTER THE INSTALLATION MARKET

by Mike Joseph

Once upon a time, long, long ago—maybe ten years—touring sound companies supported tours, industrial rental sound companies rented sound equipment, and installation contractors installed on contract. Life was simple. Customer markets were easily defined and understood. Work often matched lifestyle: long hair and T-shirts meant rock and roll, suits and ties meant corporate industrials and pocket protectors meant contracting. Cliche, but for the most part historically true.

Today, once-clear designations are blurring. Companies are changing emphases. Folks who traditionally derived their income from sales, rentals or installations only (pro audio dealerships, rental sound companies and contractors) are blending markets before our eyes. More than ever, *crossing over* describes what flourishing organizations are doing to make a living in today's fluid, constantly reforming audio landscape. The lesson may be: work is where you find it, and it ain't necessarily where it used to be.

A BRIEF HISTORY LESSON

In the days of tiny amplifiers and necessarily big speaker horns, the sound reinforcement world installed by the book—70-volt distribution, matching transformers, super "high-power" 20-watt drivers and lots of twisted-pair. Sound system design was math, done by the numbers. Acoustics was black art. Can you understand the words? Fine! *Articulation uber*

alles. Emphasis was on voice reproduction, 200 Hz to 8 kHz, give or take a few cycles. Installers came from radio or TV service shop backgrounds, via GI Bill post war education and based out of electrical contracting houses or early hi-fi stores. Their work can still be seen in churches, schools and civic auditoriums built in the '50s and '60s. Lots of Bozak, Altec, Bogen and Shure.

In another market altogether, '60s rock bands found the need to get their vocals up above the levels of screaming 100-watt Marshalls and 6L6-powered Fender Twins. They borrowed from theater, using 75-watt A-7s and welded metal sectoral horns. In time, complete "used" sound systems hit the market, orphans of group breakups and upgrades. Bands begot sound companies, sometimes short on business acumen but long on vision, who rented out these packages with the motto: you play, we splay. A seat-of-the-pants, second sound industry blossomed, backing up concert tours and festivals, centering on music reinforcement. You couldn't bribe them into a church or school.

Later, corporations embraced multimedia presentations and cities stepped up self-promotion as hosts for sponsored seminars and civic events. A need arose for flexible sound systems delivered and operated by persons acceptable to comptrollers and purchasing agents: suits, ties, nice shoes, reasonable hair, a passing familiarity with purchase orders. Some adventurous rock and rollers

moved over and dressed up; some electrical contractors went mobile, repackaged. Forward-thinking newcomers saw a fresh market and started from scratch, picking up slide projectors and Barco video beams along the way. It was three distinct markets with little crossover.

REALITY UPDATE

That was yesterday. Things have rapidly progressed in the 1980s: Mac-driven, MIDI-strapped synthesizers appear in sanctuaries; stereo, digital audio playback rolls for 60,000, supporting 30-meter Sony Jumbotron screens that rebroadcast evangelists and wrestlers; nightclubs front fashion shows; glam-bands rock corporate America's national sales meetings; live productions wow multimedia product roll-outs, rivaling MTV glitter. Gone is the line between voice amplification and high-level music reinforcement. Systems must do both, which begs the question: Who gets the call for the high-power install?

The folks with the high-level expertise, it turns out, are more often those who have done road work. Not that qualified traditional contractors familiar with powerful, music-quality systems and ways to hang them don't exist. But many more regional and national, rental and touring sound companies are responding to the growing need for permanently installed, high-level systems that are securely hung, properly powered and of "music" quality. Architects and consultants are now sending bids to these companies, who, armed

with newly dealt product lines and an installation code book, are rarin' to go.

ON THE FRONT LINE

A prime example of this movement is Maryland Sound Industries of Baltimore. Traditionally a rental and touring house, MSI started answering client requests for installed high-power systems six years ago. Will Parry, director of the installation division, acknowledges the trend: "The whole market has been exploding. We focus our installation activities on high-quality, music reinforcement systems, wherever they may be installed. We always felt the music reinforcement systems were the ones we could do really well. For example, Resorts International in Atlantic City has a full MSI house and monitor system. We're doing Trump's new Taj Mahal—5,000 seats—with a fully portable, flying voice and music reinforcement system, in this case using Meyer Sound's MSL 3s, 650-R2s and UPAs. Virtually everything we sell is off-the-shelf. The only facilities that use our own boxes are facilities that won't compete with us, but complement us. Everything else we do—nightclubs, auditoriums—uses manufactured devices."

Albert Leccese, VP of engineering for the touring sound company Audio Analysts (based in Montreal), concurs. "Most sound companies could use installations to balance out the slow time, when systems aren't on the road as heavily as the summer touring months. At some point we are all going to have to concentrate on it more, really pursue it."

"It takes real resources to go after installs," Leccese adds. "Bonding, insurance—it's a question of allocating resources, both human and dollars. You always have to post a performance bond and [deal with] other details that go beyond most touring companies' experience. In Canada, we're seeing local install business going to the usual traditional contractors, but a fair share is going to large companies that have rental and sales outlets, and regional

companies that do high-powered sound reinforcement in both areas."

Along with large, high-power music facilities, companies such as MSI also cover the middle-ground corporate A/V world. As Parry indicates, "We have done many successful boardroom and conference-room systems for major corporate clients [in this region]—the NASA space station control building for Grumman Aerospace, Apple's new facility, IBM, the new AT&T conference center—about 30 or 40 industrial jobs like this. We do quite a bit of government work—boardrooms, presentation suites; that's been an excellent market. We did the Nuclear Regulatory Commission's facility, all 16 stories, including four full presentation facilities that all had high-definition, high scan-rate video in addition to intercom and sound systems."

The growth potential at a company with a rental background is clear, as MSI's success proves. Parry states, "One interesting thing about being a major touring sound company is that, as the employees mature, they become excellent, well-rounded individuals who can do anything. A road engineer has all these abilities that you never quantify, but they're there, because being on the road is a demanding profession. Taking those people and rolling them into project management or system design is no problem. A lot of the people who work here have training and degrees anyway. We've promoted just about everybody from within."

MEANWHILE, IN CALIFORNIA

Although most installs for national-level sports arena and stadium jobs are still completed by well-instated, highly technical contractors or rental/sales/install houses, on a regional level, more and more install contracts are won by former rental-only shops. A San Francisco success story is BBI (Black Boxes Incorporated), an industrial rental sound and event production support organization that branched into permanent installs several years ago. Recent accomplishments include the per-

formance stage at Marine World/Africa USA, a Coast Guard training facility in Petaluma, California, a classical civic theater rehab for the San Francisco Palace Legion of Honor, and a 25,000-square-foot, 10,000-watt super nightclub/disco in Fremont, California.

BBI president Phil Bailey takes a pragmatic view toward installations: "Why should rental sound companies do installs? The primary reason is diversification, so your business is not dependent on any one given market at any point of the year. There is a natural synergy between the skills needed to design a sound system that will be used for an event on a rental basis and the skills needed to put it in permanently. The acoustic part, and the design and equipment choices that make it sound good, are pretty much the same for both."

"As a rental company you have the advantage of being adept at making it sound good quickly," Bailey continues. "On installs you have to pay great attention to the details of how everything is wired. You have to make it look nicer than a temporary system, and it has to sound as good, if not better. Many contractors do voice-reinforcement horn clusters well, but much of that is old technology. I don't know of many old-line contractors making their living installing 70-volt airport, factory paging and school ceiling distro systems who are familiar with flying a many-kilowatt, tri-amped, subwoofered system that works well for music. Do they understand the critical aspects of high-power loudspeaker placement as well as touring folks do? Whereas in 70-volt systems, speaker location is usually a given, then you balance loads, crunch the formulas, etc., a hanging high-power system is much more involved. It can be tuned in, aimed up or down, side to side, clustered and coupled for best performance. Its location in a room can be specified. Rental companies deal with this nightly, in physical reality as well as on paper and by formula."

As for regional competition, Bailey sees a pattern: "As you go

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up in price and quality, there are fewer highly qualified installation companies than service or rental companies. I don't know the reason. Expertise? Financial commitment? Performance bonding? The ability to produce the drawings and written specifications that are key to large installation jobs? Installs are the segment of the audio industry that is opening up, that still has a reasonable amount of profit in it—bid and spec'd jobs, where you need to be able to deliver your submittal and produce a credible paper interface to the project. The actual equipment install is the smallest part of these projects. We have less competition on big projects involving installations than big projects involving rentals. Full in-house CAD and plotting capabilities, and the ability to publish system-operational and service manual documentation are necessary aspects of our success. In addition to providing great sound, we have to give great paper."

CALLING THE FUTURE

Bailey believes in a strong future for all market segments. "I suspect that grand-scale touring will remain a specialty market," he says, "and those who have mastered it, do it well. If you differentiate between local or regional event rental and installations, companies are going to see both areas growing. Many customers you had as rental clients, whether clubs or industrial corporates, will eventually find they want to own the rental package, what has worked for them in the past. If you have a good relationship with these clients, the expertise, and the insurance, bonding and legal details covered, then they'll want *you*—the one who made their problems go away during the rental event—to provide the same service for the installation."

Whether the accelerated expansion of rental sound companies into the installation field is merely reflective of our industry's total growth or whether it's technical competence responding to market need is difficult to tell. Yet we

—CONTINUED ON PAGE 182

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ALL ACCESS

HOWARD JONES IN CONCERT

by Mark Herman

In July, the sound reinforcement company Delicate Productions invited me to check out its new Martin F2 main P.A. system at rock promoter Bill Graham's Shoreline Amphitheater (Mountain View, Calif.). Techno-wizard Howard Jones headlined at the outdoor venue, with Midge Ure (former vocalist for Ultravox) appearing in the opening slot. Smoother Smyth—one of Delicate's five owners—was on hand to show me around the system and introduce everyone at soundcheck.

Engineering the house mix for Howard Jones, and the man responsible for much of this tour's P.A. layout was Steve Venezia from Delicate. Jones' engineer Alan Bradshaw handled the monitor



PHOTO: DAVE LEPORI



PHOTO: DAVE LEPORI

mix and mic headset duties. Crew chief Steve Dabbs—who is also a Delicate co-owner—oversaw the P.A. setup and ran the load-in and load-out. Greg Guzzetta assisted Venezia at the FOH and Tracy Kunstmann helped out on monitors. Master rigger Steve Kendall was on the tour because of a special request by Delicate to design and manufacture a new flying rig for the Martin F2 P.A. He owns a rigging company (Rigstar) and has invented the K-Link, a 1-foot round sling made of 60 continuously wound polyester fibers, covered with a polyester tubular webbing. Dabbs worked closely with Kendall, who has designed flying systems for others in the past. The lightweight aluminum flybars can be angled easily at var-

ying degrees. On this show, the flybars (each takes two cabinets wide and supports four to five deep) were angled at 40° to best cover the amphitheater.

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Left to right: Barry Bongiovi, Studio Manager; Bob Walters, President; Tony Bongiovi, Technical Director.

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very highs. There is also a super-tweeter module with three JBL 2402 ring radiators in a horizontal phased array for 8kHz and above, short/medium throw use. The lower F2B bass enclosure has dual, horn-loaded, 15-inch Martin speakers with a 38Hz to 500Hz bandwidth.

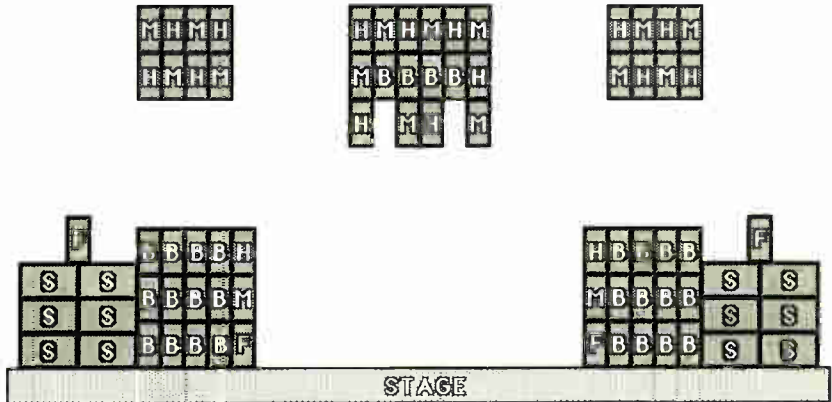
Augmenting the F2B on the low end were Delicate's 218 sub-bass cabinets (designed by Mark Engaberson) loaded with JBL 2445s, which were powered by Crest 8001s running at 4 ohms (each 8001 powered two subs). The 8001s also ran the F2B boxes on a 2-ohm load (each 8001 powered four F2B cabinets). Carver 1.5s were used for the F2 mids and Crest 6001s for the highs. Onstage, Martin LE-400 wedges were powered by AB 1210 amplifiers and mixed through a 40 x 16 Soundcraft Series 4 for HoJo, while Midge Ure had a TAC Scorpion 30 x 12. Each act had its own Yamaha PM3000 40C in the house.

After the soundcheck was finished Steve Venezia answered some questions about the P.A.

Mix: How is the system configured, and why the large center cluster?

Venezia: The center cluster has cabinets dedicated solely for Howard Jones' vocals, and the flying right and left main P.A. is primarily reproducing the instruments and just a little vocal. All the bass is stacked on the floor except for several in the middle. For the center cluster I use an auxiliary send off the Yamaha PM3000 40C mixing console, and I never put any effects in the center cluster; Howard is always flat there. But I use the outer right and left flying P.A. a lot for effects; all his reverbs are in stereo. No matter how much reverb you add—it can get wet and wet and wet—you don't lose the clarity. You get this vocal that comes straight at you through the middle; the imaging is amazing. All the effects can be out on the sides, and not lose the words in the clarity.

This setup is something we



- 1 x 1" JBL 2426
- 1 x 2" JBL 2445
- 1 x 12" Martin
- 3 X 1" JBL 2426
- 2 X 2" JBL 2445
- 3 X 12" Martin
- 2 x 15" Martin
- 2 x 18" JBL 2245

HOWARD JONES
P.A. LAYOUT
DELICATE
PRODUCTIONS
SHORELINE,
MTN. VIEW, CA
JULY 7, 1989

started doing at Delicate with Dire Straits. Another recent example would be on the latest INXS tour. The speakers are not trying to put out the kick drum, snare, bass,

low-end synth and guitar. The center cluster is only trying to reproduce one thing—vocals. That makes it more efficient.

By assigning the center cluster from an effects send I can also selectively put in anything I want, at any time, through it. The matrixes are used for video feeds that need to be in stereo, so I patch the left, right and center through a matrix send. The sub-bass cabinets on this tour are primarily used for specific synthesizer effects. For the lawn seat-

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ing we used a spare effect send with a dedicated graphic. This helps me tailor the lawn-fill area to suit the venue—quite often I completely pull out the kick and bass from the lawn system, for instance.

Mix: What are you using for effects?

Venezia: It's pretty simple. An AMS delay, a couple of Lexicon 224s, a Lexicon PCM70 for all the drum reverbs and an SPX90 for various things like gated snare, vocal flanges, etc.

Mix: How does the Martin F2 system sound different from other P.A.s you have used?

Venezia: The bass bins are deep and rich-sounding, tight, and throw well. On this tour we've gotten many unsolicited compliments about the sound. I am very pleased at the separation between kick and bass guitar; sometimes that is the hardest part of the mix. Often at shows one can't hear the bass guitar when the engineer falls back on it because it is de-

stroying the kick.

The low-mids are the most magical part of the system. The quality of the low-mid is what makes the P.A. for me. That's where the majority of the vocal bite is—more things on stage share and overlap that frequency range than any other. The Martin F2 is clean, clear and in your face. The flair that David Martin has put on the 2445 is great. It doesn't have that ugly bite that I associate with the 2445; it seems that usually everyone is EQing out the 2.5 kHz. Not on the F2. And I never run out of the high end with the 2426s. And being horn-loaded—not bullets—it really throws.

Mix: What does the stacked bass do to the sound?

Venezia: We try to go with the square box effect—keep the height and width of the low end stack as close together as possible. In acoustic theory you should get less phase cancellation this way. This makes the stack work as one piston, as opposed to spread out

bass boxes that cancel each other out. We fly everything that is 250 Hz and up. I believe in the two-box concept. The thing about this type of system over a one-box system is you can block all the bass together, giving that tight low end. We put some full-range cabinets in the bass area to round out the sound for the people who sit close to the bass cabinets.

Mix: How much do you angle the flying cabinets, and does your setup change often?

Venezia: We use 40 wraps between the speaker sets. Every room venue is different. We try to approach each one as an installation. Every day we choose our angles, what will go where, over what. Some of the larger venues require adding a fourth row to the cluster and another two-box wide set to cover the fans on the sides.

Mix: Do you plan it out before the venue or after you get there?

Venezia: Since I know most of the venues, I plan it out roughly and Steve Dabbs gets it up. If, after checking everything out, it is

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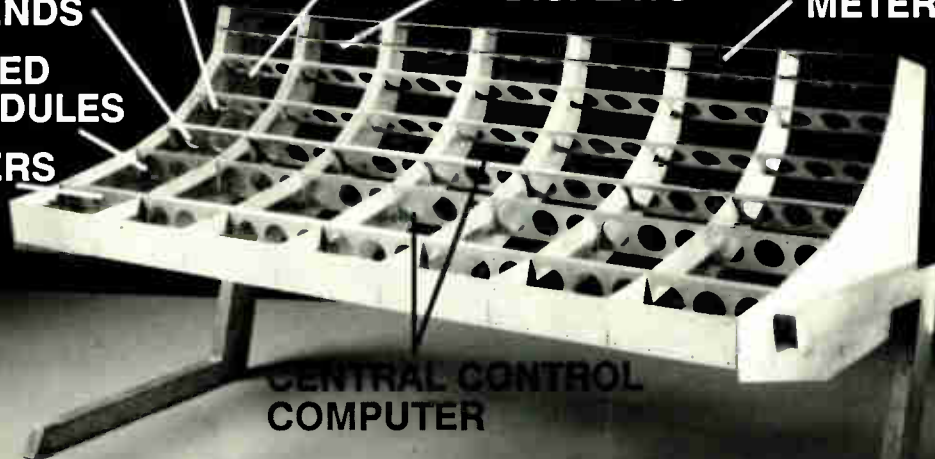
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not what he thinks I want, he'll get me up and out there early in the morning. I want to get it up right, even if it means hopping out of bed early. If it is not up there properly, and not pointed in the right places, or there aren't enough cabinets, you can EQ for days but you can't create what is not there. But if I get what I want—where I want—the mix becomes the fun part of the show, not the hard part. I don't believe in people that come in and hang big stacks straight ahead. Because some fans hear nothing, some get totally blasted, and only those in the center near the console get a decent mix. It should sound good to everyone if possible. Certainly, it will be louder in the front but the coverage needs to be dispersed evenly.

Mix: What does Howard Jones use for his vocal microphone?

Venezia: It is a Countryman Isomax, which he has used for years because it allows him free hand movement. There is a low-

profile metal wire done up in flesh-tone that goes around the ear. The headset is in a wireless transmitter with a custom 15V preamp made by Harbor House in London. Headsets of this type never sound as good as a regular microphone, so it's a disadvantage of sorts. And it is very humidity-sensitive. We have trouble with it and often go through three to four mics per night on a muggy night, especially when Howard works up a sweat. Alan [the band's monitor eng.] is continually babysitting the Isomaxes.

Mix: I noticed two Yamaha DMP7 MIDI mixers at the house position . . .

Venezia: Howard has two onstage and I have two for 16 channels of keyboards. There are programs for 32 songs, and the DMP7s set the levels and EQ of all the different keyboards for each song. All this information is programmed in before the tour by Howard and myself. During the show I might make slight adjustments, if necessary.

After all this talk you're probably wondering how the gig sounded, right? Well, it was remarkable when I walked around the amphitheater (with which I am very familiar) because every seat sounded excellent. As you know, at most concerts there is a great deal of comb filtering and general muddiness, and the seats on the side generally experience terrible sound; but not at this show. The vocal imaging was very good everywhere, which can probably be attributed to the center vocal cluster. It was evident at sound-check that HoJo's microphone was the weak link in the audio chain, but Venezia skillfully managed to keep the disadvantage to a minimum. On the whole it was one of the better P.A. experiences I've had lately. ■

Mix sound reinforcement editor Mark Herman also operates a company specializing in console rentals for live sound and touring applications.

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World Radio History

TROUBLESHOOTING

CARGO LESSONS

by Mark Herman

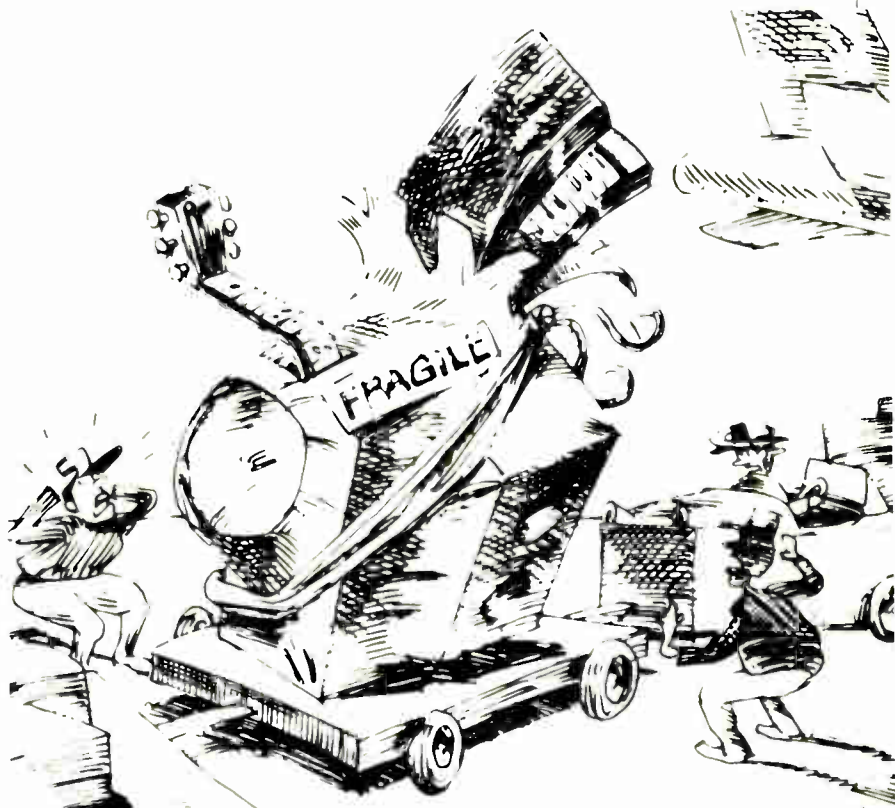
It is a fact of life in the sound business that at some time or other your equipment will be at the mercy of the freight shipping gods. Who knows what indignities your gear will suffer along its journey, and if it will get there on time or at all? Often the experience is confusing, traumatic and costly. What paths can you take to protect your equipment, save on costs and generally ease the pain of dealing with difficult airline and trucking freight companies?

Phil Eastick, president of Quick Cargo Systems (Burlingame, Calif.), is a man with some answers. His company concentrates on cargo transportation needs for the entertainment industry. Recent clients include many international artists and sound reinforcement companies, as well as television personnel and equipment. Eastick explains how things are done in the freight world and gives tips that you, the consumer, can use in everyday shipping.

Mix: What should someone shipping equipment do first?

Eastick: The most important thing is to plan as much as possible in advance, because there is less chance of screw-ups and a greater chance that you can shop a little for the best price and service. It is better that you work on things a week in advance instead of the day something needs to be shipped. Preplanning means more options and it isn't always from a cost perspective. Sometimes it is logistics. Of course, you can't always preplan everything, because events happen that aren't expected, but there are steps that one can do to help in those situations.

For instance, do you have the information needed to solve your



problem? You should have a list of phone numbers and names of people that can solve your transportation problems as they arise. Preferably in your wallet, so that you're covered wherever you are, should be your cargo company or agent's number. If you are in a state of panic, it seems that people take advantage of you and the price goes up. Anything done in a rush costs more.

Mix: How are shipping rates figured?

Eastick: By weight or volume. In the U.S., the volume formula is the length×width×height of the cargo, divided by 194. This gives a number that is referenced to weight. Whatever figure is greater will be charged to you, and most of the time it is the volume number. Expect to have shipping rates quoted by the pound. Always find out how much it is going to cost before you send equipment.

Mix: How does the freight company decide to route your cargo?

Eastick: Ninety-nine percent of the time they make decisions based on profit. If the piece is going direct, nonstop from San Francisco to New York and they sold you 75 cents per pound and it costs them 50 cents per pound, they are making 25 cents a pound profit. If they can get the piece to New York by way of Minneapolis for 35 cents per pound, then they make an additional 15 cents per pound, but it takes longer and is handled by more people. They don't care nearly as much as you do about the equipment.

Mix: What is the best way to route equipment being shipped?

Eastick: Try to avoid connections. First choice is a nonstop, direct flight. Then a direct flight. There is a difference between a direct flight and a nonstop flight, and most people do not realize that. A

direct flight means that it goes from San Francisco to New York, for instance. But it is not necessarily nonstop; it may stop in Chicago, Denver or L.A. The term "direct flight" is a misnomer. All it means is that your gear will stay on the same plane. Certain cities do not have nonstop or direct service, so that means you must catch a connecting flight from another city. If a connection is necessary, a one-stop flight is preferable to multiple stops.

Try to keep the connections away from the airlines' major hubs. For instance, Dallas is American Airlines' main hub, and it is best to avoid it. But it would be fine to ship there on another airline whose hub is somewhere else. Hubs are where the bulk of the airline's freight goes. That means they will have a small amount of your gear in a giant warehouse. It would be better to have your equipment in a less hectic place. I'd rather make a connection in a small airport like Salt Lake City,

where I can call up and get a personal rapport with the guy handling the equipment, rather than go to Chicago where the guy is totally swamped and doesn't have time to care about me or my equipment.

One of the rules that we try to follow is: have as few people handle the piece as possible. That is why routing is so important. The more it is handled, the greater the chance that it will be dropped, knocked over and damaged. The other reason is that if it is damaged, it is so much easier to figure out who will pay for the damages. The fewer people in the chain, the greater your chances of knowing who screwed up.

Mix: Will labeling the equipment help at all?

Eastick: Absolutely. There are very few companies that label well. Sure, they say DO NOT TIP on a rack, but their own crew tips it every night in the truck, so it is BS. That's fine when your crew is there and they know which way is up, but the normal union guy at

some loading dock has no idea of what's in the rack; to him it is just a big, heavy box. What will quite often happen is that things will end up being tipped the wrong way and elements inside the rack will be jiggled loose, and the rack-mounting will break. And it's not that he doesn't care; it's just that he doesn't know. One way to help prevent that problem is to indicate which way up the rack should ride if it must be tipped off its wheels. There is a wrong way and a right way. You don't want to lay an amp rack down with the front of the amps down, because that puts all the weight on the bolts. The same thing applies to mixing consoles. It is very infrequent that a console will travel on its wheels, because it is more convenient for the airlines to lay the console on its side. If there's nothing to indicate which side should remain up, chances are that 50 percent of the time it will ride tray up. Labeling is really key.

Mix: Weight is important. Should it be posted on the equipment, or does the freight company take care of it?

Eastick: A good thing to do is weigh and clearly post it so the folks in the warehouse know what to expect. They won't have to weigh the piece if they already know how much it is. Also, you won't get someone who attempts to tip it over by himself. I recommend that the day you load in for production rehearsals, weigh and measure all the equipment scheduled to go on tour. If you have to rent a scale, do so. Just look in the Yellow Pages. It is worth knowing how much everything weighs and the volumes involved; you won't have to ever do it again, either. Three key points are: weigh it, measure it and write down what's in it. You can never have too much information. It is invaluable if there is an insurance problem.

Mix: When sound companies travel across international borders special paperwork and information must be provided. The terms manifest and carnet are always mentioned. What are they, why are they needed and what is their purpose?



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Eastick: The manifest is a list you prepare of exactly what is being shipped. Make the list and description as complete and clearly identifiable as possible for the customs and shipping people. Don't count on inspectors and clerks to know what every individual sound piece is. You need to state what it is, the value, physical description, weight if possible and the origin. You should always include the equipment's country of origin. Not where it was purchased—where it was made. If it is a Yamaha piece sold in California the origin would still be Japan. The manifest is used for insurance documentation, crossing into Canada and for certain countries that don't accept carnets. A computer program and database is very handy for generating manifests.

The carnet is a document that guarantees your goods will enter and leave a particular country in a specified period of time. When goods enter a country under nor-

mal circumstances, the importer has to pay customs duty or post a temporary import bond assessed on the value of the goods. This is to guarantee that you will not leave the equipment in their country.

The carnet is set up with a chain of chambers similar in operation to the Chamber of Commerce. To get a carnet you apply to the U.S. Council for International Businesses and supply them with a manifest. They assess a fee through an insurance company. You bond the USCIB to protect them. They guarantee, to all the other chambers around the world, that your goods will go into and out of the country as specified, on schedule. The standard rate of the bond is 1 percent of 40 percent of the value. In some countries it can be as high as 50 percent of the value. Some countries won't issue a carnet unless you deposit 50 percent of the value. The issuing of the carnet is not automatic; it is not something that you have a right

to. You have to qualify financially so they know you can support the bond. All the main countries have their own chamber. If a chamber presents a document to the USCIB that says you violated the time frame allowed and now owe the duty, then the USCIB will be hot on your tail. In the U.S., the chamber is a government-recognized body. The Roanoke Insurance Co. does the majority of the USCIB business in the U.S. A typical carnet takes three or four days to get.

Here's the flow: you pay the application fee, the USCIB issues the carnet, and a company like Roanoke bonds the carnet that allows your goods to enter and exit a country without paying customs duty. If you don't have a carnet, you must post the full bond to the country your goods enter, and it usually takes a minimum of 180 days, after you leave their country, to get your money back. And, they also charge an administrative fee. So as you can see, a carnet is very helpful.

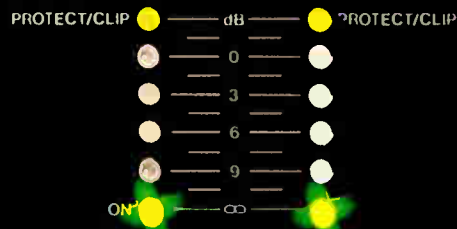
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NEW BSS CROSSOVER:

OVERBOARD WITH OVERDESIGN™?



FDS-310 Baffles Industry!

Has Brooke Siren Systems finally crossed over into the fourth dimension of OverDesign™? Many industry experts believe the company's new FDS-310 crossover has gone too far because of what they call an "over the top" hardware-intensive design that actually employs *FOUR* stacked potentiometers on each of the unit's two frequency selectors, instead of the standard one pot setup.

4 Pots Too Many?

Quizzed at a press conference to introduce the new "Sweepable Frequency Dividing System," as the company calls it, BSS Managing Director Chas Brooke deflected all questions from the hysterical audio press with a terse prepared statement.

"There's been a lot of talk about this '4 POTS' thing," he announced to the buzzing throng, "but, typically, you are all missing the point.

"At BSS, we never OverDesign just to pile on the extra hardware," Brooke emphasized.

"In this case, we had to use 4 pots on each band of the FDS-310 because it was the *only* way to insure the precise 24 dB crossover slope at all frequencies for superior audio performance.

"We don't take these things for granted, even if our customers or competitors do. But they thank us in the end when they hear the difference OverDesign can make!"

OverDesign Pays Dividends

Having dispensed with the "controversy," Brooke went

on to point out a wealth of other OverDesign features that pay off in the superior performance of the FDS-310.

"Like our top-line, industry standard OverDesign FDS-360, our new economical FDS-310 variable crossover can be tailored to fit your needs," he gloated.

"The system uses a 24 dB/octave Linkwitz-Riley filter. The unit also has the built-in flexibility to be used in two-way stereo or three-way mono operation."

Chas also revealed that internal OverDesign features are, "money in the bank. Like CD Horn EQ, Mono Low Linking and, for

the Sub Bass, a special 'divide by 10' network allows a lower range of 18 Hz to 200 Hz.

"For greater user control, each frequency band has its own level control, a Polarity Reverse switch; Mute button; Signal Present LED and Peak Signal Warning LED. The rear panel features both 1/4" and balanced XLR connectors.

"The truly remarkable thing about the FDS-310 is its price," Brooke concluded. "Designed exclusively for the U.S. market, this is indeed a 'medium bucks' crossover that delivers anything but, 'medium sonic performance.'"



TWO BRAKES WEREN'T ENOUGH!

With two powerful disc brakes, Mr. John Mudd of Hapless, New Mexico thought he could stop his car in any situation. This picture of Mudd accidentally leaving the road tells a very different story!

Think Of The Alternatives



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Mix: What is the actual chain of events involved in handling a piece of freight?

Eastick: Let's say it is to be shipped via air. (Most of the steps are the same for ground transportation.) Normally, a freight forwarder brings the piece back to their facility, unloads it and then does the paperwork—a three- to four-hour proposition that means your stuff may not be loaded until the next day. While paperwork is being done, the piece usually sits in a warehouse surrounded by other cargo going to the same city. It can easily get misplaced or damaged; forklifts whiz around, and it is a rush, rush scene. At the end of the day (evening) they call the airline and try to book space for the cargo. Then, usually the next day, they load it back on a truck to take it to the airline dock, where it is taken off the truck and loaded into the airline's warehouse.

In the warehouse there will be some sort of airline container. It could be a flat metal pallet or a metal pallet with a structural igloo container on it. It doesn't matter what it is, your piece will go in it, and how carefully they load it depends on factors like: how busy they are, the experience of the personnel, their mood, etc. The container is brought out to the tarmac and will sit there for up to an hour and a half before the plane it is assigned to arrives. Sometimes the container will be exposed to the elements—another good reason to have cases with good tongue and groove construction. If it is raining, they might cover everything in plastic, but there is no guarantee. They will then lift the container on a big scissor lift and place it in the airplane. In that container will be many other items going to the same city. In theory, that pallet gets pulled off at the correct city.

If there is a connecting flight, it means that the piece will be removed from the plane and put back in a warehouse for another paperwork and loading cycle. When the cargo reaches its final destination, it is unloaded and brought to a warehouse again.

They break down the stuff in the container that your piece is on, move it to a section in the warehouse with other pieces and once again process your paperwork. After the aircraft arrives, don't expect to see your piece for at least three hours because of the unloading procedures.

A local-delivery freight company makes a sweep of the airport first thing in the morning. They pick up all the freight assigned to them from all the airlines. Fifty percent of the time it goes back to a warehouse and through another processing step before being delivered the next day.

Mix: What should be done when receiving a shipped piece?

Eastick: Make sure conditions are right for unloading the truck. Is there a loading dock for the delivery truck? Will there be enough people to assist the unloading if there is no loading dock or forklift? Some drivers will not assist in the unloading of the equipment due to insurance reasons, and will refuse to unload the gear if the conditions aren't right. Do not assume that the freight company will know your situation. Communication and logic is the key. Do not assume anything. Confirm it. Even in a crisis situation, take the time to give the freight company complete information so delivery will be smoother.

When you receive freight—no matter how rushed you are—always look at the box and inspect it for damage. Usually a trucking company will deliver, and they will have some kind of paperwork that shows they have delivered it, what it is and who they delivered it to. They'll ask you to sign it, because it clears them of responsibility. Before you sign, inspect the goods. If there is no apparent damage, sign it; if there is any damage, write on the bill what looks wrong. That immediately puts them on notice, because you said it was damaged when it arrived, and no one can say the damage is your responsibility. It doesn't take long to inspect a package, and it can save you an immense amount of grief in the insurance game. ■

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SNAPSHOT
For "Live Performance"

—FROM PAGE 156, SR NEWS

lers and several BSS 360 crossovers. Brunclik adds, "We also plan to buy a new Martin F2 main P.A. system soon."

Around the World... Stage-wave Productions (Hiroshima, Japan) recently took delivery of 16 ARX speaker cabinets. The new 1812MkIV Composite Flying System was furnished by Australian manufacturer **Audio Research & Technology** (ARX). The 1812MkIV features two 18-inch LF drivers and two 12-inch mid-drivers loaded into two quasi exponential midrange flares, as well as a 2-inch throat compression driver loaded into a flat front radial horn. Stagewave specializes in overseas artists working Japan's university and college touring circuit... **U.K. Sound** (London) delivered an

Altec Lansing sound reinforcement system to Amman, Jordan, for installation in the **King Abdullah Mosque**. The system includes 16 Altec Lansing 9444A power amplifiers, 16 299 compression drivers and several 8256 bass systems loaded with MR42B and MR94B Mantarayhorns... **Fee Lun Radio Service** (Beijing, China) announced that an Altec Lansing sound system will be installed in the Beijing World Trade Center.

Console News... DDA recently unveiled two new mixing console models for the professional sound reinforcement market. The fully balanced **DDA Arena Monitor Console** is available in formats up to 44 channels and features 16 outputs plus stereo left and right out, EQ on the 16 outputs, an 18-way output meter panel and P&G faders. The second BSS model is the **DDA Arena VCA House Console**, available in formats up to 40x8x2. The VCA features eight VCA/mute groups, eight aux returns, eight aux sends with EQ, P&G faders, and is fully balanced throughout. Both consoles are based on DDA's D Series console technology.

More Console News... Unveiled at the May NSCA Convention in Nashville is the

Ramsa WR-C900, designed for reinforcement use in live theater and derived from the WR-S840 console. Some of the features include Left-Center-Right plus separate Left-Right panning (five buses), mono or stereo inputs, up to 24 matrix outputs, submix input modules and a pleasing ergonomic design. The special center panning feature allows for better source imaging for more of the audience if a center speaker cluster is used. The 900 is an interesting development in the live mixing console industry.

Note: Some of the data in this column and in "On the Road" is based on information provided by the companies. Address all correspondence and photos to Mix Publications, Sound Reinforcement Editor, 6400 Hollis St., Suite 12, Emeryville, CA 94608. ■

Mix sound reinforcement editor Mark Herman also operates a company specializing in console rentals for live sound and touring applications.

—FROM PAGE 162, LIVE SOUND

must also consider: modern "now-a-go-go" live production sensibilities, which need higher SPLs and wider bandwidth; the demographics of today's event-going, discretionary dollar spenders; the inevitable failure of sound systems installed during the '50s and '60s; the aging and retiring of traditional, postwar-trained, electrical sound system contractors; the proliferation of all-in-one, electronically controlled, easy-install speaker enclosures; the high aesthetic expectations of a digitally aware consumer ear-trained on compact discs and wall-to-wall FM transmissions; and more. These and other variables need to filter first. But the door is wide open for rental companies with experience, ability and a desire for technical growth to effectively tackle the high-power sound reinforcement installation market—and succeed. ■

Mike Joseph is a San Francisco Bay Area-based audio marketing consultant, sound system designer and writer.

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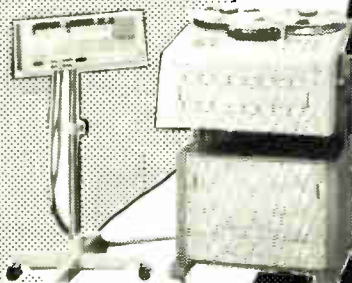
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by Iain Blair

TOM PETTY'S SOLO FEVER



Y'know, I hadn't even planned to make this record. It all sort of happened by accident," says Tom Petty. The singer, who's sporting day-old stubble and faded denim, is sitting in his manager's office on Melrose Avenue in West Hollywood, and talking about his solo debut album, *Full Moon Fever*.

"Why is it called *Full Moon Fever*?" Petty grins, lights up another cigarette and scratches his chin thoughtfully.

"It's a personal phrase I use when I do things and I don't quite know why. It kind of summed up the album because I didn't know why I was making the record, I was just enjoying myself, and I kept doing it. I certainly hadn't planned to make a solo record. I was on a year-long break, really."

No wonder Petty looks tired but happy. 1988 may have started off as a sabbatical, but it quickly turned into

Feature Shock!

Otari's new MX-50. Built around the premise that you can have everything you ever wanted in a two-track tape machine, and still stay within your budget. For example:

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The Electronics

—Optional remote control.

—Lighted VU meters with peak-reading LED indicators.

—Transformerless active balanced inputs with X1-type connectors.

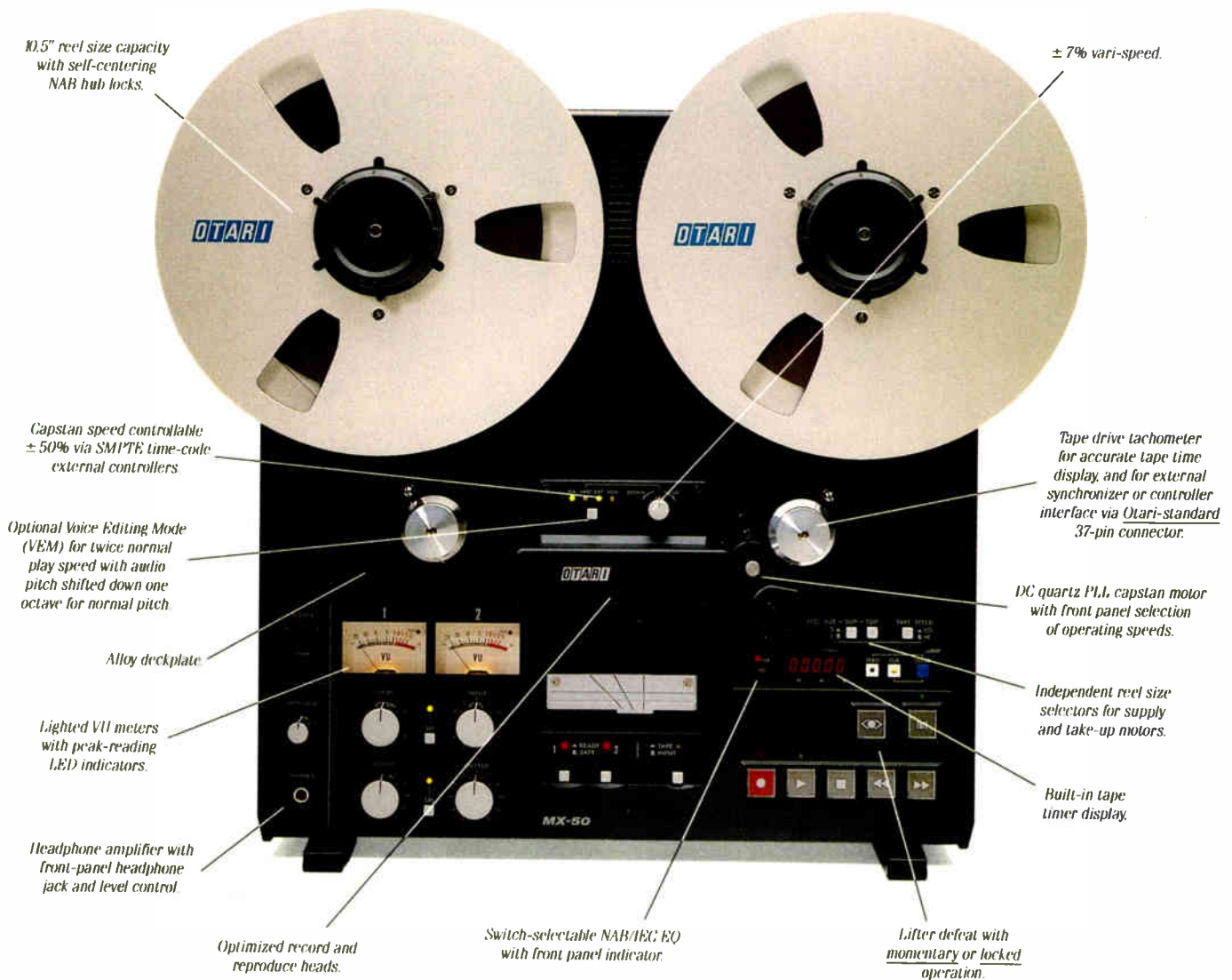
—Optional Voice Editing Module (VEM) for twice normal play speed with normal pitch.



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his busiest year since the singer first erupted onto the musical scene in 1976 with the classic *Tom Petty & the Heartbreakers* debut.

It began with the sessions that gradually formed the backbone of *Full Moon Fever*. Then, in the summer, Petty and his producer, Jeff Lynne, took a side trip with George Harrison, Roy Orbison and Bob Dylan to form the Traveling Wilburys. In between all this activity, the singer also managed to find time to contribute to Orbison's hit comeback album, *Mystery Girl*.

But right now, Petty's focus is firmly on his first solo project, and correcting any misconceptions that *Full Moon Fever* spells the end of the Heartbreakers. "I needed to stretch, to try something different, but it doesn't mean that I want a solo career now," he explains. "I'll always be a Heartbreaker." And indeed, he's been touring with the Heartbreakers since midsummer.

Mix: How did *Full Moon Fever* come about?

Petty: It sounds like a tall story, but it all started when I ran into Jeff Lynne at a traffic light, around Thanksgiving 1987, and found he lived right up the road from me. He'd produced George Harrison's album *Cloud Nine*, which I thought was great, so we got to talking and became friends. Then around Christmas that year, I wrote a couple of songs and showed them to him, and he had a few suggestions which really improved them. So we ended up going over to Mike Campbell's house and putting them down in his studio, and they sounded like records. By then I was already having too much fun and didn't want to stop and go back to doing nothing, so I kept convincing Jeff song by song to do one more, and finally hooked him into finishing the whole album. [Laughs] So the whole project just evolved without any type of plan. I was real surprised to end up with a solo album, but that's how it happened.

Mix: Did those first two songs make it onto the album?

Petty: Yeah. They're "Free Fallin'" and "Yer So Bad."

Mix: Did you start by making demos of all the songs?

Petty: No. I never make demos and I've never understood how to do them. What happens to me is that I do

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a demo and then I get frustrated because the record doesn't sound as good. So I always put songs down on 24 track so if I want to make a record later, I can.

Mix: How fast did you work after the initial rush?

Petty: We didn't wait until we had all the songs to start recording. As soon as I had a song, we'd cut it. And we'd usually mix at the same time. So we worked pretty quickly from January '88 until March when I got sidetracked with the Traveling Wilburys project. I wasn't in any mad rush to finish it, so I stopped at that point, with nine tracks done, then came back later to finish up.

Mix: Give some insight into your songwriting methods.

Petty: I don't have any set formula. I wish I did because that'd make the whole process much easier, but you just have to take what you're given. Sometimes I might get a phrase and that'll trigger something, but usually I'm just sitting around strumming my guitar and a song emerges. I've written a lot of songs in the studio in the past, but not for this record. I think I

write on the Heartbreaker sessions because they're not a group that's known for being prepared. [Laughs] This album is more based on acoustic guitars, so it was easier to figure it all out before we got in the studio. I wrote most of the songs on a 12-string, and it seemed to me that rhythm guitar is missing from a lot of records these days, so I set out to make it a dominant sound. In fact, we started most tracks by putting down just rhythm guitars and drums, then adding bass and everything else as we went along.

Mix: Your vocals sound tougher, more aggressive on this album.

Petty: Well, I tried real hard to sing well. [Laughs] The fact that I'd been out singing live for so long may have helped. I think I sound stronger. I purposely didn't use any effects on the vocals, either. When you use echo and all the tricks, it's easier to hide. I wanted it to be direct, real up front in the mix.

Mix: The album features guest appearances by George Harrison and Roy Orbison. How did that come about?

Petty: I'd known them both for a while, and it was a huge thrill for me. George plays and sings on "I Won't

"For the first time I didn't have to stop and ask anyone else what they thought. I just did what I wanted."

Back Down," and Roy's on "Zombie Zoo." Add me and Jeff, and it's almost the whole Traveling Wilburys group, but in fact nine tracks of this album were completed before the Wilburys even got together, so this project was probably the catalyst for the Wilburys. And of course, at the same time I was working on Roy's solo album.

Mix: You must really miss Roy.

Petty: He was real special. And although all of us have been around, we'd always get a kick when he walked in; it was always a thrill. And he was such a pro in the studio—you never wanted to sing after he sang. [Laughs]

Mix: You've mentioned that The Byrds



and The Searchers were influences on this album, and there's even a reference to Del Shannon. What other influences are at work on the album?

Petty: The Beatles. They were always a big influence on me and the Heartbreakers. In fact, the whole album sounds quite British to me, and it's not just that Jeff and George were involved. I think it's that I've always been fond of that music, like The Kinks and The Searchers and The Who, and that's probably been my big contribution to the Heartbreakers—that English, '60s sound. The other big thing is that for the first time, I wasn't in a group situation, so I didn't have to stop and ask anyone else what they thought. I just did what I wanted.

Mix: Where did you record the album?

Petty: It was all done at Mike Campbell's home studio, which is a 24-track, state-of-the-art operation set up in an old bedroom, and there's a TV monitor hooked up to the garage which is the best-sounding room for drums. It has a Soundcraft board, and we used a whole bunch of different mics, such as an AKG, a Neumann U87 and a couple of Sennheisers, depending on the effect we wanted.

Mix: Are you into the tech side of recording?

Petty: Nah, I can't even work a stereo. [Laughs] I'm really irritated by the fact they don't use knobs anymore. You could turn 'em and know exactly where you were. This whole deal of pushing a panel and watching numbers is going backwards to me. I basically use as little technology as possible.

Mix: How did you set about on production of the album?

Petty: Usually we started out with the rhythm guitars and drums, then overdubbed the bass and built from there. We never used click tracks or sequencers. We just sat down, got the feel and tempo, and went for it, because I wanted to make a record that was played by hand, not machines.

Mix: Were the arrangements worked out in the sessions or before?

Petty: Pretty much in the studio. Jeff, Mike and I would just run the tunes through and start building on the basic structure until it felt right. Like I said, nothing was really planned. A lot of it was trial and error. I must say, it was a real pleasant album to make 'cause there was no pressure.

Mix: Where did you mix?

Petty: I really like a Neve desk, so we just went wherever we could find one, like Sunset Sound, Devonshire and Conway. And we never booked time ahead. We'd just call up and if we could get time, we'd go in and mix.

Mix: Why do you like Neve consoles so much?

Petty: They have a very warm sound, and that's important if you're using a lot of real instruments like guitars and piano as opposed to computers.

Mix: How involved in mixing are you?

Petty: Very. I'm right there in the middle of both production and mixing because I'm not the type of personality who can turn it over to someone and just walk away. I learned years ago that you'd better stay involved if you want to be satisfied.

Mix: You've been with the Heartbreakers for 12 years. Why did it take you so long to make a solo album?

Petty: Good question. It certainly wasn't a dream of mine, but the timing seemed right, and I think I needed a break. Of course, once you do something on your own, the rumors start flying, but I never had any intention of quitting or leaving the band. I just felt it'd give me a kick in the ass to do

—CONTINUED ON PAGE 224



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World Radio History

TOM JUNG DIRECT-TO-DIGITAL:

Analysis of Two Recent Sessions

by Mel Lambert

IN THE EVER EXPANDING WORLD of pro audio, we often overlook the formative pioneers of the recording art. It's all too easy to forget that digital technology, for example, has been around now for more than a decade and a half. And, during the 17 years since the first Denon PCM systems appeared, a growing number of us have developed a taste for the sonic transparency of the digital medium.

Tom Jung is one engineer/producer who has been intimately involved with digital recording for well over a decade. He began in 1977 with the first digital 2-track recordings at his Sound 80 Studio in Minneapolis, using the early 3M DMS system. Over the past dozen years, Jung has been the worthy recipient of accolades from critics and fans on both sides of the studio glass.

His extensive credits include the first digital multitrack remote recording for Billy Joel's *Songs in the Attic* album, using his Road 80 mobile

equipped with a 3M 32-track, and movie scores for *Annie*, *Blow Out*, *Star 80*, *Cotton Club* and *Jagged Edge*. Jung's attention during recent years, however, has been focused on his own high-quality record label, Digital Music Products. DMP has enjoyed an enviable reputation for issuing recordings on compact disc, beginning with its first two releases, Warren Bernhardt's *Trio* and Flim & the BBs' *Tricycle*.

"I set up DMP in 1982 to push the limits of digital technology, and at the same time get back to the recording basics," Jung recalls. "I realized that the 'more-is-better' philosophy prevalent in today's industry is not only detrimental to the quality of music but also to the sound quality. I realized that, to a certain extent, multitrack recording and modern miking techniques were obscuring the essence and purity of the digital sound. As a result, I restrict the number of elements I place in the recording chain and, whenever possible, record direct-to-digital 2-track."

Since the early '80s, DMP has is-

sued almost 30 CDs, featuring such artists as Billy Barber, Manfredo Fest, Bob Mintzer Big Band and Thom Rotella. The majority of these recordings were made direct to 2-track digital—usually a modified Mitsubishi X-80 PD-format machine—through a custom-designed Cello console made by Mark Levinson, using discrete analog Class-A electronics. "Every element in that system," Jung confides, "was chosen for its musical accuracy and its ability to reproduce steep musical wavefronts and frequency transients with zero distortion."

During the past year Jung has started exploring the possibilities of using digital multitracks for overdubs. "Because of the size of some of the ensembles I wanted to record, and also because not everyone could make it to or play on the date at the same time, I was looking for a way to overdub additional tracks against a stereo mix of the basic tracks.

"But at the same time, I wanted to reduce to an absolute minimum the number of A-to-D and D-to-A stages. My intention has always been to find a way to digitize the signals on the studio floor and then keep everything in the digital domain until it hits the consumer's compact disc player. That, for me, would be the ultimate in quality recording!

"All of which means I needed a digital mixing console that provided the same level of sonic transparency as the Cello analog board I still use on more demanding direct-to-digital dates. After some investigation, I came across the Yamaha DMP7D 8-channel digital mixer, which is designed for use with the AD808 8-channel analog-to-digital converter and DA202 2-channel D-to-A converter.

A study in digital concentration: producer Tom Jung during "Dial & Oatts" project at Clinton Studios, New York.



PHOTO: BUZZ FREITAG

"In this way I can record my basics to digital, overdub and then remix to stereo using only one stage of A-to-D in the entire process," Jung explains. "That, for me, is a fundamental breakthrough in the technology. The main reason I have avoided using a digital multitrack in the past is because I do not like going through multiple A-to-D and D-to-A stages. The DMP7D allows me to convert to digital once, stay in the digital domain for the mixing and overdubs, and then master direct from first-generation material."

DIGITAL VERSUS ANALOG MIXING

According to Jung, mixing the various individual instruments within a digital console—rather than combining them in the analog domain—has specific sonic advantages for certain musical forms. "When you take individual musical components and convert them to digital, the A-to-D converter is not overtaxed by the signal itself; a more complex, mixed program signal, on the other hand, presents additional problems for an A-to-D stage. I think that some of the subtleties of, let's say, drums and percussion, sound much better when

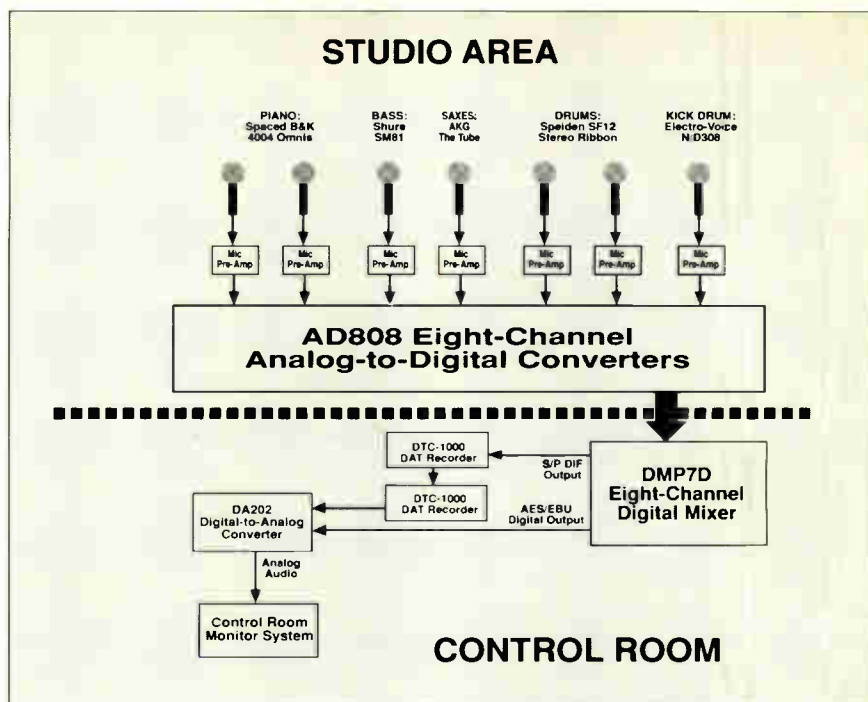


Fig. 1: The rhythm section miking arrangement.

they are mixed in the digital domain, compared to mixing them analog and recording the composite mix to digital. I hear more inter-instrument or inter-microphone detail preserved in that way.

"The toughest test for any A-to-D converter—which I have always considered to be the weakest link in my all-digital recording chain—is harmonic accuracy. In the analog world, there are subtle intermodula-



tion products common with any op amp that tend to blend together those factors. With digital mixing we are able to retain the image of these separate components a little more clearly, because I don't think that you get that same sort of intermixing."

DIGITAL OVERDUBS ON DIAL & OATTS

Late last year, Jung had the opportunity to record a jazz quartet with a 30-piece string section. The CD release on DMP, *Dial & Oatts*, features saxophonist Dick Oatts, from Flim & the BBs, pianist Garry Dial, Joey Baron on drums and Jay Anderson on acoustic bass.

"Because of the complexity of recording a live orchestra, piano and a rhythm section," Jung says, "I soon realized that some of the elements had to overlap. And the only way to record the music would be as multi-track overdubs. The concept was to open the CD with orchestral strings and saxophone recorded live, move into the quartet section and then weave back and forth between rhythm section material and the string orchestra with saxophone.

"Having a quartet in the studio at

the same time as the 30-piece orchestra would have gotten too cumbersome. We chose to record the quartet material first and then overdub the strings. Several of the tracks on the CD are also direct-to-stereo orchestra and/or piano."

For the quartet material, recorded at Clinton Recording's Studio A in New York City, Jung used six microphones to cover the basic rhythm section: B&K Model 4004 large-capsule omnis set up as a spaced pair on piano; AKG The Tube on sax; Shure SM81 condenser on acoustic bass; Speiden SF12 stereo bidirectional ribbon microphone over the drums; and Electro-Voice N/D308 on kick drum.

First, the microphone signals were boosted to line level via Professional Systems Engineering (PSE) and Studio Technologies preamplifiers located close to the mics. The line-level signals then went to the Yamaha AD808, an 8-channel, 16-bit A/D converter system. A multiconductor cable routed the digitized signals from the AD808 to the DMP7D digital console in the control room. A DA202 2-channel, 18-bit D/A converter monitored the DMP7D's stereo AES/EBU

digital outputs. The DA202 also monitored the off-tape signals from the pair of Sony DTC-1000 DAT machines recording the stereo mix.

Transfer of the stereo DAT tracks to Mitsubishi X-80 format took place at Jung's DMP studios in Stamford, Connecticut. He used a Harmonia Mundi bw102 system, which features SPDIF digital inputs and Mitsubishi-compatible outputs. (The H-M unit was also used later to transfer digital material in the other direction, from edited 2-track X-80 master to DAT format.)

ORCHESTRAL OVERDUBS

After editing, the X-80 tracks were dubbed over to a Mitsubishi X-400 16-track using the digital DUB ports of both machines. Returning to Clinton in late October, Jung gathered the 30-piece orchestra, pianist Dial and saxophonist Oatts for overdubs to the X-400. Orchestra miking consisted of a pair of spaced B&K Model 4007 omnis over the high strings (viola and violins) and another spaced pair of 4007s over the low strings (cellos and basses).

Again, the producer miked the piano with a pair of B&K Model 4004

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Mix: What is the actual chain of events involved in handling a piece of freight?

Eastick: Let's say it is to be shipped via air. (Most of the steps are the same for ground transportation.) Normally, a freight forwarder brings the piece back to their facility, unloads it and then does the paperwork—a three- to four-hour proposition that means your stuff may not be loaded until the next day. While paperwork is being done, the piece usually sits in a warehouse surrounded by other cargo going to the same city. It can easily get misplaced or damaged; forklifts whiz around, and it is a rush, rush scene. At the end of the day (evening) they call the airline and try to book space for the cargo. Then, usually the next day, they load it back on a truck to take it to the airline dock, where it is taken off the truck and loaded into the airline's warehouse.

In the warehouse there will be some sort of airline container. It could be a flat metal pallet or a metal pallet with a structural igloo container on it. It doesn't matter what it is, your piece will go in it, and how carefully they load it depends on factors like: how busy they are, the experience of the personnel, their mood, etc. The container is brought out to the tarmac and will sit there for up to an hour and a half before the plane it is assigned to arrives. Sometimes the container will be exposed to the elements—another good reason to have cases with good tongue and groove construction. If it is raining, they might cover everything in plastic, but there is no guarantee. They will then lift the container on a big scissor lift and place it in the airplane. In that container will be many other items going to the same city. In theory, that pallet gets pulled off at the correct city.

If there is a connecting flight, it means that the piece will be removed from the plane and put back in a warehouse for another paperwork and loading cycle. When the cargo reaches its final destination, it is unloaded and brought to a warehouse again.

They break down the stuff in the container that your piece is on, move it to a section in the warehouse with other pieces and once again process your paperwork. After the aircraft arrives, don't expect to see your piece for at least three hours because of the unloading procedures.

A local-delivery freight company makes a sweep of the airport first thing in the morning. They pick up all the freight assigned to them from all the airlines. Fifty percent of the time it goes back to a warehouse and through another processing step before being delivered the next day.

Mix: What should be done when receiving a shipped piece?

Eastick: Make sure conditions are right for unloading the truck. Is there a loading dock for the delivery truck? Will there be enough people to assist the unloading if there is no loading dock or forklift? Some drivers will not assist in the unloading of the equipment due to insurance reasons, and will refuse to unload the gear if the conditions aren't right. Do not assume that the freight company will know your situation. Communication and logic is the key. Do not assume anything. Confirm it. Even in a crisis situation, take the time to give the freight company complete information so delivery will be smoother.

When you receive freight—no matter how rushed you are—always look at the box and inspect it for damage. Usually a trucking company will deliver, and they will have some kind of paperwork that shows they have delivered it, what it is and who they delivered it to. They'll ask you to sign it, because it clears them of responsibility. Before you sign, inspect the goods. If there is no apparent damage, sign it; if there is any damage, write on the bill what looks wrong. That immediately puts them on notice, because you said it was damaged when it arrived, and no one can say the damage is your responsibility. It doesn't take long to inspect a package, and it can save you an immense amount of grief in the insurance game. ■

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SNAPSHOT

For "Live Performance"

—FROM PAGE 156, SR NEWS

lers and several BSS 360 crossovers. Brunclik adds, "We also plan to buy a new Martin F2 main P.A. system soon."

Around the World... Stage-wave Productions (Hiroshima, Japan) recently took delivery of 16 ARX speaker cabinets. The new 1812MkIV Composite Flying System was furnished by Australian manufacturer **Audio Research & Technology** (ARX). The 1812MkIV features two 18-inch LF drivers and two 12-inch mid-drivers loaded into two quasi exponential midrange flares, as well as a 2-inch throat compression driver loaded into a flat front radial horn. Stagewave specializes in overseas artists working Japan's university and college touring circuit... **U.K. Sound** (London) delivered an Altec Lansing sound reinforcement system to Amman, Jordan, for installation in the **King Abdullah Mosque**. The system includes 16 Altec Lansing 9444A power amplifiers, 16 299 compression drivers and several 8256 bass systems loaded with MR42B and MR94B Mantarayhorns... **Fee Lun Radio Service** (Beijing, China) announced that an Altec Lansing sound system will be installed in the Beijing World Trade Center.

Console News... DDA recently unveiled two new mixing console models for the professional sound reinforcement market. The fully balanced **DDA Arena Monitor Console** is available in formats up to 44 channels and features 16 outputs plus stereo left and right out, EQ on the 16 outputs, an 18-way output meter panel and P&G faders. The second model is the **DDA Arena VCA House Console**, available in formats up to 40x8x2. The VCA features eight VCA/mute groups, eight aux returns, eight aux sends with EQ, P&G faders, and is fully balanced throughout. Both consoles are based on DDA's D Series console technology.

More Console News... Unveiled at the May NSCA Convention in Nashville is the

Ramsa WR-C900, designed for reinforcement use in live theater and derived from the WR-S840 console. Some of the features include Left-Center-Right plus separate Left-Right panning (five buses), mono or stereo inputs, up to 24 matrix outputs, submix input modules and a pleasing ergonomic design. The special center panning feature allows for better source imaging for more of the audience if a center speaker cluster is used. The 900 is an interesting development in the live mixing console industry.

Note: Some of the data in this column and in "On the Road" is based on information provided by the companies. Address all correspondence and photos to Mix Publications, Sound Reinforcement Editor, 6400 Hollis St., Suite 12, Emeryville, CA 94608. ■

Mix sound reinforcement editor Mark Herman also operates a company specializing in console rentals for live sound and touring applications.

—FROM PAGE 162, LIVE SOUND

must also consider: modern "now-a-go-go" live production sensibilities, which need higher SPLs and wider bandwidth; the demographics of today's event-going, discretionary dollar spenders; the inevitable failure of sound systems installed during the '50s and '60s; the aging and retiring of traditional, postwar-trained, electrical sound system contractors; the proliferation of all-in-one, electronically controlled, easy-install speaker enclosures; the high aesthetic expectations of a digitally aware consumer ear trained on compact discs and wall-to-wall FM transmissions; and more. These and other variables need to filter first. But the door is wide open for rental companies with experience, ability and a desire for technical growth to effectively tackle the high-power sound reinforcement installation market—and succeed. ■

Mike Joseph is a San Francisco Bay Area-based audio marketing consultant, sound system designer and writer.

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NEW BSS CROSSOVER:

OVERBOARD WITH OVERDESIGN™?



FDS-310 Baffles Industry!

Has Brooke Siren Systems finally crossed over into the fourth dimension of OverDesign™? Many industry experts believe the company's new FDS-310 crossover has gone too far because of what they call an "over the top" hardware-intensive design that actually employs *FOUR* stacked potentiometers on each of the unit's two frequency selectors, instead of the standard one pot setup.

4 Pots Too Many?

Quizzed at a press conference to introduce the new "Sweepable Frequency Dividing System," as the company calls it, BSS Managing Director Chas Brooke deflected all questions from the hysterical audio press with a terse prepared statement.

"There's been a lot of talk about this '4 POTS' thing," he announced to the buzzing throng, "but, typically, you are all missing the point.

"At BSS, we never OverDesign just to pile on the extra hardware," Brooke emphasized.

"In this case, we had to use 4 pots on each band of the FDS-310 because it was the *only* way to insure the precise 24 dB crossover slope at all frequencies for superior audio performance.

"We don't take these things for granted, even if our customers or competitors do. But they thank us in the end when they hear the difference OverDesign can make!"

OverDesign Pays Dividends

Having dispensed with the "controversy," Brooke went

on to point out a wealth of other OverDesign features that pay off in the superior performance of the FDS-310.

"Like our top-line, industry standard OverDesign FDS-360, our new economical FDS-310 variable crossover can be tailored to fit your needs," he gloated.

"The system uses a 24 dB/octave Linkwitz-Riley filter. The unit also has the built-in flexibility to be used in two-way stereo or three-way mono operation."

Chas also revealed that internal OverDesign features are, "money in the bank. Like CD Horn EQ, Mono Low Linking and, for

the Sub Bass, a special 'divide by 10' network allows a lower range of 18 Hz to 200 Hz.

"For greater user control, each frequency band has its own level control, a Polarity Reverse switch; Mute button; Signal Present LED and Peak Signal Warning LED. The rear panel features both 1/4" and balanced XLR connectors.

"The truly remarkable thing about the FDS-310 is its price," Brooke concluded. "Designed exclusively for the U.S. market, this is indeed a 'medium bucks' crossover that delivers anything but, 'medium sonic performance.'"



TWO BRAKES WEREN'T ENOUGH!

With two powerful disc brakes, Mr. John Mudd of Hapless, New Mexico thought he could stop his car in any situation. This picture of Mudd accidentally leaving the road tells a very different story!

Think Of The Alternatives



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Eastick: The manifest is a list you prepare of exactly what is being shipped. Make the list and description as complete and clearly identifiable as possible for the customs and shipping people. Don't count on inspectors and clerks to know what every individual sound piece is. You need to state what it is, the value, physical description, weight if possible and the origin. You should always include the equipment's country of origin. Not where it was purchased—where it was made. If it is a Yamaha piece sold in California the origin would still be Japan. The manifest is used for insurance documentation, crossing into Canada and for certain countries that don't accept carnets. A computer program and database is very handy for generating manifests.

The carnet is a document that guarantees your goods will enter and leave a particular country in a specified period of time. When goods enter a country under nor-

mal circumstances, the importer has to pay customs duty or post a temporary import bond assessed on the value of the goods. This is to guarantee that you will not leave the equipment in their country.

The carnet is set up with a chain of chambers similar in operation to the Chamber of Commerce. To get a carnet you apply to the U.S. Council for International Businesses and supply them with a manifest. They assess a fee through an insurance company. You bond the USCIB to protect them. They guarantee, to all the other chambers around the world, that your goods will go into and out of the country as specified, on schedule. The standard rate of the bond is 1 percent of 40 percent of the value. In some countries it can be as high as 50 percent of the value. Some countries won't issue a carnet unless you deposit 50 percent of the value. The issuing of the carnet is not automatic; it is not something that you have a right

to. You have to qualify financially so they know you can support the bond. All the main countries have their own chamber. If a chamber presents a document to the USCIB that says you violated the time frame allowed and now owe the duty, then the USCIB will be hot on your tail. In the U.S., the chamber is a government-recognized body. The Roanoke Insurance Co. does the majority of the USCIB business in the U.S. A typical carnet takes three or four days to get.

Here's the flow: you pay the application fee, the USCIB issues the carnet, and a company like Roanoke bonds the carnet that allows your goods to enter and exit a country without paying customs duty. If you don't have a carnet, you must post the full bond to the country your goods enter, and it usually takes a minimum of 180 days, after you leave their country, to get your money back. And, they also charge an administrative fee. So as you can see, a carnet is very helpful.

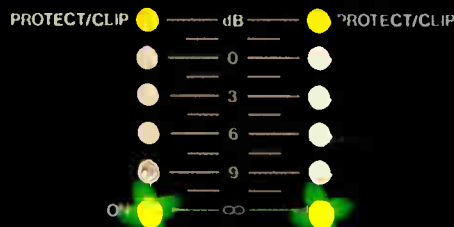
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large-capsule spaced omnis, while a Pearl Model TL4 stereo microphone covered the saxophone. Mic signals were boosted to line level, connected to the producer's Cello analog mixer and finally to the X-400 multitrack.

