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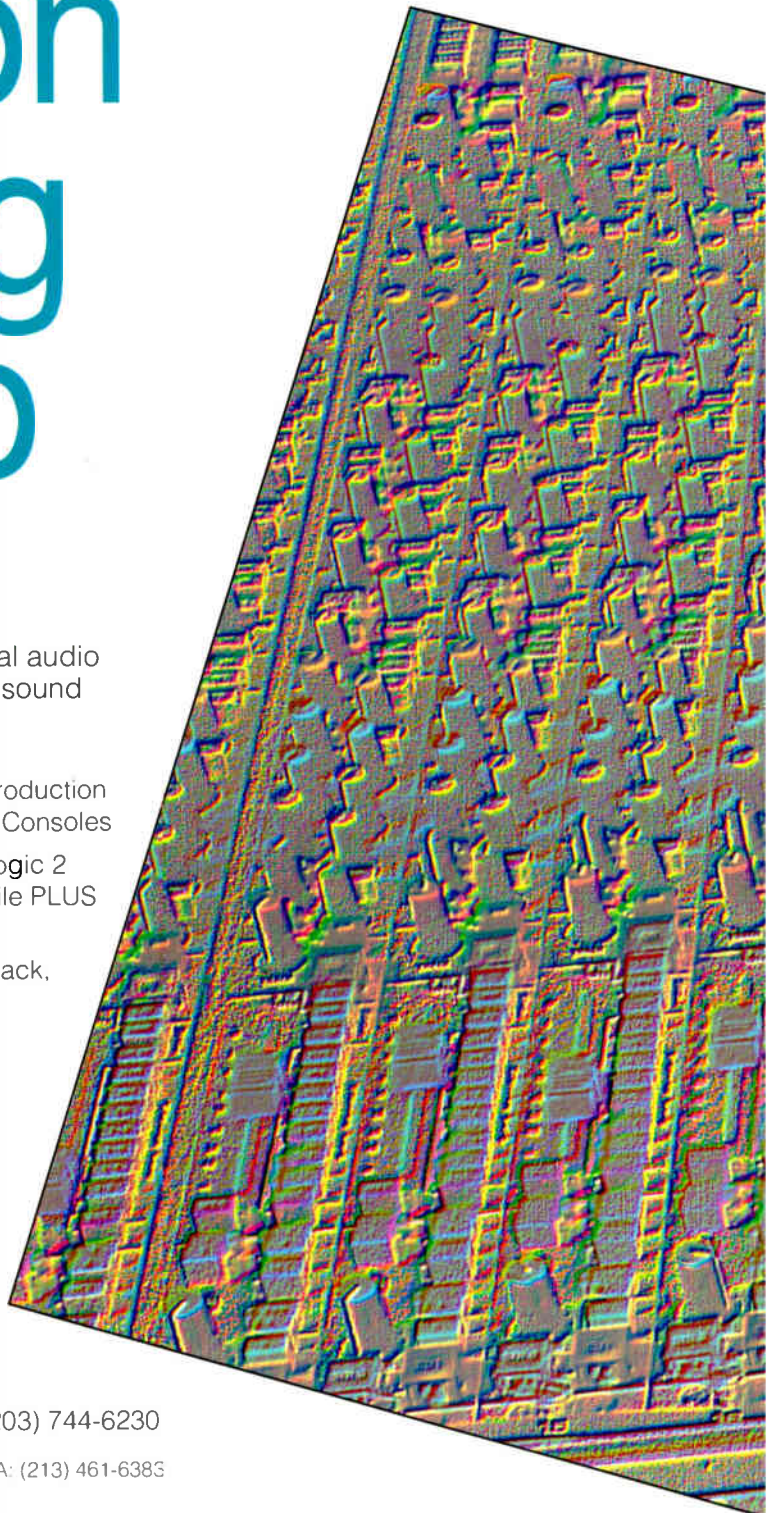
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MIX

PROFESSIONAL RECORDING • SOUND AND MUSIC PRODUCTION

JANUARY 1992, VOLUME 16, NUMBER 1

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Cover: Tom Petty & the Heartbreakers onstage during their fall '91 "Touring The Great Wide Open" tour. Sound was provided by Electrotec and featured their new LAB Q-2 loudspeaker array. Personnel included crew chief Chris East, house mixer Mark Deadman, monitor engineer Dave Bryson and set and lighting design by Jim Lenahan. **Photo:** Steve Jennings. **Inset Photo:** ©Walt Disney Pictures.



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FROM THE EDITOR

It sure is nice to get 1991 out of the way, isn't it? A bum economy that just wouldn't go away, war, drought, fires, you name it, it was a year that deserves to be over. So what do we have to look forward to in '92? With elections and the Olympics coming up, media production companies could very well get back into high gear after the slow times. Here's a toast to the long lost recovery.

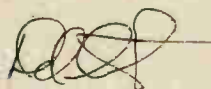
1992 will bring a few changes in the schedule here at *Mix* and I wanted to tell you about some of them. First of all, this January issue, for a change, features Sound Reinforcement and Remote Recording. We take a look at some of the latest technology in concert sound presentation and reproduction. February will be our Education issue this year, with our directory of recording schools and programs. Also featured in February will be European Pro Audio, since this is the issue that travels to the international AES Convention in Vienna.

Our March issue will look in on Northwest U.S. recording, with a special focus on project studios. Also coming in March will be our next Spanish language version of *Mix*, for Mexico and Central and South America. April will continue to be our Audio-for-Video issue, geared for the NAB Convention, and we will spotlight Northeast studios again in May. Also in May, we will be releasing the first issue of Live Sound, a special publication totally dedicated to the active and rapidly growing sound reinforcement world.


In June we'll look at studios of the Southeast and catch up on developments in the microphone world. And in July be sure to watch for our gala 15th anniversary issue, with a directory of Independent Engineers and Producers and a special supplement on The Digital Studio.

A few other *Mix* items will surface in early '92, including a book on today's hottest record producers and our first CD-ROM. We can't tell you much just yet about the CD-ROM, other than that it will be on the subject of Digital Audio, and that its contents will be of staggering depth and accessibility. For those of you contemplating adding a CD-ROM player to your arsenal, we think this disc will convince you that the time has truly arrived for multimedia.

Keep Reading,



David Schwartz
Editor-in-Chief

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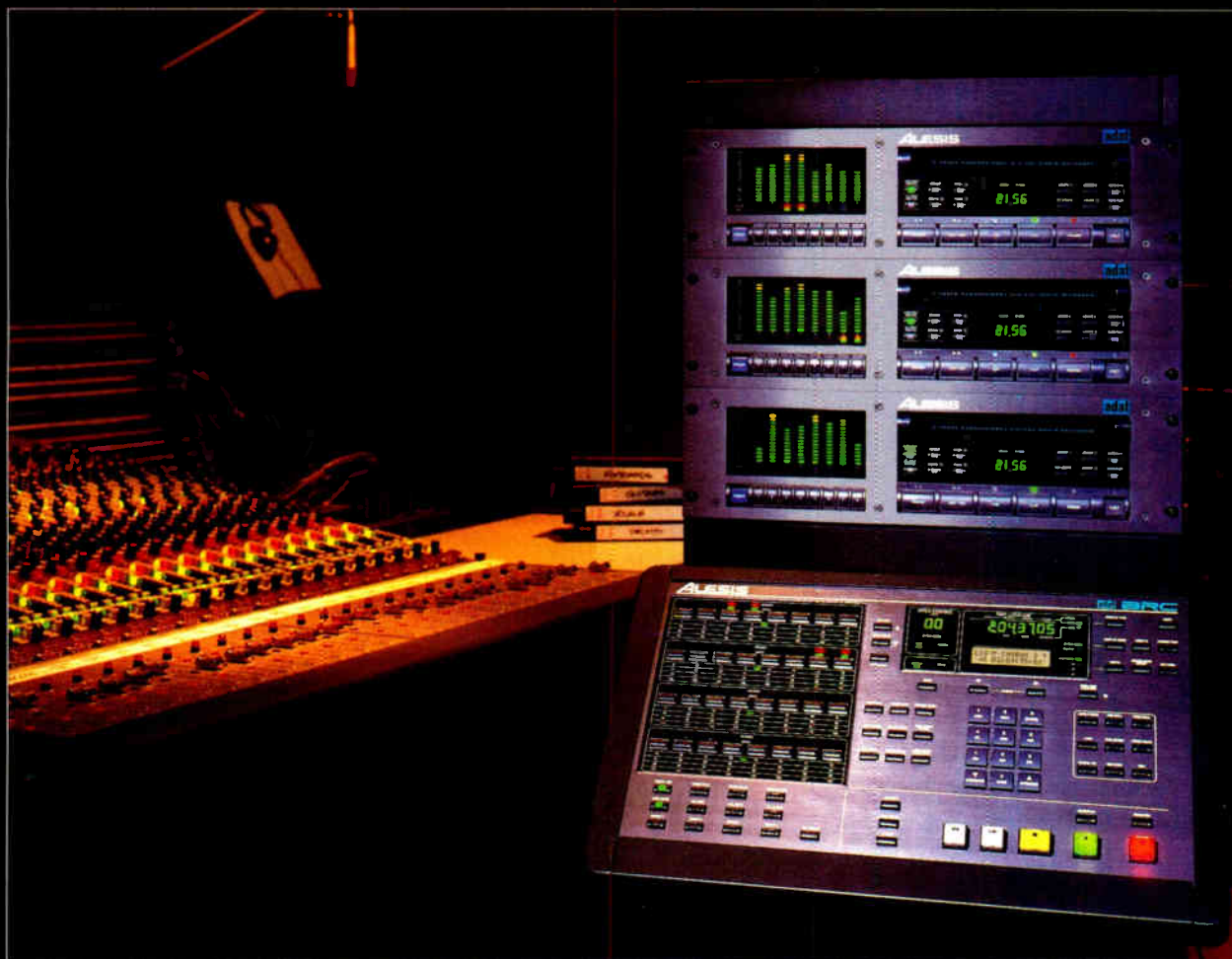
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CURRENT

SMPTE Report

Every trade show for the past few years has been inundated with digital audio workstations, and this winter's SMPTE, held October 26-29 in L.A., was no exception. There are probably more DAWs on the market than the industry can ever hope to sustain, and more than one person expressed concern about being able to distinguish the differences between them all.

Another trend evident at SMPTE is the move by MI recording manufacturers into the post-production arena, where the money is perceived to be. For example, Alesis made its first-ever SMPTE appearance, showing off its ADAT 8-track digital recorder.

Other SMPTE firsts were Amek's aptly named Media console, specifically for post applications, and Euphonix's second-generation CSII console with Total Automation, providing word processor-like flexibility for manipulating automation data.

Otari's DTR-90 DAT deck also made its debut at the show, hoping to replace cart machines in the broadcast industry. The DTR-90's Memory Start feature employs a RAM buffer for instantaneous playback of a cue. Also up the DAT alley is Fostex's PD-2, the first portable time code DAT, which some suggest might replace the venerable Nagra for location sound recording and effects gathering.

Neve/AMS (now Siemens Audio Inc.) demonstrated the Logic 2 all-digital console and Total Dynamic Automation, as well as two post-specific features for Flying Faders: Mix Conforming Window (for adapting audio easily to a new picture cut) and Multi Solo (for localizing a solo within a group).

Studer showed the D740 CD recorder, a sequential write-once system with integral subcode generation that allows one-off CD production, while over at the Fairlight booth, the MFX2 DAW could be heard playing back audio at its correct pitch in jog mode.

SSL's draws were the SL 8000 G console, Ultimotion automation and new features for ScreenSound. And Dolby saw interest in its 430 Series background noise suppressor (successor to the CAT43 single-ended NR) and SR•D 6-channel digital film sound system. SR•D has the advantage of analog and digital tracks on the same piece of film. A first release is expected in the summer.

—Amy Ziffer

Ads Against AIDS Rolls Out Winners

The advertising industry held a party at New York's Marriott Marquee on Nov. 6 to honor the winners and all the entrants of Ads Against AIDS, a coalition of advertising agencies conceived of by Bob Starr of DDB Needham. DDB organized a nationwide advertising competition to produce public service announcements to enhance AIDS awareness.

"A number of New York recording and post facilities generously lent their time, talent and expertise to this competition," said Don Hall, president of the nonprofit organization. Of over 1,000 entries received, 60 finalists were chosen and 15 winners were declared by a review board made up of top executives at some of the country's leading ad agencies.

Among the New York studios providing time were Sync Sound, East Side Film & Video, Post Perfect, Hip Pocket Recording and Back Pocket Recording Studios, the latter operated by music house Russo Grantham (which was among the competition winners with its audio for producer Rhoda Malamet of Wells, Rich Greene BDDP). "The great thing was that there was a real sense of generosity and volunteerism from the New York studio community," company president John Russo said. "Everyone worked together as a single entity toward fighting a common enemy."

—Dan Daley

Korg USA Opens Pro Audio Division

Korg USA, Westbury, N.Y., announced the formation of a new pro audio division dedicated to servicing studios, production facilities and audio-for-video post houses. Rod Revilock has been called upon to head up the marketing and product development for the new division. Joining him will be Dave Goldberg in New York and Mike Haprov in Canoga Park, Calif.

With the division in place, Korg also announced its first pro audio product, the SoundLink digital audio production system that debuted at AES. SoundLink combines an automated digital mixer with an 8-track hard disk recorder/editor providing 110 track-minutes of recording at 48 kHz.

