

MIX

Bob Clearmountain on Mixing for Live TV & Radio

Multiple DAT Copies— The Fidelity Issue

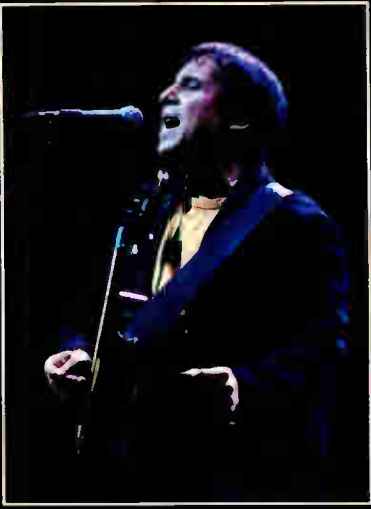
Live Sound Developments: The Latest Products and Techniques

Directory: Remote Recording, Sound Reinforcement Companies

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MIX

PROFESSIONAL RECORDING • SOUND AND MUSIC PRODUCTION

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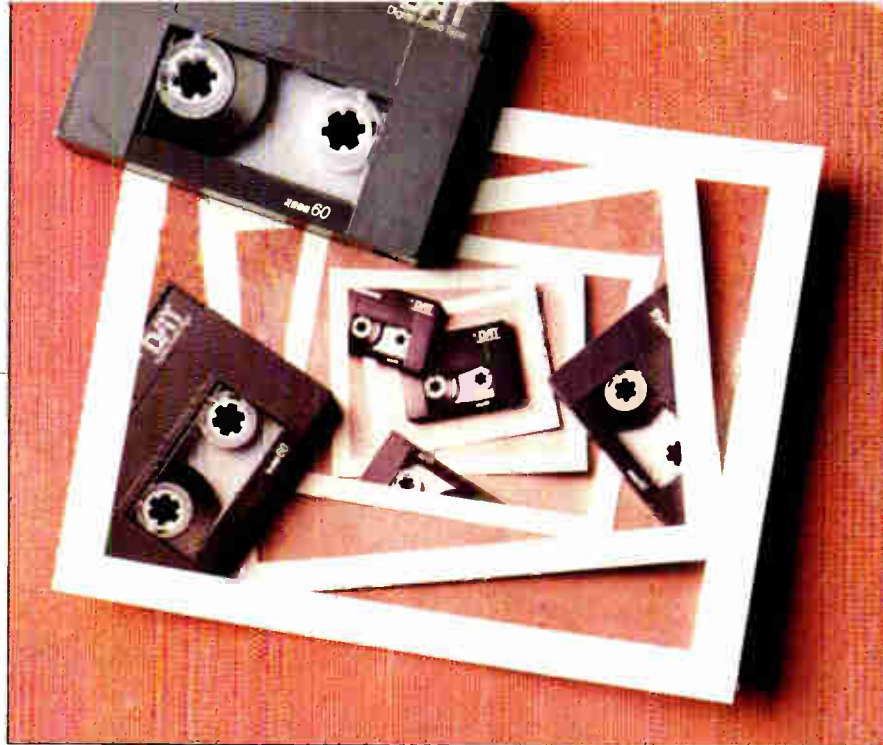
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Cover: The Silver Remote Studio of David Hewitt's Remote Recording Services (Lahaska, Pa.) was completed in March 1990. The production area features a 48x48 all-discrete API console with a computer-controlled I/O matrix and Massemburg fader automation. The vehicle has extensive video interface capabilities for live TV and also includes a separate radio room. **Photo:** Jay Manis. **Inset Photo:** Jay Blakesberg.



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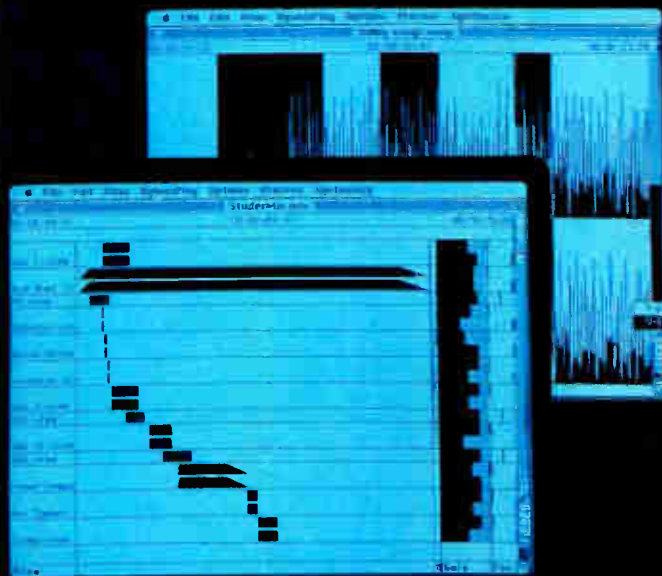
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FROM THE EDITOR

I attended a concert at the January NAMM convention, and I left with my ears ringing. I complained to my wife that I forgot to bring our ear plugs, the standard procedure for rock shows these days.

For so many years I supported the arms buildup of wattage and amplification, and now I find myself wishing that all along we had put more of an emphasis on fidelity and intelligibility, and less on loudness. Concert sound does not have to be loud to be good, though most in the audience want a "physical" quality to the music—something larger than life.

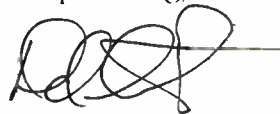
More and more, the marshalling of the loudness variable has become a hotly debated responsibility. While guidelines for hearing safety and community compatibility are not well-defined or clearly obvious, they all point toward less sound being the best sound.

Sound operators will soon find themselves obligated to keep the levels down. They will be moving from impact toward subtlety, from bombast to contrast. Using low-distortion amplification with even coverage, special effects and sophisticated signal processing will be more appreciated at comfortable listening levels.

As health awareness becomes more acute and measuring devices more prominent, the sound industry will need to define recommendations on sound level issues. Legislation to impose legal limits will need to be well-informed and sensitive to the complexities of reinforced sound.

These topics will surely be discussed as sound reinforcement engineers prepare for the summer touring season. Until then...

Keep reading,



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Rather than show you a picture of George Massenburg posing in front of our digital multitrack, here's why he stands behind it.

Legendary recording engineer and producer, George Massenburg,



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3348 seems like it was designed with the engineer in mind. It never fights you."

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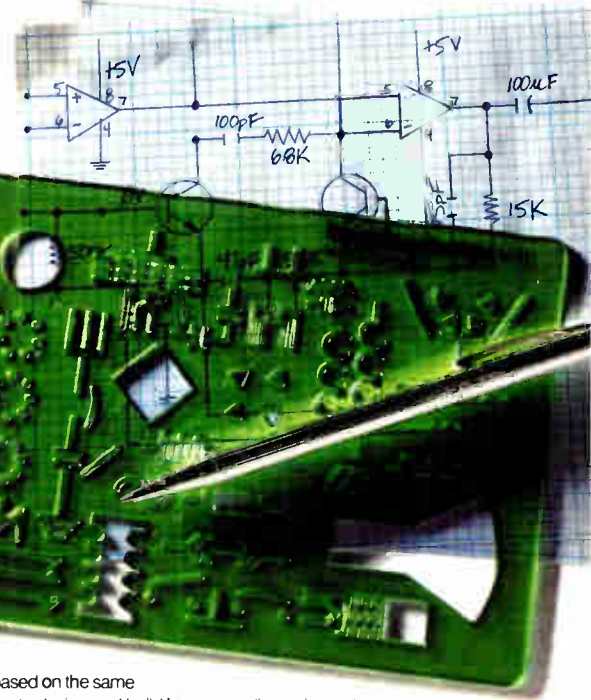
Reasons like the people behind the 3348. "I like Sony's philosophy. They're looking way over the horizon. They've given the 3348 features I've only

begun to use now, but I know they'll be essential down the road."

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World Radio History

CURRENT

For Sale: Record Plant

Despite solid bookings and more than 20 years of hitmaking history, Record Plant L.A. is closing its doors effective March 1. Chrysalis Group plc, shareholders of Record Plant Recording Inc., announced "immediate plans to discontinue operations and sell its business assets and real estate." According to Joe Kiener, vice chairman of Chrysalis USA, "Studio operations no longer represent an integral part of the group strategy in the U.S. market."

This is the Sycamore Avenue Record Plant, the reincarnation of the legendary Third Street complex where Stevie Wonder once booked Studio B for a couple of years, and where the client list included the Rolling Stones, Fleetwood Mac, Linda Ronstadt, the Bee Gees, Sly Stone, Quincy Jones, CSN...and so many more. Record Plant L.A. was the second phase of Chris Stone's "mother-ship" concept of the late 1960s, following the original Record Plant in New York (now 321 Studios) and before The Plant in Sausalito, Calif.

Guns N' Roses recently spent five months at Record Plant; Bonnie Raitt mixed *Nick of Time* there; and Bruce Springsteen was in mixing just before closure. Still, hits and solid bookings no longer guarantee survival.

"It came as a complete surprise to everyone here," says David Ellman, chief operating officer and executive VP. "We were told that [Chrysalis] no longer has a need for a presence on the West Coast. You know, the studio business changes every day, and it's difficult with only two rooms."

Since the announcement, calls have been coming in from people seeking to purchase equipment from the well-stocked rooms. As of press time, offers are still being sought on the entire package. Interested parties are invited to call Ellman at (213) 653-0240.

Management Buys Back IMC, Adds Hill Audio

An investor group that includes top management at International Music Company recently purchased IMC and its parent company, Rhythm Band Inc., in a debt-free, all-equity transaction, effective November 29, 1990. At the same time, IMC Holdings Corp., the former parent company of IMC/RBI, was dissolved.

"With the new investor group, IMC will no longer be constrained by debt obligation at the holding company level that in the past hampered some of our marketing activities," said IMC president Tommy Moore, who founded the company in 1974 with Jerry Freed and sold it in 1988 during the height of leveraged buy-outs. Moore expected no formal changes in the product or school divisions.

In January, IMC, based in Fort Worth, Texas, added exclusive distribution rights for Hill Audio products in North and South America. The company is also the exclusive U.S. distributor for Akai electronic music products, Jackson/Charvel guitars and Ross Systems.

Roland Forms Pro Audio/Video Division

Roland Corp. opened a new Pro Audio/Video Division on January 1, under the direction of general manager Curtis Chan, formerly of Sony and Ampex. Chan will be based in the RolandCorp US offices in Los Angeles.

"The formation of the Pro Audio/Video Division is part of Roland's strategic plan to leverage its advanced technology base and experience to develop products for the professional industries," says RolandCorp US president Tom Beckmen. "Targeted markets include broadcast, post-production, film, recording, radio, sound reinforcement, government and theme parks."

Bob Davis, 1935-1991

Robert Trabue Davis, manager of promotions and advertising at Yamaha Pro Audio, passed away on January 23 as a result of complications brought on by lung and throat cancer. He was 56 years old.

Davis was a regular at industry trade shows and professional organization meetings, and he will be remembered for his dignity, humor, intelligence and gentleness. He will also be remembered for his unique contributions to the professional audio industry.

Davis was born in Kentucky, and by the age of eleven he was something of a prodigy on clarinet. His schooling included post-graduate work in musicology at the University of Kentucky, where he later joined the faculty. He also became principal clarinetist for the Lexington Philharmonic.

In 1975 he moved west, joining Altec Lansing as manager of market development and training. He soon became VP for market development, and under his supervision, Altec Lansing developed its first digital delay lines, as well as Incremental Power amplifiers, constant-directivity horns and large-scale touring sound systems.

Davis joined Yamaha Music Corporation in 1983. He was active in SMPTE, AES and a variety of professional organizations. In 1984 he received the AES Board of Governors Award. He will be missed by all who knew him.

In lieu of flowers or gifts, the family has asked that all contributions go to a scholarship fund for the Central Kentucky Youth Orchestras. Send to: Robert T. Davis Scholarship Fund, 161 N. Mill St., Lexington, KY 40507.

Mix Announces TEC Contributions

The 1990 Technical Excellence &

INDUSTRY NOTES

As of this summer, **Kenneth D. Almgren** will take over the posts of chief financial officer and senior vice president at the **National Association of Broadcasters**. Three NAB board members resigned and will be replaced by **Travis O. Rockey**, who steps in for **John J. Moffitt**; **Ralph Gabbard**, taking over for **Cullie M. Tarleton**; and **Scott Vaughan**, completing the term of **Anita L. Wallgren**. NAB also presented their **Engineering Achievement** award to **Kerns H. Powers** of the **David Sarnoff Research Center** (television recipient) and **George W. Marti** of **Marti Electronics** (radio recipient)...**Sound Marketing** now handles **Maxcon** consoles, **Equitek** microphones and **CAD** signal processing in **Ohio**/western **Pennsylvania** for **CTI Audio Inc.**...More information on a **May 1991** workstation business conference, hosted by **SPARS**, can be obtained by calling (800) 771-7727...**Digidesign** appointed **Steven Krampf** to VP of marketing...**Will Lewis** is now with **Loppnow & Associates** as **Northwest** manufacturer's rep...**Martin Audio Video** expanded to a nationwide operation and has a free phone number customers may use to order parts, accessories and supplies: (800) 421-9550...**Dave Talbot** is now marketing and sales manager for **BSS** and **Turbosound**; the two companies were acquired by **AKG** last December. **Turbosound** also enlisted the aid of three new rep firms: **Taub Sales** (mid-Atlantic states), **Northcoast Marketing** (Ohio, western **Pennsylvania** and **West Virginia**) and **Sound Marketing** (**Indiana** and **Kentucky**)...**Phillip N. Shuey** will serve a second term as national president of the **Association of Visual Communicators**... **George Parrish** joined **Television Associates** (provider of technical video communication services) as an account executive...**Tannoy**

Audix chose **Tim Roberts** as new managing director; he replaces **John Billet**, who rises to the post of executive chairman...**StuderRevox** announced in-house awards given to the following outstanding employees: **Joe Bean**, **Sabin B. Brown**, **Ross A. Catlin**, **Steven W. Smith** and **Marcel Siegenthaler**...**Lynnwood**, **WA**-based **Pacnor Marketing** welcomed **Dave Harwood** to their sales team...**NBC Radio Networks** appointed several new officers to the **NBC Radio Affiliate Executive Committee**: **Paul Hedberg** is chairman, **Allan Land** is vice chairman, **Dennis Curley** is secretary/treasurer, and **Greg Anderson**, **Tom Baker** and **Dan Griffin** join as new members...The **U.S. Advanced Television Systems Committee** added **General Instrument Corp.** to the executive committee...**Audio Services Corp.** (**North Hollywood, CA**) is now an authorized **Neumann** microphone service center...**Alesis Corporation** hired **T.D. Craig** as the **Canadian** sales manager...**J.L. Cooper Electronics** chose **Midwest Audio Marketing** as the company's rep for northern **Illinois**, **Michigan**, **North** and **South Dakota**, **Wisconsin** and **Minnesota**...**QSC Audio Products**, maker of pro power amps, awarded in-house accolades to **Washington Music Center** as dealer of the year and **Audio Representative** as rep of the year...**Atari Computer** picked up the good vibrations of **James K. Grunke** (former keyboardist for the **Beach Boys**); **Grunke** will serve as product manager for the company's **MIDI** group...**Steve Johannesen** was promoted to director of **Young Chang/Kurzweil Music System's** customer support and artist relations for the digital products and acoustic pianos divisions...**Musicanada's** 20th anniversary trade show will be **May 4-6** in **Toronto**; for further info, call **Brad Heintzman** at (416) 985-3811. ■

Creativity Awards were the most successful to date, with nearly \$30,000 distributed to the event's designated beneficiaries. "We are very pleased to be contributing so much money to these worthy causes," said **Hillel Resner**, **Mix** publisher and **TEC Awards** executive producer. "And we are grateful to those who attended for making it possible."

The proceeds, distributed by the **Mix Foundation** for Excellence in Audio, went to the **House Ear Institute** (50%), the **AES Educational Foundation** (25%) and the scholarship program of **Full Sail Center** for the **Recording Arts**, winner in the **Outstanding Recording School/Program** category.

Resner also announced the addition of a new category for 1991. Under the **Outstanding Institutional Achievement** banner, **Mix** subscribers will now also vote for **Audio Post-Production Facility**.

The 1991 **TEC Awards** will be held at a location to be announced in **New York City** on **Saturday, October 5**, the second night of the **AES** convention. For more information, contact **Karen Dunn**, **TEC Awards** executive director, at (415) 562-7519.

Convention News

The big announcement at **Winter NAMM** was the cancelling of the **Summer Expo**, originally scheduled for **August 1-4** in **New York City**. **NAMM** president **Jack Coffey** said the board of directors voted "overwhelmingly" in favor of cancellation after receiving input from the **Trade Show Advisory Commission** and other retail and commercial members. A 1992 schedule is still being evaluated. Input is welcome.

The **National Association of Broadcasters** will host **NAB '91** and **HDTV World** in **Las Vegas**, **April 15-18**. Call (202) 429-5300 for more information.

Video Expo Los Angeles will be held **May 14-16** at the **L.A. Convention Center**. Audio companies should call **Barbara Stockwell** at (800) 800-5474 for booth information or general questions. ■

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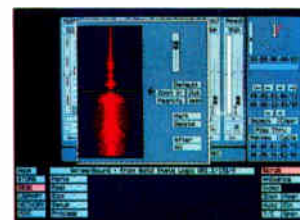
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by Ken C. Pohlmann

A VISIT TO FUJITSU TEN

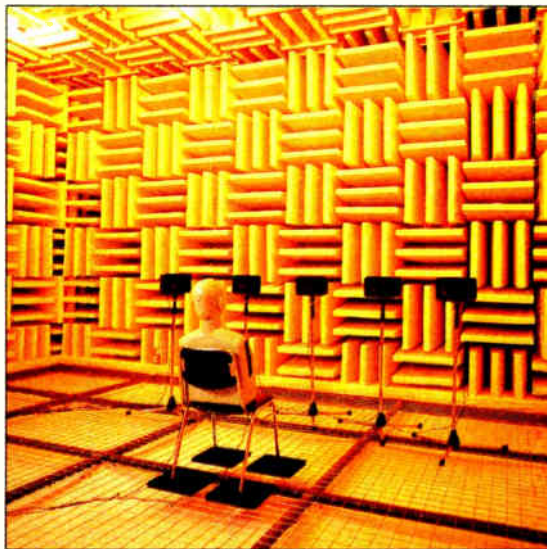
Japan has constructed a superpower recording studio industry—a fact often overlooked in this country. Some of the world's finest recording facilities are now located in that tiny island nation, and on a per-square-kilometer basis, the excellence of its audio recording technology is probably unparalleled. For example, there are 225 multitrack DASH recorders in America and 275 in Japan. That's particularly impressive

and Daihatsu, as well as GM, Ford and Chrysler. High-end Fujitsu Ten car audio products are sold to the aftermarket in the U.S. through the Eclipse name. Annual sales surpass \$500 million.

Fujitsu Ten's parent company, Fujitsu International, is one of the 50 largest multinational corporations in the world. Among other endeavors, it is a leading computer manufacturer, ranking second in mainframe sales.

This provides vast technical and financial resources, particularly benefiting Fujitsu Ten's development of new audio products using computer-based technology. For example, the company recently completed its FT8800, a custom 24-bit, floating-point DSP chip.

Despite the company's diversity, it is audio that captivates the engineers at Fujitsu Ten. Their commitment was reaffirmed recently with the completion of the Acoustic Development Center, an audio R&D facility. At one end of this



building, structurally isolated from the rest of the Center, is an anechoic chamber. Its enclosed volume is approximately 200 cubic meters, and the NC is below 10. The room is completely floated within a frame that weighs approximately 300 tons. The walls, ceiling and floor are covered with fiberglass wedges that are 1.2 meters long; measurements down to 63 Hz are possible, with free-field measurements within a 2-meter radius. This room is used to measure equipment such as speakers, microphones and acoustic materials, and to conduct acoustic psychology experiments regarding sound fields and image control. All measurements are controlled and recorded with equipment located in a

considering that the price of DASH multitracks is considerably higher in Japan. Also impressive is the fact that a number of Japanese studios are constructed for the sake of research and development rather than commercial profit.

I recently stopped off in Japan to visit one such facility—Fujitsu Ten's new Acoustic Development Center. Headquartered in Kobe, a port city south of Osaka, Fujitsu Ten is a mobile electronics company principally manufacturing audio, cellular communication and car electronics systems, including navigation systems and intelligent car technologies. The company sells its products to domestic OEMs such as Toyota, Mazda, Isuzu

The anechoic chamber at Fujitsu Ten's Acoustic Development Center is used to measure data on speakers, microphones and acoustic materials.

separate room. Many experiments are completely run and monitored by computer. Measurements include sound pressure level, frequency response, impulse response, impedance characteristics, energy time response, directionality, group delay, Nyquist spiral and distortion characteristics.

Of course, no matter how impressive the analytical results, audio products must be validated with human listening. The Center has an evaluation room with a reverberation time of 0.2 seconds and NC less than 15. The room is completely isolated. Speakers and other components may be auditioned and compared to other components using an A/B switching system. For example, five loudspeakers under development may be compared with each other, as well as to a pair of reference speakers.

The Center contains a complete control room and studio for audio recording and mixing—unique in a car audio development facility. Engineers duplicate commercially recorded signals and experiment with signal processing and other audio manipulations. The control room is approximately 5 x 6 x 3 meters, with an NC below 20. The mixing console is an automated DDA DCM232, and the recorders include Sony PCM-3324A and PCM-3402 DASH machines. In addition, the control room is equipped with a Yamaha YPE-101/YPR-201 CD recorder, which engineers use to transfer test signals or live music recordings to CD, for playback in car systems under evaluation. An effects rack contains a full set of peripherals, and the closet is

stuffed with Neumann, B&K, AKG and other microphones.

The studio measures 8 x 12 x 4 meters, with a reverberation time of 0.6



The studio is used for concerts in addition to live recording.

seconds, and is designed with floated concrete floor, walls and ceiling; transmission loss between the control room and studio is greater than 70 dB. The studio is used for live recording and as an audition room and hall for live concerts and presentations. A Barco 600S video projector is provided for the latter.

The final proof of a car audio product comes in the car itself. To provide a testing environment, the Center has three electromagnetically shielded garages

Speakers and electronics are installed in the car being tested, and acoustic measurements of in-car characteristics as well as human-in-car tuning are performed here. In-car microphones, dummy heads and a microphone traverse system are used for analytical testing.

A variety of tests may be performed, stored in the database, and called up and compared to other test results, or printed. Analysis showing 3-D plots or contour maps of sound pressure level, 1/3-octave power spectrum, binaural average 1/3-octave spectrum, impulse response, energy time response, phase vs. level,

group delay, left/right correlation coefficient, impulse response, sound level versus THD, reverberation characteristics, and other parameters provide a complete picture of the system.

Using the traverse microphone system, the microphone array may be moved through the car for dimensional plotting of response. Sharp-eyed car spotters will note that the car in the photograph is a Sera, a gullwing sports car made by Toyota. It is selling like hotcakes because of its completely astro design and low price. Sorry, it's for Japanese production only, for now.

Meter for meter, the Acoustic De-



The control room features an automated 36-input DDA DCM232 mixing console, and Sony PCM-3324A and PCM-3402 DASH recorders.



Testing procedure on a Toyota Sera.

velopment Center is one of the most impressive audio facilities I've seen. While facilities such as anechoic chambers and testing garages are standard resources for an audio hardware manufacturer, it is rare to find a manufacturer willing to build a world-class studio on its premises and equip it with state-of-the-art gear. Such willingness to invest in all aspects of the field under study is surely one of the great strengths of corporate Japan, and another example of their successful long-horizon view of product development. ■

Ken Pohlmann is director of the Music Engineering program at the University of Miami, and he always chooses an aisle seat, non-smoking, business class.

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by Stephen St. Croix

TIPS FOR A HAPPY LIFE IN OUR INDUSTRY

This month I offer you three important tips offered for the betterment of all humanity:

TIP #1: Don't use drugs. If you must, don't drive. If you must do drugs and drive, don't drive near my house.

TIP #2: Don't drink and drive. Though I try every year, I just can't seem to get capital punishment handed out for first DUI offenses. (My body

contains an impressive collection of artificial components, put there by surgeons to replace real components removed or crushed by two separate encounters with drunk drivers.)

TIP #3: Be nice to all your power supplies, or they could start talking to you right in the middle of a mix. You may have forgotten them, but they haven't forgotten *you*.

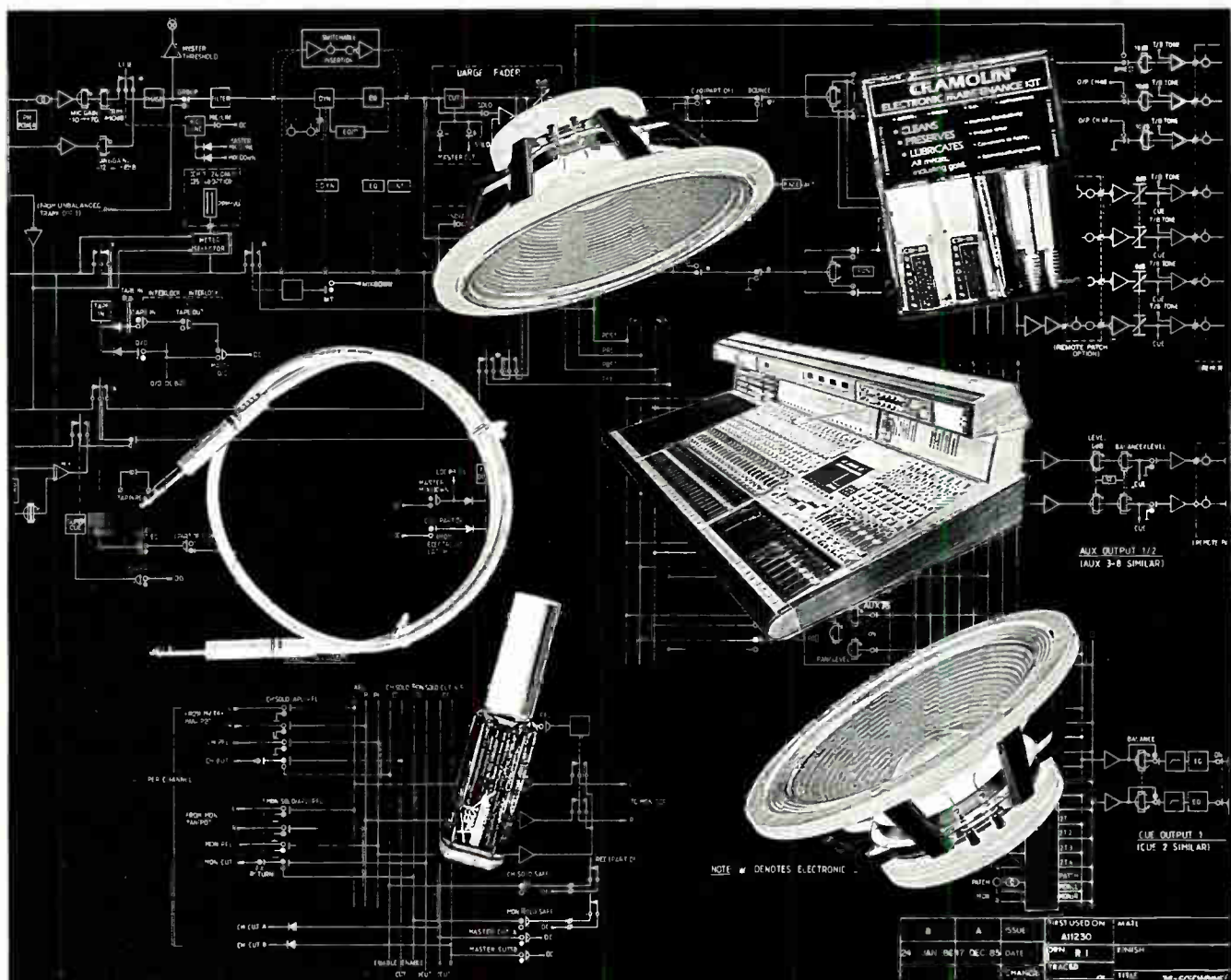


ILLUSTRATION: PATRICIA LAW

I'll elaborate a bit, since this is the only one of my three tips that is technically relevant to the recording industry.

For any machines with analog supplies, like some multitrack recorders and recording consoles, rail impedance is an important element. I know, I know—another term to learn!

Your equipment can never be quiet if the internal voltages that run it are noisy or unstable. Not only does noise come in from the outside world, but it comes in from the power supply as well. In addition, internal components

make noise, and not just the kind you know about. They also put noise on the rails—that is, the plus and minus 15- or 18-volt feed lines and the grounds.

Even as these op amps and other devices generate noise and stick it on the rails, they require immaculately clean rails in order to operate the way that you want. The noisier the rails, the noisier the audio, since those same amps use the rails as a reference to amplify the audio. One component putting noise on a rail will make all other amps nearby noisier. Because of this, power supplies are designed with low-voltage sourcing impedances, and little bypass capacitors are usually hung

on the rails all over the circuit board to keep the impedance as low as possible everywhere.

The lower the rail impedance, the quieter the rail.

For machines with remote supplies, it is vital that the connectors be kept as clean and tight as possible. A little corrosion on one of these connectors can easily raise the rail source impedance from a clean 0.25 ohm to 4 or 5 ohms, or even more. When this happens to a voltage rail, internally generated noise and clock spikes are not absorbed, reference voltages begin to droop (go low), and distortion can go up because the rails will drop even more when higher audio levels cause higher current demands from internal components. Some mess.

When this happens to an internal *ground* trace, crosstalk skyrockets, weird noises may appear (strange intermodulation artifacts are common), those little bypass caps become useless, or worse, they help spread the junk, and even front panel LEDs turning on may produce quite audible clicks at the outputs. Really.

To avoid the problem, keep all power connections clean and tight on remote-supplied devices, and on machines with internal supplies that use pressure connections to other internal sub-assemblies. I use little pliers or crimpers, Blue Shower spray, and Tweak on permanent connections (ones that are normally left alone), and small amounts of the Cramolin red/blue set for patch bay and other removable connectors. "Small amounts" are the operative words here; that stuff turns to goo if you throw it around too carelessly.

By the way, the Tweak, which is apparently some sort of surface sealing conductive polymer, seems to last for almost two years (if the connection is not opened), while the Cramolin, which is a cleaner/anti-oxidant set, seems best if the cleaning/protecting process is done every three to four months.

Okay, now that we have clean rails, we're set, right? Wrong. Thermal noise from the voltage regulators themselves is a big factor. Now, don't panic. I'm not going to give detailed instructions on redesigning your power supply's output stages. I'm going to share a long-kept secret with you—a simple hint that will get the best possible noise figures out of your gear.

Two million years ago (when

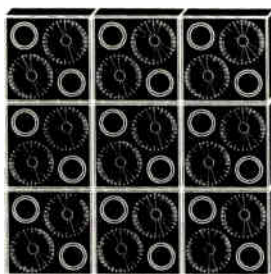
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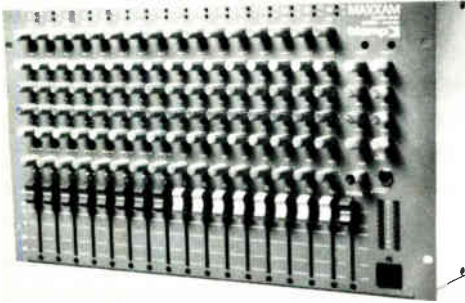


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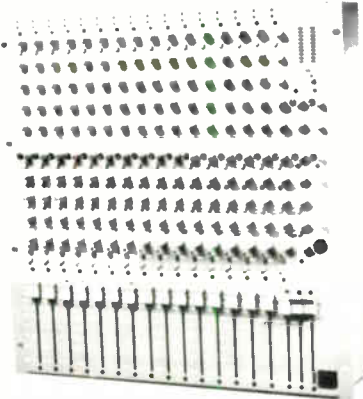
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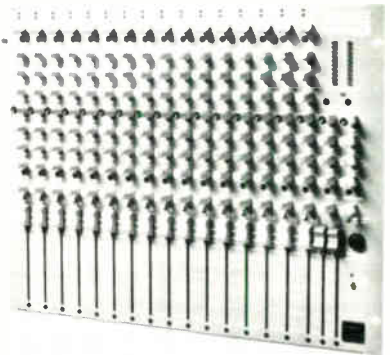


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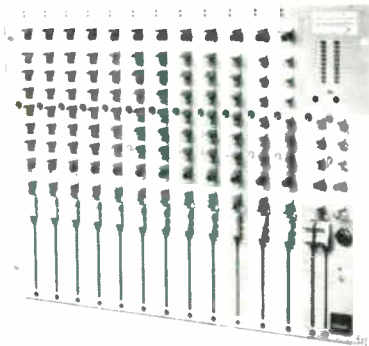
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Raquel Welch was filming that cave-man movie), I designed a machine called the Marshall Time Modulator. It was an elaborate studio-quality *analog* time manipulation device. I was extremely serious about noise in this machine, and my efforts paid off, for in the end it delivered a dynamic range of more than 100 dB.

In achieving that goal, I learned a surprising thing about voltage regulators. After a designer has done all the right things to make the grounds and rails quiet—used the best possible circuitry and the best possible layout; fast, low impedance filter and bypass caps; thick, heavy circuit board traces to keep impedances down; and maybe even a ferrite bead or two—there is one trick left: Keep cool.

That's it, literally. Keep it cool. After the Time Modulator design was finished, I had a dynamic range of 96 dB. Not bad at all, and I was happy with it. While building our first run, however, I became preoccupied with the fact that the voltage regulators ran a bit warm (only because they were the sole components running warm to the touch in this machine). While running a normal

production noise curve on a Time Modulator, I sprayed the voltage regulators with freeze spray, just for the hell of it. The noise floor instantly dropped by 4 full dB! We stopped production, played around for two days, and then moved all the voltage regulators from the circuit board and bolted them directly to the thermally conductive aluminum chassis. We got our 4 dB.

So, for *you* I have the following recommendations: If your supplies have fans, keep the fans, the filters *and the surfaces that the air moves over* totally clean. If they are only convection-cooled, keep the heat-radiating surfaces even cleaner than totally clean, and don't restrict the air flow in any way. Of course, you should never load your rack so that one piece of hot gear thermally victimizes the one directly above it.

Oh, yes, an important point: Totally clean does *not* mean polished. If you use Pledge or any other wax or oil-bearing polish on heat-radiating surfaces, you will actually cut down on their ability to get rid of heat. Think about it—if it looks shinier to your eyes on the outside, it looks shinier (more reflective) to the heat on the inside.

If you have gear with remote digital,

or "switcher," supplies, all of these points are even more significant. In addition, most of these switchers (and many of the analog, or "linear," supplies) have wires for "remote sensing." These wires tell the supply what the voltages actually are in the machine itself. (This is never the same as the voltages in the supply, because all wire has some resistance.)

If the connectors for the remote sense lines become unreliable, the line will lie to the supply, telling it the voltages are too low, and the supply will pump up the volume to try to compensate. Not good. For a linear supply, this means overvoltage in the gear, more noise, and eventual component overheating or fuse blowing. For a switcher, this often means catastrophic failure. So keep 'em cool and keep 'em clean, kids.

Follow these three tips for a cooler, cleaner, longer, happier life. I do...usually. ■

Stephen St. Croix is currently designing a set of Peltier junction (solid state electronic freezing chip) Recaro seats for his next car. When asked why, he replied, "You can't be too cool."

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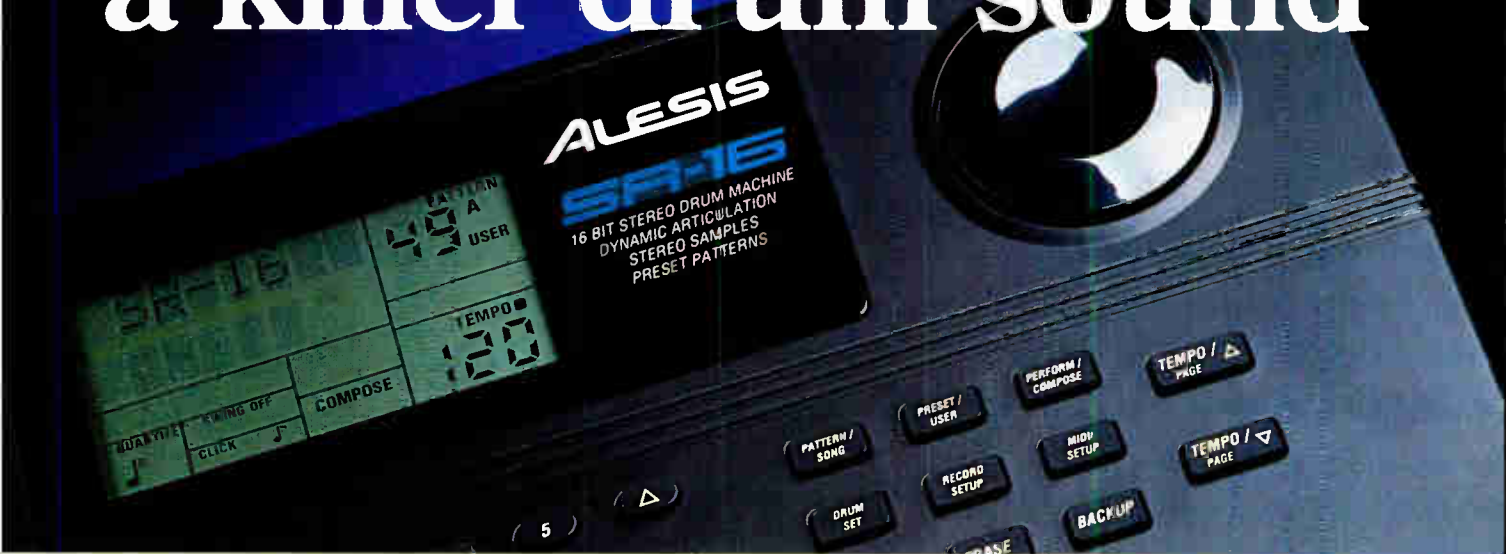
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with AES/EBU Digital I/O, so it's actually possible to set up a fully integrated digital production facility.

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e sound barrier



extraordinary sound but the flexibility to go along with it.

Before we forget, the S-770 is also blessed with an elephant-like internal memory. It can be expanded to 16 megabytes which, for those of you without calculators nearby, translates to 83.5 seconds of continuous stereo sampling time at 48 kHz—twice as much as any sampler in its price range.

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you have to add a slew of peripherals. On our sampler, you don't. Things like a 40 megabyte hard disk drive, SCSI port, Digital I/O and RGB video monitor output all come standard.

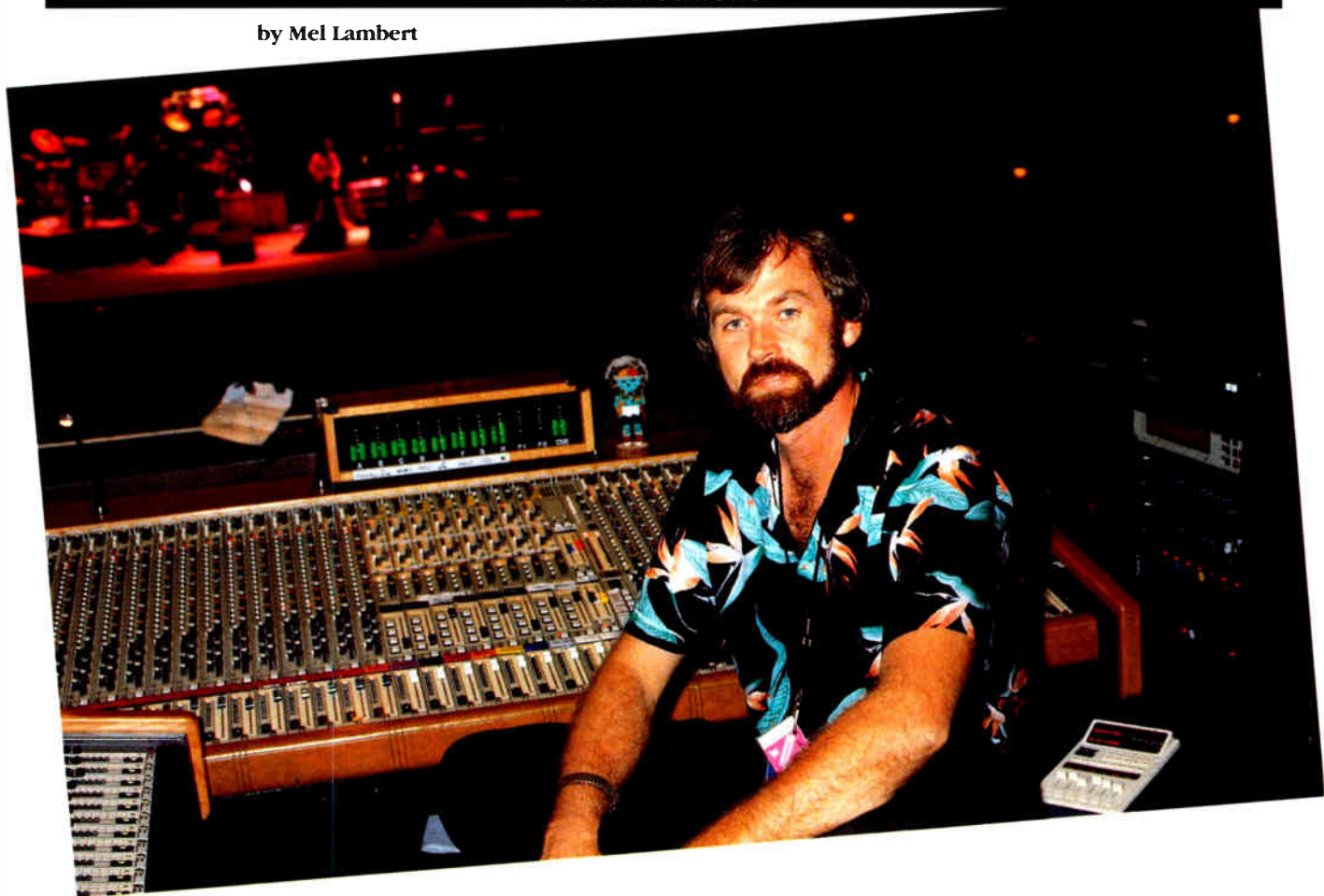
Of course, these are just the highlights. For the rocket-scientist information, write us at the address below or call (213) 685-5141.

And as far as the sonic boom is concerned, that comes later. When you hear the S-770 being played live.

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by Mel Lambert



LIVE SOUND DEVELOPMENTS

AN INTERVIEW WITH DAVID SCHEIRMAN

Technical advances are a two-edged sword. While enhanced quality and operational flexibility from new innovations allow more people to enjoy the fruits of our labor—in the studio or on the road, keeping up to date with hardware developments can be problematic. Nowhere is this more evident than in the world of concert sound engineering. Recent developments in loudspeaker design, signal processing and console topologies have made the art of mixing sound in live performance even more demanding.

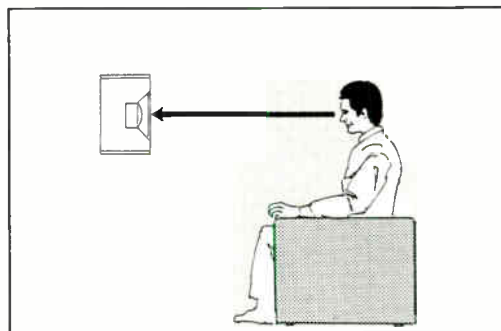
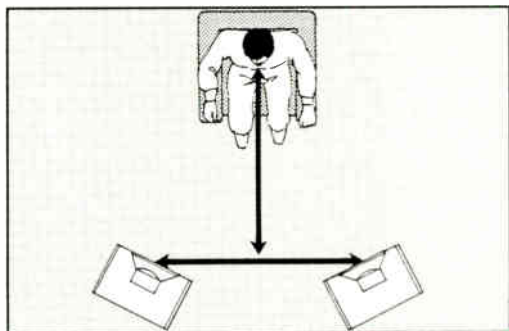
One live sound engineer who has made it his business to remain up to date with new technologies and techniques is David Scheirman. Since the mid-'70s, Scheirman has handled

sound mixing for Manhattan Transfer, Glenn Frey, Willie Nelson, Sheena Easton, Luther Vandross, Al Jarreau, Grover Washington Jr. and many more. During the past dozen years he has also designed and operated a number of permanent and touring sound systems around the world.

I caught up with this highly experienced and articulate individual during a recent summer/fall tour with Linda Ronstadt, for which he was serving as house sound mixer and system engineer.

Mix: How would you currently define your role as sound mixer/designer, and how has it changed during the past decade?

Fostex RM Monitors Leave No Room For Error.



Fostex RM monitors are significantly more directional than almost all other near-field designs. RMs eliminate those confusing reflections in the listening room so effectively that you maintain a crystal clear sonic picture at all times.

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Now you can end the frustration of mixing something in the studio and hearing it sound different on home and car systems or in other studios. The mix you create on your RMs will sound proportionally the same on all other playback systems.

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RMs are designed for the classic listening arrangement: placed the same distance apart as from the center point to the listening area or "sweet spot", with our drivers and your ears on the same horizontal plane.

In fact, a good test of correct placement is to sit down after arranging a pair of RMs as shown above. Listen for a few minutes, repeat the program material and after 30 seconds, stand up.

The sound changes radically because your ears are now out of position. Try this simple, effective test with other so-called near-field monitors. Then ask yourself this musical question: "Who's kidding whom?"

So listen to a pair of Fostex RM monitors--one of our three models will best suit your application. A neutral, accurate reference you can rely on, leaving no room for error.



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Scheirman: It depends on the role I am fulfilling for a particular client. If I'm called in as a sound system designer, my primary responsibility is to obtain and maintain the best hardware I can get my hands on. I prefer to get the budget up to a level where I have some working room. If a tour goes out with less than adequate hardware, all you'll end up with are excuses and a struggle to provide even a minimum quality level.

Sometimes people approach a tour from the perspective that, because of previous experience, they will only use a certain sound-rental firm. I am not that way. Rather than trying to stay aligned with one specific company, I prefer to evaluate the most appropriate method of presenting live music in a concert environment. More and more sound companies that offer touring hardware packages have improved their systems to a point where we now have a certain industry-wide quality level.

Mix: The past two or three years have seen a rapid development in the number of designs being offered for live sound reinforcement. Do you have any particular preference for one approach over another?

Scheirman: There's no clear winner. In my experience, so long as the sound company offers a certain style of system (and that would probably be a direct-radiating loudspeaker system custom-designed and built in-house), then I can use it during a touring situation. It's interesting to note that if the sound company is offering systems built by a commercial loudspeaker manufacturer, most of their cabinets will be horn-loaded—Meyer, Eastern Acoustic Works and Turbosound, to name just three examples.

A fundamental reason for the difference in design approach is that a sound company developing and building its own hardware can spend the extra dollars on components and R&D, rather than having to cover marketing and advertising costs like the commercial developer. I find that direct-radiating loudspeakers are the most popular with major sound companies.

Mix: How do you set yourself up for a tour? Do you spend time with the artist, listen to their music and try to develop techniques that will best reproduce their music in live performance?

Scheirman: All of the above. If it is a tour project for a known artist, I'll get a discography before the tour and listen to their material, make out some cue cards and maybe lay out the console on paper. I'll look at the various parts of the console I would be using on the tour and work out my groupings.

On occasion, I try to talk to the engineer who mixed a recent album. For this latest project with Linda Ronstadt, I happened to meet with George Massenburg [who recorded and mixed Linda's recent albums]. But the choice of signal processing and level balancing that would be done in the studio is really quite different from what I would use in a live setting. If there is something unusual about an album—maybe sampled drum material, or some fancy special effects—then you would certainly benefit from interfacing with the record mixer.

During a live sound reinforcement assignment, I'm trying to participate in the creation of a good show, and the sound is only one aspect of that event. To get too caught up in the finer details and lose sight of the big picture—the lack of one particular brand of noise gate, for example, or demanding only one type of mic on the hi-hat—is counterproductive. A live event is a composite effect. The lights, the sound, the staging, the physical layout of the room, and the artist's emotional empathy with the audience are all part of the experience for the audience. I try to keep all of those dimensions in equal balance.

Mix: What major areas of development in live sound hardware can we expect during the next year or two?

Scheirman: Several important developments have occurred recently. The first is a far greater awareness of loudspeaker array technologies, not only by sound companies but by the speaker system manufacturers. Companies as diverse as Apogee Sound, JBL, Electro-Voice, Meyer and Renkus-Heinz have been actively working on array technology measurements and have published their work in AES papers or during convention presentations. Other firms make their information available to consultants to demonstrate how their one-box systems behave when used in multiple arrays.

Concert sound systems are now being designed as an array, made up of identical-looking boxes that can actually fulfill different functions in differ-

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ent arrangements. All serious sound system designers are having to come to terms with the characteristics of a consciously designed array, rather than just a pile of identical boxes. An array is a *very* different animal from an individual cabinet; the single box may have certain frequency and coverage characteristics that the array is certainly not going to possess.

A good example of an arrayable design is the Showco Prism System, which we are using here for Linda Ronstadt.

Mix: What are the operational advantages of moving toward array-based system designs?

Scheirman: Primarily, predictable coverage and dispersion. Even a moderately sized array-type system provides many more adjustment points with which to make subtle drive-level changes within the system. I expect to see more and more integrated interfaces and controllers, such as the Crown IQ 2000 or the new Crest Audio system. These allow plug-in modules on each amplifier to be tied together on an intelligent, computer-addressable

network, so that the sound reinforcement technician can make amplification adjustments in a repeatable and consistent manner.

Computer control of sound reinforcement systems will provide precise control to tailor sound for different venues. Custom files would allow the user to easily configure and store various amplifier drive levels and other parameters. Whether it's worth the additional cost to add a PC to a large sound system, however, is questionable at this time. Certainly, in higher-income situations such as the touring Broadway-style shows and installed systems, such an approach would be cost-effective.

The use of computers in sound systems is an inevitable evolutionary change. Programmable one-third octave EQs for stage monitors would be very useful. Clair Bros. has been using their TC Electronic-developed EQ system on the recent Fleetwood Mac, Don Henley and Paul Simon tours; other sound companies are exploring ways to expand this concept.

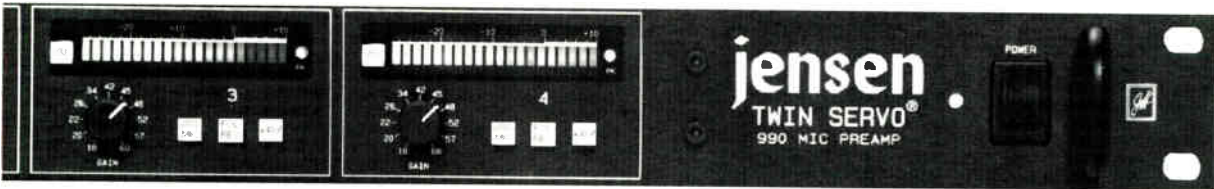
And computer-controlled console automation is also finding greater application in live-sound reinforcement.

The Cadac console that A-1 Audio has provided for some of the larger Broadway-type shows, such as *Starlight Express* and *Chess*, represents a good example. Moving fader systems controlled from a PC allow scene levels to be held on disk and called up like lighting changes at a predetermined cue.

In their own way, the major sound concert companies—Clair, Showco, MSI, Electrotec and Audio Analysts, to mention five—have each chosen an area in which to perform valuable research and development, be it a better power distribution system, a higher-fidelity stage monitoring system, or a better loudspeaker system touring package. These and other advances will ensure improved advances within the live sound industry—and better sound quality for our audiences. ■

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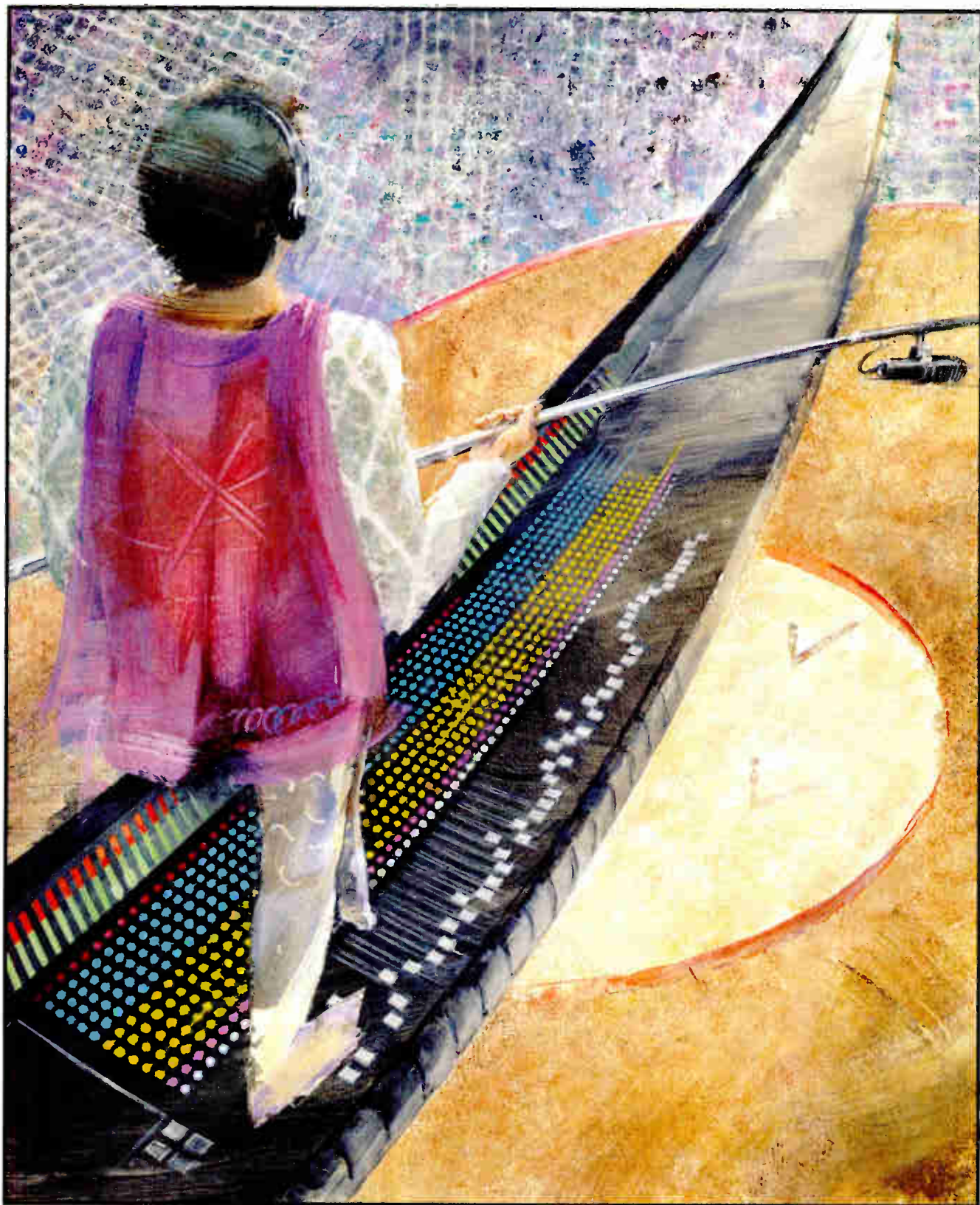
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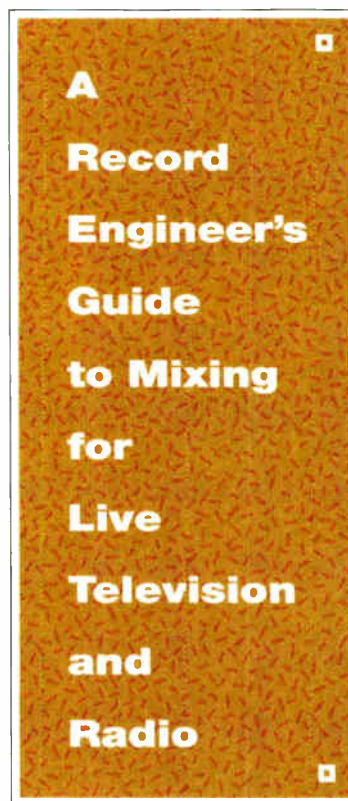


Mixing Without a Net

“Are you out of your mind?

Why would I ever want to mix live television? There won't be enough time to get sounds! What if a mic goes dead? I can't deal with stage leakage! I could never handle not being able to rewind! I won't have enough control! It's all got to come out of a little TV speaker! *What if something goes wrong?!*”

These are a few of the paranoid excuses many record mixers manufacture to avoid live TV or radio mixing. Unfortunately, those who maintain that attitude may never know what they're missing. They'll never feel that incredible adrenaline rush that comes with the knowledge that there are thousands, perhaps *millions*, of people hearing every fader move they make, and knowing there's no turning back once they're on the air. This may sound crazy, but once you get the bug, live broadcast mixing



can become a serious addiction. Whether it's Live Aid, cable television broadcasts for the Stones or The Who, or just a satellite radio show for Westwood One or DIR, I always find myself wishing the show would never end.

Now don't get me wrong...I certainly wouldn't have you believe it's all fun and games and

nothing ever goes wrong. But problems can be minimized by some careful preparation, which is what this article is all about. With the right planning and a lot of cooperation and teamwork on the part of you and all the crews involved, the broadcast and the experience can be unforgettable. (That means good!)

Selecting a Mobile Facility

If you're lucky, you'll have some control over what truck you'll use, so stay away from the likes of "Bubba's Van with Pans." Ask around. Try to get one of the top trucks that has experience with successful broadcasts and a reputation for good work. When checking out mobile facilities, keep in mind that a great crew is as important as working on a console you're comfortable with.

Get a stage input list from the P.A. company well ahead of time to make sure the mobile facility can handle the number of inputs you'll be dealing with. Allow a few to spare for last minute additions and effects returns (such as delays) that you'll need to get your hands on. Don't forget to allot ten or 12 inputs for audience mics. Even though you might have 60 lines coming off the stage and audience and the truck may only have a 40-input mixing table, all the best trucks can supply an additional mixer or two to deal with the remaining lines efficiently.

Outboard Gear, Mics and DIs

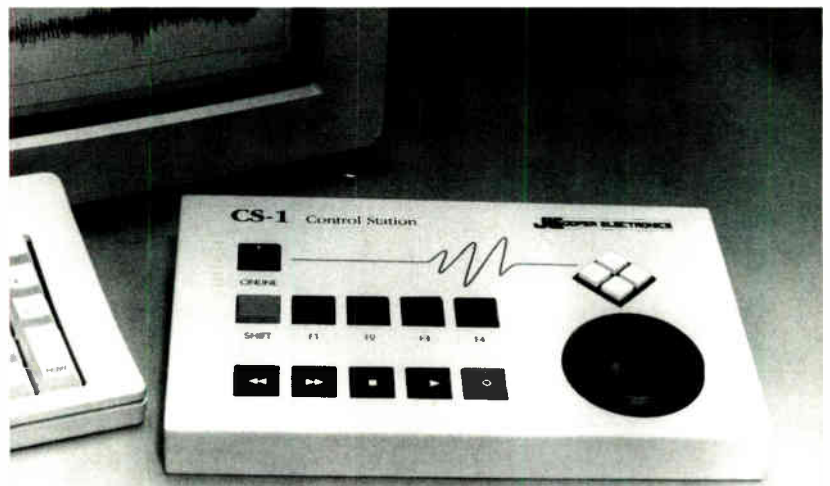
Find out what outboard gear the truck has and make up a list of whatever supplements you think you'll need. I wouldn't go hog wild with extra stuff; you'll probably only have time to deal with one or two delays once all hell breaks loose. Using things like external mic preamps is a nice idea in the studio to obtain the best possible clarity and openness, but your priority here should be to keep the signal paths as simple as possible to limit the number of things that can go wrong. Two or three good digital reverbs ought to do just fine. If you can afford it, you might want to have at least one extra of each type of gear; i.e., an extra compressor, reverb, delay, etc., in case anything decides to pack up on you, or you realize after it's too late that you need an extra effect on a particular song, which inevitably happens.

The input list should tell you the mics and DIs the P.A. folks are using. If it doesn't, make sure you obtain this information along with a list of the mics and DIs that are available with the truck. Once you examine the mic list, it'd be a good idea to get in touch with the house mixer and make friends with him or her, so you can discuss any changes you may feel are necessary. As you might imagine, this can be a touchy subject. If you're dealing with a band that's already touring, try to catch a gig to hear what the show sounds like

from the audience, and perhaps take the house and monitor mixers out for a drink. I can't over-stress how important it is to get these people on your side, especially when it comes to mic placement. Remember, if you're asking them to make compromises, you may have to make a few yourself. If need be, you can double-mike some things (put your own mics up next to theirs), but avoid that whenever possible to eliminate stage clutter and confusion during the show.