"On this date," Jung explains, "I wanted to use an analog mixer because of the subtle piano and string sounds. Also, I planned to use a Quantec Room Simulator—which lacks digital ins and outs—to provide subtle reverb and added ambience to the orchestral and solo saxophone tracks. Because I would have to exit to analog to interface with my QRS, I elected to mix through the Cello, add the ambience using the QRS and then digitize the stereo mix onto the Mitsubishi X-400."

A DMP7D console was also used during overdubs to monitor the previously recorded quartet tracks and to provide headphone cue feeds for the orchestral players.

DAT MIXDOWN SESSIONS

A few days later, Jung returned to DMP, where he set up his equipment for the remix. There, the off-tape signals from the X-400 were connected to the DMP7D through a



PHOTO: DAVE KING

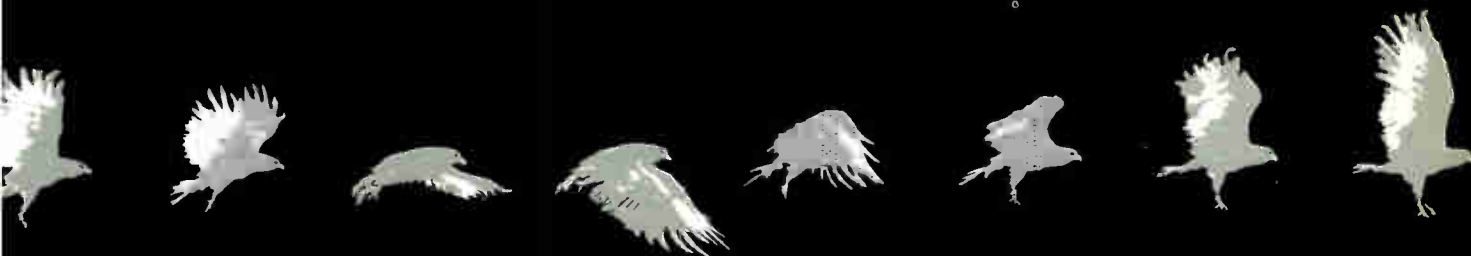
Pictured during the "Dial & Oatts" project: Dick Oatts, conductor Carlos Franzetti and producer Tom Jung.

Yamaha IFU1 Interface Unit, which converts the pinout of the X-400's DUB A output to the pin pattern of the DMP7D's input. The IFU1 converts the X-400's TTL Word Clock output to an RS-422 format, used to synchronize the digital data being sent to the IFU1 interface, and then to the DMP7D.

Some of the digital tapes from the Dial & Oatts sessions contained as many as eight tracks: stereo quartet elements, stereo orchestra, stereo overdubbed piano and saxophone solos.

Jung says that the DMP7D digital console proved to be extremely flexible for the tracking and remix ses-

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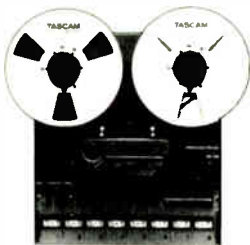


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sions. "I like the sound of the DMP7D's EQ and, on certain elements, the built-in reverb and signal processing. The mixer's three-band parametric digital EQ section is very musical and extremely flexible, more so than just about every analog equalizer that I have used."

A Yamaha SPX1000 multi-effects processor was also used to provide additional sound textures. Patched directly via the DMP7D's digital send and returns, the producer made extensive use of the SPX1000's hall program. "I like that particular effect a lot," he says. "The hall program is quite a bit more dense than most other digital reverbs and closer to the sound of my Quantec QRS."

CASCADED DIGITAL MIXERS

In April of this year, Jung had the opportunity to further stretch the technology envelope. Working at Westlake Studio D in Hollywood, he decided to record basic tracks and overdubs using three cascaded DMP7D consoles, plus three SPX1000s for signal processing. The project, with the Thom Rotella band, involved four days of sessions at Westlake, including a day to set up for the session.

"I confined electric bass, drums and percussion to one DMP7D, acoustic and electric keyboards to another, and Thom plus additional instruments to the third console. We also rigged up a talkback system using Westlake's Harrison MR-2 analog console and other facilities."

Miking on the dates were a Speiden SF-12 stereo ribbon mic on drums; AKG D-112 dynamic on kick; Sennheiser MKH-20 spaced omnis on percussion; B&K Model 4007 spaced omnis on Rotella's acoustic guitar and overdubbed mandolin solos; B&K Model 4003 large-diaphragm spaced omnis (with a custom high-voltage power supply and mic preamps) on acoustic piano; and the various synthesizers and electric piano ran direct.

"Once again, we ran the all-digital system at a sampling frequency of 48 kHz and recorded the various stereo mixes to a pair of DAT machines," Jung explains. "Having bounced the DAT cassettes to the X-80, I edited the basics and transferred them to a Mitsubishi X-850 32-track for overdubs. Even though I didn't need that many tracks, Westlake already had an X-

- CONTINUED ON PAGE 224

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Draws will take place 15 minutes after the close of the show Wednesday the 18th, Thursday the 19th, and Friday the 20th at Tannoy booth 221 and 236 on the convention floor.

Winners must be present at the time of the draw to win with the exception of the grand prize of SGM I5-B studio reference monitors. Drawing for the SGM I5-B's will take place at the close of the show Saturday. The winner will be notified by mail and announced in various trade magazines. All ballots including those previously won will be placed in the final draw for the grand prize Saturday October 21st.

Only one ballot per person will be accepted. Duplication of ballots will result in automatic disqualification.

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Speakers to be given away are as follows: One pair of PBM 6.5's (retail 340.00), one pair of TP1- AVM's (retail 550.00), one pair of NFM 8 - DMT's (retail 1,000.00), and one pair of SGM I5- B's (retail 3,300.00).

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Tom Jung: "At DMP we record exclusively live to two-track digital, so monitoring has to be at the highest level possible. Working in different studios, a compact reference monitor you can trust is essential. I have used the BBSM-6 for the past three years, and can truthfully say that I have not heard a monitor this size play as accurately...or as loud!"

The speakers Tom Jung relies on:

Westlake BBSM-6

...designed for low IM distortion, pin-point stereo imaging, and a coherent wavefront, even used as close as 18 inches. These three-way monitors with internal high-level crossover are configured to provide the

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World Radio History
 Circle #155 on Reader Service Card

by Philip De Lancie

NEW WEAPON FOR THE HOME TAPING WAR

When the CBS copy-code system was rejected by the National Bureau of Standards in March 1988, things looked grim for proponents of technological solutions to the nagging problem of home taping. Having thrown its weight behind the CBS idea, the record industry was reduced to nursing its bruised prestige and threatening DAT manufacturers with lawsuits if they began importing recorders. Both hardware makers and recording professionals were relieved, each for their own reasons, that copy-code had failed.



And Congress, which had ordered the NBS study, was by then too far into election season to worry further about the issue. Although vague alternatives to the CBS plan were kicking around, nobody seemed too anxious at that point to proclaim his or her continued faith in the curative powers of new technology.

In the intervening year-and-a-half, the climate has changed, with a thaw of sorts between the various adversaries that seems to have finally yielded some results. A June meeting in Athens of the Working Group set up by the record and hardware industries resulted in a settlement based on a copy-prevention system developed by Dutch consumer electronics giant Philips called SCMS (see "Insider Audio"). It is significant because it marks the first official acknowledgment from the hardware side that home taping is a problem for copyright owners. But the issue is far from settled. Legislation banning the importation of DAT machines that lack the Philips system will still have to make its way through the legislative labyrinth. And because no limits will be placed on copying directly from CDs, cassettes or records, the perennial issue of levies on recorders and blank tapes is certain to rise again. For the same reason, many in the record industry are likely to feel that the Philips system stops way short of providing any meaningful protection. Even if the DAT agreement is already considered a done deal, they may be on the lookout for a more restrictive system to put forward as an alternative when CD recorders are ready to roll.

One possibility is a plan originated by R. Miller & Associates, an independent electronics design firm in Glenview, Ill. Owner Rick Miller has

Rick Miller

developed APS (Anti-Piracy System), which uses patterns of tones dispersed throughout the audio band to identify copy-protected music. Circuits installed in home recorders would recognize the patterns and prohibit recording. Miller is keenly aware of the extreme uneasiness among music professionals over the possibility of having their recordings blemished by the introduction of extra-musical audio events. And he knows that CBS' flawed approach to the problem hasn't made it any easier to build support for his idea. But he hopes his new system will be evaluated on its own merits, rather than being condemned before being heard. The following interview with Miller, which took place before any news had been released about the content of the Athens agreement, explores his proposal and the hurdles it faces.

Mix: What specific types of home recording situations is APS designed to prevent?

Miller: It stops analog and digital recording. The system is not really meant to address LPs or cassettes. Some of the tones used are recorded as low as -85 dB, and an analog cassette has no chance of recording that. An LP probably could record that kind of a subtle tone, but I'm not really too concerned about vinyl, because everyone is dropping it anyway.

Mix: So you are only looking at the APS encoding of digital media such as CDs or DAT, but you will be able to prevent the recording of those media onto a DAT or CD recorder whether it is attempted in the digital or the analog domain.

Miller: Right.

Mix: What about preventing recording from CD or DAT onto an analog cassette deck?

Miller: I hadn't really planned on that. I figured it was probably too late as far as analog cassette machines are concerned. But if other parties are interested in pushing for that, it's fine with me. There is no technical reason it couldn't be done.

Mix: I assume that the system, like the CBS copy-code plan, depends on the willingness of hardware manufacturers to install some kind of chip in

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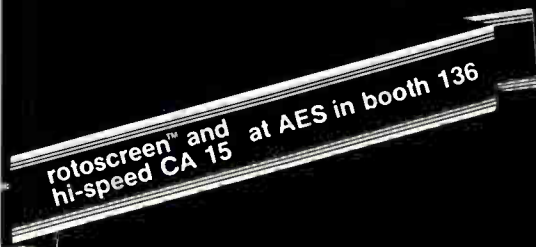
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all their consumer recording devices. **Miller:** In their CD recorders or their DAT recorders, that's true.

Mix: What is the basic step-by-step process by which the system works, from initial encoding through where it prevents the copying of encoded material?

Miller: The client would supply the mastering facility with their program. During the mastering stage the music is prepared with the APS tones. That would all be done digitally, so if everything was recorded digitally the program would maintain its digital integrity. The mastering engineer would run it through a computer system that would calculate the right point to put in the APS tones so they cannot be heard, yet they are electrically detectable. The tones that we now use are recorded between -85 and -45 dB, depending on the music. In loud contemporary music, you could probably leave them up around -45 dB.

Mix: Is the placement of the tones based only on dynamics, or also on the frequency content of the program?

Miller: The system does make big

▼

**“APS is very difficult
to get around. If
you are able to filter
out the tonal ranges
where the tones
are occurring, you
don't have much
music left.”**

▲

changes depending on both the dynamics of the song and what frequencies are being observed at any given moment. It does a lot of calcu-

lations, but I can't really tell too many of the details. I can't give away the specifics of what the frequencies of the tones are. They range very widely, but the system works within the FM broadcast band, meaning that all the information is contained in the 50 Hz to 15 kHz area. The output of the computer is digital data that is then put into the proper format with the added IDs and subcodes necessary to make a CD. The same procedure would be used for a DAT release when they get to that point.

Mix: What happens when someone tries to copy one of these encoded products?

Miller: If one were to attempt to record something that has the APS tones buried within it, the APS circuit in the recorder would recognize a particular sequence, orientation and pattern of tones. Then at a certain point the recorder would simply stop recording. It may lock out further action for a set period of time. I'm not sure, because that is all subject to negotiations with the consumer hardware manufacturers.

Mix: Would the system leave open the possibility of allowing consumers



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to make one or two copies for their own use before the record shutdown would be activated?

Miller: One thing that seems to come through pretty clearly as a request from the hardware people is that the system not act as a total brick wall to recording. So the design is such that if someone attempts to make the same recording a certain number of times, an uninterrupted pass will eventually be allowed. It keeps a detail in memory about what kind of recording was just attempted. When the same attempted recording happens a certain number of times, and that number might be random, the system says: "All right, let's give the guy a break and let him record it."

Mix: So it won't let you copy the first time you try, but it might let you the tenth time. What's the logic behind that?

Miller: The reason is to get around the political problem of opposition from the hardware manufacturers.

Mix: Wouldn't they be more interested in a system that allows consumers to record a certain number of times, to be agreed upon by the record companies and the hardware manufacturers, and then prevents all further copies?

Miller: You're talking about something like the Philips Solocopy system, in which each recorder would have a nonvolatile memory of ID and subcode information to keep track of how many times it had recorded a particular program. There are problems with that. First of all, the information doesn't appear at the analog outs. So only in the case of direct digital-to-digital copies could the recorder know anything about the subcodes or IDs of the source material. Second, Solocopy works on a per-recorder basis, so it would only lock out recording of a song if it had been previously copied on that particular recorder. Also, it would be pretty easy to design a \$100 to \$200 box to strip that information out of the signal coming from the player's digital out. And there is an even easier way to defeat it, which is for someone to put out a CD entirely filled with subcode and data blocks. Just one pass of that CD would fill up all the available Solocopy memory, rendering it blind and helpless.

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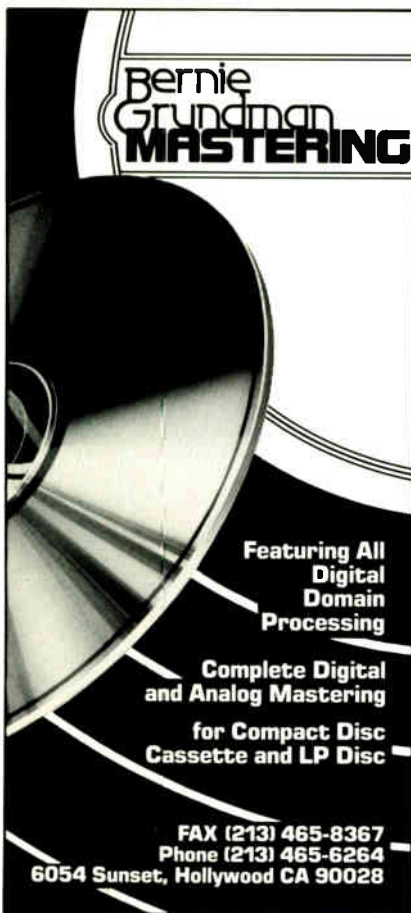
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AFTER MIX

memory only has to go back as far as however many times you make someone try before you allow them to record. So it needs only a short-term memory. If we wanted, we could design it to include a large bank of electrically erasable ROM for keeping track of what songs have been recorded, and how many times. But there is such a strong concern about cost that we have done everything we can to strip the system down. The system is meant to limit home taping. For most people it really won't be worth it to sit around and go through all the hassle of playing through their CDs over and over again to get to the point where the system will allow them to make a copy. So it is a deterrent to mass pirating of the music.

Mix: Is the computer that puts the tones into the production masters something you intend to manufacture and sell directly through your company, or license others to make?

Miller: We would be selling or renting them, depending on what works out best for the mastering people. If I rent them with a service contract, everyone will be assured of always having the highest quality. But licensing could happen, too. Those decisions are all down the road.

Mix: Is the digital format that the program is in when it is being processed by the computer the same as what Sony uses in the PCM-1630?

Miller: We will be using all the major digital formats, and obviously that will be one of them. That is something we can affect at the front end of the machine. The real heart of what is going on is not affected by what digital interfaces you use. The system will probably be done modularly, with different interfaces available as options.

Mix: But once you are past the interfacing stage, all the data will presumably end up in a uniform format for handling by the computer. Will that be 16-bit PCM?

Miller: We might go to 18-bit just to be sure that we have a lot of resolution.

Mix: You haven't really got a design for the computer yet?

Miller: No. What we are doing right now, for the sake of expediency and cost-effectiveness, is demonstrating the system with an analog tone injector designed to mimic the action that the computer will be doing later on.

Mix: Will you be designing software for an existing computer, or building a box for this specific purpose from the ground up?

Miller: I'm going to be looking at both approaches, but I would like to find a computer that is already out

"A request from the hardware people that comes through pretty clearly is that the system not act as a total brick wall to recording."

there—something that already has the mass storage, the ease of use and the flexibility to add the inputs and outputs we would need for this kind of device. At this point the real important consideration is the algorithm, regardless of what computer is used.

Mix: So you are primarily concerned about proving that APS can work before you actually start trying to develop the hardware itself.

Miller: Absolutely, because it is a very expensive process, and if we are not able to overcome the political problems, there is really no point in investing any additional time and money.

Mix: The National Bureau of Standards, when evaluating the viability of the CBS copy-code system, set out to answer three basic questions. One, does the system actually prevent copying? Two, does it diminish the quality of the program? And three, can it be easily defeated? It's likely that in order to be accepted, APS will have to undergo similar controlled testing, succeeding where copy-code failed. What have you already done to check out APS with regard to those questions?

Miller: As far as "false positives"

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[copying prevented on non-APS encoded material], we ran something like 50 CDs through the system to see if it ever went off, and looking at the statistical data, it never even got close. So we feel pretty confident about that. As for "false negatives" [copying not prevented on encoded material], it always recognizes its own encoding. We have even taken it through pitch changes, up and down, and it remains completely invulnerable to that. We've gone through that on quite a number of selections in our lab and in studio settings without any problems. To

determine audibility, we've gone to some studios in the Chicago area. We showed a number of musicians and engineers at Seagrape Studios what the tones sounded like. Then we played encoded music at full tilt, and no one could pick anything out, even with a visual display of each time a tone occurred. The crowning achievement was at Universal Recording when the listening group happened to include Rich Breen, who was the engineer for one of the songs we used for our demonstration ["The Great Lawn" by Traut & Rodby]. It has just an upright bass and a guitar, and most of the time it is at about -30 dB. Rich

was able to pick out all kinds of tiny ambient sounds that he knew were there in the recording, but he could not hear the APS tones, even with the display. He went over and over it many times with headphones, cranking it way up. When he was done he was impressed, but he was also frustrated because he thought he could hear anything.

As far as defeating it, APS is very difficult to get around. You can't filter it out. If you are able to filter out the tonal ranges where the tones are occurring, you don't have much music left.

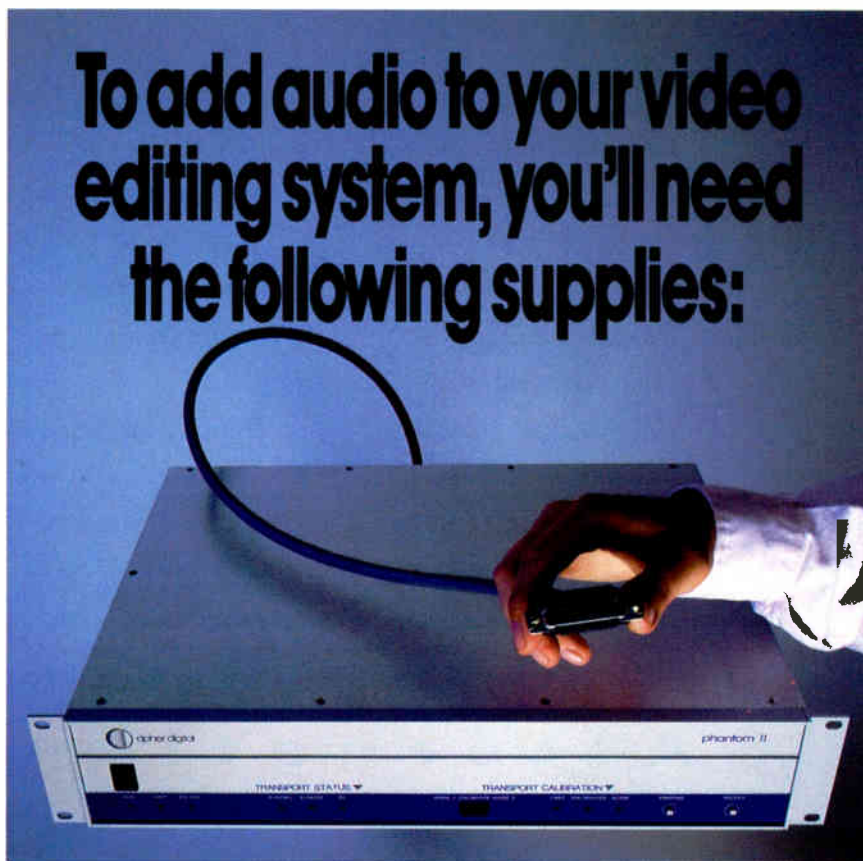
Mix: In terms of building credibility, there is a big difference between doing your own tests and having them conducted by an impartial party.

Miller: We are ready for that when the appropriate time occurs. I think double-blind tests are the best way to go, so no one knows who's got what type of recording. I fully expect that to be happening before long, but I haven't funded any independent tests myself. In my view, if I'm not able to get past the political problems, then it doesn't really matter if the system has been tested by a third party or not.

Mix: Let's take a look at some of those political problems. The so-called Working Group of representatives from record companies and hardware manufacturers met in Athens in June to continue efforts at resolving the home taping issue. The participants are said to have agreed to some kind of draft proposal, but their public statements have so far been essentially "content-free." Any idea what they are up to and how it might affect prospects for APS?

Miller: All their statements have been very vague. What's going on is that the manufacturers, according to a statement by Nesuhi Ertegun [late president of IFPI, the record industry's international trade association] in the December 10, 1988, *Billboard*, have made an agreement that they will pursue a technical means of limiting copying. My opinion is that they decided to commit to a hardware solution because they think that one doesn't exist, so they can just say it without getting into trouble.

I think that the Japanese strategy is to stall. They are acting cooperative until they are ready to sell CD recorders, and then they will revert to their earlier hard-line stance. The thing that has really stopped DAT is not the



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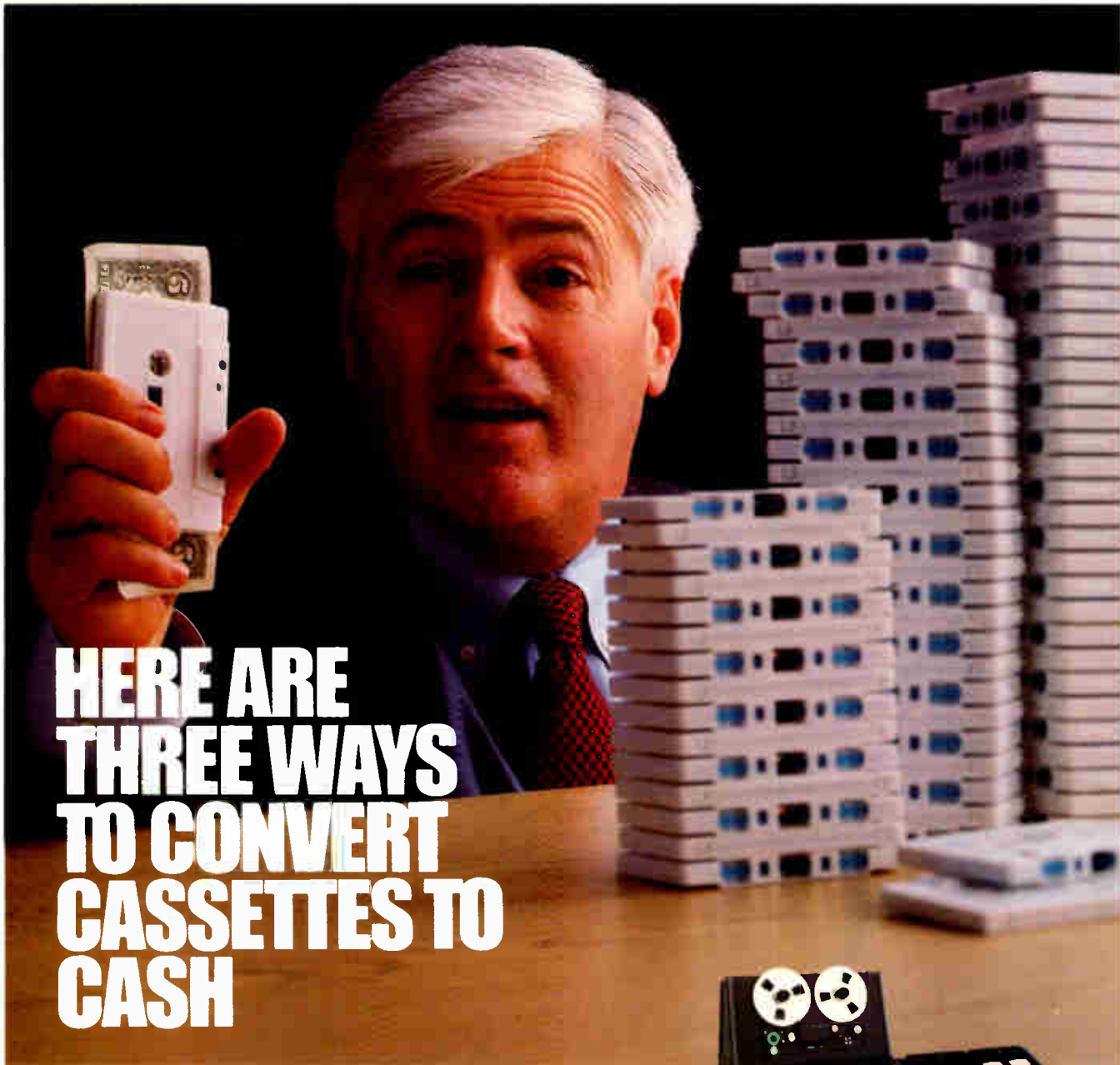
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threat of a contributory infringement lawsuit from the RIAA [Recording Industry Association of America], because the Supreme Court ruled in the Betamax case that a machine need only be capable of non-infringing uses to get around that. The problem has been that without prerecorded DAT releases, there has been no demand for the machines. But CD has a large supply of releases, and the demand is high for a recorder. So it would be worth a lengthy and expensive legal battle if they could sell 100 million CD recorders.

Mix: What progress have you made toward establishing APS as the technical solution of choice among all the various parties concerned?

Miller: I have a letter from Nesuhi Ertegun written in December in which he says: "Once you are ready to demonstrate your system, I am sure that both IFPI and RIAA will be happy to send experts to evaluate it." Last time I went to the RIAA, they had three basic objections: the component cost [of installing the system in consumer recorders] was too high, the tones

were not within the 50Hz to 15kHz band, and the artists would not like the idea of adding tones to the music. We are now down to a component cost of only about \$5. The system now works within the 50Hz to 15kHz range. And the level of the tones has been knocked down to as low as -85 dB. So I just put in a call to Jay Berman [president of RIAA] to let him know we are now ready to go.

Mix: How about the hardware side?

Miller: I have talked to people at the EIA [Electronics Industry Association], but that was quite a while ago. I haven't given them any information recently on what is going on.

Mix: Have you had any official contact with the professional recording community, which has been pretty nervous about anything being added to the music?

Miller: Only with Murray Allen, owner of Universal Recording and chairman of the NARAS National Technical Education Committee. I expect to get a lot of resistance, but once people listen to it and find they can't hear anything at all, then they really can't say anything negative about it.

Mix: It sounds as if you still have a lot

of people to convince before APS will fly. Where do you go from here?

Miller: We have connected up with Fred Davis of the New York entertainment law firm Levine, Thall and Plotkin. They are our agents in this matter, and with the kind of connections they have in the music business, I think we can get things rolling along. We will be setting up demonstrations and generating publicity over the next two to four months. When people find out that APS does not mess up the music and can easily be designed to give them what they want, then they will realize this is something that can give us decades of audio protection. But time is real short, because it will probably take about a year to make the chips and the mastering equipment. If the record companies don't do something before the CD recorders are ready, I don't think anything is going to save them.

Phil De Lancie, a mastering engineer at Fantasy Studios in Berkeley, Calif., is our resident voice on formats, trends and technologies in the world of prerecorded music mastering and manufacturing.

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MICHAEL SHRIEVE: A JOURNEY THROUGH DRUMS

The picture most people have of Michael Shrieve is that of the bare-chested, 19-year-old drummer for Santana, pouring every ounce of energy into his solo on "Soul Sacrifice" in the movie *Woodstock*. It's a picture Shrieve is proud of, certainly, but he's hardly sat around for the past 20 years basking in the glow of his brief celluloid fame.

His association with Santana lasted a few more years (and included their most adventurous early '70s music), and his career since then has consisted mainly of a series of fascinating collaborations—with Stomu Yamashta in the pioneering fusion/new age group Go; with synth ace Klaus Schulze; with top new age artist Steve Roach; with Patrick Gleason on a solo album and the soundtrack of the film *The Bedroom Window*; as well as forays with different rock bands (Automatic Man and a

short-lived "supergroup" with Neal Schon) and session work with the likes of the Rolling Stones (on *Emotional Rescue* and *Tattoo You*) and ex-Supertramp leader Roger Hodgson. This year alone he's put out two very different and distinctive albums: *The Big Picture*, an all-percussion outing with David Beal; and the jazzy *Stiletto*, which finds Shrieve leading a quartet that includes avant-guitarists David Torn and Andy Summers, trumpeter Mark Isham and bassist Terje Gewelt.

"One thing I've learned through the years is that if you do interesting things, interesting people are going to find out about it and it will lead to other interesting projects," Shrieve says. "Basically, what I tried to do on *Stiletto* and *The Big Picture* is create musical worlds or environments that I feel good in. I've come to a place in my career where after compromising here and there in hopes of a record selling better—and then it doesn't—I'm making music that I'm happy with."

The Big Picture grew out of

Shrieve's long love affair with electronic percussion—he was even an investor in Impakt, the first electronic drum company, back in 1971. "What I've always liked about electronic drums is they allow me to play so melodically, which is something I got in part from listening to Carlos [Santana] play guitar. I've just been real interested in how the technology has developed through the years; it's helped open up my playing and take it places it wouldn't have gone normally. *The Big Picture* is something that evolved after I decided it was time to explore electronic percussion seriously again. [Beal and I] played everything on the album with sticks—even keyboard parts—and I think that's part of what gives the music some of its character. It's a true percussion album in that way."

Using an Emulator III and a Mirage as primary tools, Shrieve and Beal sampled everything from Chinese woks to timpani to assorted metal sounds over the course of making the album, and Shrieve freely admits, "We'd love it if people who liked it sampled it. There are a lot of cool sounds on there that we're happy to share with anyone who wants them." The project was cut primarily at two San Francisco Bay Area studios—Different Fur Recording (with engineers John Rollo and Mark Senasac) and Studio D (with engineer Jeffrey Norman) and mixed at The Site in Marin County, Calif., by Norman and Paul Orofino. "We wrote a lot of the music in the studio," Shrieve comments, "just experimenting with different sounds and letting the music take its own course."

Near the end of the project, "I found I was dying to get back to playing acoustic drums," Shrieve says, "so we went back and put double drum kits on every track. With all the electronic stuff already on tape, we only had two tracks left for the two drum kits, so we went up into this big cement room at Millbrook Sound [in Millbrook, N.Y., down the street from Timothy Leary's old psychedelic stomping grounds] and did the double drums live and then just split them stereo."

After devoting the better part of two years to the complex electronics and rich sonic atmospheres that characterize *The Big Picture*, Shrieve wanted a change, and making *Stiletto* proved to be the ticket he was looking for. "It's got a looser, jazzy feel," Shrieve says. "I wanted to be able to sit at a drum kit and just *play* for a change. We cut it live at The Site in about five days. I flew everyone in and we got right down to business. We only did three takes of most tunes, but I'm really pleased with how it came out."

When I tell Shrieve that I think *Stiletto* is the best album Miles Davis never made, he laughs and notes, "I've been a fan of [trumpeter Mark] Isham's for years, and he and I are both fans of Miles, of course. I hope it doesn't sound too close!" It doesn't, although the echoes of late '60s Miles albums like *ESP* and *Sorcerer* and even *In a Silent Way* are unmistakable, and the addition of Gil Evans' "Las Vegas Tango" brings an earlier era of Miles to mind. Still, the guitar work by Tom and Summers is so *moderne* and Shrieve's compositions show such a distinct '80s angularity, the overall effect is totally original. It's a striking album from beginning to end, easily among my favorites in 1989.

Working in the high-ceilinged studio at the helm of an automated 24-track Neve, engineer James Barber [Nile Rodgers, Michael Brecker] succeeded masterfully at capturing the group's live energy. He recorded all the players both direct and with mics, and used relatively little signal processing. "It's such a great sounding room to play in, we didn't need to add much," Shrieve says.

"It was really a great experience for me," he adds. "It was really like having my dream band. At first I had some reservations about being the leader and writing the music and all that, so I was a little nervous. But they were just great. We really enjoyed each other's company, and it became fun for all of us. To have fun and make something I'm proud of is really the bottom line. It has to be."

—Blair Jackson

—MORE MUSIC NOTES ON PAGE 206

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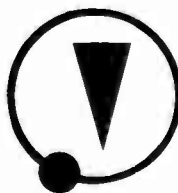
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MUSIC & RECORDING NOTES

YELLOWJACKETS: HOT AND BOP

Instead of waiting at home for the U.P.S. truck to deliver their second Grammy (Best Jazz Fusion Performance for *Politics*), the Yellowjackets—Russell Ferrante, Jimmy Haslip, Marc Russo and William Kennedy—were in Oslo, Norway, recording their follow-up, *The Spin*. It might just make the Jackets contenders for another Grammy—Best Jazz Instrumental Performance.

The Yellowjackets won an R&B Instrumental Grammy for *Shades* in 1985, but on *The Spin* they're leaning toward bebop and wide-open blowing. "We wanted lots of space in the music. Beautiful melodies and acoustic instruments," says keyboardist Ferrante, whose inventive sequencer programming has moved to the background on the new record.

When it came time to put the recording team together, the Jackets remembered many of the albums that Jan Erik Kongshaug engineered for ECM Records. That sound was

close to how they envisioned their new record. "Jan Erik made us an offer to go to his studio in Oslo, and was very helpful in finding accommodations and everything we needed," says Ferrante.

Kongshaug wasn't familiar with the Yellowjackets at the time, but he became a fan as soon as he heard the group. "Actually I thought their music was more into the rock and machine thing, and this record turned out to be more in the jazz direction," the engineer says. They worked at his Rainbow Studios for two weeks, recording basics, overdubs and mixing. "There's a gorgeous German Concert Steinway Grand in impeccable condition; 32-track, digital recording [Mitsubishi machine]; and beautiful, big rooms. And he gets a very warm, acoustic sound," says Ferrante. "Jan Erik is a musician. He hears the way the instruments should sound."

In between tours of Europe, Japan, Brazil and the U.S. last year, the Yellowjackets spent three weeks in Oakland, Calif., working up the material that became *The Spin*. Most of the record was written by Ferrante and

—CONTINUED ON PAGE 211

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Yellowjackets (L to R): Jimmy Haslip, Marc Russo, William Kennedy, Russell Ferrante.

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LONE WOLF

by Craig Anderton

EXPRESSIVENESS: THE NEXT FRONTIER FOR TECHNO-TOOLS

Some pundits feel that the public is losing interest in electronic sounds and musical technology. I keep hearing that acoustic guitar sales are up, synth sales are down and sampler sales are flat. A lot of people point to Tracy Chapman's success as further proof: she became last year's musical *cause celebre* on the strength of her voice and an acoustic guitar—not exactly a high-tech mixture.

But that's missing the point. Tracy Chapman is a star not because she

plays guitar and sings (lots of people do that), but because she does so *expressively*. Perhaps what's necessary to revitalize the synth scene is to increase the expressiveness of music based on electronic sounds, not look for some new technological "fix."

Gone are the days when novelty of sound was sufficient to attract attention. Synthesized sounds have been with us for well over two decades now; it's time to master the instruments we already have instead of



ILLUSTRATION: BUD THON

continually hoping that some new piece of gear, with some hot new factory presets, will hit the scene and maintain the novelty factor for a little while longer.

If you work with synths and sequencers, or if you engineer or produce people who do, you owe it to yourself and your clients to make not just music, but expressive music. In my quest to wrestle expressive sounds from today's techno-tools, I've found some techniques you may find helpful in your own work.

- Don't quantize unless absolutely necessary. Quantization should be the last thing you do to a track, not the first. Creative use of timing is a key component of expressiveness, and quantization destroys those subtle nuances. If your chops are rusty enough that you depend on quantization, take advantage of the fact that many sequencers let you set the quantization *strength* (e.g., 50% strength moves a note 50% closer to the nearest rhythmic value, instead of the usual 100%). This can tighten up the timing without suffocating it.

- Use MIDI controller 7 (master volume) for more than just automated MIDI mixing. I recently heard an album with a sampled sax part that screamed "keyboard sax." Why? Because once the player pressed a note, it stayed at a constant level until it was released—not at all like a real sax. Making sustained notes fade or swell adds a great deal of character and realism to a part. I often find it worthwhile to use controller 7 messages to create some kind of dynamic variation for every sustained note of a sequenced solo.

- Use pitch bend for more than just imitating guitarists. A little bend-up-to-pitch on wind instruments, or string bass samples, can add a lot of realism. Wavering the pitch a tiny bit on a sustained brass note also adds expressiveness. Remember, though, we're talking *subtle*; too much of a good thing will sound gimmicky. The object is to provide near-subliminal cues.

- Use the expressive capabilities already built into your instruments. I had a pretty good flute sample, but it included a little burst of breath noise right at the beginning. Hearing this on every note made the flute sound positively robotic. The solution was to tie the attack time to velocity. Playing notes softly increased the attack time, bypassing the noise burst; playing

percussively brought in the noise. This made for a far more interesting part.

Many keyboards support aftertouch or even polyphonic aftertouch, yet few people use these remarkably expressive options to their maximum effect. Even if you're not into programming synthesizers from scratch, investigate how to modify sound parameters with aftertouch, modulation and other controllers. This is usually not a difficult process, and the results are worth the effort.

If you work with synths and sequencers, or if you engineer or produce people who do, you owe it to yourself and your clients to make not just music, but expressive music.

Most synthesizers also support auxiliary footpedals and footswitches. Use the pedal to "swell" the filter for brass parts, vary levels in an expressive way or crossfade between sounds. Use the footswitch as a sustain pedal when playing a piano part; the overall sound will be much more realistic.

Always keep in mind that samplers are musical instruments, not just digital audio recorders. It's fine to play back cool sounds, but avoid having them sound static. Tie the filter to

velocity so sounds get brighter as you play more forcefully. Use velocity crossfading to switch to a different sample when you play a key really hard. Add outboard parametric equalization to create formats that *don't* transpose with the sample. If you want to add vibrato, don't use the modulation wheel—which adds a mechanical, overly regular effect—but wiggle the pitch bend wheel instead, like the way a guitarist wiggles a string to add vibrato.

- Experiment with tempo changes for sequenced tunes. Slight tempo changes (on the order of one or two beats per minute) can help a song "breathe." One obvious application is to rush the tempo a tiny bit during, say, an instrumental, but slow the tempo down ever so slightly during the chorus.

Localized tempo changes can also be very effective. For example, in one tune I held a chord and bass note for exactly one measure, which was followed by a strong downbeat (bass, kick, cymbal, synth chord) to introduce the next part of the song. Slowing down the tempo during that one sustaining measure delayed the onset of the next downbeat by just a tiny bit, thus building the anticipation for the song's next part.

- Finally, read any number of magazine articles on expressiveness, including "The Feel Factor" in the October 1987 issue of *Electronic Musician*. I realize this seems like a blatant plug for the magazine, but this article has helped many musicians understand the significance of subtle timing shifts. Author Michael Stewart describes how introducing these time shifts, particularly into percussive parts, can create different types of "feel." I've put the article's theory into practice on a number of occasions and have been astonished at how simple techniques can make sequenced music much more lifelike.

The overall point is this: electronic instruments have far more potential to be expressive than ever before, yet few musicians and producers seem to be taking advantage. Sure, it requires more time to tweak individual notes and add subtle changes, but mastering any instrument requires time and practice, and electronic instruments are no exception. ■

Craig Anderton writes books, produces records and edits Electronic Musician, our sister publication.



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—FROM PAGE 206, MUSIC NOTES

bassist Haslip, but as saxman Russo explains, the Jackets are a pretty democratic organization. "If someone feels strongly that something should go a certain way, then it'll usually go in that direction. On *Four Corners* and *Politics* we did a lot of group arranging and hashing and rehashing. This time around we all had suggestions, but they weren't arrangement ideas necessarily; more about a feeling or dynamics. But we always push and pull at each other to try to get the best out of every song."

"With four guys, every person has to open up," says Ferrante. "A lot of recordings I've done in Los Angeles, even with the Yellowjackets in the early days, we would do a track and then leave space to overdub. Now we approach it like, 'Let's make the four of us sound like a band, with all the dynamics and colors we need. Let's try to get it so we don't need another element on the song to make it sound complete.' That inspires everyone. William's cymbal playing, the sound of his drums' and the smooth quality of his playing really help us create that sound."

As drummer Kennedy explains, Kongshaug had a healthy, relaxed attitude about recording. "The drums were hardly baffled at all and were open-miked. I was worried about them bleeding into the other mics, but Jon Erik wasn't. And it worked out great."

"We probably had a little leakage from the drums to the piano, but sometimes the leakage can be nice, to have the room sound," says Kongshaug. "As long as you can control it, it's okay."

"I knew of ECM as having an airier, more space-oriented sound and was excited about working with Jon Erik," Kennedy says. "He has a technique of recording with reverb as the basic effect, and he combines different sized 'rooms' in the mix. He does it on all the instruments. It's a very 'room-oriented' sound. Live performance and studio clarity."

As the engineer explains, "I try to record the drums without using much EQ. I get levels and then want to start recording very quick. I don't want to listen to each tom and snare. I really don't think that's necessary if you have a drummer with a good sound. Put up the mics, get the level

right and then it sounds great.

"I work to get the balance, the panorama right, and then I use a lot of different kinds of room and reverbs, panning reverbs in different directions. Send one effect to another effect. But recording is very straight, just to get the level on tape, and not too much."

"We would play, come back and listen and it would sound wonderful," says Ferrante. "We were asking him, 'Why can't we get this sound in Los Angeles?' He said, 'I don't know. I don't use very much EQ.' I think it's in the mic placement, and he's using several different reverbs, rooms and echoes. On any one instrument he might put three, four or five 'rooms' to create a feeling, the space and dimension."

"In the mix I go to the reverb return on the computer and can change the levels and the reverb time in the middle of a song," Kongshaug says. "On the saxophone I used two or three different delays, and I might boost one of the delays on one section, and at another place boost another one. If there's a good sax player, I usually put up a Neumann U87 and no EQ and it sounds great."

Kongshaug uses Lexicon 480, Lexicon 224, EMT Plate reverb, Yamaha SPX90 and a "cheap" ART reverb. "I love the 480, but I never use the same program," Kongshaug says. "There are so many different sounds. I like to experiment. I tend to like long reverb times and maybe some long predelays also. I use different kinds of reverbs, and on one instrument I can use four different kinds of rooms—on the same microphone."

Kongshaug insists that the most important thing—more important than reverbs and rooms—is the sound of the instrument itself. "You can't get a good sound on a bad piano. It's just not possible. With a good-sounding instrument, if you have a fairly good microphone and place it right, it should sound good." Kongshaug uses Schoeps microphones on the piano and on the cymbals in the drum kit.

The engineer prefers small speakers and low levels to get the right balance at mixing time. "If you mix on huge speakers and high levels it can sound great when you're mixing, but afterwards it doesn't," he says. "And everybody will get tired sooner



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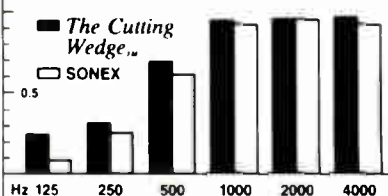
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if you play it back loud when you're mixing. If you get it to sound good on a low level and small speakers, it usually also sounds good when you boost that level up."

The material on *The Spin* is the most challenging yet heard from the Jackets, and the recording captures it all, down to Ferrante singing and moaning along with his acoustic solo on "The Spin." The title track nearly gave the drummer fits, too. "I almost had to ignore Jimmy [Haslip]," laughs Kennedy, "because he's playing in 3/4 and I'm playing in 4/4. I had to listen to him and not listen to him."

"Whistle While You Walk" combines a solid, funky shuffle with some impressive straight-ahead jazz. "We want more of the jazz element in our music, but want it to have our personality as well," says Ferrante. "It's fun to take that feel and give it a different quality, some of the electronic element and some quirky things. It's not in the middle of the road. It's off on the shoulder a little bit."

"We're trying to stretch out and

open it up," Haslip adds. "People who don't understand jazz might still like what we're doing, because it's very melodic."

"We're also trying to keep some of the traditional jazz direction alive. It seems like you have to go back into the archives to listen to that. Keith Jarrett's trio is playing the bop kind of thing but treating it in a modern perspective. That's all we're trying to do—play jazz, but with a modern technology."

The Spin was ambitious in many ways. The bandmembers met with feelings of isolation along the way. "During the tracking we were very excited, we were all busy," recalls Ferrante. "But once we came to the overdub stage and mixing, when there was more sitting around and listening, we all started to feel homesick. But we're pleased with the results."

"Not that Norway wasn't beautiful, and the people were friendly, but I for one didn't enjoy going that far away to make an album," says Russo, who continues after a pause. "But it makes you focus on the project a little more, so that could be a benefit. I'm thinking, 'Okay, I really want to

get in there and do well so I can get home.' I guess life changes when you have a family." Russo wrote *The Spin's* "Blues for Nikki" for his two-year-old son.

"The arrival was exciting, getting in there and walking in the studio, realizing, 'We're here to do a record,'" says Kennedy. "What's life without a little risk? We went for it, and we're happy with it."

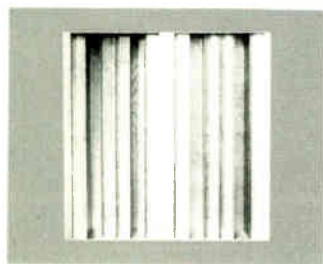
—Robin Tolleson

DOWN ON THE FARM WITH MIKE RUTHERFORD

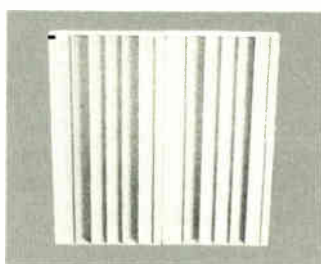
Life on the road is a vast contrast for Mike Rutherford, head wrench for Mike & The Mechanics and cornerstone member of art-rock-turned-pop music icon Genesis. The huge farm complex that serves as central headquarters for Rutherford and his two bands sits peacefully in the English countryside 3,000 miles away while, backstage at a recent Mike & The Mechanics show in New York, rock and roll confusion is taking over.

Yet, through it all, Mike Rutherford remains the consummate English

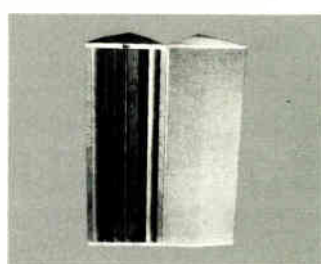
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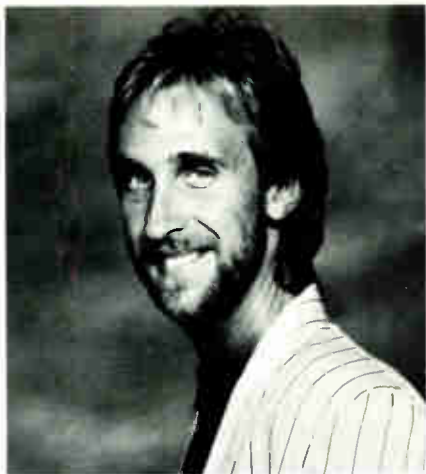
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Mike Rutherford

gentleman.

Confronted by an endless stream of record company promo guys, area radio slackers and other hangers-on, his long face wears a constant smile. And though he appears tired from a nonstop schedule, Rutherford's large, deer like eyes radiate with sincerity when it comes time to talk about his life, his music and the facility in England where he and the other members of Genesis create and record their music, both solo and together.

After a career spanning two decades in Genesis, and three moderately successful solo albums, Rutherford, like bandmate Phil Collins, has finally achieved superstar status on his own. It came this year with the multiplatinum, chart-topping Mike & The Mechanics album, *Living Years*.

Propelled by the Number One single of the same name, the album (and the band) features a crackerjack lineup of English studio players, including vocalist Paul Carrack. Now on a successful U.S. tour with The Mechanics, Rutherford is happily—and finally—at the point where audience members have stopped yelling out Genesis requests.

In a time when it is common for rock personalities of Rutherford's status to have elaborate studios in the privacy of their homes, Rutherford and his musical partners in Genesis opted instead to pool their resources into a larger, cooperative effort.

Simply called "The Farm," the studio complex was built in late 1980, in a converted cow shed deep in the countryside of Surrey, England. "We never gave it a proper name, we've just always called it 'The Farm,'" Rutherford says. "It's not a working farm, but it's got about 80 acres of

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land. In addition to the studio we have all our equipment stored there, and it's sort of a musical headquarters for the band. It's a fabulous studio. I'm ten minutes away, Phil's a mile from it, and Tony's about eight miles away."

The complex has been the recording site for not only all the Genesis and solo offshoot projects since 1981, but for various albums by the likes of Eric Clapton and others. "There's a nice farmhouse where the engineer, producer or other musicians stay, but the three of us in Genesis drive in,"

Rutherford notes.

Genesis' *ABACAB* was the first album recorded there, but Rutherford admits it wasn't nearly as good of a studio then as it is now. A major renovation and equipment update four years ago has brought the facility into the digital age and put it on the same level as many of the top rooms in New York, L.A. and London.

The studio features one large recording room, and the spacious control room is equipped with a 56-channel SSL 6000 board and digital Sony 24-track and analog Studer 24-track tape machines. Rutherford says they are often upgrading the moni-

tors and various outboard gear.

"I'm pretty involved in the new technology," Rutherford says. "I know what most of the new machines can do and can't do, although we have a head boffin, which is an English term for technical whiz kid. His name is Geoff Callingham, and he runs the studio for us and goes to all the trade shows and brings things back. He keeps us up-to-date."

Unlike many of the other professional studios owned by artists, The Farm is not available for commercial use by others. The group has let a small circle of close music industry friends use the complex, but for the most part it remains a private room.

"We let some people we know use it, like Chris Neal, Paul Carrack and Hugh Padgam. We've let Eric Clapton and Gary Brooker [from Procol Harum] use it as well. But to be honest I'd rather it be empty for three months than for it to be so busy that we can't get in there ourselves when we want to. I've seen that happen so many times.

"We did a Genesis album at ABBA's studio in Stockholm, Sweden—which is a rubbish studio—and ABBA was down the road recording at another studio because they'd booked out their studio to us. So what's the point? The whole point for having your own studio is so you can suddenly go in. It's there for you; or at least, it's supposed to be.

"I also have a writing room at home that's got all my equipment in it and just a small tape recorder. I've often thought of taking it farther, but haven't for two reasons: the Genesis studio is only ten minutes away, and it's really just a room designed for writing in, not one to worry about recording in. In there I just put things on a basic tape for reference. I've got a 12-track deck in there, but I usually just throw the music on a cassette tape."


Rutherford says the natural setting of The Farm and the fact that he and his various bands can now record without any outside pressure has made it much easier to be creative.

In the case of Genesis, he says all the music is usually written right there on the spot when they arrive to record. "Because Genesis does so much stuff apart now, for the last three or four albums we've worked together on material in the studio,"

—CONTINUED ON PAGE 287

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Fig. 4: Original electronics.

jacket, and a triode to boot, which is why they sound questionable. The 47's output transformer was designed for the VF-14, which is a pentode and has a plate impedance of only 8,000 ohms or so. The little triode has an impedance that goes up into the 30k-ohm region, and the bass response rolls off. I can just hear the fans moaning, "Oh no! Not the bass response...isn't that the reason I bought this thing in the first place?" Well, yes. We can effect a healthy improvement just by going to a more correctly matched transformer.

In addition, my company developed a complete, contemporary upgrade that uses a modern tube (shown in Fig. 5) and a Jensen output transformer dragged out of Deane at great personal peril. This brings back the 47 sound that we all know and love, and it offers the benefits of lower noise and distortion, and greater dynamic range, than the original.

Well, I think we've exhausted all the useful information on the 47, and it's time to move on to some other old friends: the M-49, U67 and U87. Until

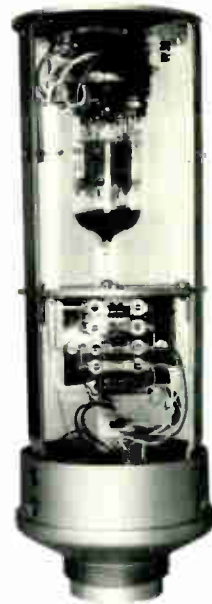


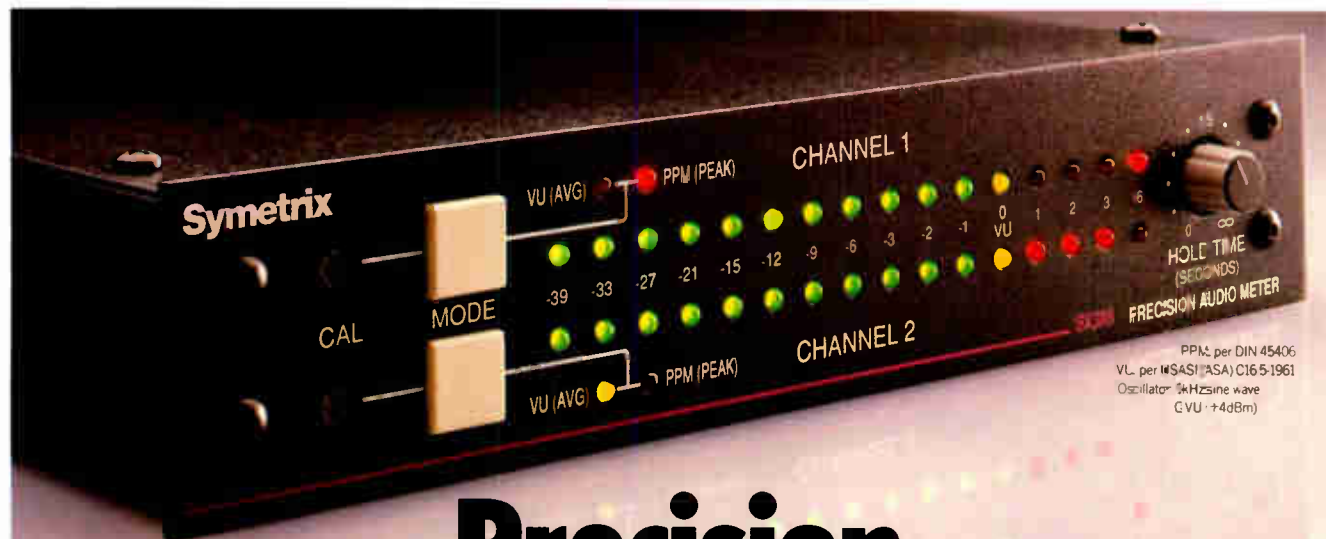
Fig. 5: Modern tube.

-FROM PAGE 130, VINTAGE MICROPHONES

knows. For a replacement, Neumann offers a "nuvistor" kit, which plugs into the old socket, but the sound has never really caught on. The nuvistor is a super-miniature tube in a metal

next month, may your vocal sounds be forever well-colored. ■

Stephen Paul is the founder and president of Stephen Paul Audio, located in Burbank, Calif.



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— FROM PAGE 125, GROUNDING

corroded pole-peg ground wire, or other forms of intermittent or highly resistant connections. Most electrical problems are caused by line imbalances, multiple earth bonds, audio ground wiring problems, outlet wiring errors, mixing AC phases and installation or design errors.

Worst-case, it may be necessary to condition the incoming power to supply a clean feed. Power conditioning is not accomplished easily. You need about 75 amps to run a standard 24-track room. This equates to a 10kVA conditioner. If you want to run two digital machines with a digitally controlled analog console, make that around 150 amps. New technology means new power demands.

A power conditioner must provide:

- Output voltage regulation within 15% of nominal with a 25% input fluctuation;
- Spike and surge protection (must be able to remove spikes of extremely short duration, although usually of great amplitude);
- Low distortion of the output waveform (we can't accept any more than 10% third-harmonic distortion and significantly less even-order distortion);

tion);

• High operating efficiency (lack of efficiency translates directly to heat, with a concurrent increase in air conditioning expense, which directly affects utility costs);

• Low primary-to-secondary capacitive coupling;

• Low primary-to-secondary common mode coupling;

• Low output impedance at all frequencies.

While running out to buy a power conditioner is not the first thing you'll want to do, it is one of the most cost-effective methods of dealing with a serious power problem. You can accomplish power conditioning in two different ways: first, by conditioning all the "tech-power" with a single conditioner; second, by conditioning equipment "locally." The concept of local conditioning makes sense when there are only one or two sensitive pieces of gear.

The primary reason for purchasing power conditioning is voltage fluctuation. Brownouts and overvoltage conditions stress any piece of electronic equipment dramatically. In this light, you can look at power conditioning as a form of insurance. You

ZERO-VOLT, GROUNDS, HUM AND PROTECTING MUSICIANS' LIVES

An astonishing number of studios have hum problems. Astonishing, because *nobody* wants hum, and most studios have spent a great deal of time and energy to eliminate it. When these efforts are successful, well and good. When they're not, the engineers, who have other things to do, will eventually give up, declare whatever hum remains to be an act of God and live with it. Not happily, but if you can't fix it,

— CONTINUED ON PAGE 219

hope that you will never need it, most of the time it won't be used, and when it is, you thank your stars you have it. ■

Former chief engineer at Wally Heider Recording (L.A. and San Francisco), Greg Hanks now heads New York Technical Support, providing installation, service and consulting to the audio industry.

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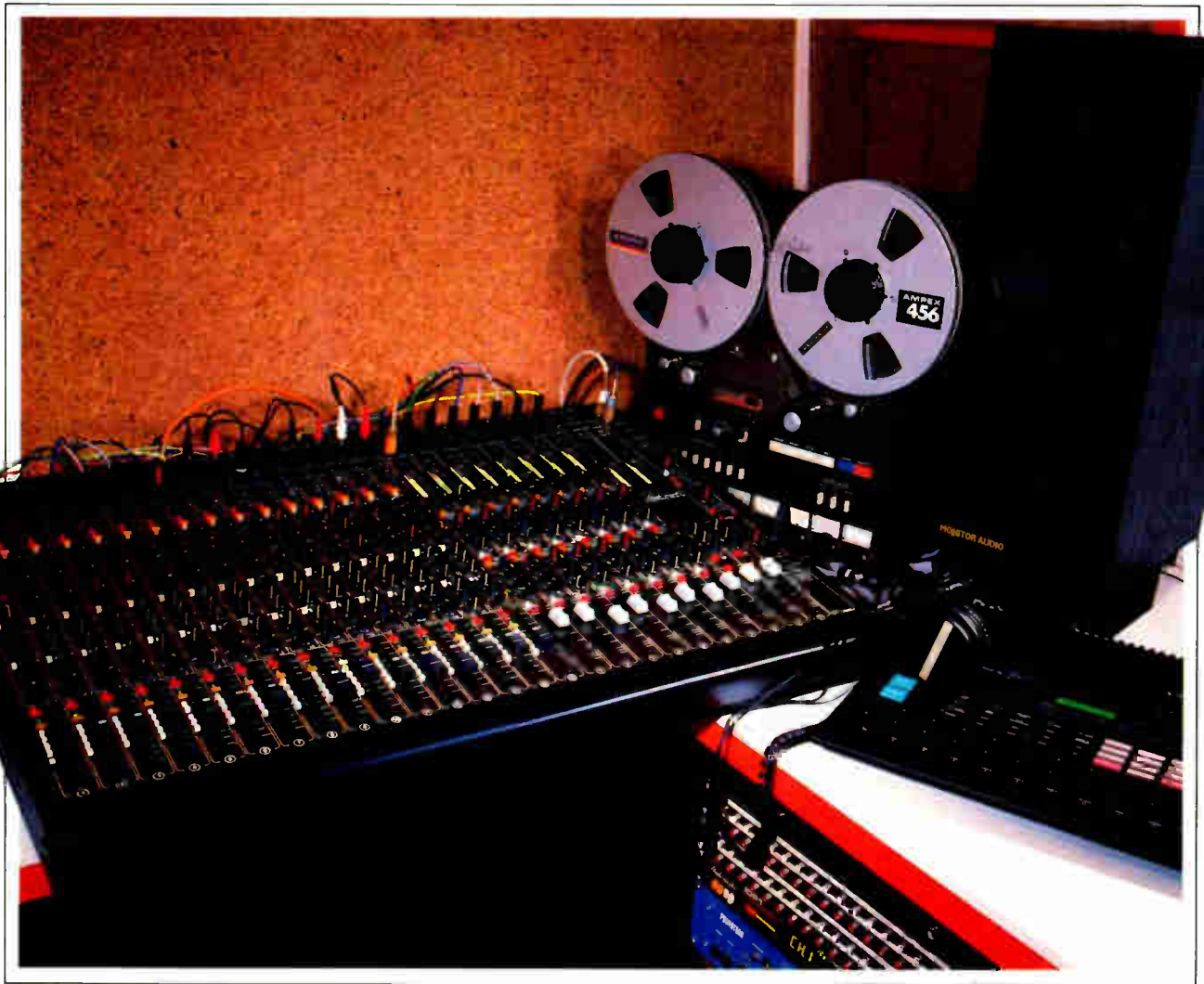
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you can't fix it, and there's a session at 3 o'clock.

By and large, the frustrations these engineers suffer is due to the fact that what they're trying to fix has very little to do with what's wrong. The problems generally lie with zero-volt differences, and they're working on grounds. That's easy to do, as the two are the same thing in most equipment, and nearly the same thing in a studio. Nearly, but not quite, and so you have hum. To define these terms, zero-volt (a European term) is the chassis potential of an AC-powered unit, measured against either true ground or whatever it's connected to.

Ground, on the other hand, is the electrical potential of the planet, usually tapped by a copper rod driven down into the water table. When that's not possible, a *very* large spider web of copper wire establishes a pretty good capacitive ground at radio frequencies, and even a large metal plate will do the job if no real current needs to be transferred to ground. The body of a car is a case in point.

Radio frequencies are alluded to here because they are the primary reason for connecting equipment to true ground. Cheating's possible, but a solid, true ground will improve the performance of virtually any radio transmitter or receiver. And that fact is responsible for the grounding systems built into many types of electronic units, such as guitar amplifiers, that have nothing at all to do with radio reception.

Water pipe grounds are currently illegal in 43 states, and dumb in all 50, probably because if there is *any* copper pipe used in the plumbing, a dielectric union (coupling) is installed to prevent bimetallic electrolysis, which eats the pipes. The dielectric union is an electrical insulator, so if there's one in the system, a water pipe may well not be on ground at all. Worse, it could have 120 volts on either side of the union if the grounded equipment has an electrical leakage problem. The same thing applies to plastic pipe, and the 120 could well kill a plumber, or you; so *don't ground to the water pipe.*

The fact that the neutral ground is dependent on circuit balance has been known for some time, but

nothing came of it until OSHA got involved some years ago and came up with what looked like a reasonable solution in the form of a separate grounding system that shows up as a third round connector present on all 120-volt sockets and most 120-volt equipment plugs.

The theory behind the OSHA ground is that since the metal pipe used to armor wires is connected solidly to ground at the breaker box, and carries no current, it will remain on ground throughout a building and can be used as a dead, reliable ground. The appropriate laws were passed, and the OSHA grounding socket, connected to the electrical pipe work, is found on all new 120-volt wall sockets.

The theory's not bad, but it ignores two facts. First, steel pipe has pretty high resistance, so if a piece of electrical equipment leaks 120 AC into it, the result is to heat up the pipe instead of popping a breaker. Second, a *lot* of electrical equipment leaks. Ancient air conditioners are notorious for leakage, and anything with a cheap power transformer, a shorted grounding cap or an old, dirty electric motor can leak a great deal of 120 VAC to the equipment case and through the OSHA connection to the pipe. Because hardly anybody checks leakage in things like air conditioners, fans, sump pumps, refrigerators, furnace motors and so forth, the pipe ground is almost never where it should be in a large building and seldom right in a small one. I've seen pipe 65 volts off ground, believed due to a leaky air conditioner on another floor. Even worse, pipe ground is often different for two outlets in a given room, as they will be on separate pipe runs.

Because of these variations, an engineer trying to cure hum problems is confronted not with a grounding problem, but with multiple grounds at different voltages, and those are the chief cause of inter-equipment hum. Simply put, a studio with several 120 VAC outlets powering various pieces of equipment feeding signals to and from each other will *normally* hum like a banshee, whether the individual units hum or not.

"Not" is normal these days, as there is no reason for solid state units to

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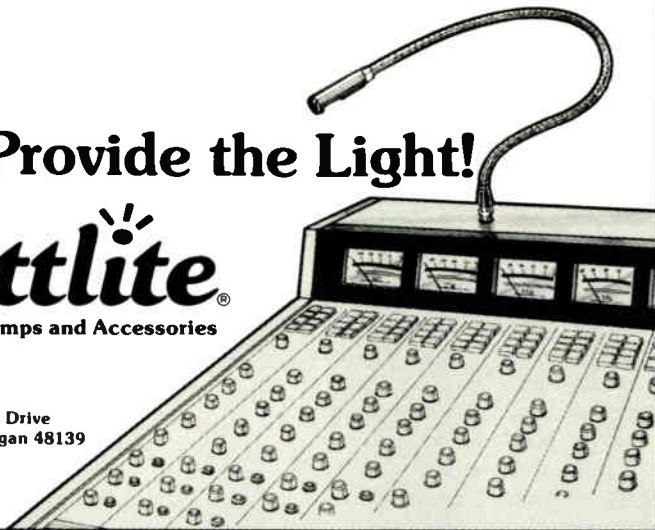
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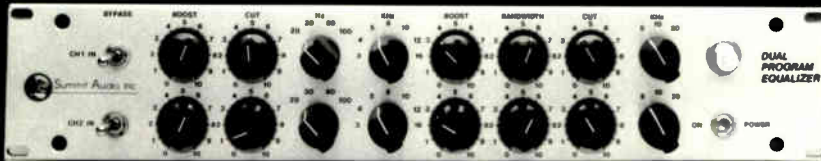


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exhibit hum at any level down to the noise floor. The one exception to this rule is tape playback heads. They develop so little output voltage at 60 Hz that a monstrous amount of amplification is needed, and since perfect shielding is nearly impossible, most playback heads hum a little. Whether machine hum is a ground loop or playback head pickup is easily checked if all the signal lead shields except #1 PB are cut at the plugs. If all the channels hum, it's the head. If not, the machine has a ground problem.

Short of defects, equipment stacking or junk, the other stuff shouldn't hum until it's interconnected, at which point it most likely will. The culprit here is shield current, caused by a difference in the chassis potential of two pieces of AC-powered equipment. It is a zero-volt problem called a ground loop.

Unless two interconnected units are at *exactly* the same voltage, the voltage difference will cancel through whatever wire connects them, and if that wire is the signal lead shield, it will carry the current involved. Even a .05mfd capacitor will allow about 3 ma of current at 120 volts. That's not much, but the signal lead is so close to the shield that the magnetic field generated by the current will cut the signal lead enough to generate an appreciable amount of 60Hz voltage in it, and even for line-level equipment, appreciable is too much for high-quality work.

Taking 60 dB as a reasonable signal-to-noise ratio, hum will be heard at anything about -70 dB, or half as loud. For standard +4dBm line level, that's about 400 microvolts, which is well under mic-level and far out of range for common voltmeters. Less would be better, and none is best, but getting the zero-volt to zero is not something that can be done with the power company's grounding systems. For one thing, a standard outlet, as one of several on a pipe run and in use, will rarely have less than 0.1 volts between pipe ground and neutral, with a *lot* of current available, and the disparity can amount to several volts between outlets on one pipe run and another. Units taking their grounds from two such outlets have chassis grounds at those differing

voltages and draw current through their connection shields. In theory, balanced feeds cancel ground loop hum. In practice, they nearly cancel it, and while they are helpful, they do not prevent shield current problems.

In short, standard AC wiring presents multiple ground voltages at the outlets. All are well below shock hazard, but the differences are far too great for recording equipment. The solution is obvious, and is called center-point grounding. Pick *one* piece of equipment, normally the console, nail it down to ground and secure everything else to that ground.

If absolute ground is wanted, pull one or two #12 copper wires through the piping from the neutral bus bar in the basement box to the console's ground point. That parallels the steel pipe ground in low-resistance wire and results in a near-perfect ground on the console. In the case of a plug-in console, connect the #12 gauge wires to the outlet box to hard-ground the console through its OSHA pin.

Keeping in mind that the object of the exercise is preventing shield current rather than rewiring the building's AC, the other equipment in the room can be clamped to the console's zero-volt with a *single* hard-ground, and any remaining shield current can be eliminated by cutting the shield at the far end, as is done inside consoles. This is most easily done by the following procedures.

UNPLUG EVERYTHING. No exceptions, and turning things off won't work. Pull *all* the plugs.

Power up the console, put a pair of headphones on the output and confirm no hum. Unplug it.

Repeat the process with the monitor amps. If they hum and are stacked atop each other in a rack, separate them. They're probably humming each other through their power transformer fields, which are surprisingly strong even in good equipment, downright amazing in cheap stuff.

Once the console and monitors are confirmed to be clean, power up both and see what you get at full roar. If there's no hum, don't fix it. If there is, you *know* you have a ground loop. To fix that:

1. Lift the OSHA ground. A three-to-two pin adapter does it. If that works, go to the next unit. If not,

2. Run a length of #12 electrical wire from console metal to monitor metal. If okay, next unit. If not,

3. Disconnect the shield(s) at the monitor ends.

Lifting the OSHA (pipe) ground removes the only strong non-console ground on the monitor amp, and if there's no internal capacitor ground to the AC neutral and no power transformer leakage, the shield will see no voltage and won't hum.

When either condition is obtained, a hard-ground in #12 wire will divert most of the current through itself rather than the shield. It amounts to a serious clip lead ground and will reduce the hum.

If appreciable hum remains despite the hard-ground, cutting the shield will kill the current, and the shield will still drain off externally generated voltages to the console.

Repeat the process for each piece of equipment. If something hums by itself, move it away from nearby equipment or turn that equipment off. Proximity hum is common. For

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LUNCHING WITH BONZAI

—FROM PAGE 94

They like it better, they feel it's better for the project.

Bonzai: Anything else you'd like to say to the public?

Clearmountain: Don't get hung up on the technology. The most important thing is the music, the songs and the performances. What you record it on, and what mics you use—they're just nowhere near as important as the music. Do what you can, establish

your own style. Don't do what I do. There is no wrong way to make records. If you use a mic that I wouldn't use for hammering nails and it works, then that's great. SSL isn't worse or better than Neve. It doesn't matter. Whatever you are comfortable with using is what's right. Music is the most important thing. ■

Mr. Bonzai didn't get a free lunch this time, but he's still Mix's editor-at-large, interviewing interesting personalities from his base in Los Angeles.

example, the power supplies in two tape machines will frequently generate mutual hum when the machines are spaced at less than a foot. And look out for a cassette deck on the 2-track machine.