Neve and AMS Merger

It is now official. The two North American divisions of the Siemens A/V Group of companies—Rupert Neve Inc. and AMS Industries Inc.—have announced their merger into a single company, Siemens Audio Inc.

Barry J. Roche has been named president of Siemens Audio Inc., Gerhard Gruber is executive vice president of sales, and John Gluck is executive vice president. Neve and AMS will continue to share the same corporate facility in Bethel, Conn., as well as regional sales offices, as they have since Siemens acquired AMS at the end of last year.

Convention Dates Announced

The big show this month is in Anaheim, where the National Association of Music Merchants will hold this year's NAMM exhibition, January 17-19 at the Anaheim Convention Center. Exhibitor space exceeds 350,000 square feet, and record crowds are expected, especially from those areas of the country affected by the closing of the summer show in Chicago. For more information, contact NAMM at (619) 438-8001.

October's Audio Engineering Soci-

INDUSTRY NOTES

Amek/TAC U.S. Operations appointed a new general manager, **Carl Reavey**. Reavey relocated from the company's Nottingham, England, office to its U.S. headquarters in North Hollywood, CA. Also in the States, **Lewis Frisch** was named regional sales manager. In an unrelated development, **Sue Jones** (previous U.S. operations manager) has left the company...The newly created position of executive vice president of marketing and sales at **JBL International** was filled by **Mark Terry**. In addition, **Rick Kamlet** was appointed product manager at **JBL Professional** (both branches are based in Northridge, CA)...**Jim Mercogliano** was promoted to vice president of Boulder, CO-based **WaveFrame**...**Fostex Corporation of America** in Norwalk, CA, hired **Robert Veri** as vice president and general manager and **David Oren** as vice president of marketing. **Audient Marketing Services** of Los Angeles was chosen to handle PR for Fostex's MI and pro audio products...**Otari** (Foster City, CA) reports the promotion of **Emil Handke** to national sales operational manager. Handke will directly supervise sales relationships between Otari and its dealers and customers. **Lee Pomerantz** moved from console products manager to export sales manager; **Roberta McKeehan** was appointed industrial products sales coordinator...**Solid State Logic's** L.A. office welcomed back **Dave Collie**; Collie was head of product development at the company's UK headquarters for the past three years and is now manager of Western operations...**TOA Electronics** formed an engineered sound management team to give product support from design and education through development and sales. Team members include **Chuck McGregor**, product applications consultant; **John Murray**, marketing development manager; and **Walter Best**, **Robert Slaughter** and **Bill Ford**, regional managers. Call the South San Francisco office

at (415) 588-2538 for more information...**Korg USA** (Westbury, NY) created a new pro audio division dedicated to servicing studios, production facilities and audio-for-video post houses...**Granite Partners Ltd.** acquired a majority interest in Lebanon, NH-based **New England Digital**. The investment team will help fund development of NED's **MultiArc**, a multi-user, multitasking workstation...**Michael P. Ciavola** was named production manager for **Eastern Acoustics Works** (Whitinsville, MA). EAW also welcomed senior design engineer **Michael Chamness**...**Bag End Loudspeaker Systems** promoted **James J. "Jay" Schwingel** to manager of production and services. He will work out of the company's Barrington, IL, headquarters. Bag End also chose **Michael Kropp & Associates** as its rep firm in Vermont, Maine, Massachusetts, Connecticut and Rhode Island; **Syncopated Marketing Technologies** will cover the Middle Atlantic region; and **Joseph L. Mazzeo Associates** is to handle upper New York state...**Casio's** electronic musical instrument division elected **Todd Ruhalter** its vice president of marketing. Call the Dover, NJ, headquarters at (201) 361-5400 for details...**Ed Bigger** is the new market support specialist at **Soundcraft** (Northridge, CA); in that position, he will spend time in the field assisting sales efforts, and he will also assist in training the company's reps and dealers...**Steven Strassberg Associates** of Manhasset Hills, NY, was chosen as the New York-area rep for Palo Alto, CA-based **Euphonix**...**Digital Audio Research** of Surrey, England, appointed **Audio Intervisual Design** [call (213) 469-4773] its U.S. West Coast rep...**Michael C. Treen** joins **Xymox Systems** of Granada Hills, CA, as its director of support services...**USCO Audio Engineering** (Hollywood) appointed **Sam Ash Pro Audio**, **Twenty First Century Limited** and **Audio Concept** as new dealers for USCO's line of reference loudspeakers. ■

—FROM PAGE 9, CURRENT

ety gathering was the best-attended AES convention to date, with more than 15,600 visitors passing through the New York Hilton. Dates have now been announced for 1992: the 92nd AES Convention will be held March 24-27 at the Austria Center in Vienna, the 93rd will be held in San Francisco for the first time, October 1-4 at the Moscone Center. Call the AES at (212) 661-8528 for more details.

The Association of Professional Recording Services will host APRS 92, an international exhibition of sound recording equipment and services, June 3-5, 1992, at Olympia 2 in London. For information, contact the APRS U.K. offices at 011-44-734-756218 or fax 011-44-734-756216.

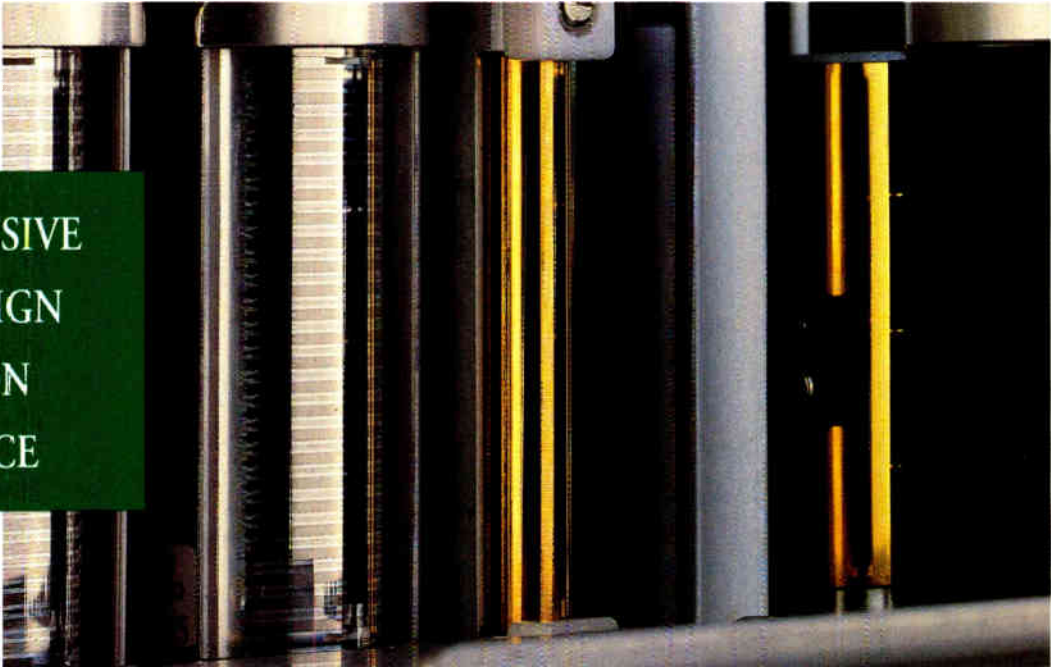
The National Sound & Communications Association will host the NSCA Contractors Expo '92 at the Anaheim Convention Center, April 27-29, 1992. Contact NSCA Headquarters at (708) 598-7070 or (800) 446-6722.

Corrections

The Sound Reinforcement New Products section in our September issue stated that Tech Tape™ was a Coe-Weiser product; the tape is actually manufactured by Specialty Tapes of Racine, Wis., (414) 634-6688. Also, the SKB line of ATA rack cases in that same section are available through the SKB Sales Headquarters at (817) 847-5400.

A photo caption in our October issue identified Suzanne Ciani and Peter Kelsey—working on Roland's RSS System—at Skyline Studios in New York City. In fact, they were working at Topanga Skyline Recording in Topanga Park, Calif.

In our November top-of-the-line console report, we identified Capitol Studios employee Jeff Minnich as the director of operations; Jeff is the facility's chief engineer. Also, in the November directory of Canadian studios, we misspelled the name of Vancouver Studios' studio manager. The correct spelling is R.H. (Ray) Gagliardi. ■



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by Ken C. Pohlmann

LOW-BIT A/D CONVERSION

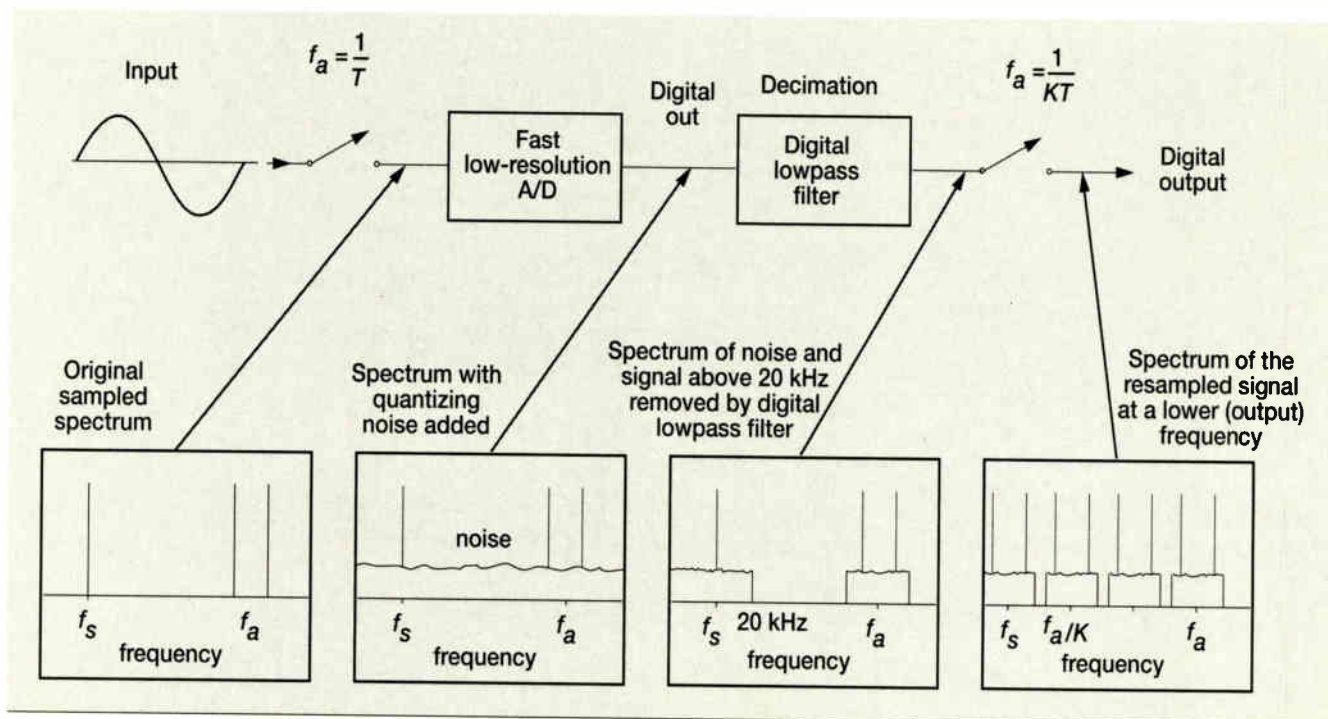
PART I

Successive approximation A/D converters—either directly or through associated circuitry such as brick wall filters—can add distortion to the audio signal. To decrease distortion, the linearity of the conversion process must be increased. One way to accomplish this is to increase the relative accuracy of the conversion by increasing word length. This can improve performance, but the brick wall filters still present problems, and resolution is generally constrained to 16 bits. Thus, a variety of oversampling A/D converters using low-bit architectures have been introduced, with particular emphasis on sigma-delta techniques.

Sigma-delta modulation (SDM) was developed to overcome the limitations of delta modulation. Like PCM, SDM quantizes the signal directly, and not the signal's derivative, as in delta

modulation. Thus, the maximum quantizer range is determined by the maximum signal amplitude and is not dependent on signal spectrum. However, as in delta modulation, very high oversampling rates can be used to produce a low-bit quantized code. The input to an SDM quantizer is the integral of the difference between the input and the quantized output. This integrator forms a lowpass filter on the difference signal, providing low-frequency feedback around the quantizer. This feedback results in a reduction of quantization noise at low (in-band) frequencies, shaped by a highpass characteristic. Only a lowpass filter is required to decode the signal, to remove high (out-of-band) frequency noise and produce an analog waveform. Quantization noise is highly correlated in a first-order SDM.

Fig 1 The A/D Process



PERESTROIKA

50 Years Ago . . .

Allied war planes laid siege to Berlin forcing Georg Neumann and his company to flee for their lives. They set up shop in a small town far from the bombing and, once again, started production. But history would again overtake them. They were inside the Eastern Block and the Iron Curtain was soon to fall.

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More effective noise shaping can be achieved with high-order SDM coders.

Some converter architectures use several first- or second-order coders in combination to achieve higher order, stable noise shaping. Instead of a 1-bit code, they may produce a low-bit word of three or four bits. Dynamic range can be increased according to the resolution of the quantizer. Because the output is proportional to the signal's amplitude rather than slope, it is like a PCM converter. However, unlike a conventional PCM converter, the noise floor rises with increasing frequency. In short, this is a low-bit, noise-shaping A/D converter.