For the Rolling Stones cable broadcast from Atlantic City, the house mixer, Benji LeFevre, had worked out a rather

unorthodox method of miking Charlie Watts' cymbals by placing two Neumann U87s directly above Charlie's head. (I guess this is why they're called "overheads.") Because Charlie sets his cymbals quite low, the wide-patterned U87s turned out to be almost as close to his stage monitor as they were to the cymbals. This arrangement was ideal for Benji, but was hell for me. Adding two more cymbal mics would have looked quite cluttered on TV, so I had to make the compromise. With the help of some radical EQ, the cymbals sounded fine, and I think the overheads actually livened up the snare a



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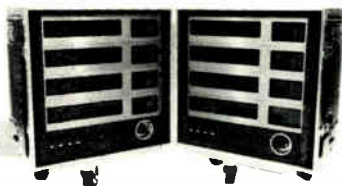
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bit. The monitor leakage was minimized by dipping most of the midrange out. This obviously was not an ideal solution, but it kept everyone happy...and it worked!

If there are more than one or two vocal mics on the stage, color code them with colored cloth tape so when band members approach a mic they're not normally on, you'll see it on the video monitor and be able to act accordingly. Color coding the appropriate channels on the console as well will let you respond quickly.

Miking the Audience

Most experienced mobile audio crews have worked out excellent methods of miking an audience, although it won't hurt to check on how it's been done. Obviously, the number of mics and placement will vary depending on the size of the venue. In an arena, for example, there should be at least eight to ten mics. A typical setup will usually consist of two shotguns on the sides of the stage aimed at the first few rows of the audience (usually the most enthusiastic), four mics (often condensers) hanging in the center and the back of the hall above the side loges, one on either side of the P.A./lighting platform, and either a stereo pair or a stereo mic at the back of the platform facing towards the back of the hall. Listen carefully to the different mics during the soundcheck.

You will notice that the mics toward the back of the hall sound delayed in relation to the ones nearer the stage. I'm sure I don't have to explain that this is a result of the time sound takes to get from the stage to the far mics, but I guess I just did. For this reason it's a good idea to record the audience on four tracks, keeping the far mics as a separate pair from the close ones. This way, during the broadcast you can separately control the amount of delay that is tolerable, and in post-production the far tracks can be "pulled up," or dubbed onto a separate tape with time code and offset enough to get them in sync with the band. This permits them to be used at a higher level, and helps a great deal when the audience is supposed to be clapping in time. Of course, if you're recording 24-track you probably won't want to devote four tracks to audience mics; balancing the mics will decrease delay annoyance.

Notes

Try to obtain a set list from the manage-

ment of whoever is on the bill. If you're not already familiar with the artist(s), pick up copies of their records that contain the material they'll be playing. Listen to them attentively and take notes as to solos, background vocals, etc. I've found a good format for these notes is to use a separate letter-size page for each song. Format each page with designated sections for intro, backing/featured vocals, solos, percussion and a section for featured instruments such as the keyboard or guitar hook line. Leave enough room to add to this list later. If you're really lucky (and this is something you should push for), there will be a full rehearsal. Even better is to set up and do a practice run at a real gig previous to the night of the broadcast.

Recording

Chances are you'll also be asked to record the show for possible post-production and rebroadcast. Budget permitting, I highly recommend recording digitally. The extremely low noise floor really helps when the band goes from a loud rocker to a soft ballad. Remember, your main focus during the show is the live mix, not the

recording. At soundcheck you've got to set your levels for the loudest songs that will be played. You won't have time between songs for pushing mic faders up to optimize tape levels, you'll be too concerned with getting your mix ready for the next tune. If the producers can't afford digital, then Dolby SR is a must. If videotape will be rolling, you might want to avoid PD-format digital, for those machines don't seem to like being locked to anything, particularly video sync. In my opinion, the ultimate live recording medium is 48-track DASH digital.

Preparation


While studying the input, mic and equipment lists during the weeks before the show, stay in touch with the person who runs the truck. Keeping the truck's equipment in mind, lay out the console on paper. Figure out track assignments, monitor fader designations, effects sends and returns, and where all the mics will come up. Make a list of all the outboard gear you may need. Once you have this worked out as well as you can, get the information to the truck crew as soon as possible. (A fax machine will come in handy

here.) They may want to make a modification or two to your plan. Heed their suggestions—they've done this before!

Hopefully the mixing table will have a "fader flip" mode so the small, or monitor, faders can be used for your mics and the large faders can be used for the mix. The advantage of this configuration is that you can set and forget your separate input levels to the multitrack on the small faders. The large faders, besides being easier to mix from, can have subgroups of things like drums and possibly percussion, keyboards, brass and audience to make your live mix easier. Also, this makes doing the rough mix a snap. If you're using an external mixer, you can subgroup channels (for example, you might have a bunch of percussion mics coming up there) to a stereo pair patched to a couple of mix faders on the main board. Now you can also send them to individual tracks of the multitrack for flexibility in post-production. In addition, try to record the subgroup for your rough mix.

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assurance that after all your hard work your mix is actually getting through the satellite and to the listening (and viewing) audience intact. The way to accomplish this is to arrange for an "air monitor." This can consist of something as complex as a satellite downlink (a dish receiving the audio signal directly off the satellite that is connected to an external monitor switch on the console), or as simple as an FM tuner tuned to a local station simulcasting the show. Occasionally, neither option is available, in which case you'll just have to hope for the best. Don't forget to set your VCR at home to tape the show! (I always forget.) If the satellite transmission company can't supply a downlink, chances are your truck crew can rig up a radio for you.

Communication

Be sure good communication has been set up with all the crews involved. If it's a television broadcast, the TV crew will usually supply an intercom from their control room so you can hear any necessary cues from the director. This can also be an occasional source of amusement. Ask for a direct intercom to both the monitor and house mixers.

Also, get a talkback into the stage monitors so you can talk to the musicians directly during soundcheck. This should be used only when necessary, and only after the house and monitor mixers are done getting what they need from their soundcheck.

Video

For a television broadcast, your audio crew will obtain a video feed from the TV crew. More than likely this will be the "line feed," or what the viewing audience will be seeing. If your truck has an extra video monitor (which most do), you can obtain an isolated feed (iso) from either a fairly wide shot of the whole stage to see who is coming and going, or an iso of whichever camera is covering the lead vocalist or featured instrumentalist. For a radio broadcast, the truck will probably have its own camera to put on stage so you can have some idea of what's going on. If there's a large keyboard rig or percussion setup and the truck has an extra camera, you might want to set the camera over it to see what's being played.

When you're recording digitally, record time code and be sure the

digital machines are connected to composite sync from the video truck and their clock input selector is set to "ext." This could save you a great deal of hassle during post-production. If the tape machine happens to be a Sony 3324, make sure it has a "VCLK" board installed. This is an option that allows the machine to be locked to video sync. Most of them have it by now but if the one you're using doesn't, the board is rentable.

Samples?

This may sound a bit sneaky, but it won't hurt to have a good stereo audience loop handy in anticipation of any possible lulls in the show. Hopefully you won't need it. An Eventide H3000 with the sampler option, a Publison or any high-quality, phase-locked stereo sampler with a looping function can be helpful here.

Snare and bass drum samples are useful, but dangerous. It can be tricky getting samples to trigger properly in a live situation. Only consider this if you feel it's absolutely necessary. Should you choose to go this route, don't use a MIDI-controlled sampler, because

—CONTINUED ON PAGE 182

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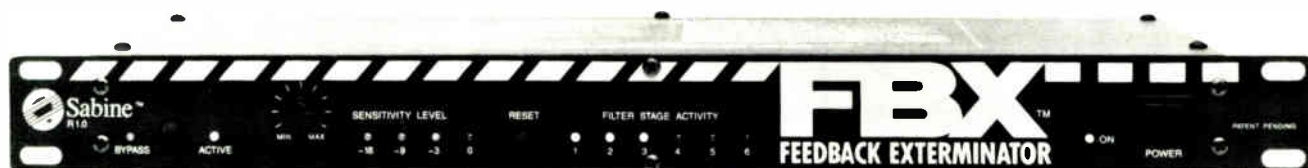
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STEPS TO PAINLESS

Wireless

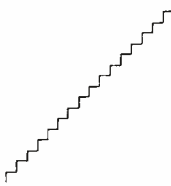
by Bob Lee  **I**n the beginning, every microphone had a cable attached to it. There was no way around it if you wanted to be heard; you were restricted by the length and lay of the cable. Today, however, performers can go wireless for full mobility and that image of high-tech “magic,” without compromising audio quality. Of course, supplanting something as simple, straightforward and reliable as a wire is a relatively complex task (see Fig. 1), and so Murphy’s Law sets many traps for the unwary





ILLUSTRATION: JIM PEARSON

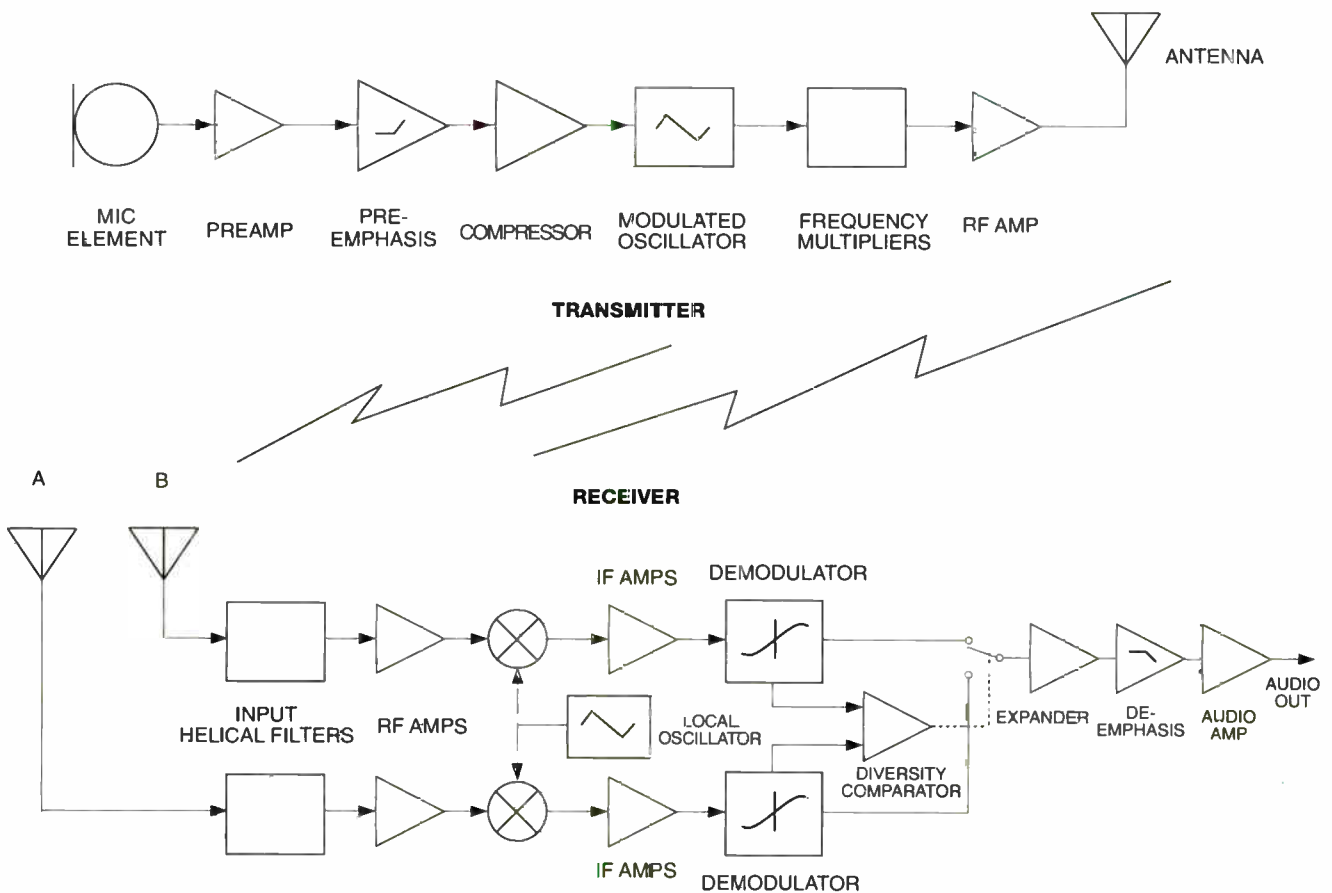


FIGURE 1: Block Diagram of a Typical Wireless Microphone System

If every wireless company claims theirs is the best, why do they try to copy ours?



First, let's talk technical.

A lot of newcomers to the wireless field are making pretty bold claims these days, but they all have one thing in common. They all say theirs are the best. Well, we've got news for them: all wireless systems are not created equal.

At Nady Systems, when we say we are the leader, we can back up our claims. Everyone knows modern wireless systems use companding for noise reduction, yet few realize that we invented and patented audio companding circuitry for wireless over 12 years ago.

Sure, other companies have attempted similar designs. Unfortunately, most of them simply fail to utilize the existing technology properly, so at 120 dB dynamic range, we still enjoy up to a 20 dB edge over many of our competitors.

In fact, what we find interesting is that even our early prototypes are still significantly quieter than these so called "new and improved" wireless systems. You may not always need the kind of performance our wireless systems can deliver, but isn't it good to know that the technology is there if it's required?

Let's talk product.

Our Nady 650 VHF Wireless System packs a surprising number of professional features into a mid price system. It's rack mountable and can be used with up to 10 channels operating on 10 different frequencies at the same time. And, of course, the 650 VHF has a highly sensitive True Diversity front end for drop out free performance in any environment.

The top of the line Nady 1200 VHF Wireless System defines state of the art wireless technology. Features include 20 channel simultaneous operating capacity on custom frequencies. The 650 and 1200 are ideal for any wireless application, such as the theatre, churches, meeting rooms or live entertainment. Musical instrument and lavalier mic body pack transmitters are available. Our 1200 HT handheld is a sleek, metal wireless mic with no protruding external antenna—another much copied Nady innovation.

Our 501 VR Wireless System delivers the highest performance available and features a portable, rugged metal case receiver perfect for video and film production.

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Finally, experience.

Nady has been in the wireless business for over 12 years. And we now sell more wireless than the rest of the industry combined. Nady almost singlehandedly pioneered the use of wireless in the live entertainment industry, where road ruggedness and dependability in a wireless system is essential. This means that when you install or use Nady, it will not only work the first time—but keep on out performing other wireless units for a long time to come.

Being on the leading edge of wireless technology practically since its inception, we have given the competition a lot of things to try to copy.

So why settle for imitations? In Wireless there's really only one leader—Nady.



Contact your local dealer or Nady Systems, Inc. 6701 Bay Street, Emeryville, CA 94608. (415) 652-2411 for more information.

sound engineer.

Three rules apply here: 1) a good-quality, hard-wired mic is extremely reliable; 2) a good-quality wireless microphone system can't quite approach the reliability of a hard-wired mic; and 3) certain preparations, precautions and prudent operating techniques can help close the gap between rules 1 and 2.

Many of these following tips for keeping Murphy at bay are applicable to other wireless uses, such as guitars.

At the Receiving End

1. Use diversity to minimize dropouts. You know RF dropouts—the “picket fencing,” or bursts of noise, in your car's FM radio as you drive through town and all those pockets of reflection-caused nulls. The same thing happens on a smaller scale with wireless mics, except the transmitter is mobile and the receiving antenna(s) stationary. The RF signal from a wireless microphone reflects off walls, floors, ceilings and other surfaces, and if you could somehow see the peaks and nulls in signal strength throughout the room, it would resemble a huge, three-dimensional moiré pattern changing wildly as the transmitter moves about. When a null hits the receiving antenna, you get a dropout.

Diversity, a technique of redundant reception, uses two antennas and RF chains to insure a dependable signal. Even if one antenna sees a null, chances are that the other still sees a decent signal. The receiver in Fig. 1 is a “true diversity” receiver, essentially two receivers in one, with a common audio chain. The diversity comparator automatically and inaudibly selects the audio signal from the RF chain that sees the stronger signal.

For example, let's say your non-diversity receiver gets a sufficient signal from a well-placed single antenna 99% of the time as the performer (with the transmitter) moves about the stage. Now, 99% looks good until you realize that in a two-hour performance, you'll have about 72 seconds of dropouts. With a second well-placed antenna (also 99% reliable) and a true diversity receiver, you'll get, statistically, 99.99% (100% - 1% x 1%) dropout-free operation, and in that same two-hour performance you'll end up with 0.72 seconds of dropouts, most of which will be unnoticeable.

2. Use the right antennas in the right places. A receiving antenna is to RF energy what a microphone is to sound.

To get a good signal to your receiver, you need a good antenna. Two effective but simple types of antennas are the ground plane (a.k.a. the Marconi) and the dipole. The dipole, sometimes called a half-wave antenna because of its physical length, comprises two quarter-wavelength driven elements fed at the center. It requires a balun transformer or active circuitry to couple its balanced feed to the unbalanced coaxial cable.

The ground plane antenna, a relative of the dipole, has one driven vertical element, but several (usually three or four) ground elements extending

radially from the base. The ground elements provide an electrical mirror image to the driven element, and because the base is grounded, the antenna is often easier to mount. The elements are commonly a quarter-wave long. Sometimes 5/8 wave elements are used, which give a little better sensitivity at directly 90° broadside, but the pickup pattern falls off more sharply as you get away from the horizontal. They're also more than twice as large, often a consideration in itself, and are more common in UHF than VHF.

Both the ground plane and the di-

microphone

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pole are omnidirectional in that they are most sensitive for 360° around their broadside planes. Sometimes, particularly in places where the RF spectrum is congested, directional antennas are better-suited because they can be placed to pick up the signal from the wireless transmitter but reject interfering signals. Directional antennas have multiple elements that cancel signals arriving from the undesired direction while reinforcing signals from the desired direction. Because of their size, they also are more common in UHF.

Some whip antennas mount right on the receiver. This is compact, but not optimum for reception; the receiver chassis is usually not big enough to act as a quarter-wave ground plane, and the antenna spacing is not wide enough for good diversity, although this is usually not critical at normal operating range. Also, it means the antennas dictate the placement of the receiver, which might not be very convenient.

Whatever type of antennas you use, place them high and close to the action to get a good signal strength, but well-separated to get good diversity reception. The antennas should be spaced at

Frequency Ranges of North American High-Band VHF TV Stations

Channel	Frequency Range (MHz)
7	174-180
8	180-186
9	186-192
10	192-198
11	198-204
12	204-210
13	210-216

least 1.5 wavelengths apart, which is about 6 to 8 feet for the high VHF band, and 1.5 to 3 feet for UHF. Generally, placing one on each side of the stage is a good approach. Keep antennas at least one-half wavelength away from any metal objects, such as scaffolding,

lighting grids, plumbing, HVAC ducts, electrical boxes and the like, and keep a clear, unobstructed "line of sight" (except for things like fabric, acoustical tile, paper, etc.) between the antenna and the transmitter. Directional antennas should be aimed at the stage.

3. Use quality antenna cables. Good coaxial antenna cables are essential, since they conduct the RF energy from the antennas to the receiver, and DC current to line amps or active antennas if they are in use. Coaxial cable comes in many types; common in wireless setups is RG-58, which is flexible and inexpensive. RG-58, like any coaxial, suffers from cable loss: at 200 MHz, it has 7 dB of attenuation per 100 feet; at 500 MHz, about 12 dB per 100 feet; and at 950 MHz, about 17 dB. (Keep in mind that 6 dB of loss represents a 50% reduction in operating range.) Another type of coaxial, RG-8, has losses of about 3.6 dB, 6.1 dB and 9 dB, respectively. It is, however, much larger in diameter, more expensive and less flexible than the RG-58.

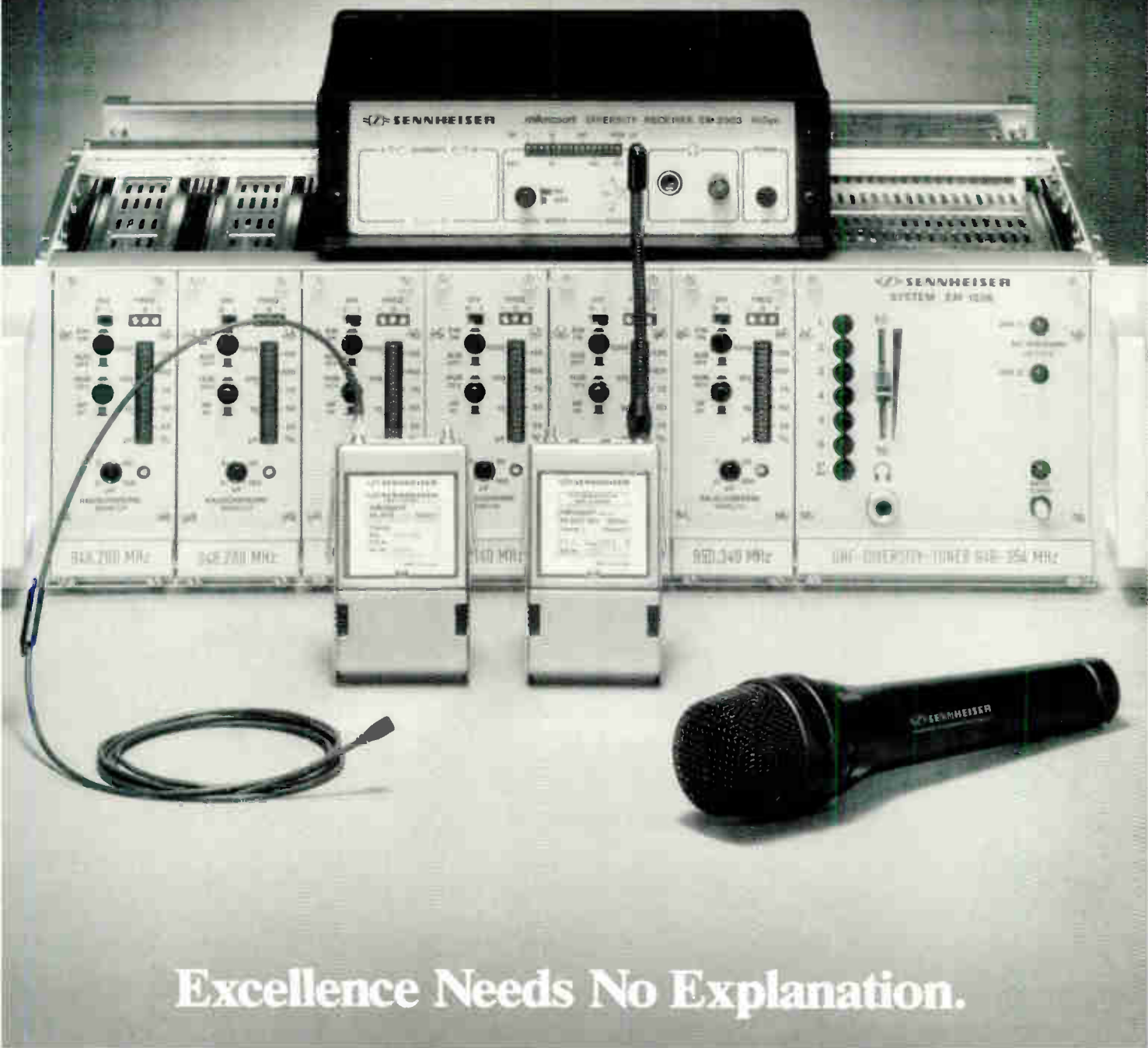
The rule of thumb here is to keep the cables as short as practical while minding the rules on antenna placement. It's better to run a long audio

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cable than long antenna cables, so try to place the receiver accordingly. If you need to run long cables, especially for UHF, try a better grade of cable, like RG-8 or RG-11. Also, take care of your cables. Don't crush them, and keep the connectors clean.

4. Use a top RF distribution system for your multichannel system. Running multiple wireless channels doesn't mean you need a small antenna farm. Actually, you can run several receivers from a single pair of antennas by using a distribution system if their frequencies are within the antennas' frequency range. This is a set of splitters that di-

vides the RF signals to the receivers and RF line amplifiers to overcome splitter loss. Several manufacturers provide these systems, which are not unlike small MATV systems. Beware: Don't go overboard on amplification. In their quest for strong RF levels, some users cascade line amps or boost the gain too high. Disaster often results as the RF amplifiers or receiver front ends overload, causing intermodulation distortion and false RF signals, which can interfere with the desired RF signals.

At the Transmitting End

5. Be gentle with the transmitter. Ac-

cidents happen, especially with wireless hand-held transmitters. They slip out of hands, and with no cable to grab, they will crash to the floor. That's bad enough with a conventional mic, but wireless transmitters have much more circuitry inside them, including tuning coil slugs, which can be jarred and detuned, causing distortion, reduced output power, frequency drift or a number of other problems. A sharp mechanical shock could also crack the crystal—that thin slab of quartz that sets the transmitter's operating frequency—and that means a costly visit to the repair shop. Some technicians fight the first problem by melting a small bit of beeswax onto each tuning coil slug after the transmitter has been aligned. The wax helps hold the slugs in place without hindering future adjustments.

Be careful also with the transmitting antenna. It's the transmitter's RF signal outlet, and if you crush it, crimp it or break the end off, you'll have a mistuned, inefficient radiator.

If you have a padded protective case for your transmitter, by all means use it; if you don't have one, order one—you'll save much more than what it costs.

6. Keep a supply of fresh batteries. Obviously, you can't phantom-power a wireless mic; it needs batteries, not only for the microphone itself (if it's an electret), but also for the other circuitry and the RF output power. The batteries face a heavy load and thus have a short life, so don't push the manufacturer's battery life specification. The added cost of fresh alkalines is usually preferable to the embarrassment of having a transmitter die. Some models have DC-to-DC converters that keep a constant operating voltage even as the batteries decline to where they are almost completely spent. As the battery voltage drops, the current draw increases to compensate, which in turn drains the batteries faster. This makes super-efficient use of the batteries, but there's no "slow death" to warn you that they're running out, just normal operation and suddenly...nothing.

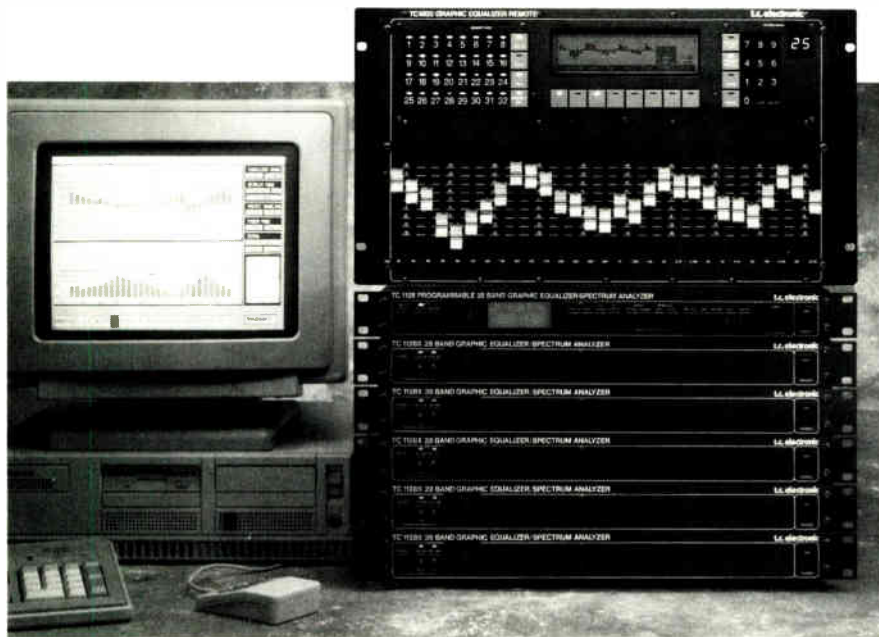
Rechargeable nickel-cadmium batteries are an option with some models, but most manufacturers actually discourage their use because a charged ni-cad cell delivers only 1.25 volts compared to an alkaline cell's 1.5 volts. A DC-to-DC converter would start out drawing much more current from the ni-cad, depleting it faster.

7. When possible, use a wire an-

—CONTINUED ON PAGE 92

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2. New UHF technology has recently been made available.

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3. UHF sounds better.

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4. More frequencies are available.

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EIGHT THINGS YOU SHOULD KNOW ABOUT UHF

WIRELESS.



5. Samson UHF offers more microphone options.

The all brass UH-4 hand-held transmitter is available with an incredibly wide variety of the industry's most popular mic elements. The streamlined UT-4 belt pack transmitter comes equipped with a broad range of high quality lavalier microphone capsules.

6. Samson UHF antennas set new standards.

Custom made so they are acutely sensitive to our bandwidth, Samson's high efficiency cellular antennas can be either front or rear-mounted. Because they are positioned at a 45° angle to the front panel, several UHF systems can be cascade-mounted in a single rack with all antennas in the clear.

7. UHF is more expensive.

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8. Write for a free Samson UHF White Paper.

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*In case you were reading too fast, we wanted to remind you that this ad is about UHF, not VHF wireless. ◊As long as you are reading our ad this closely, we thought we'd tell you who they are: Yukinaga Koike, Doug Bryant, Takao Horiuchi, Susumu Tamura. †dbx is a registered trademark of Carillon Industries.

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THE BYTE BEAT

AmigaVision and ShowMaker authoring systems, and NewTek's Video Toaster, an impressive broadcast-quality video production board that retails for \$1,595.

In one of its recent press conferences, Commodore effectively used this very technology to demonstrate the power of these tools on an Amiga 2500 system available for under \$5,000. Included were examples of presentations created for in-store kiosks, trade show demos and corporate presentations.

Cross-Pollination and Muddy Water

In a laudable effort to provide a system that works across platforms, MacroMind announced development of Windows Player, a program that allows presentations created using Director on a Mac to be played on an IBM PC or clone under Windows 3.0 and Windows with multimedia extensions. New Video Corporation has put Intel's new DVI i750 video processor (formerly in the domain of IBM) on a card for Macintosh NuBus models. The product offers binary file compatibility with PC-based DVI systems.

It remains to be seen whether the multimedia market is big enough for these players to coexist. There remains a desperate need for a set of standards that works on all platforms. Until that happens, those expecting to dive into the water as producers of multimedia presentations will probably find that water is going to get a lot cloudier before it clears up. Meanwhile, MacroMind gets my vote for creating a product that at least purports to be useful across two important platforms.

One final multimedia note...

The Center for Electronic Art in San Francisco offers ten-day interactive multimedia workshops in April and May for communicators who want to learn to design and create interactive multimedia projects. The objective is to learn about multimedia by creating design examples for interactive projects and by creating an actual videodisc. Tuition is \$2,000, and workshops run April 1-12 and April 29-May 10. For more information, call (415) 882-7063.

—Paul Potvin

—THE BYTE BEAT CONTINUED ON PAGE 55

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by Paul Potyen and Phil Cochlin

W

hile digital audio-recording and editing on the Macintosh has been covered within the pages of this magazine, not much has been said about the IBM PC environment. This is partly due to the innate differences between the two programming environments [see sidebar on p. 55, "Apples and Oranges (or Blues)"]. AES and NAMM attendees have had an opportunity to keep informed of the progress of several companies that have been developing such programs. Among them are Spectral

able crossfades, flexible EQ and mixing options, and it has SMPTE and MIDI synchronization features.

The 56k system consists of the 56k-PC Digital Signal Processor (a board that plugs into the computer and has the Motorola DSP56001 chip on it), the 56k-D Digital Interface (an external box that supplies the connections between the board, A/D/A converter, and SMPTE and MIDI devices), and SoundStage software. Also included in the package is a 129-page manual and



Synthesis, Digital Audio Labs, Microtechnology Unlimited and Turtle Beach. The latter is the developer of the 56k Digital Recording System, which has been shipping since last fall.

A digital hard disk recording and editing system, the 56k is finding uses in the professional audio community for film and video production, album resequencing, and mastering. It performs EDL-style assembly with vari-

VHS videotape tutorial. Minimum system requirements are an IBM-compatible 286 with 640K RAM; a hard disk with an access time of 28 ms, and a 1:1 interleave controller large enough for your files (which grow at a rate of 10MB/minute); a Microsoft-compatible mouse or trackball; MS-DOS 4.0 or later; and either an A/D/A converter or a DAT recorder with AES/EBU or S/PDIF connections. We installed the system on a

Caliber 386 33MHz machine with 8MB RAM and a 64K RAM cache, a 200MB, 16ms Maxtor IDE drive, and DOS 4.01. Our Tascam DA-30 DAT recorder is on Turtle Beach's list of approved DAT machines. If you already own an approved DAT machine, you will be spared the expense of buying an A/D/A converter.

Both the manual and the videotape explain how to set up the 56k system, which, depending on your equipment, can involve setting some DIP switches on the DSP card to eliminate I/O address conflicts. Turtle Beach also recommends partitioning your hard drive (using FDISK, supplied with MS-DOS) in order to separate the SoundStage application from the sound files. The manual cautions against using any disk management software to circumvent the 32MB limit imposed by earlier versions of DOS.

After installing the software, diagnostic programs should be run for both the card and the digital interface. When we ran the diagnostic on the card, we were informed of a "probable memory conflict," though the system behaved properly. No one at Turtle Beach could enlighten us about this.

Recording and Playback

SoundStage's graphic user interface allows up to four separate sound files to be open at once, with displays of both channels of audio. (The current version allows only stereo recording; mono will be supported in a future release.) All or part of a sound file can be played back from this window. Playback speed can be adjusted in terms of a percentage of normal, which causes a corresponding change in pitch. Sample rate cannot be set (or changed) from within the software; it is determined by the incoming data rate

seen by the 56k-D interface when recording.

Recording is controlled via the Record Functions window, which provides the typical equivalents of tape transport controls, along with displayed sample rate, free disk space and other pertinent information. Recording can

of two things: either pre-size the sound file before recording (a time-consuming process) or re-record the same material a second time (since the first take will have, in effect, pre-sized the file). We recommend that you record to DAT and then transfer, rather than take a chance on encountering errors while recording directly to the 56k. It's also highly recommended to minimize

these problems by using a disk defragmenting program such as Vopt, Norton Utilities or MACE to optimize your hard drive.

Editing

The system supports both destructive "cut and paste" editing and non-destructive playlist editing of sound files. But you won't want to use the first method for files longer than a few seconds: It took over 2-1/2 minutes to cut a 200ms piece out of the middle of a 3-1/2 minute file. It's much easier and quicker to use playlist editing, and Turtle Beach might want to consider reorganizing the manual to explain this method *before* any discussion of "cut and paste" editing.

DSP functions include gain adjustments for all or part of a file with linear or exponential fades; variable, non-destructive, 4-band equalization during playback or destructive EQ

of the file itself; mixing of up to three sound files down to a fourth; and variable crossfade options for fading one sound file into another.

Summary

The 56k system seems particularly well-suited to sound effects layback and music sequencing tasks. Playlist assembly, editing and crossfading were painless and, for the most part, intuitive. We found the videotape to be a nice way to familiarize new users with setup procedures and general capa-

Chip Shots

Twelve Tone Systems Inc. is now shipping Version 4.0 of Cakewalk and Cakewalk Professional MIDI sequencers for the IBM PC. Among the enhancements to both programs is support for a wider range of MIDI interfaces. In the case of Cakewalk Professional, several MIDI boards can concurrently be addressed. Other features include a completely redesigned playback engine, a programmable MIDI Metronome, fractional tempos, increased resolution and support for more SMPTE/MTC formats. Twelve Tone Systems Inc., Burlington, MA; (617) 273-4437.

Coda Music Software has released Version 2.0 of its Finale music notation package for the PC. Said to closely emulate Finale Macintosh 2.5's interface and nearly all of its functions, the new version runs under Windows 3.0 and includes a number of new features and enhancements. The program runs on an 80286-based PC with 1MB RAM and a hard disk. Suggested retail price is \$749, with upgrades available to registered users for \$75. Coda Music Software, Bloomington, MN; (612) 854-1288.

Current Music Technology.

manufacturer of rack-mount equipment, has introduced a new line of products for the Macintosh family of computers. Chassis are now available for the Mac Classic, Mac IIcx, IIci, LC, IIsi, II, IIx and IIlx, either as a complete system or as a retrofit to an existing system. Also available are rack-mount solutions for IBM PC CPUs. Current Music Technology, Malvern, PA; (215) 647-9426.

Two expansion kits have recently been released for the E-mu Proteus 1. E-mu's own Proteus/1 Orchestral Expansion Kit doubles the amount of sound memory in the Proteus to 8 MB. Thirty 16-bit orchestral instruments have been selected from the Proteus/2, along with 46 additional digital waveforms and 128 new ROM presets derived from the new orchestral instruments. It's available through all E-mu dealers for \$495 plus installation.

InVision has introduced the Protologic, an instrument expansion board for the Proteus/1 and Proteus 1 XR. Also priced at \$495, the kit contains 4 MB of pop instruments with a wide variety of performance articulations. InVision, Scotts Valley, CA; (408) 438-5530.

be triggered by SMPTE start and stop times or by a specified MIDI note and channel—useful for laying in sound effects to video or film. With Record Trigger set to "off," recording begins when the "record" button is clicked.

Occasionally, DOS will not be able to write material to the hard disk as fast as the 56k receives the data. Even with the high-speed system we were using, we once encountered this problem, which is immediately evidenced by a record error message. When this happens, Turtle Beach recommends one

bilities of the system. However, the video was surprisingly lacking in terms of both video and audio quality. And both the manual and the tape occasionally slipped into techno-dweeb humor with varying degrees of success.

While the manual is generally well-written, its troubleshooting section comprises a total of six paragraphs describing four potential problems—none of which we experienced—and there is no list of error messages, which we *did* experience.

This initial version of the 56k system

is a usable tool, though a bit gawky on occasion. For example, it didn't permit pasting of a piece of audio into a new (previously unrecorded) sound file window: It was necessary to record something into the file before pasting into it. Version 1.1 is scheduled to be available by the time you read this, and will include time compression/expansion, scrub editing, mono file support, faster screen recalculation time, and other improvements. Later versions of SoundStage will also allow backup of entire sound files, including playlist information, to DAT. Until then, your best bet is to back up unfinished work to a tape backup unit (a laboriously

slow process) or, if your files are less than 4-1/2 minutes, to a removable cartridge. On the other hand, this might not be a significant problem if you work on only one project at a time.

At a suggested retail price of \$2,689, Turtle Beach's 56k system provides an attractive, low-cost method of recording digitally in the IBM PC environment, and is already finding its way into many MS-DOS-based studios. ■

Paul Potyén is a Mix associate editor. Phil Cochlin is president of Cochlin Computer Systems, Inc., a San Francisco-based company supplying computer systems programming and support to businesses, including our in-house systems at Mix.

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Interactivity: Multimedia Developments

As awareness increases of the potential of the multimedia market in industry and entertainment, major players are jockeying for position in hopes of grabbing a piece of the action. IBM and Microsoft are betting that the huge installed base of MS-DOS-based PCs in the business community will provide a foothold for them if they can provide the software and hardware to the right people (read "developers for corporate markets"). Commodore is positioned to take advantage of the popularity of the Amiga in video production and predicts that the first multimedia developers will naturally spring from that community.

Apple's strategy of providing a relatively low-cost machine for "creative" people has paid off in the music and audio community. And there are those who believe that it is musicians who are best equipped to take advantage of the new tools that are being introduced for multimedia production. If this is true, Atari, which offers a machine with perhaps the best price/performance ratio for music production, stands to be a big loser, because it has yet to make a significant multimedia push.

MacUpdate

MacroMind (San Francisco), a company that developed groundbreaking multimedia software for the Mac, has announced development of Windows Player, a pro-

gram that allows presentations created using Director on a Mac to be played on an IBM PC or clone under Windows 3.0 and Windows with multimedia extensions. And for those Mac-based interactive producers who have decided MacroMind's Director is not for them, enter FilmMaker by ParaComp, which is reported to have similar capabilities to Director, but is more user-friendly.

Another Mac-based application that has been making waves in the video post-production community is Avid Technology's Avid/1 Media Composer. The Avid/1 is a professional editing system that provides instant random access to digital video and CD-quality audio source material.

Microsoft Multimedia Developers Conference

Meanwhile, in the MS-DOS world, a Microsoft Multimedia Developers Conference that took place last November in San Jose, Calif., saw Microsoft chairman and CEO Bill Gates, along with big guns from IBM and Tandy, announcing standards for multimedia in the IBM PC format.

In an effort to outflank (or at least provide an alternative to) the Macintosh as a development and playback platform for the emerging multimedia market, the major hardware and software companies agreed to work together in several areas. Tandy, along with nine other major computer companies, plans to ship in 1991 a standard multimedia delivery system consisting of a 10MHz 80286 PC, 2MB of RAM, a 30MB hard drive, a 3.5-inch 1.44MB floppy drive, a CD-ROM drive, Windows multimedia environment, and support for stereo, 16-bit digital audio.

IBM and Microsoft published specifications developed jointly for multimedia purposes, which cover two areas: common data file formats, and applications programming interfaces (API) for controlling media devices such as CD-ROMs and video playback units.

Microsoft also unveiled its Multimedia Development Kit, a set of tools for creating multimedia titles and applications for the Microsoft Windows environment. The minimum recommended configuration

for authoring multimedia titles is an 80386-based system with 4 MB of RAM, an 8-bit VGA card, a 3.5-inch, 1.44MB floppy, an 80MB hard drive, an audio card, and a CD-ROM drive. Optional components include a mixer, an external MIDI device or videodisc player, and TV monitor.

The 600 conference attendees spent two days attending workshops in one of two tracks: design and production, or programming. The design and production track included sessions on Multimedia Windows, Image Preparation, Audio Recording and Editing Techniques, MIDI, and CD-ROM.

Microsoft's Nigel Thompson described the general specifications for audio—both WAVE (Waveform Audio File Format) and MIDI. Gary Levenberg of Interactive Audio explained the applications for digital audio in more detail. Digital waveform support includes 11kHz and 22kHz output, and 11kHz input sampling using 8-bit resolution. A 16-bit Red Book specification is also supported as an option. He concluded with a discussion of audio recording and editing systems for both the Macintosh (from DigiDesign and Farallon) and the PC (from Turtle Beach and Microsoft).

MIDI support includes specifications for both a low-end and high-end MIDI synth system, and a method for standardizing patch maps. Microsoft's Greg Simons explained the problems created by the device-independent aspects of MIDI and presented the Microsoft solution, which includes definitions of patch timbres, relative volumes, percussion key assignments and high- and low-end synthesizer models. He also described the MIDI Mapper—a device that contains setup information for various synthesizer modules. This MIDI Mapper would be a part of the MIDI Authoring Environment. And Passport Design's David Kuseck detailed the tools required to author music for Multimedia Windows.

"Practical Multimedia" on the Amiga

Commodore has been taking its "Practical Multimedia" show on the road. The multitasking machine has already provided a platform for several powerful tools, such as the

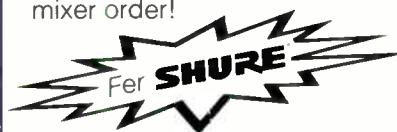
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THE BYTE BEAT

AmigaVision and ShowMaker authoring systems, and NewTek's Video Toaster, an impressive broadcast-quality video production board that retails for \$1,595.

In one of its recent press conferences, Commodore effectively used this very technology to demonstrate the power of these tools on an Amiga 2500 system available for under \$5,000. Included were examples of presentations created for in-store kiosks, trade show demos and corporate presentations.

Cross-Pollination and Muddy Water

In a laudable effort to provide a system that works across platforms, MacroMind announced development of Windows Player, a program that allows presentations created using Director on a Mac to be played on an IBM PC or clone under Windows 3.0 and Windows with multimedia extensions. New Video Corporation has put Intel's new DVI i750 video processor (formerly in the domain of IBM) on a card for Macintosh NuBus models. The product offers binary file compatibility with PC-based DVI systems.

It remains to be seen whether the multimedia market is big enough for these players to coexist. There remains a desperate need for a set of standards that works on all platforms. Until that happens, those expecting to dive into the water as producers of multimedia presentations will probably find that water is going to get a lot cloudier before it clears up. Meanwhile, MacroMind gets my vote for creating a product that at least purports to be useful across two important platforms.

One final multimedia note...

The Center for Electronic Art in San Francisco offers ten-day interactive multimedia workshops in April and May for communicators who want to learn to design and create interactive multimedia projects. The objective is to learn about multimedia by creating design examples for interactive projects and by creating an actual videodisc. Tuition is \$2,000, and workshops run April 1-12 and April 29-May 10. For more information, call (415) 882-7063.

—Paul Potvin

—THE BYTE BEAT CONTINUED ON PAGE 55

Sounds Like Magic!

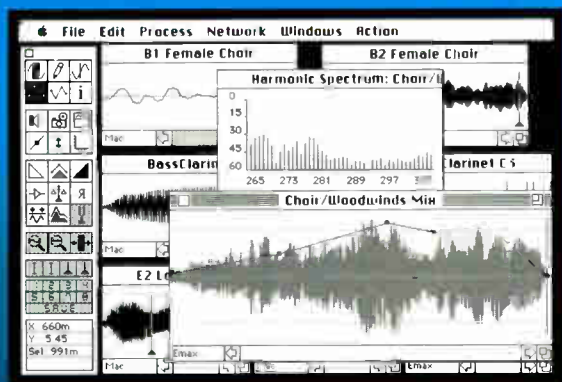


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- MacUser Magazine

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Apples and Oranges (or Blues)

Ever wonder why it is that programs on the Mac have a consistent user interface, while on the PC the user interface varies dramatically from one program to the next? Or why most graphical programs for the PC—even those running on high-powered 386-based processors—seem somewhat less refined than their Mac counterparts? Beyond the philosophical rivalries between Mac and PC aficionados, there are some technical and historical reasons for these differences.

❖ The designers of the IBM PC built their computer around the Intel 8088 microprocessor with a 1MB address space. They reserved 640K for user programs. The remaining space above 640K was reserved for things like video graphics memory. This 640K memory limit later became too restrictive, and several schemes were

devised to allow programs to utilize additional memory. None of these managed to gain enough acceptance to make software developers standardize it. To this day, the vast majority of programs for PC-compatibles cannot utilize over 640K of memory.

❖ Unlike the Motorola 68000 microprocessors (used in the Mac designs), which see RAM memory as one large contiguous space, the Intel processors used in the PC family (prior to the introduction of the 386) access memory as multiple segments, addressable on 64K boundaries. This segmented architecture is more cumbersome for programmers. Again, even though the more powerful 386 and 486 processors can be used in modes that don't have these limitations, they are for the most part being used in 8086-compatible mode, running 8086 programs.

❖ The Macintosh Graphic User Interface (GUI) was standardized for all user programs by being built into the Mac operating system. The PC's native

operating system, MS-DOS, has no standard GUI. Instead, several incompatible GUIs (like GEM, which Turtle Beach's 56k system uses; Windows, which Spectral Synthesis' DPR-100 software uses; and OS/2-PM) compete for market share, with no one being dominant. In fact, when products have been created with similar "look and feel" to competing products, they have been met with lawsuits and litigation. For these reasons, GUIs for the PC cannot be consistent between different programs.

❖ To date, the GUIs available to the PC programmer have also been limited to designs based on the above-mentioned 8086/286 chip architectures. When 386/486-based operating systems emerge for the PC, we can expect to see products for the PC like those for the Mac, with the level of sophistication that comes from continual refinement of an industry standard.

— Phil Cochlin

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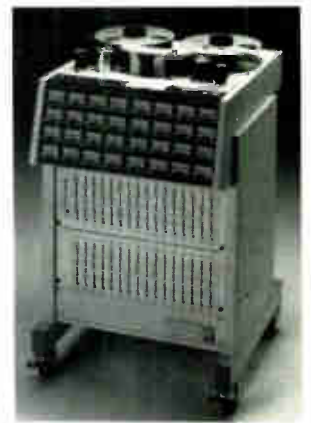
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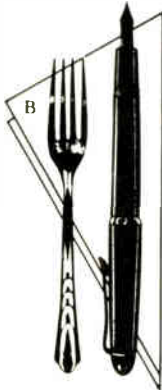
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by Mr. Bonzai

STEWART COPELAND

A DIFFERENT DRUMMER



Stewart Copeland hasn't been sitting around on his drumsticks since his days of international fame with the Police. As an aggressive film composer, he's scored for Francis Coppola's *Rumblefish*, Oliver Stone's *Wall Street* and *Talk Radio*, and just completed the music for Russel Mulcahey's upcoming *Highlander II*, starring Sean Connery. His haunting, driving music for the popular TV series *The Equalizer* has been collected in album form along with additionally compelling compositions. His experimental album *The Rhythmist*, recorded in Africa and England, was one of the more memorable recordings of 1985.

In 1988 Copeland formed the group Animal Logic with bassist Stanley Clarke and the gifted singer/songwriter Deborah Holland. Their second album is

due out this year, and if you missed the first, it's worth going back and checking out.

And opera? Copeland's *Holy Blood and Crescent Moon* debuted with the Cleveland Opera in 1989 with a 52-piece

PHOTO: MR. BONZAI



PHOTO: ROCKY SCHENCK

orchestra, 70-member choir and a production cost of \$1 million. With every performance sold out, the expanded production moved on to open the Fort Worth Opera's 1990-91 season.

We met at Copeland's winter home/studio in Beverly Hills for a lunch of carrots and onions rolled in broiled beef, fish tubes stuffed with jalapeño cheese, rice balls wrapped in seaweed, and chilled sake. A little lunchbox prepared by Mrs. Bonzai set the stage for...

**Stewart
Copeland with
Animal Logic**

Bonzai: I gather you lead

quite the cosmopolitan gentleman's life these days...

Copeland: Well, in the summer it's quite gentlemanly, but in the winter it's just a hard slog. I'm just a grunt in the studio working away.

Bonzai: Mostly film work these days?

Copeland: Yes.

Bonzai: What made you take that tack in your life?

Copeland: Accident, at first. Francis Coppola called me for *Rumblefish*. He pulled together a number of musicians, one of whom was even a professional film composer—Paul Chihara—who told me that I should be doing film scores. "Really, you think so?" I was just a drummer in a rock band. I got in there and started learning the craft and then bulldozed the other guys out of the way.

It really is an engaging musical challenge. It's not as visceral as playing drums in a band; it's not as deeply artistically and emotionally committed as writing an opera. It's more like building model airplanes, which can be pretty engrossing.

Bonzai: I would think that the challenge would be in maintaining your artistic integrity and direction while dealing with all the changes, interruptions and other bullshit elements.

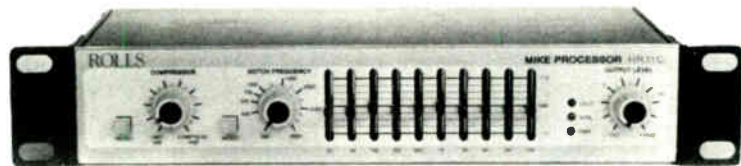
Copeland: Sadly, those interruptions and distractions and other issues are present in every form of art. In rock music, it's the promotion you have to do. You have to share your artistic vision with the other members of the band, but on the positive side you have collaboration with other talent, which is inspiring. The synergy creates better work.

But in every form of art there is bullshit. The time spent on the actual art may be a very small portion of the time spent dealing with the business. In film, it's collaboration with non-musicians. In a band, you operate with other musicians who may have different musical perspectives, but at least they are musicians and music is the beginning and end of it. In film, it's collaboration with directors, non-musical people, the drama, thespian art, photography and everything else.

Bonzai: What did you bring to your film work from your years as a rock drummer?

Copeland: A louder voice and a certain swagger. And in art, these things are actually significant. Every artist does what he has to do, and the quality is for

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other people to judge. But to actually get that opportunity takes a certain amount of swagger, so that you can realize what you want to do and follow through. It's easier for me than it is for a Juilliard graduate, who may be very talented and proficient. But those working with him may not know that, so he's not able or as free to follow through with his instincts. I'm someone who has the advantage of notoriety and previous success in other musical forms.

Bonzai: When did you find your swagger?

Copeland: Oh, pretty early on, actually. [Laughs]

Bonzai: Can we go back to your early days?

Copeland: I was born in Virginia, and when I was two months old my parents moved to Cairo, then to Damascus, and then to Beirut, where I lived until I was 15.

Bonzai: And your dad was...

Copeland: In the CIA. He was one of the founders.

Bonzai: This seems to be an interesting connection—the CIA and the Police.

Copeland: There is no connection.

People leap on this information, but there really is no connection. It just happened in the heady days of the punk boom, in the beginning when suddenly there were groups with names that were hostile, the opposite of what we were familiar with. I just remember looking at a police car one day and thought—well, there's some free promotion.

Bonzai: Was your family supportive of your interest in music?

Copeland: Well, yes. I am the fourth of four children. My oldest brother was doing great as a businessman, and my father's ambition to raise one businessman was realized. My sister was doing great at Vassar, so the debutante factor was taken care of. My other brother was a character, the spitting image of my father, the black sheep of the family. And so, what the hell, if the last one turns out to be nothing more than a musician, that's great. My dad was a jazz musician before the war. He played with the Dorsey Brothers and other legendary jazzers. He also played with Glenn Miller, but he doesn't like me to mention that, because he feels as if it was like playing with The Osmonds.

So, they encouraged me when at the age of 11 I started banging on pots and pans, or album covers laid out on a bed.

Bonzai: That was your first drum set?

Copeland: Yes, and my sticks were the dowels from wooden coat hangers. My dad sent me to drum lessons when I was 12. I learned a lot of useful technique right from the very beginning.

Bonzai: This was in Beirut?

Copeland: Yes. I took lessons from an Armenian drummer from the Kit Kat Club. He taught me how to hold the sticks and set up the drums—the basic rudiments. My first band was called the Black Knights, and we performed at the American Beach Club before I turned 13.

Bonzai: Did you get paid?

Copeland: I'm sure some money changed hands, but I didn't see any of it.

Bonzai: When did the real money start rolling in?

Copeland: It's all relative, but the first real money came from playing with Curved Air. £35 a week seemed like real money.

Bonzai: Was this around 1970?

Copeland: No, I played in the dying years of Curved Air, after they had all their success and had broken up. They re-formed just to pay off some taxes, and there turned out to be a big audience.

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Shep Pettibone, Remixer/Producer, Credits: Madonna, Janet Jackson

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During their hiatus, I had started a group with the violin and bass player, called Stark Naked & the Car Thieves. Then this tax thing caused the re-formation of Curved Air, and I got in as the tour manager. The drummer didn't want to continue, so I joined the band and carried on through 1975-76.

It was the classic old-wave scenario where every concert we played sunk us deeper and deeper in debt. We couldn't afford our road crew, or any of the lifestyle rock 'n' roll had made us accustomed to. These were the dinosaur years where a band had a road crew and a light show. It was before the crash of '76, so record companies had the money to pay for all this, which was deficit stuff. Everything we did put us deeper in debt. We never saw any of the money. We played a show, the record company paid for it, and we were deeper in debt. We made a record, we were deeper in debt.

And suddenly the punk thing happened, where bands would play and collect the money themselves. They didn't have managers. They had their own record companies and they

worked for themselves. It seemed like a great idea to me.

Bonzai: So you took things into your own hands?

Copeland: Yes, and started a record company and a group.

Bonzai: What was the name of that record company?

Copeland: Illegal Records. An old friend of mine lent me the money to record the first single, "Fallout," with "Nothing Achieving" on the flip side. We recorded the songs, took it to the RCA plant, pressed up the records, and didn't realize that we not only had to deliver the lacquer but the sleeves as well. It was down to me cutting photographs out of magazines and getting the Letraset and making a record sleeve. We had 2,000 records, 2,000 sleeves, and there was Sting, Henri and me sticking the records into the sleeves.

Selling them was the easy part. I'd sit in my brother Miles' office and call up record stores and sell boxes of 25 records like hotcakes. In those days, the early days of punk, the phenomenon was bigger than the supply of music to fulfill the need. Because of the nature of these bands, many couldn't get it together to get the records out.

Bonzai: So, it was you, Sting and you mentioned Henri...

Copeland: Henri Padavani, a Corsican guitarist. He was the only bona fide punk in the group. He couldn't play guitar, but he was a bona fide punk.

Bonzai: And he left the group?

Copeland: He was elbowed out by Andy [Summers]. As soon as Andy joined the group, his first order of business was to get rid of that other guitarist. As soon as he did, and we had a real guitarist in the group, then Sting started to write those songs, because he could write chords beyond A Major and E.

Bonzai: And success came quickly?

Copeland: No, we starved through '77 and '78. We were universally reviled as being too clever, two years too old to be real punks—played too many chords to be real punks. We had all the volume and the noise and the speed of all the punk groups, but there was something wrong with us. We weren't genuine 18-year-olds who didn't know any better. We knew better, but we were playing for the energy of that scene. We were very unhip as a result of who we were. I'd played in Curved Air—that was a downer right there. Word got out that

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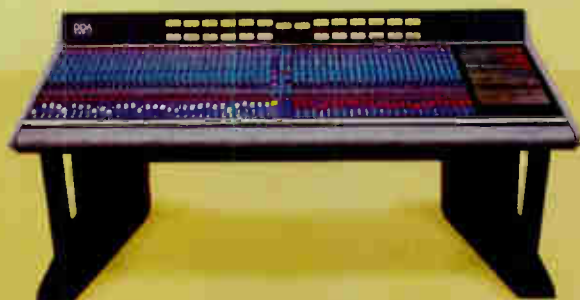
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LUNCHING WITH BONZAI

Andy had played in Soft Machine—"Jesus Christ, who do these guys think they are?" Even Sting, who was unknown at the time and was the only fresh face in the group, it was discovered that I found him playing in a jazz band. We were known as a bogus punk group.

Bonzai: So what happened?

Copeland: Well, the group Spirit came over to England. They had already been forgotten in America, and it was their last gasp. The Police opened for them on their tour. The Spirit audience didn't know any better; they didn't know we were fake punks, and they went berserk. That started people thinking, and we actually had begun to sound okay. After the Spirit tour we started to get our own following and began to pack the small clubs we played. Before that it was, "The Sniveling Shits couldn't get a truck and can't make the gig tonight. Can you play the King's Arm in Fulham tonight?" Sure, we'd show up with our two amps and a drum set. We were replacements for bona fide punk groups who were so bona fide that they couldn't get their shit together.

It was at that point that we came to

America, and because we were unknown, we weren't so unhip. In every city we hit they would start playing *Outlands d'Amour*—the famous van tour. When we went back to England, the song "Can't Stand Losing You" started to happen and we were booked to play. By this time we were involved with A&M Records, who'd released a couple of singles. The third one started to happen, and we came back and were booked to play as a support group for a comedy act called Los Albertos Trios Paranoius. They were quite well known in England and had a couple of comedy hits. The tour manager thought he had cut us too good a deal because the entire tour was sold out. At the first show we discovered that it was entirely our audience.

It was teen hysteria. That was the only overnight transition, from being unhip to being suddenly surrounded by screaming teens. The audience was very young—it was almost like the Beatles hysteria—that high-pitched shriek of pubescent females. From that point on, there was even progress.

Bonzai: When did the group stop?

Copeland: The last show was in February 1984 in Melbourne, Australia.

Bonzai: Why did you break up?

Copeland: Because the group had become a golden cage. It was a corporation with a huge number of employees and a momentum all its own. The good ship Roxanne just plowed across the waves and made everybody rich, including us. We were the prime beneficiaries, so I can't complain too much, but any project outside of the group was discouraged. By project, I mean, "I think I'll go buy a newspaper." "Oh, shit, one of them is missing. Better send someone to go with him." We were encouraged to be stuffed pillows, and independent thought was discouraged. So we were stuck with each other, which meant we were forced to confront our differences. The things we had in common had carried us that far, but our differences were festering.

Occasionally, one of us would break out. Sting would do a movie. I had my Klark Kent records. We began to feel the bonds, and we were wealthy enough that we didn't have to stay on this golden gravy train. We felt that there was more to life than endless touring and making records. Personally, I loved the group and would have loved to continue, but we had to slay

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the dragon. A year or two later, it would have been fine with me to reassemble the group occasionally and do a tour and an album every few years. That's my side of it.

Andy, particularly, feels that he isn't going back to the Police until he has made some noise on his own. Sting is not a team player—it's just a fact of his character. He's a tennis player and not a football player. He is a completely self-contained artistic unit, and although he sometimes appreciates the value of collaboration, it's basically not how his artistic mind works. That's pretty much where we all stand.

Bonzai: Let's look at some of your solo work. Tell me about *The Rhythmist*, which you recorded on location in Africa.

Copeland: The record goes with a film I made with J.P. Dutilleux. We spent two months crossing Africa and recording African music. I recorded the music and he filmed it.

Bonzai: And you played drums with all these people?

Copeland: Yes, in various circumstances. Some of them have very complex rhythms and the drummer has a specific place, which is almost part of their religion. I came along and said, "Let's jam." And they looked at me like I was a bit mad.

Then I took the tapes back to England and made a record out of them. I played almost everything except the African material. And I found, much to my disappointment, that a log in Africa sounds pretty much the same as a log in Buckinghamshire. The first month-and-a-half was spent recording music out in the bush, in the Congo, Tanzania, Burundi.

It was disappointing from a recording standpoint because the effect is really only achieved when you stand in the middle of a village and experience the music. They don't have the 12-minute dance mix, they have the 12-hour dance mix. They start in the morning and they play all day for ceremonies. When you listen to just a few minutes of the music, it doesn't have the real effect as the 12-hour version.