Short of a radical 60Hz field in the entire room, this system should leave a completely hum-free control room, and you're in great shape until the musicians arrive.

Acoustic instruments are no problem, but when the guitar amps arrive, you're back to square one but a little worse off, as these amps are neither professional equipment nor your property. This makes them both unpredictable and unfixable, and to cap it off, they contain two built-in grounding systems. One is a conventional OSHA grounding pin-to-chassis connection, the other a radio-style, .05mfd capacitor-to-ground, switched from either side of the line as a function of the three-position power switch. Since neither of the two possible amp grounds is likely to be at your console zero-volt, you're faced with a three-part problem that cannot be solved.

The practical approach to a triple variable is to eliminate one or more factors. The system is the same as steps one and two for the control room, but uses different equipment.

Step one, lifting the pipe ground, is accomplished by use of specialized extension cords commonly called rhythm boxes. These are best made up by the studio, and consist of two 4 × 4-inch electrical boxes bolted back-to-back, each containing two standard duplex outlets with 15 to 20 feet of 2-wire, rubber-covered #12 or #14 wire and heavy duty three-pin AC plugs. A three-pin plug on a 2-wire cable sounds wrong, but it's handy, as the

third pin helps hold the plug in the socket.

Each rhythm box supplies eight outlets in a 4-inch cube, and as the round ground sockets in the outlets are interconnected, it locks all the amps plugged into the box to the same zero-volt potential. This eliminates shock hazard between the amps, and therefore between the guitar players.

Step two is to hard-ground the amps. This can be done with a heavy wire from the console's ground point, but it's easier and more useful to use a direct feed on each amp.

Direct feeds are normally used to overcome the deficiencies of instrument amp loudspeakers, which are far more loud than good, and are probably not used as often as they might be because of hum problems associated with the direct.

That's a shame, because a direct input, even when mixed in with a mic on the amplifier, yields a punch and clarity that can't be matched any other way, and the hum problems are not the fault of the direct box. In fact, with the OSHA ground lifted by a rhythm box, a direct feed will nail an amp to console ground well enough to overcome the amp's capacitor ground and produce no hum at all. The direct ground is stronger than it seems because each pin of an XLR mic connector is rated at 10 amperes of continuous current. In combination with the mic cable shield, which amounts to #10 wire, it is not only a good ground but a possible lifesaver.

I have made a practice of putting a direct feed on anything with an AC cord since the mid 1950s, and I have twice encountered shorted grounding capacitors on guitar

—CONTINUED ON PAGE 224

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—FROM PAGE 192, TOM JUNG

850 on hand. I used it for adding 'sound colors' and overdubs. I built stereo mixes on the DMP7D and recorded them to multitrack using the X-850's ping-pong panels."

The DMP7D-to-X-850 overdubs required the sending of the X-850 word clock to the DMP7D, to ensure that all components were synchronized correctly.

"For the remix I replayed the over-

dubbed tracks through a single DMP7D at Westlake and mixed to stereo DAT," Jung recalls. "I then took the DAT cassettes back to my studio in Connecticut for editing and sequencing, prior to the CD mastering process. It's real nice being able to leave a session with three DAT cassettes in your pocket—A and B masters, plus the basics—instead of armfuls of analog 1/4- or 1/2-inch tapes!"

—FROM PAGE 222, ZERO VOLT

amps that locked the amplifier chassis (and the guitar strings) to one side of the AC line. Since the amps were on a high-current direct ground, the result in both cases was blowing the amp fuse rather than exposing the musician to a 120-volt shock hazard on the nearest mic, but it's the sort of thing that sticks in one's mind.

What might have happened without the direct ground is a scary thought. Needless to say, a direct should not have a ground lift switch, and it's not real smart to plug in an amp until the direct has been con-

nected. Still, the direct grounding system has served well over the course of many years and is strongly recommended. If a direct feed is not appropriate, use a ground wire, but *never* power up a music amp or electrified instrument without a reliable high-current ground on it, as it can fail to deadly shock hazard on the nearby mics.

The establishment of a strong, single-point grounding system in the control room and studio will reliably eliminate hum *and* provide a safe working environment. It is well worth the work involved.

—Malcolm Chisolm

PLAYBACK

—FROM PAGE 187

a solo project, and get some influences and input from some other people.

Mix: Looking ahead, might there be another Traveling Wilburys project?

Petty: That's a real interesting question. [Laughs] There might be in another year; who knows? The thing is, whenever we sit down to talk about it, everyone avoids getting too deep. It also has to do with the fact that we were all totally surprised by the success of the album. It was just done as a fun project. No one expected it to sell 5 or 6 million.

Mix: Could the Wilburys ever tour, with Roy gone now and all?

Petty: Funny you should ask, 'cause it was Roy, Bob and me who really wanted to tour. Jeff and George didn't, but they were outvoted! Now it's an even vote and who knows? I think the problem with a tour is that people's expectations might be too high. It was just a casual band. On the other hand, we might get someone else in and do something. You never know.

Iain Blair is a Los Angeles-based writer.

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MIX — TRACKING YOUR FUTURE

MIX THE RECORDING INDUSTRY MAGAZINE

by George Benkowsky, Fernando Quizon & Louis Wiggan

DESIGNING THE NEW CBS POST HOUSE

A new emphasis on quality audio, spurred by the introduction of stereo TV and advances in the caliber of consumer audio products, has directed attention to technical improvements in the acoustic design of audio post-production facilities for television. An ideal example is the new CBS-TV post facility, which incorporates the most current acoustic technology for effective sound control.

rating of 34.

In developing the facility layout, the requirements for sound control were integrated with the usable space, floor slab dimensions, position of columns and ceiling beams, noise control and human engineering considerations, including eye and voice contact. The facility design consists of a 30 x 21-foot control room and a small adjacent studio, 16 x 14 feet.



In 1978, CBS put an audio sweetening room into service at Television City in Los Angeles. As audio production requirements became more sophisticated and new equipment was installed—especially when 24-track recorders arrived—the need for more sound-effect capacity became evident.

PLANNING AND LAYOUT

CBS management wanted to build the facility in a convenient space at Television City, where the ratio of height to available length and width, while not ideal, was adequate. The space measured 55-feet long by 30-feet wide, with a ceiling height ranging from 13'1" to 15'7". The existing walls had a Sound Transmission Class (STC)

Both rooms have an average height of 11 feet, with a sound-lock entrance and storage space (see Fig. 1).

Lighting consists mainly of dimmer-controlled, ceiling-inserted spotlights. All cables are carried in trances under the parquet floor. An independent, closed-loop air conditioning system serves the two rooms.

NOISE CONTROL

To minimize sound transmission into and out of the facility, a complete sound-insulating shell was built within the provided space. Inside the walls (which were left in place), additional walls were built, using 4-inch, 18-gauge metal studs isolated from the floor, concrete beams, ceiling, columns and existing walls with neo-

prene gaskets, isolating fasteners and other dampening materials. As a result of these noise transmission reduction measures, the walls' STC rating increased to a range of 60 to 64.

The ceiling presented different sound isolation problems. First, acoustical and fireproofing material was sprayed to coat the existing metal/concrete ceiling, minimizing impact noise from the scenery storage area on the first floor. Then a sound-isolating, suspended ceiling was designed symmetrical to the center line of the rooms and nonparallel to the floor. Below this, the final sound-control ceiling was installed. To achieve a quiet control room and studio, the space between the suspended ceiling and the sound-control ceiling was made into a broad-bandwidth absorption trap through the use of sound absorption panels.

The studio/control room window consists of multiple, tilted glass panes of varying thickness. The doors are all sound-insulating, with an STC rating of 45 to 50.

Noise control of the air conditioning systems is accomplished by wrapping supply-and-return air ducts with a 1-inch fiberglass blanket and lining the inside of some ducts with 1-inch fiberglass material. Air diffusers and return grills were sized for the lowest-velocity air movement. Air ducts that penetrate the studio and control room are equipped with duct silencers.

SOUND CONTROL

The integration of surface absorption, reflection and diffusion brought this facility closer to the desired ideal room characteristics for enhancing the audio portion of a television production.

Based upon the planned operational use of these rooms, a Reflection-Free Zone (RFZ™) is incorporated into the design to enhance speech and music reproduction and generation. To achieve this, a proper mix of sound absorption, manipulated sound reflection and sound diffusion is required.

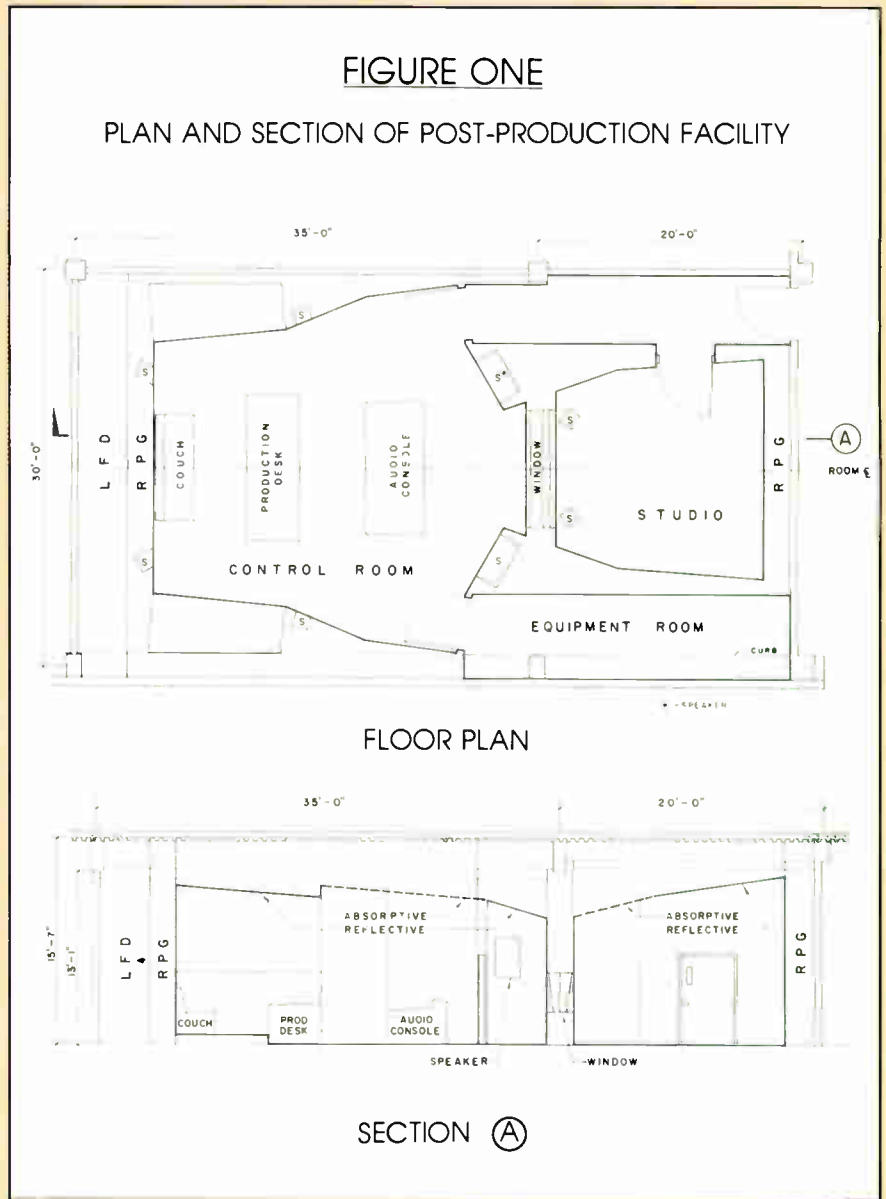
Obtaining a proper stereo image without degradation requires maintaining the symmetry of the rooms about their center axis and eliminating intense, specular reflections. Early, direct sound reflections are eliminated as much as possible to implement the RFZ. This is accomplished by sloping, tilting and beveling the

surfaces adjacent to the speakers and by providing broad-bandwidth absorption surfaces on the sidewalls and ceiling adjacent to the speakers in the control room and adjacent to the window in the small studio.

To meet the demands of critical audio monitoring in the control room, a separate Low-Frequency Diffuser (LFD™) is located in the rear of the

room. A rugged RPG, appropriate for a performing environment and suited to the small studio's volume and geometry, goes in there.

Taking advantage of the inverse square law of sound energy propagation and the characteristics of LFD and RPG diffusers, our acoustic designers were able to obtain a delayed and attenuated, uniformly diffused sound field throughout the room's decay time. This reduces unwanted



room. Overall sound diffusion is accomplished by placing a broad-bandwidth Reflection Phase Grating (RPG™) in front of the LFD, and by slanting the rear sidewalls and ceiling to direct the reflected sound into the RPG, which scatters sound uniformly in all directions while decreasing its intensity, eliminating resonance, flutter, slap echo and frequency coloration.

discontinuities and interference resulting from reflected and diffused sound combinations.

EQUIPPING THE CONTROL ROOM

At the heart of the control room is a 48-input Neve V Series console equipped with a primary and secondary fader, compressor, expander,

filter and equalizer on each input channel, and auxiliary, cue and monitoring channels on the output.

The console is linked to Studer A800 24-track and Studer A80 2-track audio recorders, Sony BVU-800 and BVH-2000 videotape machines, various audio processing devices, Dolby noise reduction equipment and audio monitors. Connection to auxiliary, show-specific, rented equipment is made via connecting panels and wall boxes. Existing sound effects equipment and radio carts are in use temporarily until replaced or augmented by new equipment. A Sony VPH-1040Q color video projector provides the main video and time code display.

A time code-dependent, master code-selectable control system is used, consisting of a Timeline Lynx controller for editing, with Lynx synchronizers and a GML Moving Fader automation system for the console.

Artistic performance has been significantly enhanced by the technology of the room design and the addition of a computer-assisted con-



rol system. With the successful completion of the facility's construction, CBS Television City can meet the requirements of current and future television audio post-production. ■

The authors wish to thank: the TV City Facilities Department and especially

Frank Passalacqua, whose patience and wisdom contributed significantly to this project's success; Dr. Peter D'Antonio for his timely counsel; and Joseph Flaherty, VP and general manager of engineering and development, for permission to publish this article.

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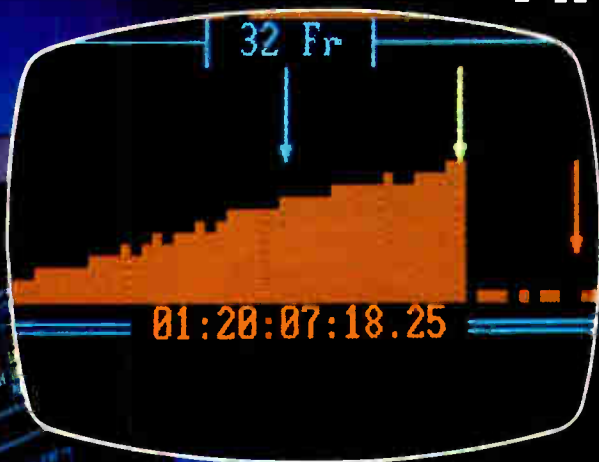
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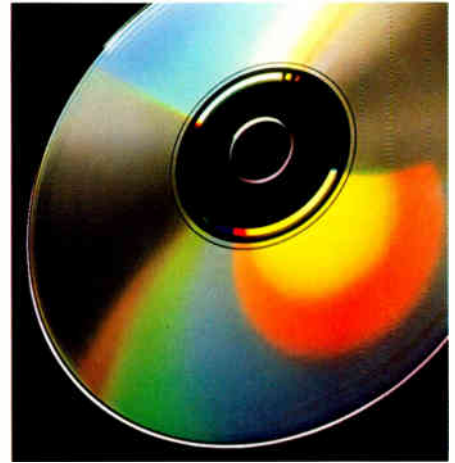
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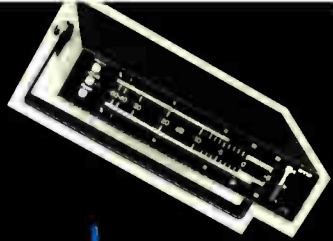
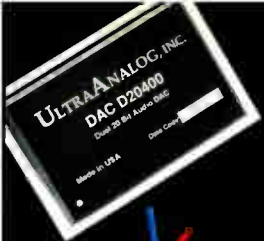
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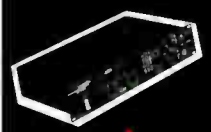
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Power amplifiers and preamps.
- 236 AUTOMATION AND CONTROL SYSTEMS
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All new product information in the following directory was provided by manufacturers responding to questionnaires mailed earlier this year. Specifications and prices may change, so verify critical information with the companies directly. Mix does not take responsibility for the accuracy of the information supplied to us by these manufacturers.

UPCOMING DIRECTORY DEADLINES

- Northwest Studios: **October 17, 1989**
- Independent Engineers/Producers: **November 15, 1989**
- International Directory (UK and Western Europe): **November 15, 1989**
- Southeast Studios: **December 15, 1989**

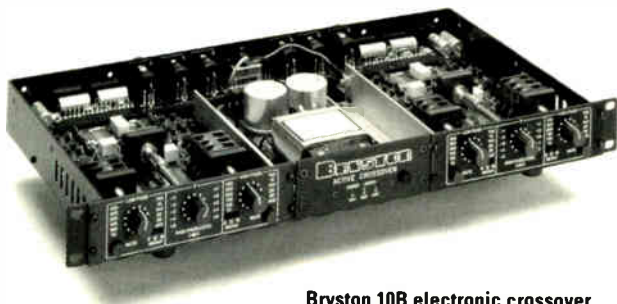


BRYSTON DESIGN PHILOSOPHY: MUSICAL ACCURACY, LONG-TERM RELIABILITY AND PRODUCT INTEGRITY

Musical accuracy is reflected throughout all Bryston power amplifiers. This includes the necessity for wide-band transient accuracy, open loop linearity ahead of closed loop specifications, and power supply design as an integral part of the overall sonic and electrical performance of a power amplifier.

We have found that a simple carbon film resistor can contribute more static distortion to a signal than the entire circuitry of the amplifier. We discovered that some parameters of transistors must be controlled as much as 1000 times more closely before their contribution to audible distortion is rendered negligible.

Each of the steps or stages in every Bryston amplifier, from the input section to the output section,



Bryston 10B electronic crossover

without exception, are designed to optimize the musical experience.

We consider reliability to be exceedingly important. We have applied techniques and materials in our everyday construction of electronic equipment more typically utilized in the military and aerospace industries.

**See us at
Booth #325-325A**



Bryston 4B power amplifier

All components used in Bryston power amplifiers are specified for continuous duty at maximum power, with typical safety margins of 250%.

The power transistors used in all Bryston amplifiers are 100% tested for safe operating area, both before and after installation in the circuit. They are then taken to a "burn-in" table where they are given a capacitor load, a square-wave input signal, and set at slightly under clipping for a period of 100 hours. During this time, the input signal is cycled three hours on to one hour off, to exert additional thermal stress.

Following the burn-in period, the amplifiers are monitored for DC bias stability for approximately another full day. At this point, they are returned to the test bench for another complete checkout of all operating parameters and functions, at which time a test sheet is made, and included in the packing with the unit.

Bryston takes very seriously the correct functioning and long term reliability of its products.



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AMPLIFIERS

1990

ASHLY AUDIO, INC.: 100 Fernwood Ave., Rochester, NY 14621; (716) 544-5191. Product Name: FET 1000M. Contact: Robert C. French, sr. vp. Date Product Introduced: 7/1/89. Product Description & Applications: The FET 1000M is a MOSFET power amplifier for medium-sized studio applications where the finest sonic quality is desirable. The amplifier features an open, modular design with a class-A, full-complementary 2-stage front end for stability and speed. The MOSFET output devices contribute to the high sound quality and near-perfect reliability. **Basic Specifications & Suggested List Price:** Total harmonic distortion 0.004%, IM distortion (SMPT) 0.004%. Power ratings per channel (EIA): 120 watts RMS at 8 ohms, 190 watts RMS at 4 ohms and 225 watts RMS at 2 ohms. Suggested retail \$699.99.

ASHLY AUDIO, INC.: 100 Fernwood Ave., Rochester, NY 14621; (716) 544-5191. Product Name: FET 2000M. Contact: Robert C. French, sr. vp. Date Product Introduced: 7/1/89. Product Description & Applications: The FET 2000M is a MOSFET power amplifier for use whenever sonic excellence is a consideration, such as studio monitoring. The amp features 250 watts per channel at 8 ohms, FTC rated, and up to 1,350 watts in mono bridged mode. The FET 2000M also features near-perfect overload and square wave response with no extra transients or ringing, uncolored sound quality with remarkable accuracy. **Basic Specifications & Suggested List Price:** Total harmonic distortion of 0.004%, IM distortion (SMPT) of 0.004%. EIA power ratings per channel: 300 watts at 8 ohms, 500 watts RMS at 4 ohms and 675 watts RMS at 2 ohms. Stable into any reasonable load. Suggested list price \$1,059.99.

ATI—AUDIO TECHNOLOGIES, INC.: 328 W. Maple Ave., Horsham, PA 19044; (215) 443-0330. Product Name: M100 Ultramik Microphone Amplifier. Contact: Ed Mullin, vp. Date Product Introduced: 3/89. Product Description & Applications: Rugged mic preamp for up-close, unattended applications to eliminate noise RF and hum pickup from long, low-level mic lines. Direct inputs up to 0dBu at high gain and a clean output limiter prevent overload. A unique output driver provides distortion-free transformer isolation for driving long lines. Self-contained power supply, dual rack-mounting, remote DI gain control. **Basic Specifications & Suggested List Price:** Gain: 74dB high, 54dB low, max input: 0dBu (high gain), +20dBu (low gain), max output +22dBm; dynamic range 92dB, THD: 10% max 20 to 20,000Hz at +22dBm; IMD: 0.05% max; low cut filter 2 pole 150Hz, phantom power +48 VDC, phase reverse switch, XLR in and out. \$299.

ATI—AUDIO TECHNOLOGIES, INC.: 328 W. Maple Ave., Horsham, PA 19044; (215) 443-0330. Product Name: Multiple Amplifier Arrays. Contact: Ed Mullin, vp. Date Product Introduced: 3/89. Product Description & Applications: Four or eight channels of high-gain microphone inputs or lower-gain line-level inputs are boosted to 600-ohm balanced line level outputs via active or transformer-balanced output drivers. Use as multichannel mic, line, buffer, interface I/HF, distribution, headphone and level matching amplifiers. Combine channels with rear panel jumpers for summing networks, a simple mixer, a press box, mic or line input DAs. **Basic Specifications & Suggested List Price:** MLA (line inputs) 22, 32 or 42 dB adjustable, +24dBm max out. MMA (mic inputs) 64, 74 or 84dB adjustable, THD 25% at +22dBm. Eight models from \$349 to \$795.

BGW SYSTEMS, INC.: 13130 Yukon Ave., PO Box 5042, Hawthorne, CA 90251-5042; (800) 468-AMPS; (213) 973-8090 (in CA); FAX: (213) 676-6713. Product Name: 8500T. Contact: Brian Wachner, president. Date Product Introduced: 5/89. Product Description & Applications: BGW's Proline II amplifiers combine power, performance and value for fixed installations. The 8500T produces 850 watts when one channel drives a 2-ohm load; 100 to 200 watts more than amplifiers priced \$100 to \$200 higher. The 8500T uses convenient barrier strip inputs and outputs, and accepts BGW crossover one or crossover two cards. Reliable solid-state DC speaker protection, forced air cooling and massive heat sinks ensure stable operation even with 2-ohm loads. **Basic Specifications & Suggested List Price:** Power output 8 ohms—300W/channel at 0.1% THD max >1W, 4 ohms—450W/channel at 0.15% THD max >1W. Frequency response 20Hz to 20kHz, +0/-0.2dB. Dimensions 5.25"H x 19"W x 14.1"D. Weight: 50 lbs. UL listing application on file.

BGW SYSTEMS, INC.: 13130 Yukon Ave., PO Box 5042, Hawthorne, CA 90251-5042; (800) 468-AMPS; (213) 973-8090 (in CA); FAX: (213) 676-6713. Product Name: Tri-Amp Grand Touring Amplifier. Contact: Brian Wachner, president. Date Product Introduced: 9/89. Product Description & Applications: The Tri-Amp Grand Touring Amplifier includes everything needed to power three-way loudspeakers in a compact, two rack-space package: three power amplifiers totaling 1,000 watts, 24dB/octave Linkwitz-Riley crossovers and a highpass filter. Internal linkset jumpers adjust crossover frequencies and levels for the low-, mid- and high-frequency bands. Other features include looping male and female XLR inputs, polarity reversal, dual output connectors (Cannon P-type or Neutrik Speakon). **Basic Specifications & Suggested List Price:** Output 8 ohms—low 275W, mid 250W, high 75W, 4 ohms—low 500W, mid 350W, high 100W. S/N: 106dB. Crossovers 24dB/octave Linkwitz-Riley. CMRR: >80dB. Dimensions: 3.5"H x 19"W x 17.25"D. Weight: 44 lbs.

BOGEN COMMUNICATIONS, INC.: 50 Spring St., PO Box 575, Ramsey, NJ 07446; (201) 934-8500. Product Name: DPA Series Power Amplifiers. Contact: D. Pear. Date Product Introduced: 8/89. Product Description & Applications: DPA-80 and DPA-160, rated output 80 and 160 watts, respectively, combine modular input flexibility with power MOSFET output stages for outstanding performance and reliability. Inputs include a built-in program input with variable mute and a port that accepts any of Bogen's plug-in modules. Front panel has a level control for each input, a master volume control and a bar graph-type LED output level meter. Preamp out/power amp in link permits insertion of signal processing equipment. Bridging in/out jack is provided for recording and/or bridging applications. **Basic Specifications & Suggested List Price:** Rated output DPA-80, 80W at 4 ohms, 8 ohms, 25VCT, 25V, 70V. DPA-160, 160W at 4 ohms, 8 ohms, 25V, 70V. Frequency response 20Hz to 20kHz, +0, -2dB. Distortion (direct) 0.3% (max) 20Hz to 20kHz, +0, -2dB, 1W to RPO, (transformer) 0.3% (max) 65Hz to 20kHz, +0, -2dB, 1W to RPO. S/N ratio 75dB or better. Suggested list: DPA-80 \$588, DPA-160 \$744.

COMUTRONIX, INC.: 18627 Brookhurst #305, Fountain Valley, CA 92708; (714) 963-7454. Product Name: Powertronix. Contact: Robert Gehlke, dir. of mktg. Date Product Introduced: 7/1/89. Product Description & Applications: PS-250 and PS-300 high power, high reliability, portable power audio amplifier system with optional integral, multichannel preamplifier. 250-watt and 300-watt models. AC version or 24VDC AC version available with battery back-up and integral 24VDC battery charger. System offered with hand truck and 24VDC gel-cell battery pack. **Basic Specifications & Suggested List Price:** Low impedance, 25V or 70.7V line output, aux and/or microphone inputs. Features "Currentclamp" absolute output circuit protection. Remains operational even with a 1,000% audio output overload.

CREST AUDIO: 150 Florence Ave., Hawthorne, NJ 07506; (201) 423-1300. Product Name: Convection Cooled Series. Contact: Craig Hannabury, div. mgr. Date Product Introduced: 8/89. Product Description & Applications: The CC Series incorporates the same electrical designs as the Professional Series, but is packaged in a 3U convection-cooled chassis. Features include IGM impedance sensing, clip limiting, auto-ramp signal control and a fully discrete front end circuit. Model CV301 and CV601 are stereo 70V amps with 300W/channel and 625W/channel outputs, respectively. All units are fully modular and are available with optional meter arrays. **Basic Specifications & Suggested List Price:** CC151 180W/ch at 8 ohms, 300W/ch at 4 ohms. CC301 350W/ch at 8 ohms, 500W/ch at 4 ohms. All models: under 0.025% THS 1kHz at full power, <0.015% SMPT EIMD, damping factor above 400:1, slew rate 35V/μs.

ELECTRO FORCE CORP.: 727 Oakstone Way, Anaheim, CA 92806; (714) 774-3666. Product Name: Electro Force 450-SR-2. Contact: Philip Lindberg, president. Date Product Introduced: 9/88. Product Description & Applications: Truly a portable power amp, delivering 450 watts of digital power and weighing only 13 pounds. True pulse width modulated (PWM) MOSFET output stages allow for an operating efficiency of 90% compared to 30% to 50% for conventional amps. This equates to excellent reliability, high-quality sound, great portability and very cool operation with no noisy fans. Make your rack of equipment weigh half as much—take up to 37 pounds

out of it. **Basic Specifications & Suggested List Price:** Power output 225 watts RMS/ch into 2-ohm speakers, mono-bridged mode 450 watts RMS into one 4-ohm speaker, frequency response 20Hz to 20kHz; input impedance 10K ohms balanced, input sensitivity: 1 volt RMS for full output, chassis size 3.5"H x 19"W x 7.5"D, weight 13 pounds, price \$639.

JENSEN TRANSFORMERS, INC.: 10735 Burbank Blvd., North Hollywood, CA 91601; (213) 876-0059. Product Name: Jensen Twin Servo 990 Microphone Preamplifier. Contact: Deane Jensen, president. Date Product Introduced: 8/89. Product Description & Applications: Deane Jensen and John Hardy have agreed to produce a new version of the Jensen Twin Servo 990 Mic Preamplifier with the new 990-C discrete opamp. It is packaged in a more convenient 1.75" by 19" rack-mount chassis that can be ordered with two or four channels that include multi-LED metering, selectable for peak or VU. **Basic Specifications & Suggested List Price:** At \$2,390 for the 2-channel model and \$4,240 for four channels, this is an investment for those who demand the ultimate edge in audio clarity.

N.I.H. LABS/INDUSTRIAL STRENGTH IND.: 13042 E. Moore St., Cerritos, CA 90701; (213) 921-2341. Product Name: PA700. Contact: Duke Gee, sales mgr. Date Product Introduced: 1/89. Product Description & Applications: The PA700 is a rugged, reliable, fan-cooled stereo power amplifier that includes a built-in, 2-way electronic crossover with 18dB/octave slopes. Its sound quality is superior to many so-called "esoteric" hi-fi amps. It provides both +4 XLR balanced and unbalanced phone jack inputs. In addition, it features mono bridging and 5-way binding posts for the speaker connections, as well as indicators for output level, overload and overheat. **Basic Specifications & Suggested List Price:** 350 watts x 2 at 4-ohm load (THD 0.1%), 700 watts (mono) at 8-ohm load (THD 0.2%); frequency response at 10V RMS: 10Hz to 35kHz at 8 ohms, S/N: -100dB, 3-microsecond rise and fall time, weight 29 lbs., sold directly from Industrial Strength Industries for \$699.

NLE 1000 Professional Power Amplifier

N.L. ELEKTRONIK
NLE 1000 Professional Power Amplifier

N.L. ELEKTRONIK: Nybro Vaenge 67, Lyngby, DK-2800 Denmark; (45) 42 88 44 12. Product Name: NLE 1000 Professional Power Amplifier. Contact: Niels Larsen, mgr. Date Product Introduced: 11/89 (USA). Product Description & Applications: Mono professional high-power amplifier, 1,000 watts into 4 ohms (3,500 watts peak into 2 ohms). No overall feedback. Extremely linear and fast signal handling. Output impedance constant to 50kHz. Slew rate 100V/μs. The new philosophy of the electronic circuit design is based on the treatment of real signals instead of artificial test signals. All bipolar transistors. Compact construction: 19" 3U. For use when highest sonic performance and power handling are required. **Basic Specifications & Suggested List Price:** Power output 1,000 watts into 4 ohms, 500 watts into 8 ohms, 3,500 watts into 2-ohm pulse. Frequency response 10 to 100,000Hz. Noise -115dB, IHF-A. Slew rate: 100V/μs. Output impedance 0.1 ohm, 10 to 50,000Hz. THD 0.1% of better. DC offset 1mV. List price \$3,200.

QSC AUDIO PRODUCTS, INC.: 1926 Placentia Ave., Costa Mesa, CA 92627; (714) 645-2540. Product Name: MX700. Contact: Peter Kaimen, Greg McVeigh. Date Product Introduced: 6/89. Product Description & Applications: Model MX700 amplifier is the latest in the MX line of power amplifiers from QSC. The MX700 is fan cooled and occupies two rack spaces (3.5"). Back panel features include 1/4" RCTs and barrier strip input connectors and 5-way binding posts for speaker connections. Front panel features gain controls, clip indicators and power on/off switch. **Basic Specifications & Suggested List Price:** List price \$598. Output power at 8 ohms: 150 watts per side; output power at 4 ohms: 225 watts per side; (output power is measured at 20Hz to 20kHz, 0.1% THD).

Finally!

A Winning Combination



It's about time someone addressed the power requirements of today's improved near-field reference monitors. After installing more Perreaux amplifiers in recording studios across the country than all other pro audio dealers combined, we've gained a certain amount of invaluable experience with high quality **studio** amplification. All too often, the amps we found ourselves replacing were P.A. units... durable, but offensive to the ear. With the success of the T.E.C. award winning Tannoy PBM Series Monitors and the introduction of their new AVM and NFM high-resolution loudspeakers it became obvious that a new, truly high fidelity, source of power was required. In bringing the new **Hot House Professional Audio** amplifiers to market it is our goal to provide the industry with an amplifier of true audiophile quality built to professional specification, that is both reliable and above all **affordable**. Previously, an amplifier with this speed, resolution and purity was available only at very high cost, and rarely in a professional format. Now there are two choices, stereo or mono... and they're priced to compete with run-of-the-mill music store amps.



Stereo Hi Current MOSFET Control Room Amplifier

The **S400** is the perfect match for the latest generation of advanced high quality near-field monitors. Its two rack space, convection cooled, hi current MOSFET design allows under-console use with no fan noise. The fully discrete front end, class A voltage gain stage and constant current bias network, along with its enormous power supply capability of over 45 amperes peak current per channel, allow the **S400** to provide the imaging, depth of field and dynamic transients too often missed in today's control rooms. Its transparent top end, sharply defined midrange and tight extended bottom are unequalled in expanding the limits of small monitors...incredible bandwidth at the frequency extremes with no grit in between.

The **M500** mono block shares the same package and power supply as its stereo counterpart, but is designed to be used in pairs with larger monitors such as Tannoy's LGM12 and SGM10B. Slightly warmer, and fatter on the bottom end, with tremendous reserve power, the **M500** is also the perfect choice when subwoofers are added in the near-field environment.

Mono Hi Current MOSFET Control Room Amplifier



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AMPLIFIERS

1990

SCHOEPS/POSTHORN RECORDINGS, 142 W. 26th St., New York, NY 10001; (212) 242-3737; FAX: (212) 924-1243. Product Name: VMS 52 UB Stereo Mic Preamp/M-S Matrix. Contact: Jerry Bruck, president. Date Product Introduced: 11/3/88. Product Description & Applications: Stereo microphone preamplifier provides 48V phantom powering and an adjustable mid-side matrix. Portable, battery- or AC-operated, with separate M-S matrix inputs for use in post-production. Switchable gain and low-frequency roll-off. Battery meter and LED overload indicator. Ideal for use with portable R-DAT and similar equipment. **Basic Specifications & Suggested List Price:** 48V phantom powering for professional condenser microphones. 20dB/40dB gain. Balanced inputs, unbalanced outputs. Operates for nine hours on eight x AA cells, external power connector. Frequency response: 30Hz to 20kHz. S/N 77dB-A. Dimensions: 6.5" x 4.4" x 2.1". Weight with batteries: 16 oz. Price: \$1,265.

SOUNDCRAFTSMEN, 2200 S. Ritchey, Santa Ana, CA 92705; (714) 556-6191. Product Name: 200X2 Power Amplifier. Contact: Roger Hagemeyer, sales. Date Product Introduced: 1989. Product Description & Applications: Studio monitor amplifier with MOSFET output stages for those applications where sonic accuracy is the primary goal. Front panel mounted circuit breaker and clipping indicators. 5-way binding post output, level controls, XLR, 1/4" and barrier strip input. Mono bridge switch. **Basic Specifications & Suggested List Price:** 125 watts per channel at 8 ohms, 20Hz to 20kHz at less than 0.05% THD. Bridge-mono: 8 ohms, 380 watts. Hum and noise: -105dB. Input sensitivity: 1.0 volt for rated output. Input impedance: 22k ohms (balanced), 32k ohms (unbalanced). 5.25" H x 19" W x 10.5" D, 25 pounds. \$699.

STEWART ELECTRONICS, 11460 Sunrise Gold Cir., Rancho Cordova, CA 95742; (916) 635-3011. Product Name: PA-Series Half-Rack Power Amplifiers. Contact: Wade Stewart, president. Date Product Introduced: 6/89. Product Description & Applications: The PA-Series provides clear, high-fidelity power in a space-saving half-rack design made possible through a unique switching power supply. They are available with balanced in/out (B models) or unbalanced (U models). They feature tamper-resistant, front panel, screw-driver level controls. The PA-100 features front panel clipping indicators. Balanced (B) models feature front panel headphone jacks and level controls. **Basic Specifications & Suggested List Price:** PA-50B/U: 25W x 2 at 8 ohms/ch, 35W x 2 at 4 ohms/ch, 50W x 2 at 2 ohms/ch, 70W x 1 at 8 ohms bridged, 100W x 1 at 4 ohms bridged. PA-100B/U: 50W x 2 at 8 ohms/ch, 70W x 2 at 4 ohms/ch, 100W x 2 at 2 ohms/ch, 140W x 1 at 8 ohms bridged, 200W x 1 at 4 ohms bridged.

SUNN/FENDER MUSICAL INST., 1130 Columbia St., Brea, CA 92621; (714) 990-0909. Product Name: SPL 7350 Power Amp. Contact: Steve Grom, vp marketing. Date Product Introduced: 1988. Product Description & Applications: Sunn SPL 7350 power amp provides 350 watts into 4 ohms and 700 watts bridged into 8 ohms at less than 0.1% THD. **Basic Specifications & Suggested List Price:** Sunn SPL 7350 list price \$799.99. 2 x 350 watts.

TIMELORD, 3-5-10 Shinjuku, Zushi-shi, Kanagawa, 249 Japan; (468) 6226. Product Name: TL A80LA. Contact: Henry Dienn, president. Date Product Introduced: 7/89. Product Description & Applications: The TL A80LA is a retrofitable line output amplifier for the Studer A80VU tape recorder. Featuring vast sonic and technical improvements, all discrete class A, no negative feedback, DC coupled, onboard pre and main regulators, OFC circuit board, hand tested and selected transistors, audio grade components, no turn on/off thumps, DC (above 50mV) on output protection, "C" core AC transformers. **Basic Specifications & Suggested List Price:** Max output: +24dBm. THD at +24dBm, 20Hz to 20kHz, less than 0.01%. Noise: -84dBu. Frequency response: ±0.1dB 10Hz to 100kHz. Short circuit current: over ±80mA continuous. Power dissipation: 11.5 watts.

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GIVE YOUR EMT PLATE A NEW IMAGE

TIMELORD's TL140 board will give your EMT plate a significantly improved SN ratio, a wider, deeper stereo image, more detail, extended high end response, equal left and right decay times.

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Our TL140 will reduce the noise of your EMT plate by 15 dB if you are using a tube amp and by 7dB for transistor amps.

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"TIMELORD's TL140 boards have brought our EMT140 plates into the digital age: the improvement was outstanding. The S/N improved by 16dB, overnight we had 4 new reverbs!" Malcolm Atkins, Manager of Air Studios London.

"The TL140 mod has given our EMT plates a new life. The dullness has completely gone, depth has improved dramatically, both channels sound equal and noise is less than any of our digital reverbs." Susumu Mera, Chief engineer of Freedom Studio Tokyo.

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TIMELORD has manufactured remote meters for the EMT 140/240 plates. Featuring the same scale, impedance, screw fixing centers and escutcheon size.



PRICES TL140 \$125 per channel
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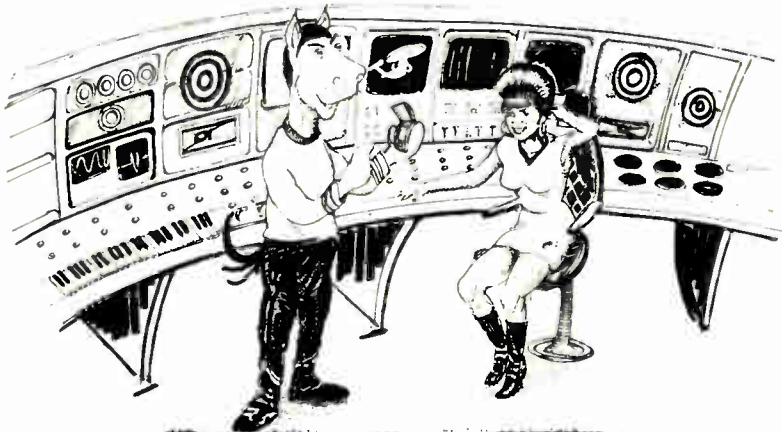
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AUTOMATION AND CONTROL SYSTEMS

1990

ADAMS-SMITH; 34 Tower St.; Hudson, MA 01749; (508) 562-3801. Product Name: Model 2600 A/V Audio-for-Video Editor Update. Contact: Walter Nickman, product mgr. Date Product Introduced: Fall 1989 Product Description & Applications: The 2600 A/V audio-for-video editor has been augmented with three important new capabilities: automatic track management, a motion control knob and substantially increased MIDI capabilities. **Basic Specifications & Suggested List Price:** Automatic track management permits local, remote and automatic selection of audio tracks, plus record keeping. Motion control knob permits VTR shuttling/jogging and C sound display scrolling. MIDI capability includes note/channel/event assignments.

ADAMS-SMITH; 34 Tower St.; Hudson, MA 01749; (508) 562-3801. Product Name: Zeta-Three "B". Contact: Jeff Junker, product eng. Date Product Introduced: Fall 1989 Product Description & Applications: The Zeta-Three "B" is identical in performance to its parent, the Zeta-Three audio-video MIDI synchronizer. All the front panel controls and displays have been removed from the "B," and the price has been substantially reduced. The "B" is designed to operate in conjunction with the Zeta-Remote autolocator/controller, which contains the controls. **Basic Specifications & Suggested List Price:** Product contains a time code generator, two time code readers, tape synchronizer, MIDI synchronizer with tempo map storage, and computer interface.

ALPHA AUDIO; 2049 W. Broad St.; Richmond, VA 23220; (804) 358-3852. Product Name: Timecode Reader Module. Contact: Spence Burton, technical mgr. Date Product Introduced: 4/89 Product Description & Applications: This module is used for 3/4" video machines such as the JVC CR850 or Sony BVU-800. The Timecode Reader Module has a wide-band time code reader and connects in-line with the serial data port. This enables the unit to supply the editor with time code read from either the address track or an audio channel. It is not necessary to modify the machine to use this module. **Basic Specifications & Suggested List Price:** Communicates via Sony protocol, reads time code at 1/5 to 20 times play speed. Suggested list price \$1,200.

AMEK; 10815 Burbank Blvd.; North Hollywood, CA 91601; (818) 508-9788. Product Name: Synchronous Reset. Contact: Steve Harvey, sales mgr. Date Product Introduced: 3/89 Product Description & Applications: The Synchronous Reset software package controls SMPTE/EBU time code resetting of the Amek APC1000 (assignable production console) switch configurations to 1/4-frame accuracy, providing external triggering of MIDI effects devices and MIDI sequencers, and also includes session management of track sheets, title information and MIDI protocols. Synchronous Reset is retrofitable to all existing APC1000 installations, creatively automating all I/O switches during mixdown. **Basic Specifications & Suggested List Price:** The Synchronous Reset software, 68000 Series computer, disk drive, high-resolution monochrome VDU, keyboard and serial interface retail for \$8,200.

AMTEL SYSTEMS, INC.; 33 Main St., Ste. 303; Nashua, NH 03060; (603) 880-9011. Product Name: E-Pix Hybrid Editing System. Contact: Mark Wronski, gen. mgr. Date Product Introduced: NAB 1989 Product Description & Applications: The system offers affordable, nonlinear editing with no extensive preparation time or expensive disk mastering required.

APHEX SYSTEMS; 11068 Randall St.; Sun Valley, CA 91352; (818) 767-2929. Product Name: Dual Channel Remote Control VCA Model 150. Contact: Paula Lintz, sales and mktg mgr. Date Product Introduced: 5/89 Product Description & Applications: The Aphex 2-channel VCA is simple to hook up, easy to use and features unmatched sonic transparency. It consists of two self-contained channels with extremely high-quality, voltage-controlled attenuators. Each channel is completely independent with servo-balanced inputs and outputs and fully buffered control ports. One Model 150 supports up to ten digital remotes with display, unlimited remotes without display, or one stereo or two mono analog remotes.

CIPHER DIGITAL, INC.; 5734 Industry Ln.; Frederick, MD 21701; (800) 331-9066. Product Name: Phantom II VTR Emulator. Contact: Sherril Monreal, sales admin. Date Product Introduced: 9/1/89 Product Description & Applications: Transport synchronizer/VTR emulator. Controls video and

audio transports using their parallel interface. The Phantom II interfaces to editing systems via RS-422, using Ampex or Sony protocols. **Basic Specifications & Suggested List Price:** \$2,550 RS-422 input/parallel output, reads the code from 1/5 to 50+ play speed. Hybrid parallel/serial protocol for Sony Type-5 VCR.

CIPHER DIGITAL, INC.; 5734 Industry Ln.; Frederick, MD 21701; (800) 331-9066. Product Name: Softouch II Edit Controller. Contact: Anthony R. Mattia, gen. mgr. Date Product Introduced: 4/20/89 Product Description & Applications: Computer-based edit controller for Shadow II synchronizers. Featuring disk storage of edit data on 3.5" disk drive, printer interface and CRT display. Also controls the CDI-750 reader/generator/event controller. **Basic Specifications & Suggested List Price:** 4-machine, 3.5" disk drive, CGA-compatible, STD, rack-mount 3RU, 3-year warranty \$4,595.

J.L. COOPER ELECTRONICS; 13478 Beach Ave.; Marina Del Rey, CA 90292; (213) 306-4131; FAX: (213) 822-2252. Product Name: FaderMaster. Contact: Chuck Thompson. Date Product Introduced: 7/7/89 Product Description & Applications: The FaderMaster MIDI command controller consists of eight programmable faders. These faders can transmit any MIDI controller, sys ex (for synthesizer or effect editing), note on, patch change, pitch bend, mod wheel, aftertouch or can be used to delay MIDI notes up to 15 milliseconds. Factory presets include access to often used parameters on E-mu Proteus, Korg M1, Roland D series, Yamaha DX series and many popular synthesizers. **Basic Specifications & Suggested List Price:** FaderMaster allows scan speed, high and low range, grouping and MIDI channel to be programmed for each fader. It features ten user programs and 30 factory presets. Optional software for Macintosh or Atari allows user banks to be easily programmed or stored to disk. Suggested retail \$299.

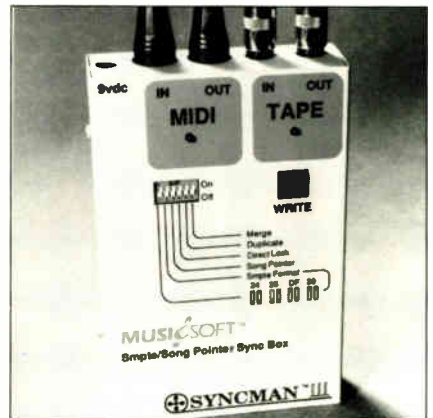
J.L. COOPER ELECTRONICS; 13478 Beach Ave.; Marina Del Rey, CA 90292; (213) 306-4131; FAX: (213) 822-2252. Product Name: MAGI II. Contact: Chuck Thompson. Date Product Introduced: 7/7/89 Product Description & Applications: The latest in the line of highly acclaimed automation systems from J.L. Cooper is the MAGI II system. The MAGI II (Mixer Automated Gain Interface) is an integrated state-of-the-art automation system that easily interfaces with any mixing console to provide SMPTE-locked fader and mute automation. Available in 16, 32, 48 and 64-channel configurations, MAGI II may be upgraded easily as your studio grows. **Basic Specifications & Suggested List Price:** MAGI II consists of rack-mounted dbx VCAs, the MAGI II controller, a MAGI remote fader unit (three models to choose from) and software. You supply either an Apple Macintosh or Atari ST computer. Complete 16-channel systems start at \$3,960.25 suggested retail.

CROWN INTERNATIONAL; 1718 W. Mishawaka Rd.; Elkhart, IN 46517; (219) 294-8000. Product Name: IQ System 2000 (Ver 1.1). Contact: Gregory DeTogno. Date Product Introduced: 10/89 Product Description & Applications: Powered by custom software that enables you to monitor remotely and control the functions of up to 2,000 amplifiers in a single sound system, Crown's IQ System 2000 is ideally suited for both touring sound and fixed installations. The monitoring functions allow you to review the on/off status for each amp channel input attenuation level, audio signals at each amp's input and output, the inversion of the audio signal, the IOC and ODEP signals, VCC signal, on/off status of the auxiliary line, and the DSPi on/off status. **Basic Specifications & Suggested List Price:** Comprised of three major components (a host computer, IQ PIP card and IQ system interface), the system is compatible with all Macro-Tech and Com-Tech amplifiers. The suggested retail prices of an IQ PIP card and IQ system interface are \$349 and \$895, respectively.

FOSTEX CORP. OF AMERICA; 15431 Blackburn Ave.; Norwalk, CA 90650; (213) 921-1112. Product Name: Moving Fader Automation. Contact: Mark Cohen. Product Description & Applications: True motorized moving fader automation system that reads SMPTE or MTC. It also can be controlled via MIDI, and mixes can be saved to any sequencer as a MIDI sequence. It offers 16 channels and can be used with any mixing console by patching across the mixer's send/receive patch points. No VCAs. **Basic Specifications & Suggested List Price:** 100mm faders, reaction time: less than one frame (1/5 of a second). Projected price \$4,000.

GML, INC.; 7821 Burnet Ave.; Van Nuys, CA 91405; (818) 781-1022. Product Name: GML Generic Machine Logic Interface. Contact: Cary Fischer, CJ Flynn, sales. Date Product Introduced: NAB 1989 Product Description & Applications: GML introduces a new option to the standard GML moving fader automation system: the Generic Machine Logic Interface. This is a hardware adjunct to the SMPTE board plus a machine-dependent cable set that will control a master machine. The program includes mixer adjustable pre- and post-roll during locate and recycle modes. It provides input into various machines and controllers, serial or otherwise, so that the advantages of both can be achieved.

GML, INC.; 7821 Burnet Ave.; Van Nuys, CA 91405; (818) 781-1022. Product Name: GML Series 2000 Automation Environment. Contact: Cary Fischer, CJ Flynn, sales. Date Product Introduced: 4/89 Product Description & Applications: GML introduces its Series 2000 automated graphics front end environment, providing recall of a console work surface. The new environment offers real-time pan and zoom across the console. Multiple channel views of equalizers/limiters provide a usable production tool. Additionally, adjusting one console knob auto pans and zooms to center that block of controls. This system integrates to the industry standard GML moving fader automation system and offers the most effective representation of the console work surface to date. **Basic Specifications & Suggested List Price:** Maximum scan/screen reset time is approximately 180ms. The graphics display is 1024-line resolution, pixel-based, 16-color palette monitoring. Environment control is through a keyboard/multi-axis console-mounted joystick. This graphics system is an option to our current system configuration and will be available October '89.



MUSICSOFT Syncman

MUSICSOFT; 30 N. Raymond Ave.; Pasadena, CA 91103; (818) 449-8838. Product Name: Syncman. Contact: Toby Odell, vp sales. Date Product Introduced: 6/89 Product Description & Applications: Syncman is a universal sync box that supports all SMPTE formats, generates and reads song position number and converts SMPTE to MIDI time code or direct lock. Syncman has built-in duplicate mode for duplicating SMPTE and song position sync stripes. Merge mode allows merging of all keyboard or sequencer MIDI info with either MIDI time code or song position sync info. **Basic Specifications & Suggested List Price:** Syncman measures 3" x 6" x 1" and weighs under 1 lb. Features include MIDI in and MIDI out, tape in and tape out jack, SMPTE format duplicate, merge (on/off) select switches. Suggested retail price \$199.95. Operates from 9-volt wall supply.

NEVE; Berkshire Industrial Park; Bethel, CT 06801; (203) 744-6230. Product Name: Flying Faders Console Automation System. Contact: Lisa Vogl, adv. and promotions mgr. Date Product Introduced: 10/88 AES Product Description & Applications: A breakthrough in console automation technology, Flying Faders is the fourth generation of moving fader console automation systems from Neve, designed in cooperation with Marinsound Technologies. Flying Faders includes expanded 12-bit resolution to provide unparalleled accuracy with over 4,000 digital steps, Total Mix Memory to keep all moves, not just the last pass, stereo fader for 2T bus master, 20-megabyte hard disk and 3.5" floppy drive for permanent mix storage, global and local fader and mute mode controls, MATCH buttons for automatic nulling, color VDU and built-in help menus. **Basic Specifications & Suggested List Price:** Interface to Adams-Smith 2600 for locates, cycling and punch-ins. Variety of fader and mute modes included for the faders, replace, retrieve, auto match, safe, relative, isolate/preview and trim. For the mutes, replace, add, safe and isolate/preview. Flying Faders can be fitted with up to a maximum of 256 moving faders.

OTARI CORPORATION; 378 Vintage Park Dr.; Foster City, CA 94404; (415) 341-5900. Product Name: Diskmix III Moving Faders. Contact: Lee Pomerantz, console products mgr. Date Product Introduced: 8/89 Product Description & Applica-

tions: Otari will introduce Diskmix III Moving Faders at the AES in New York. This upgrade to the Diskmix system is the first product to be introduced by Otari's newly formed Digital Creations Products Group. Faster system speed, higher resolution and precise user control are all a result of the new hardware upgrade to a 68000-based system processor and all-new system software. **Basic Specifications & Suggested List Price:** Moving Faders may be installed into any console that has separate fader panels and is available from several console manufacturers as a factory option on new orders. No active components are used in the audio chain, eliminating sonic degradation. The system is time code-driven and will store an unlimited number of mixes on hard disk. Touch-sensitive faders coupled with a menu-driven user interface provide quick and precise control. Complete offline editing and entry facilities are included. Price range starts at \$36,900.

PEAVEY AUDIO MEDIA RESEARCH, 711 A St., Meridian, MS 39302; (601) 483-5372. **Product Name:** SyncLoc. **Contact:** Ken Valentine, product mgr. **Date Product Introduced:** 6/89. **Product Description & Applications:** The new SyncLoc is a stand-alone transport synchronizer that also serves as a per-machine expander unit for the SyncController. The SyncLoc features an all-format TC generator, slave control port, TC in/out facilities, jam-sync capability, advance/retard TC offset facility and more in a software-based, single rack space package. The SyncLoc's cost-effective price point represents a significant breakthrough in the field of synchronization. **Basic Specifications & Suggested List Price:** Target U.S. list price \$599.99.

PENNY AND GILES, 2716 Ocean Park Blvd., Ste. 1005, Santa Monica, CA 90405; (213) 393-0014; (213) 452-4995. **Product Name:** Endless Belt—With Digital Output. **Contact:** C.J. Melech, office mgr. **Date Product Introduced:** 4/89. **Product Description & Applications:** Our new 2-channel optical incremental encoder module allows high resolution control of mixing channels. Software technology used in conjunction with the "Endless Belt" provides state-of-the-art control of attenuation in mixing and many other applications.

PENNY AND GILES, 2716 Ocean Park Blvd., Ste. 1005, Santa Monica, CA 90405; (213) 393-0014; (213) 452-4995. **Product Name:** The Rotary Motorized Fader. **Contact:** C.J. Melech, office mgr. **Date Product Introduced:** 4/89. **Product Description & Applications:** Penny & Giles introduces a motorized version of our industry-leading rotary potentiometers. The 27mm diameter "pots" are available in single or twin gangs. They provide motorized control with the high sound quality and smooth feel that Penny & Giles products are known for.

SOLID STATE LOGIC, Begbroke, Oxford, OX5 1RU England; (44) (865) 842300. **Product Name:** G Series Lynx Synchronizer Controller. **Contact:** Noel Bell, publicity mgr. **Date Product Introduced:** 6/89. **Product Description & Applications:** New version of the G Series synchronizer controller jointly developed by SSL and TimeLine Inc. Allows up to five TimeLine Lynx synchronizer modules to be controlled by the SSL G Series studio computer.

SOUNDMASTER USA INC., 950 Hampshire Rd., #102, Westlake Village, CA 91361; (805) 494-4545. **Product Name:** Soundmaster Integrated Audio Editing System. **Contact:** Curt Smith. **Product Description & Applications:** Electronic audio editing system, including Syncro programmable synchronizers and system-integrated, random access digital audio recording. **Basic Specifications & Suggested List Price:** System includes control software, synchronizers, intelligent (serial) and parallel machine interfaces, programmable remote shuttle control, time code/sync generator and random access, disk-based recording.

STEINBERG/JONES, 17700 Raymer St., Ste. 1001, Northridge, CA 91325; (818) 993-4091. **Product Name:** Mimix. **Contact:** Geoff Ryle, product specialist. **Date Product Introduced:** 1/89. **Product Description & Applications:** Mimix is mixing software and hardware automation that can be installed into virtually any mixing console. The system can control up to 80 inputs. Faders are actually read and sent as MIDI data to an Atari ST computer. Fader moves and input levels can both be monitored from the display screen. Each channel contains a built-in noise gate function. This can be used to set up audio triggers as well. For example, a poorly recorded kick drum track can be used to trigger a better sounding kick drum on your drum machine. A "cue list" is provided for creating Edit Decision Lists for triggering sound effects, etc. **Basic Specifications & Suggested List Price:** Each Mimix system is comprised of the following: bypass unit (eight channels), fader-to-MIDI converter, VCA racks (eight channels), Mimix software. Frequency response: 20Hz to 20kHz (+0dB/-0.5dB), max input level +20dBm, max output level +20dBm, input impedance: 10k ohms, S/N: +95dB, overall gain: 0dB (attenuate only).

STUDIOMASTER INC., 3941 E. Miraloma Ave., Anaheim, CA 92807; (714) 524-2227; FAX: (714) 524-5096. **Product Name:** IMP-1 Inline Mute Processor. **Contact:** Jim Giordano, nat'l sales mgr. **Date Product Introduced:** 6/89. **Product Description & Applications:** 16 x 16 MIDI-automated muting

—CONTINUED ON NEXT PAGE

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Circle #021 on Reader Service Card



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Circle #022 on Reader Service Card

AUTOMATION AND CONTROL SYSTEMS

1990

—CONTINUED FROM PREVIOUS PAGE

system in a 1U rack-mount unit. The IMP-1 will process and mute via any MIDI sequencer on any assigned MIDI channel, tape returns, line inputs, auxiliaries, etc. The IMP-1 uses MIDI note on/note off commands and can be used without a sequencer with its one onboard memory. The IMP-1 can also be linked with up to two more IMP-1s to process a maximum of 48 channels. **Basic Specifications & Suggested List Price:** Frequency response: 14Hz to 100KHz ± 1 dB. Output noise less than -112dBm. Total harmonic distortion: 0.004%. Maximum input level: +22dBm. Mute attenuation: 109dB (1kHz). Crosstalk (adjacent channels): 102dB (1kHz), 87dB (10kHz). List price: \$660.

TASCAM: 7733 Telegraph Rd.; Montebello, CA 90640; (213) 726-0303. Product Name: MTS-1000 MIDizer. Contact: Bill Mohrhoff. Date Product Introduced: 6/89. **Product Description & Applications:** Highly versatile time code-based synchronizer/controller available for use in a wide range of music production applications. Offers MIDI-to-time code and transport synchronization and control. Compatible with variety of Tascam equipment including Tascam 238, MSR-16, 644, 688 and TSR-8. Functions in music production studios as a transport synchronizer that chase-locks time code between two separate multitrack recorders, a MIDI synchronizer that locks MIDI virtual tracks to tape transports, and as a MIDI synchronizer. **Basic Specifications & Suggested List Price:** MSRP \$1,999. Features and specifications include subframe accuracy levels down to 50 sec, 10-key rotary or cursor key devices operation, with LCD status display, tempo mapping, SMPTE-based locating, 20-point cueing, pre/post-roll and end limit.

360 SYSTEMS: 18740 Oxnard St. #302; Tarzana, CA 91356; (818) 342-3127; FAX: (818) 342-4372. Product Name: AM-16/B Audio Crosspoint Switcher. Contact: Don Bird, dir. of mktg. Date Product Introduced: 9/89. **Product Description & Applications:** Audio routing switcher for studio, broadcast, film and video post-production. Field selectable for 16 x 16 mono

or 8 x 8 stereo operation. Audio routings are easily created with well-labeled front panel controls and clearly indicated on large LED displays. Recall of any routing configuration from nonvolatile memory is instantaneous. AM-16/E expander modules and AM-16/R remote control stations are also available. Systems may be configured as mono, stereo or multi-level, and controlled from multiple remote locations. **Basic Specifications & Suggested List Price:** Electronically balanced, RF suppressed inputs. Electronically balanced, phase-corrected differential outputs, short circuit proof. Maximum level +27dB, THD + N under 0.008%, DC to 20kHz; S/N 102dB unweighted. Adjustable individual input gain over a 10dB range. Full remote control through RS-422/485 or MIDI. Redundant power supply. Suggested list AM-16/B \$1,195.



TIMELINE, INC.
Lynx Keyboard Control Unit

TIMELINE, INC.: 270 Lafayette St.; New York, NY 10012; (212) 431-0330; FAX: (212) 966-7824. Product Name: Lynx Keyboard Control Unit. Contact: Josann Block, sales admin. Date Product Introduced: 10/88. **Product Description & Applications:** The Lynx Keyboard Control Unit is a compact, sophisticated control unit for multitrack synchronization and audio editing. The stand-alone configuration provides comprehen-

sive, programmable machine control for up to six transports via Lynx time code modules. All controls are functionally grouped for ease of operation, while the fluorescent alphanumeric display provides a maximum of useful information. To expand the number of transports and other devices controlled by the system, the Lynx System Supervisor may be added. **Basic Specifications & Suggested List Price:** Jog/shuttle wheel for precise transport positioning. Time codes may be captured, calculated or manually entered for flexibility. Convenient trimming of all numeric data. Automatic transport offset calculation via sync points. User-programmable function macros. Two rows by 40-character fluorescent alphanumeric display. Two built-in GPI closures, one usable in ADR mode.



TIMELINE, INC.
Lynx/SSL Interface

TIMELINE, INC.: 270 Lafayette St.; New York, NY 10012; (212) 431-0330; FAX: (212) 966-7824. Product Name: Lynx/SSL Interface. Contact: Josann Block, sales admin. Fred Ridder, prod. mgr. Date Product Introduced: 6/89, APRS in London. **Product Description & Applications:** A planned option for the Lynx Supervisor is now available that allows the SSL studio computer to talk directly to ATRs, VTRs and film equipment through the Lynx system. This product will work with all SSL consoles equipped with the studio computer and is easily field-retrofittable. No other equipment is required. The system, jointly developed with SSL, offers simplified wiring, enhanced room-to-room mobility and attractive pricing. This is the first of a series of console control developments from Timeline.

YAMAHA PROFESSIONAL AUDIO DIVISION: 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. Product Name: RTC1. Contact: Robert T. Davis. Date Product Introduced: 1/89. **Product Description & Applications:** The RTC1 MIDI-based control unit adds extra features and capabilities to the Yamaha DMP7, DMP7D and DMP11 digital mixing processors. This easy-to-use remote unit allows centralized control of up to four DMP mixers and adds "analog-like" control of EQ and special effects settings. The RTC1 also offers new features such as fader grouping, single-control crossfade and linked stereo input channel operation. The RTC1 can control from one to four DMP mixers. Onboard memory stores up to 50 different sets of assignments with immediate access and recall. **Basic Specifications & Suggested List Price:** The RTC1's rotary encoders give the user "analog-like" control just like the rotary pots in old-fashioned mixing consoles. Separate EQ, freq. and gain controls are provided for the high, mid and low bands. The settings are displayed on the large LCD readout and the user can quickly adjust the selected equalizer. This allows the user the speed of EQ setting found in analog consoles, yet retains the precision and reset capability of digital equalization. The RTC1 is a compact 11-11/16" x 3 3/8" x 15-3/16" and weighs 8 lbs 13 oz. and is powered by 120 VAC. Price: \$1,095.

As long as you're in New York, why not check up on some history? Turn to page 44 for Dan Daley's look back on New York recording in the '40s and '50s.

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V I D E O

Circle #052 on Reader Service Card

COMPUTER HARDWARE AND SOFTWARE

1990

BLANK SOFTWARE, 1477 Folsom St., San Francisco, CA 94103; (415) 863-9224. Product Name: Alchemy 2.0. Contact: Marsha Vdovin, mktg. dir. Date Product Introduced: 1/89 Product Description & Applications: Alchemy 2.0 is advanced 16-bit stereo sample editing software for the Apple Macintosh and supported sampling instruments. Alchemy offers a fast and elegant way to retrieve, edit, transfer and store sampled sounds. Alchemy also offers FFT frequency analysis and resynthesis, digital EQ, automated crossfade looping and high-fidelity automated sample rate conversion. New powerful digital signal processing functions include time compression/expansion, digital tuning, pitch shifting, volume enveloping, volume smoothing, frequency enveloping and automated pitch detection. **Basic Specifications & Suggested List Price:** System requirements: Apple Macintosh Plus, SE, SE30, II, IIcx or IIx, 2-meg RAM recommended. Supported samplers: Akai S900, S950, S1000 (MIDI and SCSI), Casio FZ-1, FZ-10, E-mu Emax (MIDI and RS422), SP-1200, EMI (SCSI), Ensoniq Mirage and EPS (MIDI and SCSI), IMS Dyaxis sample-to-disk system, Roland S-50, S-330, S-550, and the Digidesign Sound Accelerator card. Retail price \$695.

BOSE CORPORATION, The Mountain, Framingham, MA 01701-9168; (508) 879-7330. Product Name: Rackmaker™ Layout Program, SpeakerCAD™ Graphics Program. Contact: Mark Christensen, sound system software mgr. Date Product Introduced: 5/25/89. Product Description & Applications: The Rackmaker layout program is a CAD-design tool for sound system designers to aid in the layout of electronics racks for large systems. It is the third member of the Bose Sound System® software set of Macintosh-based tools. SpeakerCAD™ graphics program allows the user to simulate the physical characteristics of speakers and speaker arrays, and is the second member of S³. **Basic Specifications & Suggested List Price:** Requires Macintosh 512 KE or higher model (at least 1MB RAM). Rackmaker is licensed to qualified users for \$250 with a \$50 annual renewal fee. SpeakerCAD is licensed to qualified users for \$500 with \$100 annual renewal fee, and also requires at least the Macintosh 512 KE or higher model.

BROTHER INTERNATIONAL CORPORATION, 8 Corporate Pl., Piscataway, NJ 08854; (201) 981-0300. Product Name: Disk Composer (models MDI-30 and MDI-40). Contact: Thomas Malm, product and mktg. mgr. Date Product Introduced: 8/89 (MDI-30), 10/89 (MDI-40). Product Description & Applications: MIDI sequencer/disk drive w/2-track unlimited merge and standard 3.5" disk storage (SS/DD or DS/DD). **Basic Specifications & Suggested List Price:** The MDI-30 has 32K RAM storage (7,000 notes), punch-in/out editing, internal/MIDI clock, metronome, 16 assignable channels, 240K disk drive (53,000 notes), and a 2-digit LED display. Mfg. sug. retail: \$299. The MDI-40 is like the MDI-30 plus 64K RAM and 6-digit LCD. MDI-40 mfg. sug. retail: \$379.

C&M RESEARCH GROUP, 302 Ridgehaven Pl., San Antonio, TX 78209-3424; (512) 255-1919. Product Name: Remote Control M1. Contact: Sean Craig, business mgr. Date Product Introduced: 6/30/89. Product Description & Applications: Remote Control M1 is a patch editor/librarian for the Korg M1 and M1r synthesizers. **Basic Specifications & Suggested List Price:** Requires IBM PC (or compatible), an MPU-401 (or compatible) MIDI interface and 256K of memory. Suggested retail: \$119.99.

C&M RESEARCH GROUP, 302 Ridgehaven Pl., San Antonio, TX 78209-3424; (512) 255-1919. Product Name: Remote Control VFX. Contact: Sean Craig, business mgr. Date Product Introduced: 7/15/89. Product Description & Applications: Remote Control VFX is a patch editor/librarian for the new Ensoniq VFX synthesizer. **Basic Specifications & Suggested List Price:** Requires IBM PC (or compatible), an MPU-401 (or compatible) MIDI interface and 256K of memory. Suggested retail: \$127.43.

CURRENT MUSIC TECHNOLOGY, 146 Paoli Pike, Malvern, PA 19355; (215) 647-9426. Product Name: Mac n' Rak Plus. Contact: Christopher Wurts, Date Product Introduced: 5/1/89. Product Description & Applications: The Mac n' Rak Plus is a rack-mount version of the Macintosh Plus computer for studio and touring applications. It is available as either a retrofit for your existing computer or a complete unit. Various hard disk and memory options are available. It features a built-in Opcode Studio Plus Two MIDI interface and optional Opcode Timecode Machine. The unit is four rack heights and is "rugged-

ized" to withstand studio, stage or road abuse. **Basic Specifications & Suggested List Price:** The Mac n' Rak Plus prices vary depending on configuration, please contact us with your specific needs. Additional specifications and technical data available on request.

CURRENT MUSIC TECHNOLOGY, 146 Paoli Pike, Malvern, PA 19355; (215) 647-9426. Product Name: Mac n' Rak SE and SE/030. Contact: Christopher Wurts, Date Product Introduced: 5/1/89. Product Description & Applications: The Mac n' Rak SE and SE/030 are rack-mount versions of the Macintosh SE computer for studio and touring applications. They are available as either a retrofit for your existing computer or a complete unit. Various hard disk and memory options are available. They feature built-in Opcode Studio Plus Two MIDI interface and optional Opcode Timecode Machine. The unit is four rack heights and is "ruggedized" to withstand studio, stage or road abuse. **Basic Specifications & Suggested List Price:** The Mac n' Rak SE and SE/030 prices vary depending on configuration, please contact us with your specific needs. Additional specifications and technical data available on request.