The real potential in low-bit oversampling converters lies in improved converter linearity specifications,

between the analog input and the digital output, but by making the error occur more often. In this way, the error spectrum extends beyond the pass-band of interest. Although total noise power is high, in-band noise power is low. The high bit rate is reduced to more manageable rates through decimation. Decimation may be described through a simple example. Sixteen 1-bit values could be reduced through a 16:1 decimation to a single low-bit value; for example, values 1, 0, 1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 1, 0, 0 would be decimated to 7/16, or 0.4375. Because there is only one (low-bit) output value for every 16 input values, the decimator has decreased the sample rate by 16:1.

A diagram of the A/D process is shown in Fig. 1 (from Adams). The input signal is first passed through a

moves the frequency components outside the audio band to prevent aliasing between the audio signals and the resulting sampling rate. This would occur when the output of the digital filter is resampled (undersampled) at the system's sampling rate. An analog lowpass filter is required at the input to remove the frequency components that cannot be removed by the digital filter; however, because the preliminary sampling rate is high, the analog lowpass filter is low order.

Several sigma-delta methods have been applied to A/D conversion, all using high-input sample rate and noise shaping to increase coder resolution: single and dual integrator loops, cascading of first-order sigma-delta loops, and low-bit quantizers with loop filters. The first two methods use true 1-bit coders with inherent linearity. The

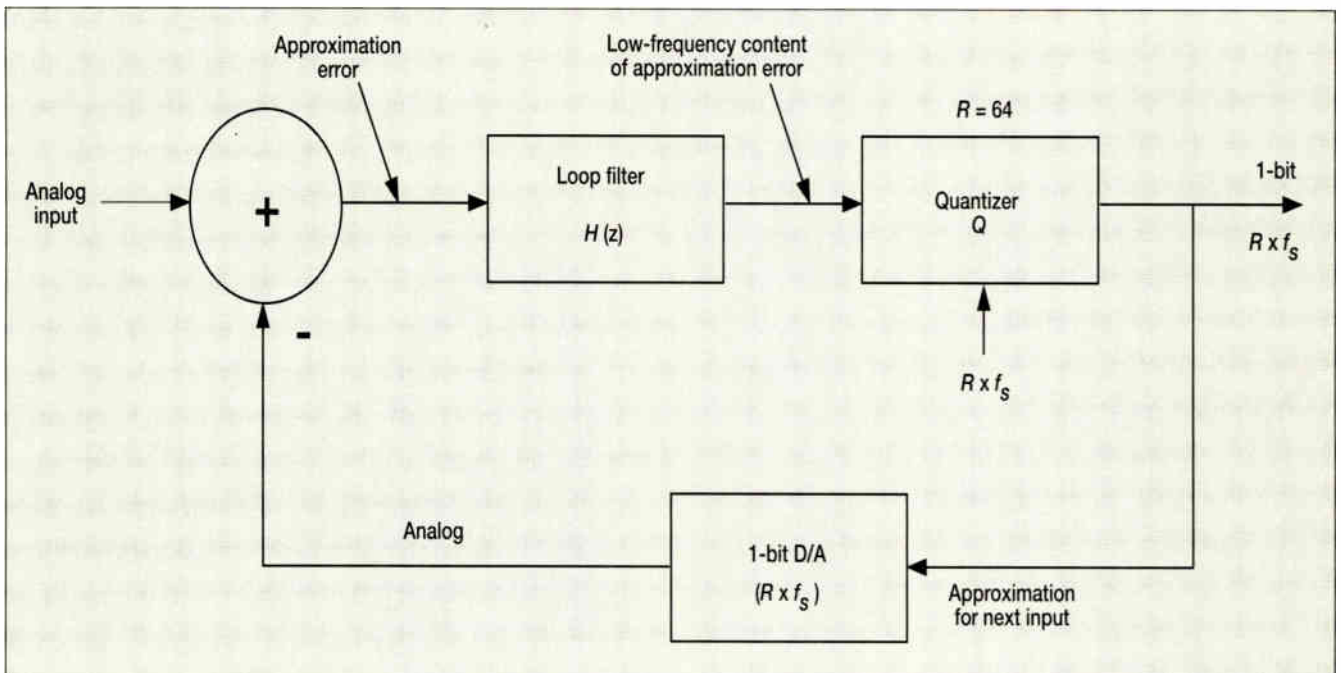


Fig. 2: Sigma-Delta Modulator

yielding extremely low distortion, even at very low amplitudes. These A/D designs use a very high initial sampling rate, and take advantage of that high rate by using low-bit intermediate coding of the audio signal. Sigma-delta modulators are increasingly used in this application.

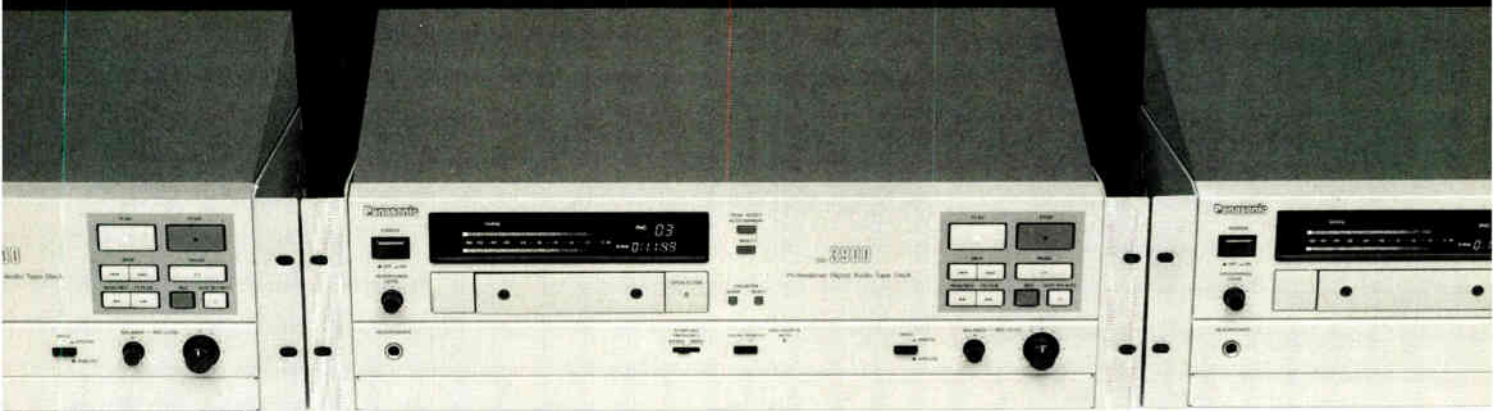
As R. W. Adams has pointed out in his technical paper "Design and Implementation of an Audio 18-bit Analog-to-Digital Converter Using Oversampling Techniques" (*Journal of the Audio Engineering Society*, March '86), oversampling converters provide high resolution not by decreasing the error

simple analog anti-aliasing filter, and the input signal is sampled at a fast rate of $1/T$ to extend the Nyquist frequency. The signal is applied to a coarse quantizer, which adds noise to the signal. The digital data is lowpass-filtered with a cutoff at the Nyquist frequency; this removes out-of-band noise components and serves as the converter's anti-aliasing filter. Finally, the signal is resampled at a rate lower than $1/T$ (e.g., 44.1 or 48 kHz) for storage or processing.

In oversampling A/D conversion, the digital filter is a decimating filter operating as a lowpass device. It re-

third method uses several bits, and noise is reduced in proportion to the number of quantizer levels used. However, the converter's linearity depends on the linearity of the quantizer. In any case, noise performance hinges on the oversampling rate and order of noise shaping employed.

A sigma-delta modulator can be used to create the low-bit coding from the lowpass-filtered analog signal. A sigma-delta modulator is shown in Fig. 2. A low-resolution (1-bit quantizer) D/A converter operating at a high sampling rate is placed in a feedback loop. High resolution (manifested as



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dynamic range) is achieved through noise shaping. This transfer function is essentially a highpass filter; noise is thus shifted to a higher frequency. Due to the high sampling rate of the input, a brick wall filter is not required and a simple one-pole RC filter would suffice.

Depending on its order and design, an SDM feedback loop generally consists of the following operations: subtraction of output from input to find the approximation error, filtering to extract the low-frequency content of the ap-

proximation error, 1-bit D/A conversion of the output code into a signal to subtract it from input analog signal, and quantization to output a 1-bit approximation for the next input sample. In practice, a third-order SDM can be used to shape the noise toward higher frequencies, where it is removed by the subsequent decimation (undersampling) filter. The quantization noise at low (in-band) frequencies is attenuated. The SDM feedback loop thus shapes the noise from the quantizer. The high frequency (out-of-band) noise is suppressed by the digital decimation filter following the SDM.

The decimation process lowpass filters the signal and noise in the 1-bit code, band-limiting the 1-bit code prior to sample-rate reduction to remove alias components. Decimation also replaces the 1-bit coding with 16-bit coding, providing a lower sampling rate and generating a PCM output. The Nyquist criterion must be observed to prevent the rising signal spectrum from aliasing with the input spectrum. However, only certain portions of the spectrum would alias into the audio band, therefore the decimation filter need only attenuate those frequency bands. The decimation filter can be designed so that its frequencies of maximum attenuation will coincide with the potentially aliasing frequencies.

Consider an example in which 1-bit coding takes place at $64 \times 44.1 \text{ kHz} = 2.8224 \text{ MHz}$. The decimating filter may have two stages. With a $64 \times f_s$ input bit-stream, the first stage may generate a multibit output sample at a sample rate of $2 \times f_s$. The second stage of the decimation filter may use a multibit multiplier with convolution performed at the output sample rate of f_s . In all, the decimating filter provides a stopband from 20 kHz to the half-sampling frequency of 1.4112 MHz. The analog filter at the system's input is modest, insuring phase linearity in the audio band.

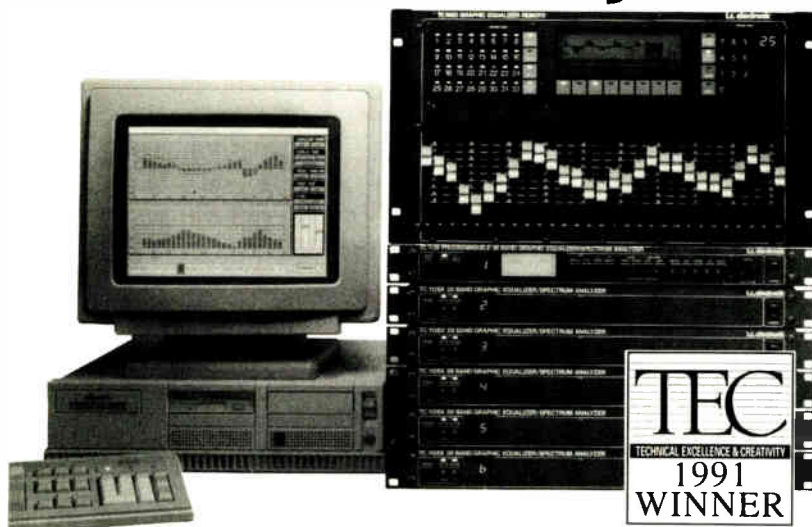
The use of 1-bit coding as the intermediate phase of A/D conversion simplifies the filter design; a new output sample is not required for every input bit. For example, a decimation factor of 64 means an output is required only for every 64 input bits. In practice, the decimation filtering might be carried out in two stages. An FIR filter would commonly be used for down-sampling, because its nonrecursive operation would simplify computation to one sample every $1/f_s$ second. Following decimation, the result may be rounded to 16 bits and output at a 44.1 or 48kHz sampling rate.

Next month we'll examine the inner workings of two sigma-delta A/D converter chip sets.

[This material is adapted from *Advanced Digital Audio*, a new book edited and co-authored by Ken Pohlmann, and available from the *Mix Bookshelf*. ■

Ken Pohlmann is a professor of music, and director of Music Engineering at the University of Miami.

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by Stephen St. Croix

PARTY ON

Party hats. A few columns ago I mentioned them. For decades I have been living with them. Using them, fighting with them, trying out all the cool new ones whenever they come out.

The concept itself still amazes me. I mean, who actually *thought* of this scheme? Well, I know who thought of it, but what would possess someone to *try* it?

Let's see. Maybe it was Halloween. Those tall pointy witch's hats were everywhere.

Perhaps Frederico Speecari (we'll use an alias to protect the privacy of the inventor's surviving heirs) was scoping out the costumes that night, mesmerized by the variety of these semi-rigid black satin cones on the heads of trick-or-treaters parading by his window.

The next day, when he went out to pick up a couple of 78s, he came across one of these hats on the road, flattened to a shallow cone. He leaned over and

grabbed it as he passed, an idea that we would all end up living with beginning to form in his head.

By now he had collected more than 300 78s, but, like everyone else, he had no good way to play them. The large mechanical horns *du jour* sounded worse than AM, and their heavy steel needles wore out a platter in a few plays.

Freddie had a few coils of wire laying about from some earlier experiments with faster-than-light mu meson particle accelerators and magnetic bottle plasma containment fields. For some reason he decided to glue one of these coils to the pointed end of his newly acquired flattened party hat and stick a magnet inside the coil so that it would repel and force the hat to move when electricity was applied. It was so ugly when he was through that he decided to put it in a box.