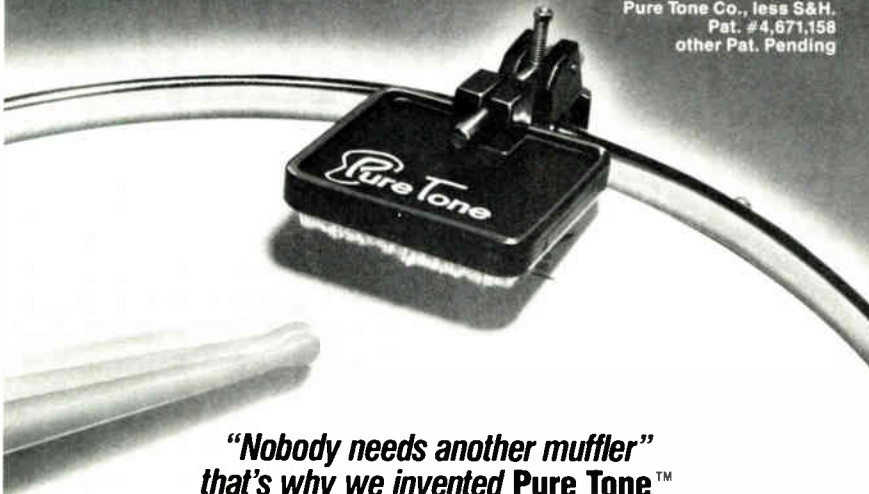
It was spending a night in jail in Zaire that really got things rolling. Trying to get into the Congo was a big problem, and they threw us in jail overnight. The soldiers were playing urban African music with electric guitars, drums and keyboards. I discovered the real African

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music is in the cities. I later found African musicians in Paris. There is a strong community of African musicians in Brussels and Paris, which is where I found Ray Lema, the singer on the record.

Bonzai: Let's talk about Animal Logic: you, Stanley Clarke and an unknown piano teacher named Deborah Holland. You know, I met her a few years back before all this happened.

Copeland: Turns out she knows everybody. If you ever need musicians, she is the best fixer in Los Angeles. You need a classical harmonica player, or a reggae oboist, she knows them all. She has an incredible memory and always finds great players for me.

Bonzai: How did you find her?

Copeland: In the normal process of my research, going through cassettes, publishing houses, cassettes handed to me by waiters and taxi drivers, passersby on the street. Hers was one of those cassettes, and when I heard her two songs—"Spy in the House of Love" and "Firing Up the Sunset Gun"—I ran out naked on Sunset Boulevard shouting "Eureka!"

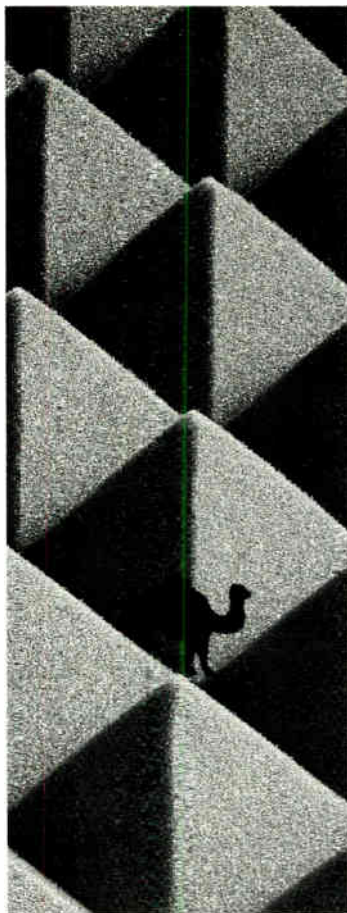
Bonzai: It's a great album.

Copeland: Yes, I think so, too, but the band let it down by not touring. We thought we could release an album that would get airplay and then we could go out later and tour and have fun. That's what Stanley and I had in mind—to make a commercial album, as a challenge. Can we make an album that speaks to the common man, that isn't just for specialists?

We made the record, but you really have to go out and tour and give yourself to the record company. The bullshit that we were discussing earlier—it's crushing, terribly boring. When I go out to promote opera, or projects like *The Rhythmattist*, there is always something interesting. But to record an album with a group, there is nothing interesting to talk about. So, you go around to all these radio stations and explain that the record is round, it's black and has a hole in the middle with ten cuts. We got a pretty good write-up from the critics, and there is much disappointment that it didn't take wing. I had films to do; Stanley had his film work to do, and we didn't have the time to do the touring and the promotion that it called for.

Bonzai: What about opera?

Copeland: It's very challenging. It's the culmination of my film work. In fact, I think of my film work as training for opera. But there is no income for me in



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opera.

Bonzai: It cost one million dollars to mount the first performances of *Holy Blood and Crescent Moon*?

Copeland: Yes, and it packed the house every night, but even with those figures the ticket sales pay for about one-third of the production costs. You have a full orchestra in the pit, a 70-member choir, soloists. There's about 250 people on the stage. Very expensive. It is the highest musical challenge, in my opinion. Unlike film, music is the prime locomotive force—it's the main event. A lot of music, two-and-a-half hours for a very big musical unit. That's a lot of dots. Making it work with the drama and all the other elements is very challenging. The most complicated form of making music. Making records is very easy by comparison.

I contributed to the lyrics, but the libretto was written by Susan Sherwin. When I was commissioned to write this opera, Susan was the only person I knew that had seen an opera. She is a playwright and taught me the technique, the dramaturgy. David Bamberger, the director in Cleveland, also advised on the staging. For instance, you can't have the tenor fight a battle, slay the dragon, climb the castle wall, rescue the princess and then sing a big aria.

Bonzai: Why were you chosen for such a mammoth project?

Copeland: Because the people in the opera world are perplexed that they have an art form that is so dramatic and deep, and held the center stage of the entertainment world for 200 years, but has been brushed aside. The reason is that all the popular talent has moved into popular music. It's difficult for the opera world to entice people with a popular touch back into the operatic art form. The living opera composers tend to be graduates of music schools who may be out of touch with lighting up a modern audience. They wanted a popular composer and offered to teach me about the technical aspects.

Bonzai: Has it been fulfilling for you?
Copeland: I've discovered a new vocation. It really is the center of my musical life now. I make my living doing film scores, get my rocks off playing drums, but my artistic energies are directed toward opera. ■

Roving editor Mr. Bonzai is writing a book about the Police hit, "De Do Do Do, De Da Da Da."

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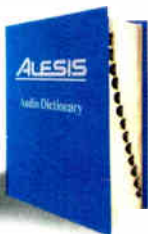
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World Radio History



by Hank Bordowitz

PHOTO: ED COLVER

BRIAN MALOUF

MUSICAL CHAMELEON

“A lot of people are very specific about the kind of music they want to work on and be associated with,” comments producer/engineer Brian Malouf. “That can be good. I’m not putting that down. I’ve just never been the kind of person who has been able to resist anything that I think is good in its own genre.”

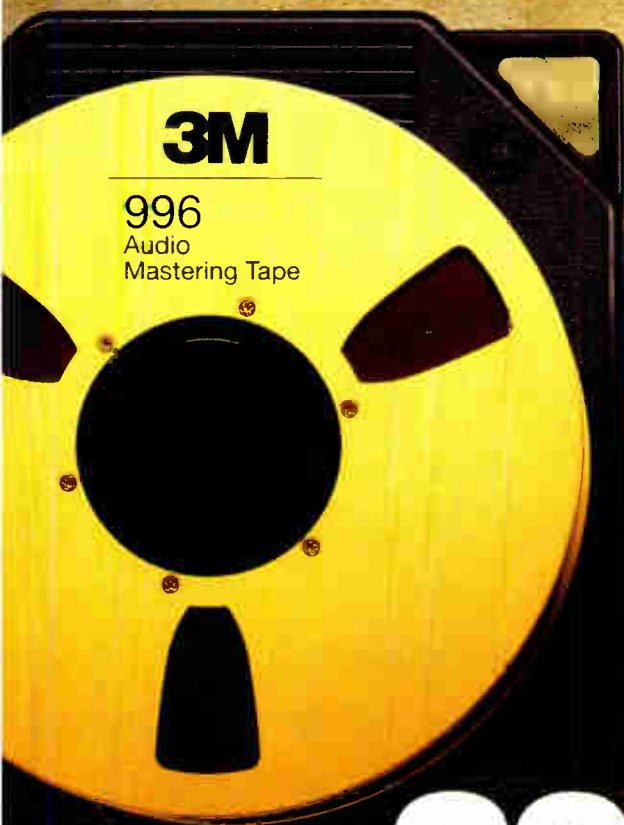
Music, like many fields, has its share of specialists. These people, for better or worse, get associated with one type of music—Ron Nevison for hard rock, L.A. Reid for dance, Jimmy Bowen for country—and that becomes what they do. But what happens when an artist decides to do something out of character, either with one track or an en-

tire project? As more artists explore different sounds, the times may once again be ripe for musical chameleons.

“I’ve been eclectic all my life in terms of my musical tastes,” Malouf says. “That lack of snobbery helps and hurts. When I was growing up as a musician, I always loved Top 40 radio. I love singles and hit songs. It didn’t matter much to me if they were R&B or rock ‘n’ roll or any of the different styles I’ve worked on in my recording career. So long as it’s good music and it’s played well, I understand it. Because I understand it, I can put it across. That’s why I’ve been so diverse. I want to keep it that way.”

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on any number of fronts. He's worked on projects ranging from cutting basic tracks with Michael Jackson, producing for Australian rockers Pseudo Echo, mixing for rockers Slaughter, to engineering the latest Madonna album, *I'm Breathless*, and soundtrack music for the film *Dick Tracy*.

"Right now, if I had my druthers," he says, "I would sit and record live tracking dates half the time, mix half the time and produce half the time. I'd have three halves to my life. I'd be really happy."

With the Madonna record, he got to work in the big band genre, a type of music he hadn't worked with since the Manhattan Transfer's *Vocalese*, when he recorded three tracks with the Count Basie Band.

"The Madonna stuff was sort of a hybrid," he remarks. "She and Pat [Leonard, producer] work fast. Everything they do becomes a master, even though it starts out as a songwriting session or a demo of a song that they have been working on. Those tracks were done at his studio, starting with Madonna and him singing and an Akai-Linn drum machine. We would go in

with something like a MIDI track and vocal, and overdub the big band to that. Drummer Jeff Porcaro played in a big iso room and the rest of the band was out on the floor. They would just perform over what we had already done. Madonna also wanted it to be somewhat electric, so as not to abandon everything she had done before."

Of course, recording a '40s-style big band in a contemporary pop context is not without its challenges. For example, do you track all the parts simultaneously? If you are using a string section, that means cramming 30 people into a studio, miking them, and for all intents and purposes, mixing them live.

"On two of the songs it was all together," Malouf recalls, "but on two others it was separate. For the bigger string section, it was kind of crowded. There were also some things with a smaller string section. We did one tune that actually turned out to be a duet with Warren Beatty that was more like a speakeasy. There were maybe seven strings and four brass and woodwinds."

On working with Madonna, Malouf says, "She can cram more into six hours in the studio than most people can get

into a week. She's exhilarating to work with—dynamic, challenging. A lot of people have trouble with that—they don't like being challenged as much. Being in the studio with her was one of the most fun times I've ever had. We got along well, and I love Pat Leonard, too. He's always fun to work with. We did that whole record in about six weeks. It went so fast.

"I did another three days of big band dates with Kim Basinger," Malouf adds. "That was a lot of fun as well. I enjoy having 20 people in the room, playing live and recording it. There's nothing like it."

Malouf had worked in this genre as a musician also, playing drums in his high school big band. "I've been a drummer since I was nine years old," he notes. "In high school I floundered around, dabbled in bass and guitar, a couple of brass instruments, trombone and baritone horn. In college I settled into percussion. I spent five years really hitting it hard. But I got tired of counting rests, which you do a lot in orchestra, and started playing drums again. That's when I analyzed Top 40 music. I was doing arrangements for my band. Then I developed arthritis in my knees. I was playing during the

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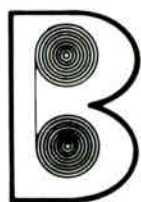
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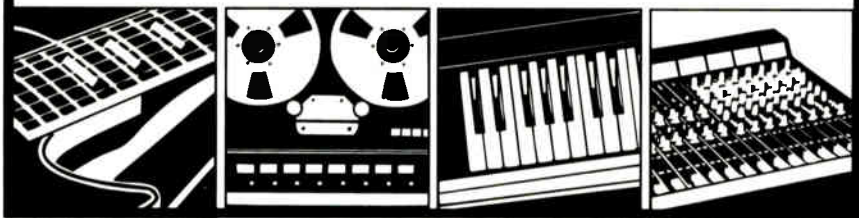


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disco era, and I went through both knees. I turned the drum set around after my right knee went out and played left-handed until my left knee went out. It was after that band that I started engineering."

Malouf landed an apprenticeship at El Dorado Studios in Hollywood and from there moved to Can Am, where most of the projects he's been associated with were recorded. He currently holds the title of chief engineer. That position has taken him all over the map musically, from Madonna to Slaughter.

"I can't think of anything fundamentally different that I would do with either kind of music," he explains. "I approach both the same way as I would anything else—that is, throw up all the faders in a roughly straight line and listen to what is coming off the tape. Let that dictate all my moves. I'll figure out what kind of ambience I want, what kind of placement the vocals should be in, etc.

"The main thing about a record like Slaughter's is how the drums are going to sound, because that is what determines the attitude of the record. I don't add things until they cry to be added, as far as processing is concerned."

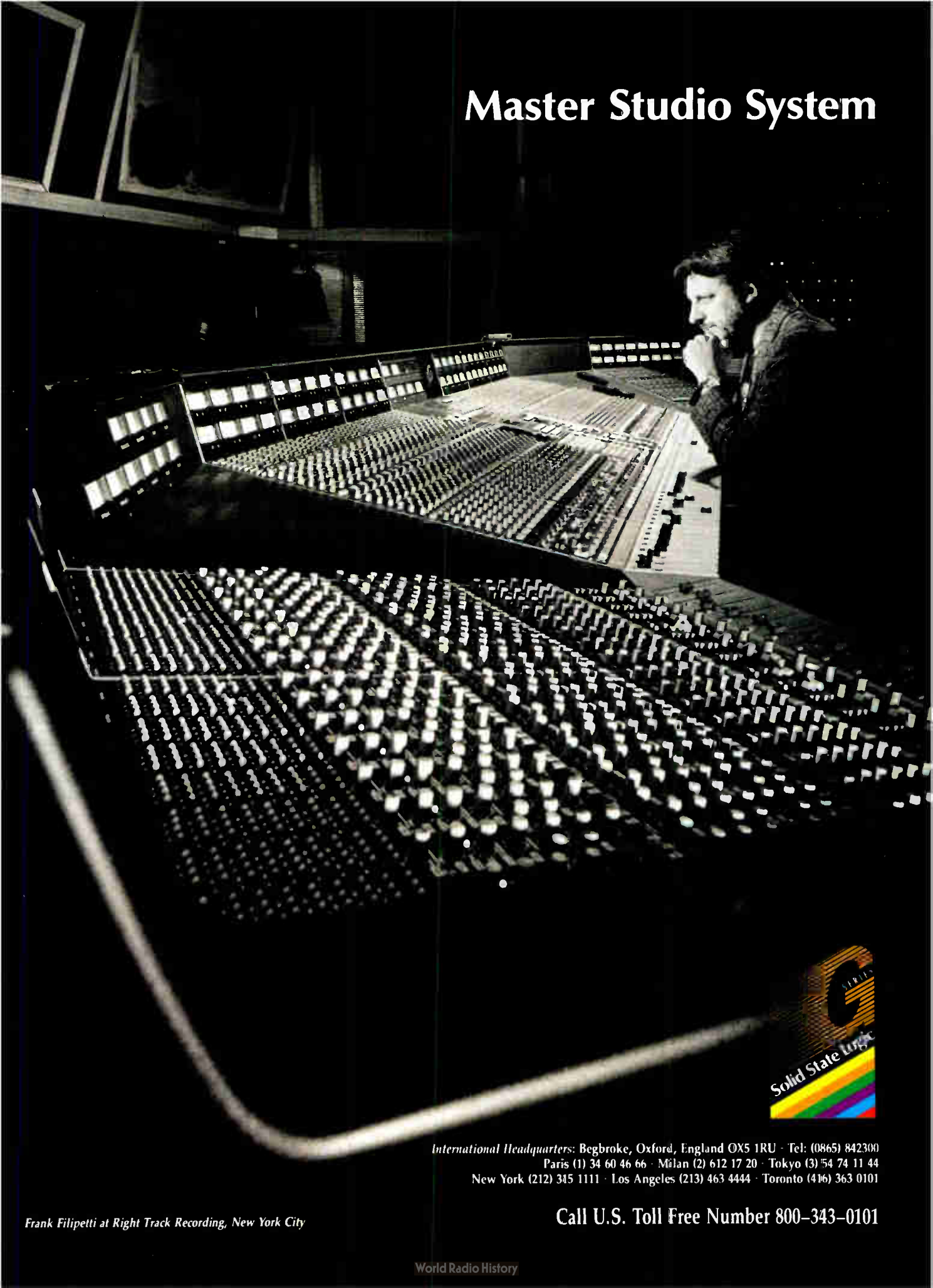
Although Malouf still primarily works as an engineer and mixer, he has set his sights on doing more actual production, and the projects are starting to fall his way. That's what working on a few name projects can do. Next up is a young pop singer on Arista named Keedy, who he is co-producing with Greg Gerard.

"Because I've worked on so many albums as an engineer," Malouf says, "I've got a good sense of how records are made. As a producer, I try to rely on my experience as a musician to get through the sessions: who to hire, what to play. I can write out charts and things like that. Most of what I know as an engineer I can also apply to producing, too. Of course, when you produce you're getting involved earlier in the project—listening to the demos and paying close attention to the performances and not just the sound.

"I enjoy producing because it gives you the feeling of *making* the record, not just mixing it. But I hope I never have to give up mixing, either." ■

Hank Bordowitz is a New York-based writer.

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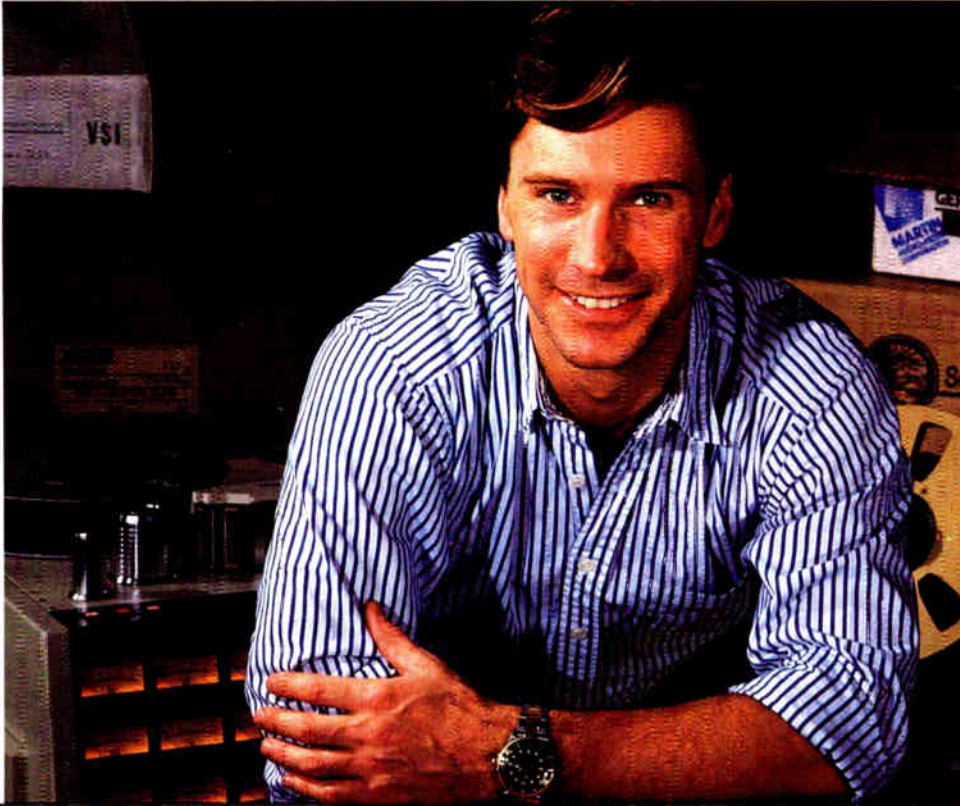
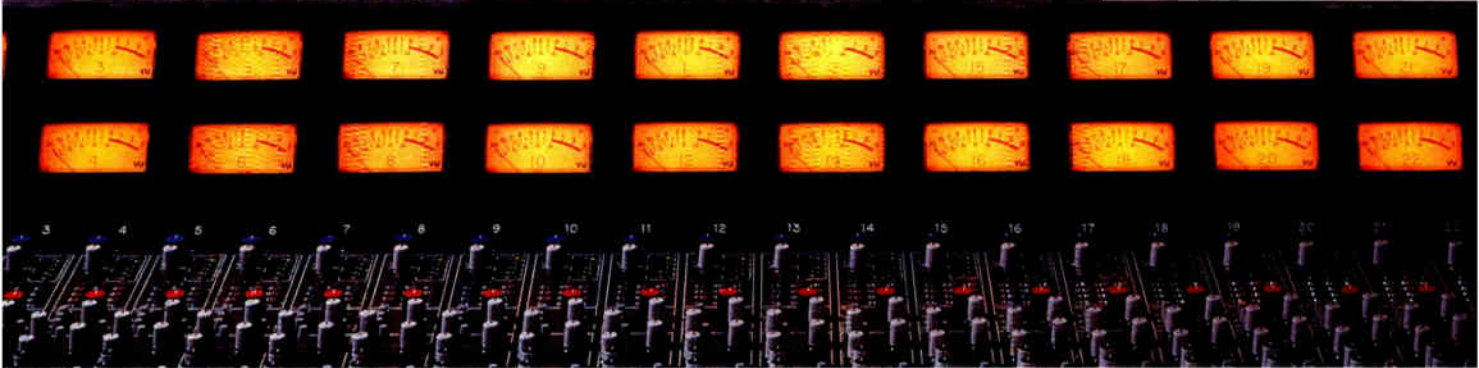


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by Dan Daley

INDEPENDENT SOUND

GO MIDWEST, YOUNG MAN

This month we begin with a multiple choice question: Your project studio operation, located for nine years in a second-tier West Coast media center, has become wildly successful. You're scoring spots for Infiniti autos, Apple Computer, Dannon, NBC and Levi Strauss, among others. Kevin Costner heard your work and asks you to score a part of his directorial-debut film, *Dances With Wolves*. The demand for your creativity and sound soars. You move your facility to the location that makes the most sense to build on this success. That location is:

- a) Los Angeles
- b) New York City
- c) Chicago
- d) Milwaukee

If you answered d), you are either

being cynical or you have an inkling of what has been going through the minds of Peter and Mary Buffett, owners of Independent Sound, late of San Francisco, lately of Milwaukee.

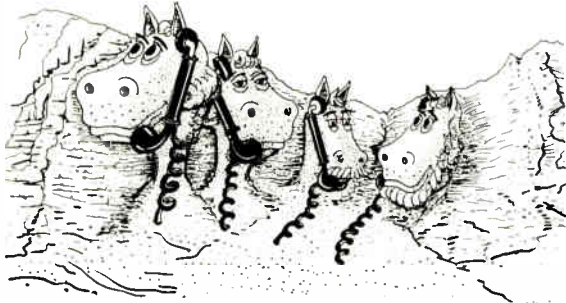
Peter Buffett has the perfect background for project studio ownership. After graduating from Stanford Uni-



versity a decade ago, he became fascinated by the then-new world of personal 4-track decks. He bought one along with a Prophet-5 synthesizer and set up shop in his Washington Street apartment in San Francisco. He split his time there between renting out the equipment for outside projects and scoring films for local film students. "I was writing, scoring, producing and engineering; I guess you could say I was the quintessential project guy," Buffett remarks. "I literally grew up with the whole personal recording phenomenon."

Top Photo:
"Craigmore,"
the Buffetts'
home. **Left:**
Mary and Peter
Buffett

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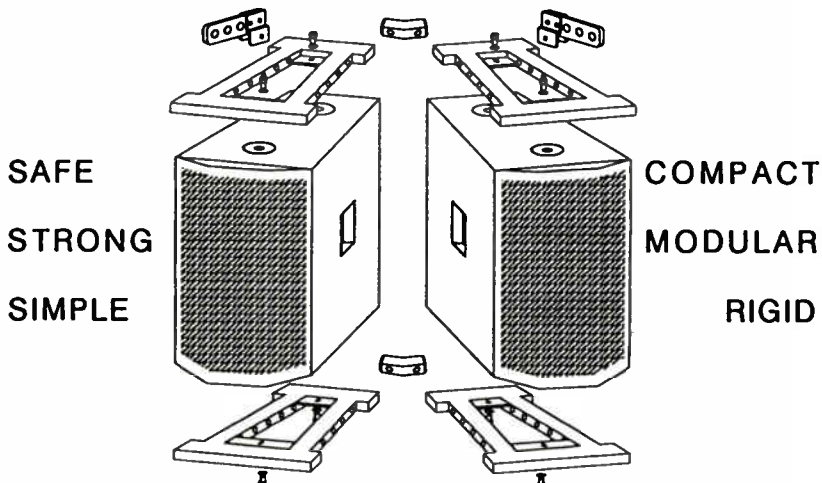
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Buffett then bought a 1/2-inch Otari 8-track deck and a small mixer. Mastering one of the first Linn drum machines in the area, he picked up dance artist Sylvester as a production client and realized the hall closet that had been serving as a vocal booth no longer could contain his growing recording needs. He and Mary, whom he married in 1981, moved to a house on Scott Street and established Independent Sound.

Mary Buffett added another dimension to both Peter's life and business. "She serves as a conduit between what the clients want and what I end up doing," Buffett explains. Mary's background includes stints with Columbia and Playboy Records, and an even more visceral foundation for a music career that was provided by hanging around Phil Spector's recording sessions when she was in her teens in Los Angeles. "I got the Ivy League education and she got the street smarts," laughs Buffett.

Independent Sound began picking up steam with the move, Mary using her contacts to get clients and Peter creating scores for them on a growing array of synthesizers, culminating in a 64-voice Synclavier, which has since been upgraded to a 9600 model. "It was at this point that I discovered the money was in the creative end, not the studio part," Buffett recalls in an epiphany that has come to mark the turning point for many project studio operators. As the saying goes, "First we shape the tools, then the tools shape us."

The Buffetts' plans took an unexpected turn in August 1989, when, in a move that left a number of colleagues aghast and puzzled, they moved to Milwaukee. It's not like a beer account was Independent Sound's anchor client. The geographical transition appeared all the more strange when Peter's second career as an instrumental recording artist on Narada/MCA Records was factored in. A new age artist moving away from the coast that spawned the genre?

Actually, it was the record deal that confirmed the Midwest connection, Narada being based in Milwaukee. Over the first four years of the record deal, the Buffetts came to see the city as both a refuge from the stress of larger urban centers and—in an age when satellite transmissions and fi-

ber optic land lines are increasingly common, not to mention deregulated airlines—as a viable place to record audio.

Independent Sound now resides in the upper reaches of a 20-room Italian Renaissance-style mansion overlooking the shores of Lake Michigan, a 90-mile commute from the advertising center of Chicago but as close to anywhere else in a virtual sense. "I can draw a two-hour flight time radius around Milwaukee and find plenty of major cities," Buffett says. "People are using planes like taxis these days. And once producers see this place and spend time in it doing spots, they don't want to leave. They think of it as a vacation."

Buffett designed the place himself, disregarding elaborate acoustical treatments recommended by the designer he hired initially. "I simply realized that I didn't need \$150,000 worth of acoustical treatment, and that the money could be better spent in other ways," he says. Like many other studios of its type, it's lean compared with commercial facilities. Meyer HD-1s provide the monitoring, an Otari MTR-100 is the multitrack and an Otari Series 54 console is being installed. The upgraded Synclavier is there as well.

"Most project studios are like cars, in the sense that if you're the only one who drives it, it lasts a lot longer," Buffett comments. "You know the equipment better, and you don't need all the bells and whistles. You're not establishing a neutral ground that's supposed to please ten different sets of ears." Peter does the light engineering tasks, bringing in a local engineer for some jobs, and he plans to have a fellow San Franciscan move to Milwaukee shortly to augment the technical staff. Maintenance still reflects the remnants of Buffett's West Coast philosophy of life. However, "I align my machines once a year, whether they need it or not," he deadpans.

With a satellite up/downlink system to be in place sometime this year, Buffett sees Independent Sound interacting with any other facility in real time with no signal degradation, using a standard phone patch as the talk-back. "Between the satellite system and improved land lines," Buffett explains, "I can have national talent from any city recorded here, store it on tape or another digital media, and fly it in over the scores I create."

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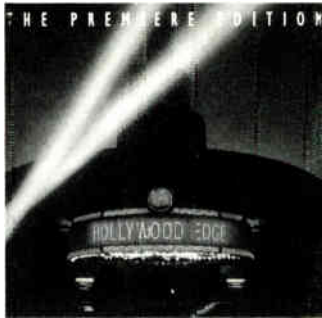
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emerged as strong centers for commercial production over the last decade as digital equipment became more commonplace and affordable, and transmission capabilities improved. The lower overhead these cities offer is increasingly attractive to agencies facing tighter budgets.

"The equipment available today has gotten to the point where it's powerful enough to provide a huge range of expression," Buffett asserts. "If you sit five people down with the same hardware and software, you'll get five different approaches to sound. It neutralizes the sense that you need to spend \$5 million to be competitive."

The bottom line, Buffett says, is that if someone wants your sound and your particular abilities, they're more willing to leave home to get it, because moving around, physically and virtually, gets easier every day. As he contemplates the budget for his next solo record, he is looking at a proposed digital compression technology that can send digital audio and video over phone lines, allowing consumers to sample entertainment products at home.

"There's such a tremendous glut out there, of music, of video, of everything," Buffett sighs. "I sell 30,000 to 40,000 records, and that's not enough to support it. There's so much out there that a large part of it gets lost. When you think about it, that goes for commercial audio as well. There's probably 90 music houses in Chicago, where I'll bet ten years ago there was less than a quarter of that number. The same technology that allowed the music house to proliferate and new age records to be created inexpensively will, I think, eventually find a way to distribute music in a more advanced way."

Independent Sound is an illuminating example of how technology is changing the way the audio business works. Elimination of location-dependency to even a small degree is going to have a considerable effect on how the traditional audio (and video) power centers evolve—not the least of which will be the novelty of beer and sausage during a break in the session instead of pastrami and seltzer. ■

Dan Daley is Mix's New York editor. As the song goes, "What made Milwaukee famous, has made a writer out of me."

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by Doug White

The life of a studio technician was turned completely around in the 1980s, and as we roll into the 1990s I'm sure there won't be any relief from the swarm of new technologies that are reported to make the task of audio recording "easier."

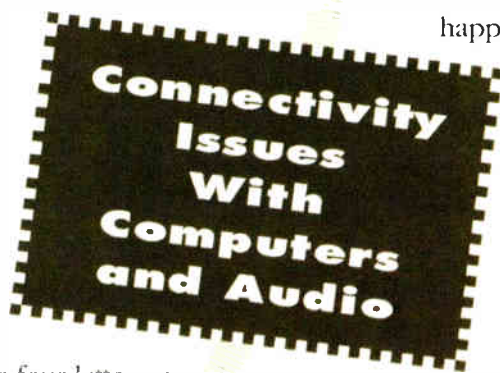
I have spent some time concentrating on that emerging technology in the recording industry known as Small Computer System Interface. I see many similarities between SCSI (pronounced "scuzzy") and that other four-letter acronym that popped into our vocabulary several years ago: You guessed it—MIDI.

SCSI can be described as a high-speed data transfer protocol allowing multiple microcomputer products to

access information across a single bus. That sounds simple. The headaches start when a theoretical standard is implemented in real life applications. Anyone who has experienced a stuck MIDI note, erratic detuning on a keyboard, or one of the dozens of other quirks that can

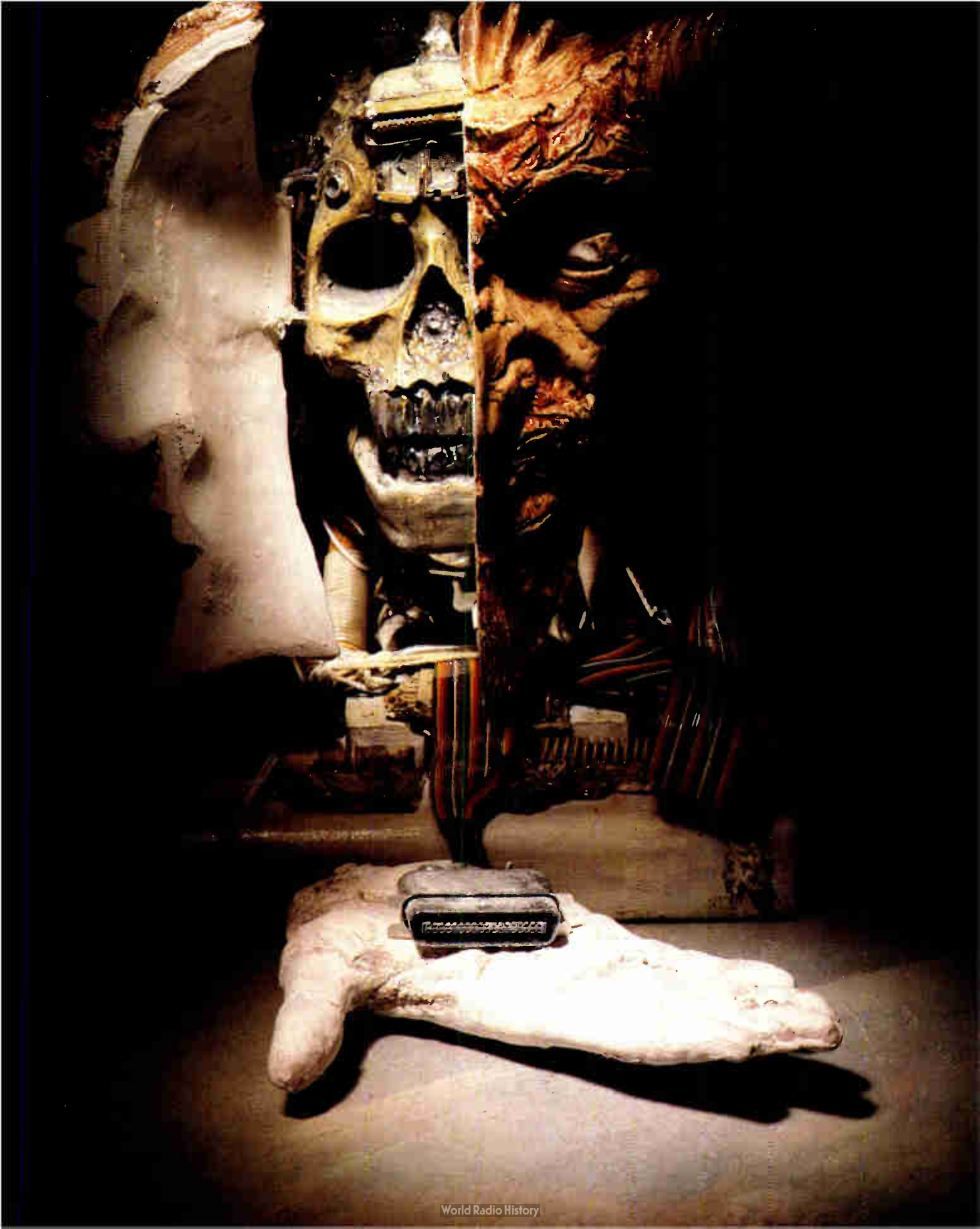
happen in the process of making and recording music, will realize the importance of that statement.

SCSI devices can be categorized as transmitters, receivers or transmitter/receivers. A transmitter is a device that can initiate a SCSI command. Generally, they are referred to as "smart" devices. These devices can request data or send data to another device, much like a MIDI controller sending pitch bend or a synthesizer sending system exclusive



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messages. A typical SCSI transmitter would be a graphic scanner, which can digitize a graphic and transmit it to some destination.

The most common SCSI receiver is a hard disk drive, sometimes referred to as a dumb SCSI device because it can only receive information. A MIDI sound module like the E-mu Proteus is analogous to a SCSI receiver. The main function of a sound module is to perform a request from some transmitting device, such as "play this note" or "change to this patch." Receiving SCSI devices lay dormant until a transmitting device requests something such as "store this sound data" or "give me a directory of your contents."

The last type of SCSI device is by far the most complex. When a device acts as both a receiver and a transmitter, problems begin. Transmitter/receivers are sometimes called "logical devices," and include computer systems, digital samplers, music production workstations and certain kinds of video equipment. Again, using the MIDI analogy, the Yamaha DX7 was one of the first MIDI devices that both transmitted and received MIDI information. Today, SCSI is a technology in its infancy. It's just catching on in the microcomputer industry, and, as with the early DX7, some devices do not implement technology that well.

Why is SCSI becoming popular? It's a fast way to move data to another location. The major concern in data transmission is speed, and in the world of live music there is nothing more important—it has to be in real time. The asynchronous data transmission rate of SCSI, according to the original specification, is 12.8 megabits per second. In an 8-bit bus that's about 1.6 megabytes per second. In real world talk, that's pretty damn fast.

The other attractive feature of SCSI is that up to eight devices can be daisy-chained and communicate with each other. As with MIDI, each SCSI device is assigned an identification number. Unlike MIDI, there is no distinction between transmitting and receiving numbers. A SCSI device is only assigned one ID number (from zero to seven), and no other SCSI device in the chain can have that ID number.

Most SCSI problems result from that rule. Having two SCSI devices with the same ID number causes a SCSI network to go haywire. The logical device constantly searches the SCSI chain looking for other devices to communicate with. If it finds a device at ID one,

it records what device it is (i.e., XYZ scanner, E-mu E-III, Akai S1000, etc.). If it finds another device at SCSI ID one, all the SCSI devices in the chain will freeze. Those of you with an Apple Macintosh computer will experience a frozen cursor. Consult the owner's manual of the SCSI device to find out what ID number it defaults to and how to change the SCSI ID number (usually via pushbuttons, DIP switches or software).

Another common error in SCSI networking can happen when a sampler has an internal hard drive (like the Roland S-770). The sampler itself is assigned a SCSI ID number, and the hard drive has its own ID number. Keeping track of your SCSI ID numbers can save hours of confusion. If you are purchasing two identical SCSI devices (such as two S-770s) and plan to daisy-chain them together, the internal drive of one unit must be changed. In some cases a service technician will be needed to crack open the unit.

Another issue causing chaos in the SCSI chain is termination. By nature, SCSI chains are dependent on the voltages on the line. Termination is a way to control the flow of voltage. The rule governing termination is that the first and last *physical* device on the chain must be terminated, and no other termination should occur in the chain. Don't confuse the SCSI ID numbers with the first and last device. SCSI ID numbers can be in any order (two, seven, three, zero, etc.). If I have a setup consisting of a Macintosh (ID seven) connected to a hard drive (ID three), followed by a removable optical drive (ID six) and a digital sampler (ID five), termination is at the Macintosh and at the sampler regardless of their ID numbers. Be sure to check the termination (internal or external) before purchasing a SCSI product: The correct choice will cause fewer headaches in the end. External termination allows the user to define where in the SCSI chain that device is most suitable. Also, keep track of the number of SCSI ports on the device. Two ports will allow daisy-chaining; one will not. Most digital samplers have only one SCSI port on them—a big design problem!

Complex SCSI networks are becoming increasingly commonplace today. Jeff Lorber, who coined the term "SCSI Hell," consulted me for assistance in configuring his network of more than eight SCSI devices at his JHL Studio. The final solution involved

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the use of SCSI switchers, which are similar to audio switchers.

In concept, a switcher should be able to reassign the flow of data. The problem with SCSI is that when you switch data runs, you interrupt power as well. This causes system crashes and frozen SCSI devices. Normally, whenever you want to switch the SCSI devices you must shut down the entire network, switch, and then reboot the system. However, there are ways around that. Alan Smith at Ensoniq recommends a simple way to alleviate the need to shut down the network. He advises the user to hard-wire the pins common to ground and power in the SCSI switcher; this will cause data to be switched without interrupting power. These SCSI switchers are also helpful in combatting problems with the single-port devices mentioned earlier.

Switching also solves problems that occur when logical devices with different operating systems attempt to access data from the chain. In the system described earlier, when the Macintosh is reading a file from the removable optical drive, it looks for the Macintosh operating system. If the platter in the optical drive is an archive of sound effects files from the digital sampler, the Macintosh will ask you to eject or reformat the drive, or worse yet, a system error can occur. Try adding another sampler on the SCSI chain and all hell breaks loose. Switchers allow for sharing of SCSI devices without having to separate the SCSI chains. At Lorber's studio, a 5-way switcher and two 2-way switchers are used in the chain to one Macintosh computer.

Software programs that can access sound data via the SCSI port are becoming more popular, making it increasingly important to adopt a detailed set of SCSI standards. At this point it's still up to end-users to find the bugs and create cost-effective solutions.

I hope this information has provided some insight for those of you who either have yet to experience or are currently enduring SCSI nightmares for the first time. As for you expert users, remember: All this technology is supposed to *increase* your productivity. Good luck! ■

Doug White is a freelance keyboardist and computer-consultant at Microtech International Inc. in New Haven, Conn. Microtech is a manufacturer of SCSI peripherals for the Macintosh.

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World Radio History

by Paul Tingen

WALLY BADAROU

CREATING THE FUTURE NOW

It's one of the oddities of human nature that fantasies about the nature of future design generally run along two distinctly different tracks. Take science fiction film sets, for example. They're either extremely stylized and abstract—smooth surfaces everywhere—or a turn-on for techno-freaks, with knobs, dials and meters.

Similarly, visions of the 21st cen-

Nassau in the Bahamas. The man is Wally Badarou—solo artist, producer and “freelance member” of Level 42, film score composer (*Kiss of the Spider Woman*), and one of the world's outstanding keyboard players and Synclavier experts. He also acted as music director for Paris' grand bicentennial celebration in 1989. A Parisian for many years, Badarou is very highly

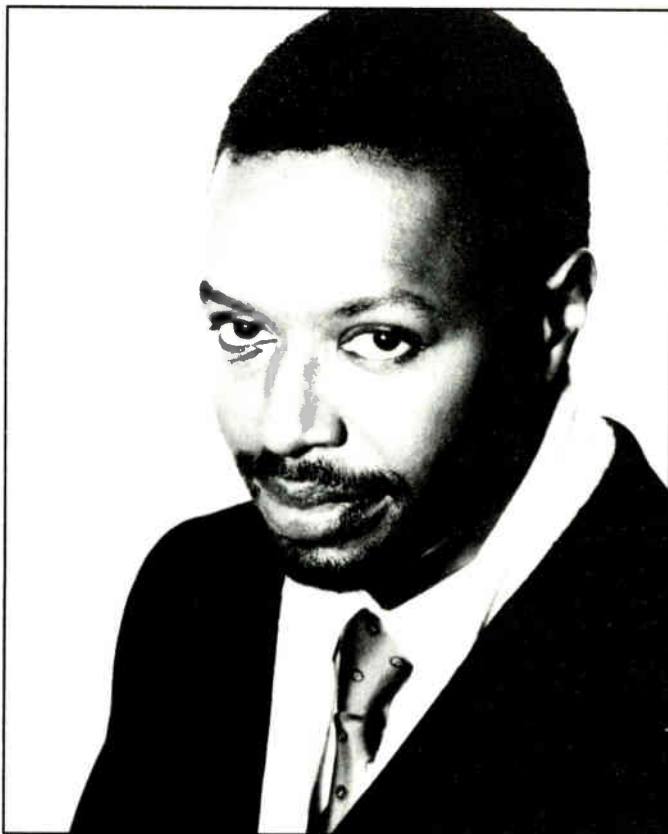
regarded throughout Europe. His future plans include moving back to France and setting up his studio in Normandy.

“My ideal,” he says, “is to have just a master keyboard and a computer in the control room, and nothing else. Studios have always been designed around the engineer, and I feel it's time that studios are built which center around the most important person in the whole studio game: the musician. I've tried to achieve that in my setup.”

In Badarou's view, most of today's studios are “antiquated,” making only limited use of the technology available. He believes one of the biggest eyesores is the current-generation large mixing desk. “They take up too much room,”

he says. “They dominate the center of the control room, whereas I think that in a modern control room the performer should be in the center.

“On top, they talk about complete recall ability, but they hardly deliver. In a regular studio today, when you want to switch from one song to another, you're talking about quite an elaborate



tury studio tend toward either more flashy gear and blinking lights and computers, or a control room with just a remote control for the central computer and invisible monitors in the walls. According to one man, the latter vision might be nearer to the truth. In fact, he's already created something quite like it in his home studio in

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job. You have to swap the tape on the tape machine, reset the patch bay, and spend 30 to 45 minutes matching the buttons on your desk—and then you haven't even matched the outboard gear yet. It's a headache. Whereas the MIDI technology is available today where you can load everything to disk and only swap a disk when switching work on songs."

In Badarou's setup, he claims that it takes him a "maximum three minutes" to change from one song to another. He explains that it's so fast due to the unlikely combination of 12(!) DMP11s, the rack-mounted version of Yamaha's digital 8-channel DMP7 mixer, as a substitute for a mixing desk, complemented by two Macintoshes with sophisticated software.

"For me [the DMP11s] were the way to go. Not because they're the best-sounding devices in the world, but they're digital, so I can chain as many of them together without any loss of quality.

"They take up a lot less space than a large mixing desk. In my place they're all in a back room; I don't even see

them. So my master keyboard has center stage in the control room. And lastly, they're completely MIDI, so I can control all their functions from a MIDI controller, whether it's a keyboard, sequencer or computer."

The keyboard player/producer lines up his DMP11s in three series of four each, with one or two instruments going into a DMP11, a stereo mix of them connected into the next DMP11, which then has six channels left to take another instrument, and so on. In the end he's left with three sets of stereo outs, which, for the time being, are mixed via a patch bay directly into a Sony 2500 DAT machine.

In between the last three DMP11s and the patch bay stand another three Sony 2500 DAT machines, functioning purely as D/A converters. "The DMP11 analog outputs aren't clean enough," Badarou says. "When I got this setup, about one-and-a-half years ago, there were no stand-alone D/A converters on the market. It may sound outrageous, but I was forced to get three Sony 2500 DAT machines just for their D/A converters."

Two Macintosh SE/30 computers form the nerve center of the French-

man's setup. On one he runs Performer, which drives his keyboards, drum machines and the mix aspects of the DMP11s. The other Mac uses Opcode's editor/librarian software, Digi-design's Sound Tools digital recording and editing system, Articulate Systems' Voice Navigator (which allows him to talk to his computer), and HyperCard.

The actual nerves of the system are formed by MIDI Time Piece, a 32-in, 32-out MIDI patch bay that also functions as a synchronizer. "My whole system wouldn't work if it weren't for this sophisticated MIDI network, which connects everything," Badarou explains. "It assigns and merges channels, and gives you 128 MIDI channels, rather than just 16."

Getting back to the nerve center, Badarou describes his use of HyperCard: "What I've done is create a stack of 'cards' for the DMP11s, which gives me a real complete recall starting situation with the DMP11s, outboard gear and keyboards. I have as many 'cards' as DMP11 units and can flick through them on my Mac, comparing, updating or merging data, like the names of the synths and the sounds and patches and levels of the different channels and/or



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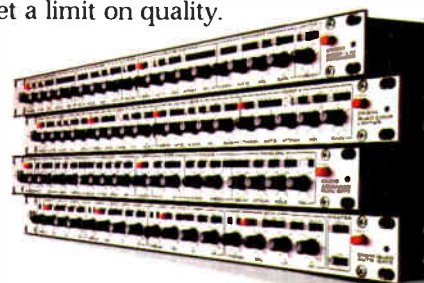
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"So I can save any setup as a file on a floppy or a hard disk, and when I want to come back to a certain song, all I have to do is load the disk and all the initial data are set, including keyboard sounds. HyperCard gives me a static initial view of what's happening. Once I start working on the song, Performer takes over and adjusts the levels of the mix and the sounds."

On Digidesign: "I actually have an MCI 24-track tape machine in my studio, though I record very few analog live sounds. Digidesign sounds great, and it's affordable. At the moment I have the 2-track version, which is enough for my purposes. I have a 600-megabyte hard disk on my Mac, which gives me a full hour of stereo sound. I use the Digidesign for audio recording, or I mix onto it to use the digital editing facilities."

And lastly, the one you've all been waiting for, the computer chat program, Voice Navigator (reviewed in the December 1990 *Mix*). Badarou explains, "Voice Navigator is hardware and software for the Mac that allows

you to conduct anything with your voice that you could type with the keyboard or click and drag with the mouse.

"It only works with one person. You have to train it so that it will recognize and understand the words you are going to use. So I've assigned certain words for specific tasks, like pulling down a menu, selecting from a menu, ejecting disks, and all the commands for its main application: the mix data on the DMP11s. Once you're finished with your training, you save everything on a Voice File, which gets automatically loaded with the other software every time I start working.

"Not everybody might want to talk to a computer, but it works for me because it's like a third hand. I can adjust my release parameter on the OB8, and at the same time direct the computer to give less reverb on the Synclavier. So I can concentrate on just making music. In the end, one might sit in a studio just with a keyboard and give vocal commands."

It's a fascinating prospect that could work even if you're not a MIDI and/or keyboard-based player. All you would then need in the room is your in-

strument(s) plus a couple of microphones. It essentially means the complete abolition of the control room in favor of the studio room, which is ironic, as it's a perfect 180° U-turn on what MIDI has set in motion over the last decade. Badarou acknowledges that his setup has some drawbacks too: "I'm not saying that it would suit everybody; it's basically ideal for a home setup, where you're usually only working on one channel at a time. You don't need to work on ten channels at once."

Perhaps Badarou's system will filter through to larger sessions and the professional studio. Perhaps the large mixing board of the future will be completely voice-controllable, perhaps even to the degree that the conductor, from in front of the orchestra, can give it directions. Imagine him or her saying, with headphones on, no engineer in sight: "A bit more cello, please, and a bit more clarity on the woodwinds..."

If anything, it makes a good sketch for a science fiction film. Or Monty Python, for that matter. ■

Paul Tingen is a London-based freelance writer.

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—FROM PAGE 42, PAINLESS WIRELESS

tenna instead of a “rubber duck.” Most body pack and some hand-held transmitters feature external antennas, and some offer a choice of either wire or a “rubber duck.” The “rubber duck” is conveniently small, but it’s terribly inefficient compared to the wire and at best will only give you about 50% to 60% of the other’s range. Extend the wire as straight as possible to maximize its radiating efficiency.

8. Watch your levels. Most wireless transmitters have gain-selecting switches, but obviously you can’t adjust them during a performance, so do your

homework beforehand and ask the performer(s) to help you set the levels. Too much gain will give you overmodulation and distortion, and too little gain gets you undermodulation and reduced signal-to-noise. If I had to choose, I’d err on the undermodulation side.

Especially for Body-Pack Transmitters

9. Protect the transmitter from sweat. A wireless transmitter can be expensive to repair, especially when the circuitry is corroded from perspiration. Practice safe sound. A dry latex condom does

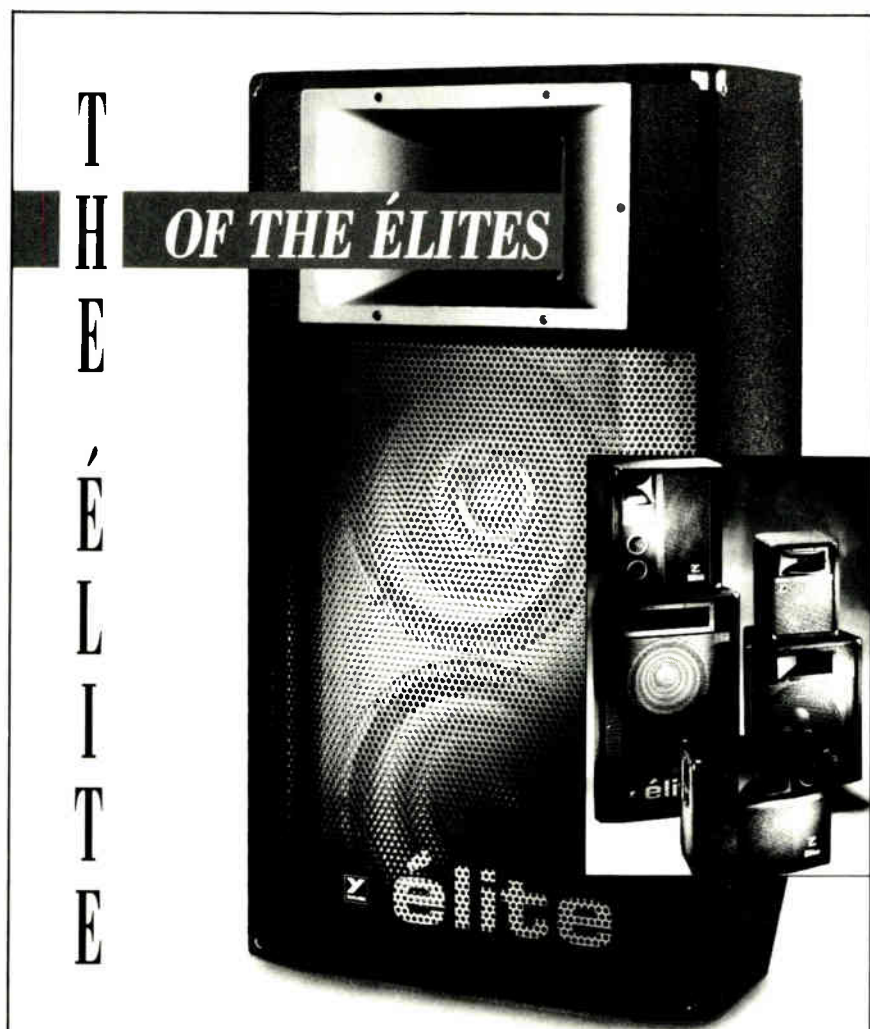
an excellent job of protecting the body-pack in plays, musicals, etc., where the performers tend to work up a good sweat.

10. For theatrical productions, place the lavalier microphone on the actor’s head, if possible. Many sound engineers never think of placing lavaliers anywhere but on the upper chest, or the “emcee” position. It’s fine for newscasts or other talking head shows, but in theater it’s better to place it on the actor’s or actress’s head—in the hairline, attached to glasses, etc. The mic-to-mouth distance will stay constant regardless of how the wearer moves their head. It also minimizes clothing noise, and costume changes are easier. Secured with bobby pins or a dab of wig adhesive and carefully placed where hats or other costume parts won’t interfere, a small lavalier is virtually invisible to the audience, and the transmitter can be hidden under the costume itself. Of course, this technique is useless if the actor butts heads or is playing Daddy Warbucks.

11. When necessary, use a moisture-resistant lavalier microphone. Moisture is a mortal enemy to many lavaliers. The two common culprits are sweat and condensation. The latter often happens in outdoor productions in hot, humid climates where the green room is cool and air-conditioned. When the performers go outside, moisture condenses on and inside the cool, exposed microphone and wreaks havoc with the high-impedance circuitry inside. Eventually, you have an expensive dud. Well-designed, moisture-resistant lavaliers are sealed to prevent this damage without compromising sound quality.

System-Wide

12. Coordinate frequencies. Obviously, you shouldn’t have more than one wireless transmitter in use on the same (or very close) frequencies in the same area. What isn’t obvious is that certain frequency combinations, even if they are seemingly well-spaced, can also cause trouble. That’s because of problems such as intermodulation distortion and image interference. A popular misconception is that RF carriers intermodulate in the air; actually, they do so only in non-linear circuits, such as a receiver’s overloaded front-end amplifier. Intermodulation produces sum-and-interference signals that may fall on or near the desired channel frequencies and cause interference problems like whistles, distortion and



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noise. Channel frequencies can be mathematically selected, though, to make potential intermodulation products fall harmlessly distant from them.

Image interference occurs when RF energy leaking from a receiver's local oscillator is at or near the channel frequency of another nearby receiver. Local oscillators on most receivers run at 10.7 MHz (the most common intermediate frequency) above or below the channel frequency, so avoid frequency spacings of 10.6 to 10.8 MHz.

Most manufacturers and distributors have computer programs for checking potential intermodulation, image and

spacing problems, and will gladly help you select frequencies. Be sure to inform them of any existing wireless microphones (brand and model) as well as any wireless intercoms, wireless IFB's and any other RF devices.

13. Don't use active TV channels. If you use frequencies that belong to a local TV station, you're asking for trouble (see Table, page 40). Their signal may interfere with yours (bad for you), or *yours* may interfere with *theirs* (worse for you). The latter means likely legal fees, possible fines and a big hassle.

14. Consider UHF. UHF is becoming

more popular with wireless microphone users, despite the extra cost and more complex equipment. Why? The VHF spectrum is pretty crowded in many places, and UHF offers many more frequencies to choose from, lessening the potential for interference. Touring shows especially like UHF, since it's so much easier to find frequencies that can be used in each city on their itineraries.

15. Have your system(s) aligned periodically. Everything ages, and even with the best care, so does your wireless microphone system. Tuned circuits, through thermal expansion and contraction and other mechanical forces, may detune, contacts may get dirty, sound baskets can clog with lipstick and spit, and other performance-robbing things happen eventually. So it's a good idea to have a qualified technician clean up and tune up your equipment now and then. How often depends on several factors: the amount of use and abuse it gets (and how much you anticipate), how well it's designed, and old Murphy's Law again.

16. Get a license. Okay, the FCC won't drag you away in the middle of the night just because you don't have a license for your wireless mic, but a license does help in case of an interference conflict with another user. The FCC classifies most wireless microphone operation as "unprotected use"; i.e., if you interfere with another licensed user, *you* have to cease operation and presumably find another frequency, but you can at least prove that you operate legally. If your conflict is with an unlicensed user, your license gives you first priority.

Wireless mic use by broadcasters, television and movie producers, networks, and local origin or public access cable TV producers is governed by Section 74.800 of the Code of Federal Regulations. Licensing is handled through the FCC's Mass Media Bureau at (202) 632-7505. Ask for Form 313. Other wireless mic use is controlled by Section 90.265B and licensed by the FCC Private Radio Bureau at (717) 337-1212. Ask for Form 574. In Canada, the Department of Communications regulates wireless mics, and in most other countries it's handled by the postal authorities. ■

Bob Lee of Vernon, Conn., is an audio/broadcast recording engineer and writer when he's working, and a bicyclist, community theater irregular and guitar player in his spare time.

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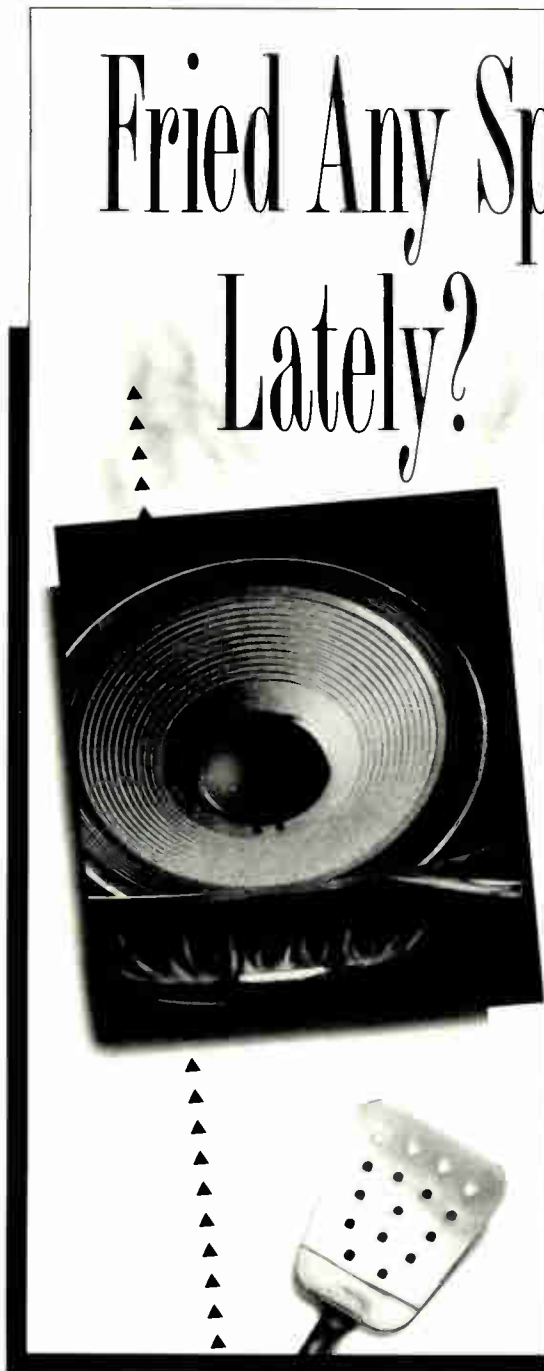
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MULTIPLE DAT COPIES

The Fidelity Issue

by Jim Paul

WITH THE ADVENT OF DAT AS A MIXDOWN, ARCHIVAL and mastering format, valid questions arise regarding its durability, accuracy and reproducibility. Especially prevalent in all this confusion is the issue of DAT's ability to make

CAN A
TWENTIETH
GENERATION
COPY SOUND
AS GOOD AS
THE
ORIGINAL?