DIGIDESIGN, 1360 Willow Rd. #101, Menlo Park, CA 94025; (415) 327-8811. Product Name: Turbosynth 2.0 Modular Synthesis Software. Contact: Suz Howells, product mktg. mgr. Date Product Introduced: 7/89. Product Description & Applications: An innovative modular synthesis and signal processing program for the Macintosh, Turbosynth allows you to create sounds by connecting sound source modules (samples, waveforms or synthesized noise) to sound processing modules (time compression, resonance, modulation, pitch shifting, envelopes, etc.) Up to 32 input signals may be patched together for an infinite variety of sounds. **Basic Specifications & Suggested List Price:** Version 2.0 offers more than ten new features, including three entirely new modules. The system is supported by the Sound Accelerator™ for real-time signal processing and 16-bit playback directly from the Mac. You may also use the AD IN™ to record any sound source into the program. For performance, over 20 popular samplers are supported. Turbosynth 2.0 is available for the Macintosh. Turbosynth is also available for the Atari (some differences in features). Retail price: \$349 (Macintosh and Atari versions).

DISSIDENTS, 730 Dawes Ave., Utica, NY 13502; (315) 797-0343. Product Name: MIDI Sample Wrench. Contact: Jim Fiore, resident dissident. Date Product Introduced: 6/30/89. Product Description & Applications: MIDI Sample Wrench is a 16-bit visual sound sample editor for the Commodore Amiga. Sounds may be transferred to and from MIDI-based samplers and stored on Amiga disks. Many functions, including full cut/copy/paste, mixing, crossfade looping, FFTs, compression, sampling frequency translation and retuning, arbitrary envelope and transfer function generation, and an extensive EQ section with filters, tunable bass/treble, and a parametric section. Preview sounds from the Amiga keyboard with 4-voice polyphony. Useful utilities included. **Basic Specifications & Suggested List Price:** Runs on the Amiga 500/1000/2000 with at least 512K RAM—1MB or more preferred. Color monitor preferred (user selectable screen colors and resolution). Requires MIDI interface and one or more supported MIDI samplers. Suggested retail \$279 (U.S.).

DR. T'S MUSIC SOFTWARE, INC., 220 Boylston St. #206, Chestnut Hill, MA 02167; (617) 244-6954. Product Name: KCS/Level II V.17. Contact: Tom D. Muzio. Date Product Introduced: 12/88. Product Description & Applications: This is our premier sequencing program for the Atari ST, Amiga or Macintosh computers. Level II is a full tape recorder simulation with open mode for maximum flexibility and song mode for easy song creation. It also contains our programmable variations generator/master editor for creation of music based on algorithmic functions and our multiprogram environment. **Basic Specifications & Suggested List Price:** Full editing of all MIDI data. \$349.

DR. T'S MUSIC SOFTWARE, INC., 220 Boylston St. #206, Chestnut Hill, MA 02167; (617) 244-6954. Product Name: The Phantom. Contact: Tom D. Muzio. Date Product Introduced: 6/88. Product Description & Applications: Phantom is an MPE-compatible software/hardware piece that allows KCS, Level II and Realtime (from Intelligent Music) to both read and write SMPTE time code. **Basic Specifications & Suggested List Price:** Phantom is bit accurate and supports 24, 25, 30 and 30DF SMPTE. \$249.

DYNWARE CORP., 1163 Chess Dr., Ste. J, Foster City, CA 94404; (415) 349-5700. Product Name: Ballade. Contact: Jane L. Smith. Date Product Introduced: 2/89. Product Description & Applications: Sequencer and tone editor for Roland's MT-32, CM-32/64, or LA-PC1 card. The level meters and faders move up and down, pan pot. left and right. MIDI data (tempo, program number, reverb, etc.) can be edited in real time. The song mode shows data in traditional notation. Data is input via mouse, step or real-time recording. Volume, pitch bend and other controls are drawn with a graph. Ballade is also an editor/librarian. New sounds are created with the mouse and pop-up graphs. **Basic Specifications & Suggested List Price:** IBM PC XT, AT or compatible with 640K memory. EGA or VGA graphics card; mouse, Roland MT-32, CM-32/64, or LA-PC card. (Roland 401 interface card). Suggested retail \$195. A demo tutorial (with documentation) is available for \$10.

DYNWARE CORP., 1163 Chess Dr., Ste. J, Foster City, CA 94404; (415) 349-5700. Product Name: DynaDuet. Contact: Jane L. Smith. Date Product Introduced: 10/88. Product Description & Applications: 16-track MIDI sequencer and score printer integrated into one intuitive, comprehensive package. Input MIDI data via mouse, or by using step or real-time recording. Data appears in traditional music notation—not by some little bars. Notes can be edited with the mouse and pop-up cut/copy/paste menus, or numerically. MIDI controls (pitch bend, volume, etc.) can be added simply by drawing a curve with a mouse. Rhythm patterns can be input onto "rhythm grids." Sequences can be transferred to the score section for hard-copy output. **Basic Specifications & Suggested List Price:** IBM PC XT, AT or compatible w/512K, EGA or VGA graphics card, mouse. (Optional 24-pin printer required for hard-copy output.) Suggested retail: \$245. Demo available for \$10. Roland MPU-401 standard interface required.

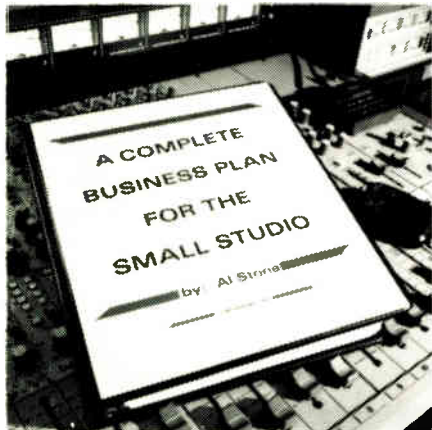
EDUCATION SOFTWARE CONSULTANTS, 934 Forest Ave., Oak Park, IL 60302; (312) 848-6677. Product Name: Basic Composer Version 4.3. Contact: Dr. Leslie M. Golden. Date Product Introduced: 5/89. Product Description & Applications: Affordable, sophisticated, user-friendly program to compose music. Updated version: compose on single staff or grand staff, user-designed figures, extraction of parts, four lines of lyrics/annotations, automatic chord generation. Compose, playback, printout, transpose, lyrics, rehearsal, fret diagrams, complete editing. All standard musical symbols. All clefs, key signatures, time signatures, tempos. Manuscript-quality printout. Help key. online tutorials and glossary. Requires no MIDI, mouse, laser printer or sound card. Free user support, not copy protected. **Basic Specifications & Suggested List Price:** IBM PC or compatible computer with 128K, one or two floppy disk drives or hard drive. IBM or compatible Hercules graphics adapter. Dot matrix printer \$49.95. Demo disk/manual \$4.

GFMUSIC, PO Box 272136, Tampa, FL 33688-2136; (813) 961-9207. Product Name: GFMUSIC. Contact: Gerald Felderman, president. Date Product Introduced: 1/89. Product Description & Applications: GFMUSIC is a sequencer for the IBM PC. In addition, GFMUSIC's Programmer's Interface provides a comprehensive MIDI programming platform for Pascal, C and assembler programmers. **Basic Specifications & Suggested List Price:** IBM PC XT AT with MPU-401. Optronics or CMS-404 MIDI interfaces. Color or monochrome. 512K RAM, DOS 2.1 or above.

HYBRID ARTS, INC., 8522 National Blvd., Los Angeles, CA 90230; (213) 841-0340. Product Name: Genedit ST. Contact: Steve Cunningham, vp sales and mktg. Date Product Introduced: 8/89. Product Description & Applications: Genedit is a universal MIDI synthesizer patch editor that runs on the Atari ST personal computer system. Genedit includes a template editor that lets the user design onscreen controls that replicate the front panel of any MIDI synthesizer. Additional patch editing functions include randomize, distort and average, allowing the computer to generate patches. Patches can be saved and loaded from disk, and patch banks can be organized and edited. **Basic Specifications & Suggested List Price:** Twelve templates for the most popular MIDI synths are included. Genedit ST retails for \$249. A version for the Macintosh, Genedit Mac, will be available in October at \$349.

INTELLIGENT MUSIC, 116 N. Lake Ave., Albany, NY 12206; (518) 434-4110; FAX: (518) 434-0308. Product Name: Real-Time. The Intelligent Sequencer. Contact: Caroline Meyers. Date Product Introduced: 1/89. Product Description & Applications: A full-featured, interactive sequencer that allows the user to hear changes in real-time while creating or editing music. Features include detailed graphic editing of all MIDI parameters and Smart Editing, for global changes throughout a sequence. Automatic variation functions add humanizing factors to music. Recording is done via MIDI or by painting with the mouse. Full time code synchronization, multitasking capability and an input control system that uses MIDI to control sequencer functions. Copy protected. Free backup disk to registered users. **Basic Specifications & Suggested List Price:** Requires: Atari 520 ST, 1040 ST or Mega ST, MIDI synthesizer. Retail price: \$350.

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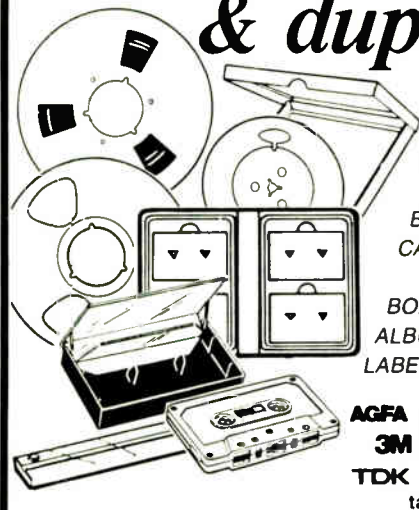
KEE (KEY ELECTRONIC ENT.): 9112 Hwy. 80 W., Ste. 221; Ft. Worth, TX 76116; (817) 560-1912. Product Name: KEE-note-16. Contact: Charles Phelan. Date Product Introduced: 12/1/88. Product Description & Applications: Sequencer program for IBM PC and compatibles. Features: 16 active tracks with direct track-to-disk storage allowing numerous inactive tracks for editing and development. Features include large recording capacity, standard MIDI files, ease of use and numerous user options. Powerful user interface uses a window display, but requires minimal keystrokes for most activities. **Basic Specifications & Suggested List Price:** 16 tracks, up to 120,000 events, MS-DOS 2.0+, 256K RAM, MDA, CGA, EGA, Hercules displays automatically selected. Specify Midiator MS-101, Yamaha C-1 or Roland MPU-401. Suggested price \$99.95

KEE (KEY ELECTRONIC ENT.): 9112 Hwy. 80 W., Ste. 221; Ft. Worth, TX 76116; (817) 560-1912. Product Name: Midiator, Model MS-101. Contact: Charles Phelan. Date Product Introduced: 12/1/88. Product Description & Applications: External serial-to-MIDI interface for IBM PC and compatibles, including laptops and all PS/2 models. Features include serial I/O, MIDI in, MIDI out and a real-time clock. The MS-101 requires no external power or batteries and has a sturdy metal case. Software is available from KEE and a number of other software companies. Features full MIDI data rate without buffering required. **Basic Specifications & Suggested List Price:** Requires IBM PC compatible serial port. Size: 1.4" x 2.6" x 4.2". Weight: 6 oz. Suggested price: \$119.95

LEONARDO: 10378 Holman Ave.; Los Angeles, CA 90024; (213) 277-5161; FAX: (213) 277-9086. Product Name: Cue-printer. Contact: Louis Benioff. Date Product Introduced: 9/1/89. Product Description & Applications: Prints standard re-recording cue sheets in feet/frames or time code on any size paper displaying a title, description, ID number, position, fades, handles and internal events with up to 96 tracks per premix. Extensive conformation functions make it easy to adjust the cue sheets to picture changes. Multiple fonts and colors can be assigned. **Basic Specifications & Suggested List Price:** Runs on IBM AT compatibles. \$495.

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LONE WOLF
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LONE WOLF: 1505 Aviation Blvd.; Redondo Beach, CA 90278; (213) 379-2036; (213) 376-8115. Product Name: Midi-Tap. Contact: Mark Koenig. Date Product Introduced: 6/89. Product Description & Applications: Rack-mount unit using a revolutionary new protocol (Media Link). Provides bidirectional, fully merged, high-speed communication equal to 32,000 separate MIDI cables over one fiber optic cable. Midi-Tap provides for configuration of all devices with full electronic patch bay capability from any MidiTap. The MidiTap has four MIDI ports, two fiber optic ports and a RS232/422 port (Mac or IBM). The fiber optics can link to 255 MidiTap-4s communicating at 2 megabaud. The protocol allows for other types of data such as SMPTE, video, digital audio, etc., to simultaneously share the cable. **Basic Specifications & Suggested List Price:** \$1,500. Ports: MIDI (4) in and (4) out, fully merged, MediaLink, fiber optic, serial, (1) RS422/232. User interface: display, 16 x 2 line supertwist backlit LCD; controls: command, edit, enter, exit buttons, parameter knob, LED indicators, ring status, network mode.

MIDISOFT CORPORATION: PO Box 1000; Bellevue, WA 98009; (206) 881-7176. Product Name: Midssoft Studio. Contact: Geoff Pepos, regional sales. Date Product Introduced:

3/89. **Product Description & Applications:** Midisoft Studio is a real-time 32-track sequencer that offers all the flexibility needed to play, create, compose and edit music on a personal computer, all in one affordable, easy-to-use package. Includes cut and paste editing, step record for note-by-note entry, auto quantization, graphics-based user interface for intuitive use, selectable time signature, multitasking songs, MIDI thru, supports 16 MIDI channels. **Basic Specifications & Suggested List Price:** IBM PC or compatible with 512K, two floppy or one hard disk drive, Roland-compatible interface, MIDI musical instrument. Mono and color monitors supported. Mouse recommended.

MIDISOFT CORPORATION; PO Box 1000; Bellevue, WA 98009; (206) 881-7176. **Product Name:** Midisoft Studio Advanced Edition. **Contact:** Geoff Pepos, regional sales. **Date Product Introduced:** 5/89. **Product Description & Applications:** Includes all the ease of use found in Studio plus adds a number of professional features normally found in packages selling at three times the price. 64-track, real-time sequencer with an event edit list for note-by-note control over music. Supports MIDI file format, and rechannelization allows a track with many instruments to be split apart or multiple channels to be combined. Load and save individual tracks, velocity sealing. Sold with interface card or separately. **Basic Specifications & Suggested List Price:** IBM PC or compatible 640K, two floppy or one hard disk drive, Roland-compatible interface card, MIDI musical instrument, mono/color monitors supported. Mouse recommended.

MUSICODE; 5575 Baltimore Dr., Ste. 105-127; La Mesa, CA 92042; (619) 469-7194. **Product Name:** K1-VDS (Voice Development System). **Contact:** Melinda Turcsanyi, product support. **Date Product Introduced:** 8/89. **Product Description & Applications:** This top-quality program offers an integrated editor, librarian and sequencer. Features include quick, clear displays, point-and-click graphic envelopes, a real-time sequencer that is always available and easy organization of patches in libraries and banks. Patch editing, randomizing, mixing, copy, sort and filter functions as well as complete printouts of all screen and patch data are easily accomplished. All functions may be easily controlled by mouse or keyboard. User satisfaction guaranteed. **Basic Specifications & Suggested List Price:** For any Atari ST. \$89.

MUSICODE; 5575 Baltimore Dr., Ste. 105-127; La Mesa, CA 92042; (619) 469-7194. **Product Name:** TX81Z/DX11 Voice Development System. **Contact:** Melinda Turcsanyi, product support. **Date Product Introduced:** 1/88. **Product Description**

& Applications: Powerful, solid and dependable, this beautifully integrated editor, librarian and sequencer program allows users complete access to all instrument parameters. Create voices and organize them within libraries and banks. Change voices, hearing results immediately while the sequencer is running! Auto-load feature loads specified effects, micro tune and voices from disk by simply selecting a new performance from the library. Includes quick-edit, randomizing, voice mixing, printouts of all screen and patch data. User satisfaction guaranteed! **Basic Specifications & Suggested List Price:** For any Atari ST. \$99.

OPCODE SYSTEMS; 1024 Hamilton Ct.; Menlo Park, CA 94025; (415) 321-8977. **Product Name:** Studio 3. **Contact:** Paul de Benedictis, marketing. **Date Product Introduced:** 3/29/89. **Product Description & Applications:** The Studio 3 is Opcode's top-of-the-line MIDI interface with synchronization. It combines the Studio Plus Two with the synchronization abilities of the Timecode Machine, plus several new features. Features include two independent MIDI ins and six assignable MIDI outs, reads and writes all formats of SMPTE, outputs MIDI time code or direct time lock, Jam Sync, MIDI activity LEDs, "thru" patching, connectors for Soft Shoes—two footswitches and a continuous controller pedal useful with Opcode's Vision sequencer. **Basic Specifications & Suggested List Price:** Single-space rack-mount MIDI and SMPTE interface for the Apple Macintosh computer. Internal power supply. Twelve-foot serial cables included. Optional footpedals (Soft Shoes) from Opcode. Compatible with Mac Plus, Mac SE, II, Ix, Ixc. Retail price is \$459.

OPCODE SYSTEMS; 1024 Hamilton Ct.; Menlo Park, CA 94025; (415) 321-8977. **Product Name:** Vision. **Contact:** Paul de Benedictis, marketing. **Date Product Introduced:** 3/10/89. **Product Description & Applications:** Vision redefines the computer-based sequencer standard. Vision's first advancement is a sophisticated visual editing system that includes both list editing and graphic editing. The information can be edited in either window, and any change in one is automatically displayed in the other. Other features include: SMPTE, 32 faders, loop recording, 32 assignable MIDI instrument setups, system exclusive, real-time track shift, tempo and meter tracks, sequence chaining, 99 tracks per sequence, modal transposition, MIDI keys, transcription links, generated sequences and MIDI files. **Basic Specifications & Suggested List Price:** Music sequencing software for the Macintosh computer. Minimum requirements: Mac Plus with external disk drive, also compatible with Mac SE, II, Ix, Ixc; hard disk recommended. Retail price is \$495.

OPTRONICS TECHNOLOGY; PO Box 3239; Ashland, OR 97520; (503) 488-5040. **Product Name:** BasicMIDI I/O. **Contact:** Jim Chamberlain. **Date Product Introduced:** 1/89. **Product Description & Applications:** IBM MIDI interface. BasicMIDI I/O card allows music synthesizer to be connected to PC. Optional software is available for sequencing or music notation. **Basic Specifications & Suggested List Price:** Can be operated at four different addresses. Has MIDI in, out and thru. \$99 list.

PASSPORT DESIGNS, INC.; 625 Miramontes St.; Half Moon Bay, CA 94019; (415) 726-0280. **Product Name:** Encore. **Contact:** Anastasia Lanier, dir. of sales and mktg. **Date Product Introduced:** 8/89. **Product Description & Applications:** Encore provides a professional composing environment for the Macintosh. Encore can intelligently transcribe and print out Master Tracks Pro™ and Master Tracks Jr.™ sequences, read and write standard MIDI files, and can print entire scores or single fonts using the Sonata™ music font. Encore can handle 64 parts with multiple key signatures, meters, clef staff types, smooth slurs, slanted beams or almost anything else. Enter music in real time or step time using a mouse or MIDI keyboard, and perform your composition on any MIDI gear. **Basic Specifications & Suggested List Price:** Requirements: Macintosh 512E, Mac Plus, Mac SE or Macintosh II, MIDI cables, compatible MIDI software, any MIDI-equipped synthesizer(s), drum machines or other MIDI equipment capable of sending and/or receiving MIDI data, a Passport MIDI Transport or compatible MIDI interface, imagewriter, Laserwriter or Postscript-compatible printer. **Suggested list price:** \$595.

PASSPORT DESIGNS, INC.; 625 Miramontes St.; Half Moon Bay, CA 94019; (415) 726-0280. **Product Name:** Pro 4. **Contact:** Anastasia Lanier, dir. of sales and mktg. **Date Product Introduced:** 6/89. **Product Description & Applications:** Pro 4 is Passport's new sequencing program for the Macintosh, designed to provide innovative and advanced tools for the music professional. Pro 4's main advantage is its stability and extreme ease of use. It provides an integrated track editor for recording and playback, a notepad, song editing and complete graphic and event-based editing. Edit multiple sequences, select discontinuous regions, perform most operations in real time, hear their effects during playback, and lock everything to SMPTE. **Basic Specifications & Suggested List Price:** Requirements: Macintosh 512E, Mac Plus, Mac SE or Macintosh II, MIDI cables, compatible MIDI software, any MIDI-equipped synthesizer(s), drum machines or other MIDI equipment capable of sending and/or receiving MIDI data, a Passport MIDI transport or compatible MIDI interface. **Suggested list price:** \$495.

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PERSONAL DATABASE APPLICATIONS: 2634 Meadow Bend Ct., Duluth, GA 30136-6037; (404) 242-0887. Product Name: Personal Music Librarian. Contact: Dennis Hevener, product development. Date Product Introduced: 6/89. Product Description & Applications: Comprehensive music collection cataloging system. Features include user-defined fields, categories and subcategories, and up to 20 pages of notes per entry. Comes with a powerful report writer for printing labels and reports. You can use included reports or design your own. Fast, flexible, online retrieval. Catalogs recordings as well as songs. **Basic Specifications & Suggested List Price:** For Atari ST (1MB RAM required) and IBM PC (512K RAM required). Free info packet available \$55

PERSONAL DATABASE APPLICATIONS: 2634 Meadow Bend Ct., Duluth, GA 30136-6037; (404) 242-0887. Product Name: Personal Video Librarian. Contact: Dennis Hevener, product development. Date Product Introduced: 8/89. Product Description & Applications: Comprehensive video collection cataloging system. Fast, flexible, online retrieval. Features include user-defined fields, categories and subcategories, and up to 20 pages of notes per entry. Comes with a powerful report writer for printing labels and reports. You can use included reports or design your own. **Basic Specifications & Suggested List Price:** For Atari ST (1MB RAM required) and IBM PC (512K RAM required). Free info packet available \$55

PRISTINE SYSTEMS, INC.: 8489 W. 3rd St., Ste. 1017; Los Angeles, CA 90048; (213) 852-0737. Product Name: The Pristine Music Management and Control System. Contact: Boyce Williams. Date Product Introduced: 4/89. Product Description & Applications: A microcomputer-based software package that both schedules music rotations and commercial breaks and plays them back on compact disc, DAT, hard disk audio or cart/tape. Schedules can be generated from one hour to one month in advance, and up to 64 individual playback devices can be controlled at one time. **Basic Specifications & Suggested List Price:** Requires an IBM AT/compatible microcomputer with 640K memory, at least 30MB hard disk, color monitor and printer. Software package prices start at \$3,500

QUIET LION: PO Box 219; Sun Valley, CA 91353; (818) 765-6224. Product Name: Mu-Script I, Ver. 2.6. Contact: John Fitzpatrick. Date Product Introduced: 2/89. Product Description & Applications: Powerful 16-track sequencer with event editor and notation, record, overdub, edit, enter, playback and print. Immediate notation after recording—or quick, efficient entry at computer. Edit single event or block. Improvements: external MIDI sync, direct access to score by measure number, sequence looping, improved user interface, MIDI thru. **Basic Specifications & Suggested List Price:** For use with one or more MIDI instruments and/or standard dot matrix printer \$99.95

QUIET LION: PO Box 219; Sun Valley, CA 91353; (818) 765-6224. Product Name: Mu-Script II. Contact: John Fitzpatrick. Date Product Introduced: 7/89. Product Description & Applications: 16-track sequencer, editor, notation. Powerful features, easy-to-use format. Quick access to record, play, edit, score. Reads, writes standard MIDI files. 8-stave, full sheet conductor's score. 30-position song list. Mouse entry/edit. Measure-by-measure control. MIDI exclusive save/load. Fully compatible with Mu-Script I. **Basic Specifications & Suggested List Price:** For use with one or more MIDI instruments and/or standard dot matrix printer \$169.95

RICHMOND SOUND DESIGN LTD.: 1234 W. Sixth Ave.; Vancouver, V6H 1A5 Canada; (604) 734-1217. Product Name: Command/Cue Plus. Contact: Damon Wootten, gen. mgr. Date Product Introduced: 3/89. Product Description & Applications: Command/Cue Plus has the ability to send and capture MIDI messages on a cue-to-cue basis. A complete editor/librarian resides in the software as a subprogram while editing. Software is not sequencer- or clock-dependent. **Basic Specifications & Suggested List Price:** Shipped with proprietary hardware as a complete software/hardware mixing system. Entry level—\$15,000

SOUND QUEST, INC.: 1573 Eglinton Ave. W., Ste. 200; Toronto, M6E 2G9 Canada; (416) 256-0466. Product Name: Quest Series of Editor/Librarians and MultiQuest. Contact: Glenn Hayworth, vp marketing. Date Product Introduced: June 1989. Product Description & Applications: The Quest Series of editor/librarians supports Yamaha DX7II/TX802, DX11/TX812/FB-01, Roland D-50, D-10/20/110, MT-32, Kawai K1, Korg M1, Oberheim Matrix-6/1000, Ensoniq ESQ/SQ-80 and Casio CZ series. The MultiQuest bank editor supports all Quest editor/librarians. **Basic Specifications & Suggested List Price:** Prices range from \$165 to \$190, and packages operate on the Atari, Mac, PC/XT/AT, Amiga and C1

SPECTRAL SYNTHESIS, INC.: 18568 142nd Ave. NE; Woodinville, WA 98072; (206) 487-2931. Product Name: Synth-Card™. SynthEngine™. AudioCad™. Contact: Ron Bradshaw, president. Date Product Introduced: 1/89. Product Description & Applications: IBM PC/AT-compatible digital signal processing system for building a digital audio workstation. Applications include sound synthesis, 16-bit sampling, direct hard disk recording and editing. Real-time sampling, synthesis and effects processing may occur simultaneously. AudioCad software runs in Microsoft Windows environment. **Basic Specifications & Suggested List Price:** Two each TMS320C25 DSP devices running at 40MHz. 16-bit high-speed bus, sample rates up to 96kHz. Software-configurable DSP engine can support multiple real-time functions

STEINBERG/JONES: 17700 Raymer St., Ste. 1002; Northridge, CA 91325; (818) 993-4091. Product Name: Cubase. Contact: Geoff Ryle, product specialist. Date Product Introduced: 1/16/89. Product Description & Applications: The most intuitive sequencer program available for the Atari ST computer. Visual-Song-Processing (VISP) actually lets you see your music. Tracks and patterns can be moved just by dragging them with the mouse. Four graphic edit pages (event-list, scoring, key-edit and drum-edit) give you every possible advantage to editing your music. All windows can be shrunk, moved and zoomed in or out so you can create your own working environment. Innovative quantize features like Groove Quantize, where you can create a "groove" to quantize almost anything to. Also a MIDI effects processor for creating echo and delay effects in real time. **Basic Specifications & Suggested List Price:** Requires 1MB in RAM. 16 songs can be open at once. Each song can have up to 64 tracks. SMPTE synchronization available via Time-Lock or SMP-24 SMPTE hardware. Suggestec retail: \$495

SYNTONYX: 7 Loudoun St. SE; Leesburg, VA 22075; (703) 777-1933. Product Name: Overtone. Contact: Michael Rohrer, president. Date Product Introduced: 9/1/88. Product Description & Applications: Overtone is an editor/librarian for the Kawai K5 and IBM PC Mouse-driven graphic display. Draw your own spectrum, use Square/Sawtooth/Pulse, or extract spectra from sample files! Multipatches automatically adjusted when rearranging layouts. Kawai patch library (over 750 patches) included. Free **Basic Specifications & Suggested List Price:** IBM PC/XT/AT, 640K, MPU, CGA/EGA/VGA/Heracles, MS-Mouse optional, two floppy disks or one floppy disk plus hard drive. Suggested list is \$99.95 plus shipping

TEACH SERVICES: 182 Donovan Rd.; Brushlton, NY 12916; (518) 358-2125. Product Name: LMP—The Laser Music Processor. Contact: Timothy Hultquist. Date Product Introduced: 1988. Product Description & Applications: Integrated music scoring program for the laser jet printer supports five test fonts and over 400 symbols, including true-arcing ties and slurs, slanted beams, diatomic markings, fermata, segno, repeats, automatic key and complex time signatures. Complete editing of score and MIDI input through MPU-401 device or from standard MIDI files. **Basic Specifications & Suggested List Price:** Runs on the IBM PC/XT/AT and 100% compatibles, with DOS 2.1 or higher. 512K RAM and single floppy. Mouse is optional. Prints on HP Laser Jet II/Epson or 100% compatibles. \$99.95 plus \$5 shipping (New York residents add 7% tax)

TWELVE TONE SYSTEMS, INC.: 165 Bedford St.; Burlington, MA 01803; (800) 234-1171. Product Name: Cakewalk Professional. Date Product Introduced: 1/89. Product Description & Applications: Professional sequencer software for IBM computers featuring SMPTE synchronization, powerful editing and support for more than 16 MIDI channels. **Basic Specifications & Suggested List Price:** 256 tracks, 240 ppqn resolution, standard MIDI file import/export, pull-down menus, context-sensitive online help. \$249 to \$349 (different editions for different hardware).

VOYETRA TECHNOLOGIES: 333 Fifth Ave.; Pelham, NY 10803; (914) 738-4500. Product Name: Sequencer Plus Version 3.0. Contact: Fred Romano, vp. Date Product Introduced: 7/89. Product Description & Applications: Sequencer Plus Mkl, II and III make up a three-level line of related products based on the popular Sequencer Plus package. All three allow you to pick MIDI editing software to match your needs. Mkl, II and III are comprised of many independent "tracks," similar in concept to those on a multitrack tape deck. Using these tracks you can record MIDI data from external synthesizers that are connected to your computer (IBM or compatible) via IBM MIDI Interface (V-4001). **Basic Specifications & Suggested List Price:** IBM PC/XT/AT/386 and compatibles, IBM System/2 models 25/30/30286, DOS 2.0 or higher, 512K memory minimum (640K recommended), hard drive recommended but not required. Graphics monitor not required (EGA/VGA will display additional characters.) Voyetra V-400X or other 100% MPU 401 Ver. 1 5A-compatible MIDI interface Mkl—\$129, MkII—\$229, MkIII—\$349

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MICROPHONES AND PICKUPS

1990

AKG ACOUSTICS; 77 Selleck St.; Stamford, CT 06902; (203) 348-2121. Product Name: C426. Contact: Chris Moore, vp, digital division. Date Product Introduced: 5/89. Product Description & Applications: High-quality, two large diaphragms, adjustable stereo microphone using the Ultra Linear Series (ULS) electronics for improved signal-to-noise ratio and lower equivalent noise than its predecessor, the C422. Basic Specifications & Suggested List Price: Suggested retail \$3,395.

AMS INDUSTRIES INC.; 3827 Stone Way N.; Seattle, WA 98103; (206) 633-1956. Product Name: ST250 M/S and L/R. Contact: Nigel Branwell. Date Product Introduced: 9/89. Product Description & Applications: Based on the Soundfield mic technology, this top-of-the-range microphone is supplied with its own control unit. Powered from 110/240V or internal C cells for location use or via phantom power, the ST250 may be used upright or inverted or "end fire" on a boom. Features include coincident signals up to 10kHz, M/S or L/R output signals, fully variable patterns from omni through cardioids to figure of 8, plus 0° to 180° angle control. Basic Specifications & Suggested List Price: Frequency range 20-20k Hz. Max input (for less than 0.5% THD) 140dB SPL. Max output from control unit +22dBu. Minimum load impedance 600 ohms. Price \$3,450.

AUDIO-TECHNICA U.S., INC.; 1221 Commerce Dr.; Stow, OH 44224; (216) 686-2600. Product Name: ATM25. Contact: Ken Reichel, vp mktg. Date Product Introduced: 1/19/89. Product Description & Applications: The ATM25 high-SPL dynamic instrument microphone is a wide-range moving coil microphone with a hypercardioid pickup pattern. It is particularly suited to applications involving high sound pressure levels. Response is tailored to provide natural reproduction when used by instrumental performers at very short distances. The hypercardioid polar pattern features a narrow acceptance angle, allowing the ATM25 to focus upon the desired sound location and reject ringing or other unwanted sounds outside the pickup pattern. Basic Specifications & Suggested List Price: Element moving coil dynamic, polar pattern hypercardioid, frequency response: 30 to 15,000Hz, sensitivity -54 dB/m (0dB at 1mW/1Pa), impedance 600 ohms.

AUDIO-TECHNICA U.S., INC.; 1221 Commerce Dr.; Stow, OH 44224; (216) 686-2600. Product Name: ATW-1031 Uni-Pak™ and ATW-1032 Hand-Held Wireless Mic System. Contact: Ken Reichel, vp mktg. Date Product Introduced: 1/19/89. Product Description & Applications: The Audio-Technica true diversity wireless microphone systems feature a rack-mount receiver with adjustable output and squelch. The transmitters are crystal-controlled and are available as a body-pack with instrument or microphone input, or as a hand-held microphone. Battery life is ten hours continuous and a special circuit allows silent turn on and off. Ten VHF frequencies are available. Basic Specifications & Suggested List Price: Carrier frequency range VHF high band, 169 to 216MHz, frequency stability ±0.005%, crystal controlled, modulation mode FM, S/N ratio (receiver and transmitters) 95dB, IEC-weighted, operation range 200 ft. minimum.



BEYER DYNAMIC
TG-X Series Vocal Microphones

BEYER DYNAMIC; 5-05 Burns Ave.; Hicksville, NY 11801-2689; (516) 935-8000. Product Name: TG-X Series Vocal Microphones. Contact: Mike Solomon, mktg. mgr. Date Product Introduced: 1989. Product Description & Applications: TG-X Series consists of four new additions to the Beyer Tourgroup microphone line. Each TG-X vocal microphone contains new Minimal Mass™ diaphragms and rare earth magnet structures to provide high sensitivity, fast transient response, ultra-low distortion and phenomenal gain before feedback. Basic Specifications & Suggested List Price: All are hypercardioid, dynamic microphones. Frequency response TG-X180—40Hz to 16kHz, TG-X280—30Hz to 16kHz, TG-X480—40Hz to 18kHz, TG-X580—30Hz to 18kHz.

BRUEL & KJAER; 185 Forest St.; Marlborough, MA 01752; (508) 481-7000. Product Name: Type 4012. Contact: Adrian Weidmann, product mgr. Date Product Introduced: 9/1/89. Product Description & Applications: The 4012 is an extension of the acclaimed 4011 cardioid microphone. The 4012 is also a first-order cardioid microphone capable of 168dB SPL before clipping, making it ideal for high dynamics for digital recording. Basic Specifications & Suggested List Price: The 4012 works in conjunction with the 2812 power supply and lists at \$1,633.

CROWN INTERNATIONAL; 1718 W. Mishawaka Rd.; Elkhart, IN 46517; (219) 294-8000. Product Name: SASS (Stereo Ambient Sampling System). Contact: Bruce Bartlett, mic engineer. Date Product Introduced: 8/89. Product Description & Applications: SASS-P is a PZM stereo microphone. Sharp and spacious imaging. Mono-compatible. No matrix box required; intuitive to use. Battery/phantom and rack-out switches. All accessories included. Applications: classical music recording, stereo ENG, sports ambience and crowd reaction, film ambience, stereo sampling, stereo sound effects. Low pickup of mechanical vibrations and wind noise. SASS-B is a similarly shaped stereo boundary mount for B&K 4006/4003 microphones, permitting 10dB less noise. Basic Specifications & Suggested List Price: SASS-P frequency response 20Hz-10kHz. Self-noise 20 dBa. Max SPL 150dB. Impedance 150 ohms balanced. Polar pattern omni/uni. Sensitivity -64dB/microbar \$849. SASS-B: frequency response 20Hz-18kHz. Self-noise 11 dBa. Max SPL 143dB. Polar pattern omni/uni. Sensitivity 56 dBV/microbar \$799.

C-T AUDIO MARKETING; 3050 SW 14th Pl. #3; Boynton Beach, FL 33426; (407) 738-0622. Product Name: Drum Wizard. Contact: Andre Walton, president. Date Product Introduced: 3/89. Product Description & Applications: Drum Wizard is mics, mixer, trigger generator and MIDI for acoustic drums. The system includes eight C-ducer microphones for top-quality acoustic sound, 8-channel mic mixer; triggering for pre-MIDI electronic drums, and a MIDI interface to trigger the whole range of electronic sounds available from any MIDI instrument—all from acoustic drums. Basic Specifications & Suggested List Price: Audio outputs 600 ohms balanced with respect to ground, line-level male XLR connector, distortion less than 0.05%, frequency response (-3dB) 40Hz-22kHz; S/N ratio 79dB(A). Rack-mountable. Suggested price \$1,495.

ELECTRO-VOICE, INC.; 600 Cecil St.; Buchanan, MI 49107; (616) 695-6831. Product Name: GS-1000 and MS-1000 (wireless systems). Contact: Claude Kleiman, wireless mktg. mgr. Date Product Introduced: 6/89. Product Description & Applications: The wireless MS-1000 (vocal system) and GS-1000 (guitar system) are dual-receiver, true-diversity systems. For interference-free operation in harsh RF environments, the receivers provide high selectivity for rejection of adjacent and interfering signals. The systems have companding circuitry for 108dB typical (105dB minimum) signal-to-noise ratio. The powerful 50mW transmitter—the legal maximum output for a wireless system—provides excellent range and virtually eliminates dropouts. Basic Specifications & Suggested List Price: Operates up to ten hours on a 9-volt alkaline battery; switchable mic/line output level on 1/4" phone jack; rack-mountable receiver; 1-year warranty; single frequency/conversion super-heterodyne FM receiver. MS-1000 frequency range: 169 to 186MHz. GS-1000 frequencies: 169.505, 170.245, 171.045, 171.905, 179.200, 184.425, 185.125—special frequencies available. Retail prices: \$1,368 (MS-1000); \$1,311 (GS-1000).

HME ELECTRONICS, INC.; 6675 Mesa Ridge Rd.; San Diego, CA 92121; (619) 535-6060. Product Name: System 535 Body-

Pac Wireless Microphone System. Contact: Matt Riches, mktg coordinator. Date Product Introduced: 6/89. Product Description & Applications: The System 535 was engineered to offer a professional wireless microphone system at an affordable price. It is ideal for the church and entertainment industry to meet their demanding standards. The system features the all-new TX530 Body-Pac Transmitter (with hard-wired EM43 lavalier mic) of impact-resistant casing and dynamic expansion to provide lower noise, improved dynamic response and a wide dynamic range. The RX522, HME's road-tested and reliable receiver, is utilized and features noise-reduction circuitry for quality sound reproduction. Basic Specifications & Suggested List Price: Frequency response 100Hz to 15kHz ±3dB typical. Distortion <2% typical. Operating range 100 ft. adverse to 1,000 ft. line of sight. RF carrier frequency: 169 to 216MHz. TX530 weight: 4.5 oz. Dynamic range <100dB (A weighted). Power requirements: 120 VAC, 50-60Hz or 12-16 VDC. Receiver controls and indicators: power/volume switch, squelch level control, green power LED, red RF LED. Suggested price: \$683.

HME ELECTRONICS, INC.; 6675 Mesa Ridge Rd.; San Diego, CA 92121; (619) 535-6060. Product Name: System 535I Wireless Instrument Link. Contact: Matt Riches, mktg. coordinator. Date Product Introduced: 6/89. Product Description & Applications: The System 535I was designed as a professional instrument link intended for guitars and other musical outputs. Using the wireless link does not color the sound of the instrument. The all-new TX530I transmitter is hard-wired with a quality 1/4" phone plug and durable cable. The system also features HME's RX522 receiver, which has dynamic expansion circuitry to provide the type of performance demanded by the entertainment industry. Basic Specifications & Suggested List Price: Dynamic range: <100dB (A weighted). Frequency response: 100Hz to 15kHz ±3dB typical. RX522 weight: 10.5 oz. TX530I weight: 4.5 oz. Distortion: <2% typical. Operating range: 100 ft. adverse to 1,000 ft. line of sight. Power requirements: 120 VAC, 50-60Hz or 12-16 VDC. RF carrier frequency: 169-216MHz. Receiver controls and indicators: power/volume switch, squelch level control, green power LED, red RF LED. Suggested price: \$650.

LLECTROSONICS, INC.; 581 Laser Rd., NE; Rio Rancho, NM 87124; (505) 892-4501. Product Name: T-185. Contact: Gordon Moore, mktg. Date Product Introduced: 2/89. Product Description & Applications: One-piece wireless stage microphone/transmitter. Featuring a Shure SM58 element on a machined aluminum and stainless steel frame, the T-185 transmitter operates in the VHF highband and is compatible with all Lectrosonics VHF highband pre-receivers. The audio input circuitry includes a unique compressor that will limit input signals up to 20dB above maximum modulation. This action is not audible. Basic Specifications & Suggested List Price: Frequency response: same as Shure SM58; operating frequencies: 150-216MHz; equivalent input noise: 126dB; gain control range: 43dB; weight: 13.2 oz.; length: 10.38"; battery: 9V alkaline.

MILAB; 30B Banfi Plaza N.; Farmingdale, NY 11735; (516) 249-3660. Product Name: VM-44. Contact: Sam C. Spennachio. Date Product Introduced: 8/89. Product Description & Applications: Small-diaphragm condenser microphone. Cardioid pattern. Switchable pad and roll-off. Ideal snare drum mic, as well as for many instrumental applications. Basic Specifications & Suggested List Price: \$575 retail.



NADY SYSTEMS, INC.
Nady 650 VHF Wireless Systems

NADY SYSTEMS, INC.; 1145 65th St.; Oakland, CA 94608; (415) 652-2411. Product Name: Nady 650 VHF Wireless Systems. Contact: Chris Calder, mktg. assistant. Date Product Introduced: 1988. Product Description & Applications: New from Nady in the middle price range for wireless is the 650 VHF Wireless System. Nady's 650 VHF systems rack-mount and feature true diversity reception for dropout-free performance. The Nady 650 VHF includes newly developed filtering circuitry that allows up to ten 650 units to function together.

onstage. The systems operate on VHF highband channels from 151 to 216MHz, with a wide choice of channels offered. The systems are built using Nady's patented noise-reduction circuitry for dynamic range of 120dB. Mic and line outputs are included. The 650 receiver can be powered by 110 or 230 VAC current. **Basic Specifications & Suggested List Price:** List price for the Nady 650 GT Instrument System is \$599. The 650 LT Lavalier System is \$639 and the 650 HT Handheld System is \$659.



NADY SYSTEMS, INC.
Nady 750 VHF

NADY SYSTEMS, INC.: 1145 65th St., Oakland, CA 94608; (415) 652-2411. **Product Name:** Nady 750 VHF. **Contact:** Chris Calder, mktg assistant. **Date Product Introduced:** 1989. **Product Description & Applications:** Nady's 750 VHF wireless receiver combines two true diversity front ends in one light-weight, rack-mountable unit. Easy to set up and use, the 750 is an economical solution to running multiple wireless systems. A pair of sophisticated receiving sections on VHF high-band frequencies work with two Nady VHF wireless transmitters simultaneously. Each channel has its own gain control and balanced 3-pin XLR and unbalanced 1/4" phone jack outputs. The 750 is compatible with all amps and mixers and adaptable to a wide variety of operating conditions. **Basic Specifications & Suggested List Price:** The 750's true diversity design provides dropout-free performance. Nady's patented noise-reduction circuitry provides dynamic range of 120dB, eliminating background noise and distortion. Special filtering circuitry allows up to ten channels to operate together. The 750 VHF receiver is offered with a choice of transmitters: handheld, instrument and lavalier. A wide variety of popular elements is available.

SAMSON TECH. CORP.: 485-19 S. Broadway, Hicksville, NY 11801; (516) 932-3810. **Product Name:** MR-1 Microreceiver. **Contact:** Kevin Moran, show coordinator. **Date Product Introduced:** 4/29/89. **Product Description & Applications:** The MR-1 Microreceiver is an ENG-type wireless receiver for use with any Samson microphone transmitter. Being smaller than most belt-pack transmitters, it simply attaches to a video camera with Velcro strips. Available in ten different channels, it features a balanced/unbalanced option switch depending on application. It can run on a 9V battery, and the audio can be monitored with headphones. **Basic Specifications & Suggested List Price:** Frequency response: 30Hz to 14kHz. Signal-to-noise ratio: over 100dB. Operating range: 300 ft. min. Frequency band: 174-200MHz. List price: \$264.



SANKEN MICROPHONES
Sanken Lavalier Microphones

SANKEN MICROPHONES; c/o Audio Intervisual Design; 1032 N. Sycamore Ave.; Los Angeles, CA 90038; (213) 469-4773. **Product Name:** Sanken Lavalier Microphones. **Contact:** Jim Pace, vp A I D. **Date Product Introduced:** Fall '89. **Product Description & Applications:** Introducing a new line of microphones, the world's smallest high-quality lavaliers available, 4mm in diameter. These units boast 20 to 20k Hz frequency response, with sensitivity of -59dB, better than the most popular units sold today.

SENNHEISER ELECTRONIC CORP.: 6 Vista Dr., PO Box 987, Old Lyme, CT 06371; (203) 434-9190. **Product Name:** MD518. **Contact:** Joe Claudelli, applications engineer. **Date Product Introduced:** 2/89. **Product Description & Applications:** Hand-held dynamic microphone with cardioid pickup pattern. Applications include vocals, saxophone, drum and guitar amp miking. The MD518 has a frequency response tailored for maximum intelligibility and the ability to withstand high sound pressure levels. **Basic Specifications & Suggested List Price:** Frequency response: 50 to 16,000Hz. Hum sensitivity: $5\mu V/5\mu T$. Sensitivity: $1.3\mu V/Pa</math>. Max cancellation: -17dB at 180° (1,000Hz). Nominal impedance: 200 ohms. Load impedance: 1,000 ohms. Weight: 180 g/6.5 oz. $219 suggested retail.$

SHURE: 222 Hartrey Ave., Evanston, IL 60202; (312) 866-2200. **Product Name:** Beta Series Microphones. **Contact:** Davida Rochman, mgr. media relations. **Date Product Introduced:** 1/89. **Product Description & Applications:** A major breakthrough in microphone performance, the Beta Series offers outstanding sound quality with extraordinary gain before feedback. Beta 57 and Beta 58 are premium dynamic microphones that combine a "true" supercardioid polar pattern with the extra-hot output of neodymium. Other engineering refinements include a three-stage directional tuning network, advanced shock isolation system and extra-rugged construction. Beta 57 is designed for instrumental applications, and Beta 58 is designed for vocals. **Basic Specifications & Suggested List Price:** Beta 58—type: dynamic, polar pattern: supercardioid, frequency response: 50 to 16,000Hz; output level (1,000Hz): -71dB, list price: \$258. Beta 57—type: dynamic, polar pattern: supercardioid, frequency response: 50 to 16,000Hz; output level (1,000Hz): -71.5dB, list price: \$258.

SHURE: 222 Hartrey Ave., Evanston, IL 60202; (312) 866-2200. **Product Name:** L Series Wireless Microphone Systems. **Contact:** Davida Rochman, mgr. media relations. **Date Product Introduced:** 6/89. **Product Description & Applications:** Professional features and outstanding reliability at a moderate price. L Series products are available in four complete systems, diversity and nondiversity, for use with microphones and electric musical instruments. All are crystal-controlled, single-frequency systems. A wide range of accessories and optional microphones are available. The L4 Diversity receiver features exclusive MARCAD™ audio combining diversity circuitry. L3 Nondiversity receiver features double-tuned RF stages with high-gain, low-noise MOSFETs. L1 body-pack transmitter features a universal input with separate power and mute switches. 839W lavalier microphone provides excellent sound, rugged construction and total reliability. **Basic Specifications & Suggested List Price:** L4 receiver—RF carrier frequency range: 169 to 216MHz. Frequency response: 50 to 15,000Hz, dynamic range: 94dB A-weighted, distortion: 0.25% THD typical, working range: 30m (100 ft.) with greater than 90dB dynamic range under average conditions, 300m (1,000 ft.) at 60dB, list price: \$318.50. L3 receiver—RF carrier frequency range: 169 to 216MHz. Frequency response: 50 to 15,000Hz, dynamic range: 94dB A-weighted, distortion: 0.3% THD typical, working range: 30m (100 ft.) with greater than 90dB dynamic range under average conditions, 300m (1,000 ft.) at 60dB, list price: \$176.75. L1 transmitter—RF power output: 50mW maximum; input gain adjustment range: 0 to 40dB; 8-10 hours operation from 9V alkaline battery, list price: \$201.25.

SONY PROFESSIONAL AUDIO; 1600 Queen Anne Rd.; Teaneck, NJ 07666; (201) 833-5200. **Product Name:** ECM-M55. **Contact:** Art Gonzales, product mgr. **Date Product Introduced:** 7/89. **Product Description & Applications:** The ECM-M55 is a durable and rugged M-S stereo microphone designed for any application where stereo is desired. It can easily be used in a sound sampling situation or can be mounted on a broadcast camera for stereo ambience pickup. With its adjustable stereo angle, mono compatibility and phantom or battery operation (using optional DC-M55), the ECM-M55 can be considered the most flexible stereo microphone in its class. **Basic Specifications & Suggested List Price:** Stereo type, middle-side, frequency response: 70 to 20k Hz, impedance: 150 ohms, dynamic range: more than 108dB; S/N ratio: more than 74dB; inherent noise: less than 20dB SPL, max SPL: 130dB, operating voltage: DC 12-48V; weight: 7.6 oz., power supply: optional DC-M55 or 12-48V phantom power. List price: \$1,250.

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MIXING CONSOLES

1990

ALESIS CORPORATION; 3630 Holdrege Ave., Los Angeles, CA 90016; Product Name: 1622 Mixer Monolithic/Integrated Surface Audio Console. Contact: Allen Wald, vp, advertising and promotion Date Product Introduced: 1/89 Product Description & Applications: The 1622 Mixer is a 16-channel audio console with six auxiliary sends, eight returns and two buses. It is perfectly suited for 4- and 8-track recording, P.A. and sound reinforcement applications, as a monitor or auxiliary submixer, and as a keyboard and electronic instrument mixer. **Basic Specifications & Suggested List Price:** Monolithic Integrated Surface™ design. 16 channels. Six auxiliary sends. Eight returns configurable as four stereo pairs. 16 line inputs. All inputs and outputs on 1/4" jacks. XLR inputs on channels 1-8. Direct outs on channels 1-8. Two buses with pan pots and master assign switches. Inserts on every channel as well as on the subs and masters. Solo and mute switches on all input channels. Free-standing or rack-mountable. 12 rack spaces. 19" x 21" x 6"-1.5". \$799 retail.

ALLEN AND HEATH; Five Connair Rd., Orange, CT 06477; (203) 795-3594. Product Name: SC-Plus. Contact: Chuck Augustowski, sales mgr. Date Product Introduced: 9/89 Product Description & Applications: Modular mixing line available in 16/24/32-input formats. Choice of matrix group module or 8-channel tape monitoring group module. Choice of fixed EQ, sweep EQ or stereo input modules. **Basic Specifications & Suggested List Price:** Price to be announced.

AMEK; 10815 Burbank Blvd., North Hollywood, CA 91601; (818) 508-9788. Product Name: BCII 24-Position Chassis. Contact: Steve Harvey, sales mgr. Date Product Introduced: 12/88 Product Description & Applications: A 24-module position chassis has been added to the Amek BCII range of broadcast consoles, allowing configurations of 16 x 4 x 2 or 18 x 4 to be produced in the minimum amount of space. The 30mm-wide modules make this console one of the most space-efficient on the market. The 24-position chassis is available without attached meters or with meter hoods to house from two to seven VU or PPM meters. **Basic Specifications & Suggested List Price:** A BCII 16 x 4 x 2 in a 24-position chassis retails at around \$22,000.



AMEK
Mozart

AMEK; 10815 Burbank Blvd., North Hollywood, CA 91601; (818) 508-9788. Product Name: Mozart. Contact: Steve Harvey, sales mgr. Date Product Introduced: 3/89 Product Description & Applications: A versatile audio console suitable for recording and video-post, which features a high level of integrated automation at a very realistic price. Fifteen switches per input channel are under real-time control and offline switch editing facilities are provided. A comprehensive SMPTE-locked MIDI and events triggering system is included. Two types of input channels, in-line and all-input, are available. Comprehensive 4-band EQ, 32 buses, up to 16 auxiliary buses, 12 stereo effects returns and onboard-grouping computer are standard. **Basic Specifications & Suggested List**

Price: Mozart has three standard chassis for 40, 56 and 80 inputs. A typical configuration is 56 x 32, which can allow monitoring of up to 56 tracks and includes the complete automation system. The typical price is under \$145,000.



ANALOG DIGITAL SYNERGY, INC.
Synergy One

ANALOG DIGITAL SYNERGY, INC.; 120 SW 21 Terr., C-104; Ft. Lauderdale, FL 33312; (305) 791-1501; FAX: (305) 791-8986. Product Name: Synergy One. Contact: Lutz H. Meyer, president. Date Product Introduced: 3/7/89. Product Description & Applications: Synergy One is a totally digital console for use in post-production, CD mastering, recording, remixing and similar applications. 24-bit bus, 56-bit internal processing, multiformat, 6-band equalization, four sends, grouping, digital 100-segment PPM and remaining headroom indicators are some of the key features. Frame sizes between 6 and 64 channels are available. **Basic Specifications & Suggested List Price:** Available format converters include: SDIF-2, SPDIF, AES/EBU, Soundstream and analog 4-channel system. \$40,750. 36-channel system \$147,900.

ANCHOR AUDIO, INC.; 913 W. 223rd St., Torrance, CA 90502; (213) 533-5984. Product Name: BAM-I. Contact: Jonathan Peirson, vp marketing. Date Product Introduced: 2/89. Product Description & Applications: Anchor Audio, Inc. has introduced the BAM, a portable, battery-powered 50-watt mixer/amplifier. The BAM-I has two mic-level and one aux-level inputs, as well as one line-level and one speaker-level output. Three 12VDC outputs are provided for powering additional mixers or wireless microphone receivers. Internal batteries will power the unit at full volume for three to four hours. An optional battery pack is available allowing the unit to run six to 12 hours. The sealed lead acid batteries will fully recharge overnight. The entire package is housed in a small, flight-type road case. **Basic Specifications & Suggested List Price:** Two low-Z (balanced) phantom-powered mic inputs, aux input, line output, treble and bass controls, three 12 VDC outputs, external battery input, built-in battery charger, housed in a roadie case. List price \$789.

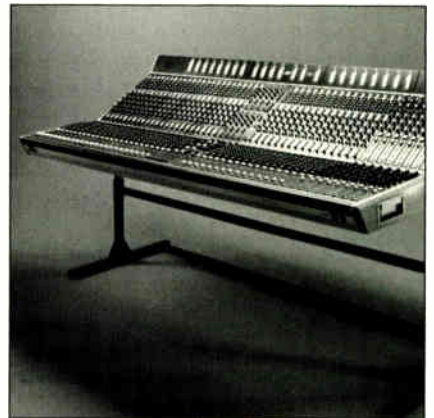
API AUDIO PRODUCTS, INC.; 7951 Twist Ln., Springfield, VA 22153; (703) 455-8188. Product Name: API Discrete Series Consoles. Contact: Paul Wolff. Date Product Introduced: 1989 AES. Product Description & Applications: An all-discrete console with up to 96 channels and 48 buses. Using an in-line design, both large and small fader sections are identical, allowing up to 192 mixing channels with no compromise. The standard configuration comes with three stereo buses, ten aux sends, 12 aux returns, four cue masters and analog VU meters. The console automation system is GML, allowing seven channel functions to be automated four times a frame. **Basic Specifications & Suggested List Price:** 96 inputs, 48 buses, three stereo buses, ten aux sends (all inputs, outputs and buses are resettable within one frame), GML Moving Faders (recommended), total automation on inputs with console snapshot and reset. All-discrete op amps used throughout. All API-format equalizers will fit. Totally modular design.



AUDIO
ANIMATION
INCORPORATED

AUDIO ANIMATION, INC.
The MUSE

AUDIO ANIMATION, INC.; 210 W. Magnolia Ave., Knoxville, TN 37917; (615) 544-0458; FAX: (615) 637-3423. Product Name: The MUSE. Contact: Milton McNally, president. Date Product Introduced: 1/89. Product Description & Applications: A fully digital mastering console featuring 24- to 56-bit real-time processing and 80 minutes of automatic updating at 100 times per second. Over 2,000 ratio, threshold attack and delay, 16 EQ and ORC blocks, over 8,000 taps, 1,000 settings of Q, center-frequency cut and boost on each 5-band parametric EQ. **Basic Specifications & Suggested List Price:** 24- to 56-bit from input to output, AES/EBU and SDIF 1610/1630 inputs and outputs, continuous sampling rate 30kHz-100kHz EQ 1024 center, full automation and disk-based storage. Price \$135,000.



AUDIO TEKNOLOGY INC.
Paragon Series

AUDIO TEKNOLOGY INC.; 7556 SW Bridgeport Rd., Durham, OR 97224; (503) 624-0405. Product Name: Paragon Series. Contact: Chris N. Strahm, president. Date Product Introduced: 8/89. Product Description & Applications: Universal console for house/monitor use. Featuring high-voltage mic preamp, RMS comp/limiter, noise gate with key filters, 4-band parametric EQ, dynamics linking on each channel, 16 sends with muting, 16 mono/8 stereo submasters, eight VCA groups, VCA master, VCA mutes, eight stereo effects returns with 3-band semi-parametric EQ, bar graph displays for input, compressor and noise gate, 23 stereo fluorescent VU meters, excellent outdoor visibility of switches and meters, full facilities for multipair cable systems, adjustable stand, plus many more outstanding features. **Basic Specifications & Suggested List Price:** Clipping level of all stages: +24dBm 20dB headroom throughout, THD: 0.008%, 20Hz to 20kHz at +14dBm; frequency response +0/-3dB, 20Hz to 20kHz, hum and noise. 92dBm at nominal gain, maximum input +28dBm (no pad required), CMR above 80dB all inputs and outputs. Suggested list price: P40, \$87,950; P32, \$74,950, including power supply and reflective thermal cover. Optional adjustable stand and case containing stand compartment.

AUDIOLOGIC; 5639 S. Riley Ln., Salt Lake City, UT 84107; (801) 268-8400. Product Name: SC-610. Date Product Introduced: 6/89. Product Description & Applications: 6-channel mixer, rack-mountable, phantom power, XLR connectors. Perfect for installations. Each input has switchable low-cut filter, gain trim pot, and clip indicator, and the unit has auxiliary inputs for tape deck, etc. Unit features EQ controls and has the ability to be cascaded for more inputs. **Basic Specifications & Suggested List Price:** SC-610 retail \$450. 20Hz to 20kHz bandwidth. Made in USA. 24dBm output into 600 ohms. Security panels option. Balanced or unbalanced connections.

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MIXING CONSOLES

1990

AUDITRONICS; 3750 Old Getwell Rd., Memphis, TN 38118; (901) 362-1350. Product Name: 1900 Series IFB/Mix-Minus System. Contact: Murray Shields, director of sales. Date Product Introduced: 5/1/89. Product Description & Applications: The 1900 Mix-Minus is a stand-alone, modular, output-assignment mixer system designed specifically for multiple foldback applications to remote locations. The matrix size is "N" inputs (up to 48) to 8 discrete output buses. Two-way communication with the remote location is via three IFB buses and the Talkback Return module. Features include YLL metering and speaker monitoring of both input and output assignments, tone oscillator and redundant power. Basic Specifications & Suggested List Price: Frequency response 20Hz to 20kHz ± 0.5 dB. Max input and output +26dBu. S/N ratio -91dB. Crosstalk -88dBu. THD: less than 0.01%. Suggested list for 16-in by 8-out matrix, approx. \$7,000.

BOGEN COMMUNICATIONS, INC.; 50 Spring St., PO Box 575, Ramsey, NJ 07446; (201) 934-8500. Product Name: DMP-06 Modular Mixer/Preamplifier. Contact: D. Pear, dir. of communications. Date Product Introduced: 7/89. Product Description & Applications: Seven-input, two-output mixer/preamplifier designed to serve wide range of applications with professional performance and reliability. Six ports accept any combination of Bogen's plug-in input and control modules. Program input is built-in. Each input has two level controls, permitting independent mix for each of the two output channels. Each output has master volume and bass and treble tone controls, and a bar graph-type LED output-level meter. Three-level priority operation permits selected inputs to override those of lower priority. Basic Specifications & Suggested List Price: Output rating (transformer) +4dBm, 600 ohms; +16dBm, 600 ohms (max); (direct) +6dBm, 600 ohms; +18dBm, 600 ohms (max). Frequency response 20Hz to 20kHz, +0, -1 dB. Distortion less than 0.2% at max. Output (power bandwidth 20Hz-20kHz, +0, -1dB), less than 0.01% typical. S/N ratio 72dB with master volume at max. Suggested list \$410.

CARVIN CORP.; 1155 Industrial Ave., Escondido, CA 92025; (619) 747-1710; (800) 854-2235. Product Name: MX842 Stereo Rackmount Mixer. Contact: Neal Taylor, sales mgr. Date Product Introduced: 1/89. Product Description & Applications: 8-channel stereo mixer, rack-mountable with 200-watt amps for 400 watts (200/200) RMS; two stereo effects returns that are ideal for keyboardists, capacity for live performances with capabilities for converting one amp for separate stage monitor amp, dual graphic EQ, 19" rack-mountable or Ozite™ scuff resistant enclosure. Basic Specifications & Suggested List Price: 400 watts at 2 ohms (200/200), MOSFET sound quality, frequency response 20Hz to 20kHz ± 1 dB, 5-band octave equalizers, total harmonic distortion 0.1% (20Hz to 20kHz), wt. 47 lbs., one year parts and labor. Factory direct price \$749.

CREST AUDIO; 150 Florence Ave., Hawthorne, NJ 07066; (201) 423-1300. Product Name: Gamble/Series EX Mixing Console. Contact: Craig Hannabury, div. mg. Date Product Introduced: 9/89. Product Description & Applications: The standard Series EX is 56 x 16 x 2 and includes eight stereo matrices and a sophisticated integral patch bay. Each input includes ten aux buses, 4-band full parametric EQ, eight scene mutes, a 20-segment LED array and a P&G fader. Interface connectors include two amp QLS that accept 88 microphone inputs, and another three amp QLS provide 144 tie-lines that appear on the patch bay. The console runs on ± 24 VDC power rails and clips at +26dBu. Basic Specifications & Suggested List Price: Frequency response 3dB down at 3Hz and 75kHz. Distortion: 0.003% 1kHz at +20dBu. Dynamic range 115dB. All polypropylene film capacitors used throughout the console.

DDA; 30B Banfi Plaza N., Farmingdale, NY 11735; (516) 249-3660. Product Name: Arena Monitor. Contact: Sam Spennacchio. Date Product Introduced: 6/89. Product Description & Applications: This new stage monitor console provides 18 monitor sends (12 mono and three stereo). The 16 (plus stereo mix) sends are arranged as two stereo sends, switchable between buses 1-2 and 3-4, with level, pan, pre/post switching, and 12 mono sends with individual level controls. 18-way meter panel, 3-band EQ on outputs and P&G faders on outputs are standard. Available in 20- to 44-input versions. Basic Specifications & Suggested List Price: The Arena Monitor is completely modular, including back connector panels. Technical specs are the same as DDA's Q-mute console. Price for a 44 x 16 x 2 configuration \$37,000.

DDA; 30B Banfi Plaza N., Farmingdale, NY 11735; (516) 249-3660. Product Name: Q-mute. Contact: Sam Spennacchio. Date Product Introduced: 5/89. Product Description & Applications: Based on the current Q-Series console, new additions are (8) mute group assigns on each input channel, a

10-segment input-level LED indicator on each channel and illuminated on/off, or "cut," switches on each channel. The Q-mute is available in formats from 16 to 40 inputs and with either P.A. or matrix outputs. The Q-mute also includes direct outputs with a level control on each input. Basic Specifications & Suggested List Price: Separate mic/line XLR inputs. All XLR ins/outs balanced. Send and return on separate 1/4" connectors unbalanced. Noise (DIN audio) microphone less than -127dBV (gain: 55dB, EIN ref: 200 ohms), noise (DIN audio) line less than -84dBV (gain: 0dB, 16 inputs). Crosstalk adjacent channel 1kHz -90dB. Crosstalk group to mix: 1kHz -80dB. Price: 40-input Q-mute matrix \$26,900.

FOSTEX CORP. OF AMERICA; 15431 Blackburn Ave., Norwalk, CA 90650; (213) 921-1112. Product Name: 2016 Line Mixer. Contact: Steve Teip. Date Product Introduced: 6/89. Product Description & Applications: Line-level mixer with switchable configuration as 16 x 2 or dual 8 x 2. Gain, pan and four aux sends. 3 1/2" rack-mount.

GALAXY AUDIO; 625 E. Pawnee, Wichita, KS 67211; (316) 263-2852. Product Name: i/o Series Mixing Consoles. Contact: Brock M. Jabara, president. Date Product Introduced: 8/89. Product Description & Applications: The i/o Series are compact, factory-upgradeable mixing consoles available in configurations of 4 to 24 channels, in increments of four. 4- and 8-channel versions have a rack-mount option that can be flush or recessed to accommodate a cover. All inputs and outputs can be ordered either on the rear or bottom of the unit. Ideally suited for sound reinforcement or P.A. use, they are also designed to work well in studio applications. Basic Specifications & Suggested List Price: 6 x 2 matrix, user-selectable aux assignments: pre-EQ/pre-fade, post-EQ/pre-fade, post-EQ/post-fade, phantom power; pre-fade listen; channel mute switch, eight balanced outputs, at least 26dBm; six line-level patch circuits, subs have -30 and +8dBm LEDs, +30dBm, headphone amplifier: over 2 watts.

HOWE TECHNOLOGIES CORP.; 2300 Central Ave., Ste. E; Boulder, CO 80301; (303) 444-4693; (800) 525-7520; FAX: (303) 444-8447. Product Name: Series 10K Console. Contact: Terry Sweeney, vp sales. Date Product Introduced: 1989. NAB. Product Description & Applications: The Series 10K Console features a universal, multilayer backplane that eliminates all wires between modules, dual bass signal architecture that provides fully differential audio signal paths across the backplane; proprietary, low-noise, class-A VCA and a mic preamp that employs DC-servoed high slew rate amps to reduce harmonic and transient intermodulation distortion. Can be used for radio/TV on-air or production. Basic Specifications & Suggested List Price: List price is about \$1,350 per channel. Available in four configurations: 14-channel, 20-channel, 26-channel and 32-channel.



MACKIE DESIGNS

MACKIE DESIGNS INC.
Mackie Designs CR1604

MACKIE DESIGNS INC.; 7512 218th SW; Edmonds, WA 98020; (206) 771-4927. Product Name: Mackie Designs CR1604. Contact: Greg Mackie, president. Date Product Introduced: 9/89. Product Description & Applications: A 16 x 2+2 studio grade, high headroom, low-noise mic/line mixer. Can be rack-mounted or used as a table-top unit. Designed for applications in electronic music production, recording studio use, broadcast, general sound reinforcement, audio-for-video post-production. Basic Specifications & Suggested List Price: 16 channels, 3 band EQ, seven aux sends, stereo solo, four stereo aux returns. Mic pre EIN -129dBm; overall S/N -85dB, distortion 0.01%, frequency response 20Hz to 40kHz ± 1 dB, max output: +24dBm. Rack-mount seven spaces or table-top configuration 48V phantom power \$995 retail.

NEOTEK CORPORATION; 1154 W. Belmont Ave., Chicago, IL 60657; (312) 929-6699. Product Name: Elite. Contact: Tom Der, sales and support. Date Product Introduced: 4/89. Product Description & Applications: The latest version of the Elite multitrack recording console features a completely new, all-



NEOTEK CORPORATION
Elite

metal frame with a look unlike any other console. The equalizer and mic preamp have been improved and the shielded cable system redesigned. Automation options have been expanded with Neotek VCA faders for enhanced performance. The Elite now comes in a film-mixing version with logic-controlled, multifactor monitor section and three-man frame layout. Basic Specifications & Suggested List Price: Crosstalk and isolation have been improved in the new Elite, with figures in the range of 90 to 110dB at 10kHz between all buses, inputs and outputs. Prices for the mid-sized Elite consoles are in the range of \$62,000.

NEOTEK CORPORATION; 1154 W. Belmont Ave., Chicago, IL 60657; (312) 929-6699. Product Name: Essence. Contact: Tom Der, sales and support. Date Product Introduced: Summer 1989. Product Description & Applications: The Essence is designed for ADR, Foley and effects layup on multitrack tape and for synthesizer sampling and assembly. It is ideal for use with a hard disk recorder, and a digital workstation may be built into the new, all-metal frame. Multitrack monitoring channels provide linear faders and signal-presence meters. Input channels are fitted with audiophile-quality mic preamps and 6-band equalizers. A complete machine-logic interface is standard. Basic Specifications & Suggested List Price: The Essence, with its integral desk area and patch bay, is custom-configured for each order. A typical 8-input, 24-monitor Essence has a list price of about \$28,000.

NEVE; Berkshire Industrial Park, Bethel, CT 06801; (203) 744-6230. Product Name: Neve VR Console. Contact: Lisa Vogl, adv and promotions mgr. Date Product Introduced: 3/89. Product Description & Applications: The Neve VR Console offers the ability to store console settings and to recall the stored settings under computer control. Derived from the Neve V Series console, the VR is a unique and fast-acting system for the modern studio where ease and speed of operation combined with maximum use of studio time is a necessity. The first fully operational VR console with Neve's Flying Faders automation system was installed at Cherokee Recording Studios in Los Angeles in May 1989. Basic Specifications & Suggested List Price: Online data is automatically stored on an integral hard disk to facilitate rapid access with storage space of 20 megabytes and the ability to record all or part of the stored configurations onto floppy disk—3 1/2" floppy holding approximately 140 complete stores of a 60-channel console.

NEVE; Berkshire Industrial Park, Bethel, CT 06801; (203) 744-6230. Product Name: Post-Production Series Console (VP Console). Contact: Lisa Vogl, adv and promotions mgr. Date Product Introduced: 4/89. Product Description & Applications: Developed to meet the increasing needs of major film and post-production facilities, Neve developed an entirely new range of audio consoles—the Neve Post-Production Series. The VP Console made its world debut at NAB in April 1989, and is designed for stereo television, film or multitrack operation. It is ideally suited to perform a wide variety of tasks, including television and video post-production, Dolby matrix film and film re-recording. The Enterprise, in Burbank, Calif., took delivery of the first Neve VPR 72 console in June 1989. Basic Specifications & Suggested List Price: The VP Console includes clever console routing to eliminate intensive patch rerouting, multiple push-button switching and complex operator moves. Features include Dolby matrix monitoring on switchable 4- and 8-track video post, 24-track operation, 4- and 8-track stereo or mono television feeds, independent master recorder.