He took another coil of wire and

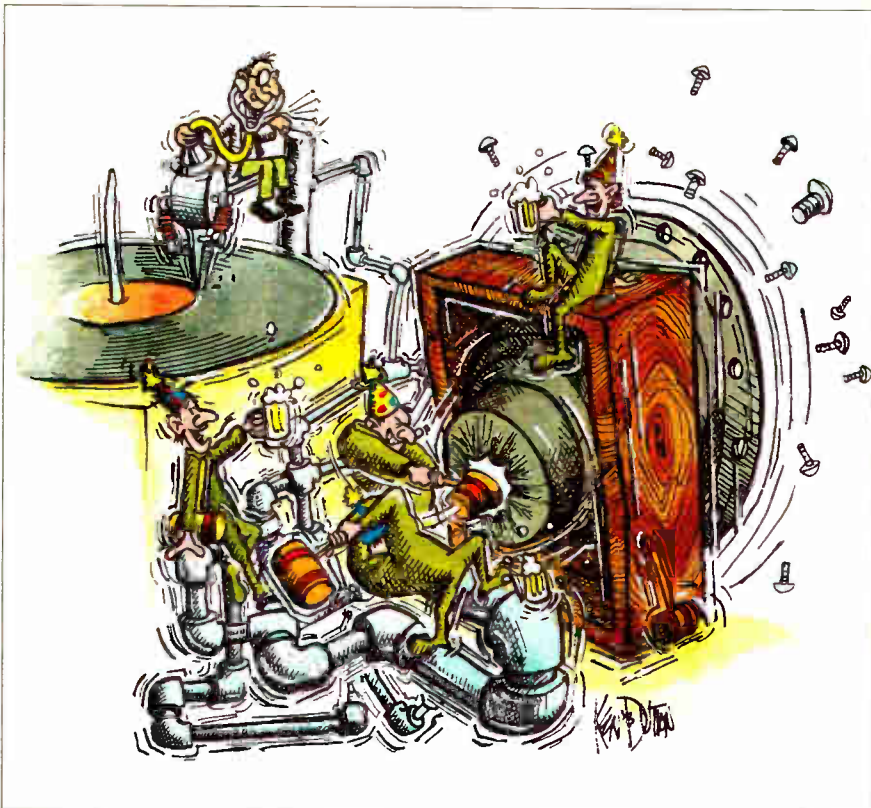


ILLUSTRATION: KEN DUTTON

placed it around a smaller magnet, which he had glued to a steel needle. He used one of his accelerator driver amps to get the current he needed to drive the hat, and...the rest, as they say in Jamaica, is his story.

The flattened party hat with the coil glued to it became instantly popular and rocketed Federico Speecari to instant fame. In fact, the device was named after him, and in English became known as the "speaker." To date, it remains traditionally as black as the original witch's hat.

What a playback chain! A mechanical needle, moving a magnet, generating a current in a coil, amplified electrically, driving another generator backward, moving its coil, thereby vibrating the attached hat (in a box). Nice.

It *must* have been nice, since absolutely nothing changed for about six decades.

Then, finally, the front end evolved. Reflective, non-destructive laser technology replaced the destructive dragging of a hard needle across the me-

chanical wiggles on the surface of a soft vinyl disc.

But...But...We *still* listen to this wonderful new digital technology through the same flattened party hats! What's going on here?

There have been some rather interesting and occasionally innovative attempts to evolve the state-of-the-hat in recent decades.

A major Japanese company once had a very intriguing direct-drive digital piston transducer prototype, four motors per rectangular-honeycomb aluminum piston.

Apparently, it sent raw, unfiltered digital data *directly* to the driver motors, which were actually sort of specialized stepper motors. Each had 16 different windings, one for each bit. That's it. It was that simple. The winding for the MSB was huge, and the LSB winding was a tiny token loop. The clock rate was very high, and they simply let the mass of the driver and the inductance of the motor windings do the filtering. Quite clever.

They directly switched each bit full-

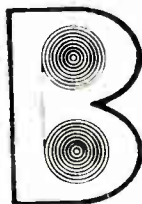
on when it was high, so there were no inefficient, heat-producing, linear driver stages at all—just ultra-fast, cool-running, digital power switching transistors (the power amps were built into the speaker cabinets). Each box had an analog input and contained an A/D converter as the only analog electronics. Even the power supply was a digital switcher that locked to the data master clock. Very impressive. I had a pair here for two weeks, and in spite of the truly dismal state-of-the-art for A/D converters at the time, these things sounded great!

At least two companies that I know of have tried true plasma speakers. These devices shred normal matter and produce a new state: plasma, kind of like the inside of a star. Since the mass of this stuff is, well, insignificant at most, and since it reacts to magnetic fields, it theoretically can be the perfect speaker diaphragm. The problem is that the stuff doesn't want to exist in our world, and constantly generating enough to use as a speaker uses massive power, generates considerable



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noise and heat, and generally sprays the immediate area with enough broadband radiation to snow every TV on the block and let you check on how your wife's broken arm is healing just by holding a roll of film up behind it.

So, there came to be several "faux-plasma" systems, using ionized flame. They do tweet, but they're pretty beat. I don't have any in *my* car.

Then came high-quality planar electrostatics with very low mass, no box, impressively clear and transparent sound. But it was still not possible to move enough air for low frequencies at respectable volume, so they all require conventional party hat subwoofers even now.

Then magnetic (printed coil) planar speakers. A little more bottom, but not as clean or defined. It *is*, by the way, one excellent way to do earphones.

Then there were PolyPlanars (cheap styrofoam speakers that were meant to hang on your wall behind paintings)—graduation hats. They sounded exactly like you would think.

They were, however, absolutely great for wars. You wired them directly

to the 110-volt AC socket via a hand-held switch, and when your opponent came within range, you simply held the speaker up, aimed the flat diaphragm and hit the switch. It would produce a very satisfying bang, an impressive cloud of smoke, and send



the voice coil across the room with remarkable efficiency. And then it would snow styrofoam. And then your boss would walk in.

One thing you learned early on was to be very sure that you had the polarity correct. The first time you get a

PolyPlanar voice coil in the chest or face at 100 miles an hour from 18 inches away teaches you that.

Then came solid pistons (top hats), ferrofluid-coupled drivers (wet hats), curvilinear diaphragms (bowlers), and even honeycomb graphite, carbon fiber, Kevlar, Nomex styrofoam core curvilinears (crash helmets).

Finally, extreme measures were taken in the form of electronic assistance. Remote-sensing, servo-corrected, closed-loop systems, time alignment, phase alignment, Zobel inductance compensation networks, resonance compensation networks, dynamic EQ, compression, limiting and more.

So, the bottom line is: Why are we stuck here? Isn't it time we moved on to the next step? Somebody *please* help.

If any of you know what to do, please grab your hat and speak up! We can't let Speecari get away with this party joke forever! ■

Stephen St. Croix has spent his adult life learning monitors. He really wanted to be a lifeguard in Santa Monica, but he couldn't do both.

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ASHLY

by Mel Lambert

DIGITAL AUDIO I/O

AES3 REVISED AND ENHANCED

It is the fundamental duty of any audio columnist to stay fully up to date with the changes that permeate our industry. In the past, these developments have been governed by advances in analog chip design and slowly evolving multitrack recording and production techniques. With digital-based technologies, however, the rapid acceptance of random-access recording and editing systems, processors, mixers and workstations is placing additional strains on technical departments.

In many ways, the problems are related to a fundamental lack of information about such simple concepts as digital interfacing, system design and other day-to-day operational considerations. To help overcome such difficulties, during the coming year I plan to devote this column to a series of digital topics. And for the July special issue of *Mix*, which will spotlight "The Digital Studio," I'm gathering a series of articles that focus on the myriad technical and operational parameters important to today's digitally conscious facility.

For this, the first installment in my "Digital Sojourn," I'd like to look at the recent changes to the AES3 Digital Interface Standard. It is of primary importance that users of digital recorders, processors, consoles and workstations can reliably exchange data with one another. While it would be feasible for some digital hardware to connect via standard data highways and backplane architectures, in the real world this is impractical. These internal digital bitstreams need to be converted to a more robust version for the passage from one device to another, or via several hundred feet of cable from one end of a multiroom production complex to the other.

Various interface formats have been developed during the past several years, including PCM-F1, Sony SDIF-2 (Sony PCM-1610/1630), ProDigital

A/B/C-Dub (Mitsubishi and Otari stereo/multitracks), Yamaha Digital Cascade, S/PDIF (plus EIAJ CP-340 Type II and its variants) plus MADI (Multi-Channel Audio Digital Interface). Today, however, the AES/EBU-format I/O is *the* interface of choice for just about every component in the all-digital studio.

The AES/EBU Digital Interface—described in the AES Recommended Practice for Digital Audio Engineering

Expectations of what a

truly versatile interface

should achieve have

expanded greatly—upgrades

and enhancements have

become a natural

and inevitable

way of life.

document, "AES3-1985: Serial Transmission Format for Linearly Represented Digital Audio Data"—defines a way to connect two channels of 24-bit digital audio at sampling rates of up to 48 kHz, along with accompanying Validity, User, Channel Status and

Parity Data. The data is biphase-encoded, which enables the receiving device to extract a clock signal from the bitstream. Also, three defined preambles violate the biphase encoding scheme and provide accurately defined sample and block boundaries (in essence, the start of Channel A, Channel B, and the beginning of a 192-sample Channel Status block).

AES3-1985 specifies the use of shielded, twisted-pair cable for distances up to 300 feet without equalization, via three-pin XL-type connectors configured to IEC 268-12, and carrying balanced, RS422-compatible signals. Depending on cable selection and termination, up to four receivers (110 ohms output impedance) can be connected across the interconnecting cable from a single transmitter (nominal impedance of 250 ohms).

Digital I/Os configured to the AES3-1985 recommended practice are referred to as the AES/EBU-Format. (In Europe, the European Broadcasting Union has republished the document; the result is identical to AES3-1985, apart from the specified use of transformer-coupled inputs and outputs.)

Despite the groundbreaking work of the AES Working Group on Digital Audio Interfacing, chaired by Robert Finger of Matsushita Electric Corporation, the requirements of digital manufacturers and users have changed since the recommended practice was published. With a few important exceptions, the AES/EBU format has proved extremely reliable within the majority of applications. However, there are several operational areas where the original AES3 Recommended Practice called for improvement.

In June 1991, the AES Working Group responded to this need with the release of a new draft for publication within the *Journal of The Audio Engineering Society*. After a six-month period for comment and industry feedback, the document will be ratified as the new 2-channel AES3-199X Recommended Practice. (The "199X" designation will become either 1991 or 1992, depending on when it is accepted formally by the AES.)

Quoting from its foreword, the AES3-199X revision is designed to "simplify and clarify language, improve electrical performance, minimize confusion with IEC 958 'con-

sumer use' specifications, allocate certain previously reserved bits to new applications, and improve compatibility by improving uniformity of transmitter implementation in regards to validity, use, channel status and parity bits."

These revisions need to be seen as an enhancement rather than a criticism of the original AES document. During the six years since its drafting and ratification, the AES I/O format has simplified the often perplexing practice of connecting two channels of digital audio between different devices. Expectations of what a truly versatile interface should achieve have expanded greatly—including the transmission of non-audio data. Thus, upgrades and enhancements become a natural and inevitable way of life.

The new AES3-199X Recommended Practice provides more specific definitions of 16-, 20- and 24-bit data transfers, together with techniques for designating any unassigned bits as auxiliary data (and maybe even a reduced-bandwidth cueing or talkback channel). Stereo, mono and primary/secondary transmissions are also redefined to allow mixed use of the interface.

Now that synchronization of digital equipment is becoming such a hot topic—an area I'll cover in greater detail in the March issue—various data within the AES3-199X I/O format's Channel Status area are now defined to signify the stability of a transmitter's sampling/clock frequency—Grade 1, 2 or "unspecified." Such designations will allow following equipment—master recorders, for example—to identify the stability (or instability) of digital source and its reliability as a word-clock synchronization source.

Other bits within the Channel Status block include a special alphanumeric data channel, which might be used to label the source of a digital bitstream. (This information could prove useful for automatically identifying the source and intended destination of signals passing between studios in a multi-room post facility, or to/from external locations during a complex remote broadcast.)

Also defined within the Channel Status block are bytes that can be used to carry a time-of-day sample address code. Such information might be laid down as part of the original recording and remain unchanged during subsequent re-recording and/or processing.

One application might be to identify the stop/start times of various digital sources, for example, or for cueing and ID purposes.

There is one major area in which the new AES3-199X I/O format has moved forward dramatically. Now, instead of a single, default implementation, the Recommended Practice defines *three* Levels of Interface Implementation, which will indicate to receiving units the *exact* nature of important data being carried across the digital port. Definitions of "Minimum," "Standard" and "Enhanced Implementation" establish a basic amount of information that needs to be carried within the data-stream. Such designations will remove a great deal of ambiguity from current AES/EBU-format interfaces. (Simply setting undefined data to zero can cause confusion if these bits really *ought* to be carrying zero information; the new AES3-199X I/O format clarifies these potential misunderstandings.)

Confusion can also result from the type of cables that should be used for digital connections. Where the original Recommended Practice specified a balanced output impedance of 110 ohms and an input impedance of 250 ohms (to allow a 4:1 fanout), the new proposal calls for *matching* 110-ohm impedances over the operating frequency range of 100 kHz to 6 MHz, and single transmitter/receiver configurations. And although several industry worthies have suggested the use of video-style BNCs and 75-ohm source and terminating loads—or even fiber-optics—the new AES3-199X format retains the original three-pin, male/female XLR connectors. Good-quality, 110-ohm, twisted-pair cable is available from several suppliers and is preferred to conventional mic cable.

The various enhancements contained within the revised AES3-199X will go a long way toward providing simplified, reliable techniques for interfacing various components.