“perfect” copies and the institution of the Serial Copy Management System copy protection scheme. SCMS addresses only the digital copying process. It does not prevent copying when the *analog* ports of two DAT machines are used. It is generally assumed that analog copies would be so inferior to the original that there is no reason to be concerned with them in the “boot-

leg” market. It is appropriate, then, to take a look at just what happens to an analog, multi-generational DAT copy and determine how well it will hold up across many generations.

For this article three well-known record producers participated in an A/B listening test of material recorded onto a DAT and copied using the D/A and A/D conversions across *20 generations!* Each of the producers then shared their views on DAT in general and the role it plays in each of their careers.

The question is simple. Can an experienced producer/engineer, whose career lives and dies by an ability to distinguish the most subtle nuances in music, *consistently* identify a 20-generation copy against a digital master?

The Test

I devised a simple blind A/B comparison to determine the



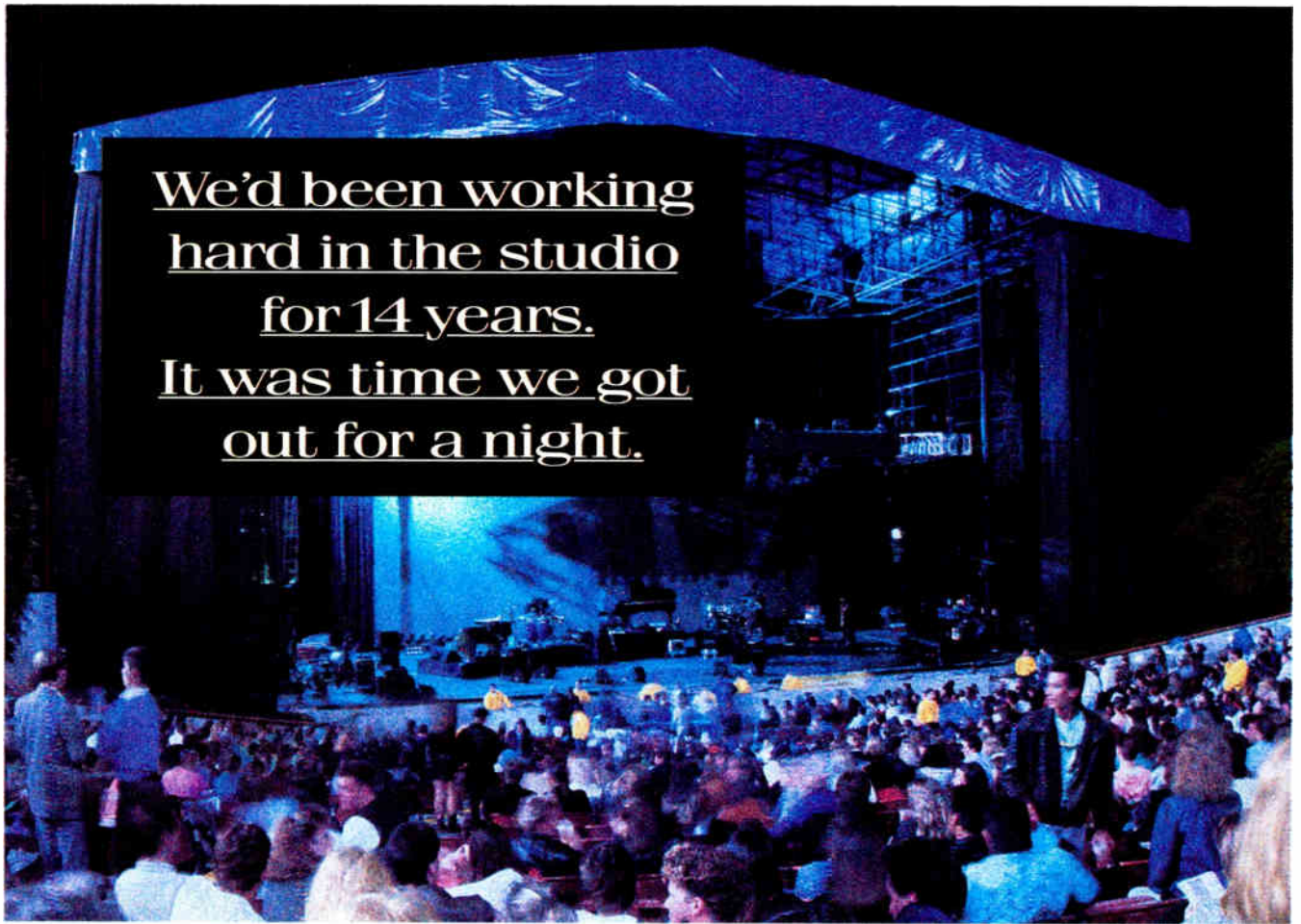
listenability and quality of a multi-generational DAT copy. The record producers would have two identical sources running simultaneously to choose from, one the copy and the other the master.

I used high-quality equipment, tape and recordings in an effort to eliminate as many variables as possible. I chose two of the new

Panasonic SV-3700 DAT machines, provided by the company. (Its predecessor, the SV-3500, is an accepted studio standard, and the 3700 appears to be an improvement over that, with its delta-sigma 1-bit converters.)

All copies were made on Ampex 467 tape. An emerging standard in DAT tapes, it is highly dependable and predictable. Short,

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low-loss Belden cables with high-quality Switchcraft connectors were used for interconnecting the two machines.

For program material I used three sources. The first was the Prosonus *Studio Reference Disc* and sound library for pianos and brass. Its sounds were recorded with Schoeps mics direct to Sony 1630. It also contained digitally generated sine waves. For my second source I used the services of my good friend and crack engineer David Gehlhar at Selah Studios to record some guitars and vocals with two AKG 414 Ultra Linear Series mics direct to the DAT machine. The third source was an analog 24-track recording of a fully produced instrumental with keyboards, bass, drums and guitars, mastered directly to DAT and digitally edited with Digidesign's Sound Tools.

Each source was transferred to the SV-3700 using the AES/EBU digital interface, and a first-generation master containing all the source material was prepared. Then that master was copied out of the D/A converters of one SV-3700 into the A/D converters of a second SV-3700. This copying process was meticulously repeated using virgin tape each time, until the 19th generation. (The 20th generation would be onto the A or B source.)

The heads of each machine were cleaned after each five passes using the DAT head cleaning tape that Panasonic includes with the 3700.

Finally, the A and B source tapes were prepared with the 20th generation of the copied material distributed randomly on either source A or source B, and its digital counterpart transferred to the other source tape. In the end I had two tapes, both with identical program material, but for each musical segment, either A or B was the pure second-generation digital copy, and the other was the multi-generational copy. A careful log was made indicating which was the original and which was the copy for each of the musical selections.

The Producer/Engineers

The next step was to choose the producers. First I called on Roger Nichols, whose album credits as producer/engineer include the awesome Steely Dan *Aja* and *Gaucho* albums, as well as Donald Fagen's *The Nightfly* and Rickie Lee Jones' *Flying Cowboys*. Next I talked to David Cole, producer for those wonderful Richard Marx albums.

The third producer was Peter McLan, most noted for his work as the producer on the smash success *Men at Work* debut, as well as work with the band Mr. Mister.

Roger agreed to hold the tests at his Hollywood base of operations, Soundworks West, so we could use his favorite reference monitors, the Meyer HD-1s. David Cole was unable to make the session, so he rescheduled later in the week at Capitol Records' Studio B.

Each listener heard nine musical selections playing together in relative sync—switched between A and B—and marked down the source they thought was the copy. They also indicated when they could not determine which was the copy and were encouraged to write comments about what they heard on the page. This was essentially a double-blindfold test because the master log was not on the premises, and, as the operator, I honestly did not know which copy was which.

The Results

As I scored each producer's sheet against the master, a feeling of disbelief began to sweep over me. It seemed the assumptions I held before the test were to be proven wrong. Although I believed the copies might hold up to nearly acceptable standards, I assumed that they would be easily distinguishable from the master.

What I found instead not only shocked me, but caused me to double-check my methodology. The incorrect choices were scattered randomly throughout the nine pieces and seemed to fit no particular pattern.

Not only were there *two or more* incorrect or indistinguishable choices distributed randomly on *each* sheet, but there were instances where the copy was incorrectly identified to be the master *because of the way it sounded!* Out of a total of 27 pieces of music listened to in the A/B test, the correct choice was made only 63% of the time! In the other 37% of the time, the copy was either incorrectly chosen as the master or it was indicated that they could not accurately make a choice.

Audio Analysis

In order to try to gain some insight into what was happening to the copies, I copied pure sine waves for 20 generations and fed the data into an FFT analysis program on the Macintosh,

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looking at each harmonic as well as the entire audio spectrum. I could find no artifacts from 20 to 20k Hz at about 60 dB down. The DAT tapes were then taken to the lab at Jensen Transformers to have a closer look.

The sine wave copies were fed into a Hewlett-Packard spectral analyzer to look for visible harmonics or noise.

The DAT copy was actually quieter than the machine's internal noise level, and as low as -70 dB down, artifacts appeared that were above the level of the machine noise.

Finally, we fed the audio into an Audio Precision PC-based THD Analyzer. For the first time we found dramatic differences between the

DAT:

The Participants Speak Out

FOLLOWING THE LISTENING comparisons, I talked to the three producer/engineers, soliciting some of their feelings about DAT technology and issues.

Mix: Where do you see DAT going from here? It is being used all over the world now, but there are some obvious questions and limitations to it.

Nichols: DAT is here to stay. It will be difficult making it the professional media we all want it to be, replacing a 2-track and replacing 1630s. It was not designed to do that. It was designed as a consumer medium, and the very thing that makes it inexpensive is the fragility of the media. The density of the digital bits on that tape is higher than anything that's ever been devised. The heads are one-quarter the thickness of a human hair! There is a problem because of the level of adjustment going from DAT machine to DAT machine. So if someone's going to use it for professional applications, they'd better make backups!

Cole: DAT is a great format to replace the cassette in terms of an accurate portable reference. It's so much nicer to take a DAT home or give a DAT to a record company.

You know it's going to run at the right speed, and it has a better chance of playing an accurate frequency response. When decisions are made at a lot of different levels—whether it be from the artist, the producer or the record company—they are based on the rough mix. I'd much rather have as high quality of a copy as possible to put into those people's hands. So for me, DAT works great in that context.

Mix: Where does DAT fit into your personal career?

McIan: I use DAT now mainly as a storage medium or for live-to-2-track. I recently mixed a project to 1/2-inch at 30 ips and also at the same time to a DAT, and they definitely sounded different. Aesthetically speaking, the analog sounded more pleasing.

Cole: I simultaneously record to DAT when I mix, but my primary mix format is 1/2-inch analog at 30 ips, no noise reduction. I like it from a cost standpoint. It's easy to cut and paste 1/2-inch, and there's no editing equipment to rent. When you take it to the mastering place, there's no conversion process that has to happen because you recorded the wrong format. And I prefer the sound of analog tape!

McIan: Also, I don't know what the editing capabilities of DAT are going to be in the future.

—CONTINUED ON PAGE 102

originals and the copies. On the originals, the THD read out at about 0.015% for most of the sine waves. When we fed in the copies, however, the distortion took a quantum leap to as high as 0.350%! This led me to wonder if the added distortion was a factor in causing some of the copies to "sound better" than the originals.

Interpretations and Conclusions

The results presented here are certainly not conclusive, nor do they suggest that the D/A and A/D conversion process is perfect, nor that copies made this way are up to acceptable standards in the audio industry. However, these results do point to some possible trends, and it is obvious that something interesting is happening to the audio during the conversion process.

Each producer noted a *very* distinct difference in the sound of the two sources, especially with respect to the stereo image in the copies shifting—either collapsing inward or expanding way out left and right. Obvious phase anomalies were noted, and on several pieces, there was a noticeable increase in hiss, particularly with very low piano notes.

No one had trouble with the 12-string guitar, the trumpet notes, low piano notes or with a male vocalist. This might be explained by noting that a 12-string guitar is extremely rich in harmonics, and as they were lost in the inevitable phase distortions, it became obvious which one was a copy. As for the voice, perhaps we are so in tune with how a human voice should sound, that after 20 generations of added distortion and phase shift, it just didn't sound the way our ears know it should. The trumpet and piano pieces were solo instruments, and as the ambient noise floor increased in the copying process, these copies also became obvious.

The most difficult pieces to identify were the fully produced tune and the sine wave sweep. Most of us do not sit around listening to sine waves, and it was not surprising that a slow sweep from 30-16k Hz was difficult to distinguish from the original.

Regarding the fully produced piece, all three producers had trouble identifying the copy. Nichols suggested that perhaps the phase shift was responsible for making the image appear to spread wider, and Cole noted that the

original seemed to have elements that were out of phase to begin with. The full bandwidth masked the increased hiss. Perhaps the added distortion gave this piece more of an analog sound—less brittle in the high-end, with added warmth.

What caused certain pieces to be easier to distinguish and others to be more difficult? Further study is warranted, perhaps with more of a variety of source material and a larger sample of listeners. Possibly a pro DAT manufacturer will want to pursue this issue further. As consumer DAT machines proliferate and SCMS protects the digital domain, the analog copying process will take on more and more importance.

I'll leave the debate about just what this means to others. But for myself, I have an increased confidence in the A/D and D/A conversion and copying process. ■

Jim Paul is owner of Reel Time Productions, an audio and video production company in Southern California, and teaches sound reinforcement at Orange Coast College in Costa Mesa, California.



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—FROM PAGE 100, PARTICIPANTS SPEAK OUT

Nichols: I've done editing on the Fostex and the new Sony machines with SMPTE time code. They have an editor available so you can edit between two R-DAT machines and do the same stuff you can do with a 1630. But there's a problem. The media—this little 4mm tape— isn't going to take all this shuttling and punching in at the same spot when you want to fix edits. In order to get all the density on R-DAT tape, each pass of the record head erases part of the track before it. So to do

assemble recording you're okay, because you can punch-in at the vertical interval and erase the previous track and go on. But what you cannot do is insert editing where you need to record a little piece and punch-out, because you've erased one swipe of the next piece and there's no getting that back.

With the new technology in converters—the 1-bit stuff, like my inexpensive Yamaha converter with digital outs—a lot of the problems people had with digital are going away. And now they are including

that technology in the new DAT machines like the Panasonic 3700. This comes from the consumer market. They have to depend on the consumer R-DAT machines, which are going to sell hundreds of thousands, and CD players, which will sell millions.

Mix: The advent of digital technology spelled the demise of the vinyl record. Do you believe that DAT will do to the cassette what CD has done to vinyl?

Mclan: I definitely think so. In our business we spend months of time and thousands of dollars in creating a piece of music. And then the final result of what the consumer heard for a long time was a needle scratching across a hunk of plastic. Or a cassette that doesn't have any bandwidth, although we so carefully worked to compensate for it. I think that the case for DAT has already been made. The only thing that is making it elitist at the moment is the price, [and it will drop].

Cole: I don't know. A lot of people are perfectly content with taking a store-bought cassette and putting it in their double cassette deck, making a high-speed copy of it, and saying, "Hey, I got this album for free!" and they don't care if they got the artwork or if it's noisy and hissy. They throw it in their car and away they go. So whether they will invest a thousand bucks in a DAT machine, I just don't know.

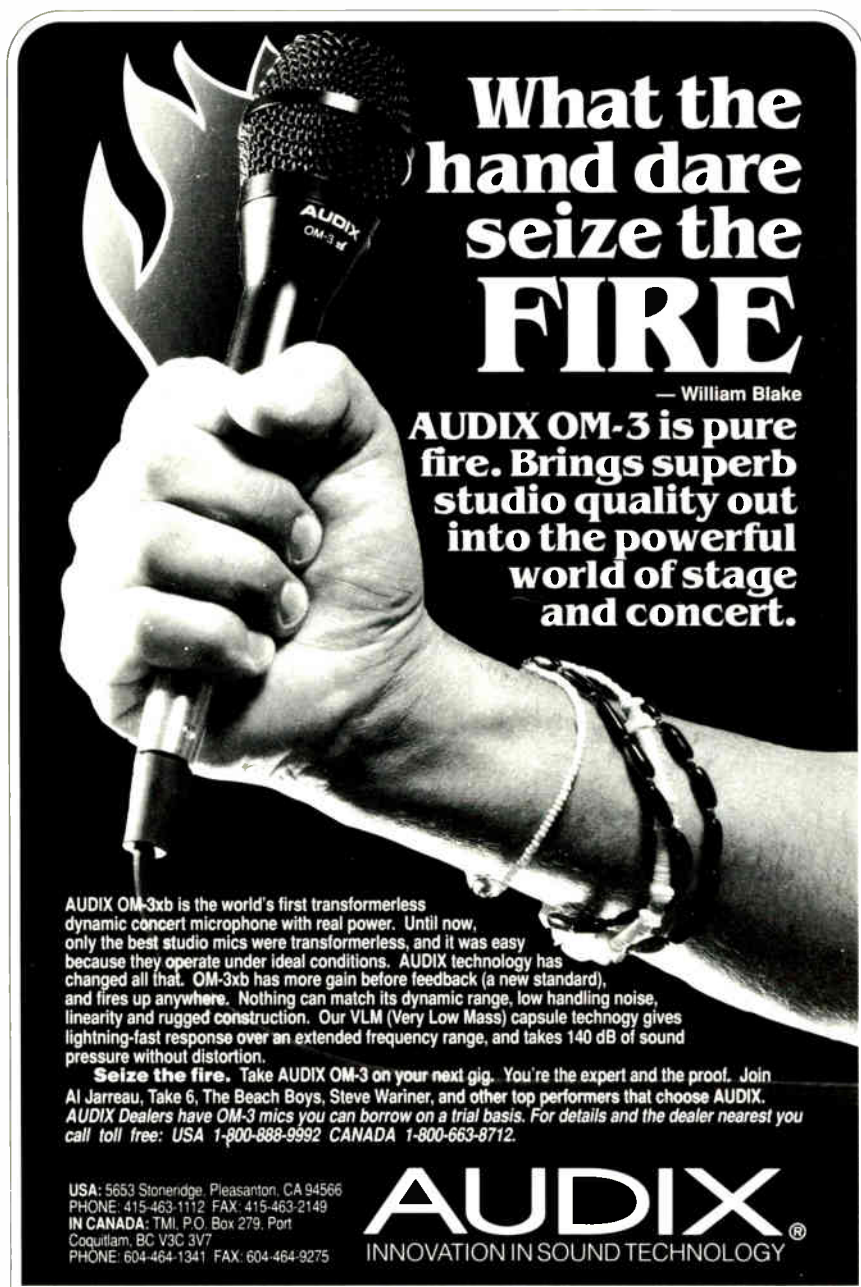
Mix: Finally, what are your reactions to what we did today, and did you learn anything?

Nichols: I learned that I won't be so gun-shy if I have to make analog copies for someone to listen to. It's much better than I thought it would be, especially after that many generations.

Mclan: I have a very similar reaction to Roger. Twenty generations down is obviously vastly superior to one generation on analog cassette, and that is what this format is designed to replace. So for my money, it's tremendous!

Cole: It was very interesting. Phase certainly gets scrambled in passing through that many filters, with definite image shifting. There was definitely some distortion on some of the cuts. But overall it was an interesting experience.

—Jim Paul



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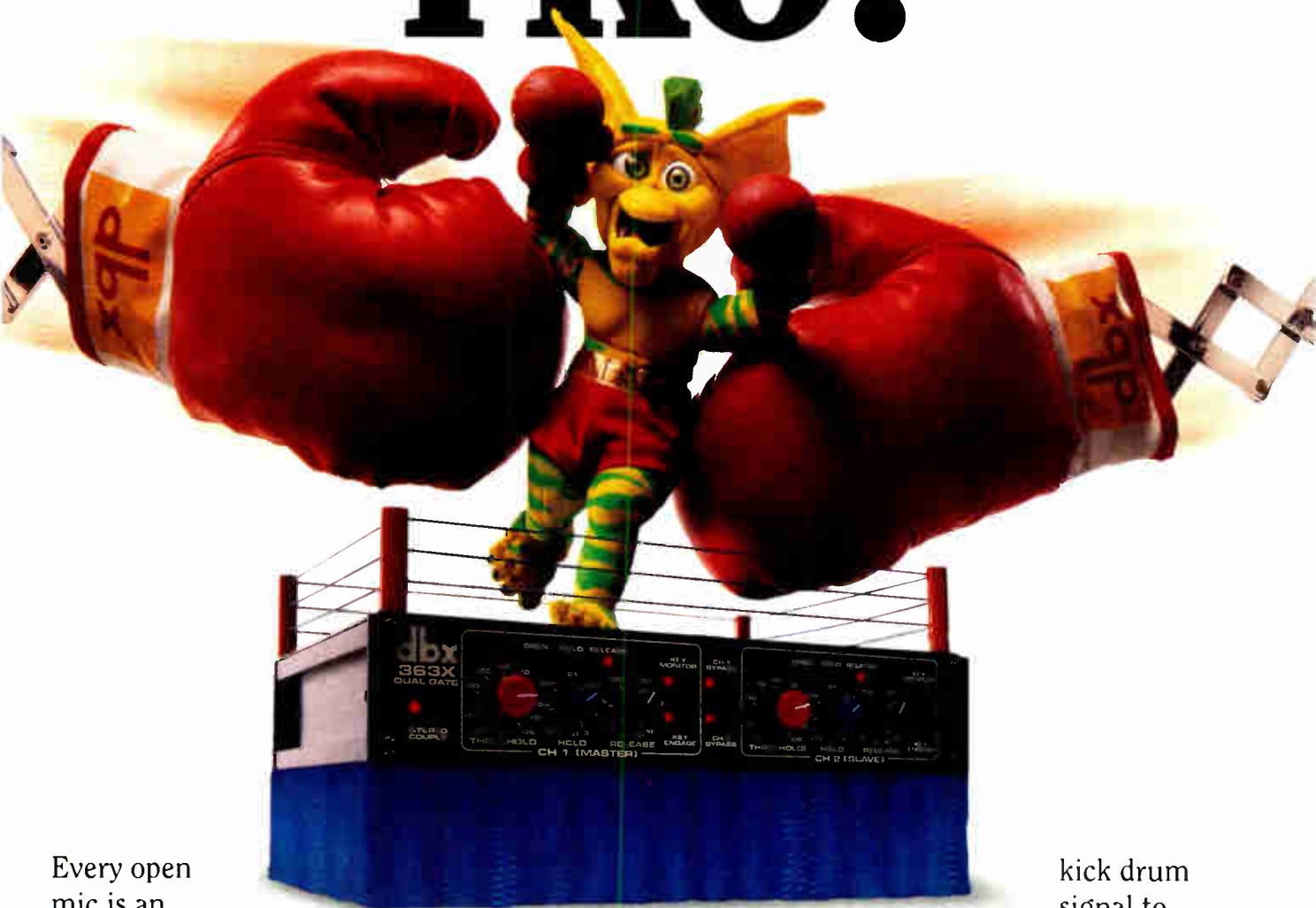
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The console is more substantial physically than many consoles of com-

parable price. This can be a plus or minus to buyers in this price range: While the size provides for professional functionality and is visually impressive to clients in a post-production-type environment, the dimensions may be prohibitive in a personal production studio where space is often at a premium.

The design is modular: Input, return and monitor modules can be individually removed for servicing, and the meter bridge hinges back for easy access. While Peavey presently offers no fader automation, the fader bay is deep enough to accept such a package. The power supply is housed in its own external rack-mount chassis.

Input Modules

The input modules have all of the standard features. One of the first things I liked was four-stage EQ on each input module: low shelving (sweepable from 50-500 Hz); peaking low-mid (sweepable from 200-2,000 Hz); peaking high-mid from 600-8,000 Hz; and high shelving from 3k-15k Hz. Controls for ± 15 dB boost/cut and frequency sweeps are concentric, and EQ bypass switching is provided.

A total of eight send/return buses are divided into four aux sends and four effects sends. Effects A and B are on a concentric pot, as are effects C and D, both as permanently post-EQ and post-fader. Needless to say, this nicely accommodates the variety of stereo

A 36x24 version of the Peavey AMR Production Series console in use at Mylon LeFevre's Broken Heart Studios in Atlanta, Ga.

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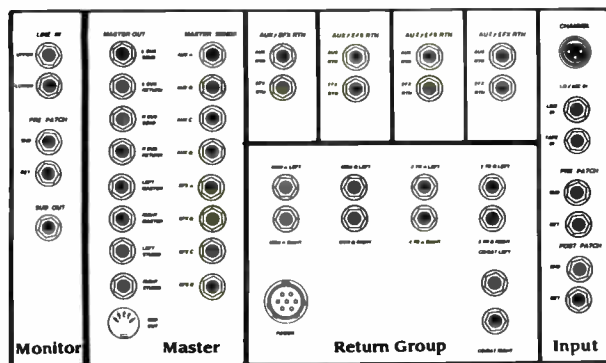
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signal processors available today. On the other hand, each of the four aux sends has its own individual pot, which is ideal for quickly setting up four cue mixes. Aux A and B are jointly assignable to be pre- or post-EQ and pre- or post-fader, as are aux C and D. In a mix suite, video post facility or MIDI studio where cue mixes are rarely needed, this design paves the way for a total of eight effects sends. When either aux pair is switched post-EQ, the associated sends are always equalized regardless of the EQ in/out bypass switch, thus cues and effects can be equalized independently of the main signal path.

Bus assignment is in stereo pairs



The Production Series console's rear panel connections for the monitor, master return group and input sections provide ample access to insert points and all I/O jacks.

with the pan pot governing the balance between the selected bus pair, in addition to left-right imaging. Each input module has a tape/line switch—when engaged, the tape inputs to the monitor section are swapped with the line-ins on the input module. (This function is only active on the number of modules that match the number of buses on a given model.) Channels all have a pre-EQ, pre-fader patch point, as well as a post-EQ, post-fader patch point.

Return Modules

The return section is organized into four identical modules, each with similar upper and lower returns. The upper returns are designed as aux returns, the lower as effects returns. Each has ± 15 dB shelving EQ at 100 Hz and 10 kHz, as well as pan, bus assign, mute, solo and level control. Each module also provides a fader that can control either the aux or effects portion of the module. Finally, the effects section of each return module features a concentric pot switchable between aux A/B or aux C/D sends (post-fader, post-mute). This provides convenient routing of outboard effects signals to cue and headphone mixes without affecting the

main mix.

Monitor Modules

Monitor modules incorporate three functions: submaster, upper monitor and lower monitor. Upper and lower monitor sections are nearly identical, featuring trim, concentric ± 15 dB shelving EQ (100 Hz and 10 kHz), pan, mute, solo and level. Upper and lower sections also have concentric pots switchable between aux A/B and C/D, and concentric pots switchable between effects A/B and C/D (all post-fader, post-mute). This allows tape returns to be sent to both the cue mixes and effects devices (with some switching limitations). The submaster section has its own mute and solo switches, as

well as left/right assign.

Various switch combinations on each module permit the associated meter to track the submaster, upper monitor or lower monitor. A switch on each module reverses the role of the lower monitor level pot and submaster fader. Thus, the monitor section's faders can govern subgroup level while recording, and tape/instrument levels during mixdown. The signal present in the lower monitor can also be switched between tape and the lower-line input.

Master Module

The first thing you notice about the master module is the MIDI Command Center, consisting of a three-character LED display, numeric keypad and a few other buttons. This does not provide MIDI automation. Its function is to act as a MIDI remote control for other devices in the studio. The keypad can be used to specify a MIDI channel, program change or song number, as well as to send start/stop commands to sequencers. Unfortunately, these controls are the smallest on the console, yet are an arm's length from the mixing position. Generally,

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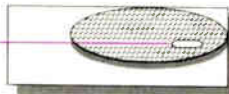
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the usefulness of the MIDI Command Center is going to depend upon the user's working style and equipment setup.

Control room routing is fairly extensive. Besides left/right assign, there are separate switches for all eight aux and effects buses, as well as separate inputs and switches for CD/DAT (RCA) and two 2-track machines. Two pairs of control room monitors are provided for. Separate level controls are implemented for headphone and studio mixes (with a common mute switch). The headphone mix can be switched between the left-right bus and the control room mix.

Talkback is implemented with a -10dB control room level dim. Talkback level can either be governed by its own control or routed to the slate level. (The slate level also controls the level of the onboard oscillator.) The slate control, in turn, can be routed to any of the four aux buses and/or the left/right and all submaster buses (tape slating).

Connections and Levels

The Production Series consoles accept input levels that accommodate the blurring lines between pro and semi-pro gear. All line, tape and return inputs on the consoles are -10dBV to +4dBu; microphone inputs are 2,000 ohms nominal impedance. All inputs are high-impedance and all outputs are low-impedance for a "loss-less" bridging interface. All inputs and outputs use transformerless electronic balancing in critical signal paths. Summing amps and microphone preamps employ low-noise, discrete semiconductors. High-speed, low-noise op amps are used in all signal paths.

Signal-level LEDs are provided at every critical point: each input module, each aux and effects return, upper and lower monitors, and master level. Each is tapped at multiple points in its respective circuit to catch "hidden" clipping. These LEDs are bi-color: green at low or nominal levels, and red within 3 dB of clipping.

Conclusions

Let's face it. The pro audio community is all set to not like a Peavey console. Regardless of perceptions of what Peavey is or isn't, the Mississippi company carefully paved the way for a new identity with the Audio Media Research division. And guess what? I like

this board. Construction is solid. Components are of good quality. Functionality and flexibility are extensive. There are mutes and solos on everything imaginable. The number of line inputs on mixdown is formidable—for example, a 32x16 console can provide up to 70 available inputs with equalization. And speaking of the latter, the EQ is comprehensive and clean. More importantly, the whole board is clean.

Yes, there are a handful of negatives. Switch nomenclature makes it a bit difficult to understand whether a function is engaged in the up or down position. Switches have a 3/16-inch throw, making it difficult to change a row of them with one sweep of the finger. Less subtle color-coding might make operation a bit more intuitive. A sharper incline of the front panel would make controls easier to identify (I found myself standing up a lot). No stereo input modules are available. Only two aux and two effects buses are available at a time on each monitor section, and only two aux buses at a time are available on any one effects send. The owner's manual could go into more depth with regard to applications (the typical buyer in this price range might not have previous experience with all the mixing techniques these boards provide). These, however, are minor complaints within the Grand Scheme of Things.

Company officials prefer that we don't use the phrase, "It's a good board for the money." Let's face it, money is a consideration, and the AMR Production Series console is a *lot* of board for the money. It's not a Trident or a Harrison. It won't put any six-figure console manufacturers in the poorhouse. It is, however, going to find a very happy home in small or second studios, post-production facilities, and project studios. The choice between in-line and split-monitor designs in this price range is a whole separate issue. As a split-monitor console, AMRs have a solid price/performance ratio. The biggest hurdle facing the AMR Production Series is the bias that members of the pro audio community may have against the Peavey moniker. However, as more and more engineers put AMR consoles through the paces, this perception will certainly change. ■

Jeff Burger is president of Creative Technologies, a multimedia production company based in Northern California.

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NEW PRODUCTS



AUDIO-TECHNICA ◀ PRO 25 MICROPHONES

One of seven new models in the Pro Series from Audio-Technica (Stow, Ohio) is the Pro 25. Featuring a hypercardioid dynamic design with a large diaphragm, the Pro 25 is particularly suited for close-miking high SPL sources, such as drums, bass and vocals, where low-frequency emphasis is desirable.

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FRIEND-CHIP ▼ SRC/AT

New from Friend-Chip (U.S. offices in New York City) is the SRC/AT, a high-resolution, SMPTE-to-MIDI synchronizer (with song pointer and MIDI time code modes) in a single-rackspace chassis. Features include support of 24/25/30/30DF frame formats, $\pm 25\%$ reading capability; time code re-shaping; programmable time offsets; internal 1x4 thru box; two MIDI inputs with merger; tempo map resolution to 1/10,000 bpm; 32-character illuminated LCD; "learn tempo" mode from audio input; and sophisticated editing features. The SRC/AT retails at \$1,095, including internal RAM disk memory. Other Friend-Chip products include a Time Code Refresher (\$199) and large-size, 1- and 2-inch LED time code displays priced at \$599 and \$950.

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OTARI PREMIERE CONSOLE

Designed for television or film post is the Premiere from Otari (Foster City, Calif.). Custom-configurable with an unlimited number of input modules, it accommodates one to three or more engineers. Each input module features dual line inputs, sweepable high/lowpass filters, fully parametric 4-band EQ, eight aux sends and 4-channel panning. Options include mono or stereo film-style 7-band graphic EQs, Disk-mix 3/Film Moving Faders (with fader, mute and switch automation), and Otari Virtual Monitor/Listen Computer System: The latter allows each engineer full access to monitor and machine control of any number of tracks.

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MOSVALVE POWER AMPS

Tube Works of Denver has unveiled a 500-watt tube amplifier designed for studio monitoring and PA applications. A unique, patent-pending design incorporates MOSFETs as the power source, offering solid-state reliability with the warm, musical performance of tubes, for the best of both worlds.

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SAUSALITO CRAFTWORKS CONSOLE WORKSTATION

A new addition to the Omnirax Series of rack-mounted studio furniture from Sausalito Craftworks (Sausalito, Calif.) is the CW-30 console workstation. The system provides 14 spaces slanted toward the user to accommodate most rack-mount mixers, along with ten vertical spaces for effects processors and six bottom spaces. Additional racks (such as the company's E-Series) can be placed above the console for expansion, and shelves for reference monitors, drum machines, etc. will be available soon. The CW-30 costs \$299 and comes in black or gray melamine with heavy-duty locking wheels.

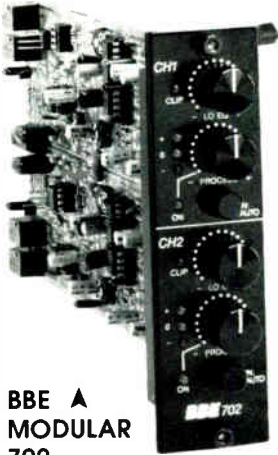
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ALLEN & HEATH SPECTRUM CONSOLES

Designed for the recording and sound reinforcement markets is the Spectrum Series of consoles from Allen & Heath (Orange, Conn.). Priced from \$8,900, the Spectrum 16 is intended for 8/16-track recording and supports up to 40 line inputs during mixdown, 32 of which have full EQ. The Spectrum 32 can be used for the simultaneous recording of up to 32 tracks. All models feature six aux buses (and a dedicated stereo cue bus), along with internal switching to accommodate -10 or +4 level recorders and outboard gear. Onboard automation is supported via a V-4 software package, offering full MIDI sequencing and direct MIDI control of console functions. Options include J.L. Cooper Magi III automation and a choice of mechanical or bar graph meters.

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BBE ▲ MODULAR 702

The Model 702 from BBE Sound (Huntington Beach, Calif.) offers the same performance specs as the company's top-of-the-line BBE 822A processor, but in a compact module that can be fitted into a dbx 900 Series rack. The 702 is a 2-channel unit that includes front panel adjustments for process and low-EQ, process and clip indicators, and a hard-wire bypass.

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LEADER DIGITAL STORAGE OSCILLOSCOPE

Leader Instruments of Anaheim, Calif., has announced the Model 3100D, a new autoranging 100MHz analog/digital oscilloscope. Features include separate 4K memories for both display and reference memories, 40 MS/s maximum sampling rate (100 MS/s equivalent sampling), with the ability to store up to four waveforms in memory (with waveform expansion ranging from 1-100x and automatic interpolation). The 3100D offers CRT readouts with cursors of voltage, time, frequency and phase, along with ratios for voltage, time and decibels. Results can be downloaded to computer via the standard GPIB interface or to a HP-GL plotter for hard copy.

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YAMAHA PC4002 POWER AMP ▼

Designed for the high-end listening environment is the PC4002M from Yamaha Pro Audio, Buena Park, Calif. The PC4002M delivers 700 watts per channel into 4 ohms, 430 watts per side at 8 ohms or 1,100 watts in BTL mono. Frequency response is 10 to 50k Hz (± 1 dB), with a THD of under 0.005%. Features include peak reading/peak power meters, detented level controls, thermostatically controlled, two-speed fans, twin power supplies, and even a separate power supply for the input stage.

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DOLBY DIGITAL AUDIO ENCODING SYSTEM

Now shipping from Dolby Laboratories (San Francisco) are the Model DP501 encoder and DP502 decoder, which use Dolby AC-2 technology to code two audio channels at a rate only one-sixth of 16-bit linear PCM. Applications include data transmission and storage where spectrum efficiency and speed are of concern, such as satellite transmissions, terrestrial links and digital storage media capacity extension.

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by George Petersen

PRODUCT

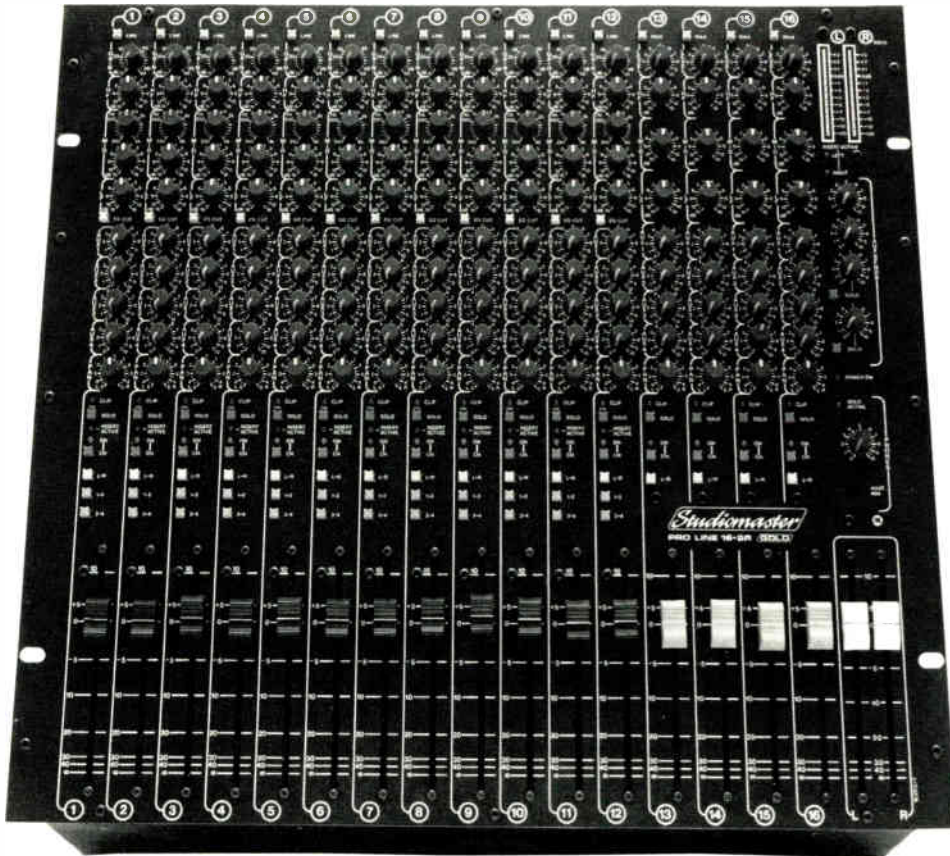
CRITIQUES AND COMMENTS

Studiomaster ProLine 16-2R Console

S Rack-mountable mixers seem to be growing in popularity, appearing more frequently in installations large and small. This is not too surprising, since they can be an ideal space-saving solution for use in small studios, DJ and club P.A.s, video post suites, remote recording vans, musician's racks—just about anywhere you need a compact mixer—or as a submixer to handle additional inputs on larger jobs.

figuration, providing up to 20 input channels with full fader and EQ control.

Features include 3-band EQ (with sweepable midrange on inputs 1-12); four aux sends; balanced XLR mic and unbalanced 1/4-inch line inputs; unbalanced XLR main outputs; 48VDC phantom power (now standard on all Studiomaster consoles); four stereo inputs (channels 13-16); four subgroups; LED metering; and automatic deck, turntable start switches controlled



Part of the Studiomaster ProLine Gold Series, the Model 16-2R is a rack-mount mixer that handles any of the above duties with ease. As its name implies, the 16-2R is a 16x2 mixer, although it can also function in a 12x4x2 or 12 (plus 4 stereo inputs) x2 con-

from the stereo channel 13 and 15 inputs. The mixer has insert points on all inputs and the main L/R buses; these are 1/4-inch TRS-type, with the tip designated as a send, and ring as the return. Someday, the audio industry will agree on a standard for TRS insert

Seven Sessions with the Audix SCX-1 Microphone

by Tom Carr

Some months ago, my search for new, interesting mics led me to a pair of SCX-1 microphones from the Audix Corporation in Pleasanton, Calif. Rather than get involved with teeny details like how much the mics weigh, what's their favorite console, and what they like to do on the weekend, I decided to present some basic information. Then we'll check out some of the sessions in which the mics have been used.

The SCX-1 is a high-output condenser mic the size of a Neumann KM84 that allows the user to change the pickup pattern by unscrewing the capsule and replacing it with the pattern desired. Four capsules—cardioid, hypercardioid, omni and omni with a presence peak—were provided for evaluation with each microphone body. In high-SPL situations, optional -10dB pads can be placed in series with the capsules.

It seems fitting that the first test of these mics would be on a session filled with extremes: a 19-piece big band recording live-to-2-track. The pair of SCX-1s fitted with cardioid capsules were used on the piano. The already bright Yamaha grand sounded very even but now even brighter. Had this been an overdub, I probably would have shaved a bit of the high frequencies off, but the need to hear the piano in the midst of 18 other instruments made that extra sparkle quite useful. The mic's rejection of the screaming brass section was impressive. There was no need to cover the piano, even with the lid open wide.

Next, I used the cardioid capsule on a couple of voice-over sessions. The sound was crisp, open, and because of the low noise and strong output, the recording was quiet.

A week later I was overdubbing

classical guitar. The instrument was rather dark in timbre—a perfect opportunity to try out the omni capsule with the presence peak. The result was wonderful. Very little EQ was required: -2dB at around 400 Hz. The presence peak and the airy quality of the omni pattern provided the desired enhancement to counter the guitar's dark side. The track sounded big, and the guitar player was delighted.

My next test was an avant-garde jazz klezmer trio performing on clarinet or bass clarinet, acoustic bass, and drums—a wild blend of very traditional



and very "out there." For the clarinets I used the Audix placed above and in front of the player's head—the spot usually occupied by a KM84. I also used an old U67 to the right and ahead of the instrument. Both mics were set to cardioid. As the clarinetist moved through the three-and-a-half-octave range, I noticed a smoother transition from lower to upper register with the SCX than what I normally got with the Neumann. As one might expect, some trimming of the high frequencies was needed to prevent the clarinet from getting shrill. The combination of the U67's warmth with the SCX's smooth top end was harmonious.

Picture a 100-voice church choir

packed into a large studio with 20 headphones for the key singers, six stage monitors providing foldback of the orchestra tracks for the other 80 singers, and a room temperature alternating between that of a sweaty gymnasium and a meat locker. For this session I used a pair of omni SCXs as overheads, approximately 17 feet above the choir, combined with four Neumanns down below. The overheads handled the blistering crescendos without a twitch (still without pads, mind you) and lent a good sense of the room size to the tracks.

Question: "Does it sound good on a Marshall stack?" The hypercardioid capsule a foot out from the cabinet pulled the speaker sound out and pushed it into my face in a rather cheeky manner. The omni with the presence peak capsule about six feet out contributed some unbridled aggression for a tasty guitar sound.

With 10dB pads in hand, it was time to try the SCX on a snare drum. I was helping a friend on the first day of tracking for an album project. Both pads were used with the cardioid capsule. The mic was placed within a few inches of the top of the drum, aimed in a way to minimize the leakage from hi-hat and the closest tom-tom.

The first thing we noticed was the mic's output level. Often the output from a padded mic can be a little wimpy. This was definitely not the case with the SCX. Also notable was the absence of that boxy, dull quality that is a by-product of close-miking a snare drum. The low end was tight and even. The high end was brilliant. With spare use of EQ, it was immediately obvious to both of us how well-suited this mic is for snare. It was a fabulous sound achieved with little effort. ■

Tom Carr is an independent producer/engineer whose home base is the Music Annex, Menlo Park, Calif.

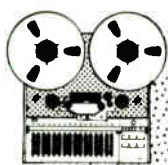
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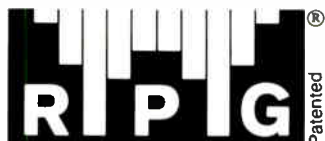
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AUDITIONS

wiring, but until then, it's a good idea to check this out before connecting your outboard gear. Studiomaster has thoughtfully printed a legend on the back panel indicating pin wiring for all connections.

The 16-2R occupies ten rackspaces, allowing the use of long-throw 100mm faders (a nice touch) and avoiding the need for concentric EQ and aux send controls, which can be cumbersome to use in a fast-paced environment. Since all input/output connectors are located on the rear panel, the mixer cannot be used horizontally on a tabletop without constructing some supporting adapters. Of course, in a permanent installation, the 16-2R could easily be flush-mounted in a countertop or console. The AC power and phantom supply switches are mounted on the back panel—an inconvenient location whether the mixer is used in a rack or console.

Operation is straightforward and simple. Inputs 1-12 are mono, while inputs 13-16 can be used either as subgroups, mono or stereo inputs. The stereo inputs also include RIAA-equalized preamps for moving-magnet phono cartridges; these can be switched into the input pathway if desired. Signal LEDs (channel on, clipping, solo active, insert active) are used liberally throughout the board, offering the engineer a quick, at-a-glance indication of operating status. The 12-segment LED meters use VU-type ballistics and are fast, bright and easy to read.

The four aux sends are set up such that aux 1 and 2 are post-fader and sends 3 and 4 are pre-fader. While this is the opposite of the arrangement found on most consoles, it actually makes more sense, since you are more likely to be changing post-fader sends for effects processing during a mix, rather than the pre-fader (cue) sends, which are often in a "set and forget" mode. It would be nice if the 16-2R included switches (or internal jumpers) that would convert the pre-fader cue sends to post-fader effects sends, since there are many applications—such as electronic music mixing and video sweetening—where pre-sends are rarely used. Perhaps Studiomaster could consider adding such options to future models.

Speaking of options, the 16-2R offers an optional mono sum output

(\$145) that provides a monaural version of the main L/R output at a rear-panel 1/4-inch jack. This useful accessory provides an additional output for subwoofers, broadcast or video feeds, or sending a mono signal to the lobby, backstage area or green room. Nine times out of ten, there's always somebody showing up at the last minute who needs a feed, and this takes care of the problem nicely.

I have always liked the sound of the equalization on Studiomaster boards, and the 16-2R didn't disappoint me in this regard. The EQ is smooth and rather musical, and the shelving LF/HF sections ($\pm 16\text{dB}$ @ 60 and 12k Hz) do a fine job of handling most typical equalization needs. One thing to be careful of is the EQ in/out switches, which *bypass* the equalization circuit when the button is depressed. This tricked me a couple of times when I was first using the board, but is something you get used to after a while.

Overall, I liked the Studiomaster 16-2R. It packs a lot into a compact chassis, has an excellent manual, is well laid-out, and offers rugged construction, but best of all it sounds great: extremely quiet with tons of headroom. At a retail price of \$2,750, it's not inexpensive, but based on previous Studiomaster boards, the ProLine 16-2R should provide years of dependable operation in any professional application.

Studiomaster U.S.A., 3941 East Miraloma Ave., Anaheim, CA 92807; (714) 524-2227.

The Black Book, Volume One

Perhaps inspired by the stunning black-and-white photographs of jazz musicians of the 1930s and 1940s, *The Black Book* features full-page portraits of world-class producers, along with biographies, discographies and their comments about music production. While the book is published by Solid State Logic (and about one-third of those spotlighted in the text make some comment about SSL consoles), *The Black Book* is not intended as a promotional item. Its *raison d'être* is instead as a testament to the producer as that generally unseen entity who has shaped the very nature of music today.

The text focuses on producers from every corner of popular music—rock, blues, jazz, country, R&B—and includes artist/producers (such as Kate Bush, Paul McCartney, Peter Gabriel);



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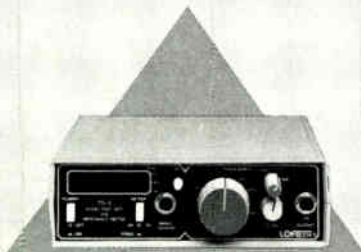
With price tags that rival semi-professional entry-level consoles, Spirit makes available Soundcraft's innovative technology to anyone with a need to produce truly professional sound. The same sound that has distinguished Soundcraft in top recording studios and concert halls throughout the world.

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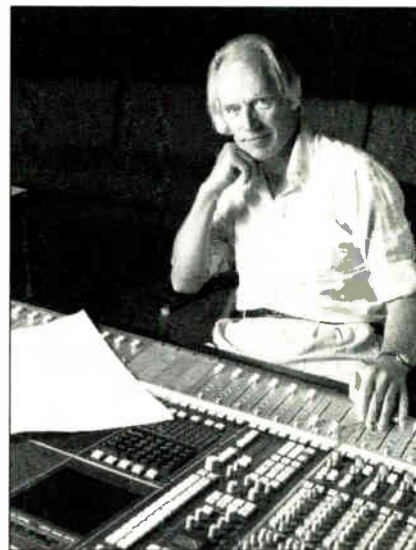
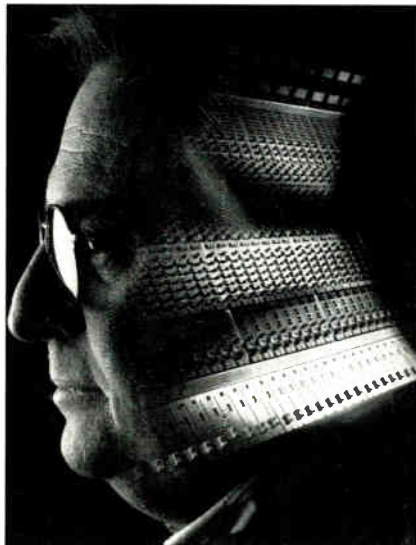
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Clockwise: Phil Ramone, Mick Jones, George Martin, Nile Rodgers

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MIX

engineer/producers (Bob Clearmountain, Jimmy Iovine, Kevin Killen); and producer/producers (Jimmy Bowen, George Martin, Nile Rodgers, Phil Ramone). Of course, this is just a short sampling of the 39 legendary producers featured in the book.

Overall, *The Black Book* is an impressive work, filled with superb photography that captures the essence of the producer in the inner sanctum of the studio. The 88-page text is priced at \$25, and SSL will donate the proceeds from book sales to benefit the House Ear Institute of Los Angeles, a non-profit organization involved with hearing and deafness research.

Distributed by Mix Bookshelf, 6400 Hollis St., #12, Emeryville, CA 94608; (415) 653-3307 or (800) 233-9604.

East-West Prosamples™ Drum Sample Library

Getting a great studio drum sound can be an elusive thing. You gotta have

some great mics, great console/mic preamps, a great room and, of course, a great sounding kit. It quickly can become a very expensive process. Now you can get it all (without having to mortgage your Pultecs) with *Prosamples Volume 1*, a new CD release of drum sounds engineered by multi-TEC Award-winning producer/engineer Bob Clearmountain.

While Clearmountain has worked with the Rolling Stones, The Who, Tina Turner, Bruce Springsteen and many other top acts, don't expect to find the classic Charlie Watts kick drum or Max Weinberg's favorite snare on the CD. *Prosamples 1* is a collection of 259 new, never-before-released drum sounds, painstakingly recorded for this disc at A&M Studios in Hollywood and Bearsville Studios in Bearsville, N.Y. The drums used on the CD come from the collections of Clearmountain, Paul Jamieson Studio Drum Rentals, Jeff Kahan, 'Til Tuesday, Mark McKenna,

PHOTO CREDITS: ROBERT LEWIS;
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Jeff Baxter *Producer/Artist*

"If I'm not getting what I want from another microphone...I've been putting up the 4051 and it nearly always does the job."

Mack Emerman *Criteria Studio*

"The response is very flat...it holds the natural tonal qualities even at high sound pressure levels."

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Steve Rinkov and Shelly Yakus.

Prosamples 1 excels at snare drum sounds, with 19 different snare/studio combinations presented, each captured with a variety of miking techniques and varying amounts of room ambience. The documentation with the disc is exhaustive. For example, Track 1/Index 1 is a dry, mono recording of Jeff Kahan's 22-inch Yamaha bass drum (with frosted Remo Ambassador heads) captured with Sennheiser MD-421 and AKG D-12 mics, played with a felt beater. Speaking of mic techniques, most of the "dry" snare and kick samples are mono, while alternate recordings of the same drum with room mics (usually two to four Neumann U87s) are stereo. Two sets of five toms (Yamaha and Gretsch) are recorded with the dry signal on the left, a room mic on the right, allowing the user to control the natural room ambience in the mix. The disc also includes the Gretsch toms, recorded with true stereo ambience.

With a few exceptions (some of the cymbals and a few of the bass drums), each sample is recorded with four separate hits. This not only simplifies loading of sounds into your sampler, but also provides a bit of variety within each sample for playing natural-sounding left/right hand fills and rolls.

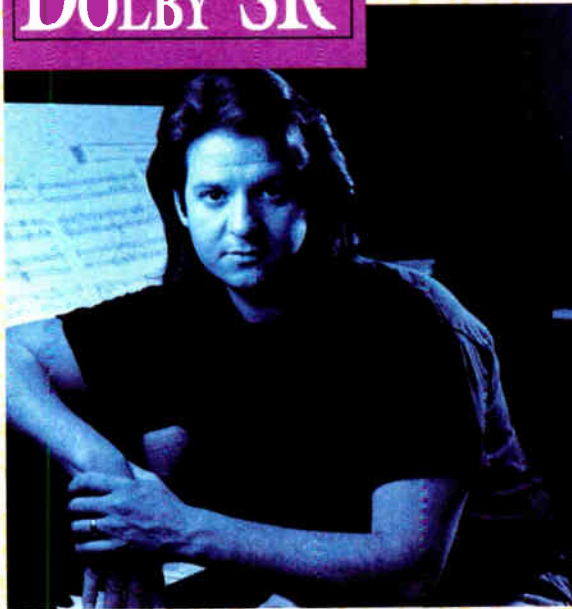
All in all, I was impressed with *Prosamples 1*. It's a collection of beautifully sampled (direct-to-DAT) drum sounds, the quality of which is light years ahead of the CD of drum sounds released by East-West three years ago. This time they've done it right. *Prosamples 1*'s main drawback is that it leaves the listener with a taste for more (for example, the CD only provides a single set of hi-hat samples). Perhaps that's why they named it *Prosamples ONE*. In the meantime, the disc's \$129 purchase price is a lot less than hiring Bob Clearmountain and renting weeks of world-class studio time...A LOT less.

East-West Communications, 8787 Shoreham Dr., Suite 807, Los Angeles, CA 90069; (213) 659-2928. ■

George Petersen is an engineer, producer and avid drum-ophile whose collection includes models from the 1930s to present. His favorite is a 1968 Premier Black Watch marching snare.

Patrick Leonard

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Alan Sillen

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On what he does

"I like it all, I have to do it all. I feel a need to challenge myself in areas I haven't entered before."

On his technique

"I find the air and space around the principal elements in a recording are becoming more important to me. The music becomes more centered, with less need for effects and layering."

On Dolby SR

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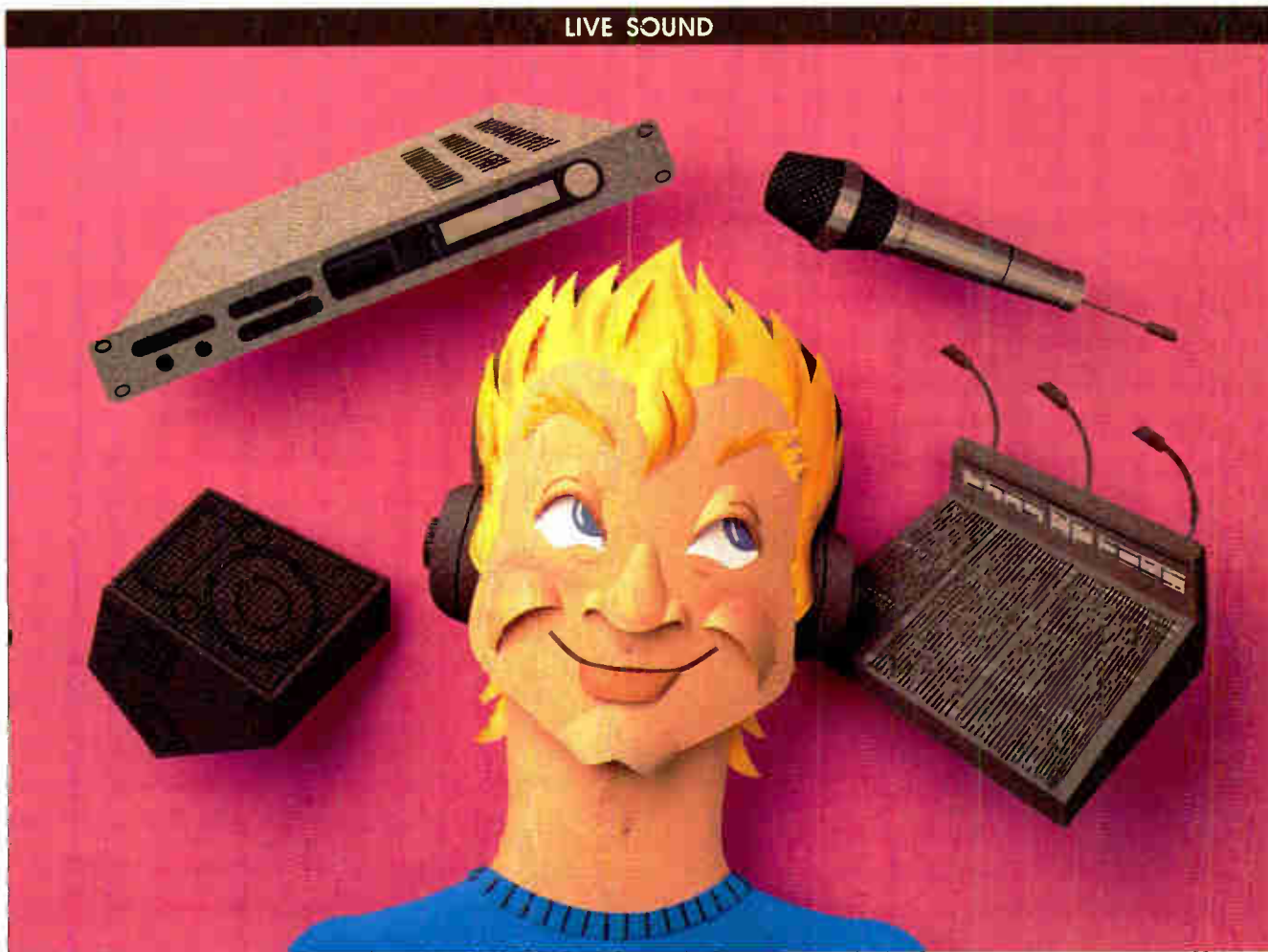


ILLUSTRATION: AJIN

AMERICA'S MOST WANTED

WINDOW SHOPPING WITH LIVE SOUND ENGINEERS

by Linda Jacobson

This month—the one that comes in like a lion and out like a lamb—it's possible to visualize the upcoming tour days of summer. Sound reinforcement companies are gearing up. Manufacturers are bringing '91 product to market. And artists are getting ready to hop on the bus. It's a perfect time to ask a bunch of road warriors what new live sound technology would make them happy.

Dave Burns

Burns Audio
Burbank, Calif.

"We buy whatever new items work well and show significant improvements over their predecessors. We handle mostly TV and high-profile live events, and the hottest new thing is the Vega wireless UHF microphone. We do lots of wireless work, and because this mic is UHF, it gets us out of the overcrowded VHF band where we compete with TV stations. The chances of getting dropouts are greatly minimized. Vega made significant improvements in the design, and it's an excellent-sounding system. They were improving on performance that was already good, I might add!"

Jeff Forbes

Electrotec
Canoga Park, Calif.

"We're in the process of getting new Gambler EX-56 consoles, which I really like for the way they sound, and for their EQ section, patch bay, and

the fact that you can interconnect two consoles by tying their buses together—if you solo one thing on one board, you can hear it on the other. The whole way it's laid out, and the fact that Gamble's come out with a monitor console, make for a very powerful package for both monitoring and house sound.

"For effects, I like Lexicon's new LXP-15, a multiprocessor unit that can run delay, reverb, chorusing—you don't have to dedicate one machine to one effect. I also like the [TC Electronic] TC 1128 programmable EQ. It can interface with video monitors for display. It has 99 presets, so you can store curves for every room on your tour, and it has a great remote that lets you see, on a movable fader pot, what you're doing with the graphic display. It combines the best of analog and digital, so those old-time engineers who like a hands-on feel can actually see their curves. And it only takes up one rackspace. It's a small unit with a lot of power."