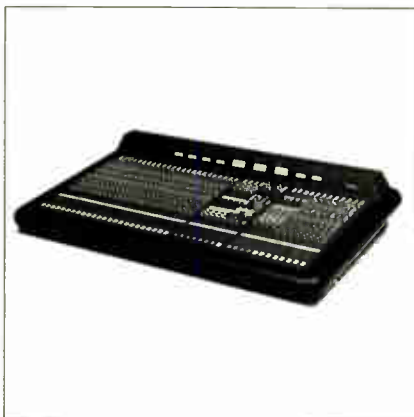
N.I.H. LABS/INDUSTRIAL STRENGTH IND.; 13042 E. Moore St., Cerritos, CA 90701; (213) 921-2341. Product Name: PM160. Contact: Duke Gee, sales mgr. Date Product Introduced: 1/89. Product Description & Applications: The PM160 provides everything one needs in a state-of-the-art P.A. mixer. 16 inputs, two stereo power amps, digital effects processor, two graphic EQs and a 2-way electronic cross-

over. The built-in digital effects processor has 99 programs including digital reverb and digital delay. It also has a talkback mic input which is routable to L and R mains, monitor and effects send 1 or 2. **Basic Specifications & Suggested List Price:** Stereo power amps 400W/400W and 150W/150W. 16 inputs: +4dBm (XLR and 1/4" phone), input equalization high, mid (sweepable) and low, 9-band graphic equalizers, weight 70 lbs. Sold directly from Industrial Strength Industries for \$2,195.

N.I.H. LABS/INDUSTRIAL STRENGTH IND.: 13042 E. Moore St., Cerritos, CA 90701; (213) 921-2341. **Product Name:** PM80. **Contact:** Duke Gee, sales mgr. **Date Product Introduced:** 1/89. **Product Description & Applications:** This 8-channel powered mixer is perfect for small to medium-sized halls. Each input channel supplies -50dB to 0dB input sensitivity, high, mid and low EQ, an effects and monitor send, pan control, a solo feature and clip LED. A stereo graphic EQ supplies equalization for the main speaker outputs. The unit also features a built-in digital delay with regain and delay time flexibility. **Basic Specifications & Suggested List Price:** 180 watts at a 4 ohm load (THD less than 0.1%), frequency response 20Hz to 20kHz at 10V RMS. Sold directly from Industrial Strength Industries for \$995.

ORION RESEARCH, INC.: 4650 W. 160th St., Cleveland, OH 44135; (216) 267-7700. **Product Name:** AFV/8+8. **Contact:** Charles A. Polomsky, mktg. mgr. **Date Product Introduced:** 1989. **Product Description & Applications:** Software-controlled audio mixing system for television applications: broadcast, production, post-production. Features ReMem™ recall memory system enabling storage, recall and instant reset of up to 32 online console setups. May be interlaced to video editors, newsroom computers or other devices through serial interface. **Basic Specifications & Suggested List Price:** Frequency response 10Hz to 20kHz (±0.1dB), 10Hz to 100kHz (-3dB). Price range: \$27.5k to \$32k.

PANASONIC PROFESSIONAL AUDIO SYSTEMS RAMSA: 6550 Katella Ave., Cypress, CA 90630; (714) 373-7277. **Product Name:** Ramsa WR-C900. **Contact:** Steve Woolley, sales and mktg. mgr. **Date Product Introduced:** 5/89. **Product Description & Applications:** The Ramsa WR-C900 is a sound reinforcement mixing console designed for live theater and similar applications. The WR-C900 features true left-center-right (three-channel) panning with a "hard" center channel, three choices of input module type (mono, stereo, submix) and up to 24 matrix outputs. **Basic Specifications & Suggested List Price:** L/C/R panning (3-bus) plus L/R (2-bus) panning on separate aux L/R bus, 16- and 24-slot frame sizes, up to 32 mono inputs, up to 72 separate inputs using submix modules, up to 24 matrix outputs.

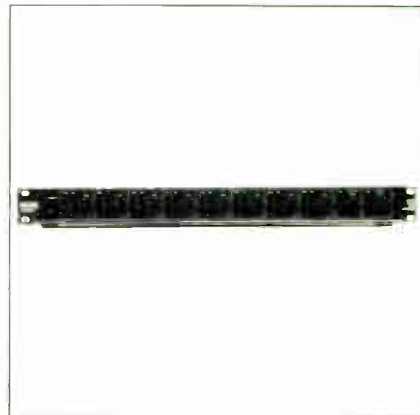


PANASONIC PROFESSIONAL AUDIO SYSTEMS RAMSA
Ramsa WR-C900



PASSAC CORPORATION
Unity Eight

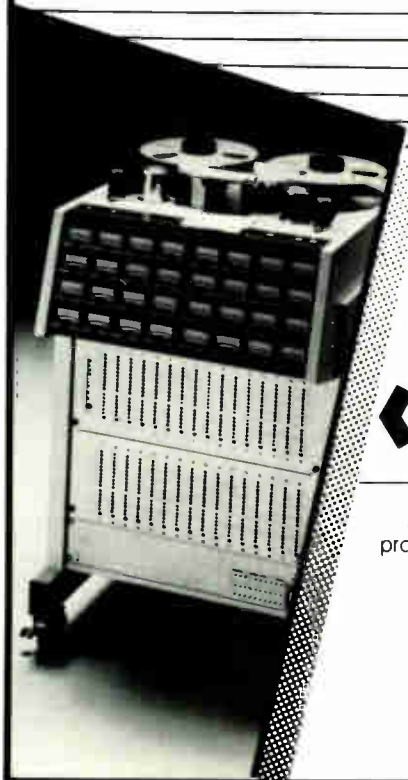
PASSAC CORPORATION: 759 Ames Ave., Milpitas, CA 95035; (408) 946-8989; FAX: (408) 946-0443. **Product Name:** Unity Eight. **Contact:** Royce Krilanovich, mgr. **Date Product Introduced:** 1/89. **Product Description & Applications:** The Unity Eight is an 8-channel single-rack space, line mixer with balanced out and two stereo effects loops. It features peak reading LEDs, separate monitor volume and a signal-to-noise ratio of 95dB. Ideal for home studios, keyboard and guitar racks. **Basic Specifications & Suggested List Price:** 8 channels into 4, single space, 0 and -10dBm inputs, 95dB signal-to-noise ratio, two stereo sends and returns, list \$524.95.



RANE CORP.
SM82 Stereo Line Mixer

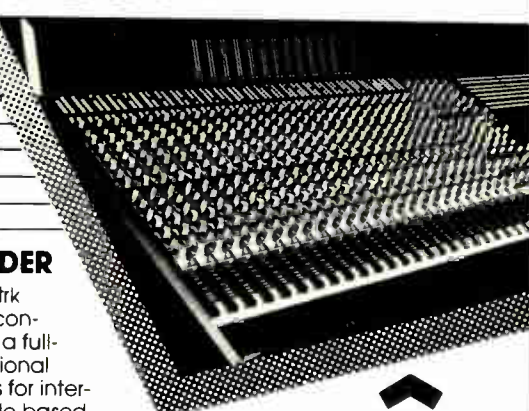
RANE CORP.: 10802 47th Ave. W., Everett, WA 98204; (206) 355-6000. **Product Name:** SM82 Stereo Line Mixer. **Contact:** Larry Winter, vp mktg. **Date Product Introduced:** 6/89. **Product Description & Applications:** 16 line inputs paired into eight stereo channels in a single-space, 19" chassis. Each channel features stereo level control, stereo aux send and balance controls. Aux return, master level and balance are also included. Several units can be expanded together for additional inputs. **Basic Specifications & Suggested List Price:** Balanced/unbalanced master outputs, 114dB signal-to-noise, 0.01% distortion, 1.75"H x 19"W x 5.3"D. List price \$599.

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MIXING CONSOLES

1990

RICHMOND SOUND DESIGN LTD.; 1234 W. Sixth Ave.; Vancouver, V6H 1A5 Canada; (604) 734-1217. Product Name: Command/Cue SR. Contact: Damon Wooten, gen mgr. Date Product Introduced: 9/89 Product Description & Applications: Software designed to control routing and level snapshots for sound reinforcement systems SR also has the ability to send and capture MIDI control messages. Software is not sequencer- or clock-dependent. Basic Specifications & Suggested List Price: Shipped with proprietary hardware as a complete software/hardware mixing system. Entry level \$9,000



SOLID STATE LOGIC
SL 6000 G Series Stereo Video System

SOLID STATE LOGIC; Begbroke; Oxford, OX5 1RU England; (44) (865) 842300. Product Name: SL 6000 G Series Stereo Video System. Contact: Noel Bell, publicity mgr. Date Product Introduced: 11/88 Product Description & Applications: Totally integrated, modular, in-line audio processing and mixing system for stereo audio production and post-production applications. Simultaneous broadcast and multitrack capability. Facilities for music, effects and dialog submixing plus main program output. SSL G Series studio computer automation system. Basic Specifications & Suggested List Price: Mainframes available accepting up to 32, 40, 48, 56, 64, 72, 80 and 96 mono and stereo input/output modules. All versions have 32 output groups, three stereo mix groups, plus stereo and mono program outputs, eight VCA groups and four patchable stereo groups.

SONY PROFESSIONAL AUDIO; 1600 Queen Anne Rd.; Teaneck, NJ 07666; (201) 833-5200. Product Name: MXP-3056VF. Contact: Karl Kussmaul, product mgr. Date Product Introduced: 1/90 Product Description & Applications: Incorporates additional features not found in other MXP-3000 Series consoles, including automated stereo echo returns, improved cue mix output facilities, enhanced automation user interface, an electroluminescent display and built-in keyboard for the hard disk automation system, and a five-button remote controller for three tape machines. Locate and reset control buttons also provided for tape machines that support these features (such as Sony's APR Series analog recorders). Other new center-section features include an alphanumeric display for console automation status and an X-Y LED matrix phase meter. Basic Specifications & Suggested List Price: MXP-3000 Series features include five different choices of input preamplifier modules, as well as five different choices of equalizer modules. Proprietary hybrid circuits, oxygen-free interconnect cabling and gold-plated connectors throughout the audio path deliver the best analog signal available. Provisions for 56 input/output channels split by a center control section, with 32 I/O modules to the left and 24 modules to the right.

SOUNDCRAFT; 8500 Balboa Blvd.; Northridge, CA 91329; (818) 893-4351. Product Name: Model 3200. Contact: David Kimm, sales mgr. Date Product Introduced: 3/89 Product Description & Applications: The new Model 3200 recording console is in split configuration, offering full 32-bus routing with direct access to a total of 64 tracks of tape. Up to 100 fader-controlled line inputs are available for mixdown, and a unique onboard system can generate up to 20 auxiliary sends. A built-in noise gate is included on every channel and monitor input, as well as 4-band parametric EQ. The console also offers a full-range, padless mic preamp and a patented active panpot design. Basic Specifications & Suggested List Price: \$75,000 to \$91,000.

Soundcraft



SOUNDCRAFT
Model 3200

SOUNDTRACS PLC; 91 Ewell Rd., Surbiton, Surrey, KT6 6AH England; (01) 399-3392. Product Name: SPA (Super PA). Contact: Katie Seaman, marketing assistant. Date Product Introduced: 7/3/89 Product Description & Applications: The SPA is a sound reinforcement front-of-house desk but can be reconfigured via a single switch on each group as a monitor desk. Access points to all audio, VCA and mute buses are available on rear panel connectors, enabling two consoles to be linked, providing up to 96 inputs. This powerful console should be considered by anyone seeking a versatile and highly specified mixer designed with the rigors of the road in mind. Basic Specifications & Suggested List Price: 24/32/40-input versions are available with full 4-band parametric EQ, eight aux sends plus local aux, input metering, eight VCA groups and eight mute groups as standard. The entire console is electronically balanced including all buses. Auto-switching for dual power supply units. 8 x 8 matrix and eight stereo returns on groups. List price: \$50,000 to \$70,000.

SOUNDTRACS PLC; 91 Ewell Rd., Surbiton, Surrey, KT6 6AH England; (01) 399-3392. Product Name: To be advised. Contact: Katie Seaman, marketing assistant. Date Product Introduced: 10/89 Product Description & Applications: A new 24-bus recording console to include MIDI automation. Full details will be announced at AES, New York.

STEWART ELECTRONICS; 11460 Sunrise Gold Cir.; Rancho Cordova, CA 95742; (916) 635-3011. Product Name: MM-4 4-Channel Mixer. Contact: Wade Stewart, president. Date Product Introduced: 6/89 Product Description & Applications: The MM-4S/M is a 4-channel mixer in a space-saving, half-rack chassis. Each of the four independent balanced input channels features a mic/line switch, level adjust and (MM-4S only) pan control. A built-in, switchable phantom power supply is also included. The switchable output operating level allows the MM-4 to operate at -10 or +4 levels. The MM-4S provides a stereo output, the MM-4M supplies a monoaural output. Basic Specifications & Suggested List Price: Frequency response: 20Hz to 20kHz ± 0.5 dB. Bandwidth 5 Hz to 20kHz ± 3 dB. Noise EIN -120dB. S/N 98dB. Distortion at 1kHz 0.01%.

STUDIOMASTER INC.; 3941 E. Miraloma Ave.; Anaheim, CA 92807; (714) 524-2227; FAX: (714) 524-5096. Product Name: 16x2R Pro Line. Contact: Jim Giordano, nat'l sales mgr. Date Product Introduced: 6/89 Product Description & Applications: 16 x 2/12 x 4 x 2 rack-mount mixer features include 12 mic/line inputs with channel inserts and post-fade direct out; four stereo line/phone inputs. Mic/line channels feature 3-band EQ with sweep mid, four aux sends, L/R and group assign, solo, channel mutes, 100mm faders, etc. Stereo

inputs feature 3-band fixed EQ, four aux sends, solo channel mutes, L/R assign and 100mm faders. Four group outs, L/R out, mono out, 48V phantom power and headphone out. Basic Specifications & Suggested List Price: EIN 150 ohm source mic input -129dB, 10k ohm source line input -89dB. THD: less than 0.05%. Frequency response (+0, -1dB) 30Hz to 20kHz. Signal-to-noise ratio: -87dB. Nominal output noise: -95dB. Nominal output level, subgroup and master output: +4dBm. List price: \$2,495.

TLM ELECTRONICS INC.; 343 Manville Rd. #6B; Pleasantville, NY 10570; (914) 769-6423; FAX: (914) 769-0012. Product Name: Group Insert 200B. Contact: Tony Marja. Date Product Introduced: 12/88 Product Description & Applications: Adds subgroup insert jacks to Soundcraft S200B mixing consoles. Insert jacks are 1/4" 3-conductor wired as per Soundcraft specifications. Insertion points may be either pre- or post-subgroup fader. Options include pre/post-subgroup switches and balanced insert sends and/or returns.

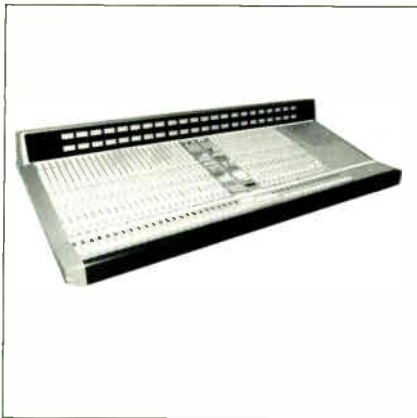
TOTAL AUDIO CONCEPTS; 10815 Burbank Blvd.; North Hollywood, CA 91601; (818) 508-9788. Product Name: Matchless 2. Contact: Steve Harvey, U.S. sales mgr. Date Product Introduced: 10/89 AES Product Description & Applications: The new 24-bus in-line recording console from TAC, code-named "Matchless 2," will be launched at the show. Features include 4-band split EQ, eight discrete aux sends all switchable to monitor, auxes to multitrack routing, in-place solo, two programmable mute groups, comprehensive monitor facilities with 30-segment LED or VU metering, and onboard 288-point 19" TT Jackfield. The console also features optional MIDI muting and fader automation systems. Basic Specifications & Suggested List Price: Consoles are available in 26- or 36-input frames, providing 52 and 72 inputs respectively, all with EQ and aux sends if required at mixdown. Prices are expected to be approx \$28,500 and \$37,500 respectively, including stand and PSU. A 24-bus, 32-track version is also available.

TOTAL AUDIO CONCEPTS; 10815 Burbank Blvd.; North Hollywood, CA 91601; (818) 508-9788. Product Name: Scorpion II. Contact: Steve Harvey, U.S. sales mgr. Date Product Introduced: 10/89 AES Product Description & Applications: All consoles to be exhibited by TAC at this year's AES are either completely new or have undergone a major update, including the Scorpion range of sound reinforcement and split-monitor multitrack recording consoles, which will now be called Scorpion II. New features include a more flexible 4-band EQ with switched midrange cues, a highpass filter and 15-segment LED metering in a restyled chassis. Also on show will be the new input modules for the SR9000 live sound superconsole. Basic Specifications & Suggested List Price: The Scorpion II is available in four different chassis sizes housing the range of 12 modules to give 42 standard configurations, including a 4-aux 16/8/2 at \$8,006, a 4-aux 24/16/2 at \$13,760, an 8-aux 40/8/2 with 8 x 8 output matrix at \$18,467 and an 8-aux 28/12/2 with onboard patch bay and 24-track monitoring at \$24,229.



TOTAL AUDIO CONCEPTS
TAC Bullet

TOTAL AUDIO CONCEPTS; 10815 Burbank Blvd.; North Hollywood, CA 91601; (818) 508-9788. Product Name: TAC Bullet. Contact: Steve Harvey, U.S. sales mgr. Date Product Introduced: 10/89 AES Product Description & Applications: The TAC Bullet compact-format audio mixing console with 4-band EQ, six aux sends and either four or six stereo aux returns will be shown in six formats, five of which will be seen for the first time at the AES show. These are a 28 x 8 x 2 and a 30 x 4 x 2 in the new 34-position large chassis size, and a 10 x 4 x 2 with AFX interface, a 10 x 4 x 2 with balanced outputs and stereo modules, a 10 x 4 x 2 rack-mount and a 10 x 4 x 2 with VU metering in the 14-module position chassis size. Applications include video post-production, sound reinforcement, submixing and direct-to-DAT recording. Basic Specifications & Suggested List Price: Price range between \$4,250 for the basic 10 x 4 x 2 to \$10,300 for the 30 x 4 x 2. All consoles are available with optional flight cases.



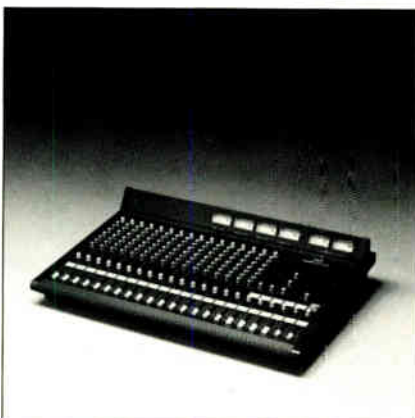
TRIDENT AUDIO U.S.A.
Vector

TRIDENT AUDIO U.S.A.; 2720 Monterey St., Ste. 403; Torrance, CA 90503; (213) 533-8900. Product Name: Vector. Contact: Mike Abercrombie, nat'l sales mgr. Date Product Introduced: 10/89 Product Description & Applications: In-line console design consistent with Trident's reputation for sonic integrity. New features such as four stereo mix buses and 4-band fully parametric EQ, stereo input modules and optional VCA subgrouping make the console well-suited in a variety of post-production or broadcast applications. Music recording studios will appreciate the extensive cue system and optional MIDI-controllable mute system. The console will be available in frame sizes up to 56 inputs. Basic Specifications & Suggested List Price: Additionally, the console features 32 multitrack buses, eight auxiliary sends, machine control with track arming and a stereo bus assignment matrix. The console includes integral patch bay and can also be fitted with VCA or moving fader automation systems.

U.S. AUDIO; 100 Boxart St.; Rochester, NY 14612; (716) 663-8820. Product Name: MIX-5S Stereo 5-Channel Mixer. Contact: Ron Long, sales. Date Product Introduced: 6/89. Product Description & Applications: With low noise and its single rack-space size, the MIX-5S is designed to bring professional high-quality mixing capabilities to any audio/AV installation. Ideal as a submixer for larger P.A./recording systems, or as a full mixer for schools, restaurants, churches, paging and any permanent or portable installation. Basic Specifications & Suggested List Price: The MIX-5S offers four balanced inputs with pan, each switchable between line and mic/instrument level, and a stereo aux input. LED level indicators are provided, as well as phantom power. Two outputs are provided for each channel. Provision is made for connection of the U.S. Audio PHEX-8 expander module, which provides 12 additional inputs.

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. Product Name: AM602. Contact: Robert T. Davis. Date Product Introduced: 6/89. Product Description & Applications: The AM602 is a compact, versatile mixer for all audio applications. The AM602 has provision for a separate submix in/out and aux mix in/out for advanced signal processing. The AM602 has two mixing buses and two aux sends from each input. Inputs 1 and 2 are mic/line-selectable with adjustable gain for optimum level matching, and include two-stage ± 15 dB boost/cut equalizers. Two auxiliary send controls on each input provide for a wide range of effects and/or submixes. Basic Specifications & Suggested List Price: The AM602 features a submix in/out and additional aux mix in/out. The submix output, when selected, is taken from the stereo bus aux. The additional aux mix is taken from the aux send mix. The sub input, when selected, is sent to the aux return system, post-fader, and the additional aux input is sent to the aux buses. The AM602 has LED meters for precise level setting and clip indicators for the stereo buses. Price: \$325.

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. Product Name: AM802. Contact: Robert T. Davis. Date Product Introduced: 6/89. Product Description & Applications: The AM802 is a compact, versatile mixer for all audio applications, and has eight inputs, stereo mixing buses and three aux sends. The AM802 has two mixing buses and three aux sends from each input. Inputs 1 through 6 are mic/line-selectable with adjustable gain and have a peak overload LED for optimum level matching. Each of the eight inputs include two-stage ± 15 dB boost/cut equalizers. Three auxiliary send controls on each input provide for a wide range of effects and/or submixes. The three aux returns are stereo. Basic Specifications & Suggested List Price: The AM802 has LED meters for precise level setting and clip indicators for the stereo buses. The AM802 is a compact 13 $\frac{3}{4}$ "W x 11-15/16"D x 3 $\frac{3}{4}$ "H. Price: \$495.



YAMAHA PROFESSIONAL AUDIO DIVISION
MR Series

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. Product Name: MR Series. Contact: Robert T. Davis. Date Product Introduced: 1/89. Product Description & Applications: Available in 8-, 12- and 16-input versions, the MR Series is ideal for demanding recording studio uses, sound production applications and small sound reinforcement needs. The consoles feature four mixing buses and a stereo master bus. Each input features a choice of electronically balanced, low-impedance XLR-type inputs or balanced, high-impedance TRS jack inputs, both with built-in phantom microphone power. Each channel includes a 3-band EQ with ± 15 dB boost/cut and sweepable peaking mid-frequency control. The pan and group assign switches on each input allow signals to be either independently assigned to one of the program buses or simultaneously panned between buses 1 & 2 and 3 & 4. Three auxiliary send controls on each input provide for a wide range of effects and/or submixes. Basic Specifications & Suggested List Price: The MR Series consoles have complete monitoring assign and talkback facilities. Illuminated precision VU meters are switchable to provide accurate monitoring of program, aux, cue and stereo mixing buses. Each meter includes a peak overload LED indicator for accurate and safe level control. Price: MR842, \$1,395, MR1242, \$1,695, MR1642, \$1,995.

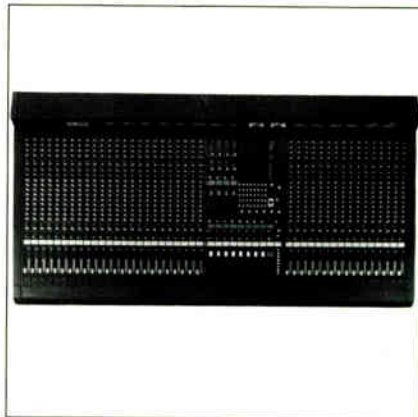


YAMAHA PROFESSIONAL AUDIO DIVISION
MV1602

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. Product Name: MV1602. Contact: Robert T. Davis. Date Product Introduced: 6/89. Product Description & Applications: The MV1602 is a compact, rack-mount, 16-input stereo mixer for high-performance audio applications. The MV1602 has two mixing buses and four aux sends from each input. Inputs 1 through 6 are mic/line-selectable with adjustable gain and have a peak overload LED for optimum level matching. Inputs 9 through 14 are line inputs with a 20dB pad, switch-selectable. Inputs 15 and 16 are ganged stereo inputs. All inputs include 3-stage ± 15 dB boost/cut equalizers. Basic Specifications & Suggested List Price: Four auxiliary send controls on each input provide for effects and/or submixes. The two aux returns are stereo. The MV1602 has LED meters for precise level setting and clip indicators for the stereo buses. Additionally, the MV1602 includes insert outputs from each of the aux buses and the stereo bus. The MV1602 is a compact 18 $\frac{3}{4}$ "W x 11 $\frac{1}{4}$ "H and is designed for rack-mounting. Price: \$2,295.

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. Product Name: PM1200. Contact: Robert T. Davis. Date Product Intro-

duced: 10/89. Product Description & Applications: Designed for both sound reinforcement and broadcast applications, the PM1200 is available in 16-, 24- and 32-input channel configurations. Each input has 3-band EQ with a sweepable mid-band, 80Hz highpass filter, four aux sends with pre-post front panel switches, channel mute, cue and switches to route the channel output to buses 1-4 or stereo. Each channel input gain control allows an input signal range from +10 to -60dB. Basic Specifications & Suggested List Price: Each console features, in addition to the mono input modules, two stereo input modules for both mic and line stereo inputs with EQ. The output section includes controls for output level on each output and facilities to meter all outputs, two stereo effects returns are included as well as a talkback section and a 1kHz tone generator. All outputs are balanced (+4dBu) on XLR-type connectors with inserts.



YAMAHA PROFESSIONAL AUDIO DIVISION
PM2800M Monitor Consoles

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. Product Name: PM2800M Monitor Consoles. Contact: Robert T. Davis. Product Description & Applications: The PM2800Ms are available in 32- (PM2800M-32) and 40-channel (PM2800M-40-C) configurations. Each console features eight mix buses and a stereo master. Eight different monitor mixes via the eight mix buses plus four additional buses from the aux sends, and the independent stereo mix bus give users all the functions they need. The PM2800M consoles have eight master mix groups, with eight mute assign switches, allowing multiple channels to be muted at once. The PM2800M Series also has four matrix mixes with level controls for all eight channels, stereo L/R and a master level control. Basic Specifications & Suggested List Price: Input channels feature flexible input gain structure with a three-position input attenuator switch, variable trim and LED clip indicator. The precision, long-throw faders feed 4-band sweep equalizers (± 15 dB) and variable highpass filters. Each console has 16 VU meters switchable to monitor every bus in the console. All primary inputs and outputs are electronically balanced, XLR-type connectors for full compatibility with all professional equipment and systems. Price: PM2800M-32, \$31,500, PM2800M-40-C, \$36,000.

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MUSIC PRODUCTS

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ADA AMPLIFICATION SYSTEMS; 7303D Edgewater Dr., Oakland, CA 94621; (415) 632-1323; FAX: (415) 632-9358. Product Name: B200S Guitar Power Amp. Contact: Lisa Carrell-Gonden, marketing/sales. Date Product Introduced: 1/89. Product Description & Applications: The B200S is a stereo rack-mount power amp for guitarists. Using bipolar transistors in a conservative design that requires no cooling fan, the unit preserves the fidelity of the MP-1 MIDI tube preamp and sends all the harmonics, compression and distortion generated by the preamp to the speakers without affecting the phase of the signal or adding distortion. Basic Specifications & Suggested List Price: The B200S stereo power amp is two rack spaces and 14.5 pounds. 5.5" L x 19" W x 3.25" H. It puts 100 watts per channel into 8 ohms (250 watts per channel into 4 ohms). Suggested list price is \$549.95.

ADA AMPLIFICATION SYSTEMS; 7303D Edgewater Dr., Oakland, CA 94621; (415) 632-1323; FAX: (415) 632-9358. Product Name: Split-Stack Guitar Speaker Cabinets. Contact: Lisa Carrell-Gonden, marketing/sales. Date Product Introduced: 10/88. Product Description & Applications: Designed as a powerful, lightweight alternative to a 4 x 12 cabinet, 2 x 12 split-stack speaker cabinets are slant- or straight-faced so you may split for a true stereo performance or stack for a traditional full stack. Tough, wear-resistant ozite covers the cabinet, and custom metal grilles with injection-molded stacking hardware are standard features. Combined with the MP-1 preamp and B200S power amp, the split-stack offers the perfect match. Basic Specifications & Suggested List Price: Split-stacks are wired with parallel and series extension jacks to be compatible with any power amp. Each split-stack contains two 12" 50-watt Celestion speakers. Each cabinet is capable of handling 100 watts into 8 ohms. Weight: 48 lbs. List price: \$469.95.

AKAI PROFESSIONAL/IMC; 1316 E. Lancaster, Fort Worth, TX 76102; (817) 336-5114. Product Name: IB103. Contact: James Martin, product specialist. Date Product Introduced: 5/89. Product Description & Applications: SCSI interface for S1000/HD/PB digital samplers. Permits SCSI communication with SCSI hard drives and computer-based sample editing software. Basic Specifications & Suggested List Price: 50-pin SCSI connector. List price: \$159.95.

AKAI PROFESSIONAL/IMC; 1316 E. Lancaster, Fort Worth, TX 76102; (817) 336-5114. Product Name: IB104. Contact: James Martin, product specialist. Date Product Introduced: 9/89. Product Description & Applications: Digital I/O interface for the S1000/HD/PB digital samplers. Optical and AES/EBU Type II input and output connections. Basic Specifications & Suggested List Price: List price: \$599.95.

AKAI PROFESSIONAL/IMC; 1316 E. Lancaster, Fort Worth, TX 76102; (817) 336-5114. Product Name: IB105. Contact: James Martin, product specialist. Date Product Introduced: 3/89. Product Description & Applications: The IB105 is a hard disk drive and digital audio input board for the Akai S950 digital sampler. Atari or Supra HDs can be used. Digital input is for DAT or CD formats. Basic Specifications & Suggested List Price: Digital audio input, optical or phono. List price: \$169.95.

AKAI PROFESSIONAL/IMC; 1316 E. Lancaster, Fort Worth, TX 76102; (817) 336-5114. Product Name: S1000PB. Contact: James Martin, product specialist. Date Product Introduced: 3/89. Product Description & Applications: The S1000PB is a playback-only version of the S1000 stereo digital sampler. It includes all the program editing functions of the S1000, except the ability to record or edit samples. It is compatible with all the sound disks and interfaces for the S1000 series. Basic Specifications & Suggested List Price: 16-bit linear, 44.1kHz and 22.05kHz sample rates. 2MB RAM, expandable to 8MB. 16-voice polyphony, dynamic voice allocation. Stereo outs, eight polyphonic outs, effects out with stereo returns. List price: \$3,599.95.

AKAI PROFESSIONAL/IMC; 1316 E. Lancaster, Fort Worth, TX 76102; (817) 336-5114. Product Name: XE8. Contact: James Martin, product specialist. Date Product Introduced: 1/89. Product Description & Applications: 16-bit sampled drum playback. 16 internal ROM-based sounds, plus two slots for ROM cards, each of which may contain up to 16 sounds. One mix output, eight separate outs. The pitch, envelope and direction of all sounds may be edited. "Kits" of up to 16 sounds are stored in 32 programs. Triggering is via MIDI. Basic Specifications & Suggested List Price: 16-bit linear format. 32kHz/44kHz PCM sound generator. Voices: eight. Display: 2-digit, 7-segment LED (x2). EIA 1U rack-mount. List price: \$899.95.

ALESIS CORPORATION; 3630 Holdrege Ave., Los Angeles, CA 90016; Product Name: DataDisk Direct MIDI-to-Disk Universal Data Storage. Contact: Allen Wald, vp, advertising and promotion. Date Product Introduced: 6/89. Product Description & Applications: DataDisk is a MIDI system exclusive data storage device capable of storing 800K of MIDI data to a 3.5" floppy disk. It can be used to store sequences, drum machine patterns, effects programs from programmable effects processors, samples, synth patches and data from virtually any MIDI hardware capable of sending system exclusive. Basic Specifications & Suggested List Price: 800K MIDI direct-to-hard disk storage on 3.5" floppy disks. File size is limited only by the amount of space available on the disk, as there is no data buffer. Files are identified by product, manufacturer and an 8-character, user-definable file name. File names are displayed in a 32-character LCD. DataDisk recognizes MIDI sample dump and interfaces with most brands of MIDI instruments. List price: \$399.

ALESIS CORPORATION; 3630 Holdrege Ave., Los Angeles, CA 90016; Product Name: HR-16 B High Sample Rate 16-Bit Drum Machine. Contact: Allen Wald, vp, advertising and promotion. Date Product Introduced: 1/89. Product Description & Applications: The HR-16 B is the companion to the popular HR-16 drum machine, featuring 47 aggressive new sounds. It can be used as a stand-alone drum machine, as a sound source for a MIDI drum or keyboard controller, and to augment the sounds of the HR-16. Basic Specifications & Suggested List Price: Includes programming chip for HR-16, allowing both machines to be linked via MIDI system exclusive to create a comprehensive electronic drum system. 20kHz bandwidth. 47kHz sampling rate. 47 samples. 100 patterns. 100 songs. Up to 255 patterns per song. Velocity-sensitive drum pads—8 levels internally, 32 levels through MIDI. Sound Stacking™ allows creative layering of samples to create new sounds. Voice/tune/mix assignable per pad, per pattern. Tape sync. Assign any drum pad or sound to any MIDI note. Transmits and receives MIDI notes. Single-step editing. Copy patterns/songs. Seven-position pan. 32-step pitch programmable per drum pad, per pattern. Comprehensive timing offset for creating subtle rhythm "feels." Programmable tempo in song mode. Recognizes MIDI song position pointer. List price: \$499.

AMPLIFIED MUSIC PRODUCTS CORP.; 9829 Independence Ave., Chatsworth, CA 91311; (818) 709-0518. Product Name: Model BC-250 Dual Channel Bass Combo Amplifier. Contact: Russell Allee, president. Date Product Introduced: 5/89. Product Description & Applications: The AMP Model BC-250 Dual Channel Bass Combo Amplifier has a "flip top" that allows the amp head to be inside the carpet-covered ¾" plywood cabinet for protection while traveling and flipped up when ready to perform. A new limiter control with indicator gives a wide range of compression and follows your quickest licks without overshoot or delay. One of the two effects loops is pushbutton-assignable to Channel A, Channel B, or both, and is indicated by LEDs. Both footswitchable channels have bass, mid, treble and volume controls. Basic Specifications & Suggested List Price: 250 watts at 4 ohms, 160 watts at 8 ohms, 15" speaker with heavy metal grille, dual channel (second channel includes an "edge" control for added warmth). Suggested retail: \$999.

AMPLIFIED MUSIC PRODUCTS CORP.; 9829 Independence Ave., Chatsworth, CA 91311; (818) 709-0518. Product Name: Model BH-250 Dual Channel Bass Head. Contact: Russell Allee, president. Date Product Introduced: 5/89. Product Description & Applications: The AMP Model BH-250 Dual Channel Bass Head has a new limiter control with indicator that gives a wide range of compression and follows your quickest licks without overshoot or delay. One of the two effects loops is pushbutton-assignable to Channel A, Channel B, or both, and is indicated by LEDs. Both footswitchable channels have bass, mid, treble and volume controls. The second channel includes an "edge" control for added warmth. Basic Specifications & Suggested List Price: 250 watts at 4

ohms, 160 watts at 8 ohms, dual-channel, compressor/limiter. Suggested retail: \$699.

ASSOCIATED PRODUCTION MUSIC; 6255 Sunset Blvd., Ste. 820, Hollywood, CA 90028; (213) 461-3211. Product Name: Broadcast One. Contact: Connie Red, broadcast sales mgr. Date Product Introduced: 1988. Product Description & Applications: CD music library designed specifically for broadcasters containing music from the world-famous KDM, Bruton and Themes music libraries. All tracks available in full length, underscore, bumper 30- and 60-second edits. The package currently contains 26 CDs with approximately 15 new releases a year. Tracks may be used for station ID, news, sports, commercial spots and promos. Basic Specifications & Suggested List Price: Priced according to market size.

DAUZ DESIGNS LTD.; 1147 Stanford Ave., Redondo Beach, CA 90278; (213) 372-0337; FAX: (213) 372-7336. Product Name: Daz Drum Pads DDP-6, DZP-2. Contact: Dan Dauz, president. Date Product Introduced: 8/89. Product Description & Applications: Electronic trigger pads used in conjunction with drum brains and MIDI-to-trigger converters, making MIDI accessible to drummers and percussionists. Basic Specifications & Suggested List Price: DDP-6: 6" piezo-based pad featuring neoprene playing surface, shock-mounted on springs enclosed by a dome-shaped back assembly with adjustable clamp. DZP-2: 7" FSR-based pad with dual-zone sensor, gum-rubber playing surface and the same back assembly as the DDP-6.

DEWOLFE MUSIC LIBRARY; 25 W. 45th St., New York, NY 10036; (212) 382-0220. Product Name: DeWolfe Music. Contact: Mitchell J. Greenspan, vp. Date Product Introduced: Updated 1989. Product Description & Applications: Production music library containing over 70 compact discs. Classical, contemporary, jazz, rock, pop, new age, humorous, foreign lands and much more. Broadcast production lengths, 60s, 30s, 15s and tags. New releases produced throughout the year. New digitally recorded sound effects now available on compact disc.

DIGITAL MUSIC CORP.; 5312-J Derry Ave., Agoura Hills, CA 91301; (818) 991-3881. Product Name: MX-28M MIDI Patchbay/Merger Plus. Contact: Gene Barkin, vp. Date Product Introduced: 6/89. Product Description & Applications: Combines 2 x 8 MIDI routing with merge capability, a transpose function and overlapping map zones (for layering or splitting any keyboard). There is also a reset button and LED data indicators for each input. Basic Specifications & Suggested List Price: Weight: 3 lbs.; power: 9V external adapter (supplied). MSRP \$149.

DIGITAL MUSIC CORP.; 5312-J Derry Ave., Agoura Hills, CA 91301; (818) 991-3881. Product Name: MX-28S 2 x 8 MIDI Patchbay. Contact: Gene Barkin, vp. Date Product Introduced: 1/89. Product Description & Applications: The MX-28S 2 x 8 MIDI Patchbay performs 2 x 8 routing of MIDI signals and features LED data indicators and output disable switches for each of the eight outputs. Basic Specifications & Suggested List Price: Weight: 2 lbs.; power: 9V external adapter (supplied). MSRP \$89.

DRUM WORKSHOP, INC.; 2697 Lavery Ct. #16, Newbury Park, CA 91320; (805) 499-6863. Product Name: DW 5000 Turbo E Acoustic Bass Drum/Electronic Trigger Pedal, DW 5002 Turbo TEC Acoustic Bass Drum/Electronic Trigger Double Pedal. Contact: Don Lombardi, president. Date Product Introduced: 1/89. Product Description & Applications: DW's Turbo "E" and "TEC" pedals are single and double versions of Drum Workshop's popular acoustic bass drum pedals that have incorporated a magnetic trigger sensor that dynamically, effectively and accurately triggers electronic sound sources as the acoustic bass drum is played without requiring a mic or sensor to be placed on the drum itself. Basic Specifications & Suggested List Price: Both the Turbo "E" and "TEC" models have standard mechanical adjustments for acoustic pedal feel and response with variable control over trigger sensitivity and impact point. A ¼" output phone jack and 9-volt AC power adapter are included. DW 5000 Turbo "E": \$298, DW 5002 Turbo "TEC": \$595.

DRUM WORKSHOP, INC.; 2697 Lavery Ct. #16, Newbury Park, CA 91320; (805) 499-6863. Product Name: TBX-3 Electronic Drum Pad. Contact: Don Lombardi, president. Date Product Introduced: 6/89. Product Description & Applications: Designed and developed by drummer and drum innovator Terry Bozzio, the TBX-3 provides drummers with a compact, reliable electronic drum pad that features three separate trigger areas. Due to a patented design, each of the three trigger areas are completely isolated from each other to prevent crosstalk and false triggering. Basic Specifications & Suggested List Price: Aluminum casing with high-quality gum rubber adjustable playing surfaces, three individual ¼" phone jack outputs and mounting bracket. Price: \$119.

DW LABS, INC.; PO Box 882; Millburn, NJ 07041; (201) 376-8453; (800) 542-2454. Product Name: QuickChange Artist. Contact: Jeff Davis, manager. Date Product Introduced: 1/89. Product Description & Applications: The QuickChange Artist rack is a product designed for musicians who would like

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1990

—CONTINUED FROM PREVIOUS PAGE

to professionally control their rack or pedal effects with freedom, flexibility and ease. The OCA can control up to five effects. Four preset functions are available. Each preset can be any combination of the five effects and offers an independent +6dB active gain control. FET circuitry is used for fast, quiet switching. From the remote pedal onstage, the musician is able to call up any preset combination. **Basic Specifications & Suggested List Price:** The QuickChange Artist rack unit consists of the controller unit (in a one-slot rack enclosure), a remote footpedal with LED status indicators and a 25-foot remote cable. Designed and manufactured in the United States, the suggested list price of the QuickChange Artist rack unit is \$475.

DW LABS, INC.; PO Box 882; Millburn, NJ 07041; (201) 376-8453; (800) 542-2454. Product Name: Superconductor™. Contact: Jeff Davis, manager. Date Product Introduced: 4/89. Product Description & Applications: The Superconductor is a high-quality buffering preamplifier. The Superconductor isolates passive guitar electronics from the large capacitance of the guitar cable. The capacitance of the cable is proportional to the cable's length and can absorb a significant part of the high end of the guitar's signal. The SC allows the crisp, true sound of the guitar to come through. The SC also provides switchable +2dB/+12dB boost for use as a multi-application preamplifier. **Basic Specifications & Suggested List Price:** The Superconductor provides a switchable +2dB/+12dB boost. Frequency response is 20 to 20k Hz +0/-0.8dB. Total harmonic distortion is .003% at 1kHz. Housed in a compact ABS plastic case with belt clip, the unit is designed and manufactured in the USA. The suggested list price is \$60.

DYNACORD; (distributed in the U.S. by Drum Workshop, Inc.); 2697 Lavery Ct. #16; Newbury Park, CA 91320; (805) 499-6863. Product Name: ADD-two Electronic Drum Sampler/Controller. Contact: Don Lombardi, president. Date Product Introduced: First shipped in mid-1989. Product Description & Applications: The ADD-two is a sophisticated, all-in-one drum controller that features the advanced sound quality and programmability of Dynacord's ADS sampler with drummer-oriented features such as onboard mixing, programmable trigger sensitivity, eight pad/trigger inputs and an extensive library of Dynacord digital drum sounds. The ADD-two is recommended for use in any drumming situation where versatility and high-quality sound are required. **Basic Specifications & Suggested List Price:** 16-bit, 44.1kHz sampling with 20-bit D/A conversion, 16 voices, loop-smoothing, sound fusion and multisampling. Also, a complete selection of input/output and MIDI options, 8 x 8 digital mixer, a hard disk SCSI port and a 3½" floppy drive that reads both Dynacord and S900 sample information. ADD-two: \$4,995.

DYNACORD; (distributed in the U.S. by Drum Workshop, Inc.); 2697 Lavery Ct. #16; Newbury Park, CA 91320; (805) 499-6863. Product Name: ADS Sampler/ADS-K Sampler-Keyboard Controller. Contact: Don Lombardi, president. Date Product Introduced: First shipped in mid-1989. Product Description & Applications: The ADS features state-of-the-art sound quality, 16-bit, 44.1kHz phase-locked stereo sampling with 20-bit, 88.2kHz D/A conversion, 16-voice polyphony, loop-smoothing, sound fusion and multisampling. An advanced MIDI implementation with eight dynamically allocated polyphonic audio outputs, a hard disk SCSI port and a high-density floppy drive that reads Dynacord and S900 sample information make the ADS a sophisticated yet functional instrument that's suitable for a variety of musical applications. **Basic Specifications & Suggested List Price:** ADS-K combines the ADS with a 61-note, master keyboard controller that includes velocity, release velocity and after-touch sensitivity. ADS: \$4,995, ADS-K: \$5,495.

E-MU SYSTEMS INC.; 1600 Green Hills Rd.; Scotts Valley, CA 95066; (408) 438-1921. Product Name: PROTEUS Digital Sound Module. Contact: Jim Rosenberg, product marketing manager. Date Product Introduced: 1/89. Product Description & Applications: 16-bit, 32-voice, multitrack sound module. Four megabytes of ROM memory with digital waveforms and samples from the Emulator III library. Any of 192 presets are addressed by 16 MIDI channels simultaneously. Voice channels are dynamically allocated and routed through six polyphonic outputs, with effect sends/returns. 1U, rack-mount. **Basic Specifications & Suggested List Price:** \$995.

FIRSTCOM/MUSIC HOUSE; 13747 Montfort Dr., Ste. 220; Dallas, TX 75240; (214) 934-2222; (800) 858-8880. Product Name: FirstCom/Music House Library. Contact: Robert Jenkins, vp/managing dir. Date Product Introduced: 7/89. Product Description & Applications: Four new releases to the Music House library. MH9-Technicolor, MHA8-Video Friendly 1, MHE10-Video Friendly 2 and MHE11-Video Friendly 3. From soft and intimate to innovative and interesting new sounds,

these new production music CDs have appealing tracks from sophistication to comedy. Many come with commercial-length versions. **Basic Specifications & Suggested List Price:** Pricing options available through regional representative.



FORTE MUSIC, INC.
Mentor 686 MIDI Matrix Processor

FORTE MUSIC, INC.; 1951-X Colony St., Mountain View, CA 94043; (415) 965-8880. Product Name: Mentor 686 MIDI Matrix Processor. Contact: Steve Salani. Date Product Introduced: 1/89. Product Description & Applications: The Mentor 686 is an advanced MIDI processor for any application requiring switching, routing, special processing and performance control. The Mentor employs a sophisticated new architecture free of the restrictions and limitations of earlier MIDI devices. The Mentor is an integrated, versatile alternative to struggling with an awkward, unmanageable collection of separate MIDI products. Remote control unit (included) permits convenient operation from any point on stage or in the studio. **Basic Specifications & Suggested List Price:** Six MIDI inputs (fully mergeable), six MIDI outputs (fully independent). Eight independent MIDI processors in matrix configuration. Programmable footswitches, control pedals and sliders. 64 presets (128 with optional memory card). Issues virtually any MIDI message desired. Complete controller mapping and filtering. List \$995.

GAMBATTE, INC.; 1442 Tullie Rd. NE; Atlanta, GA 30329; (404) 325-4843. Product Name: MidiStar™ Pro. Contact: Kevin Talman, sales and marketing mgr. Date Product Introduced: 1/89. Product Description & Applications: All-digital wireless MIDI system. Utilizes a patented "spread spectrum" technology providing users with over 400 feet of dependable, drop-out free range. MidiStar Pro transmits on all MIDI channels, processing all commands and codes. Will be used most frequently by musicians playing MIDI keyboard, guitar or wind controllers, without constraints of a physical cable. Additional applications involve the remote control of sequencers, drum-trigger systems and lighting. **Basic Specifications & Suggested List Price:** RF carrier frequencies: 5. MIDI compatibility: all codes, all channels, all commands. Transmitter dimensions: 2.4" x 3.8" x 1". Battery: 9V alkaline. Receiver dimensions: 3.5" x 17.2" (19" rack-mount). Frequencies: five (factory selectable). Range: 400 feet. Suggested list price: \$2,995.

GENERAL MIDI; 9430 E. Golf Links Rd., Ste. 106; Tucson, AZ 85730; (602) 884-3501. Product Name: FOX MUX—The Fiber Optic Multiplexer. Contact: R. Paulsen, nat'l mktg. mgr. Date Product Introduced: 3/90. Product Description & Applications: Combines fiber optic technology with data multiplexing for MIDI. Transfers the data from up to eight individual MIDI cables through one compact and cost-effective fiber optic link. LED indicators for power, network intact and multichannel MIDI activity. Generates and receives no electrical interference. Locates multiple, interference-free MIDI communications in the sound studio, stage, club or auditorium. **Basic Specifications & Suggested List Price:** Housed in rack-mounted units. Projected suggested list prices: \$495, \$595, \$695 for the 50', 100' and 150' fiber multiplexer links.

GENERAL MIDI; 9430 E. Golf Links Rd., Ste. 106; Tucson, AZ 85730; (602) 884-3501. Product Name: MIDI FOX—The Fiber Optic Extender. Contact: R. Paulsen, nat'l mktg. mgr. Date Product Introduced: 3/89. Product Description & Applications: Revolutionary light-speed fiber optic extender for MIDI. LED indicators for power, network intact and MIDI activity. The design is optimized for minimum propagation delay. Contained in handheld-size, rugged transmitter and receiver enclosures. Generates and receives no electrical interference. Runs interference-free communications in the sound studio, stage, club or auditorium. **Basic Specifications & Suggested List Price:** 4" x 2" x 1.5", up to 1 megabaud maximum data rate. 660nm wavelength, power units replaceable with 9-12V AC or DC. Complete system suggested list prices: \$395, \$495, \$595 for the 50', 100' and 150' fiber optic links.



HUGHES & KETTNER, INC.
Cream Machine

HUGHES & KETTNER, INC.; 35 Summit Ave., Chadds Ford, PA 19317; (215) 558-0345. Product Name: Cream Machine. Contact: Lee Liebner, U.S. mktg. rep. Date Product Introduced: 6/16/89. Product Description & Applications: H&K's Cream Machine is an all-tube guitar overdrive preamp/amp with the same multifunctionality and array of inputs and outputs as the Crunch Master. Whereas the Crunch Master delivers the sound of a vintage American tube amp, from clean to blues and the onset of distortion, the Cream Machine offers the full-blown classic rock overdrive tone of a hot-rodded British tube-amp stack. **Basic Specifications & Suggested List Price:** Same as H&K Crunch Master, except: tone controls fixed internally at optimum settings; speaker out 1 watt, price \$349. Both the Cream Machine and Crunch Master include "Cabinetulator" circuitry for recording direct with authentic, miked-up cabinet sound.



HUGHES & KETTNER, INC.
Crunch Master

HUGHES & KETTNER, INC.; 35 Summit Ave., Chadds Ford, PA 19317; (215) 558-0345. Product Name: Crunch Master. Contact: Lee Liebner, U.S. mktg. rep. Date Product Introduced: 6/16/89. Product Description & Applications: The Crunch Master is a multifunctional all-tube guitar preamp and amplifier with built-in power attenuator, "Cabinetulator," and multiple outputs for interfacing with a variety of equipment. Connected directly to a recording console, the Crunch Master delivers the clean and crunch sounds of a vintage American tube amplifier (pre-1965). Authenticity of tone is achieved through the use of vacuum tubes in both preamp and output stages and H&K's Cabinetulator circuitry. **Basic Specifications & Suggested List Price:** Controls: gain, master, bass, middle, treble, bright switch; tube amp volume, line/instrument level, bypass switch. Inputs (front and back): unbalanced. Four unbalanced outputs can be switched to either line or instrument level. Speaker out, 5 watts. Footswitch jack. Size: 7½" x 7¾" x 1¾". \$369.

HUGHES & KETTNER, INC.; 35 Summit Ave., Chadds Ford, PA 19317; (215) 558-0345. Product Name: Red Box. Contact: Lee Liebner, U.S. mktg. rep. Date Product Introduced: 6/89. Product Description & Applications: The Red Box allows a guitar amplifier to interface directly with a mixing console, without the problems of miking. The "Cabinetulator" circuitry of the Red Box authentically re-creates the sound of a miked-up guitar cabinet loaded with four 12" loudspeakers. The device works with both solid-state and tube amps, converting the line out or speaker out into a balanced signal. Advantages over microphones: no bleedthrough from other instruments, no phase cancellation through interaction with other open



HUGHES & KETTNER, INC.
Red Box

microphones, greatly reduced setup time, consistent sound
Basic Specifications & Suggested List Price: Power requirements 9 volts DC, 1 mA Line in: unbalanced maximum 2.3 volts, impedance 20k ohms Line out: balanced, impedance 200 ohms Gain 0dB Size 4 1/2" x 2 1/4" Suggested list price \$99

INDUSTRIAL STRENGTH IND., 13042 E. Moore St., Cerritos, CA 90701; (213) 921-2341. Product Name: Wendel Jr. Contact: Duke Gee, sales mgr. Date Product Introduced: 8/88 Product Description & Applications: The Wendel Jr. is a high-quality percussion replacement device. The unsurpassed sound quality is the result of a 50kHz sampling rate and samples that were recorded by sound engineer Roger Nichols on a 3M digital mastering system, then transferred direct to EPROMs for use in the Wendel Jr. It also features the world's fastest trigger, so fast there is no audible timing difference between the original and triggered drum sound. Basic Specifications & Suggested List Price: This drum enhancement device is sold direct from Industrial Strength Industries for \$600

KORG USA, 89 Frost St., Westbury, NY 11590; (516) 333-9100. Product Name: Korg T Series Keyboards. Contact: Michael Kovins, senior vp. Date Product Introduced: 6/89 Product Description & Applications: The new T Series of keyboards, featuring the T1, T2 and T3, is the latest in Korg's line of state-of-the-art, professional-quality musical instruments. The 8MB ROM incorporates new 16-bit high-quality sounds, including acoustic instruments, attack transients and analog waveforms. There is a PCM card slot and 512K RAM area for loading additional sounds from T Series disks, computers and the Korg DSM1 work disks. A powerful 65,000-note internal sequencer is included with extensive editing functions, allowing you to record any performance with uncompromised flexibility. As a master MIDI controller, the T1, T2 and T3 feature large, easy-to-read character displays. All programs, combinations, sequences and sys ex data can be saved and loaded to the internal 3.5" disk drive. As on the M1, the T Series keyboards have 33 different types of effects independently programmable in stereo.

KURZWEIL MUSIC SYSTEMS, INC., 411 Waverley Oaks Rd., Waltham, MA 02154; (617) 893-5900; FAX: (617) 893-2733. Product Name: 1000 Series Synthesizers. Contact: Michael J. Malizola, mktg comm mgr. Date Product Introduced: 6/89 Product Description & Applications: The 1000 AX Plus Acoustic Expander and the 1000 PX Plus Professional Expander are Kurzweil's latest 1000 Series products. Both feature high-quality Kurzweil orchestral and synth ROM samples and are expandable up to eight megasamples of ROM with the AX Upgrade and PXB Sound Blocks. The 1000 PX Plus has stereo audio outputs, 24-voice polyphony, full MIDI implementation and 96dB S/N ratio. The AX Plus has all the same audio specs with 20-voice polyphony. Both are in two-space 19" rack enclosures. Basic Specifications & Suggested List Price: 1000 AX Plus Acoustic Expander is \$2,395 list. 1000 PX Plus Professional Expander is \$2,395 list. AX Upgrade (SXA and HXA Sound Blocks for the AX Plus) is \$495 list. PXB Sound Block (for 1000PX, PX Plus, and KXB for K1000) is \$495 list.

L.A. AIR FORCE, 1097 D-BAR-K Dr., Durango, CO 81301; (303) 247-5082. Product Name: Cheap Radio Thrills CD Edition. Contact: Terry Moss, producer. Date Product Introduced: 8/89 Product Description & Applications: Original "world's best production library," now transferred to CD with new additions. Both goofy stuff and serious music and effects from the "Singing EBS Test" and awful (parody) versions of *Happy Birthday*, *The Circus March*, *The Lone Ranger*, etc., to rich 60- and 30-second music cuts, timpani rolls, soap opera organ music, etc. Basic Specifications & Suggested List Price: Three CD set over 300 cuts, \$249.95 buyout for local production. Low-cost national buyout.

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MUSIC PRODUCTS

1990

L.A. AIR FORCE; 1097 D-BAR-K Dr.; Durango, CO 81301; (303) 247-5082. Product Name: Hollywood Production Library. Contact: Terry Moss, producer. Date Product Introduced: 1988 Product Description & Applications: Three-compact disc library containing 221 cuts, all 60s and pullout 30s. Very diverse instrumentation and styles, computer to full orchestra. Buyout for local production, fully guaranteed. \$295 includes shipping

LOWREY ORGAN COMPANY/LOWREY CONTEMPORARY KEYBOARDS; 825 E. 26th St.; LaGrange Park, IL 60525; (312) 352-3388; FAX: (312) 352-3464. Product Name: LS-30. Contact: Frank A. West, advertising and promotions Date Product Introduced: 1/89 Product Description & Applications: Lowrey's LS-30, a portable keyboard with big sound The ease of operation and wealth of performance features will have you sounding like a pro and having fun. Up to 576 voices are accessible with "top note dual," and a dynamic variety of rhythm patterns will satisfy any musical taste. "One Finger Ad-Lib" lets you play wonderful melody riffs with just one finger. Basic Specifications & Suggested List Price: 49 mid-size keys, 256 total voice variations, 24 rhythm patterns, record, erase playback, demo, one finger ad-lib, sound-selectable pads, MIDI in/out, stereo headphone jack, rhythm tempo control, top note dual, start/stop, sync, fill-in intro/ending. Price not available.

LOWREY ORGAN COMPANY/LOWREY CONTEMPORARY KEYBOARDS; 825 E. 26th St.; LaGrange Park, IL 60525; (312) 352-3388; FAX: (312) 352-3464. Product Name: LSM-1 Sound Expander. Contact: Frank A. West, advertising and promotions. Date Product Introduced: 6/16/89 Product Description & Applications: Small, powerful and incredibly affordable, the LSM-1 will expand the capabilities of any MIDI-compatible keyboard by adding 250 tone patches and 30 fabulous rhythms. Create beautiful tones by layering voices up to four deep or split the keyboard up to four times to create musical ensembles. These and many more capabilities in a small, lightweight unit. Basic Specifications & Sug-

gested List Price: Voices: 16 max Tone patches: 250 200 tones, 50 combinations. Rhythm: 30 patterns, start and stop, intro fill-in, tempo, rhythm volume. Combination edit: 30 forms, assign volume System: tune, transpose, transmit/receive channel, omni on/off Program change, pitch bend, modulation, volume, hold, velocity on/off, L/Mono/R, MIDI in/out/thru.

NEW ENGLAND DIGITAL; 49 N. Main St., P.O. Box 546; White River Jct., VT 05001; (802) 295-5800. Product Name: Synclavier® 6400. Contact: Ted Pine, marketing comm mgr. Date Product Introduced: 10/89 Product Description & Applications: New England Digital will be showing the newest addition to its full line of digital audio workstations for recording and post-production, the Synclavier 6400. The newest Synclavier is a 32-voice, stereo sampling system with 64MB of RAM and enhanced 76-note keyboard with improved response and control features. Demonstrated with the Synclavier 6400 will be MIDInet™, a comprehensive MIDI studio integration tool providing unprecedented filtering, mapping, channelization, transposition and routing capabilities for up to 128 separate MIDI devices, including data-intensive applications such as console automation. Basic Specifications & Suggested List Price: Core system includes CPU, 2-channel, 1 to 100kHz A/D input module; 76-note keyboard, Macintosh Iix graphics workstation, SMPTE interface, system hard disk, operating software, sound library and documentation. Options include Optical Disk storage, MIDInet, additional RAM, disk storage and outputs Base price: \$86,000

OBERHEIM DIVISION, EMCOA; 2015 Davie Ave.; Commerce, CA 90040-1704; (213) 725-7870; FAX: (213) 888-2874. Product Name: Eclipse. Contact: Bob Selan, Lawrence Kameen Date Product Introduced: 9/89. Product Description & Applications: The Eclipse surpasses current-technology keyboards in two dimensions simultaneously. Stand-alone, the Eclipse is a fully programmable multitimbral analog synthesizer incorporating Matrix voice architecture with a stereo chorus to create the world's fattest textures. Combined with external components of the musicians's choosing (controller, sequencer and up to 16 slaves), the Eclipse provides fully personalized, yet integrated workstation-style control for stage and studio, far beyond conventional controllers. Five custom colors are available. Basic Specifications & Suggested List Price: Eight voices, four assignable outs; stereo headphone out; 1,000-patch library (800 ROM, 200 RAM), fully programmable patches. Dedicated alternate controller input, sequencer in/out/thru, and four slave outs, 100 setups controlling 16 instruments at once; 16 setup chains. 5-octave velocity/pressure keyboard; four pedals; mfr. sugg. retail. \$1,995.

PEAVEY ELECTRONICS; 711 A St.; Meridian, MS 39301; (601) 483-5365. Product Name: DPM-3. Contact: Ken Valentine, product mgr. Date Product Introduced: 1/89. Product Description & Applications: The DPM-3 provides 16 voices in a polyphonic/multitimbral configuration. With its 27-megahertz voice data processing rate, it provides more processing power than six personal computers in a totally software-based voice-generation architecture. It houses a 3.5" floppy disk drive and a RAM card interface for program, effects and sequencer data storage. The internal 9-track MIDI sequencer provides for up to 20,000-note recording, with independent track looping and "micro-editing" for sequencer, tracks and song compositions. Basic Specifications & Suggested List Price: Digital phase modulation synthesis, 16 voices with two 16-bit digital PCM oscillators per voice. 61-key velocity-sensitive keyboard with aftertouch. Dual multi-effects signal processing with three assignable inputs and up to six simultaneous effects 9-track sequencer with 20,000-note capacity 4MB of internal ROM along with a 720KB floppy disk drive.

ROLANDCORP US; 7200 Dominion Circle; Los Angeles, CA 90040; (213) 685-5141. Product Name: S-770 Digital Sampler. Contact: Craig Sibley, product specialist mgr. Date Product Introduced: 6/89. Product Description & Applications: The S-770 is a professional digital sampler featuring a 16-bit linear digital data sampling format and Differential Interpolation technology that provides excellent sound quality. Digital inputs and outputs allow you to transmit and receive data entirely in the digital domain. Standard memory is 2MB of RAM, expandable to 16MB to provide up to 90 seconds of stereo sampling at 48kHz. A large LCD and CRT outputs provide a user-friendly interface. Basic Specifications & Suggested List Price: 16-bit linear data sampling; 48kHz, 44.1kHz, 24kHz and 22.05kHz sampling rates; 24-bit processing capability; 20-bit D/A converter; Differential Interpolation sampling method; 2MB RAM capacity expandable to 16MB; 24-voice polyphony; digital inputs and outputs; 64 x 240-dot LCD; RGB and monochrome display outputs; built-in 40MB hard disk; SCSI interface. \$7,995.

SCHOLZ RESEARCH AND DEVELOPMENT, INC.; 1560 Trapelo Rd.; Waltham, MA 02154; (617) 890-5211. Product Name: Rockman MIDIPedal Footcontroller. Contact: Sherri Cohn. Date Product Introduced: 1/89. Product Description & Applications: The Rockman MIDIPedal Footcontroller was created for instantaneous program switching on all the new Rockman MIDI products, as well as any other type of MIDI processor. Sending out all 128 MIDI program change commands on all 16 MIDI channels, the MIDIPedal features a

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large, easy-to-read LED display, plus LED indicators for each of the "stomp-proof" control buttons. Very simple and intuitive to operate. **Basic Specifications & Suggested List Price:** Pre-select your next bank while you're playing, and call up your next program by hitting one control button. The answer to the need for a straightforward, rugged and affordable MIDI foot-controller that lets you concentrate on making music, not patch changes. Built-in AC power supply. List price: \$219.95

SEYMOUR DUNCAN RESEARCH; 601 Pine Ave., Goleta, CA 93117; (805) 964-9610. Product Name: 84-40 Tube Guitar Amplifier. Contact: Mark Spangler, artist relations. Date Product Introduced: 6/89. Product Description & Applications: All-tube guitar amp. 40 watts—perfect for recording, rehearsal, small club work. Uses EL-84-type tubes for a classic tube sound at an affordable price. **Basic Specifications & Suggested List Price:** 40 watts, two channels, effects loop, reverb. Available with one 12" or two 10" speakers. \$595

SMITH ELECTRONIC MUSIC LABS (SEML); 213 N. Broadway, Billings, MT 59101; (406) 245-8108. Product Name: SEML Modular. Contact: Timothy C. Smith, president. Date Product Introduced: 7/17/89. Product Description & Applications: SEML Modular announces a complete line of analog and hybrid synthesizer modules. They are designed to be used in the construction of classical modular systems or to expand existing modular systems. They are also perfectly suited for MIDI-to-CV conversion. All modules are either linear or exponential response and have 1V/octave compatibility. These are not flat, two-dimensional sound "chip-type" circuits, but are discrete, high-slew rate designs. **Basic Specifications & Suggested List Price:** Included are "Fat" four-pole VCF (completely discrete), VCO, 7-mode VCF, dual VCA, exponential amplifier, lag processor, mini sequencer, voltage processor/mixer/inverter, red/pink/white noise generator, ADSR, AR with gate delayer, env. follower, dual VCA mixers, sample/hold and several unusual modules. Also available: a discrete op amp board for use in special projects/applications. All modules are priced between \$65 and \$160

STANDTASTIC; 1325 Meridian St., Anderson, IN 46016; (317) 642-5205. Product Name: Wall Mount Kits. Contact: L. J. Mechem, vp. Date Product Introduced: 1989. Product Description & Applications: Wall Mount Kits—designed for studio, store, home installation. Frees up floor space. Allows for flexible displaying/placement of keyboards and accessories directly to the wall. **Basic Specifications & Suggested List Price:** \$129.95

SYNTH-BANK; 12080 SW Parkway, Portland, OR 97225; (800) 336-0466. Product Name: Soft-Drop™. Contact: Bryan Bell. Date Product Introduced: 9/89. Product Description & Applications: Soft-Drop provides control over musical and sound-effect passages in conjunction with synchronization to film/video while requiring a minimum of training and experience. Soft-Drop is the computer's version of audio post-production "needle drop" concept. Soft-Drop has prerecorded musical selections stored in both audio and MIDI formats. The music index software offers a powerful new dimension in search capacity. The MIDI mode allows editing of time, arrangement and tempo without changing the pitch. **Basic Specifications & Suggested List Price:** Designed for video post, corporate video and regional television production facilities. Soft-Drop is a turnkey system including Macintosh computer, software and hardware, service and training. SMPTE-compatible. Also included is an online connection (via modem) to the musical library and the Synth-Bank sound file library on MacNet. Call for pricing.

WALDORF ELECTRONICS c/o STEINBERG/JONES; 17700 Raymer St., Ste. 1002; Northridge, CA 91325; (818) 993-4091. Product Name: Micro-Wave. Contact: Geoff Ryle, product specialist. Date Product Introduced: 6/89. Product Description & Applications: The Micro-Wave uses Dynamic Spectral Wavetable Synthesis to produce delicate timbres that vary over time according to your sound programming. It is based on the legendary family of Wave synthesizers developed by Wolfgang Palm of PPG in the early 1980s. The Micro-Wave offers eight voices with two oscillators, a true analog filter, volume and panning, four envelopes and two LFOs per voice, and complex modulation routings. It can achieve eight-part multitimbral mode with dynamically allocated voices, keyboard and velocity windows, tuning and velocity tables, assignable MIDI controllers, overflow, etc. **Basic Specifications & Suggested List Price:** Memory of close to 2,000 different wavetables, two oscillators per voice with three modulation inputs each drive a wavetable memory with four modulation inputs per oscillator, two LFOs with four waveforms, symmetry, humanize and sync features, split, layer and velocity crossfade/switch sounds; macro templates allow for quick editing of sounds. Holds up to 64 sounds; RAM card.

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave., Buena Park, CA 90622; (714) 522-6600. Product Name: Yamaha MIDI Grand. Contact: Carter Schuld. Date Product Introduced: AES 1989. Product Description & Applications: The Yamaha MIDI Grand combines the sonic excellence and superb feel of the renowned Yamaha Conservatory Grand piano with an advanced fiber optic sensor system that accurately captures keyboard expression, converts to MIDI data and transmits this data to external MIDI devices. Each key



YAMAHA PROFESSIONAL AUDIO DIVISION
Yamaha MIDI Grand

also has aftertouch sensors. Two independently programmable processors allow simultaneous control over two separate MIDI systems. A control panel above the keyboard displays function status and allows remote modification to external MIDI gear, or change keyboard splits, configurations, etc. **Basic Specifications & Suggested List Price:** The MIDI Grand is available in C3 (6-foot) and C7 (7-foot, 4-inch) models and is factory assembled as a complete performance controller, and not a retrofit kit. Two footpedals send volume and modulation data to external controllers. The traditional sustain and soft pedals can control both the acoustic piano and MIDI functions. The unit also includes pitch and modulation wheels and a BC-2 breath controller.

ZETA MUSIC SYSTEMS, INC.; 2230 Livingston St., Oakland, CA 94606; (415) 261-1702; (800) 622-6434. Product Name: Mirror 6 MIDI Guitar. Contact: Sales manager. Date Product Introduced: 1/89. Product Description & Applications: The Mirror 6 patented fret-scan and pitch-extraction hybrid technology allows for note triggering within one millisecond on all strings. Our custom software allows for MIDI response in any use—legato to heavy picking. Each string can control a separate synthesizer via mono or poly mode. The guitars use standard strings and jumbo frets for the true feel of your favorite guitar. **Basic Specifications & Suggested List Price:** Deluxe model includes Kahler custom tremolo, breath controller, accelerometer and EMG pickups. The standard and deluxe are available in pearl white, gloss black, red, seafoam green or anthracite gray. Custom finishes available. Optional Amtrak™ synthesizer dynamics processor. Deluxe—\$3,795, standard—\$2,995, Amtrak—\$295

ZETA MUSIC SYSTEMS, INC.; 2230 Livingston St., Oakland, CA 94606; (415) 261-1702; (800) 622-6434. Product Name: Prism Bass. Contact: Sales manager. Date Product Introduced: 3/89. Product Description & Applications: The Zeta Prism Bass features our proprietary bridge pickup system, advanced active electronics, and a carbon graphite, aluminum and hardrock maple neck. The pickup system incorporates four piezo crystal transducers per string. Placed directly under the string, the pickups provide a clarity and transient response unavailable with magnetic pickups. This allows for improved frequency response. The Prism is ergonomically designed for easy access to the 24th fret. **Basic Specifications & Suggested List Price:** Bass controls include master volume, bass EQ knob, treble EQ knob and 3-way "Phantom" pickup selector switch; bolt-on neck—34" scale, 24 nickel-silver alloy frets, ebony fretboard, Gotoh tuning machines. Zeta BP410B bridge pickup, hard maple neck. Finishes available in black, white, red, gray, seafoam green. Custom finishes available. List \$1,495.