Next month's "Juxtapositions" will feature more insider information about AES/EBU and "consumer-grade" digital I/O; why they may not communicate with one another; and future implications of the new AES3-199X Recommended Practice. ■

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

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**ERIC CLAPTON'S
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When Russ Titelman was looking for a remote recording company for Eric Clapton's recently released, double live CD, *24*

Nights, he asked fellow producer Hugh Padgham for advice. Titelman needed an outfit that could handle Clapton's four different band configurations in a concert space that has been called "an acoustical nightmare"—London's Royal Albert Hall. To make things even tougher, one configuration featured an orchestra that would have to be heard over a nine-piece rock band playing full-out. The February and March 1991 Royal Albert Hall concerts were the culmination of a massive world tour of sold-out performances in England, Europe, the Americas, the Far East and Australia.

As an alternative to conventional truck-based mobiles, Padgham suggested Effanel Music. Having mixed tracks recorded in a Manhattan apartment by Effanel for Suzanne Vega's

Days of Open Hand LP, Padgham knew the quality of their work firsthand. Padgham also told Titelman of Effanel's versatility in recording the Amnesty International concerts in Argentina and Chile. Padgham added, "They pack it up and take it over, and they're excellent at it."

Effanel has been taking its Porta-48 system to remote places for more than ten years. From a summer cottage in Maine to a Manhattan apartment, to a stadium in Santiago and even the crater of a volcano in Athens, Effanel has provided 24- and 48-track recording for Sting, Peter Gabriel, Bruce Springsteen, Tina Turner, the Rolling Stones, Sinéad O'Connor and Paul Simon, among others. Along the way, Effanel has

become one of the most respected remote companies in the business.

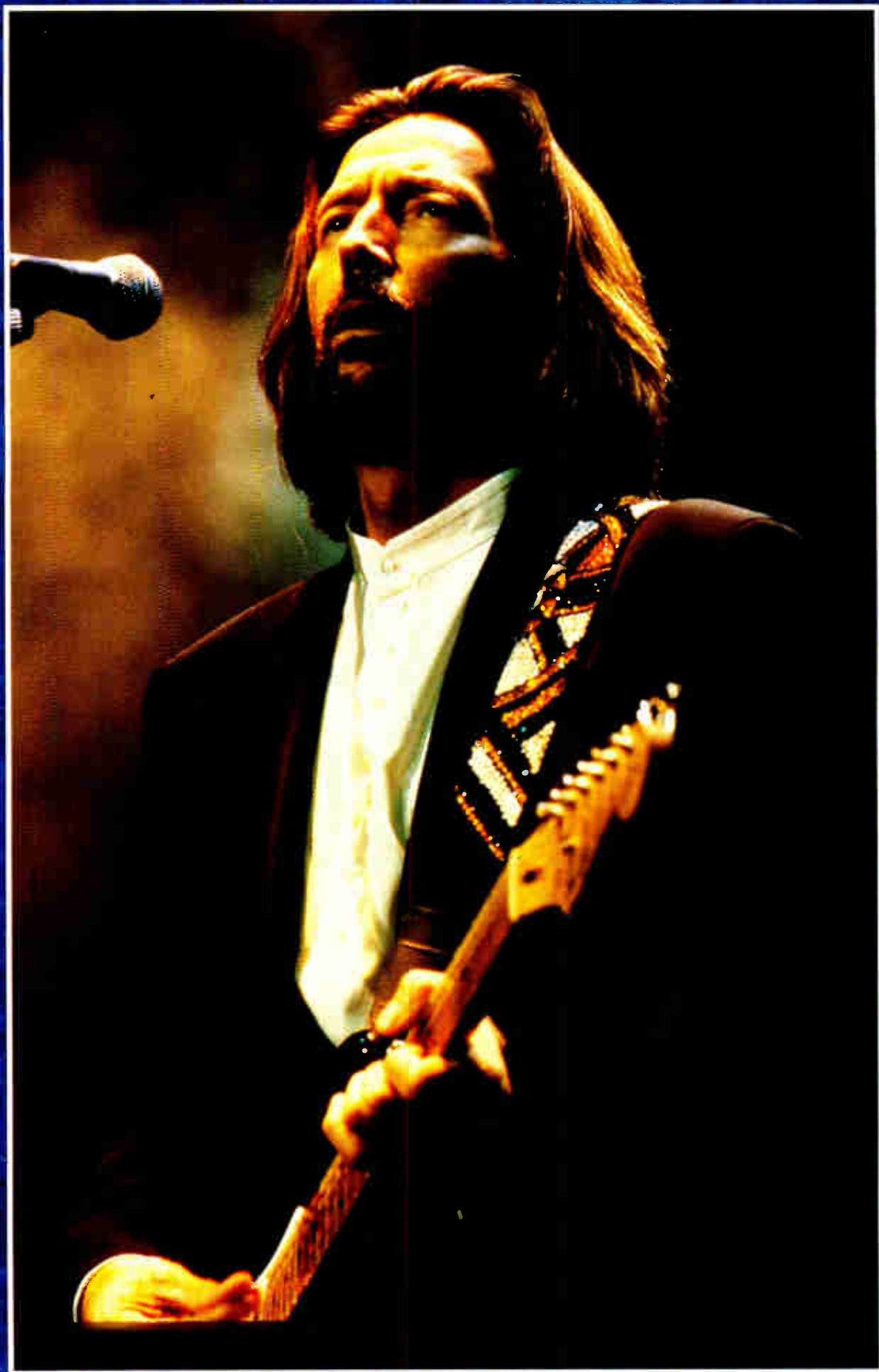
The primary components of the Porta-48 system are twin Sony PCM-3348 48-track digital recorders. "The key to the system, however, is the 48 Hardy M-1 microphone preamplifier," explains Effanel engineer John Harris. This component facilitates onstage placement—ahead of signal-degrading snakes—of first-rate, discrete amplification. Line-level audio is then injected straight to tape or processed as needed. RF problems associated with long mic runs are eliminated. Producer Titelman agrees: "The clarity is unbelievable. The quality is the highest. I don't know why everybody doesn't use it. It's expensive, but it's worth it."

The portable system does not rely on placement and installation in a truck but can be set up anywhere. Everything can be broken into racks and pieces in any configuration that can be as-

BY PATTI GANDOLFINI

TOP PHOTO: ROMILLY LOCKYER
PHOTO AT RIGHT: CARL STUDNA

World Radio History



sembled, reassembled and shipped with a minimum of fuss. The only piece of equipment that is not totally portable is the SSL G Series console. It's permanently installed in Effanel's 48-foot trailer, which travels coast to coast from its home garage in the Chelsea neighborhood in NYC. But even that is not a hard-and-fast rule since the trailer recently returned from Jamaica for the recording of Ziggy Marley's latest album. Says Harris, "Anywhere an airplane flies, we can go."

For the Clapton project, Effanel recorded "every note for six weeks," providing producer Titelman and

mixing engineer Alex Haas with 65 hours of tape. This was not the first attempt to record Clapton at Albert Hall. According to Titelman, "We did it the year before, recording only four shows. It's a little more expensive to record every night, but it's certainly the best way, because you get everything. It's sort of a shame when a night goes by and there are two or three things that are played better than they've ever been played, and you're not recording it."

"You never would know the show was being recorded," says Ian Craigie, Harris' assistant. Harris, Craigie and producer Titelman were hidden away

under the Albert Hall stage in a dressing room. "We were an integral part of the show rather than an interference or a distraction from the performance. They probably even forgot about us after a while."

During the 24 shows, four different productions were recorded: a four-piece with Clapton, Nathan East, Greg Phillinganes, and Phil Collins and Steve Ferrone switching places; a nine-piece big band with Clapton, East, Ferrone, Phillinganes, Chuck Leavell, Phil Palmer, Katie Kisson, and Tessa Niles; a blues band with Clapton, Leavell, Albert Collins, Robert Cray, Buddy Guy, Johnnie Johnson, Jamie Oldaker, Jerry Portnoy, Joey Spampinato and Jimmy Vaughan; and the 72-piece National Philharmonic Orchestra, conducted by Michael Kamen, performing with the nine-piece.

"As you might guess, we didn't fill all 48 tracks with the four-piece, but by the time we got to the orchestra we had to smash 130-plus inputs onto the 48 tracks," says Harris. "Wherever viable, mics were run to the preamps on the shortest leads possible, then straight to tape. Where groups had to be made, Effanel's new custom summing bus system was used. With the concept in place, the first 18 shows were relatively easy. We set up a 'big picture' master plan for the orchestra in advance and fit the first three segments within that framework. The tracks were laid out so that, for example, the bass track would always be the bass, and Eric's guitar track would be Eric's guitar for each configuration.

"Obviously, recording the orchestra with the nine-piece was the main challenge," Harris continues. "The nine-piece was reset and the orchestra had to be tracked with a substantially loud rock band nestled in the middle. The drums were isolated by surrounding them with a Plexiglas wall. We recorded the orchestra classically when the orchestra was featured and the band was quiet or silent, using sectional miking techniques. But when the band joined in, those mics would have to be given some help. Close miking for brass, woodwinds, etc., would have worked for this task, but strings were another matter. Robert Collins, Clapton's house sound man, came up with contact pickups for strings made for concert sound that sounded great—something that traditionally sounds only passable at best. At the top of the orchestra track, we used sectional and ambient mics and only brought in the

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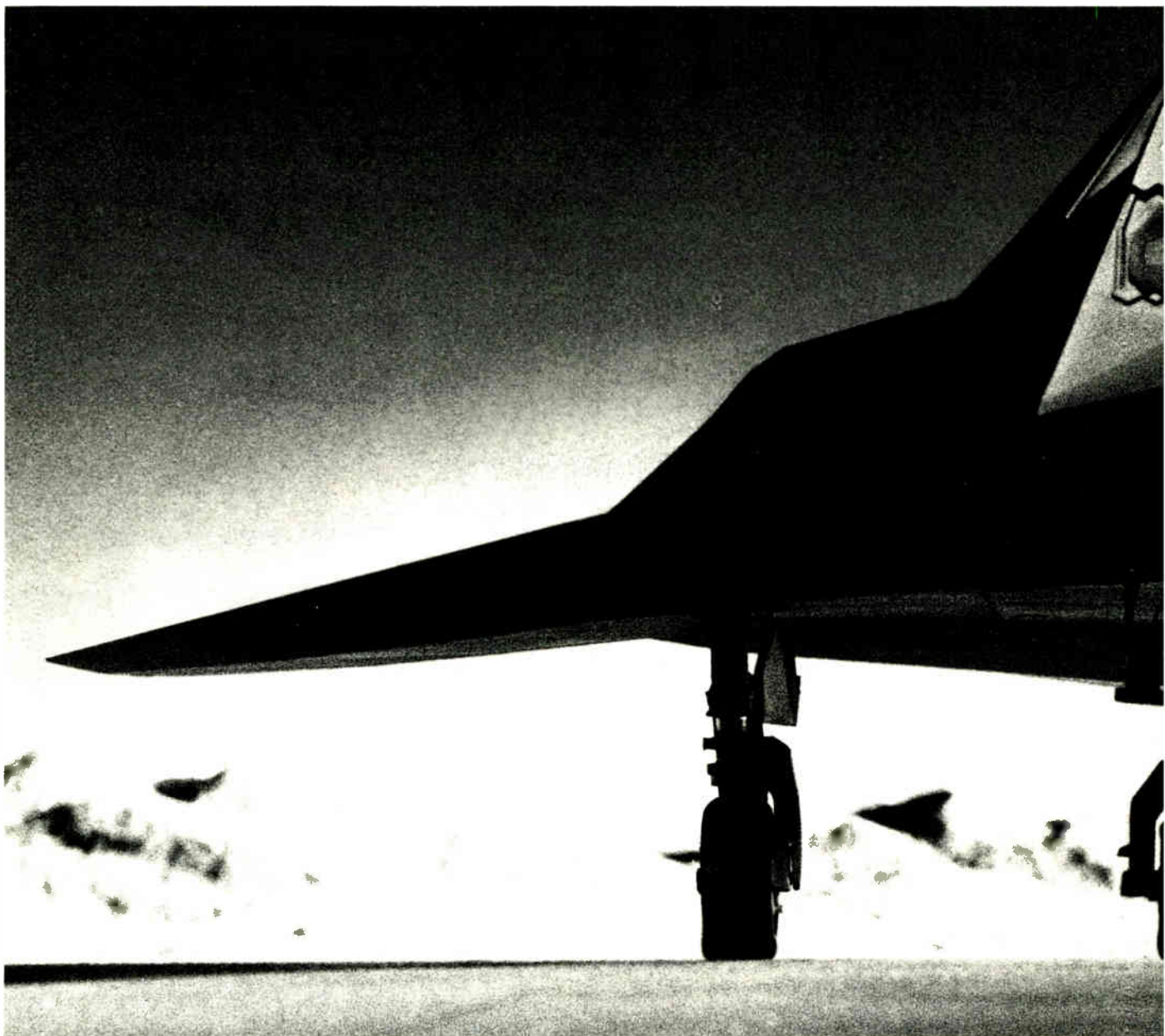
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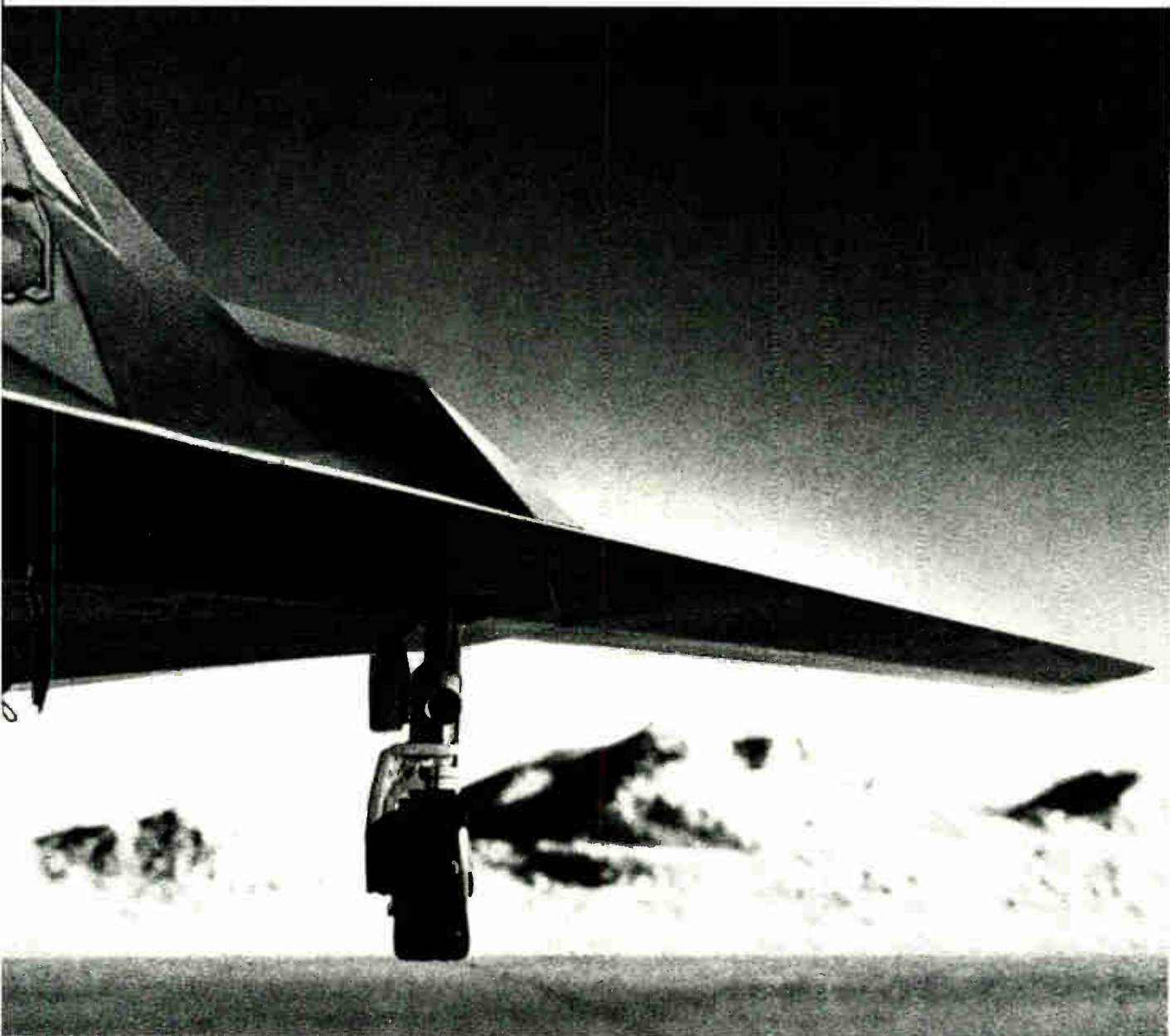
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close miking theory later, to supplement as the song developed. Tim Boyle and Tim May of Concert Sound, London, were invaluable in getting the string pickups mixed to stereo groups, making life a lot easier for us."