Mark Friedman

See Factor

Long Island City, N.Y.

"We spent a lot of money this year increasing our inventory in a number of areas, especially effects. There's so much on the market, we end up buying what everyone wants: Crest 7001 amplifiers, Lexicon PCM70s, the new Yamaha SPX90s, Drawmer gates, Brooke-Siren compressors, and Aphex Compellers and 612 gates."

David Scheirman

Concert Sound Consultants

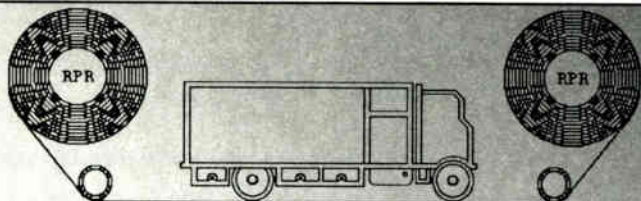
Julian, Calif.

"In general, I'd like to have power amplifiers that are lighter in weight and offer exceptionally rugged power cords. The QSC EX4000 looks like a good direction for engineering development in power amps. So do the new products coming online from other firms, like Crest Audio, with their computer-addressable monitoring and control link-up. I'd like to see large-scale sound reinforcement sys-

tems make use of this type of computer-addressable technology, as pioneered by the Crown IQ 2000 system.

"I'm also looking for higher-fidelity, more compact microphone systems to help reduce the clutter on stage when you have a lot of microphones and stands and cables out there. Shure's SM98 works very well for keeping the clutter down with large drum kits. Ram-sa's X Series miniature condenser microphones are another good example.

"With loudspeaker systems, I'd like to see comprehensive and reliable engineering data from many different companies. Lately, companies such as JBL, Apogee and Meyer Sound Labs have been doing research into the 'arrayability' of their large-scale products, making that information available to the end-user, which helps the whole industry better understand how modular, one-box speaker systems behave when they're combined into large arrays."



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Gary Mathews

Quickbeam Systems
Albuquerque, N.M.

"At the top of our list are monitor systems. In the process of building a whole new system, we revamped our house console last year, and now we're looking at the new Clair Bros. 12AM monitor system and the Apogee AE-6 and AE-6B monitors. We're currently lining up demos. We're looking for the greatest amount of power and performance in the smallest package. But we also want to save ourselves time in construction and R&D. We want to buy off-the-shelf or as close to off-the-shelf, as possible, vs. making it ourselves, which we used to do. There are a lot more products available now. We've even closed down our woodshop. It shows that the industry has matured."

Stephan Tersak

Maryland Sound
Baltimore, Md.

"There are some hot products from BSS: their TCS-804 time correction system and their DPR-901 parametric dynamic processor, which is a unique device that works like a combination gate and compressor with key-in properties. It does neat effects in-line with the console and sounds great on bass guitar. It lets you tune the response and holds it for you.

"From Crest, we like the EX Series of Gamble consoles, and from ATI, the Paragon console. I can't say enough good things about either board.

"And here's an oldie but goodie: the B&K 4007, which we've recently rediscovered. I like using the 4007 on anything; it's a great universal microphone. With all the new stuff out there, you tend to forget the tried-and-true." ■

Journalist Linda Jacobson also runs Wordswork, providing high-tech writing, editing and publishing services to businesses in the San Francisco Bay Area.

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by Linda Jacobson

NEWS FLASHES

Madison Square Garden Updates Sound System

Philadelphia-based sound contractor U.S. Sound just completed a new installation at Madison Square Garden, using its patented "Coherent Zone" engineering technologies and proprietary speaker system components. The custom-engineered project had to comply with the Garden's requirements for an extremely low-profile system that would fit into its unique acoustical steel ceiling. The system is powered by 30 of Carver's compact PM-1200 amplifiers, contributing to the Garden's high sound quality and very high system headroom. U.S. Sound specializes in arena sound systems. The company designs, manufactures, installs, services and trains the operators on all of its installations.

Showco Does Rio

Rock In Rio II, the eight-day festival billed as "the rock event of the decade," took place in January at Brazil's Maracana Stadium. Costing more than \$17 million to stage in the 170,000-seat stadium, the festival starred dozens of international rock stars (including George Michael, INXS, Robert Plant and Billy Idol) and top Brazilian entertainers. The stage production team was staffed by GLS Productions (Madonna tour, Paul McCartney), while Radio Vision International, which has international television rights, provided on-site live TV and radio production and broadcast facilities.

Sound was handled by Dallas-based Showco Inc., with engineer Mike Ponczek serving as project

manager, assisted by Leon Hopkins overseeing a Showco crew of 12. Ponczek's no stranger to rockin' Rio; he handled sound there for Paul McCartney's record-breaking solo appearance last year. For Rock In Rio II, Ponczek says, "We're using our 24-column Prism stadium sound system with two Prism control units, for a total of 164 speaker enclosures and 61 sub-bass, with a power output in excess of 350,000 watts. We have two separate console setups, one for each stage: two Harrison HM-5 32-channel house consoles with 32-channel extenders, and two Harrison SM-5 32-channel monitor consoles at the other end of the stadium—plus some Yamaha boards to add inputs. Each board setup has a clone set of effects processing devices, and some of the special effects, such as AMS devices, can go between one setup or the other."



Klipsch KP-320 Speaker

From Klipsch & Associates (Hope, Ark.) comes the KP-320, a compact, two-way speaker system incorporating a 15-inch woofer, 12-inch passive radiator and horn-loaded high-frequency section. The latter features a compression driver mated to the new Klipsch hybrid tractrix horn, which

combines the characteristics of hyperbolic, exponential and conical horns to provide high efficiency, smooth coverage and extended bandwidth. The HF section is fused and protected by a Klipsch limiter protection ("KLiP") circuit, a device that momentarily reduces the input level to the tweeter when safe power levels are exceeded.

Specs include a 49-15k Hz (± 4 dB) frequency response (-10 dB at 38 Hz) and maximum continuous SPL of 124 dB (1m/225W). The enclosure is 3/4-inch plywood with metal-reinforced grille cloth. The KP-320 retails at \$583; paint, handles, protective trim and Ultimate Support mounting sockets are optional.

Circle #286 on Reader Service Card

Austin City Limits Upgrades

Austin City Limits launched its 16th season in January with an upgraded live sound system. Fans of the weekly National Public Television music program may not see the effects of the \$150,000 upgrade, but they'll hear them. According to system designer Clark Sykes of Xeno Sound, the Austin-based contracting firm responsible for the installation, "*Austin City Limits* really sets the standard for live performance shows. They have a first-class facility, but they had always rented speakers. They finally decided to buy a really good system so they could do all their production in-house. Everything's recorded 24-track, and the program is simulcast on FM radio, so sound quality is critical."

The resulting system, based on the Yamaha PM1832 house

—CONTINUED ON PAGE 129

Paul Simon's fusion of American and South African music on his 1986 *Graceland* album helped introduce millions of us to the sounds of other lands. He's at it again.

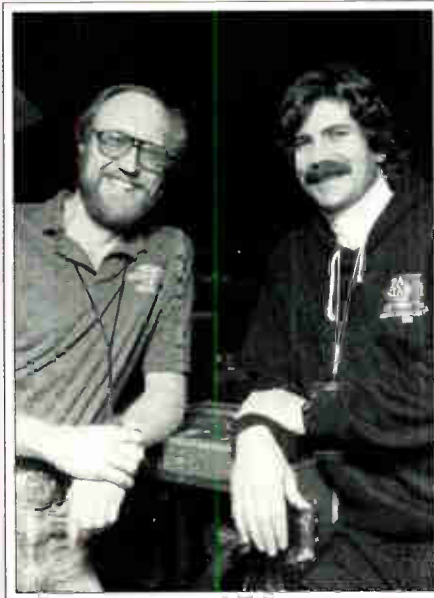
Now touring the world to celebrate his Warner Bros. release, *The Rhythm of the Saints*, Simon has blended West African musical styles and Brazilian rhythms with his unique song structures. Since the new LP boasts a broad variety of drum and percussion tracks, the "Rhythm of the Saints" tour—its sound system provided by Clair Bros.—requires *two* house mixers, one dedicated solely to percussion.

Kicked off in Tacoma, Wash., on January 4, the tour hits the U.S., Europe, South America and the Far East. Simon's soundman Dave Morgan handles the brunt of house mixing chores, using a loaded, Crest-made Gamble EX-56 console. The board was modified by Crest for Clair Bros., so the mains and subs are located mid-board, with 32 channels controlled to the left and 24 to the right.

Seventeen musicians perform with Simon. Four are Brazilian percussionists, whose sound is mixed by Mike "Wolfie" Wolf on a 40-channel Yamaha PM3000: 32 channels (eight per player) are for inputs, eight are effects returns. No gates swing here, because "we have to get those nuances and highlights out," Wolf says. "Their playing goes from very soft to very loud." Percussion effects include TC 2290, Lexicon 480L and AMS reverb—"the standard run of reverbs and delays," Wolf notes. "But this tour is different from others I've done with Paul, because they're using traditional Brazilian and weird percussion instruments, including a mule jawbone, glass bottles, strange gourds, and the Brazilian *sordu* double-headed bass drum. Nothing's harmonized. We're going for natural sounds. And everything happens at once; it's all live, all the time."

A Clair Bros. engineer and system designer since 1973, Wolf

Dave Morgan & Mike Wolf On Tour with Paul Simon



Mike Wolf and Dave Morgan

launched his mixing career in southern Ohio. He now lives in Manheim, Pa., and has mixed around the world for Bon Jovi, Jimmy Page, Elton John, Tina Turner and other stars. Working for Clair Bros., he mixed Simon's European "Graceland" tour and the 1982-83 Simon & Garfunkel tour, as well as the duo's 1981 Central Park reunion.

Paul Simon's new Clair system handles 102 channels of sound; that sound has already scored praise from the press as clean, powerful, natural and dynamic. Kudos to the 72 Clair Bros. Audio S4 cabinets, providing 360° projection; 16 are long-throw Series 2P speakers; the rest are short-throw "F" cabinets. (See photo on page 159.) Onstage, 34 Clair Bros. Audio Model 12AM cabinets handle 22 monitor mixes.

Another fundamental difference between this and Simon's last tour is stage size. The new, larger, multitiered stage necessitates physical separation of the musicians, making it harder to achieve an "intimate" feel, ac-

ording to Dave Morgan.

Morgan, who lives in L.A., has handled Simon's concert sound since 1987. In his 16 years in the business, he's mixed shows for Whitney Houston, Debbie

Gibson, Barry Manilow, the Doobie Brothers and Michael McDonald. During Simon's recent soundcheck at Oakland Coliseum, Morgan comments, "We're trying for a really different sound; it's actually *silent* in the house between songs. And you can have a normal conversation during the show! I don't mix loud; after 16 years, that's how I can still mix. We don't get much over 100 dB."

Morgan and Wolf work with 82 lines from the stage; 75 are mics or pickups. "I spent a lot of time choosing the mics," Morgan says. "Each one is adapted to its special purpose." Most of the instrument mics are Shure: 57s on guitars, 98s on congas and drums, and an SM91 conference mic on the kick. (Morgan adds that drummer Steve Gadd "plays with so much expression that I can't gate him, except for toms occasionally. Otherwise, I'd lose all his dynamics. We don't do much processing on this show. There's just enough compression to keep things in line.")

Simon goes wireless with his acoustic guitar; Yamaha built a special pickup just for him. Morgan explains that a Beyer condenser mic "lives in Paul's guitar, and I vary the sound using a combination of the pickup and the mic in the guitar."

For Simon's voice Morgan chose the Shure Beta 58. He embellishes that with a Lexicon 480L for reverb and TC 2290 for "straight slap, dynamically suppressed while he's talking."

Wolf adds, "Paul likes to try new things all the time. This thing we call 'soundcheck' is really the time when he throws out ideas and tries new ways of doing things. He wants sound to be a priority—he wants it to sound as much like being in your living room as possible."

—Linda Jacobson

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Community's design philosophy has always been a little unconventional.

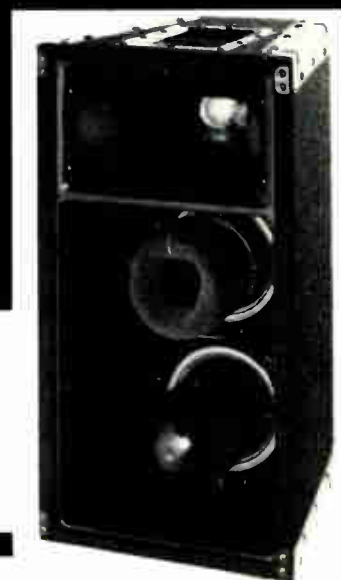
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—CONTINUED FROM PAGE 126, SR NEWS console and PM2832 monitor console, includes the new Electro-Voice DeltaMax DML house speakers and dual-position monitor speakers, all powered by QSC MX1500, MX2000 and MX700 power amplifiers.

Live Sound Videotape

Sound Concepts (Julian, Calif.) recently released a 75-minute, VHS-format videotape entitled *Live Sound! How to Run Your PA System* (\$39.95). The program, which follows a band's soundman on the job, describes how to select, set up and use a live sound system. Although it is aimed at sound reinforcement novices, the program is hosted by well-known live sound engineer/designer David Scheirman, who provides "plenty of insider hints and tips, as well as sophisticated approaches to using signal processing equipment. Even working professionals will find something of immediate value from this videotape."

Circle #287 on Reader Service Card



ATM Debuts Flying Hardware

ATM Fly-Ware (Gardena, Calif.) introduces AMFS flying hardware for loudspeakers, using a modular design that lets the truss components remain fixed on the enclosures when not in use. Avoiding the need for bulky overhead truss assemblies, the hardware incorporates 1- to 2-inch steel truss sections acting as the entire

support, allowing configuration of rigid arrays based on the speaker manufacturer's recommended splay angles. Speakers can be stacked, tilted or inverted, without additional straps or hardware. AMFS flying hardware is engineered at a 6:1 safety ratio. Designs are available for Meyer Sound Labs UPA-1A and MSL-3 speakers and the Apogee AE-5; coming soon are trusses for the Renkus-Heinz SR-1/SR-2 and EAW KF300 and KF600.

Circle #288 on Reader Service Card

EV's New AP3200 Power Amp

Electro-Voice (Buchanan, Mich.) has introduced the most powerful amplifier in its pro sound contracting line, the AP3200. This 2-channel, 3U rack unit delivers 600W/channel into 4 ohms (400W/ch into 8 ohms) and 1,200 watts bridged mono into an 8-ohm load. Features include rear panel level controls, front panel clipping and protection status LEDs, low-noise two-speed

—CONTINUED ON PAGE 183

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by Philip De Lancie

OPTICAL DISC RECORDING

WILL CONSUMERS BE MAD ABOUT MOD?

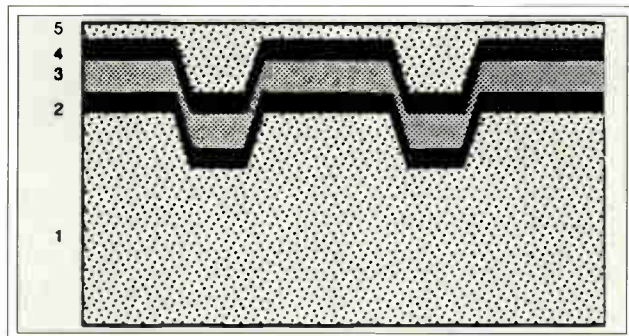


Fig. 1: MOD cross section:
1-Polycarbonate, 2-Protective Layer, 3-MO Layer, 4-Protective Layer, 5-Label Painting

The recent formal announcement by Philips of its Digital Compact Cassette configuration turns up the heat on those working to bring rewritable optical recording to the consumer market. Over the last few years, record company opposition to DAT bought these disc recording advocates some much needed time to catch up with tape systems. But while the major labels have probably succeeded in killing consumer DAT, they have by and large responded positively to DCC. And the copyright issues which justified their anti-DAT stance appear likely to be resolved, at least outside the U.S., by some kind of home taping "royalty" levied on recorders and blank tape. So obstacles to home digital recording may soon be dissolved, setting the stage for vigorous competition between various tape- and disc-based systems.

Rivalry among information storage methods is nothing new, going back at least as far as the post-WWII encroachment of tape recording onto the turf of transcription discs. It's a hot topic whenever the storage media systems industry gathers to ponder its future. One such forum is the annual Magnetic and Optical Media Seminar, co-sponsored by the International Tape/

Disc Association and Knowledge Industry Publications.

At the most recent MOMS, a number of presentations extolled the virtues of optical disc storage, particularly the hybrid magneto-optical (MO) approach, for computer applications requiring rewritable data storage. Such systems have been sold for about three years and can be found in the pro audio market in samplers and workstations. According to forecasts made at the seminar by Linda Helgerson of Helgerson Associates, shipments of rewritable optical drives are expected to grow from less than 200,000 units in 1990 to nearly 900,000 in 1993.

The magneto-optical disc (MOD)

is also a leading contender among systems vying for the opportunity to ride the coattails of the CD into the consumer audio market. Thomson, the French-owned group that owns RCA (not RCA Records, which is part of BMG), is one of several consumer electronics companies working on optical recording, as are Tandy and Philips. In a paper delivered at MOMS, and a subsequent interview from his company's research facility in Villingen, Germany, Heinz-Joerg Schroeder of Deutsche Thomson-Brandt discussed Thomson's efforts in this area, and why the company has opted for the MO approach.

Considering the Alternatives

According to Schroeder, MO recording was chosen over three alternative concepts, each based on different physical principles. One was the dye-polymer process selected by Tandy for the THORCID system announced in April 1988. At the time, Tandy claimed it would bring a CD recorder to market for under \$500 by 1990. So far there's been no sign that the company is ready to begin manufac-

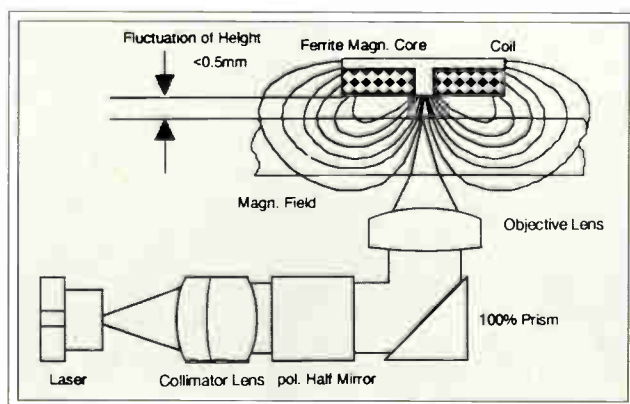


Fig. 2: Cross-section: write section of MO pickup

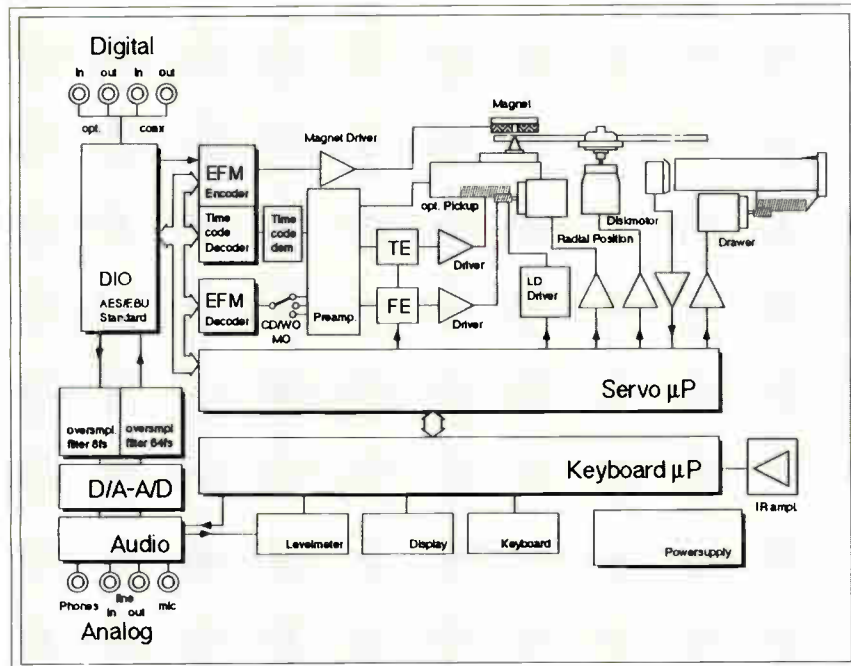


Fig. 3: Draft block diagram of MO recorder

amorphous states. In these "phase change" systems, crystalline material becomes amorphous when laser-heated to a temperature above its melting point. The resulting loss of reflectivity allows the read laser to differentiate the amorphous spots from their surroundings. Heated to a different temperature, the amorphous spots revert to a crystalline state and are thereby erased.

Schroeder reports that progress has been made recently in arresting the age-related crystallization of amorphous spots, which had limited the longevity of data storage. But he notes that the system's low erasability, which he gives as less than 30 dB, restricts its current suitability for rewritable applications. He describes the situation for phase change as nearly identical to that of dye-polymer. In other words, it's unlikely the approach will yield field-usable rewritable systems in the near- or mid-term.

The prospect for "color change" techniques is even more distant. These involve the use of light to "enforce" color change in organic molecules, thereby changing their reflectivity. "They've been able to achieve quite good contrast ratios," Schroeder says. "It could be very competitive in the far future, but it's only research up to now. So far as I know, there is no industrial work on this subject."

turing hardware.

Dye-polymer discs contain two layers of light-absorbing dyes, each sensitive to different wavelengths of laser light. When a high-power laser beam of the appropriate wavelength heats the "expansion" layer, it pushes into the "retention" layer, forming a bump, which is frozen in place as the layers cool. During playback, a low-power read laser detects the difference in reflectivity between a bump and the smooth "land" area around it. In re-recording, another high-power laser operating at the sensitive wavelength of the retention layer expands it to its original smooth condition, after which new data may be written by the record laser.

At least two obstacles arise with dye-polymer recording. One is that the recording material fatigues, limiting the number of times a disc may be written over. In his *Principles of Digital Audio*, Ken Pohlmann suggests the limit may be "100 times or less," but goes on to note that this is unlikely to pose the problem for consumers that it would in data processing.

Perhaps more damaging is the

fact that a rewritable system, unlike write-once dye-polymer recording, requires two high-power lasers of differing wavelengths. "These laser diodes don't exist at the moment," Schroeder says. "You can't buy them. So there is no way to say when an optical system using such lasers could be available at a reasonable cost. Theoretically, this is a brilliant idea, no question. But I see no chance to make a rewritable product from it in the next seven years."

Another system involves the use of materials that respond to laser beams of particular wavelengths and powers by changing back and forth between crystalline and

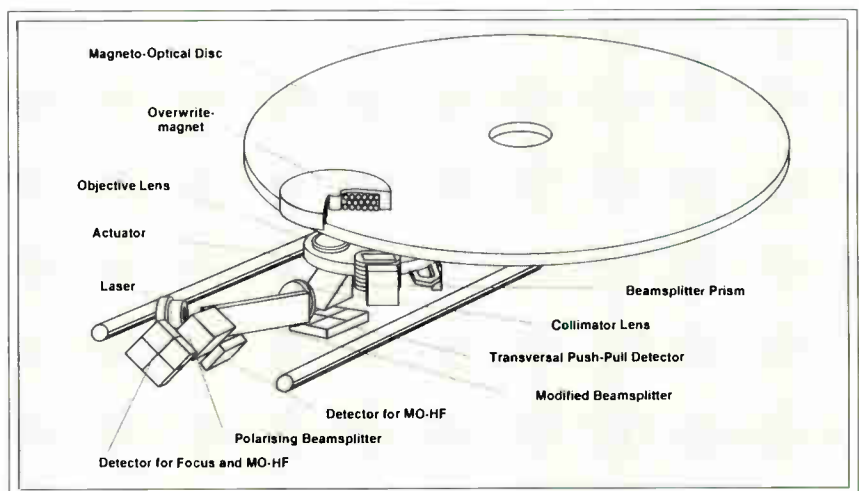


Fig. 4: Optical system for magneto-optical recording

The Magneto-Optical Approach

While researchers work on these alternatives in the lab, MO is already at work in the field. The component technology is commercially available, its reliability proven in computer applications. It's the integration of magnetics into an optical environment that accounts for MO's headstart. "The technique was invented 50 years ago," Schroeder explains, "but nobody could do it at that time since no lasers were available."

In an MO disc, a layer of vertically oriented magnetic particles from "rare earth transition metals" is sandwiched between protective coatings laid on a pregrooved substrate (Fig. 1). The vertical orientation allows a much greater particle density than is possible in longitudinally oriented media like magnetic tape. At room temperature, the recording material has very high coercivity (several thousand Oersted), which protects it from accidental magnetization.

During recording, a high-power laser (25 mW) tracks the groove. Tightly focused by an "objective lens" (Fig. 2), the beam heats a few particles at a time. As their temperatures rise above their Curie point, the particles become thermally excited, minimizing coercivity and randomizing any prior magnetic orientation. A mild magnetic field (200 Oersted) is then sufficient to orient the excited particles, but not their cooler neighbors. As the disc rotates these just-oriented particles away from the recording components, the particles' temperature drops below the Curie point, and their new orientation is frozen in place.

Two techniques are available for changing particle orientation on the disc. MO drives found in computing applications use laser modulation, in which the magnetic field is constant, while the laser is turned on only as needed to heat particles for reorientation. But Thomson claims that jitter can be reduced by using magnetic modulation—applying high laser power

at all times while modulating the magnetic field with an EFM signal like that used in CD coding. Because the process of orienting the particles involves no permanent transformation of disc materials, re-recording is simply a matter of re-applying the laser/magnetic field combination.

For playback, the MO system makes use of a phenomenon referred to as "Kerr-rotation." When polarized light is reflected from a magnetic layer, its plane of polarization changes according to particle orientation. In Thomson's system, this rotation in polarization plane affects the amount of light reaching each of two detectors in the optical pickup. The play signal is derived from the difference between the two.

Compatibility

The reliance on Kerr-rotation to generate read signal from the disc is a crucial difference between MO and competing technologies. In dye-polymer, phase change and color change, recorded areas differ

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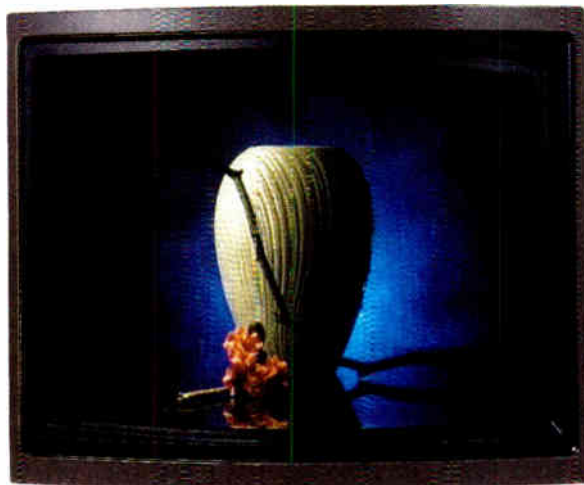
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from land areas in the amount of light they reflect. This difference in reflectivity is used to modulate the amplitude of a read laser beam as it reflects back from the disc surface to an optical pickup. Amplitude modulation can be detected by the same pickups already in use in conventional CD players. But Kerr-rotation cannot, meaning that MODs will play only in MO recorders or players.

Imagine all the consumers who've waited for years for the chance to buy a "CD recorder." They rush out to pick up a MOD system, only to discover that what looks like a CD doesn't necessarily play like a CD. True, the MO player will probably be designed to allow playback of existing CD collections. But what about playing newly recorded MODs on expensive car CD players, or those spiffy portables brought along to the beach, or the Discmans many wear while jogging?

"There's no question that this is the main problem with MO," Schroeder concedes. "But everyone

who buys the MO recorder will be able to play the discs. And when the system is introduced, Thomson will offer CD players that also play MO discs. They won't cost much more than conventional CD players."

Still, Schroeder recognizes that these steps won't entirely lay the compatibility issue to rest: "Of course, everyone will continue research on follow-ups to this technology. But all these things need a lot of time. With MO, we have everything available to do it now. So we may have to live with some drawbacks, but I feel quite secure that MO is the only chance for the moment."

Schroeder's assessment of MO is based not only on the lack of feasible alternatives, but on the extent to which the CD, despite differences in read technique, has paved the way for the new format. "We understand MO less as a new process than as a logical follow-up to CD," he says. "Requirements for MO pickups are not much more complicated than for CD. Their added cost is mainly determined by the

price of a high-power laser diode, which is necessary for any optical recorder." Further, disc production requires only modest adjustment of procedures developed for CD replication. These include limiting substrate birefringence and improving the oxygen resistance of the lacquer coating.

Bringing MOD to Market

With so many of the necessary elements already in place, MOD development moved much faster than if Thomson had been starting from scratch. "We showed our first prototype at the Berlin Fair three years ago," Schroeder recalls, "but that machine required a separate erase pass before rewriting." In the meantime, the company was able to perfect its use of magnetic modulation. "About one year ago we were able to show with our new machines that direct overwrite is possible, so you can make recordings just like with a cassette player," Schroeder adds.

Thomson's MO audio machine

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is now essentially ready to go into production. "There are still some things to optimize, but there are no real handicaps anymore," Schroeder says. Much of the electronic design (Fig. 3) is common to that of CD players and DAT machines, using familiar sampling rates (48, 44.1 and 32 kHz), coding techniques (EFM) and error correction (Reed-Solomon). The optical system, too, uses familiar elements, while integrating components specific to MO requirements (Fig. 4).

Beyond this first-stage audio machine, Thomson is looking at several additional applications of MO technology. The company has already demonstrated data compression schemes that yield four simultaneous stereo channels of 74 minutes each on one disc. Another intriguing possibility is the RAM-ROM disc, which combines a full-capacity (600MB) CD-ROM with MO recording capability. And still-frame video is also being considered, with full-motion conceivable in the distant future.

Whatever the promise of MO for these alternative uses, however, audio remains the area in which its consumer appeal will be tested initially. But how soon? "When we announced the machine in Berlin," Schroeder says, "we told everybody that we would market it in 1991. But the date has unfortunately been postponed by our management, and I don't know exactly how long. Our marketing people think it's still too early. Maybe by 1992 it will at least be decided when production will begin, but I would say that in '92 it will still not be sold to consumers."

Why, having selected MO for the speed with which it could be brought to market, is Thomson now holding back? Several factors seem to be at work. "First of all," Schroeder points out, "when we mass-produce the machine, we need to be able to make it in huge quantities. So it's very important that the market really be open to the system. For this, we have to work together with other manufacturers so that they will offer similar systems and we can get a wide market introduction. We've already found them, but we are

still in discussion."

Related to the issue of production quantities is the issue of price. "This may also explain the delay a little bit," Schroeder says. "We want this machine to be very cheap, which means that when introduced it must cost less than DAT costs at that time." Another complication is the home taping question. "I thought that everything was solved when the serial copy management system was adopted for DAT," Schroeder says. "Unfortunately, there are some people saying that SCMS is not enough, and they want to make a stronger copy protection for MOD and write-once discs. And this, too, creates delays."

It may be that further holdups, whatever their cause, will only complicate the dilemma Thomson and other MOD proponents created for themselves by straying from complete CD compatibility. Many consumers will believe that they can't really profit from MOD without replacing their CD players. For the moment, player penetration remains relatively low, but it's growing daily. So by pushing MOD now, electronics companies might leave fewer angry customers feeling that their investment in CD hardware has been instantly outmoded. Thomson's management, though, may have concluded that it's too early in the product cycle of the CD to complicate matters with MOD. The question is, how long can they wait before CD-compatible alternatives begin to come out of the labs and into the market?

Tape & Disc News

Personics Files for Chapter 11

A few years back, Personics was created with the idea of allowing consumers to go to a record store, select current and classic material from a catalog, and have it custom-duplicated onto a cassette while they wait. As a startup venture, the

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firm depended on capital infusions from equity investors to keep it going while it developed reliable technology and negotiated with record companies for the right to sell their music on the system. Though its outlets are now found in more than 250 stores, it may be too late to get the company onto a profitable footing. According to a report in *Billboard*, Personics filed a petition for reorganization under Chapter 11 of federal bankruptcy law on December 31.

Contacted by *Mix* just before the bankruptcy filing was made public, president and CEO Steve Boone said the company's troubles began last fall. Two main backers, suffering from financial woes of their own, made clear that they would be unable to participate in another round of funding. That sent the company scrambling for alternative financing, and left some employees looking for new jobs.

"The company has been working on a round of financing for some months," Boone said, "but it's

a difficult time to raise money. This current round is coming in later than anticipated, so we've had to implement some cost-reduction strategies like anybody else would in this situation. We've had a few layoffs, but it's not that big of a deal."

Boone claimed he had reason to hope that Personics will soon be back on track. "We had an offer in December from a Japanese firm," he said, "though we are still in negotiation. The money will go into new machines for more outlets, as well as greater marketing efforts and acquisition of new music. We also anticipate being able to bring some of our people back. This will hopefully be the last round of funding, because this next business plan will finally get us profitable. We just need a few more stores and a little more music, and we'll start to look pretty good."

Despite Boone's attempts to downplay the situation, the use of Chapter 11 to hold off creditors while looking for money could backfire. That's because the credi-

tors, according to *Billboard*, are primarily the very music rights owners whose cooperation and goodwill Personics desperately needs. As an alternative means of music distribution, the company reportedly has had to struggle all along to gain access to quality current material from major record companies. Even if Personics emerges from bankruptcy intact, lingering doubts about its reliability may hamper efforts to win acceptance from record industry skeptics. And without their music, Personics has nothing to sell.

ITA Seminar Topics

The ITA has released program information for its 21st annual seminar for magnetic and optical media manufacturers. Entitled "Challenge for the '90s: Strategies to Deal with Economic Change," the seminar will take place March 20-23 in Tucson, Ariz. Audio-related sessions will examine the outlook for DAT, DCC and analog cassettes, piracy and environmental issues in manufacturing, and packaging. Busi-



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ness-oriented sessions will look at opportunities in Eastern Europe, the effects of mergers and acquisitions, and dealing with emerging and competing technologies. The status of EP and LP duplication will also be covered, as will other video topics like S-VHS, digital video and high definition TV. Contact the ITA at (212) 643-0620 for further information.

Agfa Honors Watchtower

The Agfa Audio Pancake Award has gone to the Watchtower Bible and Tract Society for its facility upgrades and quality control procedures. Watchtower recently purchased a Lyrec high-speed duplication system featuring a model 4409 100:1 bin-loop master and five twin slaves. The society has also added ten AEG Tachos 90 loaders. The upgrades bring Watchtower's capacity up to 568,000 C-90s monthly.

Splices

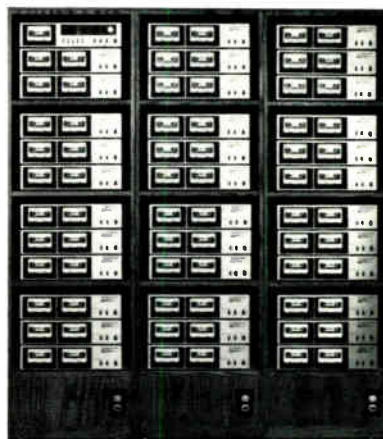
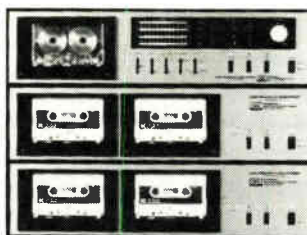
The Mastering Lab has installed a CDR 90 system from Gotham Audio in its Hollywood, CA, facility for making reference CDs from PCM-1630 master tapes. The system combines components from Yamaha, Harmonia Mundi, Audio Design and Dell Computers to allow write-once recording on recordable CDs manufactured by Taiyo Yuden or Fuji. According to Gotham, The Mastering Lab joins at least one dozen other mastering houses worldwide who are using the CDR 90... Digidesign has announced the use of its Atari Sound Tools disassembled digital audio editing package for preparation of a forthcoming album on Rounder Records. The Four Bitchin' Babes project was recorded live in four performances, then edited for release at Amerisound in Columbus, OH... The Little Warehouse has installed an Apex On-Cassette Printer at its Independence, OH, facility. The expansion of cassette labeling capabilities means the company is now offering a four- to seven-working-day turnaround time... Optical Disc Corporation (Santa Fe Springs, CA) has opened an office in Amsterdam. The new European head-

quarters, led by co-founder Donald Hayes, will oversee worldwide sales, service and technical operations for ODC's line of videodisc recorders and optical disc mastering systems. The company's existing office in Paris will continue operations as well... Applications in both professional audio and broadcast were touted by Sony in a 23-country promotional tour featuring the new PCM-7000 Series DAT recorders. The machines, which offer time code and editing capabilities, were demonstrated across Europe and

Africa by a team of Sony engineers... TEAC has announced two industrial sales of videodisc recording and playback systems. Southern California Edison will use the WORM gear as part of an interactive operator training program, while the Portland District Army Corps of Engineers will archive hundreds of thousands of slides and negatives. ■

Tape & Disc editor Philip De Lancie is a mastering engineer at Fantasy Studios in Berkeley, Calif.

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by Bruce Pilato

TOY MATINEE

PRODUCER PATRICK LEONARD HAS A NEW PLAYGROUND

Patrick Leonard, producer and co-writer for the likes of Madonna and Bryan Ferry, is nearing the end of seven hours of interviews designed to promote his current *Toy Matinee* LP, which was written and recorded with partner Kevin Gilbert. As the dinner hour approaches, he's far from happy.

You see, all of today's interviewers [including me] can't seem to avoid the obligatory "Tell-us-about-your-work-with-Madonna" questions, and by now, Leonard has had it with the publicity game. All he had wanted to do was talk about *Toy Matinee*.

"The main problem I'm running into is that people assume it's a dance record," he says. "That's something that I have to try and figure how to get around. I understand it, though. I've been with Madonna for five years, and she's associated with a lot of dance music."

The next day, in Leonard's own Johnny Yuma Recording Studios in Burbank, Calif., the mood is different. After a good night's sleep, he is fresh and eager to talk about *Toy Matinee*, an album that has received across-the-board rave reviews and has some in the music industry even calling Leonard & Gilbert the Steely Dan of the '90s.

"Shut that thing off!" Leonard shouts to someone in the next room. "I don't want to hear [Madonna's] 'Vogue' while I'm doing this interview!" He rolls his eyes and cracks up laughing.

What makes *Toy Matinee* so fresh and exciting is its careful balance of both upbeat and haunting pop songs and its convincing musical performances. For the LP, Leonard and Gilbert formed a band and cut the tracks without the aid of samplers, sequencers or drum machines.

"It's all real stuff," Leonard says. "I really don't do dance records. When you hear a dance mix of a Madonna song, it's someone else's thing: That's the dance mix guy's [version of the song]. I try to use all real people on my sessions for her. When someone else does a dance mix of one of my songs with Madonna, it has already walked out my front door, and my job is done. And, yes, that does bother me a bit."

"This album is different," Gilbert adds. "There are no Synclavier and very few samplers. There is only one sequenced bit on the record. In fact, the only real sampled bit on the album was a Mellotron. You remember Mellotrons, don't you?"

"It wasn't a conscious effort," he continues. "It's just that we didn't want to make a machine record. It was not appropriate to do that with these songs. The arrangements had been worked out for a band and they sounded good with a band. There was no reason to have a song arranged for a band and then record it with click tracks. To me, that all just sounds very cold and calculated. The one thing we wanted to have going for us on this record was some heart and some soul."

Those qualities abound on *Toy Matinee*. From the Yes-flavored single "Last Plane Out," to the Beatlesque pop exercise "Things She Said" (featuring vocals by none other than Julian Lennon), to the Steely Dan-like epics "The Ballad of Jenny Ledge" and "There Was a Boy," Leonard and Gilbert have shown they have the writing chops that could eventually put them in the league of the classic rock songsters they so obviously emulate.

Their lyrics are often built around odd stories laced with quirky charac-

ters. Musically, *Toy Matinee* offers a tasteful blend of acoustic and electric instruments played over a solid rhythm section provided by bassist Guy Pratt, guitarist Tim Pierce and drummer Brian MacLeod. The album was produced by Bill Bottrell, best known for his work as engineer or co-producer for Thomas Dolby, Tom Petty, Jeff Lynne and Madonna.

Though there is a ten-year-plus spread between Leonard (34) and Gilbert (23), both grew up listening to the same music. Their record company bio is peppered with references to such acts as Gentle Giant, Yes, Pink Floyd and early Genesis, as well as classic pop heroes such as the Beatles and Elton John.

(There is, surprisingly, no mention of Donald Fagen and Walter Becker, who's influence on the duo is undeniable. "We were trying to avoid comparisons to the most frightening band in the world," admits Gilbert. "They are not somebody I would really like to compete with.")

It was their mutual love for many of the same acts that brought the two together in the first place. "My friends were listening to the Sex Pistols and Devo," says Gilbert, "and I was sneaking around behind their backs buying Gentle Giant records in used record stores."

The two actually came together last year when Leonard served as a judge in a Yamaha *Soundcheck* battle of the bands contest that Gilbert's old backing group, Giraffe, entered and eventually won.

"Yeah, our meeting was made for television," jokes Gilbert. "Patrick was at the show; he was a judge and he came backstage and said, 'That was neat. What else have you got?' So I gave him a CD of this project, and I just expected him to throw it away and never hear from him again. Much to my surprise he called and said, 'I think you should come down here and we should write some things together.'"

Both credit the success of the album to the creative partnership they had with producer Bill Bottrell, which is

similar to the Steely Dan team of Fagen, Becker and producer Gary Katz.

According to Leonard, "Hiring Bill Bottrell and the fact that I became a 'band' member was essentially saying, 'I want to be on this team over here.' So when I would have a difference of opinion with the guitar player or Bill or anyone else, it would be coming from the keyboard player and one of the songwriters, and not from anyone else." Gilbert adds, "Having Bill onboard avoided an internal war going on with one of the writers also being the pro-



Patrick Leonard and Kevin Gilbert of Toy Matinee

ducer."

Sonically, *Toy Matinee* rates as one of the brightest albums of the year. Coming from this team, that is not unusual. However, the fact that it was made in a style of recording that was common in 1975, yet still sounds better than most contemporary releases, is

"We avoided digital like the plague," says Gilbert, who formerly ran a 16-track studio in San Francisco. "For my ears, digital is a major step backward. The more hype these dynamic microphones get, the more I dislike them. I think digital mastering, however, is a big boon. The ability to walk home with a CD from your mastering session is a wonderful thing."

"I'm here trying to make records that make me feel good like the records I grew up with," says Leonard, "and part of that is tape compression, crosstalk and other analog idiosyncracies."

Most of the songs on the album were laid down live with the five-piece band, miked straight through Neve 1071 and 1073 modules, and fed di-

rectly into the Studer 800 and 820 multitrack tape machines. With the exception of some light compression, mostly through a dbx 160, everything was recorded as dry as possible.

Leonard says: "I really like the sound of the old Neve stuff. I had the two racks built of Neve 1071 and 1073 modules, and I go right through them and use their mic pres. I had phantom put on them so I can use them directly plugged into the Studer. And that with Dolby SR sounds great. I have Boulder preamps and some API outboard stuff that I use to record, and then I monitor back through a Soundcraft TS 24, but I don't record through it."

In all, the album took about eight weeks, far less than the time Leonard has spent making albums for Madonna and Bryan Ferry. With the recording behind them, both Leonard and Gilbert are eager to tell the world about *Toy Matinee*. There is even talk of a tour in the coming year.

Also in the future for Leonard will be other producing projects and an instrumental solo album produced, in part, by jazz great Chick Corea.

"People who think they know who I am think that *Toy Matinee* is just a one-off thing," Leonard says. "It's not at all. This is far more representative of what I do and what I hope to do in the future. People like to pigeonhole. It's sort of my mission to show people that I don't just make dance records." ■

Restoring Debut's Jazz Legacy

by Hank Bordowitz

"Certainly there are more interested consumers for Mr. Mingus's recordings today than there were when the first Debut records appeared in the record stores," writes producer Ed Michel in the liner notes of Fantasy's epic 12-CD set of the *Complete Debut Recordings*. Debut Records was set up by the great jazz bassist/composer Charles Mingus in 1951 to showcase his compositions,

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MUSIC & RECORDING NOTES

the new, more complex direction jazz was taking, and the talents of Mingus's companions in this evolution, like Max Roach. The music they recorded for Debut was a far cry from the swing that was popular only a few years previously. Instead, they explored bebop and the other changes that were happening in jazz, with a heavy accent on improvisation. Debut's six years of existence were some of the most fertile in modern jazz, and many of the players on these records became latter-day legends: Art Blakey, Oscar Pettiford, Thad Jones, Dr. Billy Taylor (before his degree), John Lewis, Paul Bley, J.J. Johnston & Kai Winding, Miles Davis, and of course, the principals in Debut's most successful recording, *The Concert at Massey Hall*: Mingus, Max, Dizzy, Bird and Bud Powell.

In addition to being on the cusp of a musical revolution, Debut was on the tip of a technical revolution. In the years Debut was releasing records, the standard medium went from 78 RPM singles to LPs.

"Nobody knew what was going to

matter. While much of the music released on Debut was preserved in the Fantasy vaults, trying to live up to the *complete* element of the title transformed Michel into a disc detective.

"In one case," he notes, "it took forever to find a collector who was a Mingus specialist, who actually had a certain record. I did find a guy who had it and he said, literally, 'I know I've got it. It's in the vault. I've never actually played it.' And he added, 'I've never seen another copy of it.' I believe that.

"Then there were sessions like the Jimmy Knepper date. I'd never seen a copy of that. I knew it existed. Somebody played me a cassette at one point, but it only existed in Denmark. And I knew about the session with the Gordons because there was one track on the Debut sampler, but I'd never heard the other three sides. Honey Gordon's mom had scratchy old 78s, because it was her husband and her kids. So she'd saved a copy, and that's where that came from."

Converting scratchy old 78s and even some ill-kept tapes was another matter. Since economy was always an issue at Debut, fidelity was often not

up to par. Listen to the Paul Bley version of "Santa Claus is Coming To Town" on disc six, and you'll hear Bley running down the changes while an engineer yells, "Let's go. Go, go, I'm waiting." Bringing these recordings up to a level that would stand

PHOTO: PHIL BRAY



**Top: Ed Michel
Bottom: Charles Mingus**



happen," recalls Michel. "When they started they put out singles, and there were projects that were absolutely single-oriented, as opposed to album-oriented. Record companies still thought, 'Well, we'll put out a record,' and [what they meant was] a two-sided 78."

In this environment of change, Debut recorded 169 tracks. It fell to Michel to prepare these thirty-something-year-old recordings for digital release. Often this proved a difficult

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digital scrutiny was the project's biggest chore.

"Part of a producer's job is to make the medium more transparent, so that you're not aware you're listening to a scratchy LP that was badly recorded," Michel says. "As far as possible, you should be listening to the music and not to what it's fighting its way through. You can never get all the way there, but part of my job was to clean things up as much as possible. The fact is, if the original tapes had not been so horrible and so badly handled over the years, they would sound even better. The way audio technology is going, if somebody does this again in 25 years it will probably sound better still."

Such an industrial-strength audio custodial job requires the proper tools. Michel knows them well, having made some 800 records. He has done similar work for decades as head of Impulse, and as a producer for Bluebird and Fantasy. His work cleaning up the Bluebird releases revitalized some of the finest archival jazz available. Through his auspices, Bluebird started using Sonic Solutions' No Noise system.

"I found it for them," he says. "I did a lot of those first cleanups four or five years ago. It's a nice piece of equipment. It solves certain kinds of problems very nicely. It de-ticks and de-pops better than anything else, and it reduces certain kinds of hiss pretty well. Now there's a lot of other stuff doing the same thing in different ways."

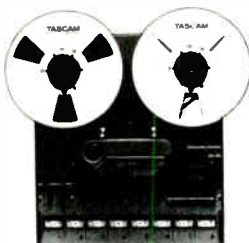
No Noise is not the only tool in Michel's kit. When it comes to bringing old masters up to acceptable digital standards, it's no holds barred.

"I use everything in the arsenal!" he exclaims. "Everything from the same kind of limiters and equalizers that were available when the stuff was originally recorded, to high-speed computer processing that models noise. It literally takes a signal that has been transferred to digital—so now it's a bunch of numbers replicating a waveform—and it alters the numbers, making small changes in them. What you're doing is subtracting noise and not touching music. That's the most radical kind of equipment. I used a lot of toys, always do. In a way, it's like asking what notes you play when you're performing a piece of music. You play all the notes you need."

Indeed, that sounds very much like something that Mingus himself would have said. ■

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by Peter Caranicas

IN THE CAN

SHOULD A VIDEO POST HOUSE OWN STOCK MUSIC AND SOUND EFFECTS LIBRARIES?

When it comes to audio, video post facilities are torn between two desires. On the one hand, they want to provide their clients with every possible service, including audio. On the other hand, they need to operate in the real world, where their equipment, rates and staffs may not justify the setting up of full-fledged audio services.

This tension extends to the area of music libraries. Some video post houses



have them, some don't. The same holds true for sound effects. Some offer a music library but no sound effects, while others have effects libraries but no music. Much depends on the type of work and on the client mix for each facility.

If money were no object, video houses would offer everything. One that comes close to this ideal state is Limelite Video of Miami, Fla., which is involved in high-end commercial work,

music videos and broadcast. In addition to owning a number of music and sound libraries—including FirstCom, FirstCom Sound Effects and Full Sound Ideas—Limelite is also able to offer its producer clients originally scored music.

According to VP and general manager Michael Garrett, when Limelite was designed from the ground up four years ago, its owners decided to put in a full-fledged audio studio, complete with a Neve 36-input board with Necam 96 automation, 24-track Dolby SR, 32-track Mitsubishi X-850 digital recorder, a Sony 2800 one-inch machine with two channels of PCM audio, and the ability to sync everything to video in the control room. In this luxurious environment, clients who want original scores are directed to the composing department; those who want canned music are steered to the audio engineer and the CD libraries.

Audio-Not-for-Video

But Limelite is the exception, not the rule. High-end video clients need original scores and are accustomed to doing their audio in a separate facility. As a result, video post houses catering to such clients—whether from advertising or broadcasting—have little need for canned music.

The management of New York's Broadway Video—a facility originally set up to edit old *Saturday Night Live* episodes into half-hour and hour versions for syndication—made a conscious decision *not* to have a music library. Why? "It basically comes down to the economics of video editing suites: the cost-effective use of time in there," says president Peter Rudoy. "The whole process of selecting music, listening to cuts and deciding on the best one is not an appropriate activity in a video suite."

Peter Rudoy,
president of
Broadway
Video

In addition, in Rudoy's view, having a music library opens up serious creative issues: "Every music library is different, and you need a comprehensive collection to give a client enough choice. Otherwise you're locked into one library style."

But Broadway, which serves primarily the cable and broadcast programming market, *did* invest in a sound effects library. "It's not that you can't be creative with sound effects," Rudoy says, "but often the need is pretty straightforward. If there's a door slamming on the screen, you need a door slam. With a library, you can do that quickly. Before we had the library, our clients would leave here with the sound effect as the only element not present on a finished track; for the lack of a single door slam they had to go to a mix session. That's why we got the library. Now within minutes clients call up the right effect, lay it in and later incorporate it in the final mix. They can walk out with a finished track."

Before purchasing sound effects, Broadway looked at several libraries. To determine quality, Rudoy recalls, "We listened to the very low-level, subtle effects. That's where the differences in the libraries were apparent, and where digital recording technology was really a significant factor." Equally important, Rudoy says, was the library's organization. "It had to be logical, and the categories had to make sense in terms of real production situations."

Another Big Apple post-production facility that makes good use of a sound effects library, but eschews canned music, is Editel/New York. "We don't do stock music, so we don't have a music library," says Bob Schott, sound mixer. "We post lots of national commercials, for which people have usually created their own music." But, like Broadway, Editel has a full range of the Sound Ideas sound effects libraries, which are used by "just about every client, on just about every job," Schott says.

On the opposite coast, San Francisco's Pacific Video Resources also has no need for library music. According to Mike McRoberts, a musician who heads up all the facility's audio: "I create a lot of the music that we're doing myself. Even though we have a lot of audio equipment here, we're not oriented toward sweetening. Producers generally go to the audio houses for that, and most of them have music libraries. So

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it makes no sense for us to invest in one."

Like Rudoy, McRoberts makes the point that "if someone wants to do audio here, they've got to pay the room rate, which is a lot higher than at an audio place. It makes more sense for them to go to a studio like Music Annex, do the audio, select from the music library there, where they'll dub it over to tape. Then they bring the tape to us, and we bump it over to videotape. It just works better that way."

Western Images, another San Francisco video post house, which gets 70%

of its business from national commercials, has not invested in either music or sound effects. Mike Cunningham, president, agrees with his New York and San Francisco counterparts: "You have to consider the support required for doing music library work or effects work in terms of other sound sweetening and mixing needs," he says. "You can't just do music. You have to provide more than that. When you get to the level of music search and music mix, you have to have a commitment to audio post-production as well as more traditional video post-production."

Cunningham also points out that it

would be necessary to have people onboard who are audio mixers as well as video editors, all the necessary equipment, plus the space. "And the space can't be in your online suite, because you couldn't charge enough for the service to justify putting it there. You're creating another profit center, and you have to analyze whether that works for your business."

Another important factor, in Cunningham's view, is "who else is available in town: Are they competitors or friends? The ones here that provide the service—Music Annex, Berke Sound, Russian Hill Recording—are all fine audio companies that I'd rather support than compete with."

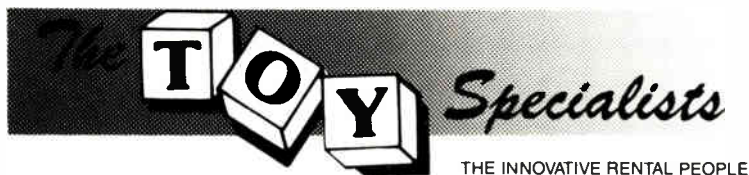
The commercials posted at Western Images use original music. "On these, the tracks are usually pre-built by the time it gets to the edit stage," Cunningham says, "so we're basically laying down to a scratch track, and when it's all sweetened there's a final audio layback onto the D-2 master."

But if music libraries are less popular in national hotbeds of video post like San Francisco and New York, they do better in some regional centers where more "industrials" are produced. In Honolulu, for instance, a music library has found a home at Pacific Focus, a production company and post house serving the 50th state with a wide range of commercials, corporate work and promotional videos for the tourist industry. The company uses the Killer Trucks library, according to president Dennis Burns, and made the investment mainly for economic reasons.

"For Honolulu, we're a high-end video facility, with two online edit suites, so we're looking for ways to serve middle-to-low-end clients," Burns explains. "To do that we've got to control costs and create the perception in the market that we can do a good spot inexpensively. A music library helps us do that."

"I've used a lot of library music over the years at various Honolulu facilities," Burns adds, "and I decided it was time to have something in-house so we could have more control over costs. We bought the library to save money, and also to control as much of the audio process as we could in-house. Little new equipment was involved in the library acquisition, with the facility having to get a consumer-grade CD player for listening. For dubbing a CD to videotape, we have a high-quality professional CD player."

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Unlike some of his New York peers, Burns has not yet invested in a sound effects library.

Interface Video of Washington, D.C., posts programs ranging from political spots and PBS specials to commercials and trade-association industrials. Interface uses two music libraries, Network and FirstCom, which together constitute about 280 CDs. However, Interface president Tom Angell says he finds the libraries limited: "You can never get by with just one." After Network, Interface added FirstCom in order to increase its repertoire, but decided to keep Network as well since so many of its clients had become accustomed to it. "Fortunately, both Network and FirstCom are continually adding to the library; you get one of these CDs about once a month," Angell says. "If all the rage is Scott Joplin, or *Chariots of Fire*, they'll send you some knock-offs."

Angell has sometimes found the non-exclusiveness of music library product to be a problem. He cites an opening his facility created for the local PBS show *Metro Week in Review*; it used a catchy piece of music from Network. Six months later exactly the same music turned up on an open for CBS Sports. "If there's a good piece, a lot of people may use it," Angell warns. For that reason, "heavy-duty commercials use original music. Some other programs don't have money for that, and even if there were money, there would be no time to go out and compose and arrange. We're a speed business."

In addition to music, Interface has some eight sound effects libraries on 120 CDs that are played back on two Sony "juke boxes." These are hooked up to a database program from Gefen Systems that categorizes and cross-references 18,000 effects.

HSN Telemation, a Seattle-based video facility, subscribes to two music libraries, according to Gordon Glascock, senior sound engineer. One of them—Associated Production Music—allows access to several other international music libraries, such as Sonotone, KPM, Conroy and others.

Most of Telemation's clients are corporate and use library music extensively. Fortunately, "library music has improved a great deal over the last ten years," Glascock says. "The production quality and artistic composition are much better than they used to be, and it's become more responsive to current trends."

And what about costs? No music

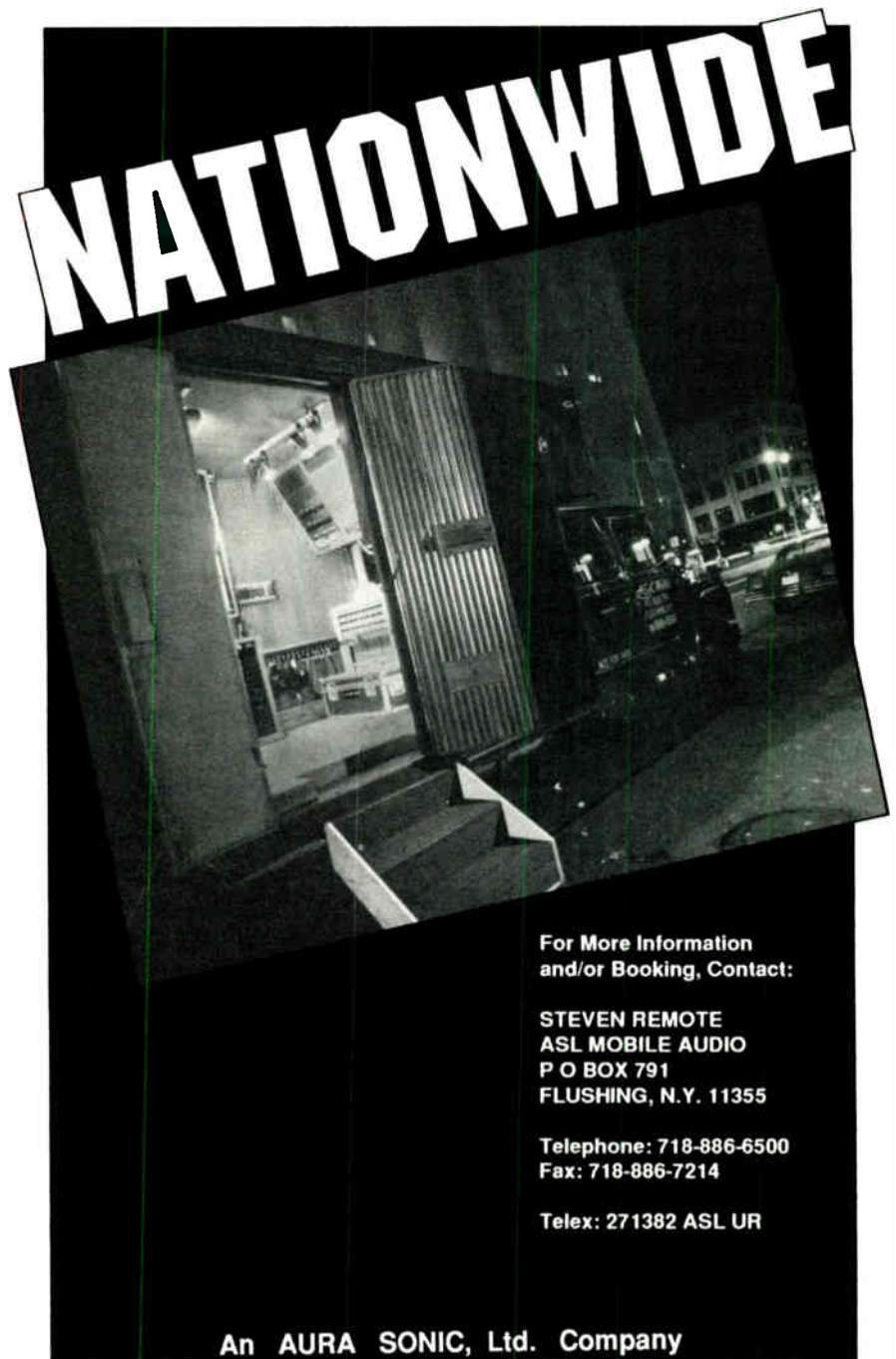
library user seems put off by them. Although Interface's Tom Angell complains that "they have so many damned plans it drives me nuts," he himself has done two buyouts. Network costs him roughly \$3,000 a year, Firstcom about \$5,000. However, Interface "records it every time we make a cut. As long as we break even or do a little better on it, we're doing fine. It's a service center, not a profit center."