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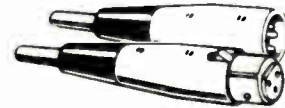
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RECORDING DEVICES AND TAPE

1990

ACCURATE SOUND CORPORATION; 3515 Edison Way; Menlo Park, CA 94025; (415) 365-2843; FAX: (415) 365-3057. Product Name: AS 300 Audio Tape Transport. Contact: Ronald M. Newdell, president. Date Product Introduced: 9/89. Product Description & Applications: Audio tape transport for handling 150 to 1" tape on 14" reels. DC Servo Systems with direct drive capstan similar to the Ampex ATR 100 series transport will replace present AS 200-A high-speed audio duplicator and AS 6000 tape cleaner/conditioner transports. A new line of audio recorders will be developed around this new transport.

ACCURATE SOUND CORPORATION; 3515 Edison Way; Menlo Park, CA 94025; (415) 365-2843; FAX: (415) 365-3057. Product Name: AS-4000-8 Cassette Data Recorder/Logger. Contact: Ronald M. Newdell, president. Date Product Introduced: 8/89. Product Description & Applications: Cassette audio recorder 4- and 8-channel 15/64 ips bidirectional for low-speed recording of broadcast, police, fire, airport and other audio plus instrumentation data logging requirements. Basic Specifications & Suggested List Price: 4- and 8-channel using standard Phillips C-90 or C-120 audio cassette. Eight hours of recording on eight channels or 64 hours on one channel bidirection. 300Hz to 3kHz frequency response. Time code option per automatic search. 8-channel—\$4,800, 4-channel—\$2,800.



AGFA CORPORATION
PE 647/947

AGFA CORPORATION; 100 Challenger Rd.; Ridgefield Park, NJ 07660; (201) 440-2500. Product Name: PE 647/947. Contact: Chris Emery, nat'l mktg. mgr.—magnetic tape products. Date Product Introduced: 1/89. Product Description & Applications: The newest addition to the AGFA cassette tape line is PE 647/947, a chromium dioxide bias II product, featuring excellent high-frequency response, low noise and overall wide dynamic range for the most critical applications in either high-speed duplication or real-time recording. Basic Specifications & Suggested List Price: PE 647—HUB 8,200; C-60 PE 947—HUB 11,500; C-90

AKG ACOUSTICS; 77 Selleck St.; Stamford, CT 06902; (203) 348-2121. Product Name: DSE 7000. Contact: Chris Moore, vp, digital division. Date Product Introduced: 5/89. Product Description & Applications: The AKG digital sound editor is a RAM-based digital audio workstation optimized for the efficient, rapid, low-cost production of high-quality short recordings.

ALPHA AUDIO; 2049 W. Broad St.; Richmond, VA 23220; (804) 358-3852. Product Name: DR-2. Contact: Spence Burton, tech mgr. Date Product Introduced: Fourth quarter 1989. Product Description & Applications: Alpha Audio automation systems division announces the development of a 2-channel digital disk-based recorder: the DR-2. The DR-2 can be controlled by a hand-held remote control, or by an external editing controller via its Sony VTR emulation port. The DR-2 can be used for storage of general sound effects or field elements for

auto assembly. Basic Specifications & Suggested List Price: The DR-2 is capable of 44.1 kHz, 16-bit stereo sampling and playback 35- or 70-minute configurations (double for mono operation). Four rack units. Digital I/O available soon. Suggested list price—comparable to high-end, 2-track tape recorders, which it replaces.



AMPEX RECORDING MEDIA CORPORATION
467-DAT

AMPEX RECORDING MEDIA CORPORATION; 401 Broadway, M/S 22-02; Redwood City, CA 94063; (415) 367-2288. Product Name: 467-DAT. Contact: Steve Smith, audio product line mgr. Date Product Introduced: 3/89. Product Description & Applications: Ampex Recording Media Corporation's superior quality Ampex 467-DAT digital audio tape features an advanced formulation of metal particle tape and Ampex's new and unique "DATpak™" DAT mastering storage system. The Ampex exclusive DATpak provides large write-on area and the special tray design allows storage of two DAT cassettes, plus room for track sheet storage. Ampex 467-DAT comes in a full range of length configurations: 45, 60, 90 and 120 minutes.

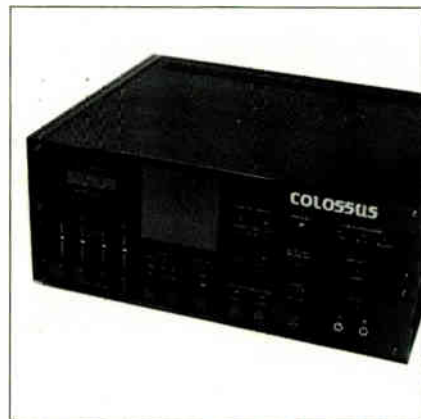


AMPEX RECORDING MEDIA CORPORATION
472 Studio Audio Cassette

AMPEX RECORDING MEDIA CORPORATION; 401 Broadway, M/S 22-02; Redwood City, CA 94063; (415) 367-2288. Product Name: 472 Studio Audio Cassette. Contact: Steve Smith, audio product line mgr. Date Product Introduced: 2/89. Product Description & Applications: Ampex Recording Media Corporation's 472 Studio Audio Cassettes, for studio, dubs, client copies and other applications. Normal bias and high bias, 472 cassettes are available in 5, 10, 15, 30, 45, 60 and

90-minute lengths. Ampex 472 Studio Audio Cassettes feature Ampex's distinctive, user-friendly labeling, designed to aid the busy studio professional.

AMS INDUSTRIES INC.; 3827 Stone Way N.; Seattle, WA 98103; (206) 633-1956. Product Name: AudioFile with version 8.07 software. Contact: Nigel Branwell. Date Product Introduced: 9/89. Product Description & Applications: Software enhancements to AudioFile include: varispeed through the digital port, digital de-emphasis, digital outputs available in all pages, DC offset removal, high-resolution metering, simplified screen structures, record "punch in/out", SMPTE output (including dropframe), automatic dialog replacement, "Timeflex" time compression and expansion. Basic Specifications & Suggested List Price: 8-input x 8-output system with optional integrated digital mixer. \$90,000 for two-hour storage (includes all standard software upgrades).



BY THE NUMBERS
Colossus

BY THE NUMBERS; PO Box 8359; Incline Village, NV 89450-8359; (702) 831-4459; (702) 831-4461. Product Name: Colossus. Contact: Brad S. Miller, Lou Doreen. Date Product Introduced: 8/89. Product Description & Applications: 4-channel production units are now available! PCM archiva/recording system that has NO sound of its own! Live recording for film, video or CD, A/D or D/D conversions and disk storage/retrieval, and NTSC compatibility offers wide range of recording and broadcast possibilities. Over 36 compact disc samples available on labels such as Bainbridge, Te'arc, Delos/A&M, Monster Music, Quartet, PolyGram/Verve. List available. 4-channel microphone (MS-4) also available. Basic Specifications & Suggested List Price: 4-channel PCM digital format, compatible with NTSC professional recording and broadcast formats, including optical LVD 12 VDC, 120 and 240 VAC, 28 sounds, rack-mountable, 96dB S/N, 96dB dynamic range and channel separation. System uses no error concealment or data compression of any kind! Flat from 2Hz to 20kHz, +4/-10 in/out, selectable. \$22,500.

DWIGHT CAVENDISH COMPANY; 2117 Chestnut Ave.; Wilmette, IL 60091; (312) 256-0937. Product Name: Cavendish Copymaster Video Cassette Duplicator. Contact: Marshall A. Ruedanz. Date Product Introduced: 1989. Product Description & Applications: The Cavendish Copymaster Video Cassette Duplicator is modular in design to allow users to start small and enlarge their duplicator as their business grows. Cavendish duplicators can start with as few as five or ten slaves and will expand to any size. Any remotely controllable VCR may be used in a Cavendish duplicator. Basic Specifications & Suggested List Price: The price varies with the size of the duplicator. As an example, a 50-slave duplicator (less VCRs) will sell complete, assembled, tested and installed for about \$27,000.

CINEDCO, INC.; 1225 Grand Central Ave.; Glendale, CA 91201-2425; (818) 502-9100. Product Name: Audiflex. Contact: Herb Dow, exec. VP. Date Product Introduced: NAMM '89. Product Description & Applications: Audiflex—a digital dialog track editing system. Audiflex is a multichannel, hard disk-based, digital sound editing system designed to clean dialog tracks for features or television. Editor uses a visual wave form to mark splice points for easy insertion of ADR Foley lines, etc. The Audiflex is also capable of auto-assembling tracks from a SMPTE standard edit decision list. Basic Specifications & Suggested List Price: System configurations of one to eight channels, independent hard disk storage of 27 minutes per channel; removable, reusable backup/library storage facilities: one +4dBm XLR input per channel, two +4dBm XLR outputs per channel, 44,056kHz fixed frequency; sample rate locked to video, 16-bit linear sampling.

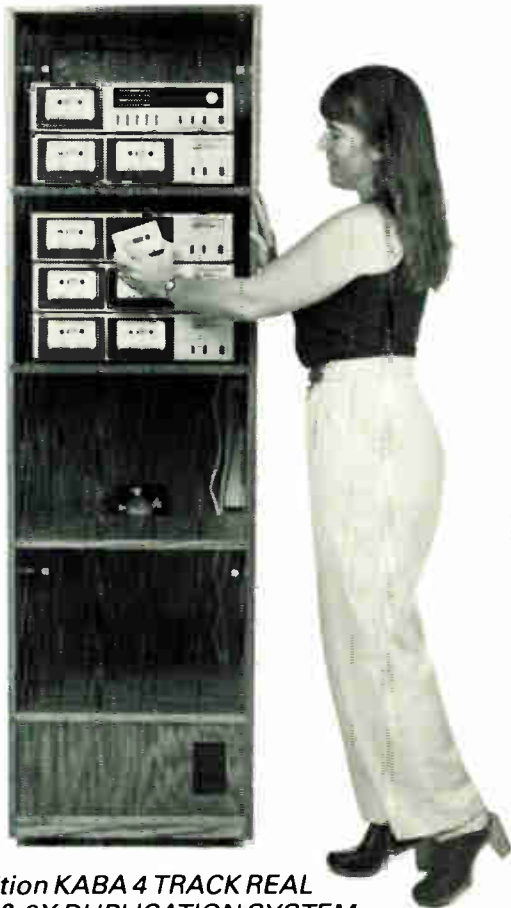
DIC DIGITAL; 2 University Plaza; Hackensack, NJ 07601; (201) 487-4605. Product Name: 8mm Video Tape Cassette. Contact: Kevin Kennedy, nat'l mktg. mgr. Date Product Intro-

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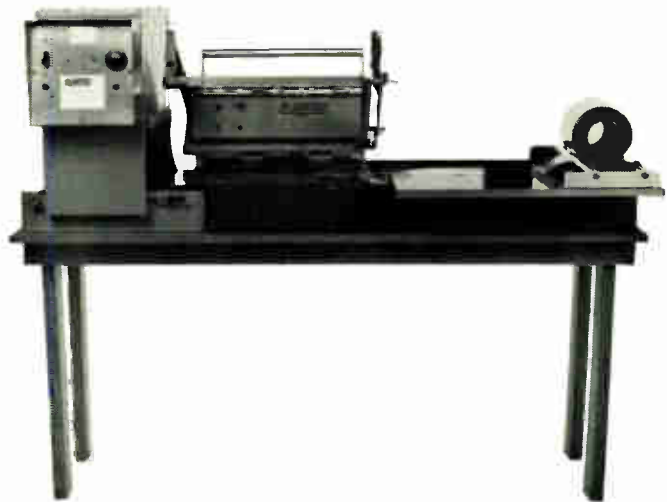
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RECORDING DEVICES AND TAPE

1990

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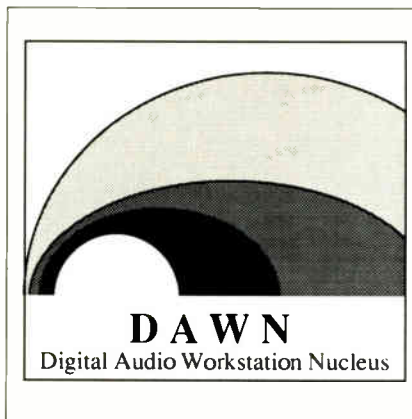
duced: 6/89 Product Description & Applications: 8mm metal particle videocassettes have a surface density of 1,500 oersted allowing for more higher-quality recording per inch of tape. The tape is presently used by duplicators to meet the fast-growing industrial and consumer markets. Also used by production companies for "dailies"—sampling the work done that day on the set. The product, because of its density, is also used in data storage applications: one 120-minute 8mm videocassette can store 2.3 gigabytes of information. Basic Specifications & Suggested List Price: DIC Digital Video 8's range is 85dB—with virtually no ambient noise, distortion, wow or flutter. That's sound performance comparable to that of DIC//DAT, the definitive digital audio tape. Smooth, consistent surface quality guarantees stable, vibration-free performance even at high speeds. And DIC Digital's unique tape backcoating and tape edge treatment resist the buildup of static electricity, a frequent cause of damaging tape dropouts. 120-min tape \$8.99

DIGIDESIGN; 1360 Willow Rd., #101; Menlo Park, CA 94025; (415) 327-8811. Product Name: Sound Tools Digital Recording and Editing System. Contact: Suz Howells, product mktg mgr. Date Product Introduced: 3/89 Product Description & Applications: Sound Tools™ is a stereo direct-to-hard disk digital recording and playback system with extensive editing features and powerful digital signal processing functions. Offering professional audio quality (16-bit, 44.1kHz), Sound Tools is ideal for music editing and mastering and audio post-production applications. System features include non-destructive playlist editing, time compression/expansion, digital EQ, full SMPTE synchronization, DAT editing and much more! Basic Specifications & Suggested List Price: The system is Macintosh based, consisting of Sound Accelerator digital signal processing card, Sound Designer II audio editing software and the AD IN analog-to-digital converter. For compatibility with professional digital audio devices such as DAT machines and compact disc players, there's the DAT I/O bidirectional digital interface. System price \$3,285, DAT I/O \$995. Requires Macintosh SE/30 or II models. 1 meg RAM and a hard disk drive.

DIGITAL AUDIO RESEARCH; 6363 Sunset Blvd., Ste. 802; Hollywood, CA 90028; (213) 466-9151. Product Name: SoundStation II. Contact: Lee Bartolomei, regional mgr. Date Product Introduced: Software update: 8/89 Product Description & Applications: SoundStation II is an easy to use, multichannel digital audio recording, editing and production system for audio, film and video applications. With its unique console and touch-sensitive screen, SoundStation provides fast and familiar "tape-like" operations such as reel-rock editing, cut, mark, copy and loop as well as Stereo TimeWarp, splice and segment sliding, adjustable crosslades. SoundStation supports up to eight channels of digital and analog I/O, time code chase, machine control, and backup to R-DAT and optical disk. Basic Specifications & Suggested List Price: Control console and processing unit incorporating two track hours, four channels in, eight channels out (analog) and time code chase. \$99,900. New options include 16 channels of record/playback.

DIGITAL DYNAMICS, INC.; 270 E. Pulaski Rd.; Greenlawn, NY 11740; (516) 271-5600. Product Name: Pro Disk-464. Contact: John J. Little, sales mgr. Date Product Introduced: 8/89. Product Description & Applications: The ProDisk-464 is a 4- to 64-track digital audio recording and editing system for music recording, video/film post-production, television and radio broadcast. Priced below what you expect to pay for a multitrack digital tape recorder, the ProDisk-464 is a second generation, random access, disk-based system that will dramatically reduce your production costs. Basic Specifications & Suggested List Price: Graphical control panel operation from a Macintosh computer. Each 4-track unit provides up to two track hours of storage. Time code capability. 8-track system price \$38,495. 24-track system price \$98,995.

DOREMI LABS; 4927 Glen Arden Ave., Covina, CA 91724; (818) 966-2454. Product Name: Digital Audio Workstation Nucleus (DAWN). Contact: Camille Ritko, designer. Date Product Introduced: 8/89. Product Description & Applications: Digital Audio Workstation Nucleus (DAWN) is the heart of a Macintosh-based audio workstation. It is a network-based system that can accommodate various recording devices such as hard disks, removables, optical erasables and WORMs. The basic unit has 2 inputs and 8 outputs that can operate both from RAM or directly to disk. It has a MIDI interface for external control, and is also SMPTE cueable. The unit has been successfully used in sound effects editing, dialog replacement, music and other audio and audio-for-video environments. Basic Specifications & Suggested List



DOREMI LABS
Digital Audio Workstation Nucleus (DAWN)

Price: 2 inputs, 8 outputs. 16-bit linear sampling at 44.1kHz, 48kHz or 96kHz. Playback rate is variable. Internal RAM capacity is 16MB. Synchronization is achieved with MIDI time code (MTC). Total recording in RAM is 2.78 minute/track at 48kHz; recording on disk is media dependent (e.g., 300MB hard disk will allow 52 minute/track at 48kHz). DAWN list price \$10,500

HYBRID ARTS, INC.; 8522 National Blvd.; Los Angeles, CA 90230; (213) 841-0340. Product Name: ADAP II. Contact: Steve Cunningham, vp sales and mktg. Date Product Introduced: 4/89. Product Description & Applications: ADAP II is a disk-based digital audio recorder and editor. ADAP II allows full cut, copy and paste editing of stereo digital audio. ADAP's built-in cue page allows precise placement of sounds against video, and ADAP includes a built-in SMPTE reader/writer. ADAP II's operating system is easy to use and designed for speed of editing. The ADAP II is a turnkey system that includes audio I/O, CPU, signal processor and hard disk modules. Basic Specifications & Suggested List Price: Resolution: 16-bit. Sample rates available include 48, 44.1, 32 and 22kHz. Digital audio formats supported include AES/EBU and SPDIF. ADAP II turnkey systems start at \$9,995. An ADAP II with 760MB of disk for 50 min. of stereo recording is \$14,995.

INTEGRATED MEDIA SYSTEMS; 1370 Willow Rd.; Menlo Park, CA 94025; (415) 326-7030. Product Name: Dual Dyaxis. Contact: Gerry Kearby, VP mktg. Date Product Introduced: 9/89. Product Description & Applications: 4-channel hard disk recording and editing system. Multiformat real-time digital I/O system supports SPDIF, AES/EBU, SDFI, Sony 601, Yamaha, P.D. and IMS/D. Locks to any sync source. Designed for 4-channel audio post applications, CD premastering applications and music recording. System is capable of offline upload/download functions as well as R-DAT backup. Basic Specifications & Suggested List Price: Call for specs. List price \$15,000 and up.

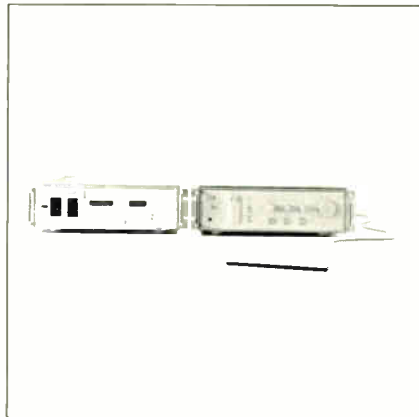
JVC PROFESSIONAL PRODUCTS COMPANY; 41 Slater Dr.; Elmwood Park, NJ 07407; (201) 794-3900; FAX: (201) 523-2077. Product Name: Professional DAT Recorder. Contact: Elin Everson, mgr. advertising sales promotion. Date Product Introduced: AES 1989. Product Description & Applications: Prototype of Professional DAT—main features are SMPTE time code recording in subcode area, and synchronization with video systems.



MUSICSOFT
MIDIman

MUSICSOFT; 30 N. Raymond Ave.; Pasadena, CA 91103; (818) 449-8838. Product Name: MIDIman. Contact: Toby Odell, vp sales. Date Product Introduced: 1/89. Product De-

scription & Applications: MIDIman is a MIDI-to-tape interface that allows MIDI data (notes, pitch bend, sequences, timing, etc.) to be recorded to any tape recorder and played back in real time. The product features very high reliability, ease of use and low cost. The product has a MIDI-merge capability built in. Data read from tape can be channeled. Basic Specifications & Suggested List Price: MIDIman is 3" x 6" x 1" and has in and out jacks for tape and in and out jacks for MIDI. It operates from a 9-volt wall unit (supplied). Retail price: \$199.25



NAKAMICHI AMERICA CORP.
1000 Digital Audio Recording System

NAKAMICHI AMERICA CORP.; 19701 S. Vermont Ave.; Torrance, CA 90502; (213) 538-8150. Product Name: 1000 Digital Audio Recording System. Contact: Jett Logan, vp pro audio. Date Product Introduced: 4/89. Product Description & Applications: Nakamichi's 1000 Digital Audio Recording System is a 2-channel DAT machine in a modular design with dedicated chassis for the recorder and digital processor. The recorder incorporates Nakamichi's patented F.A.S.T. transport that provides quicker access and superior tape-to-head alignment. True off-tape monitoring is available via the 4-head design. The 1000P digital processor allows recording at sampling frequencies of 48, 44.1 and 32kHz. Two recorders can be supported with a single processor. Basic Specifications & Suggested List Price: Heads: four (two record/two play). Sampling frequencies: 48, 44.1 and 32kHz (D/A), 48 and 44.1kHz (A/D). Frequency response: 5 to 20,000Hz ±0.5dB (D/A), S/N ratio: >106dB (D/A). Dynamic range: >100dB (D/A). THD: 0.0005% at 1kHz (D/A). Line input/output (analog): +4dB XLR balanced, -10dB RCA. Line input/output (digital): 75-ohm coaxial/optical. Suggested retail price: \$10,000 (\$5,400—1000; \$4,600—1000P)

NEW ENGLAND DIGITAL; 49 N. Main St., PO Box 546; White River Jct., VT 05001; (802) 295-5800. Product Name: Direct-to-Disk™ PostPro®. Contact: Ted Pine, marketing manager. Date Product Introduced: Updated 1989. Product Description & Applications: New England Digital will be showing the latest enhancements to its Direct-to-Disk/PostPro family of digital multitrack disk recorder/editors, including: 1) CMX® autoconforming software (uses CMX-format EDLs to automatically create audio sequences), 2) optical disk sound effects and ambience database, 3) EditView, a second generation Macintosh-based graphic audio editing package, 4) new operating software for the DESC™ editing and control interface. Basic Specifications & Suggested List Price: Core system includes dual CPUs, 4-channel (expandable) 1 to 100kHz A/D input module, Macintosh Iix graphics workstation, MIDI and SMPTE interface, meter bridge, system hard disk, audio storage module. System prices start at \$86,900.

OTARI CORPORATION; 378 Vintage Park Dr.; Foster City, CA 94404; (415) 341-5900. Product Name: MX-50. Contact: Sally O. Saubolle, mktg. coord. Date Product Introduced: 11/88. Product Description & Applications: The MX-50 is an inexpensive 2-track recorder targeted for any application where an expensive but professional recorder is used. It is available in both a 15/7.5 and 7.5/3.75 ips version, and includes built-in tape timer, front panel ±7% vari-speed, electronic filter control, and dump edit function. An optional Voice Editing Mode (VEM) is available to provide 2x playback without pitch shift for fast editing and review of news or dialog material; a feature ideal for radio news applications. Basic Specifications & Suggested List Price: 1/4" tape, 2-channel, 10.5" maximum reel size. Wow and flutter: less than 0.6% at 15 ips, less than 0.8% (7.5 ips) and less than 0.12% (3.75 ips). S/N ratio at 15 ips is 69dB or more. Frequency response (15 ips): 30 to 20,000Hz ±2dB (0 VU). Weight is approx. 52 lbs.; suggested professional user price is \$2,495.

PUBLISON; 18 Avenue de la Republique; Bagnolet, 93170 France; (33) (1) 43 60 84 64. Product Name: Infernal Workstation. Contact: Peter Dean. Date Product Introduced: 9/89. Product Description & Applications: The Infernal Workstation 4000 is a disk-based recording/editing system on four tracks



PUBLISON
Internal Workstation



SOLID STATE LOGIC
01 Digital Production Centre

For the basic system, expendable up to eight tracks. A convolution color software makes editing powerful and easy. Main features: disk-based recording, two hours with the basic rack, up to ten hours with the extension rack. On option, recording, editing, directly on erasable optical disk (45 minutes per track). Envelope graphic color editing, editing and chaining lists, event lists, synchronization with audio and video materials via the SMPTE time-code, backup on digital cartridge (capacity six hours on 8mm video cartridge) and on optical erasable disk.

SOLID STATE LOGIC, Begbroke, Oxford, OX5 1RU England; (44) (865) 842300. Product Name: 01 Digital Production Centre. Contact: Noel Bell, publicity mgr. Date Product Introduced: 7/89. Product Description & Applications: Integrated digital audio recording, processing and editing system. Comprises an edit suite, 8 channel mixer with digital signal processing and hard disk store of stereo audio. The 01 can serve as a digital master or multitrack recorder, support multitrack sessions, and be used for stereo program mastering, production and post-production. **Basic Specifications & Suggested List Price:** Accepts AES/EBU digital and analog I/O with A/D and D/A conversion, digital EQ and dynamics, 380MB hard disk storage.



SOLID STATE LOGIC
Screensound

SOLID STATE LOGIC, Begbroke, Oxford, OX5 1RU England; (44) (865) 842300. Product Name: Screensound. Contact: Noel Bell, publicity mgr. Date Product Introduced: 6/89. Product Description & Applications: Hard disk-based digital audio editing, mixing and recording system for offline video and film post-production and audio-for-vision editing applications. Interfaces with VTR VCRs and film reproducers with direct machine control. May operate in Harrysound mode with the Quantel Harry System. Screensound uses a VDU, tablet and pen as the control interface. **Basic Specifications & Suggested List Price:** Eight sound reels may be edited and mixed, accepts AES/EBU digital and analog I/Os with A/D and D/A conversion, optional WORM optical disk system for creating and storing library sound effects.

SONY PROFESSIONAL AUDIO, 1600 Queen Anne Rd., Teaneck, NJ 07666; (201) 833-5200. Product Name: TCD-D10PRO DAT recorder. Contact: Art Gonzales, product mgr. Date Product Introduced: 7/89. Product Description & Applications: With its compact size and all-in-one design, the TCD-D10PRO is a "go anywhere" unit for a variety of applications. From music recording to sound effects gathering, the TCD-D10PRO will meet the need for high-quality digital audio. Supplied accessories include full-function remote, two batteries and charger, digital I/O cables, AC universal power supply, shoulder strap and carrying case. The D10PRO exhibits dual A/D converters, enhanced LCD backlit display, balanced mic/line inputs and new CPU transport function check to achieve the ultimate in DAT portability and convenience. **Basic Specifications & Suggested List Price:** Frequency response 20 to 22kHz, S/N ratio more than 85dB (A wt), THD less than 0.06%, channel sep. 80dB, wow and flutter below measurable limits, digital I/O SPDIF and AES/EBU, battery life 1.5 hours, dimensions 10" x 2 1/4" x 7 1/2". Weight 4 lbs 7 oz (incl. battery). List price: \$2,900.

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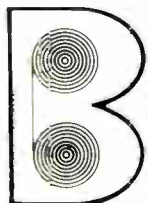


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RECORDING DEVICES AND TAPE

1990

STUDER REVOX

STUDER REVOX AMERICA, INC.: 1425 Elm Hill Pike, Nashville, TN 37210, (615) 254-5651. Product Name: A827-24 Multichannel Recorder. Contact: Tore B Nordahl, president/gen mgr. Date Product Introduced: AES Hamburg, 2/89. Product Description & Applications: Based on the A820-24 transport, the Studer A827 is aimed at users demanding superior performance and reliability in a cost-effective multichannel recorder. For film and video post-production work, A827 features an optional internal SMPTE time code synchronizer. Parallel and serial RS232/422 control ports for integration into editing systems. Also 14" reel capacity, three tape speeds with integrated varispeed controller (and parameters storable in nonvolatile memory for two tape types), phase

compensated MDA-controlled amplifiers with switchable Dolby HX Pro and menu-programmable transport functions. Basic Specifications & Suggested List Price: Wow and flutter: 0.04% at 30 ips; frequency response: 50Hz to 20kHz ± 2 dB, high level input impedance, greater than or equal to 10k Ω m balanced, unweighted S/N OVC = 512 nWb-m, 64dB at 30 ips. Dimensions 30" x 56" x 23". Weight 500 lbs. Price fully fitted with remote control and autolocator—\$47,500, with optional chase lock synchronizer—\$49,950.



STUDER REVOX AMERICA, INC.
A827-24 Multichannel Recorder

STUDER REVOX AMERICA, INC.: 1425 Elm Hill Pike, Nashville, TN 37210, (615) 254-5651, (212) 255-4462 (in NY). Product Name: D820-48 Multichannel Digital Recorder. Contact: Tore B Nordahl, president/gen mgr. Date Product Introduced: AES New York 10/89. Product Description & Applications: The D820-48 employs advanced digital audio devices and powerful computer processing technology. Based on the A820-24 transport, the fully DASH-compatible D820-48 uses 1" tape.



STUDER REVOX AMERICA, INC.
D820-48 Multichannel Digital Recorder

SYMETRIX, INC.: 4211 24th Ave. W., Seattle, WA 98199, (206) 282-2555. Product Name: DPR100 Digital Processing Recorder. Contact: Dane Butcher, president. Date Product Introduced: 1990. Product Description & Applications: The DPR100 is a second generation workstation that provides 8-in/8-out digital domain recording, mixing and signal processing, in real time. Nondestructive editing of up to 28 recorded tracks includes time compression and time expansion. The system is modular and field expandable. Fully configured, the DPR100 delivers a throughput of over 100 MIPS. The DPR100 provides sampling rate conversion and locks to any time code standard. A Mac II is employed as a user interface only and an optional hardware control surface will be available. Designed for video and film post-production, compact disc mastering and broadcast production. Available mid-1990. Basic Specifications & Suggested List Price: True 16-bit A/D and D/A converters, 24-bit internal bus, 32kHz, 44.1kHz and 48kHz, optional AES/EBU digital ins and outs, 28 virtual recording tracks, eight discrete channels in and out, real-time record/play mixing, equalization and dynamic range control for all eight channels.

TASCAM: 7733 Telegraph Rd., Montebello, CA 90640, (213) 726-0303. Product Name: 644 MIDISudio Portable 4-track Mixer/Recorder. Contact: Bill Mohrhoff. Date Product Introduced: 6/89. Product Description & Applications: 16-input mixer with 4-track cassette recorder. Meets electronic music environments' demands for more connections for multiple instruments and keyboards. Compact, easy operation is ideal for home studio composition, audio/music production in small project studios and commercial/industrial applications. Includes built-in MIDI-to-tape synchronizer and serial interface port for external control from a computer. Multitasking capabilities are simplified via routing into "memorable scenes" (through computer memory) on LCD display. Basic Specifications & Suggested List Price: MSRP: \$1,495. Specifications include: 1 1/2" or 3/4" ips; 16-input, dual-channel mixer, 99 "scene" memory through LCD status display, auto punch in/out, rehearse mode, rotary shuttle cue control, three autolocate functions.

TASCAM: 7733 Telegraph Rd., Montebello, CA 90640, (213) 726-0303. Product Name: 688 MIDISudio Portable 6-track Mixer/Recorder. Contact: Bill Mohrhoff. Date Product Introduced: 6/89. Product Description & Applications: 20-input mixer with 8-track cassette recorder. Ideal for music composition at home, or audio production at small-scale professional recording studios, with inputs for keyboards, samplers, drum machines and various instruments under MIDI sequencer controls. Multitasking capabilities are simplified via routing into memorable scenes (99), where status is viewed on LCD display. Includes built-in MIDI-to-tape synchronizer, and serial interface port for external control from a computer. Basic Specifications & Suggested List Price: MSRP: \$3,299. Features include: 3/8" ips, 20-input, dual-channel mixer, 99 "scene" memory through LCD status display, dbx Type II noise reduction, auto punch in/out, rehearse mode, rotary shuttle cue control, three autolocate functions.

TASCAM: 7733 Telegraph Rd., Montebello, CA 90640, (213) 726-0303. Product Name: MSR-24 Recorder/Reproducer. Contact: Bill Mohrhoff. Date Product Introduced: 8/89. Product Description & Applications: Highly affordable 1-inch tape, 24-track recorder/reproducer for commercial, industrial and project studio applications in music, audio and video. Useful features include: rehearse mode, noiseless and gapless punch in/out points, noise-free spot erase, controlled by 8-bit microprocessor digital control, direct drive, high-torque, capstan-motored transport, pitch control for coarse/fine adjustments over 15% range, SMPTE time code-based synchronizer interface, large-core proprietary head design. Basic Specifications & Suggested List Price: MSRP: \$15,000. Outstanding specifications include: 10.5" reels; 7 1/2" or 15 ips tape speeds, built-in ddx; S/N at 108dB (A-weighted at 15 ips).

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TASCAM; 7733 Telegraph Rd.; Montebello, CA 90640; (213) 726-0303. Product Name: TSR-8 8-track Recorder/Reproducer. Contact: Bill Mohrhoff. Date Product Introduced: 8/89. Product Description & Applications: 1/2-inch, 8-track ideally suited to meet needs of home studios and smaller professional facilities on tight budgets. As stand-alone or in sync-lock applications, features include built-in dbx professional Type I noise reduction, fully automated punch in/out for gapless/noise-free inserts and edits, rehearsal mode, sync-lock mode switch for use with SMPTE and FSK time codes, "spot" erase function, adapts to virtually any type of external controllers. Basic Specifications & Suggested List Price: MSRP \$3,499. Features and specifications include: 10 1/2" tape reels, 7 1/2 or 15 ips, 3-motor servo-controlled, tape-tension mechanism, proprietary head materials and design.

TDK; 12 Harbor Park Dr.; Port Washington, NY 11050; (516) 625-0100. Product Name: DA DAT Tape. Contact: Doug Booth, nat'l industrial sales mgr. Date Product Introduced: 1989. Product Description & Applications: Highly refined super finavix pure-metal particle formulation. New high-durability TDC (three-dimensional compound) binder for excellent packing density and even dispersion of particles. Ultra-flat and durable (UFD) base film combines exceptional smoothness with superior strength. Special five-layer high-adhesion treatment for durability and exclusive stable running and reliable backcoating to minimize static build-up. Basic Specifications & Suggested List Price: DA-R60 \$10, DA-R90 \$12, DA-R120 \$14.

TDK; 12 Harbor Park Dr.; Port Washington, NY 11050; (516) 625-0100. Product Name: SM (Sound Master). Contact: Doug Booth, nat'l industrial sales mgr. Date Product Introduced: 8/89. Product Description & Applications: Superior high-bias cassette for studio and demo recordings. Uses top-quality "SA" tape pancake for low noise and wide dynamic range. Precision live-crew cassette mechanism ensures smooth tape travel and stable, reliable operation. Exceptionally life-like sound reproduction of digital sources. Basic Specifications & Suggested List Price: Magnetic particle. Super Avilyn. Coercivity: 53 kA/m, 660 Oe. Remanence: 170 mT, 1700 gauss. Soarance ratio: 0.86.

3M PROFESSIONAL AUDIO/VIDEO & SPECIALTY PRODUCTS; 3M Center, Bldg. 223-5N-01; St. Paul, MN 55144-1000; (612) 733-7732. Product Name: 186 General Purpose Recording Tape. Contact: J.L. Leon, nat'l sales dir. Date Product Introduced: 10/89. Product Description & Applications: 186 low-noise, reel to reel tape is a general purpose tape designed for your everyday recording needs. The product is available on 1/4" hub and comes in 2,500' length and 5,000' length. Basic Specifications & Suggested List Price: 186 is a low noise tape for use with spoken word and where economy is important. See your local 3M pro audio dealer for details.

360 SYSTEMS; 18740 Oxnard St. #302; Tarzana, CA 91356; (818) 342-3127; FAX: (818) 342-4372. Product Name: Permanent Playback Digital Message Systems. Contact: Don Bird, dir. of mktg. Date Product Introduced: 1/89. Product Description & Applications: Zero maintenance storage and playback systems for messages, music, sound effects and more. Modular systems can be configured to handle any length messages. Features include high-bandwidth capability, digital quality audio and complete reliability. Basic Specifications & Suggested List Price: Many different systems are available with pricing dependent upon configuration. Contact the manufacturer for complete pricing and specifications.

TLM ELECTRONICS, INC.; 343 Manville Rd. #6B; Pleasantville, NY 10570; (914) 769-6423; FAX: (914) 769-0012. Product Name: 762 Tension. Contact: Tony Marra. Date Product Introduced: 1/89. Product Description & Applications: The Tape Tension modification is for the Soundcraft 762 tape machine. It replaces the impossible-to-find English distributed Motor Drive Transistors with easily obtainable power MOSFETs. The motor drive circuitry runs cooler, smoother and more reliable. Also available from TLM are New Motor Start capacitors. Basic Specifications & Suggested List Price: \$73.48 per mod including instructions.

VERSADYNE INTERNATIONAL, INC.; 504-D Vandell Way; Campbell, CA 95008; (408) 379-0900; FAX: (408) 379-0902. Product Name: 1500 Series Tape Duplicating System. Contact: Robert W. Kraff, president. Date Product Introduced: 5/89. Product Description & Applications: An upgraded version of Versadyne's professional 1500 Series tape duplication system started shipping during May of this year. Areas of design enhancement included a modification to the loop bin, better enabling the use of very short master tapes, a change in the system controller software, allowing the operator to select a master counter to count up for production totalization or count down for programmed shut-off. The slave's bias buffers have been modified to give a greater output, thus making the system accommodate a wider range of high bias tapes. Basic Specifications & Suggested List Price: The system utilizes a 1/2", 4-track master tape for 32:1 and 64:1 ratios. Slaves operate at 60/120 ips with constant tape tension. System response: 40Hz to 18kHz. 5MHz bias buffers are located at each slave. HFE (similar to Dolby's HX-Pro) and level expand for greater record headroom without additional distortion are standard features. Prices: master—\$27,500; slaves—\$18,500/pair.

Versadyne



VERSADYNE INTERNATIONAL, INC.
1500 Series Tape Duplicating System

VERSADYNE INTERNATIONAL, INC.; 504-D Vandell Way; Campbell, CA 95008; (408) 379-0900; FAX: (408) 379-0902. Product Name: Model 500 High-Speed Tape Duplicating System. Contact: Robert W. Kraff, president. Date Product Introduced: 7/89. Product Description & Applications: The Model 500 tape duplicating system provides the user with a professional loop-bin tape duplicating system at a fraction of the cost. The 500 utilizes a 1/4", 4-track master tape for 32:1 duplicating. The master cabinet houses a 3.4MHz bias supply, playback/record amplifiers and the loop-bin master transport. All can drive up to ten slave recorders. The slaves are equipped with motorized tape wipers and packer arms. Slave cabinets are for table-top use or can be fitted with an optional console base. Basic Specifications & Suggested List Price: The 500 system response is 50 to 15kHz. Bias frequency: 3.5MHz. Loop-bin uses 1/4", 4-track master tape at either 3 3/4 or 7 1/2 ips (master speed is switchable for either master tape). Slave recorders operate at 60 ips and are equipped with a tape wiper and packer arm. The system has been designed with very simple control circuits to minimize servicing requirements. Prices: master—\$14,500, slaves—\$4,650 each.

WAVEFRAME CORPORATION; 2511 55th St.; Boulder, CO 80301; (303) 447-1572. Product Name: Disk Recording Module (DRM-4 and DRM-8). Contact: Gus Skinas, senior product mgr. Date Product Introduced: 4/89. Product Description & Applications: Hard disk recording for the AudioFrame is now available with the Disk Recording Module (DRM). The DRM offers the choice of standard 16-bit or High Definition Digital Audio™ (HDDA™) 24-bit recording capabilities. In 16-bit mode, these modules are either 4- or 8-track with additional modules permitting expansion to 32 tracks. The DRM can interface through the 24-bit Digital Audio Bus™ to other modules providing mixing, signal processing and sampler functions. Basic Specifications & Suggested List Price: DRM-4 \$10,000, DRM-8 \$15,000.

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. Product Name: MT3X "Studio" Mixer/Recorder. Contact: Robert T. Davis. Date Product Introduced: 6/89. Product Description & Applications: The MT3X is a flexible 6-input mixer designed with studio console-like features and a professional-quality 4-track cassette recorder built in. The MT3X is the most advanced mixer/recorder ever offered and adds studio console monitoring and send/return features. This full-featured mixer/recorder can synchronize with outboard systems via the MIDI



YAMAHA PROFESSIONAL AUDIO DIVISION
MT3X "Studio" Mixer/Recorder

code. The MT3X has six input channels, each with two auxiliary sends, L/R pan, channel assign switch, and 2-band linear-fader equalizer. Channels 1 and 2 are selectable microphone, line input, or tape, and channels 3 through 6 are line inputs. Basic Specifications & Suggested List Price: The 4-track recorder has two speeds ±10% pitch control and switch selectable dbx noise reduction. Comprehensive counter system with programmable auto punch in/out. The user can assign track 4 to the YMC10 MIDI converter, or an external MIDI converter. With this accessory, the MT3X synchronizes to any MIDI source. 17-7/16" x 12-13/16", 4-3/16" thick. 8 lbs. 2 oz. Price: \$995.

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SIGNAL PROCESSING DEVICES

1990



ADAMSON ACOUSTIC DESIGN CORP.
AX300 Crossover

ADAMSON ACOUSTIC DESIGN CORP.: 817 Brock Rd. Ste. 9, Pickering, Ontario, L1W 3L9 Canada; (416) 420-6279. Product Name: AX300 Crossover. Contact: Jerry Placken, mktg/sales mgr. Date Product Introduced: 8/89. Product Description & Applications: This 3-way, mono analog crossover is configurable for use with the Adamson MH225/B218F and MH121 system. Utilizing eighth-order, finite frequency, loss-pole filters (over 48dB/oct), Aphex VCA limiters and three bands of parametric equalization, this unit defines the state-of-the-art in system control. Internal calibration oscillators allow precise compensation for power amplifier gain as well as cable losses. The AX300 allows engineers maximum control and flexibility without the interference and coloration caused by most protection circuitry. **Basic Specifications & Suggested List Price:** \$2,160. Crossover points: MH225/B218F system: 200Hz, 2kHz, MH121 system: 100Hz, 1kHz. Parametric equalization: ± 4 dB, 36 to 80Hz, 2 to 4kHz, 7 to 14kHz. Gain: 0dB standard/variable from +9 to $-\infty$ dB. Balanced inputs and outputs. Size: 482mm x 44mm x 277mm (19" x 1.75" x 10.88"). Weight: 5.2 kg (11.51 lbs).

ALESIS CORPORATION: 3630 Holdrege Ave., Los Angeles, CA 90016; Product Name: M-EQ 230 Dual $\frac{1}{3}$ Octave Precision Room Equalization System. Contact: Allen Wald, vp, advertising and promotion. Date Product Introduced: 1/89. Product Description & Applications: The Alesis M-EQ 230 is a dual 30-band, $\frac{1}{3}$ -octave graphic equalizer. It is ideally suited for studio monitor equalization, room tuning for live PA applications, feedback control in stage monitor and sound systems, and tonal shaping of instruments. **Basic Specifications & Suggested List Price:** Monolithic Integrated Surface™ design, 30 bands per channel. 25Hz to 20kHz frequency range on $\frac{1}{3}$ -octave ANSI/ISO centers. Auto muting on power-up and power-down. Detented faders with ± 12 dB of gain. Master fader, clip and signal-present LEDs, and bypass switch on each channel. Inputs and outputs for each channel on $\frac{1}{4}$ " and RCA jacks. Rack-mountable in one rack space. External UL power supply. The M-EQ 230 lists for \$199.

ALESIS CORPORATION: 3630 Holdrege Ave., Los Angeles, CA 90016; Product Name: MIDVerb III 16-bit Simultaneous Multieffects Processor. Contact: Allen Wald, vp, advertising and promotion. Date Product Introduced: 6/89. Product Description & Applications: MIDVerb III is a Preset/Programmable™ simultaneous 16-bit digital effects processor capable of generating three effects and high-frequency rolloff all at the same time. It is perfectly suited for instrument rigs, live sound reinforcement, or recording applications. **Basic Specifications & Suggested List Price:** Reverb, delay, chorus or flange. 15kHz bandwidth, 200 memory locations, 100 nonvolatile factory presets and 100 user-programmable memory locations. Real-time MIDI parameter control. MIDI mapping and system exclusive program dump capability. Bypass footswitch jack. MIDVerb III list price \$399.

APHEX SYSTEMS: 11068 Randall St.; Sun Valley, CA 91352; (818) 767-2929. Product Name: Aural Exciter Type III. Con-

tact: Paula Lintz, sales and mktg. mgr. Date Product Introduced: 4/89. Product Description & Applications: The Type III is the latest generation, fully professional Aural Exciter with powerful new processing features and improved circuitry. Noise and distortion are virtually eliminated in the Type III circuitry. Two modes of noise reduction make enhancement possible while reducing noise from noisy sources. Spectral Phase Refractor (SPR) restores bass clarity and openness and significantly increases apparent bass energy level without any amplitude EQ or bass boost. **Basic Specifications & Suggested List Price:** Frequency response: +0, -1dB kHz to 190kHz. THD: 0.01% at +27dBm I/O. IMD: 0.01% at 27dBm I/O. Dynamic range: 114dB. Servo balanced, transformerless inputs and outputs. Suggested list: \$999.

APPLIED RESEARCH AND TECHNOLOGY, INC.: 215 Tremont St.; Rochester, NY 14608; (716) 436-2720; Telex: 4949793 ARTROC; FAX: (716) 436-3942. Product Name: Multiverb II. Contact: Philip Beletto, president. Date Product Introduced: 1/89. Product Description & Applications: The Multiverb II is the next generation forward from the wildly successful Multiverb. It contains all of the algorithms and effects that the Multiverb has, and includes many refinements and additions that make it even more sonically amazing. The Multiverb contains one of the most complete real-time MIDI interfaces available. **Basic Specifications & Suggested List Price:** 100 factory presets, 200 memory locations; dynamic range: greater than 90dB typical; operating level: +16dBV max. dimensions: 175"H x 19"W x 10"D, all steel case, power requirements: 117 VAC, 60Hz, internal fuse, stereo inputs/outputs ($\frac{1}{4}$ " phone), MIDI in/out ports; input impedance: 1M ohm, output impedance: 1k ohm. Suggested retail: \$599.

APPLIED RESEARCH AND TECHNOLOGY, INC.: 215 Tremont St.; Rochester, NY 14608; (716) 436-2720; Telex: 4949793 ARTROC; FAX: (716) 436-3942. Product Name: SGE—Studio Effector. Contact: Philip Beletto, president. Date Product Introduced: 1/1/89. Product Description & Applications: Digital reverb, gated reverb, stereo chorus, stereo flange, equalization, pitch transposing, two full octaves, panning, delay, tapped delay, compression, expansion, noise gating, distortion, overdrive, turbo overdrive. It also has a unique harmonic exciter that can punch a solo through the densest live performance or studio mix. The SGE is very much at home in the studio, P.A. and keyboard rig. Real-time Performance MIDI® allows dynamic control. **Basic Specifications & Suggested List Price:** Suggested list: \$649. 100 factory presets, 200 memory locations; 35Hz to 20kHz frequency response, 90dB typical dynamic range; stereo inputs/outputs ($\frac{1}{4}$ " phone); MIDI in/out ports; 1U rack-mount steel case.

ARSONIC TONESTUDIO ELEKTRONIK/U.S.: 146 Paoli Pike; Malvern, PA 19355; (215) 647-9426. Product Name: Sigma 6.2. Contact: Christopher Wurts, Roy Hall. Date Product Introduced: 7/89. Product Description & Applications: The Sigma 6.2 is a microphone preamplifier for the studio requiring extremely high-performance devices with exceptionally low noise and THD specifications. This highly transparent, dual-channel microphone preamp also features insertion points for signal processors to keep the signal path short and direct. The unit is one rack height. **Basic Specifications & Suggested List Price:** The Sigma 6.2 list price is \$1,234. Additional specifications and technical data available on request.

AUDIO PROCESSING TECHNOLOGY: Begbroke; Oxford, OX5 1RU England; (44) (865) 842300. Product Name: apt-X100. Contact: Noel Bell, publicity mgr. Date Product Introduced: 4/89. Product Description & Applications: Digital audio compression system providing real-time compression of 16-bit digital audio to 4-bit. Accepts mono or stereo signals. Applications include digital audio storage, satellite and land-based broadcasting, integrated Services Digital Network (ISDN) telecommunications and cable audio distribution. **Basic Specifications & Suggested List Price:** 128-Kbits/sec data rate, audio bandwidth 7kHz, 15kHz, 20kHz or 22kHz, accepts sampling rates up to 48kHz, bit error rate immunity better than 1:10,000, A/D and D/A converters included.

AUDIO/DIGITAL, INC.: 1000 S. Bertelsen Rd. #4; Eugene, OR 97402; (503) 687-8412; (800) 423-1082. Product Name: PAD-300/18 Delay System. Contact: Kathleen Gallagher, office mgr. Date Product Introduced: 5/22/89. Product Description & Applications: The industry's first 18-bit delay system for alignment and synchronization applications. The PAD-300/18

features a dynamic range of at least 104dB. With a high sample rate and simple analog filtering, phase and frequency are very linear and sound quality is analog-like. **Basic Specifications & Suggested List Price:** One audio input, three audio outputs. 10Hz to 22kHz ± 0.5 dB response. Distortion at less than 0.1% THD and noise at 1kHz. Dynamic range: at least 104dB. Delay range: 0 to 650ms in 20 μ sec steps. Front panel bypass control via gold contact relays. 8-character LED dot-matrix display, which displays menu prompts and diagnostics. Suggested list: \$1,995.

B.A.S.E.
BEDINI AUDIO SPACIAL ENVIRONMENT
A GAMMA ELECTRONIC SYSTEMS, INC. SUBSIDIARY

BEDINI AMPLIFIERS, INC.
B.A.S.E.™ (Bedini Audio Spacial Environment)

BEDINI AMPLIFIERS, INC.: 13410 Sayre St.; Sylmar, CA 91342; (818) 367-7922. Product Name: B.A.S.E.™ (Bedini Audio Spacial Environment). Contact: Michael Fishman, president. Date Product Introduced: 6/88. Product Description & Applications: B.A.S.E. is an audio processor unit that allows the listener to hear all the original spatial information present during recording. An increase in the separation and the definition of components within the mix is readily heard. The effect is "a headphone experience via two open-air speakers." As more of the ambient acoustics become apparent, the listener perceives an enlarged sound field. This no longer necessitates that the listener be critically positioned in relation to the speakers anywhere in the room will produce the same effect. **Basic Specifications & Suggested List Price:** Since B.A.S.E. is not hardware or software dependent, no additional equipment is necessary. The B.A.S.E. process can be applied to recordings, films, live broadcasts or during concerts, theatre performances and home playback.

BRICK AUDIO: 102 S. Porter, Elgin, IL 60120; (312) 742-7425. Product Name: Brick Audio Plate Reverb. Contact: William Beth, owner. Date Product Introduced: 1/89. Product Description & Applications: Plate reverberation chambers, sizes starting 3' x 3'. These plates employ a patented drive system that adheres to the stainless steel plate eliminating the need for a voice coil drive. **Basic Specifications & Suggested List Price:** Plate sizes standard 3' x 3', 3' x 5', 3' x 7'. Larger sizes, custom order. Mono input, stereo return. Brilliance control at input. Separate send, return levels. Signal/noise greater than 80dB. Literature upon request.

BRYSTON: 979 Franklin Ln., Maple Glen, PA 19002; (800) 673-7899. Product Name: 10-B Crossover. Contact: Martin Bartelstone. Date Product Introduced: 2/89. Product Description & Applications: Bryston 10-B is 2-way stereo, 3-way mono. Adjustable slope, adjustable turnover points, 6, 12 and 18dB per octave. All discrete, modular design.

BSS AUDIO (EDGE DISTRIBUTION CORP.): RR2, Box 144C Milewood Rd.; Millbrook, NY 12545; (914) 567-1400. Product Name: AR-416 4-Channel Actim DI. Contact: Dave Talbot. Date Product Introduced: 1989. Product Description & Applications: The new AR-416 4-channel active DI, with its unique "reversible" ears, allows the user to configure the unit for both live and studio applications. Just remove the rack ears, reverse the unit, and refit the ears. This allows the user to have front panel access to either the XLR or $\frac{1}{4}$ " connectors depending on the application. **Basic Specifications & Suggested List Price:** The AR-416 has all of the same features as the well-known AR-116 single-channel DI, but in a 4-channel, AC-powered 1U configuration. These features include: two lowpass filters, earth lift, phase reverse and input attenuation. Applications for the AR-416 include multiple keyboard setups, electronic drums, etc. Price: \$799.

BSS AUDIO (EDGE DISTRIBUTION CORP.): RR2, Box 144C Milewood Rd.; Millbrook, NY 12545; (914) 567-1400. Product Name: DPR-504, 4-Channel Noise Gate. Contact: Dave Talbot. Date Product Introduced: 1989. Product Description & Applications: Based on our top-end DPR-502 2-channel noise gate system, the new DPR-504 is a 4-channel, 1U noise gate system incorporating a number of the features of the DPR-502. The key filter is variable between 30Hz and 20kHz. Key filter width is variable between 0.5 and

10 octaves, which allows a tighter and more controlled gated envelope. The key source can be internal or external via a rear panel 1/4" jack. Threshold is variable between +20dBV and -50dBV. Audio attack is program-dependent and switchable between "fast" or "auto." The combined hold/release time is variable from 1ms to 4 seconds with the hold period tracking proportionally with release-time. **Basic Specifications & Suggested List Price:** Channel linking allows two channels to be linked using one channel as a master control. Key side-chain metering provides simultaneous average and peak measurements. A 12-point LED display shows a 20dB range on either side of the threshold. A single triangular LED indicates "gate open" status. Price: \$1,099.

CIRCUIT RESEARCH LABS, 2522 W. Geneva, Tempe, AZ 85282; (800) 535-7648. Product Name: IPP-100 Instant Personality Processor. Contact: Bill Ammons, sales. Date Product Introduced: 5/30/89. **Product Description & Applications:** The IPP-100 microphone processor incorporates features that are specifically designed to address the problems of voice processing in the broadcast environment. Powerful equalization and compression circuitry are combined with an advanced micro-controller to give a wide range of programmable preset characteristics. An important goal in the design process was to achieve a front layout that is both easy and quick to use. **Basic Specifications & Suggested List Price:** 18 memories for all user-adjustable controls. Easy-to-use "analog" controls. Remote jack for switching of presets. Security lock prevents alteration of presets. Selectable mic/line level inputs. Phase processor, 2-band parametric equalizer, constant Q. Price: \$1,295.

CLARITY, Nelson Lane, Garrison, NY 10524; (914) 424-4071. Product Name: Clarity XLV. Contact: Terry Tegarden, mktg mgr. Date Product Introduced: 3/89. **Product Description & Applications:** Version 5.0 software in the Clarity XLV enables full automation of Lexicon 224XL, Lexicon 480L and AMS RMX 16 digital delays and reverbs. This new software automates all of the page and machine changes available in the Lexicon LARC controller used with the 224XL and 480L, in addition to the existing automation of fader moves. A LARC user can write, then recall, all of the controller's functions from a MIDI sequencer. **Basic Specifications & Suggested List Price:** Software included with any purchases of XLV. Free to current XLV owners.

DATAcube, INC., 4 Dearborn Rd., Peabody, MA 01960, (508) 535-6644. Product Name: MaxVideo Digital Signal Processor. Contact: Susan Snell Solomon. Date Product Introduced: 1988-89. **Product Description & Applications:** MaxVideo is a family of 25 VMEbus modules designed to implement high-speed and real-time image and digital signal processing. MAXbus is the heart of the MaxVideo modules and handles the error-free transfer of high-speed data between multiple modules or chassis. The MaxVideo modular approach provides system designers with the building blocks necessary to solve a myriad of applications, communications, digital communications, video special effects, movie colorization, electronic publishing. **Basic Specifications & Suggested List Price:** MaxVideo is based upon the premise that the ideal solution is the most cost-effective. The systems designer configures a system that contains only those features that are required for the application. The Euclid module is a MaxVideo-compatible DSP microprocessor board. Euclid fills the gap between fast but very specific hardware-intensive solutions to digital signal processing (DSP) applications, and more general but slower software solutions. Euclid uses the Analog Devices ADSP-2100 DSP microprocessor.



DIGITECH
DSP 256 Multi Effects Processor

DIGITECH, 5639 S. Riley Ln., Salt Lake City, UT 84107; (801) 268-8400. Product Name: DSP 256 Multi Effects Processor. Contact: Scott Grow, western sales mgr. Date Product Introduced: 6/89. **Product Description & Applications:** DigiTech

—CONTINUED ON NEXT PAGE

You don't have to go to auctions to get that classic tube sound.



Until now, the only way to get your hands on great sounding tube components was either hunting for auctions or combing the classifieds. No longer. Because today, there's TUBE-TECH.

Every TUBE-TECH product is dedicated to recreating the classic musical sound that the early tube units are known for. Our PE 1B equalizer, for example, has design features similar to the classic Pultech EQ. Including a passive filter section, and all-tube, push-pull amplification. Even the control parameters are remarkably similar.

This single-minded adherence to the classic designs has been carried out in every TUBE-TECH product. From our equalizers, to our compressor, to our microphone preamp.

If you're as serious as we are about having that vintage, all-tube sound, your search is over. Contact your nearest TUBE-TECH dealer for a demonstration.

TUBE-TECH

Circle #028 on Reader Service Card

SIGNAL PROCESSING DEVICES

1990

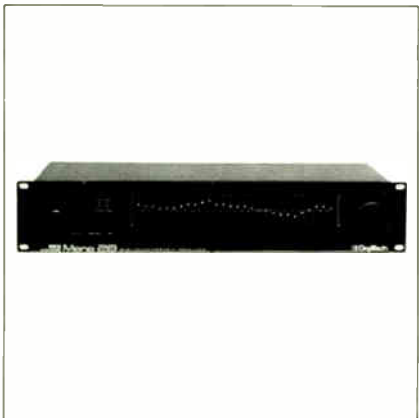
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announces the DSP 256 digital multi-effect signal processor. The DSP 256 offers up to four digital effects simultaneously at a full bandwidth of 20Hz to 20kHz with 256 memory slots (128 factory presets and 128 user-programmable presets) and MIDI mapping. **Basic Specifications & Suggested List Price:** Digital reverberation, delay, multitap delay, chorusing, flanging, and other effects are accessible via a new, very user-friendly interface that uses a 32-character LCD display. Comprehensive MIDI implementation—as well as footswitch control of the unit—offer excellent remote control of the DSP 256. Sugg. list \$499.95.



DIGITECH
The Harmony Machine

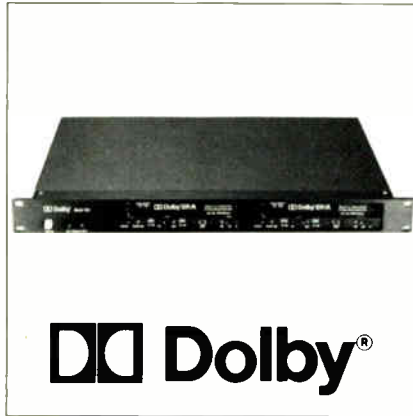
DIGITECH: 5639 S. Riley Ln., Salt Lake City, UT 84107; (801) 268-8400. Product Name: The Harmony Machine. Contact: Scott Grow, western sales mgr. Date Product Introduced: 6/89. Product Description & Applications: DigiTech announces a new intelligent pitch shifter. The Harmony Machine (HM-4). The new HM-4 gives any musician easy access to complex and exciting three-note harmonies. The HM-4's presets are organized by musical style, not by scale: rock, blues, jazz and country. Each music type has 16 different harmony presets. **Basic Specifications & Suggested List Price:** The HM-4 comes with a footswitch controller that allows the musician to either step to select the bank and preset, or select remotely with his instrument. Suggested U.S. list price \$559.95.



DIGITECH
Programmable MIDI EQ

DIGITECH: 5639 S. Riley Ln., Salt Lake City, UT 84107; (801) 268-8400. Product Name: Programmable MIDI EQ. Contact: Scott Grow, western sales mgr. Date Product Introduced: 6/89. Product Description & Applications: DigiTech announces the introduction of three units in the MEQ series of programmable graphic equalizers: the MEQ 28, the MEQ 14 and the MEQ 7. The MEQ series offers professional-quality equalization: ± 12 dB of boost/cut on standard ISO frequency centers, with a signal-to-noise ratio of 94dB. 99 memory slots (nonvolatile memory) and independent MIDI access for each

channel. **Basic Specifications & Suggested List Price:** The units include a full security lock-out system, EQ curve comparison function, and a true EQ curve display. Sugg. list prices: MEQ7 \$525.95, MEQ14 and MEQ28 \$499.95.



DOLBY LABORATORIES
Model 363

DOLBY LABORATORIES, INC.: 100 Potrero Ave., San Francisco, CA 94103-4813; (415) 558-0200. Product Name: Model 363. Contact: Nancy M. Byers, studio applications mgr., mktg. dept. Date Product Introduced: 1988 AES Convention. Product Description & Applications: 2-channel noise-reduction unit, switchable between Dolby Spectral Recording (SR) and Dolby A-type noise reduction. The Model 363 features two channels in a 1U frame, automatic record/play changeover, built-in Dolby noise and Dolby tone generators, auto-compare test facility for quick verification of system performance and transformerless balanced input and output circuits. Dolby SR provides substantial extension of available headroom, increased signal-to-noise ratio and distortion-free recording with the convenience that only analog tape allows. For use in all audio facilities: music recording, video post-production, broadcasting and film. **Basic Specifications & Suggested List Price:** Overall frequency response: 20Hz to 20kHz ± 1 dB, encode/decode at any level, overall dynamic range: 105dB clipping level to CCIR/ARM noise level, overall harmonic distortion: 0.2% maximum total harmonic distortion at Dolby level. Available in three versions: Model 363—SR/A (Cat no. 300) switchable Dolby SR and Dolby A-type, Model 363—SR (cat no. 350) SR only, Model 363—A (cat no. 450), A-type only.

DRAWNER DISTRIBUTION LTD.: Charlotte St. Business Centre; Charlotte St., Wakefield; West Yorkshire, WF1 1UH UK; (924) 378669. Product Name: DS 301 Dual Noise Gate/Expander. Contact: Jan Phillips. Date Product Introduced: 9/89. Product Description & Applications: The unit offers the advantages of auto attack, peak attack, balanced inputs and outputs, and further innovative features. Besides normal gating tasks, the unit is ideally suited for use on vocal material. Its design allows extremely low-noise and low-distortion performance. **Basic Specifications & Suggested List Price:** Provisional specifications: Attack—0.5 μ s per 10dB (from -100dB to 0dB in 5 μ s). Noise: 22Hz to 22kHz, -98dB. Total harmonic distortion—at 1kHz: 0.05% or better.

EVENTIDE, INC.: One Alsan Way; Little Ferry, NJ 07643; (201) 641-1200. Product Name: BD 94½. Contact: Gil Griffith, sales mgr. Date Product Introduced: 4/4/89. Product Description & Applications: Single- or dual-channel broadcast-obscently delay in 3-, 6- or 12-second configurations. Features include a delete button to employ memory contents while simultaneously triggering a cart machine to fill the void, plus a bypass button to bypass the delays and allow return to real time. **Basic Specifications & Suggested List Price:** 5Hz to 20kHz bandwidth, 16-bit, 44.1kHz sampling, >92dB dynamic range. Prices start at \$1,795 list.

EVENTIDE, INC.: One Alsan Way; Little Ferry, NJ 07643; (201) 641-1200. Product Name: H3000-SE Ultra-Harmonizer. Contact: Gil Griffith, sales mgr. Date Product Introduced: 8/15/89. Product Description & Applications: Enhanced studio Ultra-Harmonizer with 16-factor algorithms and over 100 factory presets. Features include digital vocoder, string simulator, multishift-tapped pitch shifter, dense reverb and several new updated programs for exceptional pitch-shift quality, especially in micropitch shift mode. **Basic Specifications & Suggested List Price:** 16-bit, 44.1kHz sampling, 5Hz to 20kHz bandwidth, >92dB dynamic range, 0.05% distortion, full stereo, balanced XLR for in/out, +4dBm levels. \$2,995 list.

FOCUSRITE: c/o Sonic Image Ltd., 100 Wheaton Oaks Ct.; Wheaton, IL 60187; (312) 653-4544. Product Name: Focusrite ISA 131 Dynamics Processor. Contact: Dan Zimbelman, president, Mal Davis, engineering and sales. Date Product Introduced: 10/89. Product Description & Applications: The ISA 131 is a 1U, 19" rack-mounting dynamics processor

including integral power supply. It is electrically identical to the ISA 130 unit already respected by many users. It has a link facility allowing the unit to combine with another ISA 131 to form a stereo pair. The ISA 131 unit is a powerfully creative and sonically transparent dynamics processor built to the same exacting standard and performance that has helped to establish Focusrite as a world leader in audio design. **Basic Specifications & Suggested List Price:** Functionally, the ISA comprises five sections. The compressor/limiter has six ratios with threshold, attack, release and gain controls. The noise gate/expander has threshold, range, hold and release controls and a key input. The de-esser/exciter has a frequency and a sensitivity control. The highpass filter, lowpass filter and EQ are independently switchable into the signal path, or either side chain of the compressor or the gate/expander. Metering is via three 20-segment bar graphs.



FURMAN SOUND, INC.
QN-44 Quad Noise Gate

FURMAN SOUND, INC.: 30 Rich St.; Greenbrae, CA 94904; (415) 927-1225. Product Name: QN-44 Quad Noise Gate. Contact: Joe Desmond, nat'l sales mgr. Date Product Introduced: 3/89. Product Description & Applications: The QN-44 consists of four completely independent noise gates in one chassis. Each channel has four controls: threshold, attack time, release time and depth. Each control covers a particularly broad range, and is calibrated directly in dB or milliseconds. A green LED signals when the gate is open. Key input jacks are provided to allow external signals to control the gating. The QN-44 uses a proprietary VCA circuit providing a simple, direct audio path with extremely low noise and distortion. **Basic Specifications & Suggested List Price:** Threshold adjustable from -infinity to +20dBV. Maximum attenuation depth: -80dB. Attack time adjustable from 50 microseconds to 50 milliseconds. Release time adjustable from 50 milliseconds to 5 seconds. Noise: -94dBV at output, unweighted, from 20Hz to 20kHz. Distortion: less than 0.1% THD at 0dBV, from 20Hz to 20kHz. Suggested list price: \$399 [Model QN-44B, with balanced in/out, \$479].

GAINES AUDIO: 1237 E. Main St., Rochester, NY 14609; (716) 266-0780; (800) 442-0780. Product Name: MM-6 Microphone Mixer. Contact: Jon Gaines. Date Product Introduced: 5/89. Product Description & Applications: The MM-6 is a simple, monaural, 6-input mic mixer in a single rack space, designed for use in small P.A. systems, i.e., schools, churches, conference rooms, etc. The basic mixer includes six balanced low-Z mic inputs, two auxiliary inputs, a master-level control and headphone jack. Options include input OL LEDs, output bar graph meter, balanced outputs, master bass and treble controls, RIAA phono input and 48V phantom power. **Basic Specifications & Suggested List Price:** \$189 basic unit. Options: \$25 each. Available direct from Gaines Audio, shipping included.

GIBSON STRINGS & ACCESSORIES: 1725 Fleetwood Dr.; Elgin, IL 60123; (312) 741-7315. Product Name: Epiphone G.A.S. Distortion, EP-DI-10. Contact: Todd S. Mauer, dir. of mktg. and sales. Date Product Introduced: 1/1/89. Product Description & Applications: The Epiphone G.A.S. Distortion, EP-DI-10, is equipped with three controls: level, tone and distortion. The EP-DI-10 is made from state-of-the-art materials and produces today's most sought after heavy metal guitar sound. **Basic Specifications & Suggested List Price:** Input imp. 150k, Output imp. 5k, Gain 50dB, equivalent noise -90dB (IHF-A), current draw 12mA. \$55.95 suggested list price.