Built in the 1870s by structural engineers who apparently cared little about acoustics, the Royal Albert Hall was used by Harris, working hand in hand with Collins, as a music chamber instead of fighting it with digital reverbs. The story is told that even at the Hall's dedication ceremony, the main speaker could not be heard over the echoes. Over the years, the Hall has been modified with the addition of dozens of "mushrooms" hanging from the steel dome's ceiling. "We walked around the hall during rehearsals just listening to the sound heard in the seats and tried to capture that for the live CD. We used the hall itself," Titelman adds. "Depending on the volume of the songs, the hall can be a blessing or a hindrance. With the slower songs it just sounds beautiful because you hear all that echo."

Using a complement of ten Bruel & Kjaer mics in different patterns, cables were run to the preamps at the nearest

point available. The rigging crew spent hours repositioning aircraft cable strung across the room until they got it to their specifications. "This got the signal through perfectly and left mic placement in the hall as the real trick," says Harris. "The right balance of ambient sound and audience applause is critical so that pushing the room in and out of the mix doesn't distract you from the music as it so often does in live recordings. Robert Collins' house mix only enhanced this."

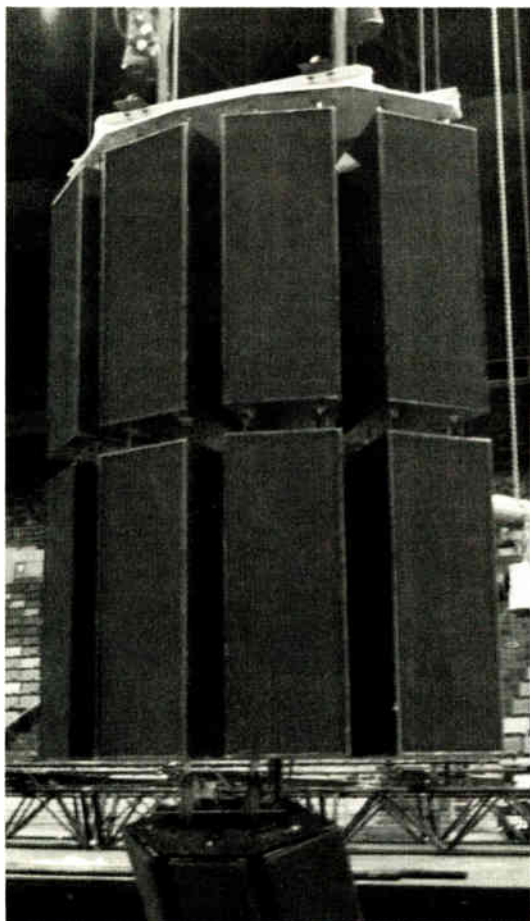
As for Clapton's guitar, Harris says, "You'd think miking an electric guitar is easy. Just put a 57 in front of the amp and you're done. Not if it's Eric Clapton." A 57 was used with an AKG 414, a Sanken CU 41 and Neumann TLM170 in a configuration that took hours to find, moving them close and back. For the orchestral performances, Clapton's substantial guitar rig was packed up and moved into a dressing room off-stage and monitored back with the full system onstage, providing isolation for the guitar and allowing Harris and Titelman to play around with the sound of the guitar in the "chamber" space.

The final challenge, according to Harris, was the huge Albert Hall organ.

The instrument has chamber after chamber with sets of pipes for different stops on the keyboard. "Hanging mics in front of the organ didn't work, so miking the chambers individually was the only way to go." Concert Sound sent one of its braver volunteers climbing across planks open to the floor far below with wireless C12s in hand, placing mics on each active chamber as the organist played in rehearsal. It was unorthodox, but it worked—so well that the rough mix was used for ABC's *In Concert* video broadcast earlier this season.

You can hear the results of all this sweat and creativity on *24 Nights*. Producer Titelman expressed his satisfaction with Effanel's recording efforts: "They did a beautiful job. The recording is excellent, and if you didn't use the house sound it would sound like it was recorded in the studio. It was so easy because they're so good at it. I really didn't have to worry whether it would be done right or not. They made it a Sunday picnic." ■

Patti Gandolfini is a New Jersey-based freelance writer and Emmy-winning television producer/director.



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Tales of Power from Remote Recording Engineers

by
Blair
Jackson

Usually when we prepare these types of stories, in which we talk to a cross-section of people about a specific issue in recording, we have some idea of the kind of answers we might get. After all, on both hardware and trend issues there are generally certain camps that different product users fall into. For this month's feature, we thought we'd broaden the scope somewhat by asking various remote recording engineers to describe a recent problem they've encountered in their work and how they dealt with it. We had visions of weird technical horror stories and bizarre techniques being employed by panicked engineers. However, truth be told, the ten engineers we randomly selected for this piece were a relentlessly upbeat and satisfied lot, with nary a tale of true desperation among them.

In fact, our respondents were optimistic about the state

of their business—recession and all—though a couple admitted they might be in trouble if they didn't have certain regular clients, be they syndicated radio broadcasts or television audio gigs. John Moran of Digital Services Remote correctly pointed out that major record labels are spending less on live recording than they used to, but fortunately there is still a fair amount of live regional work to take up some of that slack.

In speaking with both big and small remote companies, we found an acute interest in keeping up to date with the latest technology that their budgets will allow. In the upper echelon, particularly, competition is keen indeed, which is why, for instance, Sheffield Audio-Video is in the midst of building a new 48-footer to be equipped with a 48-input SSL console and boasting a 10-foot ceiling.

But problems? Well, Kooster McAllister of the Record Plant Remote complained that it's nearly impossible to park a remote truck anywhere in Manhattan ("Sometimes we have put people over-

before you go to air, you bring up the console fader and there's some hum, and you have to say, "Well, what's been plugged in since soundcheck that we don't know about?" And usually you'll find some lighting guy has plugged in a fog machine or something. Those are some of the pitfalls I have to watch for.



Steve Colby ▲
GBH Mobile, Boston

It seems that mostly we have to solve the same problems over and over again. It's pretty rare that a unique thing crops up. Grounding is still the big thing. I spend more time chasing hums and buzzes than pretty much anything else in my life. There are certain ways of loading the dice that everyone with a reputable truck does: They have a good isolated power system, and they put a lot of money in the front end of their splitting system, use good transformers and then throw in common sense. Usually the problem can be traced to some funky kind of power thing going on at the place you're working, especially if you're dealing with a hotel or a club or someplace that doesn't have a good dedicated tech power service.

There are textbook ways you go through this. You try to make sure that the remote truck and the P.A. system are on the same phase of power in the building, and you try to make sure that there's nothing hung on the system with them like lighting dimmers or ice machines or air conditioners or computers. [Or] a lot of times there are computers hung on some of those tech services that chatter back, since ticket offices became computerized.

Most of the video trucks I run into are three-phase, and many of them have good isolation transformers onboard, although some still do not. We generally try to go online to at least a couple of the phases—hopefully the phases that are feeding the videotape machines.

We put significantly more money into our splitting system than we did any other piece of custom gear on the

truck. I would say in order of expense, probably the console cost the most, then the tape machines, then the noise reduction units, and after that a significantly larger amount was spent on the cabling system than on any of the processing or peripherals.

Greg Zaremba
ASL Mobile Audio, Flushing, NY,
and Turner Broadcasting, Atlanta
 ASL had a job with Spyro Gyra in New York that was a concert being broadcast all over the country as part of the Stoli World Music Series. We had to set up our truck outside, bring in our mic

splitter and split off the P.A. Steven [Remote, owner of ASL] has a single grounding point in the truck, so when you get out there and you interface with other people—P.A. companies, or what have you—you don't have a problem with ground. [On this job] we had a problem where we had a little studio setup downstairs that was taking the radio transmission, and we sent everything back to the truck and then sent a stereo mix down to this little makeshift studio. [But] we kept getting ground problems. We put isolation transformers on, and it didn't help the situation at all. The bottom line,

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though, was that there was a power problem. The little studio was on the wrong phase of power, the opposite phase of the truck, so there was a ground difference, and it was making it buzz city through everything. So we had to come out of the truck with an AC cord, feed it down to the studio and hook them up that way. That cleared it up. Actually, I've had very few problems on Steven's truck. He doesn't cut corners. He has this killer Brooke-Siren mic splitter. It's an active splitter but it has isolation transformers on, which helps out a lot.

I've had more problems with the Turner trucks. When we go out and have a game where ESPN or CBS comes in, they all want to tap in and take feeds from our truck, so we have communication problems sometimes. A lot of these trucks don't keep dry pairs, which is a DC blocker. In communication you have to have a voltage go along with your communication line, and you have to dry out the voltage when you interface with another truck. So a DC blocker is a good thing to have. You can pay exorbitant prices for them, but you're better off just making them yourself. It's just a ca-

pacitor that blocks the voltage and lets the AC through, which is the audio signal.

John Moran

Digital Services Remote, Houston

Our biggest problem is probably lack of adequate soundcheck at some shows. With one band, which I'd rather not name, they did their soundcheck and then when they came out for the show, things were at considerably hotter levels. Unfortunately, there's not much you can do in that situation except explain. "Guys, if you're actually thinking of using these tapes we're making, you've got to give us some real levels."

The most common thing we see ground-wise is when we do the simulcast of the Houston Symphony's Fourth of July concerts. We'll do the orchestral mix on that, and John Crowe Productions handles about a nine-camera shoot. Of course, they take a tremendous amount of juice. We take a reasonable amount of juice, too, and the idea of having a 60-foot semi video truck and a 30-foot audio truck all on a single phase of power is simply out of the question. And so when you

know you're dealing with interconnecting sources that are operating on different phase legs in a given venue, you're going to have potential problems. The idea then is that anything running between the two rigs—and in this case that encompasses composite video sync, multiple video feeds (i.e., program and preview), communications, and our feeds going back to them—everything either goes through a very high-quality distribution amp and/or isolation transformers. Some are theirs, and some are ours. We've been doing it for six years, and we have it pretty well worked out. Anticipation is a wonderful concept. It works very well if you just think about what might happen.