"We pay a modest library fee of about \$400 for the CDs," says Pacific Focus's Burns, "and it's almost entirely reimbursable to us as we purchase tracks for the director or producer. We'll get

our entire investment back."

Broadway's Rudoy is happy with the "few grand" he paid for his sound effects library: "It was an investment well worth it because it filled a gap so nicely. We don't bill for it. It's not a revenue center. We just wanted to have it as an essential service, ready to go."

Cost may not be an issue for video post-production houses buying music libraries, but shifting technology will certainly have a major impact on the way such libraries are purchased and used. In particular, digital audio devices, with their easy-scoring capability as well as their ability to manipulate stock music



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Broadway Video has built a studio around a New England Digital Synclavier. It includes a 32-input board, multitrack machines, processing equipment for EQ and reverb, plus video playback and monitoring equipment. "It gives us the ability to mix and to augment the Synclavier's sampling and instrumentation abilities," Rudoy says. Instead of canned music, "we offer and package the Synclavier with video-editing projects. For example, if someone creating animation wants a musical theme to go with it, we can offer that service, with the music being composed by freelancers who work with us."

Nearby at Editel/New York, Bob Schott works with a Synclavier PostPro SD. "Because of that, we don't see the need for an extensive music library," he says. The machine, a combination of NED's Synclavier composition system and its PostPro random-access, hard disk digital editing system, "lets me take stock effects and manipulate them with such things as pitch bending, vibratos, and things we normally associate with musical instruments," Schott says. "You can apply it to effects or anything else to alter reality. For *Garfield* I used it to create cartoon-type footsteps. I recorded them and edited them right in from a keyboard, but pitch bent them up for a humorous, cartoony quality. The sounds were funny."

Schott also recalls a recent Pennzoil commercial. Starting out with silent footage of racing stock-cars, he "went to the library to find a lot of specific car sound effects. We added original music and canned effects like door latches opening and truck gates lifting. We built up about 25 different tracks of cars racing, and used our system to do such things as match a Doppler effect to the picture as cars whiz by. Once you load the sound into RAM, you treat it like any other musical instrument voice. It's basically a big sampler."

At Limelite, clients looking for something less expensive than an original score but more exclusive than canned music can use the Fairlight Series 3 sampling, reproduction and design system, which lets users of stock music design it right to playback. NED's PostPro is also available.

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Lexicon Opus audio-for-video room. Among other things, it's used directly in conjunction with the facility's sound effects library. "As soon as we find a sound effect we like," Tom Angell says, "we digitally encode it and store it on Opus's hard disk; we then call it up from there. We never record directly from the CDs; instead, we take their digital output and go directly into Opus. We never go to analog any more."

And why should they? In the fast-evolving world of audio-for-video, no one needs to look back.

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Zeta-3 "em," the emulator version of Adams-Smith's Zeta-3, is now shipping, according to company president Andrew Simon. The unit carries a list price of \$3,575. Among other things, Zeta-3 "em" allows serial transport control from another device, including control of sequencing from a video editor...With the installation of a SoundStation II from DAR, Soundtracks Studio Ltd., London, is one of the latest audio-for-video post facilities in Britain to boast a digital audio workstation...Turner Broadcasting System, in Atlanta, recently installed their sixth Amek/TAC console, an automated Amek Classic, for their new audio production suite...Rod Abernethy of Scores Inc. (Raleigh, NC) composed three seven-minute themes for the "Jump Start" film series. The scores for each program were post-scored to picture on the Synclavier Digital Music System... Stephen Land has been named executive vice president of Cinetel Productions, a division of Bagwell Communications in Knoxville, TN...Redman Productions (Orlando, FL) acquired Digidesign's Sound Tools, a disk-based recording system that provides digital voice editing, sound effects placement and digital crossfading...Composer Michael Josephs was at Henninger Video (Arlington, VA) recently to complete work for the Fox Morning News and Fox's *Off the Record*. Henninger's Rich West and Jeff Largent engineered the sessions...UK sound editor John Foster and Digital Audio Research recently demonstrated the capabilities of DAR's 16-channel SoundStation II system in England. For information, call Lesley Braun at 0372-742848. ■

Peter Caranicas is a freelance writer living in Pleasantville, N.Y. He is the former editor of Millimeter magazine.

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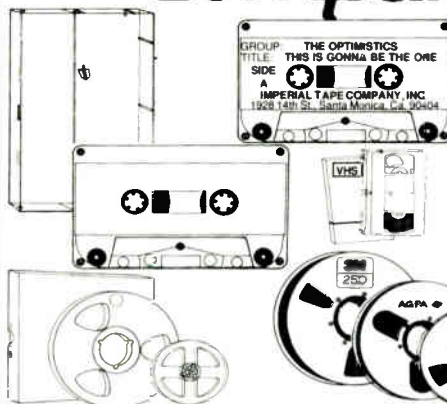
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C O A S T

L.A. GRAPEVINE

by Amy Ziffer

Once upon a time, 525 Post in Hollywood was strictly a video post house, but now the five-year-old facility has a sound department. A single audio post room is furnished with a Neve VRP48 with Flying Faders, an Otari MTR-100 24-track with Dolby SR, two MTR-12 4/2-tracks with center-track time code, a Sony 2500 Pro DAT, and a BVU-850 for 3/4-inch play-

—CONTINUED ON PAGE 152

Westwood One's remote recorded Michael Penn and his band live at Park West in Chicago. Penn (third from left) is pictured here with (l to r): Westwood One VP/programming Gary Landis, Westwood One chief remote recording engineer Biff Dawes and Westwood One executive VP/entertainment marketing Jerry Sharell.

SESSIONS & STUDIO NEWS

REMOTE ROUNDUP

Metro Mobile of Chicago has been busy doing live broadcasts and recording live and gospel albums. Metro's Timothy R. Powell reports that he took the remote to Cub Run, Ky., to record *Eleventh Dream Day* in an empty tobacco barn for two weeks. Paul McKenna engineered and produced the project, while Powell played camp counselor for their two-week campout, which included wasp attacks and a "golf course made up of mic stands throughout the barn, played with a 5-iron and a wiffle ball." Other recent projects: live broadcasts on WXRT of Living Colour, John Hiatt and The BoDeans; and REO Speedwagon, Winger and Robert Cray for Westwood One.

Randy Ezratty reports that the "big truck" from Effanel Music of New York has been busy with projects such as Phil Collins' pay-per-view from Madison Square Garden and the Lincoln Center Classical Jazz series, featuring Wynton Marsalis, Pat Metheny, Herbie Hancock and Jack DeJohnette in the

high-definition video concert. At press time, Effanel had a block booking of their truck by Ziggy Marley for his next album. "We just shipped the truck over to Kingston [Jamaica]." By the time this is printed, the portable system will be in London for five weeks with Eric Clapton at the Royal Albert Hall.

Five-year-old Dogfish Sound of Newberg, Ore. (30 miles south of Portland), is enjoying the independent band boom in the Northwest. Owner Drew Canulette reports: "Portland is nice because there isn't a lot of hype. People are more interested in the music, rather than competition for media attention." The Dogfish truck houses a 32x24 Harrison Raven board with 40 automated channels on remix, and an Otari MTR-9011. Canulette recently recorded the Dharma Bums in a grange hall (a building that farmers use for lodge meetings and bake sales) live-to-24-track for Frontier Records. He also did the Seattle Symphony scoring of the soundtrack for *Guilty As Charged* (IRS Films). The main staple (and labor of love) at Dogfish is independent bands such as Soundgarden (when they were independent), the Crazy 8s, the Tone Dogs and other indies around Portland. In between band gigs, he does church and gospel dates, including the Christian Faith Center (Portland) and the New Covenant Christian Center in Seattle.

Throughout the New York metropolitan area, ASL's remote truck has been doing more live recordings direct-to-DAT, according to owner Steve Remote (his legal name, no kidding). The Flushing, Queens-based truck is equipped for 48-track recording, but the relatively large amount of processing gear onboard the 1987 Navistar International allows Remote's remotes to sound like records. Remote recently recorded ex-Iron Maiden vocalist Paul Di'Anno's new band "Killers" for South American release; the Mick Taylor Band (for a Japanese release in a package



C O A S T



Out of Vancouver, B.C., is Turtle Recording's vehicle with interior design by Larry Anshell. The remote was used to record the Jeff Healey Band and BTO from 86th St. Music Hall in Vancouver for broadcast on CFOX, and the Northern Pikes from the Whistler Conference Center in British Columbia for broadcast on CFMI. Anshell produced and engineered both projects with assistance from David "Trigger" Trgovcic.

entitled *Manhattan Soundcoaster II*—interestingly enough, it's a promotional drink coaster with a 3-inch CD inside) from the Lone Star Roadhouse; Savoy Brown (for a live CD) also from the Lone Star Roadhouse; and Spyro Gyra from Tramps in NYC, which utilized a truck-to-phone uplink via ABC satellites for national broadcast from flagship station WQCD-FM (New York's CD 101.9). All of the above projects were direct-to-DAT, and Remote keeps a DAT of everything he does. Good thing. After doing a live radio broadcast of Living Colour at T.T. The Bears (Cambridge, MA), the band liked it so much they used Remote's DAT of five songs for use on a promotional EP and a CD.

David Glasser of Airshow Inc., which has moved into new quarters at Bias Recording in Springfield, Va., reports the remote recording operation has been busy recently. Airshow provided technical coordination for a National Public Radio live broadcast of the Paul Winter Consort's annual *Winter Sol-*

stice Whole Earth Christmas Celebration from the Cathedral of St. John the Divine in New York City. Glasser mixed the show that was carried by over 150 stations. Other remote recording



N.Y. METRO REPORT

by Dan Daley

As the pencil-points in D.C. finally began stuttering the "R" word (that's recession) around the new year, it seemed like a good time to do a quick perusal around town and see what some of the leading players think about the local economic situation. In general, responses reflect a cautious optimism.

Steve Loeb, owner of Greene Street Recording, feels that studios with a heavy dependency on commercial and industrial recordings are now the most vulnerable, citing a combination of

—CONTINUED ON PAGE 156

Steve Remote aboard the ASL truck. Remote, "The Audio Chameleon," says, "One day I'm doing Agnostic Front [hardcore] from the Ritz and the next I'm doing the Turtles from the Bottom Line."

projects include Dizzy Gillespie, Hank Jones and Benny Carter in concert at the Smithsonian, mixed by Bias Recording's Bob Dawson; and a Martin Luther King Memorial concert at the University of Alabama featuring renowned vocalist William Warfield, engineered by Glasser.

Mark Eshelman of Record Plant Remote Division (Hollywood, Calif.) reports working with chief recording engineer Bill Dooley on Cher's CBS special live from the Mirage Hotel in Las Vegas, and Luther Vandross' live radio broadcast from the Anaheim Celebrity Theatre. Other projects: Was (Not Was) at the Mayan Theatre (L.A.), and Julio Iglesias at the Greek Theatre (L.A.).

NORTHEAST

Bluesmaster B.B. King was at Quad Recording (NYC) with producer Jon Tiven and engineer Jimmy Douglass...At Sear Sound in midtown Manhattan, Rick Chudacoff and Peter Bunetta were in from the West Coast producing the new Peabo Bryson album for CBS Records. The session engineer was Leon Ross Johnson, and Fred Kevorkian assisted...At Trod Nossel Recording Studios, of Wallingford, CT, independent artists Black-Eyed Susans, Road Pizza and Visual Echoes were in recording, just to name a few...At Normandy Sound of Warren, RI, engineer Tom Soares mixed Men Without Hats for PolyGram Records with assis-

tant Joe Pires...More scrapple from the Apple: Producer Justin Strauss was at Prime Cuts (NYC) working on remixes for Information Society's single "How Long" and Vibe Tribe's "Trust Me." Both sessions have the tag team of Eric Kupper on keyboards and programming, and Shaun James on console...

SOUTHEAST

Living Colour was at Soundscape Studios in Atlanta doing a spot for MTV's *Top of the Hour*. John Payon from MTV produced the spot, Ron Christopher engineered, and Jim Zumpano and Ted Malia assisted...Thomas Dolby was at Southlake Recording Studio (Metairie, LA) doing overdubs for a new project,

—FROM PAGE 150, LA GRAPEVINE

back. Sony BVH-2000 1-inch machines are available for layback. Among the bells and whistles are a Motion Worker machine interface that allows engineer Tom Davis to talk to any machine through the Flying Faders, an E-III for sound effects and music scoring, and the Intramedia Audio Resource Manager, a custom Macintosh-driven interface for their CD-based sound effects system.

Under construction is a sound design/digital editing prelay room based around the Digital Dynamics ProDisk 464 disk-based editing system. A 24-track version of the ProDisk system is in the studio right now, being used instead of and in addition to tape multitracks. The completed room was designed by Vincent Van Haaff of Waterland Design; Waterland Construction did the building. 525 counted among their first projects a Plymouth campaign with Lol Creme (of Godley and Creme fame) producing, a pilot for the comedy show *White C/yc*, the Janet Jackson home video compilation and biography, and the *Billboard Music Awards*.

For the last eight months, audio-and-video post facility Varitel Video has been trying out the new Macintosh IIx-based Avid 1/Media Composer random access, offline editing system. The Avid stores digitized audio and video on one 600MB fixed hard disk and six removable drives, and has extensive automatic backup features. Audio can be sampled at either 22 or 44.1 kHz. Since it is an offline system, it's not

broadcast-quality. On the video side, it can perform dissolves, but not wipes or sophisticated digital effects, although it will be able to down the line. According to engineer Peter Cohen, "You get to edit your picture and sound in the computer; for people who are computer-literate, it's almost like doing word processing with pictures and sound." He's been using the Avid on *They Came From Outer Space*, a new Finnegan/Pinchuk-produced series for the Hollywood Premiere network, as well as rock videos and industrial presentations.

Several months ago, Silverlake's Sound Castle installed a new Neve VR72 with Flying Faders in Studio 1, replacing an SSL G Series board. Designed by Peter Maurer (Studio Baurton), the room reopened last September 28 for client John Tartaglia, doing media work for Huntington Bank and others. It has since been used to record music for *The Guys Next Door* and for posting *Tiny Times*. Dave Devore is facility manager. Heavy metal band Motorhead was in for six weeks, followed by X, one of Japan's most popular metal bands, who are currently spending three months there recording a new album. The VR72 makes Sound Castle a half-Neve/half-SSL studio complex, with two of each. In addition to the new board, a 35-inch video screen and new Augspurger monitors were added, and control room space was opened up in part by positioning the board's patch bay in the wall.

Rusk Sound Studios is also newly

outfitted with a Neve, in this case a V360 with Necam 96. Rusk was once one of L.A.'s hottest studios, with 48 gold and platinum albums to its name. Donna Summer did a lot of her early work there. Partners Elton Ahi and Kaiko bought out the facility about two years ago, and their efforts have revitalized the Hollywood landmark. Both of the studio's rooms have been remodeled and now have 48-track analog or 32-track digital capability. Ahi says the Neve was just used with a Mitsubishi digital multitrack to post and record the score for *Kindergarten Cop*. *The Tender* (John Travolta's new film) and *Come See the Paradise* were also posted there. On the music side, Capitol recording artist Hugh Harris has been in tracking and mixing a new album, and they recorded *Billboard* magazine's Latin Album of the Year for 1990 (by artist Daniela Romo, with over 1.5 million sold). After a long dormancy, Rusk looks to be well on its way to flowering once again.

Lastly, a Hollywood studio by the name of Starworks is at the center of a strange imbroglio. Chris Columby Pawlowski is suing Film Service Laboratories Inc. and Charles VerHalen for what he claims was the studio's forceable and illegal takeover, and for assault. The case is wending its way through the courts now.

Send studio news to Amy Ziffer, c/o *Mix* Magazine, 19725 Sherman Way, Suite 380, Canoga Park, CA 91306; or call (818) 567-1429 or fax (818) 709-6773. ■



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with Michael Doucet of Beausoleil on fiddle and Wayne Toups on accordion. Steve Himelfarb engineered...In Atlanta, Southern Tracks Recording Studio reports that .38 Special recorded material for their release on Charisma/Virgin Records. Rodney Mills produced and engineered the sessions, with Tag George assisting...After more than four decades of making music, the Ink Spots are still going strong. They were in at Criteria Recording Studios of Miami completing work on a live-to-digital 2-track recording. The recordings, for Intrepid Records, were produced by Ric Ike, while Criteria's founder and president Mack Emerman engineered with assistance from Steve Whaley...

SOUTHWEST

Longhorn Sound Studio, of Clyde, TX, reports that Elvis' original drummer, D. J. Fontana, is back in action. Fontana drummed on John Secord's new *It's Christmas Time In Texas*; Fort Worth's famous Willy Ray Band was also at Longhorn recording three hard-hitting Southern rock 'n' roll cuts. Randy B. McCoy engineered both projects...At Planet Dallas, Devo X completed mixes for their upcoming release on YO!

Records. Snake produced and Rick Rooney engineered...

NORTH CENTRAL

Metro Studios of Minneapolis reports the following activity: Dale Strength produced the up-and-coming *a capella* group 5th Avenue; Warner Bros. artist Ricky Peterson produced Jevetta Steele for an Elektra release; and producer Pepe Willie was working with Little Anthony...Studio A of Dearborn, MI, has their own version of "Cop Rock": Dale Seaton is one of Detroit's finest by day and one of Detroit's baddest (rappers, that is) by night. The Detroit cop put the finishing touches on his first album release at Studio A. Randy Poole engineered the project, which is aimed at providing a positive message for today's kids...At Ajax Recording Team in Fort Wayne, IN, Beverly Rieger mixed her latest release *The Watchers* for Mayan Dream Productions, with Craig Harding engineering...

NORTHWEST

The Plant (Sausalito, CA) sent "Rover," its mobile facility, to record Y&T on New Year's Eve at the Cabaret in San Jose...Starlight Sound (Richmond, CA)

hosted guitarists Michael Hampton and Gary Sheider and drummer Mudbone of Parliament/Funkadelic, who were in with Shock G and Smoove of Digital Underground. The sessions were engineered by Steve Counter with assistance from Lynn Levy...Recent projects at Reciprocal Recording of Seattle include Scott Benson tracking an LP from Peace and Silence with producer Kelly Gray, and Jack Endino recording the Dharma Bums, Coffin Break and Seaweed...The Life Rock Posers recorded their hit "Grind, Grind, Grind" with engineer James Jay Underwood at Santa Clara Studios (San Jose, CA)...Doug Bennett (of Doug & the Slugs fame) completed his country recording debut at Crosstown Recording Studios of North Vancouver, B.C., with Al Rodgers engineering and Simon Kendall producing...

SOUTHERN CALIFORNIA

M.C. Hammer, Tom Petty, Guns N' Roses, Al Jarreau, Terence Trent D'Arby, the Red Hot Chili Peppers, Flea, Wendy and Lisa, and Teena Marie banded together to protest war in the Gulf by recording John Lennon's "Give Peace a Chance" at Studio Masters of L.A.

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Control Panel

Lenny Kravitz produced, while Greg Grill engineered the project...Motley Crue and 2 Live Crew tracked and mixed a tune for the upcoming film *Hangin' With The Homeboys* at L.A.'s Westlake Audio. The session was engineered by Robert Margouleff and John Fundingsland, with the assistance of Brian Malina...At Foz Sound (L.A.), Freddie Towles, lead singer of Atlantic Records' Billy Caldwell Blues Band, was working on his solo project...Aldo "Life Is Just a Fantasy" Nova (PolyGram) was at Encore Studios of Burbank doing overdubs for his new project with producer Jon Bon Jovi and engineer Rob Jacobs...Warner Bros. Brazilian artist Dori Caymmi was at Sunset Sound Factory working on overdubs for his self-produced upcoming release. Don Murray engineered with John Paterno assisting...Brian Malouf was at Skip Saylor Recording (L.A.) mixing the song "Joy Ride" for EMI artist Roxette. Pat MacDougall assisted...In West Hollywood, Bel Biv DeVoe and Fishbone were taking advantage of Summa's Studio B/API room...

STUDIO NEWS

BMG Recording Studios (NYC) used their CEDAR sound restoration system to complete reissues of classical albums by Jasha Heifetz and Vladimir Horowitz, a jazz reissue by Benny Carter, and a country reissue by the group Sons of the Pioneers. Several producers were involved on the projects, including Orrin Keepnews and a variety of in-house BMG producers...Avenue Edit of Chicago purchased a Neotek Film Elite console to help handle post-production chores...Rocky Mountain Recorders (Denver) added dbx noise reduction units to two studios in its 40-track-capable complex...NRG Recording Services has expanded its new location at 7222 Hinds Avenue, North Hollywood, CA, to include a pre-production/rehearsal soundstage...Radio Active Productions has relocated from Palm Harbor back to Marathon Shores in the Florida Keys. Their new address: PO Box 2523, Marathon Shores, FL 33052; phone (305) 743-4248. ■

SPARS To Host 1991 Workstation Business Conference

SPARS will host a weekend technical conference and interface with leading manufacturers of digital audio workstations on May 18-19 in Orlando, Fla. SPARS president Pete Caldwell (Doppler Studios, Atlanta) will chair the events. SPARS' first vice president Dick Trump (Triad Productions, Des Moines) will moderate a panel discussion with the manufacturers. SPARS chairman of the board David Porter (Music Annex, San Francisco) comments, "These high-powered meetings of manufacturers and audio professionals are the best way to understand the latest technical developments and, more importantly, to help determine product development for the '90s." For more info contact SPARS executive director Shirley Kaye at (800) 771-7727. ■

—FROM PAGE 151, N.Y. METRO

lowered budgets and an increase in projects recorded outside of commercial facilities. Another barometer of the economic climate is the number of calls Loeb's been getting regarding refinancing of equipment leases, calls he assumes other studios are also receiving. Such refinancing could reflect the perception of a regional need for capital infusion, at the expense of additional tax benefits. "There's also the mass psychology effect to consider," he says. "There's still a lot of business out there, but suddenly 30-day accounts become 90-day accounts, and so on. People are holding on to their money longer."

Lou Gonzalez, owner of Quad Recording, believes that multiroom facilities that accent equipment over niceties will thrive. "I expect the record companies to pay a lot more attention to budgets this year," he says. "Equipment will have a higher focus this year over the frills because, while budgets go down, the level of quality has to be maintained." Gonzalez notes that he won't try to fight the trend toward project studios; rather, he feels that by enhancing technical aspects that project rooms can't offer, a symbiotic relationship

between the two can evolve to everyone's benefit.

Skyline's co-owner Lloyd Donnelly feels the fundamental flaw in local studio economics is one that's been around longer than the recent recession. Citing SPARS statistics, he says that studio rates are the same as they were 20 years ago. "By the standards of the business world, the studio industry is eating itself alive around here," he says. Donnelly notes that adding video capability could be an answer for some studios, although he cautions that going beyond the boundaries of a facility's expertise has implicit dangers itself. "You have to stay with your strengths," he concludes.

If there is a problem for audio-for-video houses, it likely preceded the actual recession also, according to Sync Sound president Bill Marino. He cites a belt-tightening trend by the major networks in response to cable and syndicated networks' lower-budget programming. "The success of that type of programming proves you don't have to spend a lot of money, and that applies to audio as well as video," Marino explains. However, Marino, who just completed a major expansion, points out that the entertain-

ment industry has historically been better insulated from economic hiccups than most.

"It's going to make a lot of people take a good, hard look at how they do business," says Bob Walters of Power Station, adding that the middle segment of the local recording industry is most likely to feel the greatest pinch. "High-end studios offer the most," he says, "but still, in a recessionary economy, there is always some impact across the board. [Studios] have to beware of a tendency to lower prices to improve business. If you go low enough, long enough, it becomes impossible to recover."

On a musical note...Elliott Randall, guitar guru for Steely Dan and Doobie Brothers and local demigod north of West 72nd Street, has released the first part of a two-part guitar instructional video called "On Guitar Part I," available through DCI Music Video at \$39.95. Part II will be ready in April. It was recorded at Times Square Studios, engineered by Frank Kulaga and Larry Collen. The video also features the talents of guitarist Cornell Dupree and bassist Chris Bishop in trio and duo performances. And, yes, it has the solo to "Reelin' in the Years." ■

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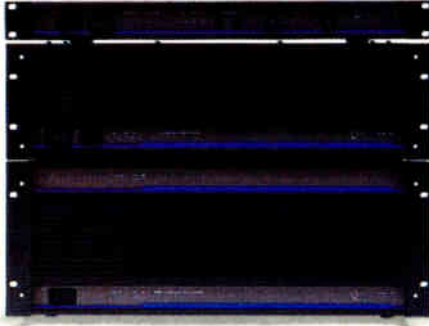
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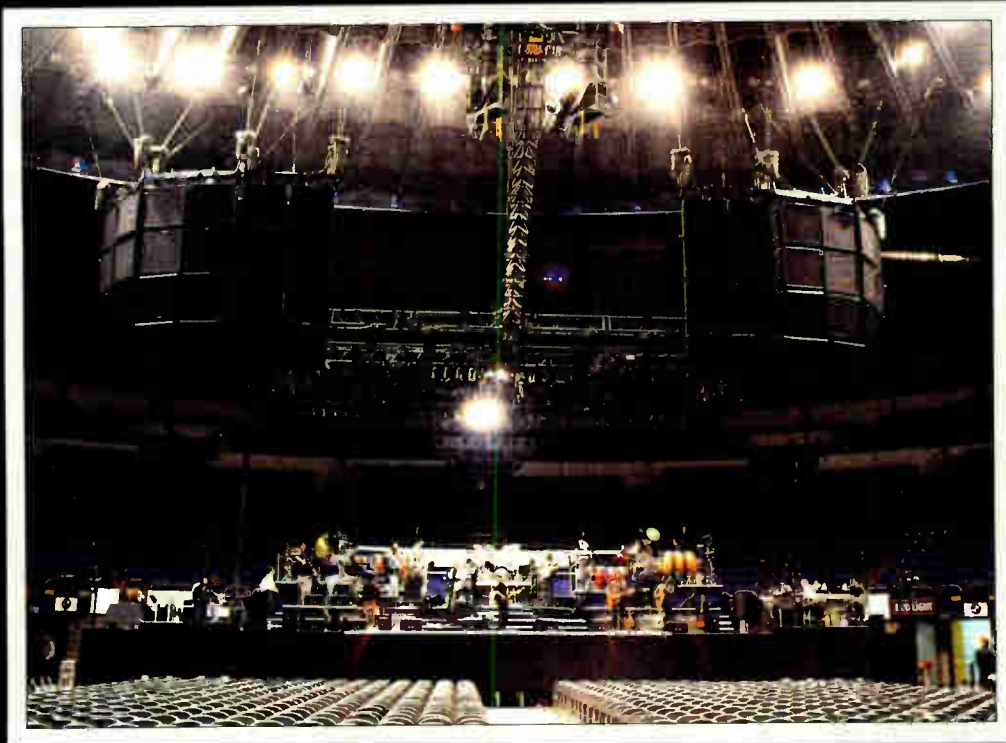
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SOUND REINFORCEMENT

REMOTE RECORDING

Information in the following directory section is based on listing applications mailed earlier this year and was supplied by those facilities listed. *Mix* claims no responsibility for the accuracy of this information. Personnel, equipment, locations and rates may change, so please verify critical information with the companies directly.



Sound reinforcement for the Paul Simon concert at the Oakland Coliseum was provided by Clair Brothers Audio Inc. Seventy-two S4 Series II™ speaker cabinets were employed, using Carver/Clair 2.0 amplification and CTS™ system controllers for the 17-piece band. The main system used Gamble EX 56-channel and Yamaha PM3000 boards, with two Harrison SM5s for the plethora of 12AM and assorted other custom-application Clair monitor speakers. Photo: Jay Blakesberg.

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Mix listings procedure: Every month, *Mix* mails listing applications to recording studios and/or other vital facilities and services for the recording, sound and video production industries. There is a nominal charge to list a Boldface Listing (name, address, contact) and an Extended Listing (equipment, credits, specialization and photo or logo). If you would like to be listed in a *Mix* Directory, write or call the *Mix* Directories Department, 6400 Hollis Street #12, Emeryville, CA 94608; toll free 800-344-LIST!

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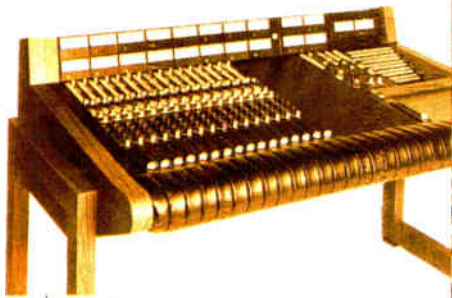
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B08 Sound Reinforcement

C. VIDEO/FILM
C10 Production Company
C11 Post-Production Company
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E23 Other (please specify)

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F26 Acoustics/Design/Construction
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G30 Radio Station
G31 TV Station
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J. RECORD COMPANY
J39 Record Company

K. INDEPENDENTS
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K45 Video Editor/Technician

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L49 Trade Association
L50 Government

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M51 Audio/Music
M52 Video/Film
M53 Rep/Sales

N. INDUSTRY-RELATED
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N56 Artist Management/Booking
N57 Music Publisher
N58 Student
N59 Other (please specify)

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- D. **Sales & Administration**—Sales representative, account executive, etc.
- E. **Other** (please specify) _____

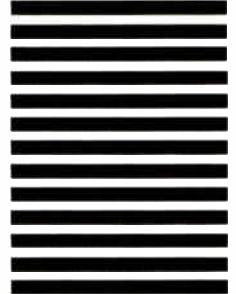
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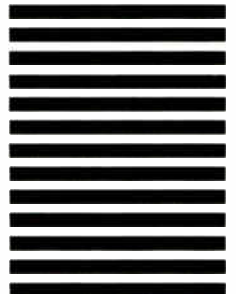
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421, 441, 528; assorted Beyer, AKG D-12E. **Staging:** Neve Flwx. **Lighting:** 20 sections of Tom Cat/Thomas truss, AVO dimming, Celco dimming. **Other Equipment:** Lycian Series 400 HTI spots, CM chain motors and flying gear.



FM SYSTEMS
Nashville, TN

FM SYSTEMS; Sound & Equipment Rental; 2500 Hillsboro Rd., #23, Nashville, TN 37212; (615) 386-3740; FAX: (615) 386-3742. Contact: Gary Daniels. Touring Radius: International. **Maximum Venue Size:** 12,000. **Vehicles:** 102' x 48' air-ride w/1990 Kenworth conventional air-ride, 102' x 24'. 1987 international straight trucks. **House Loudspeakers:** Apogee, Martin/JBL systems. **Flying System Available:** Yes. **Monitor Loudspeakers:** JBL proprietary wedges 1 x 15'7/2" bi-amped, JBL proprietary fills 2 x 15'1/2". **House Consoles:** TAC, Soundcraft, Yamaha. **Monitor Consoles:** TAC, Soundcraft, Yamaha. **Outboard Equipment:** AMS, Valley International, Lexicon, Drawmer, dbx, BSS, UREI, Klark-Teknik, Roland, Korg, Yamaha. **Power Amplifiers:** Crest, QSC. **Microphones:** Shure, Sennheiser, AKG, EV, Beyer. **Other Equipment:** Stage gear available upon request. **Rates:** Upon request.

GARRETT SOUND & LIGHTING; Sound, Lights, Staging & Equipment Rental; 9314 NW 102nd St., Miami, FL 33178; (305) 884-8339; (305) 776-4915; FAX: (305) 884-8313. Contact: Wally or Ron. Touring Radius: National. **Maximum Venue Size:** 100,000 to 150,000. **Vehicles:** 2 x tractor and trailer, 4 x 30' box trucks. **House Loudspeakers:** JBL 4871 concert series, JBL 4842 subwoofer system. **Flying System Available:** Yes. **Monitor Loudspeakers:** JBL 4604 floor wedge, JBL 4602, JBL 4871. **House Consoles:** Soundcraft 8000 40-channel, Midas 40-channel, Sony MXP-2000, Ramsa. **Monitor Consoles:** Soundcraft 800B 32-ch., MCI 24-ch., Midas 32-ch. **Outboard Equipment:** Yamaha REV7, Yamaha SPX90 and SPX900, Klark-Teknik DN360, BSS FDS360, dbx, MXR, Biamp. **Power Amplifiers:** Crest 8001, Crest 7001, Carver 2.0, Carver 1.5, Carver PM-100, Carver 350. **Microphones:** Shure, Beyer, Sennheiser, AKG, EV, Audio-Technica. **Staging:** Multistaging w/fly tops, major concert staging w/load-bearing roofs. **Lighting:** 400K of Thomas trussing, EDI dimmers, Leprecon dimmers, Avolite console, Xenon Super-Troopers. **Other Equipment:** Rigging motors, camera towers, lighting towers, generators.

IN CONCERT PRODUCTIONS; Sound, Staging, Lights & Equipment Rental; PO Box 2611; Peachtree City, GA 30269; (404) 487-5908. Contact: Jay Rabbitt.

INDEX AUDIO; Sound, Lights & Equipment Rental; PO Box 22654; Nashville, TN 37202; (615) 399-8830.

JC CONCERT SOUND & LIGHTING; Sound, Staging, Lights & Equipment Rental; 9314 NW 102nd St.; Miami, FL 33178; (305) 884-8325; (305) 776-4915; FAX: (305) 884-8313. Contact: Kevin Dillon.

J.C. POWER AND DISTRO; Equipment Rental; 1131 E. Commercial Blvd., Fort Lauderdale, FL 33334; (305) 771-1210. Contact: John Clark. Specialization & Credits: Full-service generator and power distribution services, serving southeastern United States, Bahamas and South America. 3 phase generators 25-350 KW, propane- and diesel-biamped generators, power distribution. Over 10 years of power-generating experience in the entertainment industry. **Credits:** Gator Growl/Gainesville, FL; the Police/Orange Bowl, Miami, FL; OTI International Awards/Miami; Beach Boys/Miami Beach; Joe Robbie Stadium/Miami; Heart/Fort Lauderdale, FL, spring break.

MR. O AUDIO; Sound, Lights & Equipment Rental; 2035 S. Lumpkin Rd., Columbus, GA 31903; (404) 687-6221. Contact: Maurice Owens. Touring Radius: Regional. **Maximum Venue Size:** 18,000. **Vehicles:** Volvo 28' and rental trucks for dependability. **House Loudspeakers:** (18) OAP DP-118, JBL 18"15'7/2"12"2" comp driver w/biradial, OAP FH-118 subs, Mr. OW25H (2 15'1" JBL comp driver w/biradial), Mr. O 52T (15'1" JBL comp driver w/60-degree horn). **Flying System Avail-**

able: Yes. Monitor Loudspeakers: (16) OAP 2-way Biamp wedges (15'1" comp. driver w/90-degree horn), Mr. O 52T (sidefills), Mr. O KA1 drum monitor (2 15'1" comp driver w/90-degree horn). **House Consoles:** Soundcraft 500 40 x 8, Wheatstone 40 x 8, Soundcraft 200 24 x 4, Yamaha 2404, Yamaha EM300 12 x 4. **Monitor Consoles:** Soundcraft 500 40 x 12, Yamaha 2408, Studiomaster 20 x 8. **Outboard Equipment:** Brooke-Siren FDS-366, (2) Klark-Teknik DN360, dual-octave graphic EQs, (8) dbx 166 comp/limiter, Lexicon 95 Prime Time II, Yamaha REV7, (2) Yamaha SPX90, Yamaha SPX90II, Effectron III, Ibanez HD-1500, UREI 539 1/3-octave EQ, Yamaha 2031 dual 1/3-octave EQs, Valley People Dyna-Mite (comp/limiter/gate/de-esser), UREI 525 crossovers, dbx 160x compressors, Crown VFX-2A crossover, Eventide H910 Harmonizer, Rane AC22 and AC23 crossovers. **Power Amplifiers:** Crown MA-2400, Crown PSA-2, Crown MT-600, Crown DC-300A, Crown D-75, BGW 7506, Yamaha P2200. **Microphones:** Shure SM58, Shure SM57, PE56, Sennheiser 421, AKG 414, Samson/Shure wireless, AKG D-112, AKG 408. **Lighting:** (186) PAR 64 w/(2) 40' trusses, 36 channels of Leprecon (2.4K), and Schrimmer (4.8K) dimming, 10 channels of non-dim 30 amp, circuits, CM Loadstar 1-ton chain hoists. **Other Equipment:** Oberhem DX drum machine, Korg Poly-61M, Moog Minimoog Model D, Akai AX-73 MIDI keyboard, Akai 612 sampler, Roland TR-505 drum machine, Acoustic 370 bass head, Ampeg B-25 cab, (2) JBL 2225, Fender twin w/JBLs, Ampeg V-4 headphone amp, Rane HC-6, Yamaha FX-11 drum machine, Conn Stronboturner. **Rates:** Call for rates.

MODERN METHOD PRODUCTIONS INC./BIG BRUTE CORDS; Sound, Staging, Lights & Equipment Rental; 1333 Meridian St., Huntsville, AL 35801; (205) 536-8025. Contact: David or Bobby Hendricks.

You can FAX your listing application to: Mix Directories (415) 653-5142



MUSE PRODUCTIONS
Birmingham, AL

MUSE PRODUCTIONS; PO Box 381235; Birmingham, AL 35238-1235; (205) 631-8834 (and fax #). Contact: Robert Hawthorne, Russ Hatcher.

NASHVILLE CARTAGE & SOUND; Sound, Staging, Lights & Equipment Rental; PO Box 121742; Nashville, TN 37212; (615) 386-3700. Contact: Jim White, Sheila D. Barnard.

NATIONAL EVENTS; Sound, Staging & Lights; PO Box 1177; Newington, VA 22122; (703) 550-7090. Contact: Ken Derr. Touring Radius: National. **Maximum Venue Size:** 500,000. **Vehicles:** Mercedes, GMC. **House Loudspeakers:** 40,000 watt outdoor Martin system 4-way, Woodwox SR1 3-way flying system w/subs, various proprietary 3-way box systems, all EV, JBL and T.A.D. **Flying System Available:** Yes. **Monitor Loudspeakers:** Unlimited to artist specifications: all EV, JBL, T.A.D.; 3-way microphone transformer isolator. **House Consoles:** Yamaha, Soundcraft, Soundtracs, to artist specifications. **Monitor Consoles:** Yamaha, Soundtracs, Hill, Allen and Heath, to artist specification. **Outboard Equipment:** Lexicon, Yamaha, Brolin, API, dbx, Valley People, Symetrix, Ashley. **EQs:** all Brooks 200 crossover, all Klark-Teknik, White Instruments, to artist specifications. **Power Amplifiers:** Crown, —LISTING AND PHOTOLOGO CONTINUED ON NEXT PAGE

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—continued—

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NATIONAL EVENTS
Newington, VA

QSC, Crest. **Microphones:** Over 400 assorted microphones in stock; AKG, EV, Beyer, Shure, Sennheiser, Sony, Nakamichi, Samson broadcast series wireless, to artist specifications. **Staging:** Any size, any configuration, roof. **Lighting:** Dimming & control by LMI, ETC, Leprecon, Celco and others. **Truss:** Slick Minibeam, Maxibeam and assorted triangle truss. **Instruments:** Colortan, Mini & Maxi Brutes Allman KL series & Q Series ellipsoids, Thomcat and Allstar PAR 64, Genielifts, CM chain hoists and crank trees. 12 & 14 AWG multi and stage cable. **Feeder:** Type W and Entertainment cable #1 AWG to 4/0 AWG. **Other Equipment:** 400 amp 3-phase splitter, 200 amp single-phase 50/60Hz. Isolation transformer, tour ready. Type W feeder cable, 12 1-ton chain motors. **Rates:** Call our offices. **Specialization & Credits:** National Events is the largest full service production company in the mid-Atlantic region, conveniently located in the Washington metropolitan area. National Events specializes in concert tours and single date engagements, providing sound, light, staging and power distribution to over 1,000 concerts and special events annually. Most recently: Melissa Manchester, Mitch Ryder, Dion, Righteous Brothers, Frankie Valley, Platters, Temptations, 5th Dimension, The Call, Hall and Oates, Ric Ocasek, G.E. Smith, Edie Brickell, B-52's, Bruce Hornsby, John Denver, 10,000 Manics, Judy Collins, Mary Chapin Carpenter, Charlie Daniels, Travis Tritt, Patty Loveless, Lee Greenwood, Ricky Skaggs, Reba McEntire, Chubby Checker, Doobie Brothers, Johnny Van Zant, Bonnie Raitt, Olivia Newton John, Jackson Browne, Fabulous Thunderbirds, Cher, Roberta Flack, Regina Belle, Ronald Reagan, George Bush and various senators and congressmen. **Clients:** Ralph Graves Productions, Jack Morton Productions, Cellar Door Productions, Ray Bloch Productions, Williams/Gerrard Productions, Howard Lanin Productions, East Coast Entertainment.

ON STAGE AUDIO; *Sound & Equipment Rental;* 773 Kirkman Rd., Ste. 120; Orlando, FL 32811; (407) 292-0012. Contact: Greg Smith.

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PARADISE SOUND; 4210 LB McLeod Rd., Ste. 110; Orlando, FL 32811; (407) 649-7220. Contact: Larry Epstein.

PARAGON PRODUCTIONS INC.; *Sound & Lights;* 720 Old Friendship Rd.; Rock Hill, SC 29730; (803) 329-3939; FAX: (803) 329-3592. Contact: AP Smith.

PYRAMID AUDIO PRODUCTIONS INC.; *Sound, Lights & Equipment Rental;* 849 Fulton St.; New Orleans, LA 70130; (504) 522-5473. Contact: Don Drucker. **Touring Radius:** Local & Regional. **Maximum Venue Size:** 30,000/40,000 watts. **Vehicles:** As required. **House Loudspeakers:** JBL dual sub-bass cabinets, JBL three-way cabinets, JBL two-way cabinets, Renkus-Heinz two-way cabinets, process, Crown MA-2400, Crest 3001 amplifiers. **Flying System Available:** Yes. **Monitor Loudspeakers:** (20) two-way active slants, (4) three-way sidefills, (2) three-way drum fills. **House Consoles:** Yamaha PM3000-40, Yamaha PM1800-32, Soundcraft Delta-24, Soundcraft Delta-16. **Monitor Consoles:** Soundcraft 8000-40 advance, Soundcraft 500B-32, Yamaha 2408-24. **Outboard Equipment:** Klark-Teknik, Lexicon, Yamaha, Eventide, Galax, JBL and BBS.

RAM SOUND; *Sound, Lights & Equipment Rental;* PO Box 906; Mary Esther, FL 32569-0906; (904) 664-6859. Contact: Bob McTyeire.



ROADWORX AUDIO & LIGHTING SPECIALISTS
Greensboro, NC

ROADWORX AUDIO & LIGHTING SPECIALISTS; *Sound, Staging, Lights & Equipment Rental;* 913 S. Chapman St.; Greensboro, NC 27403; (919) 378-0650; FAX: (919) 378-1498. Contact: Vickie Edwards Hutchins, Hugh K. Sarvis Jr. **Touring Radius:** National. **Maximum Venue Size:** 30,000. **Vehicles:** Tractor trailer and 24' vehicles. **House Loudspeakers:** (32) Woodworx SR-1 full-range enclosures, (60) Woodworx SR2 full-range enclosures, (32) Woodworx FR3 full-range enclosures, (24) Woodworx Sub dual 18 enclosures w/ 2241H JBL components, (40) TAD TCM-3 full-range enclosures. **Flying System Available:** Yes. **Monitor Loudspeakers:** (48) Woodworx MAX-1, (24) Woodworx MAX-2, assorted sidefill, drum and keyboard monitors available. **House Consoles:** Yamaha PM3000 40-channel, Soundcraft 8000 40-channel, Soundcraft 500 40-channel, Soundcraft 200 seq. 32-channel. **Monitor Consoles:** Ramsa WR-S840 40 x 18, Soundcraft 500 40 x 12, TAC Scorpion 30 x 12, Yamaha PM2800 40 x 14. **Outboard Equipment:** Woodworx digital control processor, Industrial Research TEQ, TC Electronic EQs and analyzers, White 4400 and 4650 EQs, dbx gates and limiters, Valley People limiters, Klark-Teknik DN60 analyzers, Yamaha REV7, REV5, SPX900, Lexicon PCM42, 70, LXP-1, proprietary power distribution systems, Whirlwind 40-channel

splitters w/mass connectors and transformer-isolated multipin stage boxes, Drawmer gate and limiters. **Power Amplifiers:** AB Systems 1200C and 1100A, Crest 8001, Crest 2400. **Microphones:** AKG, Shure, Beyer, Sennheiser, Neumann, Samson wireless. **Staging:** Concert staging available in various sizes w/ top. **Lighting:** (20) Thomas Truss prerigged w/240K and Genie Supertowers, Avolites Rolocues 60-channel, Leprecon LP-1000 and LP-2000, Leprecon LD-2400, dimmers in racks w/ patch bays. **Other Equipment:** TEF™ 12 system, various backline gear available on request.

ROCK 'N' ROAD AUDIO; *Sound;* 5238 Royal Woods Pkwy., Ste. 170; Tucker, GA 30084; (404) 493-6862. Contact: Kirk Marks.



SERIOUSLY SOUND
Atlanta, GA

SERIOUSLY SOUND; *Sound, Staging, Lights & Equipment Rental;* 550-C Amsterdam Ave.; Atlanta, GA 30306; (404) 872-0346. Contact: Garry Sharp, Dave Lowell. **Touring Radius:** National. **Maximum Venue Size:** 15,000. **Vehicles:** Hino 24', Ryder lease, Kenworth K-100 air-ride tractor, Kentucky air-ride trailer, **House Loudspeakers:** EAW KF850, SB850, Renkus-Heinz SR-2, Renkus-Heinz LR-2, Meyer MSL-3, Meyer 650 subs. **Flying System Available:** Yes. **Monitor Loudspeakers:** Woodworx Max II, Woodworx Max I, SSI TAD sidefills, Woodworx drum fills. **House Consoles:** Yamaha PM3000 40-ch., Yamaha PM2000 32-ch. **Monitor Consoles:** Ramsa S840 40 x 18, Yamaha 24 x 8. **Outboard Equipment:** Lexicon PCM70, Yamaha REV5, Yamaha REV7, Yamaha SPX90, Yamaha SPX90II, Lexicon LXP-1, Roland SDE-3000, dbx 166, Audio Logic MT-44 gates, Renkus-Heinz X-31 processor, EAW MX800 processor, JBL/UREI 55474 EQ, TDM time aligned crossovers. **Power Amplifiers:** Crest 8001, Crest 7001, Crest 4800, Carver 2.0, Carver 1.5A. **Microphones:** Sennheiser 431, 421, Shure SM58, SM57, SM85, SM81, AKG 451, 461, D-112, EV RE20, Beyer M88, M69, full Symphonic mic package. **Lighting:** Yes. **Lighting:** In-house 200-light system, CAE-Thomas format etc. Full theatrical inventory ellipsoids, FarCyes, etc., soft goods, special lighting, Lycian, high-end, data color pros, ACLs etc. **Other Equipment:** Large inventory of stage equipment, complete audio/visual rental inventory. **Specialization & Credits:** Partial client list: Lakewood Amphitheater, Atlanta Jazz Festival, Pace Concerts, Maryland Sound, Frankie Valli, Four Tops, Smokey Robinson, Atlanta Ballet, R.A. Roth Inc, Turner Broadcast Systems.

SOUTHEAST AUDIO INC.; *Sound, Staging, Lights & Equipment Rental;* 3650-K Patterson Ave.; Winston-Salem, NC 27105; (919) 767-3865. Contact: Jim Brammer/Don Cates/Jeff Cranfill.

SPECTRUM SOUND INC.; *Sound & Equipment Rental;* 1040 C Acorn Dr.; Nashville, TN 37210; (615) 391-3700. Contact: Ken Porter.

TENNESSEE CONCERT SOUND; *Sound;* 4835 Hwy. 70 E.; Brownsville, TN 38012; (901) 772-2292. Contact: Stewart Tritt, Bernie Bernil.

TREETOP SOUND AND LIGHTING; *Sound, Staging, Lights & Equipment Rental;* 4711 George Washington Hwy.; Portsmouth, VA 23702; (804) 487-6671; (804) 487-1321. Contact: Asa L. Kelly, Jr. **Touring Radius:** National. **Maximum Venue Size:** 100,000. **Vehicles:** Tractor trailers, (6) 26' Mercedes 1317. **House Loudspeakers:** (96) Stacks Lab-Q system. **Flying System Available:** Yes. **Monitor Loudspeakers:** (48) JBL 2220/2225 15", proprietary 2445 2" throat mids on DDS horn, 2405 tweeter, (12) drum and sidefill, upright, double the components. **House Consoles:** PM3000, Gamble, Soundcraft Series 4. **Monitor Consoles:** Yamaha, Soundcraft, Midas, Ramsa. **Outboard Equipment:** Klark-Teknik EQs, dbx, Lexicon, Eventide, White Instruments, Valley, DAT available upon request. **Power Amplifiers:** QSC 3800, 3500, 1500. **Microphones:** AKG, Sennheiser, Beyer, Shure, Stewart DI, Countryman, BSS.

Turn of The Century Productions Inc.



TURN OF THE CENTURY PRODUCTIONS INC.
St. Petersburg, FL

TURN OF THE CENTURY PRODUCTIONS INC.; *Sound, Staging, Lights & Equipment Rental;* 2701 24th St. N.; St. Petersburg, FL 33713; (813) 327-2496. Contact: Rick Baynard, David Cramer. Touring Radius: National. Maximum Venue Size: Unlimited indoors or outdoors. Vehicles: 48' air-ride trailers with late-model air-ride International tractors, Peterbilt 26' air-ride straight truck w/crew sleeper. **House Loudspeakers:** Turn of the Century Productions' "Overture System" proprietary, full-range flying cabinets w/JBL components, (2) 18", (2) 12", (2) biradials. **Flying System Available:** Yes. **Monitor Loudspeakers:** 2225-2425 bi-amped floor wedges, tri-amped drum fill, tri-amped stereo sidefills. **House Consoles:** Yamaha PM300040C, Ramsa WR-S840, Soundcraft 800B 40 x 8, Soundcraft 800B 32 x 8, all w/spare power supplies. **Monitor Consoles:** Amek-TAC Scorpion 40 x 12 w/balancing update, Soundcraft 40 x 12, Audioarts 24 x 8. **Outboard Equipment:** Crown RTA-2 real-time analyzer, Klark-Teknik DN300 1/3-octave EQ, Klark-Teknik DN360 1/3-octave EQ (monitors), UREI, Yamaha, 1/3-octave EQs also available, UREI LA-4 compressor/limiter (mains), BSS FDS-360 crossover, BSS FDS-310 crossover, UREI 525, Loft 602, Loft 603, dbx F900 mainframes w/902, 902, 904 modules, dbx 160X, dbx 166 gate/limiter, Omnicraft GT-4 quad noise gate, Roland SDE-3000 DDL, Yamaha REV5, Yamaha REV7, Yamaha SPX90II, Yamaha SPX90, Yamaha R1000, Eventide H3000 Ultra-Harmonizer, Eventide H910, Eventide F201, Lexicon 200 digital reverb, Lexicon PCM60, Lexicon PCM41, Clear-Com MS200, main stations, Nakamichi MR-28 cassette decks, TEAC, Technics, CD players, Crown D-75 headphone amps, Sony V6 headphones, Furman PL-8 light modules, other outboard gear available upon request. **Power Amplifiers:** Mains: Crest 8001, Crest 4001 w/1875 watts/cabinet, Monitors: QSC 3800, QSC 3500, Crown PSA-2, Crown DC-300 Series 2. **Microphones:** Shure SM58, Shure SM57, Shure SM81, EV PL20, AKG D-12E, AKG D-112, AKG C-451, AKG 451, Beyerdynamic M88, Sennheiser MD-421, Sennheiser MD-431, Sennheiser MD-44-1, Crown PZM, Crown PCC-160, C-ducer, Sony wireless, Countryman DI, Whirlwind DI, combiners, splitters, etc. **Staging:** 48 x 40 stage w/load-bearing roof. **Lighting:** Avolites QM 500-90 channel lighting console, Avolites C60 channel lighting console, Leprecon LP 2000 lighting console, Thomas Trusses, corner blocks, Thomas spot chairs, custom dimmer racks, utilizing custom Leprecon LD 2400 & Electrol DP6-2500 dimmers, Lycian HTI 400 truss spots, Altman HMI follow spots. **Other Equipment:** Yamaha Stage series drum kits, Yamaha CP80 piano, Yamaha CP70 piano, Yamaha DX7IID, Roland D-50, Roland JC-120, Fender Twin, Marshall 100-watt w/4 x 12 angle tops and bottoms, Gallien-Krueger 400RB, Guild-Houtke 4 x 10, SVT heads and 8 x 10 cabinet, LP congas, LP timbales, Ludwig timpani, complete line of rental equipment available upon request. **Specialization & Credits:** 1990 touring clients: Wayne Newton/USA and Canada—sound, lights and trucking, January-December; Expose/USA and Canada—sound and trucking, January-August; Smithereens/USA and Canada—sound, lights and trucking, April-May; Bad English/North East USA—lights and trucking; Moscow on Ice—trucking; Warrant/"Dirty Filthy Stinking Rich" video; Winger/"Easy Come Easy Go" video; Giant/"It Takes Two" video.

UNITED SOUND & ELECTRONICS; 309 Broadway Ave., PO Box 3000; Clarksburg, WV 26301; (304) 622-6461; FAX: (304) 622-0148. Contact: Rob Harold.

WOODY'S PRO SOUND & MUSIC; *Sound, Staging, Lights & Equipment Rental;* PO Box 1428, Hwy. 11 W.; Chilhowie, VA 24319; (703) 646-3392 and fax. Contact: Woody Routh, Robin Routh.

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ADVANCED AUDIO CONCEPTS; *Sound & Equipment Rental;* 513 E. Mill Rd.; Evansville, IN 47711; (812) 424-1404. Contact: Mike Shevlin.

AERIAL ENTERPRISES INC.; *Sound, Staging & Equipment Rental;* 10106 Industrial Dr.; Whitmore Lake, MI 48189; (313) 231-2500. Contact: Steve Fisher, Ed Learned, Jim Lillie.

ALLIANCE RECORDING CO. INC.; *Sound;* 8449 Parshallville Rd.; Fenton, MI 48430; (313) 632-5653. Contact: Al Hurschman.

AUDIO-PRO; *Sound;* PO Box 1515; Springfield, MO 65801-1515; (800) 242-2521. Contact: John Pitts.

CHICAGO SOUND AND MUSIC; *Sound;* 3530 N. Lincoln Ave.; Chicago, IL 60657; (312) 477-3900. Contact: Ian Hunt.

dB SOUND INC.; *Sound;* 1219 Rand Rd.; Des Plaines, IL 60016; (708) 299-0357. Contact: Harry Witz or Todd Johnson.

EMERALD CITY ENTERPRISES INC.; *Sound, Staging, Lights & Equipment Rental;* 13136 Martin St.; Minneapolis, MN 55433; (612) 757-8282 Rob Koester; (612) 529-7034 Dave Cowan. Contact: Rob Koester, Dave Cowan. Touring Radius: Local, regional and national. Maximum Venue Size: 10,000+ seats. Vehicles: (2) GMC 22' straight trucks/lease semis. **House Loudspeakers:** Full-range (2) JBL 2225, JBL 2123 on CD horn w/phase plug, JBL 2445 on CD horn, JBL 2405. Hi-pac JBL 2123 on CD horn w/phase plug, JBL 2445 on CD horn, JBL 2405, S.J.woofer (4) JBL 2225. **Flying System Available:** Soon. **Monitor Loudspeakers:** A: EV 15 and JBL 2445 bi-amped. B: JBL 2226 and JBL 2426 bi-amped. C: EV 15 and Penkus-Heinz 800 passive 4-way side and drum fills. **House Consoles:** Yamaha PM1800 40C 40 x 8, Soundcraft 60032 x 8. **Monitor Consoles:** Yamaha PM2800M 40 x 14, Studiomaster 12M32 x 12, Hill M-1 24 x 8. **Outboard Equipment:** House: BSS FDS360, Klark-Teknik DN360, dbx 900/903/904, Yamaha REV7, Yamaha SPX900, SPX90, ADA delays, Ramsa CD, Omni Craft gates, Symetrix 501, DAX Real Time, Monitor: Klark-Teknik DN360, ARX six gate, Ibanez SDR 1000, SPX 90, Yamaha Q2031, DAX Real Time, BBE 402, Symetrix 501. **Power Amplifiers:** SCS 2600A MOSFET (20k+ house), SCS 2450A MOSFET (12k+ monitor), Carver PM 1.5s, QSC 3500/3800. **Microphones:** Samsong wireless, Shure SM58/SM57, Shure, EV, Toa, Sennheiser, Beyer, Countryman active DI, Rapco passive DI. **Staging:** Outdoor roof 40' x 40' ground support/motors. **Lighting:** 260k chrome PAR 64, AVO C60, 180K EDI dimmers, 96K C.A.E. dimmers, (4) Super Troopers, 160' box truss. **Other Equipment:** Clear-Com, 200 amp AC distros, extended back console cases, whips stay patched to consoles, Rapco snakes w/amp disconnect. **Rates:** Please call.

EXTENDED PLAY SOUND INC.; *Sound, Staging & Lights;* 9914 W. 62nd Terrace; Merriam, KS 66203; (800) 899-0113. Contact: Rental dept. Touring Radius: Regional. Maximum Venue Size: 10,000 seats. **House Loudspeakers:** (8) EP-2152 (two JBL 2226H/one JBL 2445J/2385) two 15" one 2", (8) EP-MB 1/5 (one JBL 2225H) 15" mid-bass, (4) EP-HF-2 (one JBL 2445J/2385) 2" high. freq., (20) EP-SB118 (one JBL 2245M) 18" sub. **Flying System Available:** Yes. **Monitor Loudspeakers:** (10) EP-115 (JBL 15" and 1" horn), (4) EP custom/JBL triamp side/drum fills 18"/15"/1", (8) 12" passive floor wedges. **House Consoles:** TAC Scorpion 36 x 12 x 2, Studiomaster Series V 24 x 8 x 2, Studiomaster Series V 16 x 8 x 2, Studiomaster Mixdown 16 x 4 x 2. **Monitor Consoles:** Yamaha MC2408M 24 x 3, Rane MM12 12 x 6. **Outboard Equipment:** (8) Yamaha Q2031 dual 31-band EQ, (2) Rane ME30 dual 15-band EQ, (2) dbx 166 stereo comp/limiter/gate, (3) Yamaha GC2020 stereo comp/limiter, (3) Ashly Audio SC-50 mono comp/limiter, (3) Audio Logic MT-44 quad noise gate, (6) Yamaha SPX90, (4) Roland SDE-1000 digital delay, Roland SRV-2000 digital reverb. **Power Amplifiers:** (6) Crown MA2400, (2) Crown MT1200, (6) Carver PM-1.5A, (3) Rane MA6, (2) Yorkville AP300C, (5) QSC 1400. **Microphones:** (4) Shure Beta 58, (8) Shure SM58, (21) Shure SM57, (4) Sennheiser 421, (2) EV RE20, (2) AKG D-12E, (5) EV N/D 408, (3) EV N/D 308, (4) Audio-Technica AT-11, (2) Shure L4/SM58 diversity wireless. **Staging:** 20' X 28' stage. **Lighting:** (48) PAR 64 polish aluminum, Genie lifts and trussing, NSI control and dimming. **Other Equipment:** Clear-Com system w/4 stations, 40-channel 200' x 40-channel 50' split snake w/ELCO, 240VAC 200 amp custom power distro, (6) Stewart active DI.

HALF STREET PRODUCTIONS; *Sound, Lights & Equipment Rental;* 5835 Victoria; St. Louis, MO 63110; (314) 644-0992. Contact: Ken Bohannan.

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Flying System Available: Yes. **Monitor Loudspeakers:** Meyer Sound Labs UPA-1, UM-1, MSL-3, custom double 12" and single 15" slants. **House Consoles:** Yamaha PM3000, PM2000, PM1800, DMP7, Harrison Alive, Cadac, Soundcraft 800C. **Monitor Consoles:** Ramsa WR-SB40, Yamaha PM3000-40C, MC2408, Harrison, Soundcraft 800C. **Outboard Equipment:** Lexicon, Yamaha, Klark-Teknik, BSS, dbx, UREI. **Power Amplifiers:** Crest, BGW, Yamaha, Meyer, Sound Labs. **Microphones:** Sennheiser, AKG, Shure, Beyer, Countryman. **Other Equipment:** Wireless systems by Sennheiser, Vega, Micron; tape systems: reel-to-reel, cart and DAT. **Specialization & Credits:** With its facility located minutes from the Las Vegas strip and in Hollywood, CA, A-1 Audio Inc., has provided superior equipment and services to the entire entertainment industry for over 20 years. A-1 Audio has a complete music/film/video "soundstage" with a hard three-wall cyclorama, as a new addition to the facility. Grip, audio and lighting packages are available. Providing support and customized systems to international concert touring, television, film, theater, corporate events and showrooms with our extensive fabrication and technical departments. We maintain service and testing procedures to ensure the usefulness and safety of our systems, close manufacturer ties to help our clients fill their needs and custom modification facilities to allow us to fulfill the diverse and specialized requirements of the industry.