GIBSON STRINGS & ACCESSORIES: 1725 Fleetwood Dr.; Elgin, IL 60123; (312) 741-7315. Product Name: Epiphone G.A.S. Stereo Chorus, EP-CH-70. Contact: Todd S. Mauer, dir. of mktg. and sales. Date Product Introduced: 1/1/89. Product Description & Applications: The Epiphone G.A.S. Stereo Chorus, EP-CH-70, creates an overbub or sweetening of a solo performance, giving it a thick, soft and spacious sound texture, is made from state-of-the-art materials and is equipped with a speed and depth control. **Basic Specifications & Suggested**

gested List Price: Input imp 270k output imp 10k delay time 3-12msec., speed range 0.3 to 4Hz Equivalent input noise -90dB (IHF-A) Power supply one 9-volt battery or external AC adapter \$79.95 suggested list price

GML, INC.: 7821 Burnet Ave., Van Nuys, CA 91405; (818) 781-1022. Product Name: GML 8900 Compressor/Limiter. Contact: Jamie Byrd, sales. Date Product Introduced: Fall 1989 AES. Product Description & Applications: GML will be releasing the 8900 compressor/limiter at AES. The 2-channel, discrete unit features a 2-RMS and 1-peak section scheme per channel, which is programmable to react to the input source. In addition, the new "soft" knee circuit provides a selectable soft or hard transition into gain control. This will soften the transition of the breaking point from one ratio to another. There is a crest factor, also adjustable, to vary transitions between fast RMS and peak section. Basic Specifications & Suggested List Price: Discrete VCAs, stereo coupling, side-chain input, 40-segment LED meter

HIGH FIDELITY CONCEPTS, INC.: 3392 Crawford St. SE, Salem, OR 97302; (503) 363-1586. Product Name: NC-4200 4-channel Noise Gate/Compressor. Contact: Cameron D Jones, president. Date Product Introduced: 10/89. Product Description & Applications: The NC-4200 has four independent sections that can be switched for gating or compression. Controls are provided for adjustment of threshold, ratio and release while attack is program-dependent. Switching is provided for the 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 on each section. Basic Specifications & Suggested List Price: THD less than 0.05% (20Hz to 20kHz), THD under 0.02% at 1kHz with 10dB of gain reduction, S/N ratio above 85dB (above referenced to 1VRMS at output) Suggested list price \$375

HOWE TECHNOLOGIES CORP.: 2300 Central Ave., Ste. E, Boulder, CO 80301; (303) 444-4693; (800) 525-7520; FAX: (303) 444-8447. Product Name: ATC-35 Phase Chaser. Contact: Terry Sweeney, vp sales. Date Product Introduced: NAB 1989. Product Description & Applications: The ATC-35 phase chaser audio time-base corrector operates in three modes automatic, hold and manual. In hold, the unit remains set on the last correction valve. Manual mode allows front panel adjustment of time delay. Operating characteristics and signal routing are controlled from the front panel. Can be used in broadcast radio-TV, recording studios, post-production and dubbing facilities. Basic Specifications & Suggested List Price: List price is \$3,395

INDUSTRIAL STRENGTH IND.: 13042 E. Moore St., Cerritos, CA 90701; (213) 921-2341. Product Name: R-16. Contact: Duke Gee, sales mgr. Date Product Introduced: 1/89. Product Description & Applications: The R-16 is a digital effects processor utilizing a 16-bit processor, plus a 32-bit numeric co-processor, for superior reverb sound quality. It features full MIDI control of effects parameters and changes. It has sampling capability, 99 programmable sounds (30 preset), -10dB and line-level switchable inputs/outputs, and of course, front panel user-changeable parameters. Software for spectrum analysis, FFT and 3-dimensional wavefront plotting is included. Basic Specifications & Suggested List Price: Balanced or unbalanced inputs, 20Hz to 20kHz frequency response, stereo, mono or mixed outputs with switchable output level control (0dB or -20dB), MIDI in, out and thru ports, remote mute and hold controls (1/4" phone jacks), sold directly from Industrial Strength Industries for \$995

JVC PROFESSIONAL PRODUCTS COMPANY, 41 Slater Dr., Elmwood Park, NJ 07407; (201) 794-3900; FAX: (201) 523-2077. Product Name: DS-LC900. Contact: Elin Everson mgr, advertising sales promotion. Date Product Introduced: 1989. Product Description & Applications: DS-LC900 digital parametric controller—using FIR-type digital filters, the DS-LC900 permits linear-phase parametric equalization in digital audio signal processing. Dynamics-controlling functions such as limiting, compressing and noise gating are also available

KLARK-TEKNIK, 30B Banfi Plaza North, Farmingdale, NY 11735; (516) 249-3660. Product Name: DN504. Contact: Sam C. Spennacchio, nat'l sales mgr. Date Product Introduced: 5/89. Product Description & Applications: Quad compressor/limiter. Four channels of compressor/limiter in a single rack-space unit. Designed for unbeatable audio performance (less than -94dBm noise). Quick and easy set up and use, as well as machine optimum use of rack space. Switchable on front panel for use as two stereo pairs. Full LED metering of gain reduction, output level and all status switches. Separate side-chain inputs for each channel. Basic Specifications & Suggested List Price: 4 channels, 1 rack space. Each channel provides adjustment of threshold, ratio, attack and release, with switchable manual/auto modes and hard/soft knee. Noise is under -94dBm 20Hz to 20kHz, unweighted. Attack time is 50µs to 20ms, and release time is 60ms to 2.5 sec. Transformers are available. 3 year warranty \$1,295 retail

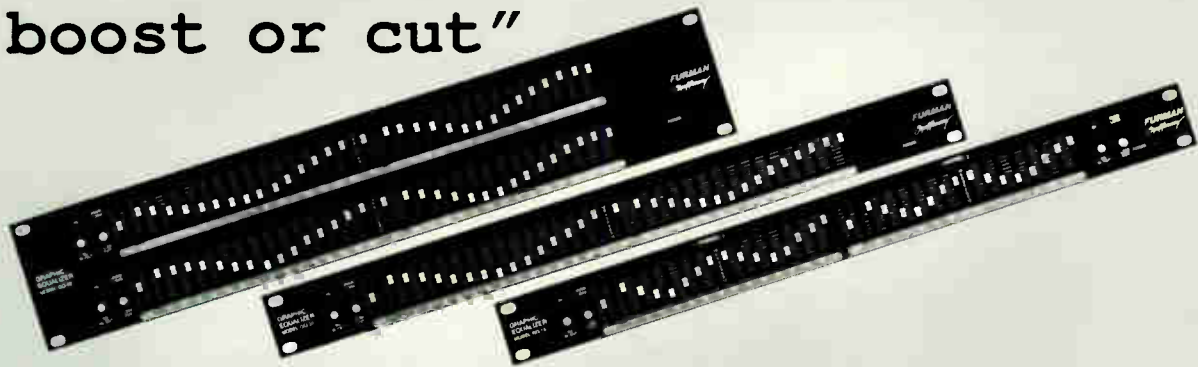
KLARK-TEKNIK, 30B Banfi Plaza North, Farmingdale, NY 11735; (516) 249-3660. Product Name: DN510. Contact: Sam C. Spennacchio, nat'l sales mgr. Date Product Introduced: 5/89. Product Description & Applications: Advanced dual

gate 2 channels of gating functions in a single rack-space unit. Each channel includes HF and LF filtering and continuously variable range control. Trigger functions include threshold and unique "mask" controls. Envelope functions include delay attack, hold and release. Unit provides velocity-sensitive MIDI outputs as well as DC trigger outputs from each channel. External key switchable from front panel. Basic Specifications & Suggested List Price: 2 channels, 1 rack space. Less than -94dBm noise, 20Hz to 20kHz unweighted. Range 0 to -90dB, HP filter 25Hz to 5kHz/12dB oct, LP filter 75Hz to 18kHz/12dB oct. Attack time: 10µs to 250ms, hold time 10ms to 3 sec, release time 5ms to 2 sec, delay time 0 to 2 sec. MIDI output, note on, note off and velocity info. Channel number adjustable 1-16, key number adjustable 0-127 \$1,100 retail

KORG USA, 89 Frost St., Westbury, NY 11590; (516) 333-9100. Product Name: A3 Multi Effects Processor. Contact: Michael Kovins, senior vp. Date Product Introduced: 6/89. Product Description & Applications: Korg announces the introduction of the new A3 performance signal processor. The A3 is equipped with 40 different types of effects including reverb, delay, exciter, chorus, distortion, compressor and even a rotary speaker effect. Up to six of any of these effects can be selected and combined for simultaneous processing. Newly developed effects and effect chains stored on optionally available ROM cards can be added to the existing internal effect. Multieffect processing, ongoing expandability and ease of use make the A3 a pioneer in a new age of signal processing. Basic Specifications & Suggested List Price: Frequency response 20Hz to 18kHz, sampling frequency 37.1kHz, input/output level +4dBm/-20dBm (unity gain), display 40-character, backlit LCD x 1, 1U rack

LEXICON, INC., 100 Beaver St., Waltham, MA 02154; (617) 891-6790. Product Name: 480L Version 3.00 Software. Contact: Steve Franke, Date Product Introduced: 1989. Product Description & Applications: The 480L digital effects system now offers new, enhanced features and programs. New digital stereo 2-band and mono 4-band parametric equalizer programs feature adjustable frequency from 30Hz to 17kHz, adjustable "Q" between shelf and notch Q=32, and boost/cut ±12dB (in the notch mode +36dB). Basic Specifications & Suggested List Price: Enhanced SME sampling features include rate change playback controlled by MIDI note-event, MIDI reference-note that provides transposable keyboard-control of sample playback, and pitch mirror-control that reverses keyboard MIDI mapping. Also added are adjustable-rate reverse playback and scrub mode for continuous playback, silent program change, and two new pitch shift presets

"Less noise, even with extreme boost or cut"



That was the conclusion we came to when we compared the Furman GQ-31 31-band Graphic Equalizer with several well known, comparably priced single rack space competitors.

The GQ-31's superior low-noise performance derives from the 120 inherently quiet discrete transistors it uses in place of

the op-amp IC's in the others—plus a clever layout that minimizes hum pickup. The Furman equalizer's center frequency accuracy is exceptionally good, as well.

Furman also makes dual 15-band (Model GQ-15) and dual 31-band (Model GQ-62) graphics, built with the same low-noise, high accuracy design philosophy.

For a detailed report comparing Furman and other popular equalizers, and for more information on other reliable Furman products, please call or write:

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Greenbrae, CA 94904 USA
Phone: (415) 927-1225
Fax: (415) 927-4548

FURMAN
Signal Processing

	EQ In, all sliders flat	All bands 12 dB boost	Worst case, comb. boost, cut
Brand D1	-86	-60	-41
Brand D2	-93	-63	-63
Brand R	-86	-56	-50
FURMAN	-97	-77	-76

Unweighted noise levels in dBV, 20 Hz to 20 KHz., input shorted.

SIGNAL PROCESSING DEVICES

1990



LEXICON, INC.
LXP-5

LEXICON, INC., 100 Beaver St., Waltham, MA 02154; (617) 891-6790. Product Name: LXP-5. Contact: Steve Frankel. Date Product Introduced: 1989. Product Description & Applications: The LXP-5 is capable of creating up to five simultaneous effects as well as three octaves of pitch shifting, extremely wide-range delay sweeps, chorusing, flanging, ambience and reverb. All of its parameters are accessible via its simple front panel controls or through Lexicon's Dynamic MIDI®. It has 64 permanent factory presets and 128 user memories. Basic Specifications & Suggested List Price: Designed as a complement to the LXP-1, they fit conveniently side-by-side in a standard single rack space. Version 3.0 software with the Lexicon MRC (MIDI Remote Controller) permits full control of up to 16 units.

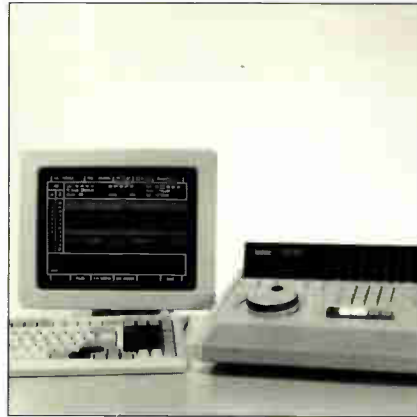
LEXICON, INC., 100 Beaver St., Waltham, MA 02154; (617) 891-6790. Product Name: Model 300. Contact: Steve Frankel. Date Product Introduced: AES 1989. Product Description & Applications: The Lexicon Model 300 is the successor to the famous Model 200. Its high-quality reverb, pitch shifting and effects make it perfect for recording studio, broadcast and post-production applications. The Model 300's fluorescent display coupled with a simple menu-driven user interface, makes its 128 factory programs easy to use under studio conditions. There are separate keys for direct access to the most commonly used functions and a numerical keypad and softknob for data entry. Basic Specifications & Suggested List Price: SMPTE time code can be used to trigger up to a 50-event program change list. Full Lexicon Dynamic MIDI is also included for control of parameters AES/EBU and EIAJ CP-340 (consumer) digital I/O allows for direct audio communication with DAT recorders and most other equipment capable of interfacing in the digital domain.



LEXICON, INC.
MRC Version 3.0

LEXICON, INC., 100 Beaver St., Waltham, MA 02154; (617) 891-6790. Product Name: MRC Version 3.0. Contact: Steve Frankel. Date Product Introduced: 1989. Product Description & Applications: The functionality of the Lexicon's MRC (MIDI

Remote Controller) has been significantly enhanced with version 3.0 software. Up to 16 machines can be controlled. Different program changes can be transmitted on all channels simultaneously to reconfigure even the most complex MIDI rig. The LXP-1 and LXP-5 can be fully controlled with a storage capability of 64 setups for each unit in the MRC. Generic MIDI controls have been increased to two slider pages. Basic Specifications & Suggested List Price: User-definable systems strings can also be programmed in the generic MIDI section. Dynamic MIDI® allows for grouping of controls, remapping and re-scaling functions. The upgrade requires a minor hardware change and can be obtained through authorized Lexicon dealers and Lexicon's customer service.



LEXICON, INC.
Opus/E Digital Audio Editing System

LEXICON, INC., 100 Beaver St., Waltham, MA 02154; (617) 891-6790. Product Name: Opus/E Digital Audio Editing System. Contact: Steve Frankel. Date Product Introduced: 1989. Product Description & Applications: Designed for use with existing mixing consoles or as a stand-alone editor, Opus/E offers the exclusive multitrack editing and recording capabilities of the larger Opus system. Multiformat audio I/O with soft patching and individual channel outputs provide flexibility for interfacing with analog operation as well. The dedicated edit panel and intuitive operation result in a short learning curve. Basic Specifications & Suggested List Price: Both the edit panel and keyboard can be rack-mounted for installation in existing mixing consoles. Opus/E is fully compatible with Opus systems providing flexibility in facility planning and integration. Full systems compatibility also allows an Opus/E system to be expanded to a full Opus system at any time.

MICROAUDIO, INC., 4438 SW Hewett, Portland, OR 97221; (503) 292-8896; (800) 445-1248. Product Name: Powered EQ, Model CS/1. Contact: Eugene Rimkeit. Date Product Introduced: 6/89. Product Description & Applications: Tamper-proof 1/3-octave programmable equalizer and 70-watt power amp in one unit. Basic Specifications & Suggested List Price: 70-watt, 1/3-octave EQ. Price: \$1,195.

N.I.H. LABS/INDUSTRIAL STRENGTH IND., 13042 E. Moore St., Cerritos, CA 90701; (213) 921-2341. Product Name: CN40. Contact: Duke Gee, sales mgr. Date Product Introduced: 1/89. Product Description & Applications: This is the first 3-way stereo/4-way mono electronic crossover to give an exact digital readout of the crossover frequency. This feature not only makes obtaining the exact crossover point much easier, it also makes it possible for one to repeat the same setting. The unit has balanced XLR connectors for optimum sound quality and screwdriver adjustments for error-free use. Basic Specifications & Suggested List Price: Frequency response: 10Hz to 100kHz, nominal output voltage: +4dBm (1.23V), S/N: better than 100dB, THD: 0.005%; 24dB/octave cutoff slopes, weight: 9 lbs., sold direct from Industrial Strength Industries for \$349.

N.I.H. LABS/INDUSTRIAL STRENGTH IND., 13042 E. Moore St., Cerritos, CA 90701; (213) 921-2341. Product Name: PE30. Contact: Duke Gee, sales mgr. Date Product Introduced: 1/89. Product Description & Applications: The PE30 provides four bands of fully adjustable, fully professional parametric equalization in a single rack space. With "Q" or bandwidth controls, one can dial in the exact EQ sound and range without affecting tones that are octaves away from the center frequency. This helps to solve all those difficult equalization problems. The send and return jacks allow one to stack PE30s for extra bands. Basic Specifications & Suggested List Price: Frequency response: 10Hz to 90kHz, THD: less than 0.01% S/N: 90dB, Variable Q range: 0.5 to 7, Variable gain range: ±6dB or ±12dB, Weight: 7 lbs., Sold directly from Industrial Strength Industries for \$199.

ORBAN, A DIVISION OF AKG ACOUSTICS, INC., 645 Bryant St., San Francisco, CA 94107; (415) 957-1067. Product

orban

ORBAN, A DIVISION OF AKG ACOUSTICS, INC.
290Rx

Name: 290Rx. Contact: David Roudebush, mktg. mgr. Date Product Introduced: 4/29/89. Product Description & Applications: The 290Rx combines two complementary audio restoration functions with a powerful new single-ended noise reduction system. A patented harmonic-generation circuit and proprietary spectral enhancement combine to give old material "new" production values, or to pull buried tracks up out of a mix. Working in conjunction with the Open Sound™ single-ended noise reduction circuitry, the restoration circuitry will open up the sound of over-processed material while steady-state noise is stripped away. The two channels can be operated in stereo or dual mode. Basic Specifications & Suggested List Price: The Rx features proprietary balanced and floating outputs and balanced inputs for maximum versatility and noise immunity. It features three LED bar graph displays per channel, displaying peak output, downward expansion, and filter bandwidth. Separate mix and in/out controls allow independent use of any Rx function. Price: \$1,200.

ORBAN, A DIVISION OF AKG ACOUSTICS, INC., 645 Bryant St., San Francisco, CA 94107; (415) 957-1067. Product Name: 764A. Contact: David Roudebush, mktg. mgr. Date Product Introduced: 4/29/89. Product Description & Applications: The 764A is digitally controlled, mastering-quality parametric equalizer. It is capable of running up to 99 full, 4-band parametric filter modules on its own MIDI-LAN, and each filter module can store and recall up to 99 presets of all parameters. Fifth-generation true constant-Q filter design produces better S/N than even the latest 20-bit A/D converters. Available in one or two-channel versions with two-channel slaves available, the 764 series can optionally be controlled by RS-422, RS-232 or MIDI interfaces. Basic Specifications & Suggested List Price: Balanced, floating input/output; one or two filter boards, each filter board containing four parametric equalizers; a highpass filter, a lowpass filter and an input attenuator, all under digital control. Filter parameters adjusted by continuous rotary encoders to provide instantaneous recall of filter settings, with no jump as filter knobs are turned. Prices: 764A/2, \$2,495, 764A/1, \$1,995, 764A/SL, \$1,895.

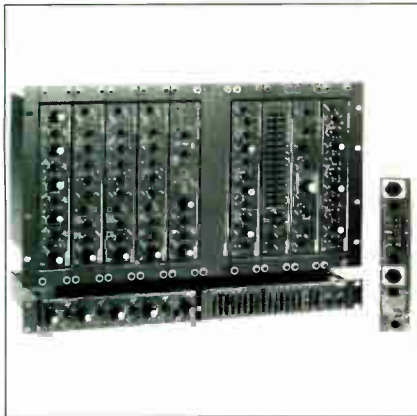
PANASONIC PROFESSIONAL AUDIO SYSTEMS/RAMSA: 6550 Katella Ave., Cypress, CA 90630; (714) 373-7277. Product Name: Ramsa WZ-9375 Digital Delay. Contact: Steve Woolley, sales and mktg. mgr. Date Product Introduced: 5/89. Product Description & Applications: The Ramsa WZ-9375 is a high sampling rate (100kHz), low group delay (14msec), low noise (over 92dB dynamic range) digital delay intended for performance-sensitive applications in sound reinforcement and recording. Basic Specifications & Suggested List Price: Two inputs, two outputs or one input, four outputs. 100kHz or 50kHz sampling rate; up to 1308msec delay in 10µsec steps, over 92dB dynamic range, 20Hz to 20kHz +0.5, -2dB at 100kHz sampling; THD under 0.03% at 100kHz sampling, programmable front panel or remote.

PASSAC CORPORATION: 759 Ames Ave., Milpitas, CA 95035; (408) 946-8989; FAX: (408) 946-0443. Product Name: AGR-1000. Contact: Royce Kirilanovich, mgr. Date Product Introduced: 5/89. Product Description & Applications: Passac's linear-resonance technology simulates natural acoustic guitar resonances for a whole new range of tonal possibilities. This is the first in a series of new voices for the electric guitar and bass. Basic Specifications & Suggested List Price: A/B effect output routing, single half-rack format. \$369 list price.

PEAVEY AUDIO MEDIA RESEARCH: 711 A St., Meridian, MS 39302; (601) 483-5372. Product Name: Q-Factor. Contact: Ken Valentine, product mgr. Date Product Introduced: 6/89. Product Description & Applications: The new Q-Factor presents "Quiet!" This dual-channel processor yields effective, dynamic noise reduction via high-quality VCA technology with a subtlety of operation approaching full transparency. Noisy sources are rid of annoying hiss by the combined action of two independent processes with user-variable parameters. Basic Specifications & Suggested List Price: Processing ac-

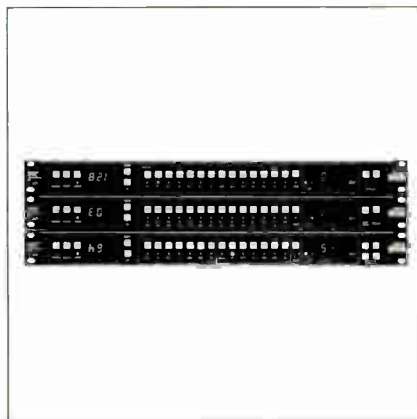
tion of the dynamic lowpass filter and the downward expander is variable in threshold, slope and attenuation. Both processes are uniquely displayed via an array of bi-color LEDs. Operating level in/out: +4dBu, XLR balanced. Target U.S. list price: \$349.99

PEAVEY ELECTRONICS; 711 A St.; Meridian, MS 39301; (601) 483-5365. Product Name: Multiflex. Contact: Ken Valentine, product mgr. Date Product Introduced: 1/89. Product Description & Applications: The Peavey Multiflex offers four 16-bit digital, multieffects modules. Each module consists of user-adjustable echo, pre-delay, early reflections, room size, tonal color, reverb time, left and right stereo channel delay and echo feedback, chorus rate, depth, delay time, feedback, multieffects algorithm facilities and 128 user-modifiable presets. The Multiflex can be used in three ways: as a multilayered effects unit, as four separate digital effects units, or as a combination of multilayered and single effects units. Basic Specifications & Suggested List Price: Four independent, full-featured, digital, multieffects processors, each with five fully programmable effects in one rack space. Up to 2.75 seconds of digital delay. Serial chairs and/or individual operation. MIDI in, out and thru. Full MIDI or front panel access to all 128 presets and 128 patches. List price: \$1,199.99



RANE CORP.
Flex Series Modular Signal Processors

RANE CORP.; 10802 47th Ave. W.; Everett, WA 98204; (206) 355-6000. Product Name: Flex Series Modular Signal Processors. Contact: Larry Winter, vp mktg. Date Product Introduced: 7/89. Product Description & Applications: Series of HR (half-rack) modules that can be mounted horizontally, vertically or operated stand-alone. Functions include many types of mixers, splitters, equalizers, crossovers, dynamic controllers, filters, meters, amps and power supplies. Basic Specifications & Suggested List Price: All modules: very low noise, low distortion, studio grade and agency exempt. Units are remote-powered. 1.75"H x 8.45"W x 8"D plus mounting hardware. List prices range from \$199 to \$399



RANE CORP.
MPE Series MIDI Programmable Equalizers

RANE CORP.; 10802 47th Ave. W.; Everett, WA 98204; (206) 355-6000. Product Name: MPE Series MIDI Programmable Equalizers. Contact: Larry Winter, vp mktg. Date Product Introduced: 6/89. Product Description & Applications: 1/3-octave, dual 2/3-octave and 4-channel/7-band models feature 128 memory locations, full MIDI interface with mapping, and powerful built-in software to allow real-time program change, curve combining, program copying, dumping tandem, remote control and "expression" control. Basic Specifications & Suggested List Price: Constant-Q filters, low noise and distortion,

decal displays. 1.75"H x 19"W x 8"D, list price: \$749 for MPE 28 and \$799 for MPE 14 and MPE 47

ROCKTRON; 2850 Technology Dr.; Rochester Hills, MI 48309; (313) 853-3055. Product Name: Pro-Gap. Contact: Jeff Sorna, product specialist. Date Product Introduced: 6/22/89. Product Description & Applications: The Pro-Gap is a MIDI-programmable guitar preamp that features pre and post EQ, programmable Hush noise reduction, 128 programs AGX (automatic gain expansion), one effects loop and two control functions. Basic Specifications & Suggested List Price: Max input level +20dBu, dynamic range over 110dB, noise floor -92dBu (clean mode Hush active), -88dBu distortion mode Hush and AGX active; MIDI in and thru

ROCKTRON; 2850 Technology Dr.; Rochester Hills, MI 48309; (313) 853-3055. Product Name: Pro-Hush. Contact: Jeff Sorna, product specialist. Date Product Introduced: 6/1/89. Product Description & Applications: The Pro-Hush is a MIDI-programmable stereo noise reduction system that features 128 program changes. Variable parameters include expander threshold, expander release, expander ratio, filter sensitivity, filter release and filter cut-off. The Pro-Hush can be instantaneously modified for the optimal setting via MIDI control, and all programmable parameters can also be instantaneously changed through continuous MIDI controllers. Basic Specifications & Suggested List Price: Suggested retail: \$799, max input level +20dBu, dynamic range greater than 110dB, effective noise reduction greater than 50dB, frequency response ± 0.5 dB, 20Hz to 20kHz, max output level +20dBu

ROLAND CORP US; 7200 Dominion Circle; Los Angeles, CA 90040; (213) 685-5141. Product Name: R-880 Digital Reverb. Contact: Paul Young. Date Product Introduced: 10/88. Product Description & Applications: The R-880 is a digital reverb and effects system. All processing is conducted in the digital domain to ensure the highest possible sound quality. Coaxial and optical-fiber digital inputs and outputs are provided, which allow you to transmit and receive signals in the digital domain. The unit can be used for reverb, early reflections, delay, chorus, equalization and compression effects, and effects can be arranged in any order. Operates with GC-8 Graphic Controller. Basic Specifications & Suggested List Price: Balanced and unbalanced inputs and outputs, digital audio interface, 16-bit A/D and 18-bit D/A converter, automatically selected 48kHz or 44.1kHz sampling rate, 20Hz to 20kHz frequency response, S/N ratio over 80dB, dynamic range over 90dB, less than 0.015% harmonic distortion, MIDI in and out jacks. Price: \$3,995; the GC-8 is \$850

ROSS SYSTEMS; PO Box 2344; Ft. Worth, TX 76102; (817) 336-5114. Product Name: RX31M/RX15S. Contact: Tom Linklater, director of product development. Date Product Introduced: 6/89. Product Description & Applications: Ross Systems' new line of EQs includes a 31-band mono and a 15-band stereo model. Both models feature 12dB cut/boost, broadband level controls, low-cut filter and bypass switch. Basic Specifications & Suggested List Price: 1/2" balanced inputs and outputs with RCA connections for home recording, +17dBm headroom, S/N ratio -98dB unweighted THD 0.015%. List: RX15S—\$229.95, RX31M—\$199.95

SAE (SCIENTIFIC AUDIO ELECTRONICS, INC.); PO Box 60271; Los Angeles, CA 90060; (213) 726-9999. Product Name: SAE E102 Stereo Equalizer. Contact: Buzz Delano, vp of sales and marketing. Date Product Introduced: Fall '89. Product Description & Applications: 10-band graphic equalizer with pink noise generator, real-time spectrum analyzer with frequency display. Unit has tape monitor, EQ bypass, EQ record, display level adjustment, non-interactive standby power supply and computer direct-line audio circuitry. The E102 is rack-mountable and includes microphone. Basic Specifications & Suggested List Price: Not yet determined at presstime

ST. LOUIS MUSIC SUPPLY—OMNIFLEX DIVISION; 1400 Ferguson; St. Louis, MO 63133; (314) 727-4512. Product Name: Omniflex Stereo 15-band Equalizer. Contact: Steve Alsop, product development. Date Product Introduced: 7/15/89. Product Description & Applications: The Omniflex GEX215 is a stereo 15-band equalizer with frequency bands at standard iso-centered frequencies. The GEX215 features low distortion, low-noise circuitry. The equalizer has balanced XLR inputs and outputs as well as unbalanced 1/4" inputs and outputs. 20dB of broadband gain is available. 12dB of boost or cut at each frequency band. Applications: room equalization, monitor equalization, creative equalization. Basic Specifications & Suggested List Price: Less than 0.01% harmonic distortion. Signal-to-noise ratio: 95dB. Frequency response: 20Hz to 20kHz ± 1 dB. Accepts all input levels from -10dB to +20dB. Power-on surge protection. Subsonic filtering. One rack space height. List price: \$299. Omniflex also offers a 31-band equalizer, the GEX131

ST. LOUIS MUSIC SUPPLY—OMNIFLEX DIVISION; 1400 Ferguson; St. Louis, MO 63133; (314) 727-4512. Product Name: Omniflex Stereo 3-way Crossover. Contact: Steve

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Also, product development Date Product Introduced: 7/15/89 Product Description & Applications: The Omniflex SCX235 crossover functions as a stereo 3-way crossover, or a mono 4 or 5-way crossover. Switching of mono/stereo functions is completely automatic and internal. The SCX235 uses a 4th-order state-variable Linkwitz-Riley design with a 24dB/octave roll-off that offers maximum driver protection, minimal driver interaction at crossover point to ensure correct phase response, and the 24dB/octave filter eliminates the need for phase correction. **Basic Specifications & Suggested List Price:** Less than 0.01% harmonic distortion. Signal-to-noise ratio: 95dB. Frequency response: 20Hz to 40kHz. Balanced and unbalanced 1/4" input and outputs for long cable runs without signal degradation. Infinitely variable crossover points. Subwoofer output. Mute Switches. List price: \$349.



SIMON SYSTEMS ENGINEERING, INC.
RDB-400 Integrated Direct Box

SIMON SYSTEMS ENGINEERING, INC.: 707 Clear Haven Dr.; Agoura Hills, CA 91301; (818) 707-9980. Product Name: RDB-400 Integrated Direct Box. Contact: Richard A. Simon, president. Date Product Introduced: 4th quarter, 1989. Product Description & Applications: Newly redesigned RDB-400 has the same state-of-the-art electronic design as its predecessor. The outward appearance has only slightly changed, but inside construction has improved to make the unit more rugged. In addition, the RDB-400 features two newly designed PC boards that increase reliability and serviceability. The AC powered RDB-400 has incredible headroom and provides four independent channels with versatile gain/attenuation and I/O capability. A must for the control room and musician's rack. **Basic Specifications & Suggested List Price:** Frequency response: 10Hz to 150kHz, THD: 0.05%, EIN: -108dB, slew rate: 5.88 V/μsec. Transient response: 0.3μsec. Input impedance: 1 Mohm. Suggested list price: \$995.

SOLID STATE LOGIC: Begbroke, Oxford, OX5 1RU England; (44) (865) 842300. Product Name: Logic FX. Contact: Noel Bell, publicity mgr. Date Product Introduced: 6/89. Product Description & Applications: Range of 19" rack-mount units with SSL G Series electronics, including Logic FX G383 dual mic amplifier and equalizer, and Logic FX G384 quad or stereo compressor with auto-fade facility. **Basic Specifications & Suggested List Price:** G383 has two identical mic amp/EQ sections, 4-band parametric EQ and LF filter.

SONY PROFESSIONAL AUDIO: 1600 Queen Anne Rd.; Teaneck, NJ 07666; (201) 833-5200. Product Name: MU-R201. Contact: Art Gonzales, product mgr. Date Product Introduced: 7/89. Product Description & Applications: The MU-R201 is a professional, two-channel digital reverb with true stereo processing. It utilizes a Sony-developed VLSI for complete stereo processing that is not possible with two monophonic reverbs. Also included is a programmable 4-band stereo digital equalizer, MIDI compatibility, 100 factory presets, 100 user-accessible presets and remote control capability with optional MU-RM1A. **Basic Specifications & Suggested List Price:** Quantization: 16-bit linear, input levels: -10/+4 selectable; dynamic range: more than 90dB, THD: less than 0.008%, weight: approx. 9 lbs, 15 oz. List price: \$1,050.

SOUNDCRAFTSMEN: 2200 S. Ritchey; Santa Ana, CA 92705; (714) 556-6191. Product Name: Pro-EQ 44. Contact: Roger Hagemeyer, sales. Date Product Introduced: 6/1/89. Product Description & Applications: 2-channel, 1/3-octave equalizer with 21 bands per channel. The bands are divided into 1/3-octave centers from 40Hz through 1kHz. From 1kHz to 16kHz the bands are on 2/3-octave centers. This 1/3 to 2/3-octave arrangement provides maximum flexibility in the critical low frequencies. Differential comparator circuit allows quick and accurate (0.1dB) balancing of input to output. **Basic Specifications & Suggested List Price:** S/N ratio: 114dB below full output (-92dBm). Input impedance: 47k ohms. Output impedance: 300 ohms. THD: 0.01% at 2V. 3.5"H x 19"W x 11"D. \$549.

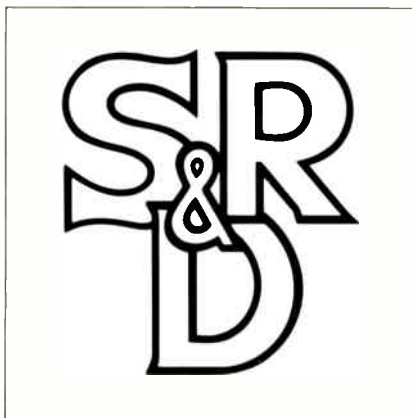
SOUNDTECH: 230 Lexington Dr.; Buffalo Grove, IL 60089; (312) 541-3520. Product Name: ST200CL compressor/limiter/gate. Contact: Todd Peden, national sales director. Date Product Introduced: 6/16/89 (NAMM). Product Description & Applications: The SoundTech ST200CL is a stereo compressor/limiter/noise gate. Features include: stereo/mono switch, compressor on/off switch, gain reduction meter, controls for variable expander gate, threshold, compression ratio, attack, release, input and output level. Inputs and outputs are XLR as well as 1/4". Priced within reach of the novice, the ST200CL is equally at home in professional recording and live sound applications. **Basic Specifications & Suggested List Price:** Frequency response: 20Hz to 20kHz ±2dB, harmonic distortion: less than 0.01%, hum and noise: -80dB, ratio: 1:1-infinity:1, attack: 0.2msec. to 20msec., release: 50msec. to 2 sec., exp. gate threshold level range: 5: -25dB to about -65dB.

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SCHOLZ RESEARCH AND DEVELOPMENT, INC.
Rockman XPR MIDI Programmable Multiprocessor Preamp

SCHOLZ RESEARCH AND DEVELOPMENT, INC.: 1560 Trapelo Rd.; Waltham, MA 02154; (617) 890-5211. Product Name: Rockman XPR MIDI Programmable Multiprocessor Preamp. Contact: Sherr Cohn. Date Product Introduced: 1/89. Product Description & Applications: The Rockman XPR is a rack-mount preamp designed to produce an infinite variety of state-of-the-art guitar sounds, from shimmering clean to mega distortion and anything in between. The XPR lets you program and store 100 of your favorite settings and access them instantly through MIDI. The new Lead Leveler distortion compressor is built in for incredible picking response and note dynamics. Programmable features include: six discretely different distortion-processing circuits, compression/sustain control, 5-band output EQ with separate 3-band predistortion EQ, effects loop. **Basic Specifications & Suggested List Price:** Simultaneous stereo chorus and stereo echo or reverb, master volume control with automatic treble compensation. Auxiliary stereo input, manually set master output tone and overall output volume, headphone and direct line-outs included. List price: \$849.

S.E.M. CO.: 3782 Westridge Ave.; West Vancouver, BC, V7V 3H5 Canada; (604) 922-0526. Product Name: 900 Series. Contact: E. Ebert. Product Description & Applications: The 900 Model Series of modular audio processing cards include distribution amplifiers, compressors, VCAs, active crossovers, parametric and graphic equalizers, digital delays, routing switches and other standard audio processing circuits providing cost-effective front-end solutions for engineered sound systems. All cards fit into standard 5.25" cardframes sharing a common power supply.

SESCOM INC.: 2100 Ward Dr.; Henderson, NV 89015; (702) 565-3400. Product Name: RK-Systems. Contact: Franklin J. Miller. Date Product Introduced: 4/89. Product Description & Applications: RK-System is a rack system of audio signal processing for high-performance audio. The system includes ten different modules with a common power supply. The system requires three rack spaces. The modules include four DA assemblies, monitor, mic/line driver, stereo buffer, stereo combiner, automatic level control and line amplifier. **Basic Specifications & Suggested List Price:** These units feature low distortion, wide frequency response and low noise. They are built to the highest quality standards. Prices range from \$200 to \$320 an module, with rack chassis and power supply, priced at \$595.

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Dimensions: 19" x 1 1/4" x 11" Weight: 8 lbs. Suggested retail price: \$299.50

SPATIAL SOUND: 743 Center Blvd., Fairfax, CA 94930, (415) 457-8114; FAX: (415) 457-6250. Product Name: SP-1 Spatial Sound Processor. Contact: Dave Yancey, sales mgr. Date Product Introduced: 10/88. Product Description & Applications: The SP-1 Spatial Sound processor is an automated panner for the simulation of sound movements and localization of sound in one, two or three dimensions. It can be used in stereo and surround sound with speaker arrays of up to eight speakers. The speaker positions are programmable. The SP-1 is controllable in real-time, step-time, by MIDI keyboard/sequencer and FSK. Applications are: live concert sound, surround sound for film, dance clubs, theaters, planetariums and multimedia shows. Basic Specifications & Suggested List Price: 4 inputs at 20 kohm (+4dBm), 2 to 8 outputs at 150 ohm (+4dBm), frequency response: 10Hz to 20Hz \pm dB, S/N ratio w/r m min 80dB. Dimensions: 16" x 13" x 4". Weight: 18 lbs (9kg). Power: 120/220V. Price: \$3,300 unbalanced, \$3,600 balanced.

SPECTRUM SIGNAL PROCESSING, INC.: #301-3700 Gilmore Way, Burnaby, BC, V5G 4M1 Canada, (800) 663-8986 (U.S. only); (604) 438-7266 (in Canada). Product Name: DSP56001 System Board and Processor Board. Contact: Judy A. Bishop, sales mgr. Date Product Introduced: 12/88. Product Description & Applications: DSP56001 System Board is a complete single-board system with dual-channel onboard analog I/O, DSP processor and memory. In addition to the onboard analog interfaces, data can also be acquired via the DSP-Link system expansion interface, a 50-pin standardized expansion bus featured on most Spectrum products, including multichannel data acquisition cards. Spectrum also supplies software development tools for the DSP56001 System and Processor Boards, including Motorola's assembler/linker and simulator and C Compiler, as well as application software for data acquisition and analysis, and filter design. Basic Specifications & Suggested List Price: DSP56001 System Board—Motorola's 110ns 24/56-bit processor, two 16-bit A/Ds with S/H (153kHz throughput), two 16-bit D/As, Combo/Codec, 48K x 24 zero-wait-state RAM—expandable to 192K x 24, efficient memory access from PC, DSP-Link system-expansion interface, serial I/O, monitor/debugger, "C" board drivers—\$3,495.



STUDIO TECHNOLOGIES, INC.
Generation II Stereo Simulator

STUDIO TECHNOLOGIES, INC.: 5520 W. Touhy Ave., Skokie, IL 60077; (312) 676-9177. (Area code after 11/89 is 708). Product Name: Generation II Stereo Simulator. Contact: Jennifer Shore, mktg. com. mgr. Date Product Introduced: 4/89. Product Description & Applications: The Generation II Stereo Simulator creates a convincing stereo image from a mono audio source. Its fully mono-compatible signal simulates space without reverberation by using random, nonrecursive filter techniques. Features two operating modes: the Music mode provides simulation over the entire audio range, the Music & Voice mode utilizes a specialized filter to give greater simulation to all frequencies except those in the voice band. It is intended for use in broadcast, post-production and film applications. Basic Specifications & Suggested List Price: Simple to install and use. It mounts in a standard, one rack-space. The mono audio input and left and right stereo output signals connect using standard XL-type connectors. The input and output levels are switch-selectable for nominal 0, +4 or +8dBu operation. It is priced at \$825.

STUDIOMASTER INC.: 3941 E. Miraloma Ave., Anaheim, CA 92807; (714) 524-2227; FAX: (714) 524-5096. Product Name: ACO-1 Electronic Crossover. Contact: Jim Giordano. Date Product Introduced: 6/89. Product Description & Applications: 2-way stereo, 3-way mono, 1 sp. rack-mount electronic crossover. Featuring electronically balanced inputs and outputs, on-locking XLRs, 24dB per octave filters. Each band incorporates tunable "feed forward" limiters, mute and phase-reverse switches, with indicator LEDs for mute status. The

ACO-1 also features a variable time-align feature, which allows for accurate time alignment of the high frequency. The ACO-1 is also available in a transformer-balanced version. Basic Specifications & Suggested List Price: Crossover slopes 24dB/octave. Crossover freq. 95Hz to 1kHz/750Hz to 8kHz. Subsonic filter 30Hz (-3dB). Gain -14dB to +6dB. Limiter type: feed-forward. Limiter attack/release time: optimized per band. Output noise: -85dBm (DIN audio). Distortion: 0.01% (1kHz 0dBm). Stereo separation: 80dB (1kHz). List price: \$795.

TELOS SYSTEMS: 1729 Superior Ave., Cleveland, OH 44114; (216) 241-7225. Product Name: Telos ONE Digital Telephone Interface. Contact: Trisha Ristagno, gen. mgr. Date Product Introduced: 4/89 (NAB). Product Description & Applications: The Telos ONE interface brings the superb Telos digital hybrid performance to applications where cost is critical. The Telos ONE uses a state-of-the-art approach to interface telephone lines for broadcast and teleconferencing use. The very fast and precise digital automatic hulling allows smooth, natural, simultaneous conversation without the usual speaker phone up-cutting or the audio distortion problems often experienced with hybrid-type devices. The same powerful digital processor and software used in the Telos 100 hybrid interface are used in the unit with impressive results. Basic Specifications & Suggested List Price: True digital—all processing in the digital domain. Trans-hybrid loss greater than 40dB. Sophisticated input and output AGG functions. Advanced caller expand and override functions. Excellent for open monitor applications. Second output with optional mix of caller and send signals. Remotable via 08-9 connector. May be used with Telos 100 family members. Full metering of input and output levels and gain reduction. List price: \$985.

ULTRAANALOG, INC.: 47747 Warm Springs Blvd., Fremont, CA 94539; (415) 657-2227. Product Name: DAC D18400 Dual Audio D/A Converters. Contact: Steve Canning, sales mgr. Date Product Introduced: 8/89. Product Description & Applications: The DAC D18400 is the lowest-priced model in UltraAnalog's product line offering 18-bit resolution, yet giving up very little performance. Like the DAC D20400, this product also converts at eight times oversampling rates. The DAC D18400 is the first dual 18-bit audio D/A converter that provides true 18-bit performance. Critical performance parameters such as differential nonlinearity, S/N ratio, monotonicity, crosstalk and harmonic distortion are consistent with the product's 18-bit resolution. For signal amplitudes at -60dB the THD +N typically measures -48dB, yielding an effective



ULTRAANALOG, INC.
DAC D18400 Dual Audio D/A Converters

dynamic range of 108dB! Basic Specifications & Suggested List Price: Applications include: digital multitrack recorders, audiophile D/A converter boxes, digital audio tape recorders (DAT), digital mixing consoles, premium quality compact disc players (CD), digital audio workstations/disk-based recording. DAC D18400 is \$265 in single quantities, \$129 at 250 each.

ULTRAANALOG, INC.: 47747 Warm Springs Blvd., Fremont, CA 94539; (415) 657-2227. Product Name: DAC D20400 Dual Audio D/A Converter. Contact: Steve Canning, sales mgr. Date Product Introduced: 8/89. Product Description & Applications: The DAC D20400 is the flagship of UltraAnalog's product line, and converts with 20-bit resolution at sampling rates up to 400kHz. By offering eight times the standard 48kHz or 44.1kHz digital audio sampling rates, the requirements of the lowpass filter that follows the D/A are relaxed. It includes two complete D/A converters, a stable bipolar reference, a universal serial CMOS/TTL compatible digital inter-

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ULTRAANALOG, INC.
DAC D20400 Dual Audio D/A Converter

face and two distortion-suppressing output ceghtcher amplifiers. The user only needs to connect a power supply, a serial data source, output lowpass filters and appropriate timing signals. **Basic Specifications & Suggested List Price:** Applications include: digital multitrack recorders, audiophile D/A converter boxes, digital audio tape recorders (DAT), digital mixing consoles, premium quality compact disc players (CD), digital audio workstations/disk-based recording. Price/delivery: (two complete channels) \$325 in single quantities, \$209 at 250 each.

VALLEY INTERNATIONAL, INC.; PO Box 40306, 2817 Erica Pl.; Nashville, TN 37204; (615) 383-4737. **Product Name:** DCE (Digital Compressor/Expander). **Contact:** Jon Bosaw, sales mgr. **Date Product Introduced:** 2/89. **Product Description & Applications:** The DCE operates entirely in the digital domain, using algorithms modeled after Valley's famous analog signal processing circuitry. The unit's compressor section can be configured to perform virtually any dynamics function ranging from very mild AGC-type compression to "zero attack time" peak limiting. The unit's independent expander may be used for noise reduction or special processing effects. The DCE is a stereo device. The unit can be directly connected to a variety of digital devices, including Sony PCM-1631D, 1630, PCM-3324/3348 and Mitsubishi X800/X850 recorders, as well as Valley's own analog interface for various digital recording and mastering applications. **Basic Specifications & Suggested List Price:** The DCE offers variable control of both the compressor section and expander section attack time, release time, set point (threshold), mix (ratio) and gain. Several factory presets are available for a quick start, and all dynamics settings may be stored for later retrieval in one of 99 user preset locations. In addition to the straightforward front panel controls the DCE may be operated through an RS-232C/RS-422 serial port or by MIDI. **List price:** \$3,250.

VALLEY INTERNATIONAL, INC.; PO Box 40306, 2817 Erica Pl.; Nashville, TN 37204; (615) 383-4737. **Product Name:** DDP (Multiband, Multifunction, Digital Dynamics Processor). **Contact:** Jon Bosaw, sales mgr. **Date Product Introduced:** 2/89. **Product Description & Applications:** The DDP is available in 3, 5 and 8-band configurations. Each band processor card is a stereo device consisting of a processor section devoted to the FIR bandpass filter function, a processor devoted to the dynamics processing function, and those peripheral communications and logic circuits necessary to support and coordinate each function. The band processors may be operated as low-ratio compressors to extract detail and enhance loudness, while limiter modes allow precise energy control in each band. Complementary expanders may be used for noise reduction or special processing effects. The stereo width can be changed for spatial enhancement and disk mastering "EE" requirements. **Basic Specifications & Suggested List Price:** The DDP can operate at sampling frequencies as high as 50kHz, and the generic digital I/O port can easily be interfaced to all popular formats, including AES/EBU, Sony, Mitsubishi and JVC. A separate analog interface featuring oversampling A/D and D/A converters and Apogee filters is also available. **DDP-3:** \$7,500, **DDP-5:** \$9,000, **DDP-8:** \$12,000, analog interface: \$1,750. Applications include: CD master preparation, processing for cassette duplication, disk mastering and production.

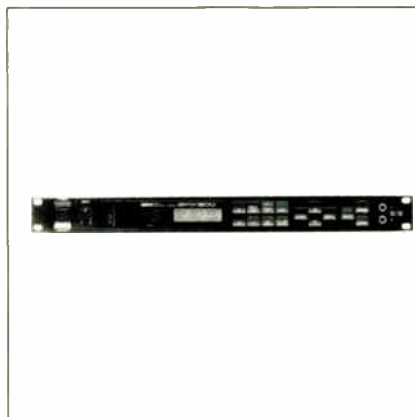
WAVEFRAME CORPORATION; 2511 55th St.; Boulder, CO 80301; (303) 447-1572. **Product Name:** Universal Digital Interface (UDI-4). **Contact:** Gus Skimas, senior product mgr. **Date Product Introduced:** 11/88. **Product Description & Applications:** The Universal Digital Interface (UDI-4) for the Audio-Frame provides four channels of high-quality 24-bit sample rate conversion, format conversion and digital emphasis/de-emphasis allowing easy interface to D1, D2, BVH-2800 (AES/EBU), PD, DASH, compact disc mastering (SDIF), and consumer digital audio systems. Sample rate conversion on each stereo pair permits the use of nonsynchronized sources. **Basic Specifications & Suggested List Price:** Four, bidirectional digital audio channels, 24-bit resolution, sample rate 32 to 50kHz, floating or internal clocking, delay: 0.2ms without sample-rate conversion or 1.0ms with sample rate conversion, 50-pin D-sub (DB-50) connectors \$8,900.

WHITE INSTRUMENTS, DIV. C VAN R, INC.; 5408 U.S. Hwy. 290 West, Austin, TX 78735; (512) 892-0752. **Product Name:** Model 4700—Digital Controlled Equalizer. **Contact:** Carl Van Ryswyk, president. **Date Product Introduced:** 6/1/89. **Product Description & Applications:** The Model 4700 analog equalizer is based on White's unique implementation of R-C active filters with the convenience, flexibility and security of digital control. The program is stored in one of the equalizer's ten memories. High and lowpass filter adjustments as well as output gain settings are stored in the unit's nonvolatile memory that requires no battery backup. Multiple channels can be networked to respond to one command source: the first equalizer's panel or optional RS-232C/EIA-422 interface. **Basic Specifications & Suggested List Price:** Active servo-balanced inputs and outputs, less than 0.05% THD and better than 98dB signal-to-noise ratio, variable gain from -6 to +12dBu, adjustable in 0.5dB steps, EQ in/out switch, clip indication, 90-130/180-260, 50/60Hz VAC operation.

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. **Product Name:** DDL3 Commercial Audio Delay. **Contact:** Robert T. Davis. **Date Product Introduced:** 10/89. **Product Description & Applications:** The DDL3 (model number tentative at time of publication) is a single input, 3-output digital audio delay intended for use in permanent and portable sound reinforcement applications. The dynamic range has been extended by use of 18-bit A/D-D/A conversion yielding signal-to-noise in excess of 100dB. Inputs and outputs are electronically balanced with +4dBu nominal, +24dBu peak outputs. Delay times may be adjusted in increments of one sample point that with a sampling frequency of 44.1kHz provides resolution of 20µsec steps. Each of the three outputs includes an independent 3-band digital parametric equalizer, and a "digital pad," calibrated in 1dB steps. Level, equalization, and delay parameters can be stored in eight memory locations that can be recalled by remote contact closure or via MIDI. **Basic Specifications & Suggested List Price:** The DDL3 also has internal software that allows it to function as a 3-way crossover with independently programmable level, filter slope, crossover point and delay settings for each output. The DDL3 is a single rack unit high. Two recessed rear panel switches discourage unauthorized tampering. Once stored, all memories may be downloaded to a microcomputer via MIDI.

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. **Product Name:** FX500 Simul-Effect Processor. **Contact:** Robert T. Davis. **Date Product Introduced:** 10/89. **Product Description & Applications:** A compact, high-performance digital effects processor, the FX500 provides up to five different effects, simultaneously, and has extensive programming capability for "personalization" of effects sounds. The FX500's effects are all created utilizing Yamaha DSP VLSI chip technology, which gives full 20kHz bandwidth, tremendous programming capability, and superb sound quality. The FX500's programmable effects include compression, distortion, equalization, modulation and reverb—60 preset effects programs, each with changeable parameters, and has 30 additional RAM locations that can store user-modified effects for recall. **Basic Specifications & Suggested List Price:** The FX500 has comprehensive MIDI implementation, including the ability to directly control up to two different effect parameters simultaneously in real time. Programming the FX500 is done via the convenient front panel pushbutton switches and the backlit LCD program display with two lines of 15 characters each for parameters and information. The FX500 has both front panel and rear panel inputs. The stereo output is switchable for -20dB/-10dB level, and the FX500 has a headphone output with its own level control. The FX500 is a half-rack sized unit (8 1/2" x 1 3/4" x 9 3/4") and weighs about 3 lbs.

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. **Product Name:** SPX900. **Contact:** Robert T. Davis. **Date Product Introduced:** 1/89. **Product Description & Applications:** The SPX900's LSI processing IC, the DSP II, yields a signal processor with full bandwidth on all effects and allows multiple programs that provide up to five effects at once. It includes 50 professional effects preset in RCM, including 13 multiple programs that allow up to five effects at once. New effects in the SPX900 include a new reverberation algorithm that provides user control of actual room dimensions, striking 2-dimensional panning effects, a sonic-enhancer program, new



YAMAHA PROFESSIONAL AUDIO DIVISION
SPX900

distortion combinations, and programmable early reflection as well as a special percussion early reflection program. The SPX900 includes programmable digital equalization on each program. **Basic Specifications & Suggested List Price:** MIDI implementation has been expanded to provide external control of up to two effects parameters per program. The SPX900 features a 90dB dynamic range, full 16-bit quantization and 44.1kHz sampling frequency. The SPX900 has a digital I/O port compatible with all Yamaha digital audio equipment, or any other digital formats via Yamaha I/FUs and format converters. The SPX900 is a compact single rack-unit high. **Price:** \$995.



YAMAHA PROFESSIONAL AUDIO DIVISION
SPX1000 Digital Multi-Effects Processor

YAMAHA PROFESSIONAL AUDIO DIVISION; 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. **Product Name:** SPX1000 Digital Multi-Effects Processor. **Contact:** Robert T. Davis. **Date Product Introduced:** 1/89. **Product Description & Applications:** Featuring 20kHz performance from second-generation DSPII chip technology, the SPX1000 also offers 40 factory-preset programs and 59 user-programmable memory locations. 16-bit linear quantization and a sampling frequency of 44.1kHz. It has a 1/4" jack feeding an unbalanced input, jacks for bypass, trigger (2) and memory toggle, and the unbalanced outputs with two (L & R) 1/4" phono jacks. There are MIDI in and MIDI thru DIN-type connectors for MIDI control interface. A unique feature of the SPX1000 is its digital audio input and output system. The SPX1000 can directly accept digital audio input and even has a provision for programmable digital audio send/return, allowing for easy connection to other external digital audio signal processors. **Basic Specifications & Suggested List Price:** All programs are displayed on a large 2-digit LED, and parameters display on the front panel LCD read-out. Additionally, all programs can be addressed by any MIDI controller. Programs include: reverb, gate reverb, delay (independent L, R), stereo echo, stereo flange, chorus, stereo phasing, reverse gate, pitch change, pan and combination programs. New programs include a reverb algorithm that provides user control of actual room dimensions, striking 2-dimensional panning effects, a downward expander program and an exciter program, as well as others. **Price:** \$1,795.

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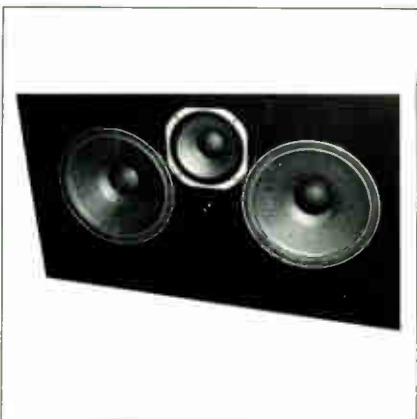
SPEAKERS AND MONITORS

1990



ACOUSTECH CORPORATION
MTR 4.5 Audio Monitor System

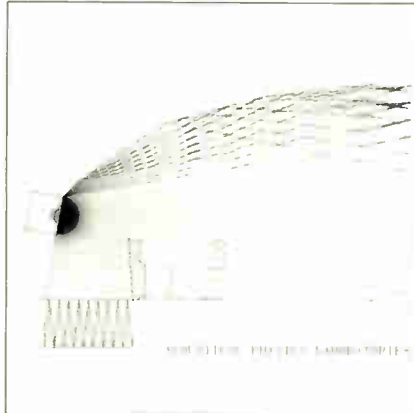
ACOUSTECH CORPORATION, 42 Enterprise Dr., Ann Arbor, MI 48103; (313) 663-3790. Product Name: MTR 4.5 Audio Monitor System. Contact: Tom Munsell, pres./eng. Date Product Introduced: 3/88. Product Description & Applications: MTR 4.5 is a powered monitor speaker for installation in standard 5 1/4" half-rack mounting. Balanced, looping, XLR type stereo inputs with front panel switch give A, B and A+B capability. Power-on, clipping indicators and level control also occupy molded ABS front panel. Equalized 55-watt amplifier and mag-shielded driver provide 55-Hz to 17kHz response to 107dB with inputs of 250mV to +22dBm. The MTR 4.5 is aesthetically and mechanically compatible with all video equipment. **Basic Specifications & Suggested List Price:** The MTR 4.5 is a complete audio monitoring system, designed to address the needs of and complement today's audio- or video production facilities. It measures 5 25/32" H x 8 5/8" W x 17" D, weighs 12 lbs. It is finished in durable epoxy and molded ABS, with anodized aluminum back panel. User net price is \$549.



ACOUSTICAL PHYSICS LABORATORIES
Control Room Monitors

ACOUSTICAL PHYSICS LABORATORIES, 3877 Foxford Dr., Doraville, GA 30340; (404) 934-9217. Product Name: Control Room Monitors. Contact: William Morrison, principal engineer. Date Product Introduced: 8/89. Product Description & Applications: The control room monitors, Model I and Model II, utilize cone and dome driver technologies in time-corrected and computer-optimized 3-way crossover alignments. Bass reproduction down to 28Hz (-3dB) is achieved in the Model I with a single 15" driver and in the Model II with dual 15" drivers. Midrange and treble accuracy is ± 1 dB to

25kHz. **Basic Specifications & Suggested List Price:** Control room monitor I: 28Hz (-3dB) to 25kHz ± 1 5dB. 36" H x 22" W x 18" D. 400 watts per channel. \$2,800 per pair. Control room monitor II: 28Hz (-3dB) to 25kHz ± 1 5dB. 29" H x 46" W x 20" D. 800 watts per channel. \$4,200 per pair.



ACOUSTICAL PHYSICS LABORATORIES
Mastering Monitor I

ACOUSTICAL PHYSICS LABORATORIES, 3877 Foxford Dr., Doraville, GA 30340; (404) 934-9217. Product Name: Mastering Monitor I. Contact: William Morrison, principal engineer. Date Product Introduced: 8/89. Product Description & Applications: Acoustical Physics Laboratories introduces a servo-controlled mastering loudspeaker monitor. The mastering monitor includes a patented, accelerometer-based, driver-amplifier servo system to achieve bass transient and tonal accuracy down to 20Hz. Midrange and treble accuracy to 25kHz (± 1 5dB) is achieved by incorporating time-corrected cone and dome drivers in computer-optimized crossover alignments. **Basic Specifications & Suggested List Price:** 20Hz to 25kHz, ± 1 5dB. 36" H x 19" W x 16" D. 800 watts per channel. \$6,100 per pair.

ALTEC LANSING CORPORATION, 10500 W. Deno, PO Box 26105, Oklahoma City, OK 73126-0105; (405) 324-5311. Product Name: Alpha Series A700 System. Contact: Karen Treadwell, mgr. mktg. services. Date Product Introduced: 5/24/89. Product Description & Applications: The Alpha Series A700 loudspeaker system is a trapezoidal-shaped slope front cabinet that houses a 515-8G, driving a vented bass horn and a 909-8A compression driver on a MR994A Manta-ray® horn. The Alpha 700 loudspeaker system is intended as a full-range building block for loudspeaker clusters in auditoriums, civic centers, hotels and houses of worship. **Basic Specifications & Suggested List Price:** The A700 is capable of producing 122dB SPL continuous output, with peak output exceeding 128dB SPL. Its trapezoidal cabinet enables close side-by-side proximity with the A700XLF subwoofer in an array form. The A700XLF dual 15" subwoofer system extends the output below 43Hz. List price for A700 \$2,900.

APOGEE SOUND, INC., 1150 Industrial Ave., Ste. C, Petaluma, CA 94952; (707) 778-8887. Product Name: AE-4 Loudspeaker System. Contact: Joe Manning, vp sales and mktg. Date Product Introduced: 5/89. Product Description & Applications: The AE-4 is a single-amplified, electronically coupled loudspeaker system for high-quality musical or speech applications such as churches, clubs, theaters and discos. It contains a 12" high-power cone driver and a 1" throat, fluid-cooled compression driver coupled to a molded uraltite high-frequency horn. It is available in either the AE-4CV version, which can be ordered in black or gray, has rigging hardware, an internal tripod stand fitting and protective steel trim. **Basic Specifications & Suggested List Price:** The frequency response of the AE-4 is 55Hz to 16.5kHz, ± 4 dB, 1 meter on axis. The power handling is 300 watts continuous, 1,200 watts peak. The speakers are 23" H x 14" W x 14" D and weigh 70 lbs. List price on the AE-4CV (Contractor Version) is \$1,380,



APOGEE SOUND, INC.
AE-4 Loudspeaker System

while the AE-4AV (for portable use) is \$1,495. The 2-channel A-4 processor is \$930 for the permanent version and \$1,100 for the portable version.

ATLAS/SOUNDOLIER, 1859 Intertech Dr., Fenton, MO 63026; (314) 349-3110. Product Name: C12A Professional Quality Loudspeaker. Contact: H.M. Jaffe, vp of mktg. Date Product Introduced: 4/89. Product Description & Applications: Professional-quality 12" diameter, coaxial loudspeaker designed for recessed mounting enclosure with a volume of 3 cubic feet and/or front or rear mounted installation in vented or sealed surface cabinets. Suggested applications include monitor and playback systems, high-quality distributed sound systems, foreground and disco music systems, etc. **Basic Specifications & Suggested List Price:** Power rating: 65 watts. Frequency range: 50Hz to 19kHz. 1 1/2" dia. voice coil, 8 ohms. Magnet weight: 32 oz. Net price: \$161.24.

ATLAS/SOUNDOLIER, 1859 Intertech Dr., Fenton, MO 63026; (314) 349-3110. Product Name: EQ Series Professional Loudspeaker System. Contact: H.M. Jaffe, vp of mktg. Date Product Introduced: 9/89. Product Description & Applications: Cost-efficient, high-fidelity 8" loudspeaker system to enhance audio quality and listener appreciation in constant-voltage distributed sound reinforcement systems. Combines high-performance 8" diameter coaxial loudspeaker with ported bass-reflex ceiling enclosure and choice of decorative grilles. Recommended for use in public areas of studio, meeting rooms, sales offices, recreation areas, hallways and walkways, etc. **Basic Specifications & Suggested List Price:** Power rating: 50 watts. Sensitivity: 93dB with 1 watt input. Frequency response: 70Hz to 20kHz. Voice-coil impedance: 8 ohms. Dispersion: 120 degrees. Net price: EQ818 loudspeaker only \$79.45, EQ818 backbox \$30.41, EQ81 tile bridge \$5.20, EQ61 round grille \$10.25.

CARVIN CORP., 1155 Industrial Ave., Escondido, CA 92025; (619) 747-1710; (800) 854-2235. Product Name: 993 Loudspeaker System. Contact: Neal Taylor, sales mgr. Product Description & Applications: This 800-watt, 3-way powerhouse can handle anything from large outdoor concerts to conventions with ease. Studio-quality sound in large sound reinforcement applications. The 993 utilizes two PS15C woofers, two midrange subsystem PS6.5 direct radiating midrange drivers and two high frequency subsystem PS1021 tweeters (flat from 2kHz to 19kHz). New, integrated crossover system response smooth from 45Hz to 19kHz. **Basic Specifications & Suggested List Price:** Frequency response: 45Hz to 19kHz (± 3 dB), power handling: 800 watts continuous program power, nominal impedance: 4 ohms, crossover frequencies: 400Hz, 4kHz, 0.2Hz.™ enclosure covering, dimensions: 25" W x 19 25/32" D x 47" H, weight: 146 lbs. Factory direct price: \$629.

COMMUNITY LIGHT & SOUND, INC., 333 E. Fifth St., Chester, PA 19013; (215) 876-3400. Product Name: RS880 Loudspeaker System. Contact: Gregory DeTogne. Date Product Introduced: 10/89. Product Description & Applications: The 3-way RS880 loudspeaker system is housed in a trapezoidal enclosure built from extensively braced plywood covered with black carpet. Options including Penn Fab D-rings and internal steel trussing make the enclosure highly suitable for flying arrays. Four individual transducers comprise the RS880's design: twin 15" drivers at the low end, an M-200 for the midband and a 1" titanium driver for the highs. Fully horn-loaded, the RS880 is complemented by the 880EQ and the VBS415 subwoofer. **Basic Specifications & Suggested List Price:** Measuring 49 1/2" high by 30" across, the RS880 is 22 1/2" deep, with a pitch of 22 degrees. Suggested retail prices for the RS880 start at \$1,999, while the 880EQ can be had for \$279. The VBS415 subwoofer has a base price of \$1,399.

SPEAKERS AND MONITORS

1990

DAHLQUIST, INC.: 601 Old Willets Path; Hauppauge, NY 11767; (516) 234-5757. Product Name: DQ-12 Phased Array™. Contact: Carl Marchisotto, president. Date Product Introduced: 9/89. Product Description & Applications: Loud-speaker combines existing patented Dahlquist Phased Array technology with a new shape midrange baffle that replicates the diffraction pattern of the human head to provide lifelike vocal reproduction. Basic Specifications & Suggested List Price: Drivers: 8" long-throw sealed woofer, 5" cone mid-range, 1" dome tweeter. Response: 35-20k Hz, sens. 86dB, power: 40W min/125W max, 42" x 16" x 9", color: black, wt: 42 lbs, price: \$1,200

DESIGN DIRECT SOUND: 9320 15th Ave. S., Seattle, WA 98108; (206) 527-4371. Product Name: CFD 2-90 Pro. Contact: Bob Rice. Date Product Introduced: 1/89. Product Description & Applications: Now there is a new, smaller 90° x 40° 2" format horn from DDS. The CFD2-90 is designed to fit in those tight situations where conventional 90° x 40°s don't fit. The 10"H x 14.5"W x 7.25"D allows easy mounting of today's top drivers into smaller monitors. The CFD2-90 is the horn you have been waiting for and is well-suited to high SPL applications. All DDS Professional Line horns are constructed using biaxial stitched fiberglass cloth with end-grain balsa wood lamination. This gives maximum transparency by eliminating ring and hangover problems in critical frequencies. Our exclusive spun-glass throat/driver mounting flange achieves unmatched strength, while its extremely high density virtually eliminates resonance problems. Basic Specifications & Suggested List Price: Sensitivity: 800Hz to 16kHz. Frequency range: 1kHz to 14kHz. Mean dispersion: 90°H x 42°V. Dimensions: 10"H x 14.5"W x 7.25"D. Weight: 3.5 lbs

EASTERN ACOUSTIC WORKS: One Main St., Whitinsville, MA 01588; (800) 992-5013; FAX: (508) 234-8251. Product Name: FR253HR High Definition Nearfield System. Contact: Ken Berger, president. Date Product Introduced: 5/89. Product Description & Applications: Engineered to reproduce modern musical material with stunning realism and detail at near-concert sound pressure levels, the FR253HR includes two 15" woofers, a pair of 7" midrange drivers and a high-frequency horn/compression driver. The total system produces a peak SPL of over 130dB with full power output down to 45Hz. The newly designed constant coverage horn and compression driver extend upper-octave response to 17,000Hz (±3dB). Basic Specifications & Suggested List Price: Axial sensitivity (1W at 1m): 104.5dB. Power handling: 900W LF, 500W MF/HF. Dimensions: 41.5"H x 24.63"W x 19.75"D. Weight: 175 lbs

EASTERN ACOUSTIC WORKS: One Main St., Whitinsville, MA 01588; (800) 992-5013; FAX: (508) 234-8251. Product Name: KF300. Contact: Ken Berger, president. Date Product Introduced: 6/89. Product Description & Applications: The ultra-compact KF300 brings Virtual Array technology to near-field applications, including stage monitoring, live and motion picture theater sound, video playback, portable PAs and installations. This is the first system in its class with true three-way design for higher midband output with lower distortion. The system is capable of SPLs in excess of 125dB over a frequency range of 80 to 18k Hz (38 to 18k Hz with optional SB300 subwoofer). Basic Specifications & Suggested List Price: Sensitivity (1W at 1m): 106.5dB (MF). Power handling: 400W LF, 200W MF/HF. Dimensions: 27.5"H x 14.75"W x 14.75"D. Weight: 85 lbs.

ELECTRO-VOICE, INC.: 600 Cecil St., Buchanan, MI 49107; (616) 695-6831. Product Name: DML-1122 Series DeltaMax. Contact: Ivan Schwartz, mktg. specialist. Product Description & Applications: DeltaMax™ loudspeaker systems are full-range systems for high-level sound reinforcement in touring sound and permanent installations. The 1152 employs a 15" woofer and is to be used with the DMC-1152 electronic controller. The DML-1122 employs a 12" woofer and is to be used with the DMC-1122 controller. The controllers protect against speaker damage from overexcursion, voice-coil overheating and amplifier clipping without altering the music's spectral balance or the frequency range. The 2181 employs an 18" woofer and is to be used with the DMC-2181 controller. Basic Specifications & Suggested List Price: The DML-1152—frequency response: 50 to 20,000Hz; crossover frequency: 1,250Hz; long-term average power handling: 400/75 watts, short-term: 1,600/300 watts, net weight: 43.3 kg., retail price: \$2,184. The DML-1122—frequency response: 67 to 20,000Hz; crossover frequency: 1,250Hz; long-term average power handling: 300/75 watts; short-term: 1,200/300 watts; net weight: 30.7 kg., retail price: \$1,860. The DMC-1122A and DMC-1152A DeltaMax controllers are \$1,632.

ENVIRONMENTAL SOUND: 31220 La Baya Dr. #110; Westlake Village, CA 91362; (818) 706-0228. Product Name: ES-1002. Contact: Ron Glathoffer, marketing. Date Product Intro-

duced: 1/90. Product Description & Applications: The ES-1002 features a 10" low-frequency polypropylene woofer and a 1" horn-loaded, liquid-filled, high-frequency tweeter. The loudspeaker is a flush-mount baffle and incorporates six inserts for mounting hardware. Also provided is a removable grille. Both the baffle and the grille can be color matched for architectural and interior designers. Applications include theater reinforcement, restaurants, nightclubs, churches and custom home installations. Basic Specifications & Suggested List Price: Minimum power required: 10 to 15 watts, maximum power: 150 watts, impedance: 8 ohms, system sensitivity: 92dB (1 meter, 1 watt), frequency response: 30Hz to 24kHz, number of drivers: 2, crossover frequency: 2,500Hz. Dimensions: 16" x 16". Net weight: 20 lbs. Dealer prices (each): 1-10: \$145; 11-50: \$125; 51-100: \$100

ENVIRONMENTAL SOUND: 31220 La Baya Dr. #110; Westlake Village, CA 91362; (818) 706-0228. Product Name: Pro Drop Ceiling Monitor I. Contact: Ron Glathoffer, marketing. Date Product Introduced: 1/90. Product Description & Applications: The Pro Drop Ceiling Monitor I features an 8" low-frequency polypropylene woofer and a 1" horn-loaded dome tweeter. The loudspeaker enclosure is an isosceles configuration and is provided with internal T-nuts incorporating eyebolt hardware, removable grilles and a removable plate for mounting 25- or 70-volt transformers. Applications include: theater reinforcement, restaurants, nightclubs, churches, conference rooms and custom home installations. Speakers can be color matched. Basic Specifications & Suggested List Price: Minimum power required: 5 to 10 watts, maximum power: 125 watts, impedance: 8 ohms, system sensitivity: 90dB (1 meter, 1 watt), frequency response: 38Hz to 20kHz, number of drivers: 2, crossover frequency: 2,500Hz. Dimensions (isosceles): two sides 11" x 12"W x 23.75"L. Net weight: 25 lbs. Dealer price (each): 1-10: \$170; 11-50: \$150; 51-100: \$125



EUROSTAT CORP.
Mondrian

EUROSTAT CORP.: 1132 East Ave., Rochester, NY 14607; (716) 473-2571. Product Name: Mondrian. Contact: Gene Hale, vp mktg. sales. Date Product Introduced: 5/31/89. Product Description & Applications: Mondrian comprises a rigidly built, 13-ply, low-energy storage cabinet utilizing ultra-low distortion drivers and premium matched crossover components in a first order, phase-correct, line-source array. Fine-tuned QB3 bass alignment with segregated laminar venting provides quick ripple-free bass with enhanced speech intelligibility in both horizontal and vertical positions. Linearity, neutrality and extended high-frequency response ensure true monitor capability. Complete with durable acrylic polyurethane finish in piano black. Others available. Basic Specifications & Suggested List Price: 3-way system (bi-amp option), bandwidth: 38Hz to 32kHz; power handling: 500W (non-clipping), 180W DIN (sine wave), 1,200W at 10ms at 127dB, sensitivity: 88dB 1W/1m, 2.83V, impedance: linear 6.8 ohms, conjugate load matched; distortion: less than 0.5% at all frequencies, dimensions/weight: 13 x 14 x 26, 52 lbs., price: \$3,600 pair

FORMULA AUDIO, INC.: Rt. 5, Box 440-3; Zebulon, NC 27597; (919) 269-6441. Product Name: RAM-300. Contact: Jeff Forsburg, president. Date Product Introduced: 1/89. Product Description & Applications: RAM300 is a 3-way, full-range, multipurpose system. Houses two 15" bass speakers, one top and one bottom, with a center mid/high block that has two 150W 8" speakers and one 2" CD mounted on 56 x 51-degree constant-directivity horn. Casters on back and arco-quip tracking for flying. Applications: concerts, clubs, churches, arenas. Basic Specifications & Suggested List Price: Size: 54" x 22.5" x 22.5". Weight: 182 lbs. Black textured finish. SPL: 132dB, power handling: 1,050W continuous, 2,600W peak. Connectors: Neutrick 8 contacts, crossover points, 250Hz to 1.6kHz. Cost: \$2,800

GALAXY AUDIO: 625 E. Pawnee; Wichita, KS 67211; (316) 263-2852. Product Name: Pro Spot 2. Contact: Brock M. Jabara, president. Date Product Introduced: 2/89. Product

Description & Applications: The Pro Spot 2 has a power handling capacity of 200 watts continuous and a sensitivity of 96dB. The unique wedge-shaped enclosure makes cluster mounting easy. Eight built-in T-nuts allow safe and hassle-free mounting. The wedge shape also makes it an ideal floor monitor. At under 50 lbs., with a built-in, recessed handle, it is truly portable. The coaxial arrangement gives incredibly even dispersion, for uniform sound at all angles. Basic Specifications & Suggested List Price: Speaker complement: 15" loudspeaker with a 3" high-temperature voice coil and 1 1/2" super-dome tweeter. Total magnet structure weight: 18.5 lbs. Sensitivity: 96dB at 1 meter with 1 watt input. Frequency response: 40Hz to 18kHz ±6dB. System impedance: 8 ohms nominal.