Bob Skye

The Plant, Sausalito, CA

We did the Lollapalooza show outside of Seattle last summer, and it was pouring rain from the time we hit Shasta [in Northern California], all the way through Oregon and into Washington. These were not good conditions. We arrived and there were ten or 12 18-wheelers there in the dark. Mud everywhere. The stage was set up al-

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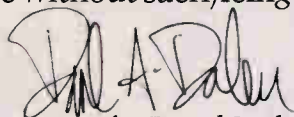
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ready, and everything was completely soaked. It could've been quite a problem. A lot of remote rigs don't chassis ground—we have to float in order to keep referencing. I try to ground the chassis, even if I have to isolate it from everything else. We laid out mats within eight feet of the rig, because there was mud everywhere. There was mud up to the console.

Everyone in the various trucks was so busy trying to keep their gear from getting wet that we were kind of on our own for the whole hookup. We were coming in on the last gig [of the tour] for a film company who was shooting it all. We had a SMPTE-lock to Nagra. We were called to do Jane's Addiction, but we also did the last two songs by the other bands—the Rollins Band, the Butthole Surfers, Siouxsie & the Banshees and Ice-T. It was pretty wild. There was no soundcheck. We had a situation where the slam-dancing circle in front of the stage was ankle deep in mud, and we lost a couple of mics to



Bob Skye of The Plant aboard "Rover" during the 1991 Bammies live broadcast for KFOG.

audience divers—they absolutely crushed the mics. With this misting rain that was falling sideways, it was extremely eerie. The body heat was causing this steam that looked like dry ice rising off the audience.

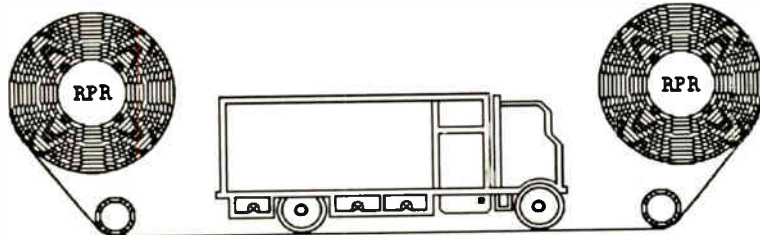
The gear was getting soaked, the speakers were getting soaked, microphones were crackling. But from our point of view, the recording came out okay. Considering the pressure that was on everyone, it worked out well. The generator they'd called in for us had flakey power. So ten minutes before we went on I made the decision. "This is not working." I was afraid it was going to shut us down in the middle of the show, so I went and found the electrician and said, "There's an electrical stand right next to the rig. I want it, I want it now." So we hooked up to that, and we were fine. But the bands had a good time, and the audience had a ball.

Jack Crymes Design FX, Los Angeles

We've had very few problems of any sort recently. This job we're working on now is an interesting one: It's the opening of this new symphony hall and performing arts center in Denver—Buell Hall. The opening night is going

Pictured: Jack Crymes, chief engineer Design FX Remotes, center left; Allen Baca, asst. chief engineer, center right; Gary Ladinsky, owner, bottom right; Terry Stark, director, far right; and the rest of the Design FX crew.

out on live TV [on the Arts & Entertainment network]. This show has everything—opera, classical, a bunch of kids



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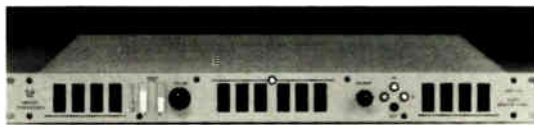
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singing, Dan Fogelberg. We got here a day early, and we got all set up with 80-some microphones. There are mics all over the place—there's a whole orchestra pit, a stage orchestra, mics for the audience, orchestra accent mics, solo mics, nine RFs on various people. It's sort of like a mini-Grammy Awards-type show.

We were all set up and everything was perfect, and then the video truck came in and we had to completely rethink our whole grounding setup to interface with them, particularly with communications and intercoms. They had different power requirements and a different philosophy. But it was fine. It's gotten a lot better through the years. Most of the recording trucks and P.A. systems have much better grounding philosophies now, and better equipment. And a lot of the sound companies also use real good equipment now. We used to mic everything, but now we use a lot of their mics, too.

Malcolm Harper Reelsound Recording Manchaca, Texas

One interesting thing we're experimenting with is trying some fiber optic systems with our snakes. The big thing there is that once all the mic lines go into a decoder, they are flipped over to fiber optics, so there's no actual electrical connection between the stage and the truck. By doing that you pretty much eliminate all kinds of grounding problems, such as electrical interference that you can pick up in your snakes on long cable runs. And you eliminate loss of signal problems because the preamps are actually on the stage.

We're working with a company here in Austin called Optodigital Design. Of course, if that goes down on you, you're in bad shape—you have to



Reelsound "Riverwalk" engineering team: back l-r, Jim Anderson, mixer, Gordon Garrison, house mixer; front l-r, Malcolm Harper Jr., technical director, Greg Klingensmith, tech engineer.

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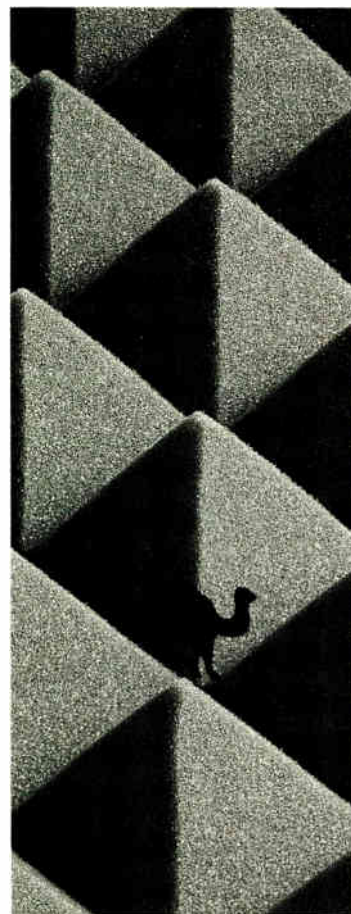
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drag out your snakes and go back to the old system again. But I think in a matter of just a few years, it'll be the system most people are going to. Plus the cost will come down from where it is today, and that will make it more attractive. They're hoping to have a system that's very transparent; in other words, it works just like a regular cable would, and you have decoder and encoder boxes shoved on each end of the fiber optics. One of the big advantages of a system like that is basically you've got 60 or 70 more channels down one fiber-optic system, and you're dealing with a cable about a quarter-inch in diameter, instead of running multiple snakes. If you can get a system that works well and it proves to be roadworthy, it will really save you time and labor. We're beta testing at the end of this year [1991], and we plan to use it on the radio series we do [*Riverwalk*, *Live From Landing*, which is heard on American Public Radio stations] next year.

Richard Van Horn
Sheffield Audio-Video Productions
Phoenix, MD

One thing we have on our truck that has saved us many, many times is a Liebert computer power regulator. It guards us against spikes as well as voltage problems. We just did a show with the band Kix, and at the last minute we discovered that we had to run sound, lights and the remote truck all off the same generator. When they'd turn the lights up, you could hear the computer regulator build up to this huge hum, which it rarely does; you could really tell it was working. And it *did* work. It compensated for what was happening. It's a great piece of gear. We've even had cases where we've lost power completely; it'll hold up power for about a minute.

David Glasser
Airshow Inc., Springfield, VA

A lot of what we do is direct-to-2-track, so we really have to get it right. In terms of power problems, for the type of things we're doing we have to worry about air conditioning in the room, and the P.A. can also pose a problem. Sometimes you can't do anything about it, and you have to wait until you get back to the edit room and see if you can filter out some of the garbage.

Since we don't work out of a truck, we like to set up in a dressing room or hallway or office backstage, away from the noise clutter. And that presents its

own set of problems sometimes. We just did a mini-tour for Rounder Records of three of their really good banjo players—Tony Trishka, Tom Adams and Tony Fratatto. We did four nights in four different places, and it's going to be a big job matching things up, not so much because of their playing, but because the monitoring environment in each of the places was slightly different—this was in clubs and even a couple of music stores. The monitoring environment was different enough that the mixes have slightly different atmospheres about them. So we'll dump everything to our digital editor—and with EQ, some additional reverb and some spatial manipulation—we'll be able to match it up.

Our setup is really portable. It all goes together in about an hour, and it's all off-the-shelf stuff. All the console inputs and outputs have to be transformer-balanced (no unbalanced circuits at all in the remote setup), and all the connectors have to be XLR connectors; it's pretty basic stuff, but it means there's never a problem plugging things in.

Lonnie Bedell
Goin' Mobile, Boston

Our biggest challenge is working with our two consoles, but we've really got it down. I have a total of 32 inputs, and I can out them in any combination of subs. The Seck has eight sub outs, and the Hill has practically six, and I can take any combination I want. It's typically set up in terms of 12 inputs going straight into the deck and the other 12 on the Hill going into the remaining four channels—that's for most of the work. But if you need more, another two subs are easy to patch in.

Two consoles is for redundancy, which is ideal for the road. And of course, it's an economic thing for us. As far as me switching to say, a 32x16 board, the cost would go up maybe five times. And then if that board goes down for any reason, I'm dead in the water. For a long time I only had the Seck board, which was 16 lines, 16 tracks, and I got away with it. Then I started doing more gospel stuff that chews up inputs like they're going out of style, so I got the Hill. Between the two of them, I've never run out of channels that I need. ■

Mix managing editor Blair Jackson has been described by some of his co-workers as "remote." But "odd" is more accurate.



SOUND CHECK

Clockwise from top: Martin Audio's LE 700 wedge. Yamaha's much anticipated PM4000 console. JBL Array Series enclosure with S.A.F.E. (ATM) modular rigging system. Soundcraft's Europa. TAD's TCM 1812 two-way cabinet. Klipsch enters the raw-frame market with its K-Series speakers.

by David (Rudy) Trubitt

Sound Reinforcement Highlights at AES

The show was well-attended, which all manufacturers found encouraging. However, economic realities had many attendees more interested in finding work and making contacts than ogling the latest and greatest in live sound gear. But those looking for an eyeful were certainly not disappointed. Here are some highlights:

Consoles

Yamaha (Buena Park, Calif.) showed its new PM4000 console. It will be available in 32-, 40- and 48-input configurations, including

four stereo input channels instead of aux returns. Features include a redesigned head-amp with 50dB trim range, 4-band parametric EQ plus variable highpass filter, balanced insert points (switchable pre- or post-EQ) and direct channel outs. VCAs are said to be improved. Eight mono and two stereo sends are included. Stereo sends are convertible to two mono sends with a front panel switch. VCA masters, mute groups and the eight matrix outs have been retained, and VCA mute switches have been added. Delivery is not expected for another six months, but the company will deliver a PM3000 (at attractive

—CONTINUED ON PAGE 54



Monsters In Moscow

"We were on tour in Europe with The Monsters of Rock—Queensryche, Metallica, AC/DC, The Black Crowes and occasionally Motley Crue," says dB Sound president Harry Witz. "After the Donnington show (see November *Mix*), we continued on to Barcelona on September 21, which was the last scheduled show."

But before the tour reached its final stop, the wheels were set in motion to add one more date to the nine-week tour. Monsters' production manager Jake Berry explains. "Management rang me up and said, 'What do you think about doing Moscow after the last show in Barcelona?' We didn't think it was a very good idea. A couple of days later they came back and said they really wanted to do it."



Above: Monster's stage and first delay tower/mix position at Tushino Air Field, Moscow. Above center: Security was provided by the Russian military.

Time-Warner was promoting it—it was a free show [for the audience] but they'd pay the expenses. So we said, 'Yes, it was feasible, provided that we took our own production and hopefully got a lot of help from the Russian military. I don't know whether we were wise or foolish, but we said, 'What the hell, let's go do it.' It was on."

The search began for a venue capable of holding a crowd of up to a million. "We looked at an enormous airfield outside Moscow," Berry

says. "Imagine trying to play a show at JFK or LAX. It was not quite that big, but the grass runway was over a mile long." Then, according to Berry, came the red tape. "We were going to play the airfield, then the square, then we didn't have permission to play the

PHOTOS: JOE GIRON

square, then we had permission to play the airfield, then we didn't. It went on and on."

In the meantime, plans had to be made. "We figured out a rough plan to try to cover up to a million people," says Witz, "which was quite a bit larger than what we'd been doing. There were limits to how much gear we could send and how much it was going to cost. We decided to put up seven delay towers (which would get their feeds via broadcast, rather than hard-wired). We had 42 blocks onstage, plus four blocks on the center delay and every other delay was six more blocks. [A block consists of two MT-41s, two MT-41s and three Crest 8001 amps.] We had a total of 80 blocks with 730,000 watts."

Planning for contingencies meant bringing everything themselves. Besides extra items like three daylight video screens (Star-Vision, Sony, JumboTron), the tour carried its own food, catering, communications (a briefcase-sized satellite phone), work lights, barricades and plywood. Extra sound gear and generators were provided by SSE Hire (London), which did the Monsters tour in tandem with dB Sound. Rock-sound (Hanover, Germany) and ALT (Estonia).

The next question was transportation. "The plan was to send two Russian Antonov 142 cargo planes to Barcelona," says Witz. "What ended up happening was that there was only one available, and it had to shuttle a couple of times. The first flight got 17 semis worth of gear onto it—that's how big the plane is. The second flight got six semis onto it."