ADVANCED PRODUCTION SERVICES INC.: *Sound & Equipment Rental*; 1035 S. Tyndall; Tucson, AZ 85719; (602) 884-8550. **Contact:** Mark Cowburn, Mark Miceli. **Touring Radius:** National. **Maximum Venue Size:** 15,000. **Vehicles:** Local 5-ton bobtail, (2) delivery vans. **House Loudspeakers:** (20) APS mid-high, (20) APS 18" subwoofer, (16) McCaulley APS-1 (12" driver, 1" driver, HF drivers bi-amped). **Flying System Available:** Yes. **Monitor Loudspeakers:** (12) JBL bi-amped wedge monitor, (4) JBL tri-amped sidefill, (2) JBL bi-amped drum fill, (8) Community L&S passive wedge monitor. **House Consoles:** Ramsa WR-SB52, Yamaha PM2000 32 x 8, Yamaha PM1000 16 x 4, Yamaha MC2404, EV 16 x 4. **Monitor Consoles:** Yamaha 24 x 8. **Outboard Equipment:** (6) White Instruments 1/3-octave EQ, (6) UREI 1/3-octave EQ, (8) Rane 1/3-octave EQ, (4) dbx 160, (4) dbx 160X, Yamaha DL1500 digital delay, (2) Yamaha REV7, (2) Yamaha SPX90, (2) Brooke-Siren 4-way crossover, (2) Klark-Teknik 716 DDL. **Power Amplifiers:** (12) Crown Micro-Tech 1200, (2) Crown Macro-Tech 2400, (4) Crown DC-300A, (3) Rane MA6, Crown PSA-11. **Microphones:** Shure SM58, Shure SM57, EV DS35, AKG 451, Shure SM81, Crown PCC-160, Sennheiser 421, stereo C-ducer, Samson PR50 wireless, Sennheiser MKE-11, Sony ECM-44. **Lighting:** Complete lighting system available for tours and clubs. **Other Equipment:** IBM PC 1/3-octave analyzer, Ivie IE-30 1/3-octave analyzer, Crown System 12 TEF™ analyzer, (3) 100-amp distros, (4) C+M chain motor, (3) 10' truss, Panasonic video camera, (2) 9" monitor.

CROSSROADS AUDIO INC.: *Sound, Lights & Equipment Rental*; 2623 Myrtle Springs Ave.; Dallas, TX 75220; (214) 358-2623; FAX: (214) 358-0185. **Contact:** Blake Dewberry, Chuck Conrad. **Touring Radius:** Regional. **Maximum Venue Size:** 20,000 indoor/60,000 outdoor. **Vehicles:** Volvo F6 24' bobtail, Isuzu 16' bobtail, 45' air-ride tractor trailer available on contract, GMC/Greyhound bus conversion mobile recording/crew vehicle. **House Loudspeakers:** (64) Crossroads C-48 flying proprietary w/EV and JBL components, (12) Crossroads C-52 proprietary dual subwoofer cabinets, Bose 802, (4) EAW KF-300, (2) Turbosound TMS4, (12) Peavey 3020 HT. **Flying System Available:** Yes. **Monitor Loudspeakers:** (20) Crossroads bi-amp 15" slant w/JBL drivers, (4) Crossroads bi-amp 2 x 12 w/2" JBL drivers, (12) Crossroads 12" 3-way passive, (4) Crossroads C-1502 drum monitors, (4) 2 x 12 slants with JBL 2" drivers. **House Consoles:** (2) Yamaha PM3000 40-ch, Peavey Mark 8 35-channel, Yamaha MR1642, Yamaha 2404. **Monitor Consoles:** Yamaha PM2800-32, Midas Pr-04 24 x 8, Yamaha MC2408, Ramsa WR-840 40-channel. **Outboard Equipment:** (5) Yamaha SPX90, (2) Yamaha SPX900, Yamaha REV7, Lexicon PCM41, (2) dbx 900 rack w/gates/limiters, (4) Brooke-Siren FDS360 crossover, (4) Klark-Teknik DN300B EQ, (6) dbx 160X limiter, (2) Peavey PC-4X digital crossover, (2) Loft 3-way crossover, Audio Logic quad noise gate, (12) Yamaha Q2031 dual channel EQ, (50) Clear-Com bellpacks/main stations, (8) TEAC or Technics cassette deck, (4) Technics CD player, Telex five-station wire intercom. **Power Amplifiers:** (36) QSC MX1500, (6) QSC MX700, (34) QSC 1400, (8) Peavey Decca 724, (2) Peavey Decca 1200, (2) QSC 1700. **Microphones:** (56) wireless from Telex, Vega and HME, (12) Shure Beta 58, (10) Shure Beta 57, (30) Shure SM58, (40) Shure SM57, (12) Audio-Technica AT857 Unipoint, (10) Sennheiser 421, (10) AKG C-451E, (8) Beyer M88, (60) Audio-Technica Pro 4L, most other popular models in stock. **Staging:** 20 x 30 sectional platform 2' high. **Lighting:** (2) 40' truss w/120KW PAR 64 (LECCOs available), (2) Genie air trees w/24K PAR 64, Celco "Baby" computer board, ETA and Spectrum dimmers with pin matrix, (2) Ultra Arc spotlights, (3) Lycian club spots, Diversitronics strobes. **Other Equipment:** (8) CM Lodestar 1-ton chain hoist, (6) Genie Super Lift, 250-amp power isolation transformer, (3) 200-amp power distribution system, 400-amp power distribution system. **Rates:** On request.

CROSSWIND SOUND SYSTEMS INC.: *Sound, Staging, Lights & Equipment Rental*; 3501 Dime Circle #113; Austin, TX 78744; (512) 441-1631. **Contact:** John Nelson.

DALLAS BACKUP INC.: *Sound & Lights*; 12589 Perimeter Dr.; Oallas, TX 75228; (214) 686-4488.

ELECTRIC EAR PRODUCTIONS INC.: *Sound, Staging, Lights & Equipment*; 1616 Ave. F; Lubbock, TX 79401; (806) 763-9794. **Contact:** Tom Prather, Sammie Prather.

FITZCO SOUND & LIGHTS: *Sound, Staging, Lights & Equipment Rental*; 912 N. Midkiff; Midland, TX 79701; (800) 292-6877; (915) 684-0861. **Contact:** Mark Eichert. **Touring Radius:** Regional. **Maximum Venue Size:** Unlimited. **Vehicles:** 14', 24' & 42' Air-Ride Kenworth. **House Loudspeakers:** (12) EV MT-4 stacks, (2) Renkus-Heinz MR-1 stacks. **Flying System Available:** Yes. **Monitor Loudspeakers:** (13) Renkus-Heinz bi-amped cabinets. **House Consoles:** Wheatstone MTX-80 40 x 8 x 3, Audioarts LM-80 24 x 8 x 2, Audioarts M-44 16 x 4 x 2, EV BK 2442 24 x 2. **Monitor Consoles:** Wheatstone M16 32 x 16, Yamaha 2408 24 x 8. **Outboard Equipment:** Lexicon, PCM 60, dbx, Alesis, Audioarts, Delta-Lab, Nakamichi. **Power Amplifiers:** BGW; GTA; GTB; 750 B, L, D, E & F; 8000; EV 7600. **Microphones:** Shure, Sennheiser, AKG, EV, Crown. **Staging:** As required, including roofs. **Lighting:** Leprecon LP-2000 48-channel, LM-850, Tomcat prorig truss (132 fixtures), Leprecon dimming (144 kW), Genie Supertowers, Martin foggers.

HIGH Q AUDIO: *Sound*; 2121 Palomas NE; Albuquerque, NM 87110; (505) 266-7725. **Contact:** Chris Romero or Jay Fisher. **Touring Radius:** Local and regional. **Vehicles:** GMC 12' box truck, commercial accounts with Ryder and Budget. **House Loudspeakers:** (24) Renkus-Heinz SR-2, 2-15", 1-2", CD horn (mains), (4) Renkus-Heinz SR-121D; 1-12", 1-2", CD horn (front fill), (6) Renkus-Heinz LP-2; 2-18" (subs), (4) Renkus-Heinz LR-1; 1-18" (subs). **Monitor Loudspeakers:** (8) Renkus-Heinz W1 1-15", 1-2", CD horn (wedge); (2) Renkus-Heinz SR-1 1-15", 1-track 1-2", CD horn (sidefill); (6) Renkus-Heinz W-121HD 1-2" 1-2", CD horn (wedge); (4) Renkus-Heinz B1 2-15", 1-2", CD horn (sidefill). **House Consoles:** Ramsa 852 52 x 8 x 2, TAC Scorpion 32 x 8 x 2, Ramsa 8752 24 x 4 x 2 x 1, Yamaha 916 Pro Series 16 x 2 x 1. **Monitor Consoles:** Soundcraft 500 40 x 12, Yamaha 2408 24 x 8. **Outboard Equipment:** Renkus-Heinz Smart Processor for mains, Rane AC22 active crossovers for monitors, dbx 900 rack with 4-903, 4-904, 1-905, (2) dbx 160, (2) dbx 166X, Yamaha REV5, (2) Yamaha REV7, Yamaha SPX90II, Yamaha SPX1000, (2) Lexicon LX1, Lexicon PCM60, (2) Klark-Teknik DN360 (mains), (16) White Instruments 4650 (monitors), (4) UREI 537 (extra), UREI 535 (extra). **Power Amplifiers:** (28) Crown MT1200, (11) Crown MT600, (3) Crown MA2400 (subs). **Microphones:** (7) Beyer, (36) Shure, (7) Audio-Technica, (4) Sennheiser 421; (2) AKG 451, Electro-Voice PL-20, (6) Countryman Isomax 2, (10) ProCo DB-1 direct boxes and various other mics and direct boxes available. **Staging:** Available locally. **Lighting:** 120-can system accessible. **Other Equipment:** (6) Techtron TEF™ 20, Ivie IE-30A, Pulsar 2/3-octave RTA, Klark-Teknik DN60 with RT60, all cases from Star Case, technical projects communication system with five headsets. **Rates:** Available on request and negotiable. **Specialization & Credits:** A professional-quality service. Qualified system engineers and technicians. All systems are Renkus-Heinz, using the latest technology in 6th order design and smart processing. A complete modular system to fit your needs with any configuration. Have experience in sound, lighting and video installations. Able to use the TEF 20 as a second source of information for acoustical analysis and alignment for sound reinforcement as well as in our designs and installations. Being versatile and modular assists us in providing a complete and professional service.

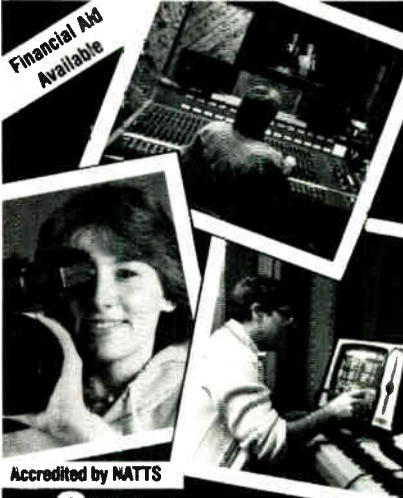


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LD SYSTEMS INC.
Houston, TX

LD SYSTEMS INC.: *Sound, Lights & Equipment Rental*; 467 W. 38th St.; Houston, TX 77018; (713) 695-9400. **Contact:** Andy DiRaddo and Charlie Burns. **Touring Radius:** Local, regional & national. **House Loudspeakers:** LD Systems 2 x 4 (2-box, 4-way), LD Systems 1 x 3 (1-box, 3-way), Turbosound TMS-3, Meyer UPA-1/USW, EAW 850, EV Delta-Way. **Flying System Available:** Yes. **Monitor Loudspeakers:** LD Systems bi-amp wedge, LD Systems 3-way sidefills and drumfills, Turbosound TMS-3 sidefills. **House Consoles:** Yamaha, —LISTING CONTINUED ON NEXT PAGE



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HARRY MCCUNE SOUND SERVICE INC.; *Sound & Equipment Rental;* 951 Howard St.; San Francisco, CA 94103; (415) 777-2700. Contact: Harry McCune.

MORGAN SOUND INC.; *Sound;* 2004 196th SW, #2; Lynnwood, WA 98036; (206) 771-7257. Contact: Darrel L. Zentz.

PERFORMANCE AUDIO; *Sound, Staging & Equipment Rental;* 2212 S. West Temple #29; Salt Lake City, UT 84115; (801) 487-2212. Contact: Craig Hylton. **Touring Radius:** Local, Regional & National. **Maximum Venue Size:** 20,000. **Vehicles:** (2) Iveco diesel 17' box. **House Loudspeakers:** (32) JBL 2 x 12" and 2" on CD horn, (16) JBL 2 x 18", (4) JBL SR 4732/4718, (24) Ramsa WSA 200/WSA 80, (6) JBL 4725. **Flying System Available:** Yes. **Monitor Loudspeakers:** (8) EAW SM222, EAW SM252, (4) custom 1 x 15 w/1" driver, (14) custom 1 x 12 w/1" driver, (4) JBL SR 4732/4718. All bi-amped. **House Consoles:** Ramsa WR-852, Soundcraft Venue 32, Soundcraft Delta 200-24. **Monitor Consoles:** Soundcraft Venue 32 x 10, Soundcraft 500B 32 x 12. **Outboard Equipment:** (5) stereo double cassette, (2) Technics CD, Klark-Teknik DN780 digital reverb, (5) White Instruments 4001 1/3-octave EQ, (8) Ashly Audio GQ231 2-channel 1/3-octave EQ, (3) BBE 802, (6) dbx 166, (3) Klark-Teknik FDS-310, (2) Valley People Gate4 4-channel, (3) Lexicon LXP-1, Lexicon LXP-5, Lexicon MRC, Yamaha SPX90. **Power Amplifiers:** (8) Crest 2401, (30) Carver PM-1.5, (15) Carver PM-1.75, QSC 1400. **Microphones:** (6) Sennheiser MD-421, (6) Sennheiser MD-441, (3) EV RE20, (3) AKG 451, (10) Shure Beta 58, (15) Shure SM57, (2) Shure SM58, (12) wireless Samson and Shure, (10) Countryman DI, (2) Brooke-Siren DI, (10) Shure SM81, (2) AKG 535, (6) Shure SM87, (4) AKG 330, (6) Shure SM91, (2) Shure SM98. **Staging:** Quickform modular staging up to 40 x 32 with sound wings and roof. **Lighting:** Referrals available. **Other Equipment:** Klark-Teknik DN60 RTA, Clear-Com intercom, (2) Fender twin reverbs, Yamaha DX7, Hammond B-3 w/ Leslie. **Rates:** On request.



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PHOTO & SOUND COMPANY; *Sound, Lights & Equipment;* 140 Hubbell St.; San Francisco, CA 94107-2201; (415) 882-7500. Contact: Meeting & Convention Services. **Touring Radius:** National. **Maximum Venue Size:** Arena, shed, coliseum up to 50,000. **Vehicles:** 50. **House Loudspeakers:** (16) Apogee 3 x 3, (8) Meyer Sound Labs MSL-3, (8) Apogee AE-12, (36) Apogee AE-5. **Flying System Available:** Yes. **Monitor Loudspeakers:** (8) Apogee AE-6, (8) Meyer Sound Labs UM-1, (8) Yamaha 2115, (40) EV FM1203. **House Consoles:** (2) Yamaha PM1800-32, Ramsa WR-S840, Yamaha PM1200. **Outboard Equipment:** Klark-Teknik EQ and delays, RTA; Yamaha EQ, crossovers, REV7; dbx; Rane EQ, comp/limiters; R-DAT; 4-track machines. **Power Amplifiers:** (8) Crest 8001, (8) Crest 7001, (26) Crest 6001, (12) Crest 4801, QSC 1400, Crown PSA-2. **Microphones:** AKG 451, D12 et al; Crown GLM, PZM et al; Shure 57, 58, 87, 99 et al; Shure AMS system. **Lighting:** Assortment PAR64, Ellipsoids, zoom, Colortran and NSI dimmers and controllers. **Other Equipment:** (5) GE Talaria light valve, (20) Sony 1270, (60) Sony 1041, assorted screen and video equipment available. **Specialization & Credits:** 50 years experience in staging, theater and corporate meeting execution, 100+ in-house hotel offices, Regional offices in Seattle, Portland, Reno, Sacramento, San Jose, Los Angeles, Orange County, San Diego, Phoenix, Houston and Hawaii. Long term and daily services. Also sales.

PINEAPPLE PRODUCTIONS; *Sound;* PO Box 12064; Portland, OR 97212; (503) 281-4380. Contact: Jay Cosnett.

PM ENGINEERING; *Sound & Equipment Rental;* PO Box 3040; 6448 S. Skyline Dr.; Evergreen, CO 80439; (313) 674-5933. Contact: Craig Patterson.



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PRO MEDIA; *Sound;* 3563 San Pablo Dam Rd.; El Sobrante, CA 94803; (415) 222-0307; FAX: (415) 223-9147. Contact: John Monitto.

PROSHOW USA; *Sound;* 20409 NE 100th St.; Redmond, WA 98053; (206) 868-5122. Contact: Andy Chapell.

R & R SOUND CO. INC.; *Sound;* 2475 Maggio Cir.; Lodi, CA 95240; (209) 333-0996. Contact: Keith Finch.

GEORGE RELLES SOUND REINFORCEMENT; *Sound;* 2021 Kincaid St.; Eugene, OR 97405; (503) 686-9325; FAX: (503) 686-9325. Contact: George Relles. **Touring Radius:** Regional. **Maximum Venue Size:** 6,000. **Vehicles:** 1990 W6 GMC, 20' box. **House Loudspeakers:** (8) Meyer MSL-3, (6) Meyer 650-R2 subs, (6) Harbinger 508, (6) Harbinger 512, (2) Community Boxer, (8) Kipsch LaScala. **Monitor Loudspeakers:** (4) Meyer UM-1, (4) Meyer UPA-1A, Harbinger 514, (4) Harbinger 524, (2) EAW 202T, (4) EAW 122J, (6) EAW 122AT. **House Consoles:** Hill Concept 4400 40 x 8 x 2 w/4 VCA groups; (12) aux sends; (6) mute groups and 8 x 8 matrix; Hill B3 24 x 4 x 2 w/5) aux sends; Gamble HC-40, 40 x 16, 8 line returns. **Monitor Consoles:** Ramsa WR-S840, 40 x 18. **Soundcraft 500 32 x 12, Hill M: 16 x 6** **Outboard Equipment:** Lexicon 200 digital reverb, Lexicon PC470, (3) Lexicon LXP-1, Lexicon LXP-5, Lexicon MRC, (2) Audio Digital ADD-2 DDL, DeltaLab ADM-512 JDL, (2) BBE 202, Aphex Type B Exciter, Valley PR-10, Valley PR-2, (2) Valley Maxi-Q, (4) Valley Commander, Valley DSP, Audio - Design Scamp rack, (2) S30 expander gates, S100 dual gates, (4) S31 comp/limiter, (3) S03 Sweep EQ, (4) S04 parametric EQ, (2) Drawmer M500 dynamics processor, Meyer CP-10 parametric, Klark-Teknik DN410 parametric, Klark-Teknik DN360 1/3 octave EQ, (2) Sundholm 2103 EQ, Panasonic SV-250 R-DAT, Sony D-6C cassette recorder, Sony D-10 CE player, Lexicon LXP, (2) CDT FP-B w/5) com, (10) dbx 1531 1/3-octave, (2) Rane ME30 1/3-octave, (2) Rane PE15 parametric. **Power Amplifiers:** (8) Hill LC1200, (13) Hill DX1500, (3) Crown Micro-Tech, (3) Carver PM-1.5, (3) Hafler P-500, Crown DC-300, (3) EGV-50, BGW 500, Crown D-150. **Microphones:** (2) AKG C-460, (2) AKG C-414, (8) AKG C-451, (10) AKG C-535, (6) Neumann KM84, (2) Neumann KM100, (8) Shure SM81, (2) Countryman EM101, Shure SM85, (2) Beyers M260, Beyers M88, (4) Shure-SM58, (8) Shure SM57, (7) Sennheiser 421, Sennheiser 431, (2) EV RE20, (4) Shure SM53.



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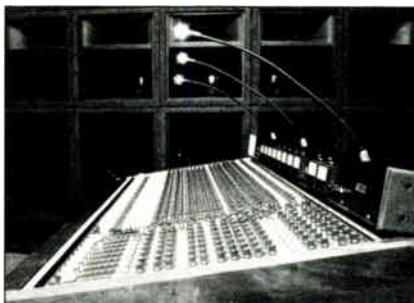
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RANDALL SCHILLER PRODUCTIONS; Sound & Equipment Rental; 1207 Fifth Ave.; San Francisco, CA 94122; (415) 661-7553. Contact: Randy Schiller. Touring Radius: Local, regional. Maximum Venue Size: 20,000 people. House Loudspeakers: (8) Eastern Acoustic Works KF-850 full-range systems, (8) Eastern Acoustic Works SB-850 sub-bass systems, (16) Harbinger 1208 horns w/JBL 2441 drivers, (6) Eastern Acoustic Works SR-115 bass bins, (8) Eastern Acoustic Works SR-215 double bass bins, (16) Cerwin-Vega B-36A/L-36PE low-frequency folded horns, (16) Gauss 1502 super tweeters, (4) EAW SF300. Flying System Available: Yes. Monitor Loudspeakers: (8) Harbinger 524, (2) Harbinger 514 (bi-amplified), (4) Gauss HF-4000 drivers on Gauss horns, (4) Altec 816 bass bin w/Gauss 5840 driver, (4) JBL 4628B speakers. House Consoles: Soundcraft 200B SEQ 24 x 4 x 2, Biamp 16 x 2 x 1, Biamp 883 8 x 2 x 1, Tapco 6100RB/6100EX 14 x 1. Outboard Equipment: Yamaha REV7 digital reverb, Yamaha SPX90 digital reverb, Eventide H910 Harmonizer, DeltaLab 2048 digital delay, DeltaLab DL-2 digital delay, dbx 161, dbx 163 compressor/limiter, UREI 1178 stereo compressor/limiter, Orban 622B parametric equalizer, parametric equalizer, Fosgate DSM3602 360 digital space matrix. Power Amplifiers: (2) Crest 8001 750-watt/channel, (3) Carver M1.5T 360-watt/channel, (14) SAE A-501 250-watt/channel, (18) SAE A-201 100-watt/channel, (8) SAE A-1001 500-watt/channel, (2) Phase Linear 700B 350-watt/channel, Crown Micro-Tech 1200LX 275-watt/channel. Microphones: (2) EV RE20, (4) EV RE15, (4) Shure SM81, (12) Shure SM58, (16) Shure SM57, (2) Sennheiser MD-431, (4) Sennheiser MD-421, (2) AKG D-12, (2) Sony ECM-33P, (10) Countryman DI. Lighting: Phoebus Ultra Quartz. Other Equipment: (2) RTS 424 distribution amplifier, RTS 444 stereo buffer amplifier, (5) Crown VF-X-2A stereo electronic crossover, (2) Rane AC-22 stereo 2-way electronic crossover, Rane AC-23 stereo 3-way elec. crossover, Uni-Sync MS-10 10 x 3 mic splitter, SA-3050 spectrum analyzer, Yamaha Q2031 1/3-octave stereo equalizer, (4) MXR dual 15-band stereo graphic EQ. Rates: Call for prices on equipment and equipment packages. Specialization & Credits: We are a multifaceted company providing facilities and services in the areas of audio, video, film and theater. We are dedicated to providing the highest quality in a relaxed but professional environment. In addition to recording studio services and location recording services, we provide sound reinforcement for venues ranging from small clubs to large outdoor concerts, audio design and installation, film and video production and lighting services. Check out our new EAW sound systems at the Kennel Club.

SELWYN CO.; Sound & Lights; PO Box 610786; San Jose, CA 95161; (415) 881-2738. Contact: Greg Gardner.

SHYNE SOUND; Box 2280; San Rafael, CA 94912; (415) 459-2833. Contact: Leroy Shyne.

SOUND EXPRESSIONS; Sound, Lights & Equipment Rental; 3249 Santa Rosa Ave.; Santa Rosa, CA 95407; (707) 528-3565. Contact: Philip Salisbury.



THIRD EAR SOUND COMPANY

THIRD EAR SOUND COMPANY
Richmond, CA

THIRD EAR SOUND COMPANY; Sound & Equipment Rental; 601 S. 8th St.; Richmond, CA 94804; (415) 233-2920.

Contact: David Trinchero, Raul Suarez. Touring Radius: National. Maximum Venue Size: 20,000. Vehicles: GMC 18' bobtail (diesel), Ford 15' box van, cargo vans. House Loudspeakers: Harbinger M 1800 3-way horn-loaded bass reflex system w/18" lows, 12" mids and 2" highs tri-amped, phase-aligned w/Brooke-Siren FDS-360 crossover, (40) stacks available, dual 18" subwoofer cabinets, dual 15" low/mid cabinets, 2" biradial horn pack, various one-box systems available. Flying System Available: Yes. Monitor Loudspeakers: 2-way floor wedge systems w/15" and compression driver sections w/JBL, EV and PAS components, 2- or 3-way drum and side fills w/15" or 18" bass and 2" high-freq. sections. House Consoles: Soundcraft 800B 32 x 8, Soundcraft 500 32 x 8, Soundtracs FM series 24 x 4, Soundtracs FM series 16 x 4, others by request. Monitor Consoles: Soundcraft 800B 32 x 10, Soundcraft 400B 24 x 10, Yamaha PM1000 modified 16 x 6, others by request. Outboard Equipment: White Instruments, Klark-Teknik, Audio Logic, UREI, Orban and Audioarts equalizers; dbx 160X and 166 compressor/limiters, GateX noise gate, Yamaha SPX900, SPX90 and REV7, Roland SDE-3000 and SRV-2000, Eventide H910, Aphex Exciters, etc. Power Amplifiers: Carver PM-1.5, 1.5A, PM-1200 and PM-175. Microphones: Sampsom CR2X PF, Shure SM58, SM57, SM56, SM54, SM59, Sennheiser 421, AKG 451, C100, D-112, Electro-Voice PL77, N/D 757 and RE20, Beyer M88 and others available. Staging: Referrals available. Lighting: Referrals available. Other Equipment: Clear-Com intercom system, power distribution system and generators. Rates: Superior service and best prices. Call for quote.

UNITED SOUND ASSOCIATES INC.; Sound; 2112 W. Nob Hill Blvd.; Yakima, WA 98902; (509) 452-8686; FAX: (509) 575-6527. Contact: Mark Sirosohl, Al Holman.

XXXX AUDIO SYSTEMS; Sound & Equipment Rental; 6384 Freepoint Blvd.; Sacramento, CA 95822; (916) 443-3535. Contact: Doug Pumphrey/Kevin Sims.

Southern Cal/ Hawaii



A-1 AUDIO INC.
Hollywood, CA

A-1 AUDIO INC.; Sound & Equipment Rental; 6322 DeLongpre Ave.; Hollywood, CA 90028-8191; (213) 465-1101; (800) 446-9967; FAX: (213) 465-9467. Contact: Al Siniscal, Bobby Ross, Bob Marshall. Touring Radius: International. Maximum Venue Size: Unlimited. House Loudspeakers: A-1 Audio fully integrated flying P.A. w/Meyer Sound Labs MLS-3, UPA-1, USW, 650. Flying System Available: Yes. Monitor Loudspeakers: Meyer Sound Labs UPA-1, UM-1, MSL-3, custom double 12" and single 15" slants. House Consoles: Yamaha PM3000, PM2000, PM1800, DMP7, Harrison Alive, Cadac, Soundcraft 800C. Monitor Consoles: Ramsa WR-SB40, Yamaha PM3000-40C, MC2408, Harrison, Soundcraft 800C. Outboard Equipment: Lexicon, Yamaha, Klark-Teknik, BSS, dbx, UREI. Power Amplifiers: Crest, BGW, Yamaha, Meyer Sound Labs. Microphones: Sennheiser, AKG, Shure, Beyer, Countryman. Other Equipment: Wireless systems by Sennheiser, Vega, Micron; tape systems: reel-to-reel, cart and DAT. Specialization & Credits: With its 20,000-sq.-ft. headquarters centrally located in Hollywood, CA, and a facility in Las Vegas, NV, A-1 Audio, Inc. has provided superior equipment and services to the entire entertainment industry for over 20 years. Providing support and customized systems to international concert touring, television, film, theater, corporate events and showrooms with our extensive fabrication and technical departments. A-1 Audio has a complete music/film/video soundstage with a hard cyclorama as a new addition to their Nevada facility. We maintain service and testing procedures to ensure the usefulness and safety of our systems, close manufacturer ties to help our clients fill their needs, and custom modification facilities to allow us to fulfill the diverse and specialized requirements of the industry.

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ATM AUDIO/VISUAL; *Sound, Lights & Equipment Rental;* 20960 Brant Ave.; Carson, CA 90810; (213) 639-8282; FAX: (213) 639-8284. Contact: Randy Wilkins, Andrew T. Martin.

ATOMIC SOUND; *Sound, Lights & Equipment Rental;* 2808 N. Naomi St.; Burbank, CA 91504; (818) 840-9119. Contact: Glona, Bryan.

AUDIO SERVICES CORPORATION; *Equipment Rental;* 10639 Riverside Dr.; North Hollywood, CA 91602; (818) 980-9891. Contact: Gwen Madrid.

AUDIOWEST; *Sound;* 670 S. Jefferson; Placentia, CA 92670; (714) 528-2285. Contact: Glenn Hatch. Touring Radius: National. Maximum Venue Size: 20-25,000. Vehicles: T 600 Aerodyne, 45' utility drop-frame air-ride, House Loudspeakers: EAW KF850, EAW SB850. Flying System Available: Yes. Monitor Loudspeakers: Custom bi-amped. House Consoles: Yamaha PM3000-40. Monitor Consoles: Ramsa WR-S840. Outboard Equipment: EQ: Meyer CP-10, Klark-Teknik DN360, Yamaha, White, Reverbs: Lexicon 480L, Lexicon 200, LXP-5, Yamaha REV5, REV7, SPX900, SPX901. Delays: Yamaha DDL3, Klark-Teknik DN700. Comp/Limiter: CAD, dbx 166, 903. Gates: CAD, dbx 904. Power Amplifiers: Crest 8001, 7001, 4801, Crown 1200LX. Microphones: AKG, Beyer, Crown, Countryman, Sennheiser, Shure and Yamaha. Other Equipment: Nakamichi MR-1 cassette, Sony DAT. Rates: Upon request.

BEST AUDIO; *Sound;* 5914 Kester Blvd.; Van Nuys, CA 91601; (818) 763-2378; FAX: (818) 505-9211. Contact: Larry Estrin. Specialization & Credits: Laurence Estrin and his company, Best Audio, specialize in sound reinforcement, production audio and telecommunications for "mega" events. The credits for the company include complete audio and communications facilities for the last six Superbowls, audio systems coordination for the last three presidential inaugurations, audio pool facilities for the Republican National Convention, technical direction for Liberty Weekend, audio direction for the Calgary Winter Olympics, complete audio design for Lotte World—Seoul, Korea. Best Audio maintains a very large inventory of RTS, Clear-Corn and Motorola equipment in its rental inventory. Best Audio features microphones and technology products from Audio-Technica.

DELICATE PRODUCTIONS INC.; *Sound & Lights;* 1390 Flynn Rd., #A; Camarillo, CA 93012; (805) 388-1800. Contact: Spy Matthews.

ELECTROTEC PRODUCTIONS INC.; *Sound;* 6735 Eton Ave.; Canoga Park, CA 91303; (818) 888-8687.

ENGINEERED SOUND & LIGHTS; *Sound, Staging, Lights & Equipment Rental;* PO Box 1009; Kaneohe, HI 96744; (808) 247-2254.

FILAMENT PRODUCTIONS; *Sound, Staging, Lights & Equipment Rental;* 143 E. Arrow Highway; San Dimas, CA 91773; (714) 592-2848. Contact: Frank Offenstein.

HARMONICA JOHN'S MUSIC TO GO/COMPACT DISC JOCKEY SHOW; *Sound & Lights;* PO Box 14545; San Diego, CA 92174; (619) 263-6826. Contact: John Frazer.

MAUI SOUND SYSTEMS INC.; *Sound & Equipment Rental;* 335 Hooohana St. Bay E/R; Kahului, Maui, HI 96732; (808) 871-8383. Contact: Joe, Jason. Touring Radius: Local. Maximum Venue Size: 5,000. Vehicles: 30' box truck, GMC cargo vans. House Loudspeakers: JBL proprietary 4-way system, Apogee, Flying System Available: Yes. Monitor Loudspeakers: JBL proprietary bi-amp, JBL 4602. House Consoles: Yamaha PM2000. Monitor Consoles: Soundcraft 500. Outboard Equipment: SPX901, REV7, SPX900, dbx 160, dbx 904, Yamaha 1027, Yamaha 2031, Klark-Teknik. Power Amplifiers: Crown, Crest, Carver. Microphones: Shure, Sennheiser, AKG. Other Equipment: Drum set, bass amps, guitar amps, keyboard amps, keyboards.

METZGER ENTERPRISES; *Sound & Lights;* 3305 E. Miraloma Ave., Ste. 177; Anaheim, CA 92806; (714) 572-0196. Contact: Timothy Metzger.

PANASONIC/RAMSA; *Sound;* 6550 Katella Ave.; Cypress, CA 90630; (714) 373-7277. Contact: Steve Woolley.

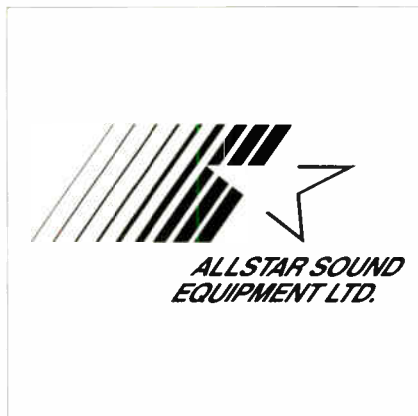
SONIC SONIC PRODUCTIONS; *Sound, Lights & Equipment Rental;* 19913 Beach Blvd. #257; Huntington Beach, CA 92648; (714) 722-9505. Contact: Wayne Birkle.

SOUND IMAGE; *Sound;* 258 La Moree Rd.; San Marcos, CA 92069; (619) 744-8460. Contact: Michael Adams. Touring Radius: National. Maximum Venue Size: Unlimited. Vehicles: Bobtail to tractor-trailer. House Loudspeakers: Phase-Loc system. Flying System Available: Yes. Monitor Loudspeakers: Phase-Loc system. House Consoles: Unlimited. Monitor Consoles: Unlimited. Outboard Equipment: Unlimited. Power Amplifiers: QSC. Microphones: Unlimited. Rates: Negotiable.

SPEEDA SOUND INC.; *Sound & Equipment Rental;* 5617 W. San Madele; Fresno, CA 93722; (209) 275-7197; FAX: (209) 275-8694. Contact: Mike King or Bill McKinney. Touring

Radius: Regional. Maximum Venue Size: 20,000+ seat. Vehicles: 40' tractor trailer rig, (3) 24' diesel bobtails with liftgates and ramps, 16' diesel bobtail with liftgate, (3) Chevy 1/2 ton cargo vans, (2) 14' tandem cargo trailers. House Loudspeakers: (72) EAW KF550 full range flying enclosures, (16) JBL concert series flying enclosures, (12) EAW SB550 subwoofers, (8) JBL concert series subwoofers, (8) EAW JF500 full range enclosures. Flying System Available: Yes. Monitor Loudspeakers: (48) EAW SM222 dual 12" + 2" horn wedge (bi-amped), (24) EAW SM155 single 15" + 1" horn wedge horn (bi-amped), (16) JBL 4602A single 12" + tweeter wedge (passive), (12) Speeda 553 (tri-amped) sidefill and 12 Smilar drum fills. House Consoles: (2) Yamaha PM3000 40 x 8 x 2, (2) Wheatstone MTX-1080 40 x 8 x 2, Yamaha PM1800 32 x 8 x 2, (4) Yamaha MC2404 24 x 4 x 2. Monitor Consoles: (2) Ramsa 840 40 x 18, (2) Wheatstone M16 32 x 16, (2) Wheatstone M8 32 x 8 x 24, (2) Yamaha MC2408 24 x 10. Outboard Equipment: (8) Audioarts 2700 1/3-octave EQ, (8) Rane GE-27 1/3-octave EQ, (16) JBL/JREI 1/3-octave EQ, (20) Yamaha Q2031 1/3-octave EQ stereo, (12) dbx 160X comp/limiter mono, (5) Audioarts 1202 comp/limiter stereo, (12) dbx 166 comp/limiter stereo, (4) Drawmer 202 comp/limitors stereo, (4) Drawmer gates, (5) Yamaha REV7, (6) Yamaha SPX900, (16) Yamaha SPX90, (4) Roland SD-3000. Power Amplifiers: (250) AB Systems Professional stereo power amps. Microphones: (100) Shure SM58, (36) Sennheiser 421, (24) Audio-Technica condensers, (8) AKG 451, (8) EV RE20, (6) Beyer M88, (24) Shure SM81, SM94, SM849, (24) Audix, (120) Shure of various types. Other Equipment: Full complement of band gear, Grand Pianos, DX7, twin Marshall stacks, full drum kits and percussion. Rates: Call for quotes.

Outside U.S.



ALLSTAR SOUND EQUIPMENT LTD.
Edmonton, Alberta

ALLSTAR SOUND EQUIPMENT LTD.; *Sound, Lights & Equipment Rental;* 11212-143rd St.; Edmonton, Alberta, T5M 1V5 Canada; (403) 452-2546; FAX: (403) 454-6452. Contact: Clive Alcock. Touring Radius: Local, regional, national. Maximum Venue Size: 15,000. Vehicles: 22' and 24' vans. House Loudspeakers: (36) Martin B215, (24) Martin MH12, (24) JBL 2445, (36) tweeters, (24) ASD 1502 top boxes, (12) ASD 1802 subwoofers. Flying System Available: Yes. Monitor Loudspeakers: Biamp 1 x 15" high-power wedges w/2" horns, Biamp medium-power wedges w/1" horns, Smart System fill boxes, heavy-duty drum monitoring. House Consoles: Soundcraft, TAC/Amek up to 40 channels by 16 groups. Monitor Consoles: Soundcraft 40 channels into 12 mixes. Outboard Equipment: BSS crossovers, Klark-Teknik graphs, dbx limiters, Yamaha, Lexicon, Roland, Valley processing. Power Amplifiers: QSC, Bryston. Microphones: Most common models by Shure, Sennheiser, AKG. Lighting: Thomas instruments, Altman instruments, compact folding truss system, Celco control, Dilor dimmers, Ratas: Phone for quotes. Specialization & Credits: Specializing in concert sound systems, touring production services, full concert lighting, remote recording, broadcast mixing and communications systems. Credits include: XVth Winter Olympic Games opening and closing ceremonies, Edmonton Folk Festival, Calgary Jazz Festival, Edmonton Jazz Festival (ten years), k.d. lang, Colin James, Blue Rodeo, David Lindley, Jeff Healy, David Foster, Randy Travis, Ricky Skaggs, Dwight Yoakam, John Hiatt, Ny-lons, Nazareth, Georgia Satellites, Edmonton Symphony Orchestra, Calgary Philharmonic Orchestra, Vancouver Symphony Orchestra and many more.

FM SYSTEMS; *Sound, Staging, Lights & Equipment Rental;* 16423 117th Ave.; Edmonton, Alberta, Canada; (403) 451-1353. Contact: Brian Thomas. Touring Radius: International. Maximum Venue Size: 12,000. Vehicles: 102" x 48' air-ride w/1990 Kenworth conventional air-ride, 102" x 24' 1987 international straight trucks. House Loudspeakers: Apogee, Martin/JBL systems. Flying System Available: Yes. Monitor

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Loudspeakers: JBL proprietary wedges 1 x 15¹/₂" bi-amped, JBL proprietary fills 2 x 15¹/₂" bi-amped, Apogee House Consoles: TAC, Soundcraft, Yamaha. Monitor Consoles: TAC, Soundcraft, Yamaha. Outboard Equipment: AMS, Valley International, Lexicon, Drawmer, dbx, BSS, UREI, Klark-

Teknik, Roland, Korg, Yamaha. Power Amplifiers: Crest, QSC. Microphones: Shure, Sennheiser, AKG, EV, Bayer. Staging: 40' x 36' stage, 40' x 32' roof. Lighting: Leprecon, Thomas, Altman, Lycian. Other Equipment: Stage gear available upon request. Rates: Upon request.



HALF NELSON SYSTEMS INC.
Toronto, Ontario

HALF NELSON SYSTEMS INC.; Sound, Staging & Lights; 943 Notre Dame Ave., Sudbury, Ontario P3A 2T7; 555 Eastern Ave., Toronto, Ontario, M4M 1C8 Canada; (705) 524-2700. Contact: Bert Brady/Dave Lawler. Touring Radius: National and International Vehicles: Tandem axle straight trucks w/sleeper, Tractor trailer upon request. House Loudspeakers: Meyer Sound Labs. Flying System Available: Yes. Monitor Loudspeakers: Meyer Sound Labs, HNS custom bi-amp. House Consoles: (2) Soundcraft Series 4, Soundcraft 8000. Monitor Consoles: (3) Soundcraft custom 40 x 12. Outboard Equipment: Lexicon, Yamaha, Aphex, BSS, Revox, Klark-Teknik, Roland, Nakamichi, Clear-Com. Staging: Custom packages and risers. Lighting: Avolites, Celco, LMI, Thomas, Genie and CM. Other Equipment: Band equipment. Specialization & Credits: Specializing in large outdoor events. North American concert hall tours, convention services and production management.

J.L. SOUNDSYSTEMS; Sound, Staging, Lights & Equipment Rental; 250 King St. E.; Hamilton, Ontario, L8N 1B7 Canada; (416) 527-6863; FAX: (416) 527-5523. Contact: Joe Sciamanna. Touring Radius: National. Maximum Venue Size: 20,000 seat. Vehicles: 18'. House Loudspeakers: CE SM-50 JBL loaded, 40 bottoms, 22 tops. Flying System Available: Yes. Monitor Loudspeakers: (25) SM-W-15 JBL loaded, (15) SM-W-12 EV loaded. House Consoles: Yamaha PM3000, PM1800, TAC. Monitor Consoles: TAC, Yamaha, Soundcraft. Outboard Equipment: Neumann, Lexicon, Yamaha etc. Power Amplifiers: Bryston, QSC, Carver. Microphones: (5) EV, (70) Shure, (15) Sennheiser, (4) Cetec Vega. Staging: Smoke machines and effects, various modules available. Lighting: 240k avail, and LDS packs, follow spots, 48k ACLs.

L.R. LIGHT AND SOUND; Sound, Lights & Equipment Rental; Box 7834; Drayton Valley, Alberta, T0E 0M0 Canada; (403) 542-5282. Contact: Lonnie Ross. Touring Radius: Local. Maximum Venue Size: 2,000. Vehicles: Ford 3-ton w/22' van. House Loudspeakers: (4) Meyer Sound Labs UPA-1A, (4) Meyer Sound Labs USW1. Flying System Available: No. Monitor Loudspeakers: (2) EV FM1502, (2) Sonic M115H, (2) Cerwin-Vega 2-12-H, JBL. House Consoles: Hill J Series III 24 x 8 x 2 w/Multipin 200' snake. Monitor Consoles: Allen and Heath Brennel SRM 186 18 x 6 w/Multipin. Outboard Equipment: (2) Yamaha SPX90, ART Multiverb II, Roland SRV-2000, Roland SDE-3000, (3) Loft 400 gate/limiter, (2) Klark-Teknik DN300, Aphex Type C Aural Exciter, Loft 410 comp/expander, Pulsar RTA150 real-time analyzer, Technics RSM270X cassette deck, (2) Audio Logic SC30 15-band graphic EQ, (2) Yamaha Q2031 31-band graphic EQ, (2) DOD Electronics R831A 30-band graphic EQ, Carver TL3200 CD player. Power Amplifiers: (2) Carver PM-1.5, (4) HH Electronic V800 MOSFET, HH Electronic V200 MOSFET, Yamaha PD2500. Microphones: (3) AKG D-330BT, (2) AKG D-310, (4) AKG D-125, D-1200, (2) AKG D-112, (4) AKG C-408, (2) C-535, (2) EV 757 wireless Samson, EV ND/308, (4) Shure SM58 wireless Rexer, (3) Sennheiser MKE-2040, MD-409, MD-421, Shure SM10 headset, SM57, SM58, (10) direct box. Staging: (2) 6 x 7 x 1 riser. Lighting: (2) LDS 12-8 desk, 76' of trussing, (3) LDS DR1200 dimmer packs—36,000-watt 2 x 12 channels, follow spot, ACL, PAR 64, 56, 46, 36-3.50, Lampo ET, Optikinetics, smoke, fog. Other Equipment: Dry ice maker, (2) isolation transformers, (2) smaller systems for rent. Rates: Negotiable.

MAECAL SOUND AND LIGHT; Sound, Staging, Lights & Equipment Rental; PO Box F 420; Freeport, Bahamas; (809) 373-8569. Contact: Henry (Juice) Outten.

SHOW PRO (A DIVISION OF ROCK VELOCITY SOUND INC.); Sound, Lights & Equipment Rental; 2005 Danforth Ave.; Toronto, Ontario, M4C 1J7 Canada; (416) 699-9699. Contact: Richard Van Steenburgh.

SMITHSOUND; Sound & Equipment Rental; 2422 Calt St.; Vancouver B.C., V5R 2R7 Canada; (604) 736-8484. Touring Radius: Local. Maximum Venue Size: 2000. Vehicles: One ton delivery van. House Loudspeakers: (10) Martin 115, (4) Martin 212, (4) JBL 2443J. Flying System Available: No. Monitor Loudspeakers: (6) EV 1502, (4) EV 1202, (6) JBL 4602. House Consoles: (2) Soundcraft 200B. Outboard Equipment: LXP1, (2) Korg 2000 DDL, SPX90, (2) dbx 166, Klark-Teknik DN300, EV XEQ3, Audio Logic Quad gate, Power Amplifiers: QSC MX 2000, (4) QSC MX 1500, (3) H + H V800. Microphones: (2) AKG D112, (4) Shure BETA 57, (8) Shure SM58, (4) EV 408A, (6) Sennheiser 421, (3) Sennheiser K3, (6) Audio-Technica 63, (8) DI boxes. Rates: One nighter delivered set-up, tear-down \$325 (6 bin system).

SOUND ART PRODUCTIONS; Sound & Equipment Rental; 134 Brentford Rd.; Winnipeg, Manitoba, R2M 5B9 Canada; (204) 253-9420; FAX: (204) 257-4087. Contact: Dave Cousins.

WESTBURY NATIONAL SHOW SYSTEMS LTD.; Sound, Staging, Lights & Equipment Rental; 36 Malley Rd.; Scarborough, Ontario, M1L 2E2 Canada; (416) 752-1371. Contact: Joel Dubin/Ian Murray.

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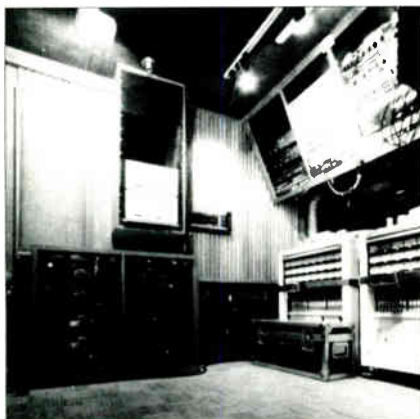
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ASL MOBILE AUDIO
Flushing, NY

ASL MOBILE AUDIO; Audio & Video; PO Box 791; Flushing, NY 11352; (718) 886-6500; FAX: (718) 886-7214. Contact: Steven Remote. Vehicles: 1987 International turbo diesel w/4-door travel-crew cab, dual fuel tanks and air-ride suspension. **Control Room Dimensions:** 17' x 7'6" x 7'10", truck length is approx. 31.5' long. **Mixing Consoles:** Harrison MR-4 36 (upgrading to 48-channels by the summer of '91), CAD Maxcon 16 x 8 x 2, Hill multimixer 16 x 4 x 2, Roland M-160 16 x 2 submixers, additional esoteric mic/line pre's and submixers available. **Audio Recorders:** (2) Otari MTR-90 24-track, Otari MTR-10 2-track, (2) Sony DTC-1000-ES DAT, (2) Akai GX-912 cassette deck, (2) Sony TCWR-900 dual cassettes, Nakamichi DMP-100 digital processor w/(2) Sony SL-HF900 Super Beta Hi-fi, Panasonic SV-250 portable DAT. **Noise Reduction Systems:** Dolby SR, others available on request. **Synchronization Systems:** TimeLine Lynx, Fostex 4010 reader/generator, Midiman SMPTE Time Window time code reader/generator. **Outboard Equipment:** Lexicon PCM70, Lexicon LXP-1, LXP-5 w/MRC, (3) Yamaha SPX90II, Yamaha REV7, Klark-

Teknik DN780, Barcus-Berry 802 processor, Ursa Major Space Station, (2) Klark-Teknik DN500, (2) Brooke-Siren DPR-402, (2) dbx 160X, (2) dbx 160, (2) UREI 1176LN, (32) noise gates by: Rebis, Valley People, BSS, Klark-Teknik and Aphex, Eventide H3000GSE, Klark-Teknik D4700, TC Electronic 2290 w/11-second memory, Lexicon PCM41, (2) Klark-Teknik DN360, (2) Klark-Teknik DN410, additional de-essers, EQs, comp/lim too numerous to list. **Microphones:** Over 120 microphones and direct boxes by: Sennheiser, Shure, Sony, EV, Milab, AKG, Beyer, Neumann, Crown, Realistic, Brooke-Siren, ASL, Whirlwind. **Monitor Speakers:** (2) UREI 813, (2) K&H 092 (tri-amped, self-powered), (4) Yamaha NS-10M, (4) EV Sentry 100A, Klark-Acoustic Jade (self-powered), Auratones. **Power Amplifiers:** (2) Briston 4B (for UREI 813), Yamaha P2200 (EV and NS-10), Crown D-60 (2nd engineer's headphone amp). **Video Recorders:** (2) Sony SL-HF900 Super Beta Hi-fi, Akai VS-603S VHS Hi-fi, call for full video production packages. **Video Monitors:** (3) 13" color, (2) FCAB&W9", (2) Panasonic 3" color. **Switchers:** Dynair 12-channel video. **Cameras:** Panasonic color (remote zoom, focus, pan and tilt), (2) RCA CCTV B&W, broadcast-quality cameras available. **Other Major Equipment:** (6) Kenwood TK-300 6-channel VHF walkie talkies, (76) audio mic/lines (via 4 x 19 pair audio snakes), individual XL connectors also available, (4) individual communication lines to mobile units, (8) video sends and returns to mobile unit, (5) incoming Telco lines, multiple stereo signal feeds for Telco and satellite links, (2) portable mobile cellular telephones, Chaos Audio Communication, 1,500-point Bantam jackfield/48-point video jackfield, 72-channel 4-way Brooke-Siren active splitter system, 38-channel, stage box, (20) isolated 600-ohm tie-line, audio and video tie-lines available in travel crew cab. **Rates:** Available upon request. Daily, weekly and/or monthly lockout welcomed. **Specialization & Credits:** ASL Mobile Audio, established in 1977, is a full-service audio/video facility handling a variety of "on location" productions. From television and radio broadcasting (via satellite uplinks and Telco feeds) to dual analog or digital multitrack recording! Our philosophy is to bring the multimedia, multitrack control room to the concert hall, video facility, MIDI studio, rehearsal space, home and/or anywhere else desired, to develop the sounds and visions needed. Here is a selected list of clients and artists who have used our mobile production facilities. Spyro Gyra, Bobby Hutcherson, Gil Evans, David Sanborn, Manhattan Transfer, Bob James, Michael Franks, Lee Ritenour, David Benoit, Judy Collins, Mick Taylor, Howard Stern, Squeeze, Adrian Belew, Lenny Kravitz, Pat Benatar, Thomas Dolby, Living Colour, Jon Butcher, Public Enemy, XTC, Jazzy Jeff and the Fresh Prince, the Neville Bros., Frank Zappa, Howard Jones, James Brown, the Police, the Ramones, Simple Minds, Stevie Wonder, Savoy Brown, Faith No More, Voivod, Soundgarden, Modern English, Jeff Healey Band, Michelle Shocked, Allen Toussaint, Dr. John, Nona Hendrix, Clarence Clemons, the Beach Boys, Concrete Blonde, the Jack Rubies, to name a few.

AUDIO OASIS OF WASHINGTON, D.C.; Audio: (800) 96-OASIS. Contact: Remy David, Dan Collow. Vehicles: 31' Mercedes 1117 moving van. **Control Room Dimensions:** 11 x 8 x 8, vocal booth/lounge/video control 6 x 8 x 8, machine room 7 x 8 x 8. **Mixing Consoles:** API/Auditronics 48 x 32 x 48, (2) API 3124M 4 x 2. **Audio Recorders:** (2) PEI Elite 24-track, Sony PCM-F1, Panasonic SV3500 DAT, (2) Scully 280B-2, TEAC 122 cassette deck. **Noise Reduction Systems:** Dolby A and SR 24-track, dbx single-ended dynamic filter. **Synchronization Systems:** Adams-Smith Zeta-3 w/100-point autolocator. **Outboard Equipment:** (2) UREI 1176LN, (2) UREI LA-4, (2) dbx 166, (2) dbx 160X, dbx 119, (2) PYE 5752/02 PDM limiter, Lexicon PCM70, Lexicon PCM60, Yamaha SPX90, Aphex Type C Exciter, (2) DeltaLab Effectron II, (4) Allison Research Kexep 1, Orban 516EC 3-channel de-esser, Orban 674A parametric/graphic EQ. **Microphones:** (2) Neumann U87, (2) Neumann KM86, Neumann KM56 tube, (2) AKG C-414BULS, (2) AKG C-452, (2) Shure SM81, (2) Sennheiser MD-421, (6) Beyer M160 ribbon, (2) EV 635A, (6) Sony ECM-50, (2) Crown PZM, (6) Shure SM56, (10) RD2 DI boxes, (20) Shure SM62, (4) Shure SM63, (6) Realistic PZM. **Monitor Speakers:** (2) UREI 809, (2) JBL 4301, (6) Realistic Minimus-7, (2) JBL 4408. **Power Amplifiers:** Pioneer Speck 2 250W/ch., Crown DC-300A, BGW 150, Son of Ampzilla. **Video Recorders:** Panasonic Industrial Hi-fi S-VHS. **Video Monitors:** Sony 19" Trinitron, (2) 9" industrial color. **Switchers:** Panasonic 6-input. **Cameras:** (2) Panasonic color "chip." **Rates:** From \$300/day and up for audio-for-video teleproduction tours. Call for specific rates for your actual requirements. **Specialization & Credits:** Audio Oasis, a division of Reelpeople Recording Services, has been supplying the Baltimore/Washington area with quality audio services since 1979. Our recent expansion now includes our new unique "Total Audio Production Truck," which gives us the capability of serving our clientele on a national level. The truck includes an audio mix room as well as separate machine room and is the only truck equipped with an overdub booth that also doubles as a video control room. MIDI room or lounge. You can't beat us for tracking live or for audio-for-video post with our highly modified 48-input console with automation and full SMPTE interlock. Plus our truck is "paid for," which lets me quote you unbelievably low prices. In this day of recession and cost-cutting, quality and price is the bottom line. At Audio Oasis "we're not a mirage, we're Reelpeople." Find out how you can benefit, call us first, toll-free.

BACKTRACKS LOCATION DIGITAL; Audio: 5 School Ave., Montpelier, VT 05602; (802) 223-2551. Contact: Mike Billingsley. **Specialization & Credits:** We love music and sound, and specialize in all the wonderful nuances of 44.1kHz digital recording... both remote in good halls and on location with DC power. As inventors and patent holders of Crown's Stereo Ambient Sampling System (SASS™) microphone, we continue our pioneering work with stereo imaging, using the SASS-P and SASS-B plus our own designs for both ultraquiet location work and a special 4-channel SASS-plus-digital recorder configuration. We use all the best components for accuracy and detail, including custom preamps, modified B&K mics and power supplies, Star-Quad cable and Apogee filter sets. We lovingly record acoustic ensembles (ethnic, folk and classical), percussion, location samples and sound effects, environmental ambience (including 4-channel) and live performances. CD premastering/editing and digital domain modifications in-house give us full control of the final stereo or 4-channel image. We create auditory environments for museums and galleries. Artist commissions are welcomed.



BIG MO RECORDING
Wheaton, MD

BIG MO RECORDING; Audio & Video; 11264 Triangle Ln.; Wheaton, MD 20902; (301) 946-7364. Contact: Ed Eastridge. Vehicles: 1990 Mercedes Benz. **Control Room Dimensions:** 8 x 24. **Mixing Consoles:** Custom 40 x 16 x 40 w/J.L. Cooper MAGI II automation. **Audio Recorders:** Sony/MCI JH-24 24-track, MCI JH-14 24-track, Sony 5003 2-track, (2) Panasonic SV-3500 DAT. Sony PCM-501 digital processor. **Noise Reduction Systems:** Dolby A (32 channels). **Synchronization Systems:** Adams-Smith Zeta-3. **Outboard Equipment:** Lex-

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icon PCM70, Lexicon PCM60, Lexicon Prime Time, Klark-Teknik DN-780, Roland DEP-5, (2) UREI LA-3A, ADR stereo comp/limiter, dbx 160, dbx 900 rack, Valley People rack. **Microphones:** (4) Neumann U87, (2) Neumann U89, (6) Sennheiser 421, (6) AKG 451, (3) AKG 535, AKG D-12, (2) AKG 414, (3) Shure SM57, (3) Shure SM58, (2) Crown PZM. **Monitor Speakers:** UREI 811B, Yamaha NS-10. **Power Amplifiers:** Bryston 3B, QSC. **Video Recorders:** (2) Sony BVU-800 3/4", (2) Sony BVU-200 1/2", JVC 3/4" editing deck. **Video Monitors:** Panasonic. **Switchers:** 3M 9-input w/double faders. **Cameras:** (6) RCA TK-76. **Rates:** Call for rates. **Specialization & Credits:** Credits include: WJFK Radio—Melissa Etheridge, live broadcast; WHFS Radio—Richard Thompson Band, live recording; WAMU Radio; WETA TV—"In Performance at the White House"; WHMM TV—Rosa Parks Tribute, with Dionne Warwick, Lou Rawls, Marilyn McCoo; ABC TV—"Project Literacy"; Rounder Records; Folkways Records; Sweetrain Records; The Seldom Scene—"15th Anniversary Celebration," with Linda Ronstadt, Emmylou Harris, Ricky Skaggs, Tony Rice; Danny Gatton; The Night Hawks; Edwin Hawkins; New Potato Caboose—produced by Elliot Mazur. Also available: studio recording and production. Video crew on request.

CABIN FEVER RECORDING; Audio; PO Box 735; Fishers, NY 14453; (716) 924-8408. Contact: Bob Potter.

DANCING BEAR PRODUCTIONS; Audio; PO Box 239; Brooklyn Heights Station; Brooklyn, NY 11201; (718) 875-2156. Contact: Bill Ohashi.

**Effanel
Music**
Location Recording
Worldwide

EFFANEL MUSIC INC.
New York, NY

EFFANEL MUSIC INC.; Audio; New York, NY; (212) 807-1100. Contact: Randy Ezratty/Adam Pinch. **Vehicles:** A—45' Matlock air-ride mobile control room, B—24' Grumman step van, C—flight case portable system. **Mixing Consoles:** Solid State Logic G Series w/studio computer, Sound Workshop Series 34 custom 52-channel, Sound Workshop Series 34 custom 72-channel. **Audio Recorders:** (2) Sony 3348 48-track digital, (2) Otari MTR-90/2 24-track analog, (2) Otari MTR-12 2-track analog, (2) Sony Pro DAT, (2) Sony 3402 2-track digital. **Noise Reduction Systems:** Dolby SR 24-channel. **Synchronization Systems:** TimeLine Lynx. **Outboard Equipment:** (24) Hardy M-1 mic preamp, (2) Drawmer 1960 stereo tube limiter, (8) Drawmer 201 gate, Lexicon 224XL reverb, Lexicon 224 reverb, Lexicon 200 reverb, (2) Yamaha REV5, (2) TC 2290 delay, (2) API 5502 EQ, (10) API 560 EQ, (2) Tube-Tech EQ, (2) Tube-Tech limiter, Neve 33609 stereo limiter, Smart stereo limiter, (2) Lexicon PCM42 delay, (16) dbx 900 Series limiter/gate/de-esser, (4) dbx 160X limiter. **Microphones:** World-class collection—AKG, Neumann, B&K, Sony, Schoeps, Beyer, Sennheiser, Shure. **Monitor Speakers:** Meyer Sound Labs HD-1, Rogers, ProAc, EV, Yamaha. **Power Amplifiers:** (2) Bryston 4B, (4) Haf er 500. **Video Monitors:** (3) Panasonic 19" color. **Switchers:** Solid State Logic. **Cameras:** (3) color CCTV for real-time performance monitoring. **Other Major Equipment:** Jensen custom 96-channel transformer/splitter system. **Specialization & Credits:** Effanel is proud to be the first remote recording company to offer SSL/dual 48-track digital recording. Recent credits include: The Rolling Stones, Atlantic City '89; The Who. "Tommy"; Carly Simon, "My Romance";

Spike Lee "Do It A Cappella"; Phil Collins, "Serious Hits, Live"; David Letterman's 9th Anniversary Special; "Night Music" series; Peter Gabriel, "Passion." Our portable system provides 96-channel, dual 48-track recording facilities worldwide.