GOLD SOUND: 2080 W. Hamilton; Sheridan, CO 80110; (303) 761-6483. Product Name: Performance Pro Double-15 Kits. Contact: Ron Gold, president. Date Product Introduced: 10/89. Product Description & Applications: High SPL, 4-way modular concert speaker kit. Each side has two JBL 15", 7" cone European lower midrange, upper midrange horn compression driver with titanium diaphragm and exponential horn supertweeter. Top three drivers have phasing plugs and level controls. All cone drivers are cast frame. Basic kits include all speakers, 4-way crossover components, wire, connectors, 20 pages of plans and shipping. Plans provide choice of vented bass reflex and horn-loaded cabinets. Knock-down, UPS-shippable cabinets are optional. Basic Specifications & Suggested List Price: Frequency response: 39 to 21k Hz ±3dB, sensitivity, 100dB, W/m, maximum SPL, 131dB, 1,200 W/m, with horn-loaded woofers, sensitivity, 107dB, W/m, max SPL 138dB, 1,200 W/m RMS power handling, LF, 1,200W, MF: 200W, HF: 80W. Crossover: 300Hz, 2kHz and 10kHz, 12dB/octave, 4 or 8 ohm. Dispersion, 90 degrees horizontal and 40 vertical to 20kHz. Woofer cabinets, two required: vented, 37" x 25" x 20"; horn-loaded 60" x 35" x 30"; basic kit, \$1,298/pr. with Gold Sound 15" cast-frame woofers, \$988/pr., w/Gold Sound 224, 24dB/octave, variable-frequency stereo electronic crossover, \$300 option.

GOLD SOUND: 2080 W. Hamilton; Sheridan, CO 80110; (303) 761-6483. Product Name: Performance Pro Double-18 Kits. Contact: Ron Gold, president. Date Product Introduced: 10/89. Product Description & Applications: All JBL, high SPL, 4-way modular concert speaker kit. Each side has two JBL 18" subwoofers, two 10" midbass drivers, upper midrange horn compression driver with titanium diaphragm and slot-horn supertweeter. Top three drivers have level controls. Five year parts and labor guarantee. Basic kits include all speakers, 4-way crossover components, wire, connectors, 20 pages of plans and shipping. Plans provide choice of vented bass reflex and horn-loaded cabinets. Knock-down, UPS-shippable cabinets are optional. Basic Specifications & Suggested List Price: Frequency response: 29 to 21k Hz ±3dB, sensitivity, 101dB, W/m, maximum SPL, 132dB, 1,200W/m, with horn-loaded woofers, sensitivity, 109dB, W/m, max SPL 140dB, 1,200W/m RMS power handling, LF, 1,200W, MF: 500W, HF: 120W. Crossover: 200Hz, 2kHz and 10kHz, 12dB/octave, 4 or 8 ohm. Dispersion: 90 degrees horizontal and 40 vertical to 20kHz. Woofer cabinets, four required: vented, 37" x 25" x 20"; horn-loaded, 24" x 48" x 30". Basic kit, \$3,698/pr., with Gold Sound 224, 24dB/octave, variable-frequency, stereo electronic crossover, \$300 option.



INTERSONICS, INC.
Servodrive

INTERSONICS, INC.: 3453 Commercial Ave., Northbrook, IL 60062; (312) 272-1772. Product Name: Servodrive. Contact: Tom Melzer, sales eng. Date Product Introduced: 1/89. Product Description & Applications: Servodrive "Contra Bass" subwoofer. Flat to 16Hz and delivering 114dB at 16Hz, this servo-motor-driven subwoofer is an extended-range, direct-radiating subwoofer. It is designed for use under 125Hz in electronic organ, synthesizer, theater and cinema sound and special effects, and sound cancellation. Basic Specifications & Suggested List Price: Size: 18" x 22 1/2" x 37". Weight: 120 lbs. Finish: black carpeting and grilles (2). Nominal impedance: 3 ohms average. Power: 200W RMS, 500W peak.



JBL PROFESSIONAL
2200 Series Loudspeakers

JBL PROFESSIONAL, 8500 Balboa Blvd., Northridge, CA 91329; (818) 893-8411. Product Name: 2200 Series Loudspeakers. Contact: Mark Gander, vp mktg. Date Product Introduced: 6/89. Product Description & Applications: New models 2206, 2226 and 2241 incorporate a direct voice-coil-to-air heat dissipation method, called Vented Gap Cooling™, which increases power handling while reducing power compression. Vented Gap Cooling pumps air through the magnetic gap and directly over and around the voice-coil to provide immediate heat transfer and reduction in operating temperature. Computer-aided magnet optimization and analysis results in lighter weight and lower distortion. Basic Specifications & Suggested List Price: 600W continuous pink noise power capacity.

JOE'S SOUND & SALAMI CO., 303 Clymer Ave., Morrisville, PA 19067; (215) 736-0811. Product Name: Red Line. Contact: Doris Morgenfruh, dir. of advertising. Date Product Introduced: 11/88. Product Description & Applications: Joe's new Red Line P.A. is a fully loaded system, ready to rock—right out of the box! Our RL15 and RL12 cabinets are available in a standard P.A. format and a wedge-style monitor. When we developed the Red Line, a number of music stores, musicians and sound engineers told us they wanted high efficiency, extended low-frequency response and high power handling in a cost-effective cabinet. Intended for P.A. and monitors in nightclubs, discos, theaters and churches. Basic Specifications & Suggested List Price: All Red Line cabinets are fully loaded with horn, driver and crossover, recessed handles with 1/4" connectors built-in, and black pebble finish. Suggested retail price: \$449 for RL15s and \$399 for RL12s.



MACPHERSON LOUDSPEAKERS
M2

MACPHERSON LOUDSPEAKERS, 3351 Remy Dr., Lansing, MI 48906; (517) 321-0700. Product Name: M2. Contact: Dave Arnold, sales mgr. Date Product Introduced: 1/15/89. Product Description & Applications: The Macpherson M2 is a 2-way, high-fidelity sound reinforcement system. Compact and arrayable, the M2 requires no outboard processing, as is often the case with other trapezoid-shaped cabinets. Available with factory-installed flying hardware. Basic Specifications & Suggested List Price: (1) 15" LF, (1) 1" HF, response (±5dB) 70 to 15k Hz, coverage 90 degrees x 50 degrees, 13-ply construction 24" H x 17" W x 17" D, 55 lbs.

MACPHERSON LOUDSPEAKERS, 3351 Remy Dr., Lansing, MI 48906; (517) 321-0700. Product Name: M4. Contact: Dave Arnold, sales mgr. Date Product Introduced: 1/15/89. Product Description & Applications: The Macpherson M4 is an ultra-compact, high-power, coaxial system easily installed in "low ceiling" environments. The M4 provides big sound from a very small enclosure. Basic Specifications & Sug-

gested List Price: Frequency response (±4dB) 48Hz to 18kHz, coverage 70 x 70 degrees, sensitivity 88dB, power requirements 200W min/400W max, nominal impedance 8 ohms, max SPL 101dB. Drivers: proprietary dual spider 8" woofer/cast-aluminum basket and 1" soft-dome HF device mounted to cast-support structure. Enclosure 1/2" birch plywood, textured black finish, removable perforated steel grille, 11" H x 10.5" W x 10" D, 18 lbs.

MARTIN AMERICA, 21000 Devonshire #205, Chatsworth, CA 91311; (818) 718-1031. Product Name: Martin F2. Contact: Linda Frank, gen. mgr. Date Product Introduced: 11/88. Product Description & Applications: The F2 is a two-box, horn-loaded sound reinforcement system. Based on a two-box design, the top box is a rack-mount system able to accept several horn combinations for a multitude of frequency bands and coverage angles. The F2 bass box is configured as a mirror-image, dual-driver, folded hyperbolic bass horn. A proprietary rigging system and flying frame complete the versatility of the F2 system. Basic Specifications & Suggested List Price: F2-B2 bass horn 2' x 15" — \$3,375. F2-R2/LD rack for mid-high/tweeter array unloaded — \$1,875. F2-H2/LD high-frequency module unloaded — \$550. F2-M2 mid-frequency module — \$1,087.50. F2-T2/LD tweeter module unloaded (for six JBL 2402) — \$550.



MEYER SOUND LABORATORIES, INC.
HD-1 Nearfield Reference Monitor

MEYER SOUND LABORATORIES, INC., 2832 San Pablo Ave., Berkeley, CA 94702; (415) 486-1166. Product Name: HD-1 Nearfield Reference Monitor. Contact: Mark Johnson, dir. technical mktg. Date Product Introduced: 10/89 (AES). Product Description & Applications: The HD-1 is a bi-amplified, self-powered nearfield reference monitor. Designed for studio applications, options to include road cases, stands and choice of finish: black or natural wood. Basic Specifications & Suggested List Price: 8" woofer/1" soft-dome tweeter 33Hz to 20kHz.



PRINCIPAL ACOUSTICS
Model CS-210 Speaker System

PRINCIPAL ACOUSTICS, 6864 Panamint Row #4, San Diego, CA 92139; (619) 267-5490. Product Name: Model CS-210 Speaker System. Contact: C.E. Baker, mktg. mgr. Date Product Introduced: 6/1/89. Product Description & Applications: The CS-210 is Principal Acoustics' new mid-sized, center-stage system, designed to provide unmatched performance in low-to-moderate power music systems. It incorporates many important acoustic principles, including separate driver sub-enclosures, time alignment and the proprietary Acoustic Lens Array. Special anti-diffraction techniques have been applied to cabinet surfaces to improve imaging. Extensive internal bracing assures solid bass per-

—CONTINUED ON NEXT PAGE

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SPEAKERS AND MONITORS

1990

—CONTINUED FROM PREVIOUS PAGE

formance, and twin super tweeters extend the speaker response beyond audibility. **Basic Specifications & Suggested List Price:** Drivers (2) 8" polypropylene woofer, (4) 5" polypropylene midrange, (4) 1" soft-dome tweeter, (4) ¼" bi-morph crystal super tweeter. Frequency response 32 to 27k Hz (±5dB) Sensitivity 92dB Power handling 10-100 watts Dimensions 11.5" W x 13.5" D x 48" H Warranty 5-year Price \$1,195/pair

PRINCIPAL ACOUSTICS: 6864 Panamint Row #4; San Diego, CA 92139; (619) 267-5490. Product Name: Model DRS-1 Speaker System. Contact: C. E. Baker, mktg mgr. Date Product Introduced: 6/15/89. Product Description & Applications: The DRS-1 is Principal Acoustics' ultimate center-stage system. It is designed to provide today's music systems with a new level of performance. We believe it incorporates every important acoustic principle—a combination of features found in no other loudspeaker. These include a pair of mono-subwoofer modules, separate driver sub-enclosures, time alignment, the Acoustic Lens Array and an asymmetrical, parabolic driver alignment capable of providing a seamless acoustic plane to the listener. **Basic Specifications & Suggested List Price:** Drivers (4) 10" polypropylene subwoofer, (8) 6½" bass midrange, (8) 5" midrange, (8) 1" soft-dome tweeter, (4) ¼" bi-morph crystal super tweeter. Frequency response 20 to 27k Hz (±5dB) Sensitivity 96dB Power handling 50-500 watts Dimensions (2) cabinets—27" W x 20" H x 18" D, (2) cabinets—20" W x 54" H x 15" D Warranty 5-year Price \$2,995/system

er systems available to sound contractors. The CMS-121 has a 12" woofer and the CMS-151 uses a 15" woofer. AP-1 attachment points allow easy ceiling or wall mounting. The custom order forms allow you to select the HF horn, horn orientation, cabinet finish, crossover frequency (or bi-amp plate) and other choices to tailor the system to the installation requirements. **Basic Specifications & Suggested List Price:** CMS-121 choice of three 1" horns or a 2" horn Dimensions 14-7/16" H x 28" W x 17-1/4" D CMS-151 choice of five 1" horns or three 2" horns Dimensions 14-7/8" H x 33" W x 19" D

SENNHEISER ELECTRONIC CORP.: 6 Vista Dr., PO Box 987, Old Lyme, CT 06371; (203) 434-9190. Product Name: HD25. Contact: Joe Claudelli, applications engineer. Date Product Introduced: 6/89. Product Description & Applications: High-efficiency monitoring headphone. Closed-cup design for maximum attenuation of external noise. Single-sided steel stranded cable. Aluminum voice-coils. Split headband for comfort and support. One earpiece can be swiveled to the side for single-muff listening. **Basic Specifications & Suggested List Price:** Frequency response 30 to 16,000Hz Power handling 0.1 watt Nominal impedance 70 ohms THD 0.5% Sensitivity 105dB Weight 140 g/5 oz Max sensitivity 124dB Plug stereo 3.5mm with 6.3mm adapter \$199 suggested retail

SIDEREAL AKUSTIC AUDIO SYSTEMS, INC.: 9974 Scripps Ranch Blvd. #120; San Diego, CA 92131; (619) 578-4226; FAX: (619) 578-4059. Product Name: Mikro. Contact: Richard A. Smith, president. Date Product Introduced: 7/89. Product Description & Applications: Mikro is a miniature nearfield monitor loudspeaker system designed for critical evaluation of audio signals. This diminutive loudspeaker system measures only 7" x 4.5" x 4" while producing a 50Hz to 20kHz bandwidth. The Mikro was designed without the rising amplitude response in the midbass region common to most small monitors. This provides a more accurate midband with a more extended low-frequency response. Available in black or charcoal-gray soft finishes. **Basic Specifications & Suggested List Price:** Frequency response 50Hz to 20kHz. Power handling minimum recommended power 20 watts, maximum recommended power—higher power sounds better, use discretion. Dimensions 7" x 4.5" x 4" Weight 5 lbs Price \$470/pair

SOUNDTECH: 230 Lexington Dr., Buffalo Grove, IL 60089; (312) 541-3520. Product Name: STS122 Trapezoidal Speaker Enclosure. Contact: Todd Peden, national sales director. Date Product Introduced: 6/16/89 (NAMM). Product Description & Applications: One of a series of three trapezoid cabinets, the STS122 is a two-way ported-design cabinet designed for flying installations (hardware included) or studio monitor applications. Components have been carefully matched to the enclosure design to yield extremely high-quality sound for the price. **Basic Specifications & Suggested List Price:** Frequency response (on axis) 70 to 18,000Hz, crossover frequency 1,200Hz, power handling RMS LF/HF 300/60 watts, SPL at 1 watt/1 meter 99dB, transducer complement HF EV DH2305 titanium driver, EV90° x 40° CD horn LF STS312-8 woofer. Finish: black ozite or textured paint option. Shipping weight 53 lbs Suggested retail price \$549.50

SUNN/FENDER MUSICAL INST.: 1130 Columbia St., Brea, CA 92621; (714) 990-0909. Product Name: 1225/1226 Speaker System. Contact: Steve Grom, vp. mktg. Date Product Introduced: 1988. Product Description & Applications: Professional speaker systems using Eminence components (woofers and compression drivers). Trapezoidal cabinet design with carpet covering. **Basic Specifications & Suggested List Price:** Sunn 1225 \$499.99, 1-15" cast-frame woofer w/compression driver, 1226 \$699.99, 2-15" cast woofers w/compression driver.



PROFESSIONAL AUDIO SYSTEMS
TOC Studio Monitors, TOC Reinforcement Systems

PROFESSIONAL AUDIO SYSTEMS: 1224 W. 252nd St.; Harbor City, CA 90710; (213) 534-3570. Product Name: TOC Studio Monitors, TOC Reinforcement Systems. Contact: Larry Doran. Product Description & Applications: TOC High Resolution Studio Monitor with the Mastering Lab modified crossover network. TOC Reinforcement Systems compact high-output applications. Complete system sensing for extended response and driver protection.

RENKUS-HEINZ, INC.: 17191 Armstrong, Irvine, CA 92714; (714) 250-0166. Product Name: C-1 Concert COAX System. Contact: Steve Armstrong, nat'l sales. Date Product Introduced: 10/89 (AES). Product Description & Applications: The new C-1 Concert Coax gives you high-level sound reinforcement with stunning clarity. This Smart System™ features coaxially mounted midrange and high-frequency compression drivers and constant beamwidth horns to achieve a true point-source from 300Hz to 17kHz. A digital time delay and the Smart Processor™ provide time-correction, equalization and protection features. The matching trapezoidal low-frequency cabinet uses four 15" woofers. A rectangular dual 18" bandpass subwoofer is available. **Basic Specifications & Suggested List Price:** Maximum system SPL 136dB at 1 meter. Coverage pattern 60 degrees x 40 degrees. Power requirements HF 300W at 8 ohms, MF 300W at 8 ohms, LF 2X400W at 4 ohms, Sub 600W at 4 ohms. Dimensions HF/MF/LF 36.5" H x 31.5" W x 28" D Sub 24.25" H x 31.5" W x 31.5" D

RENKUS-HEINZ, INC.: 17191 Armstrong, Irvine, CA 92714; (714) 250-0166. Product Name: CMS Series. Contact: Steve Armstrong, nat'l sales. Date Product Introduced: 7/89. Product Description & Applications: The CMS Series of wedge-shaped ceiling speakers has been added to the custom speak-



TANNOY
NFM8-DMT

TANNOY: 300 Gage Ave., Unit #1, Kitchener, Ontario, N2M 2C8 Canada; (519) 745-1158; Telex: 069-55328; FAX: (519) 745-2364. Product Name: NFM8-DMT. Contact: Bill Calma,

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marketing director. **Date Product Introduced:** 7/89 **Product Description & Applications:** Tannoy is pleased to announce the introduction of the NFM8-DMT nearfield monitor, with all the accuracy and benefits of the larger dual-concentric monitors. The NFM8-DMT monitors incorporate a revolutionary, new 8-inch dual-concentric driver in a ported, mediate enclosure offering solid bass reproduction. The speaker's compact dimensions make them ideally suited for use in small studios, broadcast facilities, remote recording vehicles, or as an easily transportable reference source for independent engineers and larger recording studios. **Basic Specifications & Suggested List Price:** Frequency response: ± 3 dB 47Hz to 25kHz Impedance: 8 ohms Power handle: 120 RMS Sensitivity (1W/1m) 90dB Dimensions: 18 $\frac{1}{2}$ "H x 10 $\frac{1}{4}$ "W x 8 $\frac{1}{2}$ "D Weight: 24 $\frac{1}{2}$ lbs. Retail \$998/pair.

TANNOY, 300 Gage Ave., Unit #1; Kitchener, Ontario, N2M 2C8 Canada; (519) 745-1158; Telex: 069-55328; FAX: (519) 745-2364. **Product Name:** To Be Announced. **Contact:** Bill Calma, marketing director. **Date Product Introduced:** 1989 **AES Product Description & Applications:** Tannoy will be proud to release a full new line of dual-concentric studio reference monitors at the October AES Convention in New York. The new line for 1990 will be constructed with the company's newly based DMT™ (Differential Material Technology), providing outstanding performance benefits. New products will be ready for delivery April 1990.

UNIVERSAL ELECTRONICS, INC., 5439 W. Fargo Ave., Skokie, IL 60077; (312) 673-5885. **Product Name:** Monster Magnet Series—MM. **Contact:** Joseph Naponiello, design engineer. **Date Product Introduced:** 9/89 **Product Description & Applications:** Both models, MM12 and MM15 woofers, are handmade in the USA using diecast frames, heavy-duty rigid paper cones, chemically treated double-cloth surrounds, and 3" Kapton voice-coils with 190 oz. magnets and custom molded-rubber magnet protectors. Applications for the MM12 and MM15 are maximum sound reinforcement. **Basic Specifications & Suggested List Price:** MM12: 45 to 4,000Hz range, 99dB 1W/1m MM15: 28 to 3,500Hz range, 100dB 1W/1m. Both models have 3" vented voice-coils, 190 oz. magnets, 400 watts RMS, 800 watts peak. **Suggested retail:** MM12—\$250, MM15—\$275.

UNIVERSAL ELECTRONICS, INC., 5439 W. Fargo Ave., Skokie, IL 60077; (312) 673-5885. **Product Name:** Muscle Magnet Series. **Contact:** Joseph Naponiello, design engineer. **Date Product Introduced:** 7/89 **Product Description & Applications:** Model sizes 10" to 18" made in the USA, stamped steel frames, 16 oz. to 95 oz. magnets, Hitemp Kapton voice-coils, treated cloth surrounds, heavy-duty paper cones. Applications for sound reinforcement or various musical instruments. **Basic Specifications & Suggested List Price:** VES 32 10": 25 to 3,000Hz range, 40 oz. magnet, 95dB 1W/1m, 100 watts RMS. VES 2 15": 30 to 4,000Hz range, 56 oz. magnet, 98dB 1W/1m, 150 watts RMS. VES 89 18": 26 to 3,500Hz range, 95 oz. magnet, 98dB 1W/1m, 200 watts RMS. **Suggested retail:** VES 32-10"—\$49, VES 2-15"—\$95, VES 89-18"—\$160.

WESTLAKE AUDIO INC., 2696 Lavery Ct. #18, Newbury Park, CA 91320, (805) 499-3686. **Product Name:** BBSM-10VF. **Contact:** Kay Finster, dealer administrator. **Date Product Introduced:** 6/1/89 **Product Description & Applications:** Derived from the classic BBSM-10 monitor, the BBSM-10VF offers high-power handling, very low I.M. distortion and outstanding stereo image. Totally symmetrical design eliminates the need for dedicated left/right units and guarantees horizontal polar pattern. An internal high-quality precision crossover can be bi-wired for additional inter-band (LF/HF) isolation. **Basic Specifications & Suggested List Price:** System type: 3-way, medium power, phase coherent monitor with internal high-level crossover. Configuration: two 10" woofers ported, 6.5" midrange in separate sealed non-resonant enclosure, 1.25" dome tweeter. Nominal power rating: 120 watts below 500Hz, 50 watts above 500Hz Impedance: nominally 4 ohms, minimum 2 ohms. Frequency response: ± 3 dB 45Hz to 16kHz on axis at 3', unit on floor, a minimum of 3' from low-frequency boundary. Crossover frequency: 600/4kHz; type: RLC slope 24dB/octave min. Weight with pedestal: 175 lbs.

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WOODWORX AUDIO ENCLOSURES
MAX-1



YAMAHA PROFESSIONAL AUDIO DIVISION
Mark III Speaker Systems

WOODWORX AUDIO ENCLOSURES, 913 S. Chapman St.; Greensboro, NC 27403; (919) 378-0650. **Product Name:** MAX-1. **Contact:** Jim Spain, sales mgr. **Date Product Introduced:** 6/89 **Product Description & Applications:** The MAX-1 monitor occupies minimal stage space and is ideal for getting high SPL while maintaining excellent sight lines. The unit is designed for external bi-amplification and consists of a 12" direct radiator loudspeaker and a 1" compression driver mounted to a constant-directivity horn in a vented enclosure. Cabinetry is crafted from void-free, 3/4", 13-ply Finnish birch plywood. All joints are rabbeted and stapled for increased structural strength. Dark gray, catalyzed, textured finish that offers a durable, scuff-resistant surface. **Basic Specifications & Suggested List Price:** The MAX-1 measures only 23 7/8" H x 18" W x 13" D while weighing only 65 lbs. The monitor offers a maximum SPL of 131dB and has a flat frequency response from 55Hz to 17kHz (± 3 dB) with a frequency range of 40Hz to 20kHz (-10dB). Connectors are ITC Cannon EP-4. Cabinets are sold complete and road-ready. **Suggested list price:** \$1,350.

YAMAHA PROFESSIONAL AUDIO DIVISION, 6600 Orange-thorpe Ave.; Buena Park, CA 90622; (714) 522-9011. **Product Name:** Mark III Speaker Systems. **Contact:** Robert T. Davis. **Date Product Introduced:** 7/89 **Product Description & Applications:** Two new 3-way two new 2-way and a new subwoofer loudspeakers are built in the United States by Yamaha at Thomaston, Georgia, factory, long known for high-quality manufacturing. The new loudspeakers are the S3112MT, a 3-way system with a 12" low-frequency driver, the S3115HT, a 3-way system with a 15" low-frequency driver, the S2115HIII, a 2-way stage monitor with a 15" low-frequency driver, the S4115HIII, a 2-way system with a 15" low-frequency driver, and the SW118II subwoofer with an 18" low-frequency driver. **Basic Specifications & Suggested List Price:** Each system is in a rigid, high-quality poplar plywood cabinet covered in dark gray leather-like vinyl with interlocking corners for "roadability" and to prevent shifting side-to-side and front-to-back when stacked. Each system features heavy-duty metal grilles to protect the speaker components yet still maintain excellent acoustic porosity. All the cabinets are the same width, allowing interlocked stacking. **Price:** S3112MT, \$495, S3115HT, \$775, S2115HIII, \$695, S4115HIII \$695, SW118II, \$575.

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TEST AND MAINTENANCE GEAR

1990

AMBER ELECTRO DESIGN, INC.; 3391 Griffith St.; St. Laurent, Quebec, H4T 1W5 Canada; (514) 735-4105. Product Name: AudioCheck 2 01. Contact: Wayne Jones, president. Date Product Introduced: 1989 Product Description & Applications: The AudioCheck 2 01 automated audio measurement system combines an easy-to-use, menu-driven, PC-based software package and the model 5500 Programmable Audio Measurement System. Can be easily set up to sweep a variety of audio parameters and produce professional reports incorporating graphs, text and numerical data. A simple menu-driven procedure-writing facility allows users to generate test sequences incorporating tests, sweeps, data storage and computation, user prompts, tests against stored limits and printing or plotting of hard-copy reports. Applications in all areas of audio: repetitive production testing, development or maintenance. Basic Specifications & Suggested List Price: Sine and square wave generation 10Hz to 100kHz up to +30dBm. Signal and noise measurement, wide band, narrow band and weighted 10Hz to 500kHz, +40dBm to -120dBm THD, IMD measurement to below 0.001% (-100dB). Basic price (instrument plus software) \$7,000.



DORROUGH ELECTRONICS
Stereo Signal Test Set Model 1200

AUDIO CONTROL INDUSTRIAL; 22313 70th Ave. W., Mountlake Terrace, WA 98043; (206) 775-8461. Product Name: SA 3050A 1/2-Octave Real-Time Analyzer. Contact: Rick Chinn, mktg mgr. Date Product Introduced: Software updated 1/89 Product Description & Applications: The SA 3050A is a 1/2-octave real-time spectrum analyzer designed for equalization analysis, frequency response testing, absolute SPL measurements and program monitoring in recording studios as well as for sound reinforcement. The SA 3050A has three display response speeds, six memories with averaging capability and the ability to display SPL numerically. A Centronics-type parallel printer interface and rechargeable, sealed lead-acid battery pack are available as a factory-installed option. Basic Specifications & Suggested List Price: 30 1/2-octave ANSI class II filters, 9 x 30 LED display, 1.4 dB/step, 92dB display range, digital pink noise generator, dual-mode SPL display, XLR (12V phantom power), BNC, 1/4" TRS inputs. Three display speeds, six nonvolatile memories, simultaneous peak-hold and RTA display. Price \$995, \$1,300 (with battery pack and printer interface). Includes microphone.

AUDIO PRECISION, INC.; PO Box 2209; Beaverton, OR 97075; (503) 627-0832. Product Name: System One+ Dual Domain. Contact: Tom Mintner, national mktg dir. Date Product Introduced: 3/89 Product Description & Applications: General-purpose audio test system plus DSP module and digital input-out module with AES/EBU, SPDIF and parallel digital standards. Generates audio signals directly in the digital domain, acquires and measures digital signals in the digital domain with no conversions required. Basic Specifications & Suggested List Price: Signals generated to 24-bit accuracy, digital signals acquired and measured with -130dB noise floor and -120dB residual distortion. U.S. list \$12,950.

AUDIO PRECISION, INC.; PO Box 2209; Beaverton, OR 97075; (503) 627-0832. Product Name: System One+ DSP. Contact: Tom Mintner, national mktg dir. Date Product Introduced: 3/89 Product Description & Applications: General-purpose audio test system plus DSP (digital signal processing) module for full audio spectrum analysis to 3Hz resolution, wow and flutter spectral analysis, individual harmonic distortion analysis, depth of erasure and other selective audio measurements. Basic Specifications & Suggested List Price: Noise floor for harmonic distortion below -140dB; residual distortion typically below -120dB; spectral analysis to 0.06Hz resolution at wow and flutter frequencies. U.S. list \$10,450.

DORROUGH ELECTRONICS; 5221 Collier Pl.; Woodland Hills, CA 91364; (818) 999-1132. Product Name: Stereo Signal Test Set Model 1200. Contact: Kay Dorrough. Date Product Introduced: 5/89 Product Description & Applications: A stereo signal gain set that is capable of measuring level, balance, crosstalk and signal-to-noise in both left/right and sum/difference formats. Basic Specifications & Suggested List Price: Measurement range -76 to +20dB in 1dB steps at reference. 775V.

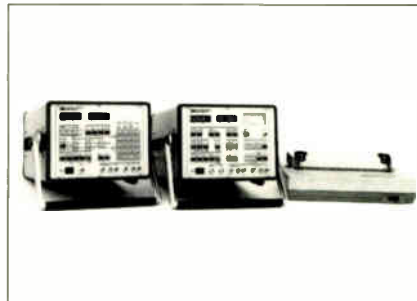
GOLD LINE/LOFT; PO Box 500; West Redding, CT 06896; (203) 938-2588; FAX: (203) 938-8740. Product Name: Audio Test Set and Impedance Meter. Contact: Martin E. Miller, president. Date Product Introduced: 10/1/89 Product Description & Applications: An audio test set combining a frequency meter, impedance meter, dB meter and audio oscillator. This useful, new instrument will provide the same handy features as our Ldftech TS-1 Series, plus impedance readings at variable frequencies. Models will be available for 115/220V as well as portable battery pack models. Both rack-mount and bench-type models will be offered. Basic Specifications & Suggested List Price: The new Audio Test Set and Impedance Meter will be offered at \$425. Frequency range 10Hz to 28kHz. Impedance range: 0.0 ohms to 999.9 ohms.

GOLD LINE/LOFT; PO Box 500; West Redding, CT 06896; (203) 938-2588; FAX: (203) 938-8740. Product Name: SPL Meter. Contact: Martin E. Miller, president. Date Product Introduced: 10/89 Product Description & Applications: A new SPL meter with an auto-ranging numerical display. Features include SPL readings in "flat" A or C weighting from 15dB to 154dB SPL. This meter is: battery operated and portable and is ideal for contractors, studios, facility owners or agencies monitoring noise levels. A mic is provided with the meter and accessories will be offered for special low and high level applications. Basic Specifications & Suggested List Price: Suggested list price \$195.

JRF MAGNETIC SCIENCES, INC.; 249 Kennedy Rd.; Green-dell, NJ 07839; (201) 579-5773. Product Name: Center Track Time Code and FM/Mono Pilot Test Tapes. Contact: John French, president. Date Product Introduced: 1989 Product Description & Applications: The JRF/PAW model PTC-50TT-15 (CTTC 15 ips) and PTC-50TT-P (FM/mono pilot 7.5 ips) test tapes are available for 1/4" tape machines. The PTC-50TT-15 contains three minutes of 15 ips center-track and full-track time code. The center track is recorded at the "IEC" specification of 250nWb/r/s (+30dB) CT and can be used for center-track time code reproduce alignment to factory spec. The full track is recorded at -6dB referenced to 250nWb/m making it usable for setting time code delay lines in most center-track time code machines. Basic Specifications & Suggested List Price: The PTC-50TT-P contains five minutes at 7.5 ips of FM pilot and mono pilot (Nagra™, Nagra-Sync and neo-pilot, respectively). The FM pilot is recorded at a standard level (the amount of modulation may differ), and the mono pilot is recorded at a 250nWb/m reference (Nagra, Nagra 2 standards).

NEUTRIK USA, INC.; 1600 Malone St.; Millville, NJ 08332; (609) 327-3113. Product Name: A-1 Analyzer. Contact: Ken Smalley, product mgr. Date Product Introduced: 10/1/89 Product Description & Applications: Audio spectrum generator and analyzer. Generates sine wave, square wave, sweeps and W and F test signal. Measures: level (V, dBV, dBu), relative level, crosstalk, noise, harmonic distortion, W and F, drift, and frequencies. Displays on a 256-128 dot super-twist LCD display. Interfaces to computers via RS232, printers via Centronics.

RESEARCH TECHNOLOGY INTERNATIONAL; 4700 Chase, Lincolnwood, IL 60648; (312) 677-3000. Product Name: VT Series Magnetic Tape Evaluators/Cleaners. Contact: Tom Tisch, vp sales. Date Product Introduced: 1/89 Product Description & Applications: Now available for new Betacam SP, MII, S-VHS formats as well as all popular commercial formats. Cleans and polishes videotape for improved performance. Evaluates tape condition to find damage or defects.



SOUND TECHNOLOGY, INC.
3100B Programmable Audio Generator

SOUND TECHNOLOGY, INC.; 1400 Dell Ave., Campbell, CA 95008; (408) 378-6540. Product Name: 3100B Programmable Audio Generator. Contact: Bob Andersen, vp. Date Product Introduced: Early 1989 Product Description & Applications: The 3100B adds two new features to the 3100A. Ten frequency tables with maximum of 200 frequencies can be user-defined through the keypad. A single panel outputs its selected table of crystal-accuracy frequencies in the manual mode or when called by an auto sequence. In the auto sequence mode, user may now key-in a level offset that will apply to every panel in the sequence. The new offset level is output and displayed for each panel during the sequence. Basic Specifications & Suggested List Price: Outputs -90 to +30dBm DC-coupled, floating and balanced, 2-channel Waveforms: sine, square, IMD, toneburst and sine/step. Frequency: 1Hz to 102.39kHz. Distortion: 0.0008% 10Hz to 20kHz, 0.008% to 100kHz. Automation: log or user-selected frequency sweeps, level sweeps, auto-sequencing of up to 80 stored panel setups. Base price: \$4,380.

SOUND TECHNOLOGY, INC.; 1400 Dell Ave., Campbell, CA 95008; (408) 378-6540. Product Name: 3200B Programmable Audio Analyzer. Contact: Bob Andersen, vp. Date Product Introduced: Early 1989 Product Description & Applications: The 3200B adds four new features to the 3200A: wow and flutter (optional), flat or weighted—a new pushbutton is located in the measurement group; selectable input impedance, bridging (200k ohms) or 600 ohms, noise floor—an additional function on the edit pushbutton, used to select lowest level for frequency measurements, optional filters—an addition to the filter group, CCITT P53 currently available as option 013. Basic Specifications & Suggested List Price: Measures level, flat or filtered from 4µV to 100V, ratio against user-set reference, THD in % or dB with residual less than 0.001% Hz to 20kHz; notch lock for residuals with low-level signal, SMPTE IMD to 0.002%, phase ±180° to 0.3°, channel separation to 100dB. Base price \$5,660.

STUDIOMASTER INC.; 3941 E. Miraloma Ave., Anaheim, CA 92807; (714) 524-2227; FAX: (714) 524-5096. Product Name: MA-36, 36-Function MIDI Analyzer. Contact: Jim Giordano, nat'l sales mgr. Date Product Introduced: 6/89 Product Description & Applications: Hand-held, 36-function MIDI analyzer (Patented) MIDI in and thru. When connected in-line with a MIDI system, the MA-36 will indicate the MIDI channel being used and display what information is being transmitted or received. The MA-36 will also indicate any faults throughout the entire system and isolate the particular fault within any parameter. For example: synthesizer pitch wheel on Channel 12, inoperative, etc. Basic Specifications & Suggested List Price: Hand-held 9V AC adapter available. MIDI in and thru. Function checks: Ch 1-16, all notes off, note off, note on, poly pressure, control change, program change, channel pressure, pitch wheel, system exclusive, song position, song select, tune request, end exclusive, timing clock, start, continue, stop. List price \$139.95.

WHIRLWIND; 100 Boxart St., Rochester, NY 14612; (716) 663-8820. Product Name: MIDI Cable Tester. Contact: Ron Long, sales Dept. Date Product Introduced: 6/89 Product Description & Applications: An ideal accessory for studios, keyboard players and drummers, this pocket-sized, affordable tester can be used to check 3- and 5-conductor MIDI cables for open as well as short circuits. Basic Specifications & Suggested List Price: Measuring only 3.8" x 2.4" x 1" in size, the MIDI Cable Tester is simple to operate. A battery test button is provided with accompanying LED to indicate proper testing voltage. Connect a cable and LEDs indicate status. The tester can operate with a 5-conductor cable for at least 30 hours.

OTHER EQUIPMENT

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AARMOR CASE CO.; 2100 Lapo Rd., Lake Odessa, MI 48849; (616) 374-5431. Product Name: Rack Pod Model RPB. Contact: Steve Catlin. Date Product Introduced: 2/15/89. Product Description & Applications: The Rack Pod Model RPB is a molded electronics rack case. The RPB is a lightweight, heavy-duty rack case that is molded from polyethylene. The RPB model offers smaller external dimensions than the RP model Rack Pods. The units stack securely on themselves and all other Rack Pod rack cases. Basic Specifications & Suggested List Price: The RPB 6-16 features six rack spaces, a 16" main-body depth (not including doors), weighs 20 lbs., external dimensions are 21 5/8" W x 21 1/4" D x 12 8/8" H. Retail price is \$272.

ADC TELECOMMUNICATIONS, INC.; 4900 W. 78th St., Minneapolis, MN 55435; (612) 835-6800. Product Name: ICON (Integrated Cable Organization Network). Contact: Lonnie Pastor, market mgr. Date Product Introduced: 4/89. Product Description & Applications: ICON is an audio cable management system engineered for broadcast, production, recording and professional audio applications. ICON is used as the central termination and distribution point for cabling in any audio system. All audio equipment is terminated on the ICON, and signal routing is accomplished by cross-connecting cable terminations to each other at this central point, rather than point-to-point interconnection. Available in both rack-mount and wall-mount versions. For video applications also. Basic Specifications & Suggested List Price: Price varies based on number and type of modules installed.

ADC TELECOMMUNICATIONS, INC.; 4900 W. 78th St., Minneapolis, MN 55435; (612) 835-6800. Product Name: Pro Patch Patchcords. Contact: Lonnie Pastor, market mgr. Date Product Introduced: 4/89. Product Description & Applications: ADC's Pro Patchcords are corrosion-proof and nickel-plated, ensuring quiet contacts with the jacks as well as less noise and higher signal-quality. Pro Patchcords feature special cordage that comes in four colors for better circuit identification. The exclusive dielectric compound dresses neatly, eliminating kinking. Pro Patchcords are available in both longframe (1/4") and Bantam sizes, and in dual and single configurations. Basic Specifications & Suggested List Price: Price varies depending on length and configuration.

ASC—TUBE TRAPS; PO Box 1189, Eugene, OR 97440; (503) 343-9727. Product Name: ASC—Glass Trap. Contact: Art Noxon, president. Date Product Introduced: 2/89. Product Description & Applications: ASC Glass Trap is the only system to control flat studio-glass reflections. Our thin 2 1/2"-diameter traps mount on standard Levolor-type vertical blind tracks to provide adjustable acoustic reflection for any size glass window or door. The curtain tubes can be drawn aside. They also can be rotated in place, bringing their reflector in and out of play to alter ambience. Basic Specifications & Suggested List Price: The ASC Glass Trap is 2 1/2" in diameter, mounted on 6" centers from a Levolor track, and comes complete with mounting track and hardware, any length. Cuts 90dB from bounce 200Hz and above with adjustable diffuse reflectivity above 1,000Hz. Priced about \$20 per square foot.

ASC—TUBE TRAPS; PO Box 1189, Eugene, OR 97440; (503) 343-9727. Product Name: QSF—Quick Sound Field™. Contact: Art Noxon, president. Date Product Introduced: 2/88. Product Description & Applications: The Quick Sound Field is the latest technique in recording-studio acoustics. Easy to install, this Tube Trap system transforms any small room into a world-class recording booth. Perfect for the walls and ceilings of drum rooms, vocal booths, sampling rooms and announce booths. Available now in modular gobos. Basic Specifications & Suggested List Price: QSF is a Tube Trap technique that develops very fast decay rates—up to 80ms RT60, with very fast specular (nonresonant) diffusion rates—up to 1,000 coherent reflections/second. Plexiglass interpanels allow 40% visual open, and wall has STC-32. Pricing is about \$20 per square foot wall surface.

AUDIOLAB ELECTRONICS, INC.; 5831 Rosebud Ln., Bldg. C, Sacramento, CA 95841; (916) 348-0200. Product Name: TD-5 High-Energy Tape Degausser. Contact: Ron Stefan, marketing mgr. Date Product Introduced: 1/89. Product Description & Applications: The Audiolab Electronics, Inc. model TD-5 Metal Particle Tape Degausser, is designed to accommodate high-coercivity tape cartridges (Beta SP, Mil. D1-2, DAT and 8mm metal particle cassettes) as well as high-

coercivity tape reels up to 16" in diameter and 2" in width. Drawing only 10 amps, Audiolab's efficient design allows a long-lasting, cool-running, professional tape degausser. Suggested list price is \$1,195. Ask about your free demo tape.

BLACK AUDIO DEVICES; PO Box 106; Ventura, CA 93002; (805) 653-5557. Product Name: The Mic Pole. Contact: Bruce Black. Date Product Introduced: 11/88. Product Description & Applications: Allows you to hang mics from theatrical lighting pipes and scenery batons using standard lighting-instrument C-clamps. Tube is extendable and fully adjustable, allowing precise mic placement. Locks mic into position. Nonreflective black won't cause flares or reflections. Basic Specifications & Suggested List Price: Small (8" to 13") \$35. Medium (14 1/2" to 26") \$42. Large (35" to 63") \$50.

BLACK AUDIO DEVICES; PO Box 106; Ventura, CA 93002; (805) 653-5557. Product Name: The Mic Shell. Contact: Bruce Black. Date Product Introduced: 11/88. Product Description & Applications: The Mic Shell fits over PZM-type mics to give them a good directional pattern. They are particularly handy for theatrical stage area mixing. Clear plexiglass makes them almost invisible, and textured finish prevents harsh reflections from lights. Minimizes pickup of orchestra and audience. Allows mixer to use less equalization to reduce feedback. Rugged and unbreakable. Basic Specifications & Suggested List Price: \$22 each.



BLACK AUDIO DEVICES
"No-Magnets" Labels

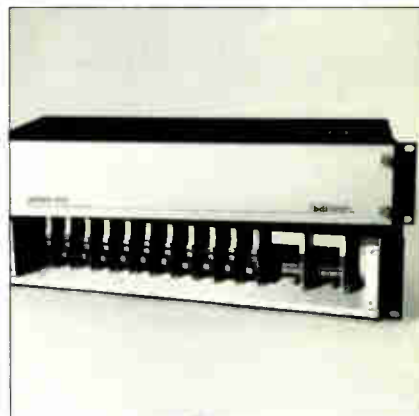
BLACK AUDIO DEVICES; PO Box 106; Ventura, CA 93002; (805) 653-5557. Product Name: "No-Magnets" Labels. Contact: Bruce Black. Date Product Introduced: 3/89. Product Description & Applications: These labels are used for shipping tapes, diskettes and any other magnetically sensitive material. Bright red color and internationally recognized warning symbol alert shippers of potential damage to package. Can also be used on tape locker door and computer disk storage boxes for added safety. Basic Specifications & Suggested List Price: 2 1/4" x 4", 2-color, 10, \$3, 100, \$25, 1,000, \$200.

BLACK AUDIO DEVICES; PO Box 106; Ventura, CA 93002; (805) 653-5557. Product Name: Taps and Dies for Stands and Booms. Contact: Bruce Black. Date Product Introduced: 11/88. Product Description & Applications: 3/8-27 taps and dies have the same threads as mics, stands and accessories. 1/2-27 taps and dies have the same threads as the screw-on cast-metal stand bases and larger American boom parts. Use them to make custom equipment or renew threads on existing equipment. These taps and dies are nearly impossible to find anywhere. Basic Specifications & Suggested List Price: 3/8-27 tap, \$30. 1/2-27 die, \$30. 1/2-27 tap, \$50. 1/2-27 die, \$50. Tap wrenches and die holders are available.

BRAINSTORM ELECTRONICS, INC.; 1515 Manning Ave., Ste. 4, Los Angeles, CA 90024; (213) 475-7570. Product Name: SR-1 Time Code Reshaper. Contact: L. Bernard Frings, president. Date Product Introduced: 12/88. Product Description

& Applications: The SR-1 is a high-quality reshapener that enables time code dubbing without the signal degradation that would result from a direct transfer. The SR-1 also cleans up unreadable time code by eliminating distortions and level fluctuations. It reshapes in rewind and fast-forward modes for high-speed code recovery. Basic Specifications & Suggested List Price: The SR-1 features a balanced or unbalanced input and output, a switchable output rise time (SMPT EBU/square wave) and an adjustable output level. Suggested retail price is \$145.

BRAINSTORM ELECTRONICS, INC.; 1515 Manning Ave., Ste. 4, Los Angeles, CA 90024; (213) 475-7570. Product Name: VP-90. Contact: L. Bernard Frings, president. Date Product Introduced: 7/89. Product Description & Applications: The VP-90 is a new VSO (variable speed oscillator) for Ampex MM1200 and ATR-100 Series tape recorders. It features a 10-turn pot for precise tuning over a range of 1/2-octave, a 4-digit display and a bypass switch with indicator. The VP-90 does not require external AC power. Interface cables for the MM1200 and the ATR-100 Series are available (25) as well as a short extension for the Ampex VS-10 cables (5). Basic Specifications & Suggested List Price: Suggested list price VP-90—\$595. Cables ATR (25)—\$150, MM1200 (25)—\$125, extension (5)—\$100.



BROADCAST DEVICES, INC.
UTA-200 Utility Amplifier System

BROADCAST DEVICES, INC.; 5 Crestview Ave., Peekskill, NY 10566; (914) 737-5032. Product Name: UTA-200 Utility Amplifier System. Contact: Bob Tarsio, sales engineer. Date Product Introduced: 4/80. Product Description & Applications: The system was designed to solve most audio interface problems in one convenient package. Using our standard input and output modules, three basic configurations are possible: distribution amplifiers, balanced line amplifiers and consumer-to-pro interfaces. All inputs and outputs are active transformerless. Balanced inputs feature common-mode rejection adjustment, balanced outputs feature gain-balance controls. Each module features front panel gain control. Basic Specifications & Suggested List Price: Frequency response +0.2dB from 20Hz to 20kHz THD < 0.05% IMD < 0.05% Noise. 80dB below nominal output. CMRR better than 80dB below 60Hz nominal output. Maximum output level +26dBm. Input impedance 220k ohms. Output impedance 600 ohms. Systems start at under \$1,000.



CAIG LABORATORIES, INC.
Cramolin®

CAIG LABORATORIES, INC.; 1175-O Industrial Ave., Escondido, CA 92025; (619) 743-7143. Product Name: Cramolin®.

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OTHER EQUIPMENT

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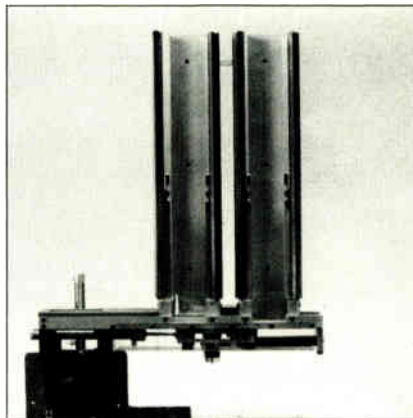
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Contact: Mark Lohkemper Date Product Introduced: 4/89
Product Description & Applications: The Cramolin aerosol product line uses only ozone-safe propellants, yet works just as effectively and still retains its nonflammability. Cramolin is a fast-acting, de-oxidizing solution for the cleaning, preservation and lubrication of metal surfaces, including gold. **Basic Specifications & Suggested List Price:** When Cramolin is applied to metal contacts and connectors, it quickly removes resistive oxides and forms a protective molecular layer that adheres to the metal surface and maintains maximum electrical conductivity, thus preventing future contamination. It is ideal for use on switches, potentiometers, relays, PCB/edge connectors, batteries, metals for protective coating, faders, interconnecting cables, plugs, jacks, etc

CALZONE CASE CO.; 225 Black Rock Ave., Bridgeport, CT 06605; (203) 367-5766. **Product Name:** Studio Series Permanent Installation Rack. **Contact:** Vincent J. Calzone, vp sales **Date Product Introduced:** 6/89 **Product Description & Applications:** The Studio Series Model S-88 and S-812 permanent installation racks are designed to serve the needs of home recording enthusiasts, studio musicians and video broadcast systems. **Basic Specifications & Suggested List Price:** Steel-lapped rack rails, lower-section rack rails vertically mounted, upper-section rack rails slanted—mixers, drum machines, etc., available in light oak and high-tech gray

CANARE CABLE, INC.; 511 Fifth St. #G; San Fernando, CA 91340; (818) 365-2446. **Product Name:** L-2E5. **Contact:** Barry Brenner, gen mgr **Date Product Introduced:** 1/89. **Product Description & Applications:** Miniature microphone cable. Very flexible, with 95% braided shield. Available in black, blue or red. Two conductors twisted, 26 AWG with cross-linked polyethylene insulation. Use for lightweight field use on any balanced interconnect. **Basic Specifications & Suggested List Price:** \$0.38 per foot list

CANARE CABLE, INC.; 511 Fifth St. #G; San Fernando, CA 91340; (818) 365-2446. **Product Name:** MR202-32AT. **Contact:** Barry Brenner, gen mgr **Date Product Introduced:** 1/89. **Product Description & Applications:** 32-channel audio snake cable. Each channel comprised of 25 AWG twisted pair, with foil shield and drain wire. Channel jacket is color-coded PVC for easy identification and to eliminate extra shrink-tubing labor. Flexible and sonically clean. Only 0.776" O.D. **Basic Specifications & Suggested List Price:** Suggested list \$7.18 per foot

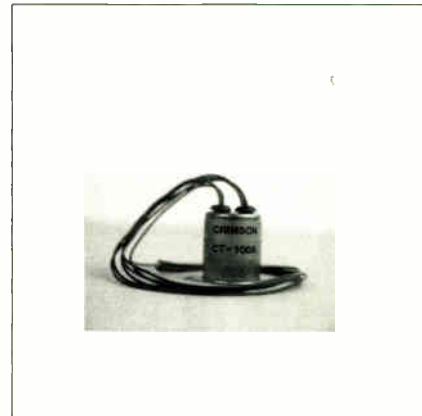


CONCEPT DESIGN ELECTRONICS & MANUFACTURING, INC.
Dual Fast Feeder

CONCEPT DESIGN ELECTRONICS & MANUFACTURING, INC.; 1105-A Pomeroy St.; Graham, NC 27253; (919) 229-6500; FAX: (919) 229-0063. **Product Name:** Dual Fast Feeder. **Contact:** Kathleen R. Farrow, technical writer **Date Product Introduced:** 7/89. **Product Description & Applications:** The Concept Design Dual Fast Feeder holds over 100 COs. It fits all Concept Design-modified loaders, as well as 790-type loaders. Designed to end problems of jam-ups, spindle misalignments and operator handling, the unit is easy to install and requires no electrical connections. No logic changes are necessary. The Dual Fast Feeder, because of its capacity, is

especially useful for loading Cassingles. **Basic Specifications & Suggested List Price:** The Dual Fast Feeder is built to last. It is constructed of stainless steel, Teflon-coated, machine-tooled aluminum and nylon. The unit retails for \$1,500. Call for delivery schedules.

CONNECTRONICS CORPORATION; 652 Glenbrook Rd.; Stamford, CT 06906; (203) 324-2889. **Product Name:** Soundwires XBay and JBay. **Contact:** Richard Chivers, president. **Date Product Introduced:** 1988. **Product Description & Applications:** JBay is a 1/4" jack-based patch bay system allowing normalized, half-normalized or straight-through configuration. Rear panel connector option. Balanced or unbalanced. Xbay is an XLR-based patch-panel system, also allowing any connector in any position. **Basic Specifications & Suggested List Price:** Jbays from \$112 to \$210. Xbays from \$80 to \$361.



CRIMSON AUDIO TRANSFORMERS
 CT-100A

CRIMSON AUDIO TRANSFORMERS; PO Box 533; Perryville, MO 63775; (314) 547-8988. **Product Name:** CT-100A. **Contact:** John Cunningham, design engineer. **Date Product Introduced:** 8/89. **Product Description & Applications:** The CT-100A is one of a family of microphone bridging transformers, used to split microphone outputs to multiple mixing



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inputs while maintaining complete isolation between consoles. There are units to split two, three or four inputs, at approximately 0dB or 10dB. They are constructed from premium-grade materials, sealed in magnetic shielding enclosures, and feature a unique, integral-flange, 2-point mounting system. Manufactured in USA with custom variations available. **Basic Specifications & Suggested List Price:** Impedance ratio: 150/150 ohms. Frequency response: 20Hz to 20kHz, ± 0.16 dB. Maximum input signal: +1dB at 20Hz THD under 0.05%. Two copper-foil Faraday shields. 28-gauge, color-coded 1 leads 1" diameter x 1.187" tall. 1-19 pcs. \$31.50 each, 20-39 pcs. \$27.25 each.

CRIMSON AUDIO TRANSFORMERS, PO Box 533, Perryville, MO 63775; (314) 547-8988. Product Name: CT-400A. Contact: John Cunningham, design engineer. Date Product Introduced: 8/89. **Product Description & Applications:** The CT-400A is a line-level output transformer, used in line-balancing or impedance-matching applications. Multi-filar construction produces four 150 ohm windings, which may be series- or parallel-connected to achieve proper impedance ratio. Top-grade materials such as 80% nickel lamination, 130-degree, C-rated magnet wire and glass-filled nylon bobbins are used throughout. Manufactured in USA with custom variations available. **Basic Specifications & Suggested List Price:** Impedance ratio: 150/600 ohms. 150/600 ohms. Frequency response: 20Hz to 20kHz, ± 0.03 dB. Maximum input signal: +24dB at 20Hz THD under 0.08%. 28-gauge, color-coded 1 leads 1.062 x 1.437 x 1.187 inches. 1-19 pcs. — \$28.75 each. 20-39 pcs. — \$24.85 each.



ELECTRONIC SYSTEMS LABORATORIES, INC.
RTW PPM/Correlator 1119

tions: mastering, duplication, signal control, measuring mono compatibility of stereo signals. **Basic Specifications & Suggested List Price:** 2-channel display. Scale length: 127mm (PPM), 27mm (correlator). Dimensions: 190 x 40 x 107mm, 24V or ± 15 V DC, 190mA, or 22-/110V 50/60Hz with power supply case model 1120. List price: \$1,600.

FINAL RESULTS, 2675 E. 74th St., Chicago, IL 60649, (312) 374-1684. Product Name: Turtlenecks. Contact: Jacob D. Collins, designer. Date Product Introduced: 1989. **Product Description & Applications:** A new generation and concept of microphone holders is being introduced in 2" and 12" lengths. The 2" Turtleneck with a 2 1/2" diameter magnetic base is for horizontal surfaces or other mounting applications. The 12" Turtleneck with hand clip is for quick mounting to such things as podiums for press conferences, etc. **Basic Specifications & Suggested List Price:** Turtlenecks are made of Delrin 500 and come in four colors: black, red, blue and gray. Short Turtleneck: between \$25 and \$30. Long: between \$35 and \$45.



FINAL RESULTS
Turtlenecks

F.M. TUBECRAFT, 1121-20 Lincoln Ave., Holbrook, NY 11741; (516) 567-8588. Product Name: Home Studio Furniture. Contact: Frank Maiella. Date Product Introduced: 6/89. **Product Description & Applications:** F.M. Tubecraft introduces a new line for home studio or store display. The set includes a racking console with 12-space swivel top and 10-space bottom mixer or utility stand, double 14-space rack with top and a workstation 42" x 24". Construction: gray 2-sided 3/4" laminate, industry-standard rack rails, castors are included, very strong construction. Custom orders are accepted.

FOSTEX CORP. OF AMERICA, 15431 Blackburn Ave., Norwalk, CA 90650; (213) 921-1112. Product Name: Underwater Communications System. Contact: Maggie Hughes. Date Product Introduced: 10/89. **Product Description & Applications:** Fostex offers a complete, integrated communications system for scuba divers. The sound quality is superior to all other systems because of proprietary noise-banking circuits that eliminate the diver's breathing sounds. Made to order.



DAGO CASES
Dago A.T.A., La Strada Flite, La Strada

DAGO CASES, 6945 Indiana Ct., Ste. 600, Golden, CO 80403; (303) 421-7912; (800) 342-3246; FAX: (303) 421-7916. Product Name: Dago A.T.A., La Strada Flite, La Strada. Contact: Nick CEO. Date Product Introduced: 1/89. **Product Description & Applications:** Dago Cases manufactures high-quality shipping and carry cases. Dago has four separate lines of cases and can custom-build any of the four lines to any specifications. Dago also has thousands of stock designs to choose from. Dago manufactures the M.A.S.C., Military Spec Case, the A.T.A. Airline Spec Case, the La Strada Flite Airline Spec Case and the La Strada Carry Case. **Basic Specifications & Suggested List Price:** The Dago M.A.S.C. meets military spec. B10-D, our A.T.A. and La Strada Flight case meet the airline spec. 300, category I. The Dago La Strada meets the airline spec. 300, category II.

DENON AMERICA, INC., 222 New Rd., Parsippany, NJ 07054; (201) 575-7810. Product Name: DN-950FA CD Cart Player. Contact: Laura Tyson, sales engineer. Date Product Introduced: 5/89. **Product Description & Applications:** The Denon DN-950FA CD Cart Player is an industrial-strength CD player designed for professional use. The CD Cart Player uses a special cartridge to store the disk, protecting it from damage and scratches during handling. The cartridge is loaded directly into the player, thus eliminating the need for jewel boxes. The CD Cart player has balanced XLR outputs, remote-control capability and can be rack-mounted. The search keys on the front panel permit very accurate frame cueing for production use. **Basic Specifications & Suggested List Price:** List price: \$1,499.

ELECTRONIC SYSTEMS LABORATORIES, INC., 120 SW 21st Terrace, C-104, Ft. Lauderdale, FL 33312; (305) 791-1501. Product Name: RTW PPM/Correlator 1119. Contact: Lutz H. Meyer, president. Date Product Introduced: 3/7/89. **Product Description & Applications:** The RTW 1119 is a peak-level and phase-correlation meter combined into a single unit. High-resolution level indication on an exceptionally long scale. Selectable integration time: 10ms for analog, 1ms for digital audio signals. Superimposed scale markers each 1dB steps (selectable). Peak level memory and +20dB scale expansion. Significant reduction in space requirement, weight and current consumption as compared to separate units. Applica-

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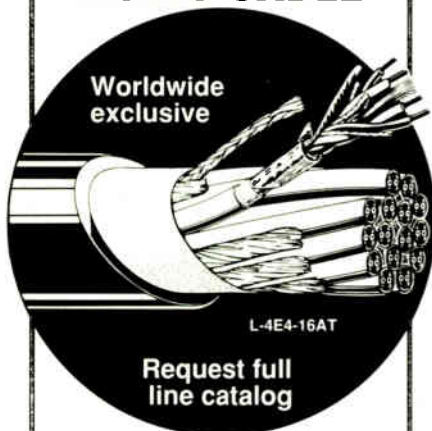
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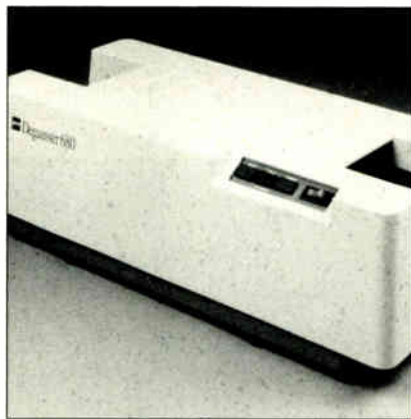
OTHER EQUIPMENT

1990

FOUR DESIGNS CO.: 6531 Gross Ave.; Canoga Park, CA 91307; (818) 716-8540. Product Name: Rack Hardware Kit. Contact: David Riddle, owner. Date Product Introduced: 1/18/89. Product Description & Applications: Prepacked rack-mounting screws, black oxide Phillips pan screws, black nylon washers (20 PC packaging). Basic Specifications & Suggested List Price: The Rack Hardware Kit contains 20 pieces, screws and washers \$3

FOUR DESIGNS CO.: 6531 Gross Ave.; Canoga Park, CA 91307; (818) 716-8540. Product Name: Wood Mounting Rails. Contact: David Riddle, owner. Date Product Introduced: 1/18/89. Product Description & Applications: Wood-mounting rails 20-space wood-mounting rails for racks. Basic Specifications & Suggested List Price: Wood eliminates ground loops. Lifetime guarantee 20 "spaces" length \$12.50

FURMAN SOUND, INC.: 30 Rich St.; Greenbrae, CA 94904; (415) 927-1225. Product Name: AR-117 AC Line Voltage Regulator. Contact: Joe Desmond, nat'l sales mgr. Date Product Introduced: 7/89. Product Description & Applications: The AR-117 protects audio, video or computer equipment from line voltage irregularities—brownouts, over-voltages, spikes, surges and RFI. It can deliver 117 (±3) VAC anywhere within its capture range of 97 to 131 volts, and delivers usable voltage from 89 to 139 volts. Extreme over- or under-voltages cause it to shut down instantly, before equipment can be damaged. It uses an 11-tap toroidal autotransformer. All tap switches occur at voltage zero crossings, while the toroidal design assures minimal magnetic flux leakage. There are an input-voltage meter and nine accessory outlets. Capacity is 15 amps. Basic Specifications & Suggested List Price: Suggested list price \$499. Model AR-117J (switchable for 117 or 100 VAC use) \$509



GARNER INDUSTRIES
Model 680

GARNER INDUSTRIES: 4200 N. 48th St.; Lincoln, NE 68504; (402) 464-5911. Product Name: Model 680. Contact: Brad Osthus, degausser sales. Date Product Introduced: 4/29/89 (NAB). Product Description & Applications: The Garner 680 is the perfect machine for video production and duplicating facilities using half-inch video cassettes. The 680 is designed for complete erasure of S-VHS, D1, U-matic and Beta video media. The 680 employs the proven "V" coil configuration for complete erasure in a single pass. An electric eye has been incorporated for optimum production of media and it makes the machine easy to use. Basic Specifications & Suggested List Price: Degaussing force, 2,400 oersteds; erasure depth -70dB analog audio tracks, S-VHS in protective carton, belt speed 4.3 ips, window opening: 6 x 1.58"; power requirements 120 VAC, 60 and 50Hz, 16A. Dimensions 31.5" L x 14.7" W x 10" H. Weight: 127 lbs. List price: \$3,590

GET ORGANIZED: 55 Azalea Ln.; Santa Cruz, CA 95060; (408) 425-7269; FAX: (408) 423-8645. Product Name: Keyboard Control Kit™. Contact: Robby Frank. Date Product Introduced: 6/21/89. Product Description & Applications: The Keyboard Control Kit was designed for keyboardists or anybody with masses of cords and cables. The kit provides a means of organizing cords into custom snakes via reusable Snake It™ tubing. The tubing holds eight to ten cables which can enter or exit through a slit that runs the length of the tube. Also included are specially designed labels and a variety of ties and mounts for securing the Snake It to any surface. Basic Specifications & Suggested List Price: Includes 15-foot Snake It tubing, 16 self-laminating labels, three go ties for securing

the tube, eight beaded ties for securing the ends of the cables. The kit makes all electronic systems look better and makes them much faster to set up and tear down. List for \$29.95

GET ORGANIZED: 55 Azalea Ln.; Santa Cruz, CA 95060; (408) 425-7269; FAX: (408) 423-8645. Product Name: Super Flex™. Contact: Robby Frank. Date Product Introduced: 6/21/89. Product Description & Applications: Super Flex tubing was designed for lighting and sound companies or anybody with dramatic cord and cable problems. This 30mm, high-temperature (300 degrees) tubing will hold 20 cords which can enter or exit at any point through a slit that runs the length of the tube. Super Flex neatly bundles masses of cords into a sharp-looking, durable, flexible but easy-to-modify snake. Basic Specifications & Suggested List Price: 30mm, holds 20 or more cables. Only sold in bulk at \$1.75 per foot since it is too big to prepackage. Sold along with all the other components of the cord-control system

HARMAN ELECTRONICS, INC.: 8400 Balboa Blvd.; Northridge, CA 91325; (818) 895-8734. Product Name: 6850. Contact: John Wilson. Date Product Introduced: 1/89. Product Description & Applications: Large-screen video projector for pictures 5' to 25" diagonal. High-brightness image from video, RF or RGB inputs. Contains multi-input selector, 178-channel tuner, onscreen graphics, wireless remote control, 12-volt screen control. Standard TAC-3 lenses, HD-6 lenses optional. True colorimetry and quiet operation (no internal fans) makes the 6850 ideal for mixing rooms, Foley stages, etc. Floor or ceiling mounted, front or rear projection. Also available without tuner as the 6850-M projection monitor. Basic Specifications & Suggested List Price: Brightness: 500+ lumens peak white. 6850 list price: \$6,495. 6850-M list price: \$5,995

HARMAN ELECTRONICS, INC.: 8400 Balboa Blvd.; Northridge, CA 91325; (818) 895-8734. Product Name: TC-1. Contact: John Wilson. Date Product Introduced: 6/89. Product Description & Applications: Video tuner controller brings complete flexibility to RGB monitors and video projectors. Three RF inputs, two S-VHS inputs and two audio/video inputs, plus 178-channel tuner are controlled via onscreen menus. Universal wireless remote control for controller, VCR and cable converter. The TC-1 permits any video display to become a high-quality, user-friendly receiver from multiple sources. Perfect for viewing rooms and lounges, as well as studio use. Basic Specifications & Suggested List Price: List price \$995



INVISIBLE PRODUCTS CORP.
Model MS2048—Composers Workstation Stand

INVISIBLE PRODUCTS CORP.: 159 Commercial St.; Lynn, MA 01905; (617) 592-5992. Product Name: Model MS2048—Composers Workstation Stand. Contact: Donald Lang, president. Date Product Introduced: 1/89. Product Description & Applications: The latest in our line of workstation stands, the MS2048 is a desk-style workstation for those who would like to spread out their work. It features a black laminate desktop 30" x 48", with a matching 13 1/4" x 42" height-adjustable shelf above. Anyone using computerized recording systems or large MIDI systems will benefit from the MS2048. Basic Specifications & Suggested List Price: All-steel patented design, height adjustable in 1 7/8" increments from 30" to 49". Supports 250 lbs., weighs 47 lbs. Compatible with all Invisible accessories, including casters. List price: \$329. Ships UPS.

JAN-AL CASES: 3339 Union Pacific Ave.; Los Angeles, CA 90023; (213) 260-7212. Product Name: Data FX Case. Contact: Jan Michael Alejandro. Date Product Introduced: 1/89. Product Description & Applications: Jan-Al briefcase-style case helps to organize your sound library and software. The Data FX Case holds 115 3 1/2" floppy disks and includes pocket for manuals and music. Custom sizes and colors available. Basic Specifications & Suggested List Price: Lockable. Available in black, blue, red, gray and white. Sugg list price \$158.75

JAN-AL CASES: 3339 Union Pacific Ave.; Los Angeles, CA 90023; (213) 260-7212. Product Name: Portable Studio Cases.

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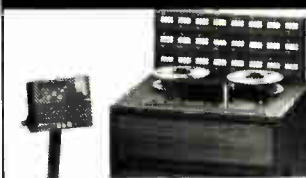
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EMPLOYEE HIRING

Of those facilities that hired technical staff employees in the last 12 months, the largest percentage of new employees came from other studios (52%), with recording school graduates filling an additional 31% of available positions. When asked how they found new staff members to hire, studios revealed that they relied on personal recommendations by a wide margin.

Of those studios that have hired graduates of recording schools (70%), 38% claim to have done so in the last 12 months, and more than half of those have hired only one employee. From the data it would appear that breaking into the recording business, as much as in any other, is a long-term process.

ACKNOWLEDGMENTS

We would like to acknowledge the contributions of the Recording Industry Association of America (RIAA), New York, N.Y., and the American Music Conference, Wilmette, Ill., for information included in Part 2 of Audio Production '89. For Part 3 information we wish to acknowledge the contributions of the Consumer Electronics Group, Washington, D.C. We would like to acknowledge the contributions of the individuals at the participating facilities who helped to make the Audio Production Facilities Survey a success.

Altogether, this information confirms the existence of a continued healthy, professional audio industry. Results are generally consistent with basic demographic information contained in previous *Mix* surveys, indicating a general trend toward diversification and an expanding market.

Copies of Audio Production '89 were made available in time for this year's AES show. Additional copies can be ordered by contacting *Mix* at 6400 Hollis St. #12, Emeryville, CA 94608, (415) 653-3307. ■

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