EIGER ENGINEERING; Audio & Video; 222 Palfrey St.; Watertown, MA 02172; (617) 924-6514. Contact: Thomas P. Scheuzger.

CHRIS GATELY AUDIO SERVICES; Audio; PO Box 526; Bryn Mawr, PA 19010; (215) JBL-3605. Contact: L.G. Harley.

GOIN' MOBILE; Audio; 304 Newbury St. #110; Boston, MA 02115; (617) 232-7969. Contact: Lonnie Bedell. **Specialization & Credits:** Goin' Mobile operates a 1" 16-track remote recording truck, based in Boston. We offer live concert recording, on-location sessions and broadcast mixes to clients up and down the East Coast. Equipment includes: Seck 1882 console, Hill Multimix (total 28 inputs), Tascam MS-16 16-track w/dbx, 32-channel 200' splitter snake, CCTV monitoring, plenty of rack gear, mics, stands and more. Past clients include: Fort Apache Studios, Bebop Productions, Fastrack Records, Darleen Wilson, Karen Kane, TAANG! Records, The Boogaloo Swamis, Rambo-McGuire Ministries, CF Video, Exact Image Video, Heartpunch Studios, Joel Hiller, T.H. & the Wreckage, Liam Clancy, The Rock Church, The Agape Victory Church, Big City Productions and many more. Additional industry references upon request. Remember...you don't have to go 24-track, try 16-track and give your wallet a rest. Call for FREE video brochure and rate card.

IRIS SOUND STUDIOS; Audio; 237 Main St.; Royersford, PA 19468; (215) 948-3448. Contact: Paul Brown or David Ivory.

J3 STUDIO; Audio; 120 Simpson Rd.; Ardmore, PA 19003; (215) 642-6558. Contact: John Mulhern III. **Vehicles:** Various. **Control Room Dimensions:** 14 x 10. **Mixing Consoles:** Alesis 1622 16 x 8, Boss BX-800 8 x 2. **Audio Recorders:** Sony ES DTC-75ES DAT, TEAC TCA-43 4-track reel-to-reel, JVC TD-V711 2-track cassette, Technics RS-TR355 2-track cassette, JVC TD-W777 2-track cassette. **Noise Reduction Systems:** (3) Dolby B, Dolby C, (2) Dolby HX Professional. **Outboard Equipment:** Alesis QuadraVerb Plus digital effects processor, Alesis MicroLimiter compressor/limiter, Alesis MicroGate noise gate, BSR EQ-300 stereo 11-band graphic EQ. **Microphones:** (6) Shure SM57, (2) Audio-Technica 75D, (3) Audio-Technica PR60, Neumann UD925. **Monitor Speakers:** (2) JBL L80T3, (2) JBL 2600. **Power Amplifiers:** Crown Power Base 2, JVC R-X500. **Other Major Equipment:** Macintosh SE w/20MB HD, MIDI-compatible software including several 16-track sequencers, Yamaha DX100 digital synthesizer, Technics SL-P999 4-DAC 20-bit CD player, AKG K-240M monitor headphones. **Rates:** Available upon request.

MUDDY HOLE STUDIOS; Audio; Rt. 1, Box 60; Tyaskin, MD 21865; (301) 873-2927. Contact: Jim or Pam Smith. **Vehicles:** 1984 Mack MS-10 diesel with an 18' box. **Control Room Dimensions:** Approx. 16' x 7'7". **Mixing Consoles:** Soundcraft 600B 24-channel (primary) heavily modified to improve metering, monitoring and 24-track direct sends, Soundcraft 200B 8-channel modified (auxiliary). **Audio Recorders:** Tascam ATR-80/24 24-track 2", Radio Systems/Sony RS-DAT, Sony D-10 Pro DAT, Tascam 42 2-track analog, Marantz portable cassette, Sony 601 digital processor w/two SL-2000 Beta. **Noise Reduction Systems:** Dolby XP Series SR 24-channels, Dolby 363 SRA stereo. **Outboard Equipment:** (3) dbx 160X compressor, (3) ART DR-1 digital reverb, PRS "warm interface," (2) ESE digital up/down/preset broadcast clocks, (2) Aphex DA, (2) Aphex balancing interface units, Aphex Compellor stereo, Henry mono summing D.A. **Microphones:** (2) Neumann KMR81, (2) Neumann KM84, AKG 426 stereo, (4) AKG 414, AKG D-112E, Sennheiser 421, (5) Shure SM87, (4) Shure SM57, (10) Countryman ISOMAX, (2) Audio-Technica ATM 31R, (2) Electro-Voice 635A, (2) Countryman DI, (4) Whirlwind DI. **Monitor Speakers:** Meyer Sound Labs HD-1 (primary), Yamaha NS-10M (secondary), Calibration Standard MDM-4 (auxiliary), Auratone Sound Cubes (auxiliary). **Power Amplifiers:** Yamaha FT100. **Video Monitors:** Universal Systems CCTV B&W w/two cameras, Philips color monitor w/one camera. **Other Major Equipment:** Kurzweil PX1000, LinnDrums w/MIDI, PRS guitar, Roland MIDI Driver, Gibson bass, PRS bass, 36 channels of isolated mic split. **Specialization & Credits:** Specializing in live mix for broadcast and digital recording with simultaneous 24-track recording with Dolby SR. Credits/clients: Country Music Foundation/NPR "Nashville Acoustic Christmas," Paul Winter, PRS Guitars, WBVR-FM "Live from Greaseland," KCR-FM, The Capitol Steps, WETA-TV, Ed King (of Lynyrd Skynyrd), Carter Jefferson, Airshow Inc., Nasar Abadey, WETA-FM, TV-48, Folkways Records.

NEW ENGLAND MOBILE RECORDING; Audio; PO Box 409; Stow, MA 01775; (508) 562-2111. Contact: Jay W. Goodrich. **Specialization & Credits:** New England Mobile Recording is a complete 8/16/24-track location recording studio. It is ideal for large or small projects, location and stationary recording, or radio broadcast work. The facility has an attractive and spacious interior that can accommodate an entire band as easily as a stationary studio. Three isolation chambers provide recording possibilities unavailable from most mobile units. The bus, a customized Eagle motor coach, is wired for 16 video and 52 exterior audio inputs and 40 interior inputs. We presently use

equipment by: MCI, Tascam, ADR/Scamp, JBL/Augsburger, Shure, AKG, Audio-Technica, Sennheiser, Dolby, Countryman, Sescum, custom-made snake (200') and splitter (52 x 2), Crown, Technical Projects, Beyer, Roland, Auratone, EV, Yamaha, Lexicon and Neumann. Additional audio and video equipment can be brought in as required. Our friendly and knowledgeable staff would like to confer with you about your recording needs. Call for further information.

NORTHEASTERN DIGITAL RECORDING INC.; 2 Hidden Meadow Ln.; Southborough, MA 01772; (508) 481-9322. Contact: Toby Mountain.

POMEROY AUDIO; Audio; 193 Baltic St.; Brooklyn, NY 11201; (718) 855-2650. Contact: Doug Pomeroiy.

PRODIGAL SOUND; Audio; 64 Sip Ave; Jersey City, NJ 07306; (201) 653-3354. Contact: David Vanderheyden. Vehicles: 22' International truck. Control Room Dimensions: 7' x 7' x 18'. Mixing Consoles: 24 input x 24 out customized, Yamaha 1602 16 input customized. Audio Recorders: Sony 24-track digital, Sony PCM-501ES 2-track digital, Panasonic R-DAT, Tascam 32-2 analog. Outboard Equipment: Lexicon LXP-1, Lexicon LXP-5 MRC remote control, ART 01A digital reverb and ART Multiverb, Ursa Major digital reverb, (3) Barcus-Berry Sonic Maximizer, (6) dbx 160X, (4) UREI LA-3A, Valley People Dyna-Mite. Microphones: Shure SM58, SM57, SM81, Beta 58; AKG D112, 330; Sennheiser 409, 518; Countryman Isomax IIC, Countryman direct boxes; Beyer 201. Monitor Speakers: UREI 809. Tannoy NFM-8, PBM-6.5. Power Amplifiers: Carver 1.5, Hafler P220. Other Major Equipment: 40-channel microphone splitter with snake.

**When There's Only
One Chance to get it
Right.**



**Record Plant Remote
New York City**

**RECORD PLANT REMOTE
West Milford, NJ**

RECORD PLANT REMOTE; Audio; 109 Pinecliff Lake Dr.; West Milford, NJ 07480; (201) 728-8114; FAX: (201) 728-8017. Contact: Kooster McAllister. Vehicles: 1990 Volvo FE7 35' 32,000 GUV. Control Room Dimensions: 7 x 23. Mixing Consoles: Trident Series 80 custom 48-input, 32-bus, (4) Yamaha 406 rack mixer. Audio Recorders: (2) Ampex MM1200 24-track, (2) Sony 3324, 3348 digital upon request, Sony 1000ES R-DAT, Sony PCM-501, (2) Denon DR-M24HX cassette, Tascam DA-30 Pro R-DAT. Noise Reduction Systems: Dolby SR upon request. Synchronization Systems: TimeLine Lynx/BTX, Audio & Design TCR-1 reader/reshaper. Outboard Equipment: (1) API 560 graphic EQ, (5) API 550A parametric EQ, Yamaha SPX900 digital reverb, Yamaha REV7, (2) UREI 1176 limiter, (2) dbx 160X compressor, (6) dbx 160 compressor, API 325 line amp, 600-ohm distribution amp, Yamaha SPX900, Lexicon 200, (2) Drawmer DS201 stereo gate, dbx 900 rack with (8) dbx 903 compressor, BBE 822. Microphones: Shure, Neumann, AKG, Sennheiser, EV, Beyer, Sony, RCA. Monitor Speakers: (2) UREI 813, (2) Yamaha NS-10, (2) Auratone, (2) B&W DM-101, (2) Tannoy 6.5. Power Amplifiers: Bryston 4B. Video Monitors: NEC 20", (2) Panasonic 10", (2) color lock-off camera onstage monitor, black and white lock-off camera onstage monitor, fully isolated video patch bay. Other Major Equipment: 15KVA onboard Yanmar/UMA generator, transformer-isolated tech and aux. AC distro, (3) 12-channel line-level w/3 video lines sub-snakes, (2) 27-channels 3-way w/Jensen JE-MB-D) splitter boxes, 600' main snake Belden 54, 600' 6- and 12-channel sub-snakes, Chaos audio intercom. Rates: Available upon request. Specialization & Credits: Now traveling on an extended 1990 Volvo FE-7 chassis, Record Plant Remote has undergone over \$120,000 in renovation and upgrade. Our expanded control room interior provides for a pleasant and comfortable production environment, while maintaining the highest technological support and efficiency. Our various artists and clients include: MTV Atlantic Records 40th Anniversary, International Rock Awards I and II, Howard Jones, Bon Jovi, James Taylor, Joe Walsh, Billy Joel, Arista Records 15th Anniversary, Laura Nyro, New Orleans Jazz and Heritage Festival, Betty Carter, Soul II Soul, Johnny Cash, J.J. Cale, AFRO POP Live Series, Richard Marx, B-52's, Lenny Kravitz, Living Colour. Video, film or live satellite broadcast can be handled with ease. Four independent auxiliary snake systems and a comprehensive video code/sync patch bay, com-

binec with our custom API line distribution network, guarantee signal quality is of the highest standard.

RELIANCE AUDIO VISUAL CORP.; Audio & Video; 622 W. 51st St.; New York, NY 10019; (212) 586-5000.

REMOTE MEN VISUAL MUSIC; Audio & Video; PO Box 791; Flushing, NY 11352; (718) 886-6500; FAX: (718) 886-7214. Contact: Steve Remote. Specialization & Credits: Remote Men Visual Music is the production end of Aura Sonic Ltd. Remote Men is available for on-location audio-for-video production. From TV and radio broadcasting to dual analog or digital multitrack recording, Remote Men will accommodate your every need, nationwide via The ASL Mobile Unit and/or the mobile unit of your choice. Recent clients include: BBC, WBCN-FM, WQCD-FM, WPIX-TV, A&M, Epic, RCA, Crescendo, CBS, Chrysalis, Def Jam, EMI/Manhattan, FM Osaka, FM Tokyo, Geffen, Giant, Metal Blade, NHK, Time Capsule Showtime, to name a few.



**REMOTE RECORDING SERVICES INC.
Lahaska, PA**

REMOTE RECORDING SERVICES INC.; Audio & Video; PO Box 334; Lahaska, PA 18931; (215) 794-5005. Contact: Travis Hewitt. Vehicles: "Silver Mobile Studio" 9 x 44 feet. Mixing Consoles: API Discrete Series 48 x 48, 560 EQ, Massenburg loaders, Auto reset, Studer 961 10 x 1", Studer 362 14 x 1", Audin Scopes 96-meter display all-digital. Audio Recorders: (2) Studer A820 24-track, (2) Sony PCM-3324/3348 digital 24/48-track available, (2) Studer A820 2-track, w/ time code, Sony PCM-1610 digital w/Apogee filters and EJU-820 VCR, Sony PCM-701 and Sony DAT available, Nakanishi cassettes. Noise Reduction Systems: Dolby SR; available (24-track). Synchronization Systems: (2) TimeLine Lynx. Outboard Equipment: Lexicon 480L, (4) UREI LA-3A, (5) UREI 1176, (7) dbx 903 limiter, Yamaha REV7, (4) Dyna-Mite gate, (2) API 550A EQ, (2) API 550B EQ, Aphex Compellor, (2) Dynafax dynamic noise filter, Lexicon PCM60. Microphones: AKG, Eyaek, Countryman, EV, Neumann, Sennheiser, Shure, Sony, Wahrenbrock, PZM. Monitor Speakers: KRK CSI MDM-4, Hartke M-18, Yamaha NS-10, Auratone. Power Amplifiers: Eryston 4B, Bryston 3B. Video Monitors: (4) Matsushita 13" multisync, NEC 25", (3) Sony 5", (2) NEC 12". Switchers: Videotek Video DIAS, Panasonic 6 x 1. Cameras: Sony CD color, (2) Sony BW. Other Major Equipment: 72 inputs of Jensen mic splitters, extensive video patch bay, Videotek sync generator, video humbuck coils, extensive cabling for large trucks or shoots, PCM-1610 mastering system and Studer consoles available separately in road cases. Rates: Please call for quote.

RIGHT COAST RECORDING INC.; Audio; 151 Delp Rd.; Lancaster, PA 17601; (717) 560-1530. Contact: Dave Wilkerson.

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in  new
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Bryston is proud to announce a new professional amplifier with improved performance in power delivery, distortion and noise.

New toroidal transformer power supplies reduce weight, while virtually eliminating both electrical and physical noise sources. Improved ultra low distortion circuitry in the bridging system allow the 7B-Pro to present what may be the most startlingly transparent "acoustical picture" you have ever experienced. Bryston's computer controlled distortion analyzers confirm Intermodulation Distortion levels as less than 10 parts per million (below 0.0009%).

Phenomenal current reserves (60 Amperes peak in the bridge mode, up to 120 Amps in the parallel mode), give the 7B-Pro the power to drive, with breathtaking ease and clarity, speakers which have been considered "impossible loads" in the past. The 7B-Pro is capable of delivering power levels of more than 800 watts into 1 ohm at distortion levels in the low thousandths of a percentage point. The 7B-Pro features a novel "soft start" circuit, allowing full racks of amps to be turned on without generating line problems or popping breakers.

Finally, new cabinetry for the 7B-Pro gives the biggest amplifier in Bryston's line an unprecedented ability to dissipate the heat generated by the high current demands of some of the latest generation of loudspeakers. We think you'll agree that the new look also gives a sense of the refinement coupled with brute force that the 7B-Pro represents.

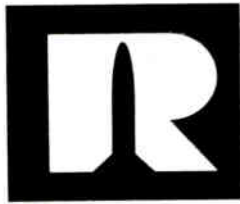
Specifications

- Power: •500 watts, Mono into loads of 2 ohms or 8 ohms
- 800 watts, Mono into loads of 1 ohm or 4 ohms
- Distortion: •Less than 0.01% from 20-20kHz at 500 watts, 1M or THD
- Slewing rate: •Greater than 60 Volts/Microsecond, parallel.
- Greater than 120 Volts/Microsecond, bridged

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DIRECTORY:

Northeast Recording Studios

Who doesn't want to know what's happening in digital studios? Digital audio is a prime area of interest for *Mix* readers. In a recent independent poll of selected *Mix* subscribers, the 1990 *Independent Engineers & Producers Survey*, 47.1% of those responding use a DAT recorder; 47.7% planned to purchase one within the year. 20% of respondents use digital audio hard disk systems. Many respondents wanted to see more information in *Mix* on digital editing. Find this, and more, in May!

Ad Close: March 7
Materials Due: March 15

REMOTE RECORDING

Southwest

—continued—

—LISTING CONTINUED FROM PREVIOUS PAGE



MIDCOM REMOTE SERVICES
Irving, TX

GPB30. (2) Crown 2LV. Cetec Vega R42 handheld and lavalier wireless microphone systems available at extra charge. **Monitor Speakers:** UREI 811B time aligned, Digital Design LS 161 and 261 near-field, Westlake BBSM-6, Auratone 5C. **Power Amplifiers:** Quality (2) Hafler P 505 on mains, Hafler P 230 on near-field. **Video Recorders:** Sony VO-5800 3/4" U-matic, Panasonic AG 6800 1 2" VHS Hi-fi. **Video Monitors:** Sony CVM-1900 19" NTSC monitor/receiver. (3) Panasonic BMW 5". **Switchers:** (2) Panasonic 12 x 1 routing switcher, (3) ADC Humbuckers, (8) external inputs. **Specialization & Credits:** Past projects include *The Cure* 1989 "Prayer" tour, Marcus Roberts "Deep in the Shed" music video, 1989 *Miss USA Pageant* Mobile, AL, for CBS TV, *Aida*, *Nixon in China*, *The Aspern Papers*, Great Performances Series for PBS; *Dolly* ABC-TV prime time "The Texas Debates" presidential debates for American Public Radio; live broadcast for Z Rock Radio Network include, Metallica Dio, King's X, Black Crowes, Nevada Black, Every Mother's Nightmare, Network; George Strait, MCA Home Video; 7th Van Cliburn Competition American Public Radio; Benjamin Lees' *Memorial Candles*, American Public Radio; score for Texas, Dramafex production at Palo Duro Canyon, *Fashion Hit Revue*, Sanger-Harris live TV special, Mary Kay Cosmetics seminars 1985-1990, League of Women Voters, 1984 *Democratic Presidential Candidates Debates*, PBS network special; Bob Banner Associates *Face of the '80s* syndicated TV special; ACTS TV Network, *Country Crossroads*, two 13-week series; Bob Stivers Productions *Stars Salute the U.S. Olympic Team*, NBC prime time special; Bugs Henderson live LP project, two live albums for The Vocal Majority; and more.



OMEGA AUDIO AND PRODUCTIONS INC.
Dallas, TX

OMEGA AUDIO AND PRODUCTIONS INC.; Audio: 7027
Twin Hills Ave, Ste. #5; Dallas, TX 75231; (214) 891-9585;

FAX: (214) 891-9623. Contact: Paul A. Christensen. Vehicles: 1978 GMC Loadstar 35' w/crew sleeper and power tailgate. Refueling travel range: 850 miles. Power requirements: 220 VAC, 100 amp. Power isolation transformer. **Control Room Dimensions:** 20 x 8 x 10. **Mixing Consoles:** API 32 x 32 mixing console w/API 550A EQ, Soundtracs 24 x 24, Hill 16 x 8 x 4 x 2, program buses w/8 stereo VCA groups. Additional inputs available on request. **Audio Recorders:** (2) Otari MTR-90 24 track, (2) Otari MTR-10 4-track 2/4-track w/center stripe TC, Mitsubishi X-80 2-track digital, (2) Technics 2-track cassette, Sony PCM-F1 2-track digital. **Noise Reduction Systems:** TTM Dolby/dbx rack 24 channels. **Synchronization Systems:** BTX 4700 Shadow. **Outboard Equipment:** Teletronix LA-2A limiter, dbx 165 limiter, (7) dbx 160 limiter, ADR Vocal Stresser, (2) UREI 1176LN limiter, Lexicon 224XL digital reverb, MXR 01a digital reverb, (2) Yamaha SPX90 special FX processor, (4) DeltaLab Super Time Line, (2) dbx 162 limit, Kepex gate, Barcus-Berry Electronics exciter, Aphex Compellor, Eventide 949 Harmonizer. **Microphones:** (2) AKG C-12A tube, (8) AKG C-414EB, (4) AKG C-451EB, AKG D-12E, (6) Beyers 201, (4) Neumann U47, (2) Neumann U87, (2) Neumann KM84, (4) Shure SM81, (12) Shure SM58, (12) Shure SM57, (4) Shure SM53, (6) Crown PZM315, (7) Sennheiser 421, (5) Sennheiser 44 1, (3) Sony ECM-22P, (2) Sony ECM-50, (3) EV RE20, (7) Countryman DI box, (10) Heider DI box, Audio-Technica ATM-5R. **Monitor Speakers:** (2) JBL 4430, (2) Auratone, (2) Yamaha NS-10, (2) Visonik. **Power Amplifiers:** (2) Yamaha P2200, Yamaha P1000, Shure 250. **Video Recorders:** JVC 6600U. **Video Monitors:** Sony Trinitron 14", RCA 26", Panasonic 19". **Rates:** Call for rates. Varies with job requirements. **Specialization & Credits:** Omega Audio has been supplying remote audio recording services to clients of the record, film and video industry since 1973. During that time, Omega Audio has worked with over 200 major recording artists, all major television networks and on numerous feature films. As a result of this vast and varied experience, Omega Audio is uniquely qualified to handle the challenging tasks that remote recording requires. Omega Audio has received two Platinum Records, five Gold Records, two Ampex Golden Reel Awards, three Grammy nominations and three Dove Awards. Partial credits include: U2, REM, Lynyrd Skynyrd, Amy Grant, B.B. King, Dizzy Gillespie, Joe Walsh, Fats Domino, Ray Charles, Paul Shaffer, Prince, Cameo, Johnny Cash, WNET-PBS Great Performances, Dick Clark Productions, Pat Benatar, Joe Jackson, Hall & Oates, Anne Murray, Art Garfunkel, Al Jarreau, Molly Hatchett, Neil Young, Ben Vereen, Bo Diddley, *The Big Easy*, *Baja Oklahoma*, Fabulous Thunderbirds, Gladys Knight, Pope John Paul II.

RAPASOUND; Audio & Video: Box 1017; Jerome, AZ 86331; (602) 634-9607; FAX: (602) 634-2518. Contact: Walter Rapaport.

REELSOUND RECORDING CO.; Audio: 2304 Sheri Oak Ln.; Austin, TX 78748; (512) 282-0713. Contact: Malcolm H. Harper.

TRIPLEX RECORDERS; Audio & Video: 3646 Gutfway Drive; Port Arthur, TX 77640; (409) 985-9550. Contact: Dr. Wayne Dyess

Northwest

Alaska, Northern California, Colorado, Idaho,
Montana, Northern Nevada, Oregon, Utah,
Washington, Wyoming

AKASHIC RECORDS GROUP; Audio: PO Box 395; Danville, CA 94526; (415) 837-7959. Contact: Stephen Jarvis.

AMERICAN AUDIO SYSTEMS LTD.; Audio: 1417 Whitecliff Way; Walnut Creek, CA 94596; (415) 934-6151. Contact: Mark Sweet.

DOG FISH SOUND; Audio: 17385 NE Hillsboro Hwy.; Newberg, OR 97132; (503) 538-5638. Contact: Drew Canulette. Vehicles: Ford F700 w/24' box. **Mixing Consoles: Harrison Raven 40 x 24, Sound Workshop Series 30 24 x 24, Biamp 1642 16 x 4 x 2, Ampex MX10 44 x 2. **Audio Recorders:** MTR-90II 24-track w/synchronizer, MX70 16/8-track, (2) RS 15002-track, Nakamichi MRI, Sony, Panasonic 3500 R-DAT, dbx 700 digital audio processor. **Noise Reduction Systems:** (18) dbx, (2) Dolby SR/A. **Synchronization Systems:** EC101. **Outboard Equipment:** (2) LA-4, LA-2A, Altch 635A, (2) ADR comp/limiters, Valley People 440, (2) Symetrix CL501, (2) dbx 106X compeller, (2) Rane PE15 parametric EQ, (2) Klark-Teknik octave EQ. **Microphones:** (2) Neumann U89, (3) C414-EB, (5) C451-EB, AKG D-12, (2) Sony C-37A, (2) Sony ECM-33P, Crown PZM 30GP, (2) 441, (4) 421, (6) Shure SM57, (2) Electro-Voice RE20, Ampex tube, (8) EV 457A, (2) Countryman DI, (2) Stewart DI, (2) Audio-Technica DI, vacuum tube DI. **Monitor Speakers:** (2) JBL 4435, (2) JBL 4408, (2) Rogers LS35A, (2) Auratone SC. **Power Amplifiers:** (2) Crown DC-300A, UREI 6250, BGW 200, QSC. **Video Recorders:** JVC 8600U. **Other Major Equipment:** 36-channel microphone splitter (transformer), Lexicon 244XL, Eventide H3000, Barcus-Berry Aural Exciter.**

PHIL EDWARDS RECORDING; Audio: 1522 W. Winton Ave.; Hayward, CA 94545-1311; (415) 784-1971. Contact: Phil Edwards. Vehicles: 31' GMC 6500 bobtail w/lift gate. Ford



PHIL EDWARDS RECORDING
Hayward, CA



PACIFIC MOBILE RECORDERS
Carmichael (Sacramento), CA

varr Control Room Dimensions: Mobile II: 20' x 8' x 8' **Mixing Consoles:** API 40 x 24 x 24 w/550A EQ, API 1604 w/550A EQ **Audio Recorders:** (2) 3M 7924-track, (2) Sony DAT, (2) PCM-F1, MCI 110-B 2-track, Ampex 440C 2-track, (3) Denon cassette deck, **Noise Reduction Systems:** (4) Dolby A361 A/SR, Dolby M24 A/SR, **Synchronization Systems:** Adams-Smith 605B 3-machine, **Outboard Equipment:** (5) UREI 1176LN limiter, (2) UREI LA-3A limiter, Orban dual parametric equalizer, Orban 3-channel de-esser, Lexicon PCM7C digital processor, Yamaha REV5 digital processor, Yamaha SPX90II, (2) Pultec MED-5, (4) Kepex noise gate, **Microphones:** (6) Neumann U87, Neumann U89, (2) Neumann U47 FET, Neumann KM84, AKG 414, (2) AKG 451, (6) Sennheiser 421, (6) Shure SM85, (2) Shure SM57, (32) Shure SM56, Sony ECM-22P, (2) RCA 77-DX, (6) Countryman FET 85 DI, stereo C-Tape, (4) EV RE15, **Monitor Speakers:** (2) JREI 811A Time Algrn, (4) Auratone, **Power Amplifiers:** Crown DC-300A, (2) McIntosh MC2100, McIntosh MC250, **Video Recorders:** (2) Sony SiO-323 Beta I, (2) Sony SL-IF-1000 Beta, Panasonic PV-1363 VHS, **Video Monitors:** Sony KX-1901 Profecolor, Sony 7" B&W, **Cameras:** Sony 1990 color, **Other Major Equipment:** (4) line-isolated mic splits, (5) Clear-Dom stations, 200' 50-amp, 220-volt line, 300' 27-pair snake, 125' 19-pair snake, (150) mic cables, **Rates:** \$1,200-\$2,300 per day, mileage and expenses extra, **Specialization & Credits:** Complete packages for record production, video and radio broadcast taping, film and commercial production, Simultaneous record and broadcast packaging a specialty. Experienced crew, recent credits include Concord Records/Mel Torme, Poncho Sanchez, Phillip Morris Superband in Sydney, Australia—Rounder Records/Irma Thomas—Hightone Records/Joe Louis Walker—NPR/New Year's Eve Special. Call for brochure.

PACIFIC MOBILE RECORDERS; Audio: 2616 Garfield Ave., Carmichael (Sacramento), CA 95608; (916) 483-2348. **Vehicles:** Mack 200 diesel with "6" box, air conditioned, lift gate. **Control Room Dimensions:** 18' x 7'6" x 7'6", 8' x 7'6" x 7'6" producer's lounge/iso room **Mixing Consoles:** Harrison MR-3E x 24 x 36 w/VCA grouping, switchable mic inputs. **Audio Recorders:** Otari MTR-90 24-track w/autolocator, Sony/MCI IH-110 B14 2-track, 3M M79 2-track, TEAC and Yamaha cassette decks. **Outboard Equipment:** Lexicon 200 digital reverb, UREI LA-4 limiters, USAudio gates, Lexicon PCM80 digital reverb, Yamaha SPX90, Ibanez digital delay, 27-band EQ, active direct boxes, Gentner 2 x 8 DA. **Microphones:** Neumann, AKG, Sennheiser, EV, Shure, Beyer, Crown. **Audio-Technica. Monitor Speakers:** EV Sentry 500, JBL 4313E M&K close-field monitors, Auratone. **Power Amplifiers:** Yamaha P2201, Crown D-150A. **Video Monitors:** Sony color, Sanyo B&W. **Cameras:** Panasonic AG-155, Sanyo B&W. **Other Major Equipment:** 40 channel 3-way transformer isolated split, 16-channel 2-way isolated split, 250' 36-pair snake, 65' sub-snakes, intercom system and 2-way radio, 220' 110V transformer isolated, 125 amp AC distribution system, prepared for additional 24-track recorder. **Rates:** Starting at \$1,500 per day. Packages available, call for quote.

PERFORMANCE AUDIO; 2358 So. Main; Salt Lake City, UT 84115; (801) 466-3196. Contact: Klay Anderson

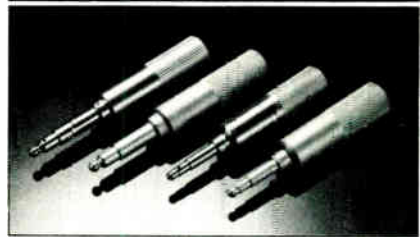
PINEAPPLE PRODUCTIONS; Audio & Video; PO Box 12064; Portland, OR 97212; (503) 281-4380. Contact: Jay Cosnett



THE PLANT RECORDING STUDIOS
Sausalito, CA

THE PLANT RECORDING STUDIOS; Audio & Video; 2200 Bridgeway; Sausalito, CA 94965; (415) 332-6100. Contact: Bob Skye. Vehicles: GMC PD-4106 motor coach, 35'. **Control Room Dimensions:** Control: 18' x 8', lounge: 10' x 8'. **Mixing Consoles:** Sound Workshop Series 30, 36 x 24. **Audio Recorders:** (2) Otari MTR 90II 24-track, (2) Otari MkIII 2-track, (2) Panasonic 3700 DAT, Tascam 122B, additional units available. **Noise Reduction Systems:** Noise reduction interface patch bay for SR Dolby or others. **Synchronization Systems:** Otari EC-101, Adams-Smith Zeta-3. **Outboard Equipment:** Lexicon PCM60 reverb, Klark-Teknik DN780 reverb, Yamaha SPX90, (4) LA-3 comp/limiter, (2) 1176 limiter, (6) Valley People Gain Brain II limiters, (2) Dyma-mite gates, additional equipment available. **Microphones:** (2) Sennheiser: 421, 431, 441; (12) Shure: 546, SM53, SM56, 3M57, SM58; (2) Schoeps M221-B tube; (8) AKG 460/CK 1, 452/CK-1, 414, D-12; (4) Neumann U87, KM84, (2) Crown PZM, (3) EV RE20, D054; Sony ECM-23, (3) Countryman Isomax and more on request. **Monitor Speakers:** JREI 811A, Auratone. **Power Amplifi-**
—LISTING CONTINUED ON NEXT PAGE

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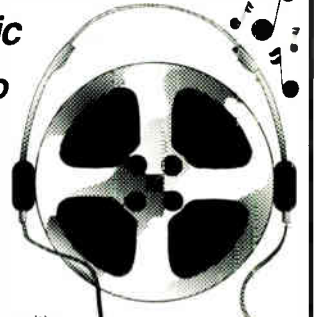
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Incline Village, NV

MOBILE FIDELITY PRODUCTIONS OF NEVADA; Audio & Video; PO Box 8359; Incline Village, NV 89450; (702) 831-4459; FAX: (702) 831-4485. Contact: Brad S. Miller. Specialization & Credits: Credits: founder, Mobile Fidelity Sound Lab, Mobile Fidelity Records and Productions; creator of the Mystical Moods Orchestra and producer/engineer of numerous special effects recordings. Principal in development of Colossus digital audio system with Louis D'Orten. **Services offered:** local on/studio recording where accurate archival of live performance or final mix is required. Production services include the Colossus (4-channel) PCM digital audio system with 1630 compact disc format compatibility; analog 4-channel surround microphone (MS-4). We recommend that interested parties inquire as to latest compact disc samples in release by clients utilizing Colossus or MS-4 or both. Conversion of existing sound effects and music libraries into Colossus format and then to optical hard disk also available. Written information package available upon request.

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REMOTE RECORDING

Northwest

—continued—

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ers: Phase Linear, Yamaha. **Video Recorders:** Sony 5850. **Video Monitors:** Sony 13" color, Panasonic 19" color. **Cameras:** Panasonic color for CCTV. **Specialization & Credits:** "Rover," The Plant's mobile recording unit, offers the finest in mobile acoustic environments and equipment for live concert recording, remote broadcast, audio-for-film and video, in-house recording and post-production/audio sweetening. It has become one of the most popular live-to-2 track, as well as multitrack, mobiles because of its ability to deliver clean, accurate sound to the client with virtually no guesswork involved. Some of our clients/projects include: John Denver, U2, Stanley Turrentine, Marty Balin, Jacques Cousteau, Judy Collins, NFL Films, Anita Baker, National Public Radio, Bobby McFerrin, B-52's, Jimmy Smith, Todd Rundgren, Carmen McRae, Ronnie James Dio, Kenny Burrell, Billy Preston, Chick Corea, Harry Belafonte, Paul Williams, Peter, Paul and Mary, Al Jarreau, Les McCann, Robert Cray, Neil Young, Crosby, Stills & Nash, Hawkins Family, Huey Lewis & the News, Miles Davis, Aaron Neville, Exodus, Holly Near, Greg Kihn, The Yellow Jackets, Joe Satriani, America, Bob Hope, Chambers Bros., Steve Miller, Taj Mahal, Eddie Money, Grace Slick, Jesse Colin Young, Turner Broadcast and Maria Muldaur.

PROFESSIONAL SOUND AND RECORDING INC.; *Audio;* 3100 W. 71st Ave.; Westminster, CO 80030; (303) 426-7819. Contact: Phil Crumrine. **Vehicles:** 1984 Winnebago Centauri van. **Control Room Dimensions:** 7 x 14. **Mixing Consoles:** Soundcraft 1624 24 x 16 x 24, Rowland Research 8 x 2 Audio-ophile, Soundcraft 200B 16 x 4. **Audio Recorders:** (2) Stephens 821A 24/16-track 2". (2) Nakamichi DMP 100 PCM digital. Revox PR99 1/2-track 1/4". (10) TEAC V2-RX3-head cassette

deck. **Outboard Equipment:** Lexicon PCM60, Yamaha REV7, Yamaha SPX901, (2) Symetrix 501 comp/limiter, Symetrix 511 noise reduction unit, dbx 900 rack w/4) compressor, (2) parametric and (3) gate, (2) Symetrix 522 comp/limiter, BBE 202R stereo processor, UREI LA-3 compressor. **Microphones:** (2) AKG C-414EB-P48, (2) AKG C-451 w/shotguns, AKG C-33 stereo, Schoeps CMTS 301 stereo, (4) Schoeps CMC-3, (2) Sennheiser MD-421U, EV RE20, (3) Shure SM81, (2) pre-Crown PZM, (2) Countryman Lavalier. **Monitor Speakers:** Yamaha NS-10, B&W DM-100, EV Sentry 100A, Spica TC-50. **Power Amplifiers:** Rowland Research Model 5, Hafler DH-200. **Video Recorders:** Panasonic AG-6400 VHS Hi-fi. **Video Monitors:** BMC 13" color.

RANDALL SCHILLER PRODUCTIONS; *Audio & Video;* 1207 Fifth Ave.; San Francisco, CA 94122; (415) 661-7553. Contact: Randy Schiller.

SHYNE SOUND; *Audio;* Box 2280; San Rafael, CA 94912; (415) 459-2833. Contact: Leroy Shyne.

SOUND EXPRESSIONS; *Audio;* 3249 Santa Rosa Ave.; Santa Rosa, CA 95407; (707) 528-3565. Contact: Philip Salisbury.

Southern Cal/ Hawaii

ATM AUDIO/VISUAL; *Audio & Video;* 20960 Brant Ave.; Carson, CA 90810; (213) 639-8282; FAX: (213) 639-8284. Contact: Randy Wilkins, Andrew T. Martin.

AUDIO SERVICES CORPORATION; 10639 Riverside Dr.; North Hollywood, CA 91602; (818) 980-9891. Contact: Gwen Madrid.

THE AUDIO TRUCK; *Audio & Video;* PO Box 1220; Kaneohe, HI 96744; (808) 247-5529. Contact: Lew Maddox or John Fielden.

METZGER ENTERPRISES; *Audio;* 3305 E. Miraloma Ave., Ste. 177; Anaheim, CA 92806; (714) 572-0196. Contact: Timothy Metzger



RECORD PLANT
Hollywood, CA

RECORD PLANT; *Audio;* 1032 N. Sycamore Ave.; Hollywood, CA 90038; (213) 653-0240. Contact: Mark Eshelman. **Vehicles:** (2) GMC bobtail w/full air cond. and heat, air-ride suspension; Mobile Unit II 29'2" x 8'4"; Mobile Unit III 34'4" x 8'4". **Mixing Consoles:** Mobile Unit II: API 44 x 24 16-bus full patch bay, designed specially for simultaneous live broadcast/recording applications; Mobile Unit III: API 44 x 32, 24-bus full patch bay, designed for simultaneous live broadcast/recording applications. **Audio Recorders:** Otari MTR-90 24-track analog, Ampex ATR-102, Ampex ATR-104, Sony 3324/3348 digital, Mitsubishi 32-track digital. **Noise Reduction Systems:** Dolby A/SR **Synchronization Systems:** Lynx. **Microphones:** Mics, outboard processing supplied according to production requirements. Stock includes most recording-quality makes and models. **Monitor Speakers:** Mobile Unit II: JBL 4320; Mobile Unit III: Meyers ACD, Auratones, Yamaha NS-10s, Yamaha NS-20s, etc.

SIDESTREAM SOUND; *Audio;* 5013 1/2 Narragansett Ave.; San Diego, CA 92107; (619) 222-0238. Contact: Ken Totten.

STUDIO M PRODUCTIONS UNLTD.; *Audio & Video;* 8715 Waikiki Station; Honolulu, HI 96830; (808) 734-3345; FAX: (808) 734-3299. Contact: Mike Michaels C.A.S.

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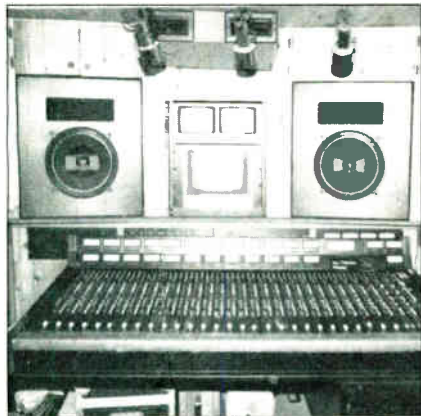
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Mix Directories, 6400 Hollis Street, Suite 12, Emeryville, CA 94608.





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Glendale, CA



STUDIO ON WHEELS
Glendale, CA

STUDIO ON WHEELS; Audio; 339 W. Windsor Rd., Ste. 6; Glendale, CA 91204; (818) 243-6165. Contact: John Falzarano.

Outside U.S.

BASTION CITY MOBILE RECORDING LTD.; Audio & Video; 3760 Departure Bay Rd.; Nanaimo, B.C., V9T 1C4 Canada; (604) 758-3424. Contact: Scott Littlejohn.

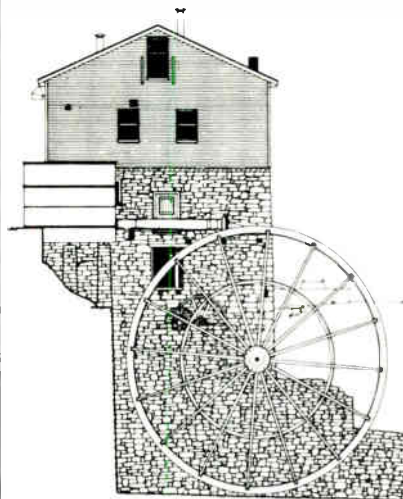
COMFORT SOUND AUDIO MOBILE; Audio; 26 Soho St., Ste. 390; Toronto, Ontario, M5T 1Z7 Canada; (416) 593-7992. Vehicles: GMC 5-ton w/22' box. Control Room Dimensions: 7' x 16'. Mixing Consoles: Neotek Elite w/50 mic inputs + 16 assignable line inputs. Audio Recorders: (2) Ampex MM1200 24-track, Tascam R-DAT, TEAC C-3 cassette deck. Synchronization Systems: BTX. Outboard Equipment: Lexicon PCM60 digital reverb, Yamaha REV7 digital reverb, Yamaha SPX90 digital effects processor, Yamaha D1500 DDL, Rane stereo 1/3-octave EQ, (2) Drawmer 201 dual channel noise gate, (8) dbx 160 compressor, CDT 8-channel compressor, Symetrix 4-channel noise gate, SMPTE time code reader. Microphones: (4) AKG 451, (2) Shure SM81, (2) Crown PZM, (4) Sennheiser 421, (2) Sennheiser 441, (2) Countryman Isomax, (2) AKG CK9, AKG D-112, (2) Audio-Technica lavalier. Monitor Speakers: Tannoy NFM 8, Yamaha NS-10, Auratone. Power Amplifiers: CSC 1500, (2) BGW 100, (2) Amcron D60 Video Recorders: RCA VHS Hi-Fi. Video Monitors: Panasonic 12" color. Switchers: Panasonic 12-channel. Cameras: Panasonic color. Other Major Equipment: 54 input 3-way transformer-isolated split, 500' 54-par mic snake, Clear-Com 2-channel intercom system, SOLA Skva power regulator/cleaner. Rates: \$1,295/12 hr. day plus \$400 for second 24-track machine if required. Specialization & Credits: Clients include: MTV, MuchMusic, Disney, CBS, The Police, k.d. lang, Steve Earle, King Sunny Ade (in Nigeria), Glen Campbell, Motorhead, Ice T, Showtime, Bryan Adams, Triumph, The Fixx, Daniel Lanois, New Order, The Neville Brothers, Living Colour, Todd Rundgren, the late Stevie Ray Vaughan, Cowboy Junkies, Leo Kottke, Ray Charles, Super Dave Osborne Show, Live radio broadcasts, telethons, award shows and concerts. Digital multitrack available on request. With over 800 remotes to our credit in the past decade, Comfort has the experience and the equipment to provide CD quality sound for your project. We also airpack multitrack systems anywhere in the world.

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—FROM PAGE 34, MINING LIVE

the MIDI delay will make the samples too late. Sneak the sample in underneath the live drum carefully, checking that the sampler isn't mistriggerring or flaming with the original drum. Don't ask for trouble by taking the original out. Tom toms aren't worth bothering with—just mic them properly. Whatever you do, first be sure it all works at soundcheck!

The Night

By this time, you should have extensive notes for each song. The running order of the songs inevitably gets changed many times before the show, so update the final set list. (This is why your song notes should be on separate sheets.) Between mixing and watching the line feed for visual cues, I've found it extremely difficult to read notes during the show. The best way around this is to find someone with a loud voice to yell out cues for you. Before the show, go over the notes with the person; ascertain that he or she understands the directions and can read your handwriting. It helps if the assistant was present while you were writing the notes or, better yet, had the notes dictated to him or her.

Well, you're ready to go now. Don't get nervous. Instead of sitting there in a cold sweat during the last half-hour before you're on the air, make sure you're truly ready. Check that no one's turned off echo sends/returns, mics, monitor channels, EQs or anything else while chasing down hums and buzzes. See if your pans and faders are properly positioned for the opening number. Check that no outboard effects were bumped (opening with "Death Flange" instead of "Large Hall" on the lead vocal may be inappropriate) and that any delay or harmonizer settings are correct. If you're planning to use samples, be sure they're still loaded. Check that the desk is in "solo safe" mode, or find out which solo button interrupts the stereo mix and which doesn't. Does your assistant have the notes in the proper order, and is he or she fully awake? You may experience the desire for an alcoholic beverage to calm your nerves. Beware—alcohol will slow your reaction time and possibly lead to some missed cues. I suggest waiting at least until the show's over (if not forever).


The Mix

You're on the air! This is when the fun starts. All you have to do now is pay

attention and mix your ass off. If a mic goes out or something starts buzzing or crackling, track the problem down as quickly as you can, and if it's not in the truck, get on the intercom or tell someone to tell your contact on stage what it is. If everyone has done their job carefully, nothing major will screw up, but there's usually *something*, so be prepared. And most importantly, don't lose your temper—it never helps!

I recommend monitoring at an average level on bookshelf speakers most of the time, occasionally switching to the big speakers and a small mono speaker. For a TV mix the mono speaker is crucial, because, of course, this is what most of your audience will be listening to. If you've been able to get a downlink or air monitor feed, you'll hear what processing is being done at the transmitter. Luckily, in the U.S. there is an FCC regulation that prohibits satellite uplinks from doing any signal processing at all, other than peak limiting to protect the transmitter from any sudden bursts of signal, and that won't affect anything unless you let your mix level get out of hand. Unfortunately, this doesn't prevent local TV and radio stations from doing massive amounts of limiting to keep their signal strong. Using a bit of musical-sounding compression on your stereo mix output can help to minimize the damage. Don't do any critical rides while listening to a signal that's been to a satellite and back, because it will have been delayed about a half-second. Only use it for an overall sound balance.

Mixing for TV is a bit different from mixing for records, since very few people are listening on decent stereos. Avoid going for a big, deep bottom end—most people won't hear it. Make sure you can hear the bass and bass drum on that small mono speaker. You may have to roll off some low bottom and add lower mids to compensate. Keep your mix mono-compatible—don't hard-pan anything to the extreme left or right. For some mysterious reason, reverb seems to diminish on TV, so you may want to make things slightly wetter than you would normally. Don't be afraid of those audience mics—part of your job is to make the home viewers feel like they're part of the live audience, so they should hear as much live reaction as possible without obscuring the music. Use the audience mics sparingly as an additional echo return during the songs to maintain a sense of the sound of the

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hall, then swell them smoothly when the audience is responding—between songs and during breakdowns.

For television, top priority should always be what is on the screen. If you and the director have done your homework, you'll both be featuring the same things most of the time. Don't be afraid to exaggerate lead vocals, solos or other featured elements. If the screen is filled with the front of a guitar, everyone's going to expect to hear it loud and clear. (That is, as long as someone's playing it.)

And in the End

Well, you've done it. Show's over, you've done a great job, had a marvelous time and now you're wondering why you're so depressed. This is completely normal after two to five (or sometimes, as in the case of Live Aid, *twelve*) hours of constant adrenaline rush. So...I guess you'll just have to go find the party! ■

Bob Clearmountain's credits include mixing tracks for Laurie Anderson, Paul McCartney, The Who and Roxy Music. He makes his home in Connecticut.

—CONTINUED FROM PAGE 129, SR NEWS
cooling fan, and electronically balanced inputs with sockets for plug-in transformers and electronic modules.

Circle #289 on Reader Service Card

A Bose of a Different Color

Bose (Framingham, Mass.) expands its Model 102 product line to offer the popular surface-mount speakers in a white finish that can be painted to match any decor. Functionally identical to the black-painted 102s, the white models feature injection-molded polypropylene enclosures with matching steel grilles and mounting brackets.

Circle #290 on Reader Service Card

Remote Cable Tester

The ACT-1 from Alphaton (Roanoke, Texas) is a compact test system for checking faults in microphone and snake systems. The ACT-1 tests for ground faults, pin shorting, opens and multiple

combinations of these conditions, as well as cold solder joints and intermittent connections. The system consists of a sender/analyzer and a remote cable connector that simplifies checking long snakes where both ends are not accessible in one location. Send and receive jacks include male and female XLR and 1/4-inch TRS connectors.

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Crown Offers Automation

Designed to expand the versatility of the IQ System 2000 amplifier control system from Crown (Elkhart, Ind.), the COM-Q allows system automation from an analog tape. COM-Q also lets the IQ system run without a host computer once the control commands are stored on tape. Applications include automated control of amps driving surround or special effects speakers in theme parks and theaters, where a multitrack tape carrying the audio tracks can be encoded with amplifier

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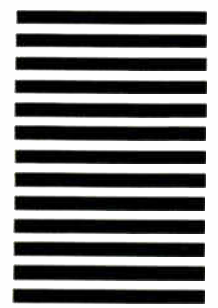
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control data. The device also can be used to control lighting and other non-audio effects.

Circle #292 on Reader Service Card

TC Expands EQ Remote

TC Electronic (North Hollywood, Calif.) has added new features to the TC 6032 EQ remote control surface that provides instant access to 32 TC 1128 1/3-octave equalizers and indicates the frequency band with 28 motorized faders. Developed jointly by TC Electronic A/S (based in Denmark) and Clair Bros. Audio (Lititz, Pa.), the system now includes a "solo" function to facilitate monitor mix setup, and remote operation of the TC 1128's "search and destroy" feature. The latter allows automatic feedback control, even when equalizers are located 100 meters from the mix position.

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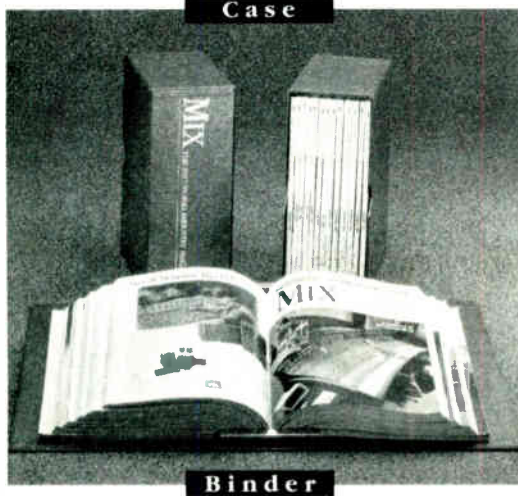
protective covers for sound reinforcement and studio gear, from Cloud 9 Covers of Endicott, N.Y. Options on these extremely durable covers include removable hard-board inserts, security straps for consoles and speaker dollies, and a new "armor-coated," waterproof nylon fabric (the type used to make bulletproof vests). To protect consoles at outdoor events from overheating before showtime, Cloud 9 also offers reversible covers that reflect 97% of the sun's energy.

Circle #294 on Reader Service Card

SOUNDCHECK

Burbank, CA-based Burns Audio opened an East Coast office in the DC area, at 4588-90 Eisenhower Ave., Alexandria, VA 22304; (703) 212-8500. Burns Audio recently worked events on both coasts, including two birthday bashes (Frank Sinatra's 75th, Motown's 30th), *Christmas in Washington*

and *Kennedy Center Honors*. All shows used Burns Audio's Apogee speakers, Yamaha and Ramsa consoles, Crest power amps, and Vega wireless mics... Long Island City-based See Factor is handling the national tours of Bad Company and Andy Williams and also did the Rock & Roll Hall of Fame Awards in January at the Waldorf; systems consist of Meyer and Martin speakers, proprietary JBL-loaded wedges, and Yamaha PM3000 and Midas Pro 40 boards... U.S. Sound (Philadelphia) outfitted the sound system at Atlanta's Omni Arena with 30 Carver PM-1200 amplifiers... Pro Media (El Sobrante, CA) provided purrrr-fect sound for its second arena performance of the Broadway musical hit *Cats* in the Pensacola Civic Center. *Cats* is touring the U.S. with a sound system from New York's Masque Sound, augmented by Pro Media's Meyer Sound Labs MSL-3s, UPAs and CP-10 parametric EQs... Ten weather-resistant Bose 802 Series II speakers carried the live



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outdoor performance at Boston's official Christmas celebration, which featured 24 handbell players and a six-member chorus; 802 speakers also were selected for the 1992 Olympic Winter Games in France. Speaking of which, CBS-TV in New York bought 39 Bryston 2B-LP power amplifiers to use during the sports extravaganza... New York's AST designed custom cabinets for the new JBL loudspeaker components installed at the U.S. Military Academy in West Point, NY; the new system is used during halftime activities at Army football games... While on the road, Bela Fleck & The Flecktones set up a rehearsal system in their tour bus. By installing Rane's rack-mount SM82 mixer and HC6 headphone console, the band could plug in up to eight stereo inputs and monitor each mix through stereo 'phones with individual level controls... The INXS world tour, handled in Europe by Showco, is using five Lone Wolf MidiTaps

and over 500 feet of fiber optic cable to network all their MIDI and computer equipment... Omnimax theater designer Michael Stearns designed the new "Back To The Future" fantasy ride at Universal Studios' theme park in Orlando, FL, using Spatial Sound's SSP-100 spatial sound processor to achieve realistic 3-D effects... General Cinema theaters around New York City now use University Sound's CS810-T ceiling speakers and PA430T constant-directivity paging projectors in the lobbies; meanwhile, the Rose Bowl Aquatics Center in Pasadena, CA, is now using University Sound's UW-30 sealed, underwater loudspeakers in its diving pool... In France, the Lagoon Group sound company is checking out the 50kW prerelease of the new Nexo touring speaker system, which debuted at AES Paris in February... One of Spain's largest sound companies, Madrid-based Sorter S.A., bought two customized Paragon P32 consoles from Audio Teknology Inc. Each

32-channel board is downloaded to 24 channels, allowing Sorter to combine the two boards into a 48-channel configuration with 32 submasters and 32 effects returns... Walter Rapaport of Rapasound has joined the staff of the NATTS-accredited Conservatory of Recording Arts & Sciences in Phoenix, AZ, to teach hands-on sound reinforcement classes; for a course catalog, call (800) 562-6383... Chris Alfiero is the new marketing specialist at Electro-Voice, where he is responsible for providing tech support for EV's music products dealers... University Sound appointed Pappas Consulting of Menlo Park, CA, as its sales rep for commercial sound products in Northern California and Nevada.

Sound reinforcement professionals: Keep those cards and press releases coming! (Photos appreciated, too.) Send to *Mix* magazine, Sound Reinforcement Editor, 6400 Hollis Street #12, Emeryville, CA 94608, or fax (415) 653-5142. ■

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Mix Classifieds

(800) 747-3703

How to Place a *Mix* Classified Ad

Please print or type in CAPITAL LETTERS and lowercase. There are 8 lines to the inch and approximately 24 CAPITAL letters or 32 lowercase letters per line. \$80 per inch—1" minimum. Each additional line is \$10. **BOLD TYPE** is \$10 per line; a border is \$10 extra; and a gray screen is \$15 extra. Logos or display advertising up to 4" will be charged at \$100/inch. Logos or display advertising must be camera-ready (width is 1-5/8" or 10 picas). Frequency discount rates available. Call for information. **Payment by check, money order or charge must accompany ad.** **DEADLINE is the 15th of the month, 6 weeks prior to publication.** (Classified ads cannot be canceled or refunded after the deadline date).

Categories Available (check one):

- | | | |
|---|--|--|
| <input type="checkbox"/> Acoustic Consulting | <input type="checkbox"/> Equipment Rentals | <input type="checkbox"/> Records, Tapes & CD Services & Supplies |
| <input type="checkbox"/> Business Opportunities | <input type="checkbox"/> Equipment Wanted | <input type="checkbox"/> Recording Services |
| <input type="checkbox"/> Employment Offered | <input type="checkbox"/> Instruction | <input type="checkbox"/> Studios for Sale |
| <input type="checkbox"/> Employment Wanted | <input type="checkbox"/> Maintenance Services | <input type="checkbox"/> Miscellaneous |
| <input type="checkbox"/> Equipment for Sale | <input type="checkbox"/> Music Products/Software | |

Co. Name _____

Name _____

Address _____

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I am paying by (check one): VISA MASTERCARD AMERICAN EXPRESS

Card #: _____ Expiration Date: _____

Signature: _____

Check or Money Order #: _____ Amount Enclosed: \$ _____

MAIL TO: Mix Classifieds, Attn: Robin Boyce, 6400 Hollis St. #12, Emeryville, CA 94608

Toll-Free Order Line: (800) 747-3703 (415) 653-3307 FAX: (415) 653-5142

You're looking at two of the most respected names in sound.



Gungi Paterson, Chief Sound Engineer for rock greats including Judas Priest, Whitesnake, Black Sabbath, Deep Purple, David Lee Roth, and Ozzy Osbourne.

Gungi Paterson and DigiTech.

Without a doubt, Gungi Paterson is one of the best sound engineers in the business. So it stands to reason that he

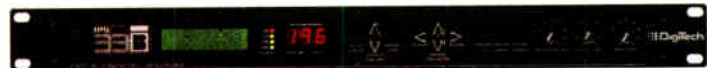
would choose the best gear as well. Like DigiTech signal



DSP 256 Digital-Effects Processor

Delivers vocal and instrumental multi-effects, up to four simultaneous effects from 24 available.

and effects processors. Because DigiTech not only gives



IPS 33B Super Harmony Machine

To generate vocal and instrument harmony effects, two and three-part chromatic, intelligent and user-defined harmonies.

him the arsenal of sound he demands and the road-tough reliability he needs, it allows him to help the greatest

names in rock do what they do best: kick ass. So if you're one of the best, demand the best. At your DigiTech dealer.



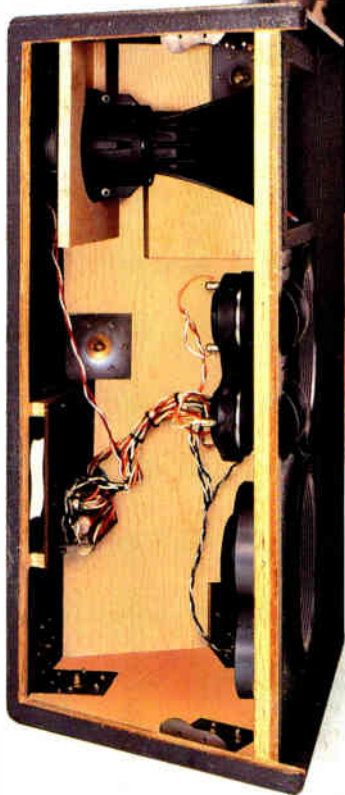
MEQ 28 MIDI Programmable Graphic EQ

For main PA equalization, 31 band programmable (single channel) 1/3 octave with 99 memory slots.

DigiTech
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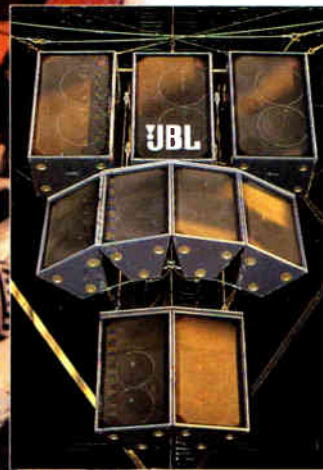
It Takes Real Guts To Face A Crowd Like This.



Concert Series

They want it all. They expect it. They deserve it. And, frankly, you wouldn't have made it this far if you had delivered anything but your absolute best. Night after night, show after show.

At JBL we share your dedication



and desire to take your music to the top. That's precisely why we invested the time and energy we did into the development of Concert Series loudspeaker systems. Just as every note and word must work together in perfect harmony, every

component in a professional sound system must integrate and function perfectly with each other.

Concert Series has the "guts" to face the most demanding audiences. This fact is underscored by the major tours and concert venues that have selected Concert

Series. From reggae and rock to solo and symphonic performances, Concert Series is helping artists the world over to give their fans the calibre of performance they demand and deserve, night after night, show after show.

We encourage you to audition Concert Series. Do it for your fans. Do it for yourself. Visit your JBL Professional dealer and discover for yourself why Concert Series is hanging around with some of the biggest names in the music business.



JBL Professional
8500 Balboa Boulevard, Northridge, CA 91329

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