"We loaded them in the Barcelona airport," says AC/DC-Metallica monitor engineer Paul Owen. "We drove four trucks on the front, loaded the rest of it and flew to the gig. But because of the Russian customs, we had to take it off a case at a time, open it and then take the case to the gig."

The crew arrived at the field with the first planeload of gear at 7 a.m. the day before the show. "We started setting up the delay towers, with little or no help from

the Russians," says Witz. "If there was a forklift, one person drove it. When that person took a break, that forklift stopped working. Our crew started doing the work ourselves. One by one, we took cabinets out to the field. We put motors up and ran generators at each tower to hoist cabinets onto the decks. It was a lengthy process."

"During the middle of the day," Witz continues, "we got some Russian marines, who reluctantly helped us dig up some dirt to link sets of towers together for redundancy in case of a transmitter failure. By the time we got into the evening, we had not yet seen the main parts of the P.A. system. We had cabinets, but we didn't have motor control, AC distro and none of the front of house. It got to be 8 p.m. and we were starting to get worried, because the [second] plane should have been back by then." It turned out that a truck wheel had broken in flight, and it took all night to remove the truck and clear customs. "The

next truck we saw was at 5 o'clock on the morning of the show," says Witz. "We had been working since 7 a.m., coming up on 24 hours, when we finally got the gear and didn't have any labor."

The traveling sound crew for the tour numbered ten, and representatives from the cooperating sound companies bolstered that number to 16. They proceeded to set up the system, accompanied by a *cappella* renditions of Metallica and AC/DC songs by a crowd whose numbers were approaching 100,000. The entire system was ready at noon, two hours before show time, despite some frightening moments. Witz explains: "The Russian military showed up and proceeded to dump about 25,000 to 50,000 troops onto the field, who then formed a human barricade across the front, an inner loop of people that stretched from either side of the mix tower back to the stage, and another loop another 50 yards beyond the mix tower in a big square. There were

300,000 Remember Bill Graham

A memorial concert was held for promoter Bill Graham on November 3 in San Francisco's Golden Gate Park. The estimated 300,000+ who came to pay tribute were joined by many of the musicians most closely associated with Graham over the years, including Jackson Browne, Aaron Neville, Santana, Journey, CSNY and, of course, the Grateful Dead. Sound was provided by Ultra Sound, with Sound on Stage providing house and monitor equipment for Santana. Ultra Sound also provided a broadcast feed for live radio broadcast. "It went exactly the way Bill would have wanted it to go," said Ultra's Don Pearson, "with seamless set changes and flawless production."

"It was a very special day," added Sound on Stage's Bob Walker. "People were thinking



about Bill and trying to make it right for him. A sense of cooperation and joining together as a family prevailed. All of us were donating everything—we weren't doing it for any reason except to pay tribute. We were fortunate in a lot of ways—to have worked with him as long as we had, and to be able to participate in the tribute—it was a healing process."

—David (Rudy) Trubitt

sections of people separated by military. I can only personally speculate that they're used to controlling crowds that have a violent or hostile intent, not simply kids that are very excited about a show. The military are kids, too, and they were standing face to face with people who were pushing and getting shoved—before you knew it there were clubs swinging.

"People were being kicked and beaten and carried off by the

military. The crowd reacted violently by throwing bottles, and soon there were guys with helmets and crash shields out there. It was dangerous, scary and chaotic. Then the military came up onto the mix riser so they could get a better vantage point, but they just drew fire [bottles, tossed at the FOH platform]. It was like sitting behind the target in a battling cage. Finally, we got the military guys off the riser and had somebody translate [to the crowd] that we came here to put on a

show for them and asked for their cooperation. From that point on, you could walk through the crowd with a pass, and it was like Moses parting the sea. We were able to get the whole thing off without a hitch."

Once the show was underway, it was almost business as usual, according to monitor mixer Paul Owen. "It was a straight format, because we'd been out for nine weeks doing the same bands every day (the gig included a Russian band, Pantera, The Black Crowes, Metallica and AC/DC). The overall thing was just another day for us. But it was a real weird vibe—you looked into a field and saw so many thousand kids and then a huge, three-deep row of soldiers, another so many thousand kids and another row of soldiers. The delay towers looked like matchboxes in the distance, and past that you saw a convoy of trucks taking more troops around the other side, and troops beating kids for no reason—for just coming over the barrier. It was very strange."

It was also very large. "The field was huge," says Berry. "You could put a million-and-a-half people in there and not notice. You know how big the Monsters of Rock stage was—it was like a fingernail in the middle of nowhere." Witz agrees: "From the mix tower, there were people as far as I could see. I don't know the official count, but there were between 500,000 and 750,000 people there. In retrospect, we might have tightened up our mix towers so that everybody got something a little more dense, but we were totally capable of covering a million people at heavy rock volume."

Then it was over. The crowds emptied out while the skies opened up. A rainstorm drenched everything, making the load out and customs inspection that much more of an adventure. Once again, every case was inspected, loaded onto trucks and sealed. Part of the P.A. was heading to Australia with AC/DC, part to Oakland for A Day On The Green, with the rest returning to the companies who provided the extra equipment.

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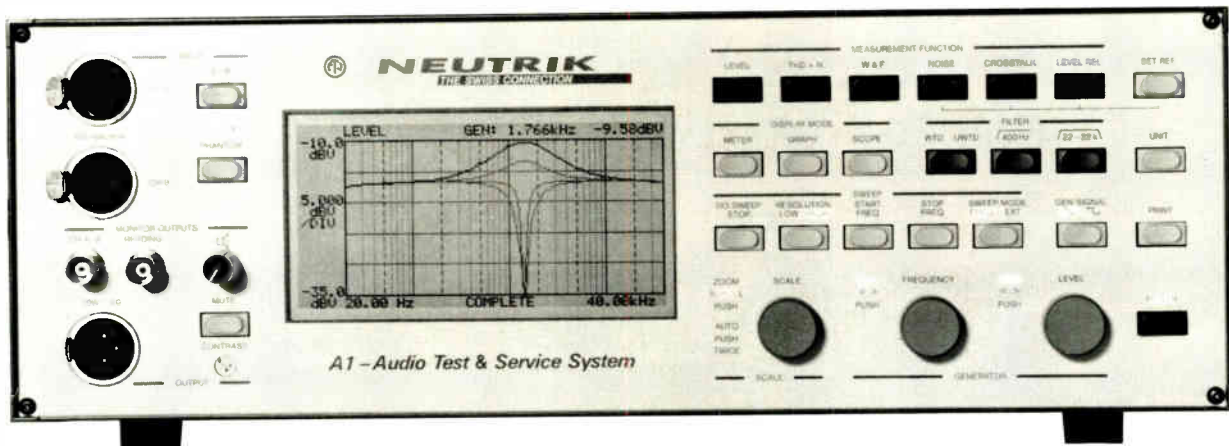
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look with two weeks of hindsight? "Were we crazy to go?" asks Berry. "Yes. Would we go back again? Two days after the show you'd have gotten a negative response from everyone. But now? Yeah. Now we'd go. But it was a unique experience in more ways than one." ■

The Mix editorial staff is beginning to worry about Rudy Trubitt's ears. He's attended entirely too many Monsters shows over the past year.

—FROM PAGE 48, SOUNDCHECK (terms) to anyone who can't wait. Also announced (but not shown) was a companion 22-mix monitor console.

The Soundcraft (Northridge, Calif.) Europa was shown publicly for the first time. Promix took delivery of the display board after the show for the White Oak Dance Company's tour. Also shown was a new 16x8 or 24x8 Spirit Monitor console. The board features 3-band, 2-sweep EQ, with a 60mm fader on each chan-

nel and separate engineer's cue wedge and headphone outs.

Crest (Hawthorne, N.J.) is delivering a short-frame version of the Gamble EX console. The EX32 is identical to the EX56, save for the reduced number of inputs and smaller patch bay. A MIDI-controllable mute option was shown for Ramsa's (Cypress, Calif.) WR-S840 and 852 consoles. Ten mute groups can be set and stored to non-volatile memory and also recalled via external MIDI commands. Soundtracs (Hicksville, N.Y.) showed its competitively priced Megas Stage 8-bus and Megas Mix 4-bus mixers. Also on display was the Amek/TAC SR6000 (North Hollywood, Calif.). The desk is available in 24-, 32- and 40-input frame sizes, and features VCA output and mute groups, split auxiliaries and a 10x8 output matrix.

Automation is making inroads into live consoles with two significant systems on display. Saie of France (Infoscene Tech., Montreal, Canada) launched its Memory console (See *Mix*, "SR New Products," Dec. '91). AES was the company's second stop on a month-long tour of sound companies across North America. TOA (South San Francisco, Calif.) debuted the ix-9000, a fully digital mixing console. Signals are digitized at input, and all processing is done digitally until output. Operators interact with the console through motorized faders and two touch-screen displays. Finally, although Harrison (Nashville) did not show any new SR-related gear, it has plans to bring automation to an upcoming monitor console.

Processors

There was continued development in the area of digital system controllers, with updated and brand-new models on display. TOA's Saori processor received several upgrades, including new PC-control software and long-delay modules offering up to 1,365 seconds. The PC-control software, in addition to providing expanded storage for setups, allows remote access to the Saori via modem if desired. JBL's (Northridge, Calif.) new ES 52000 digital controller can operate as a

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two-way dual channel, or mono three- or four-way crossover, with slopes up to 100 dB per octave. The unit also provides protection limiting, time delay and system EQ for a variety of JBL enclosures. Yamaha's D2040 digital crossover is a dual 4-band device that accepts analog or digital inputs in AES/EBU or Y2 formats. Nineteen-bit A/D and 20-bit D/A converters are used, and the device is programmable, featuring motorized rotary pots that perform any attenuation outside the digital domain, thereby preserving the unit's 19-bit resolution. Adamson

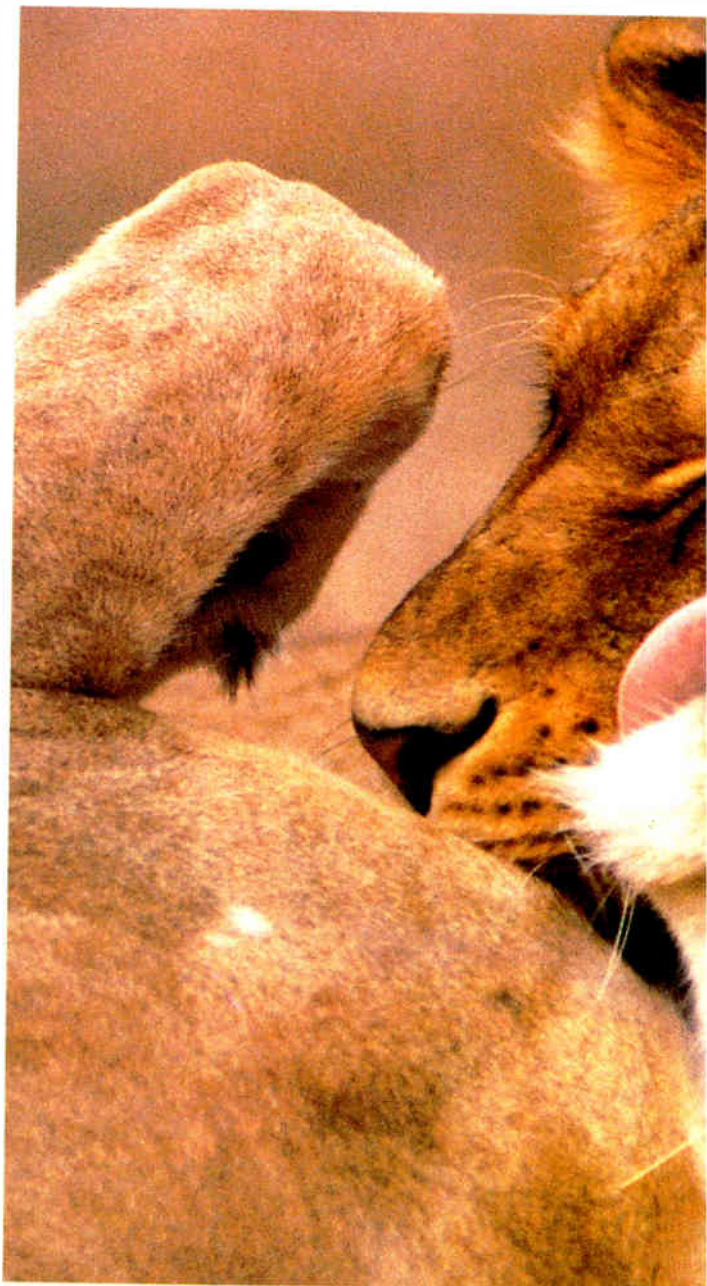
Acoustic (Pickering, Ontario) leaked preliminary information on its DSPX 4000, a digital crossover with linear-phase 100 dB/octave slopes. The ARCX 4000 will be an AT-compatible plug-in card, which will make adaptive room corrections to the DSPX 4000 crossover.

Amplifiers

Hybrid amplifiers/processors were shown by several manufacturers. Apogee Sound (Petaluma, Calif.) unveiled new integrated amplifier/processors. The PA Series amplifiers are available for the entire Apogee line except the 3X3s, which require three chan-

nels of amplification. The processors are simplified somewhat from the company's P-Series processors, omitting the adjustable limiter thresholds and using a 24 rather than 48 dB/octave slope. The company also showed four new non-processing amplifiers. Klark-Teknik (Farmingdale, N.Y.) is distributing Dynacord's line in the U.S. New from the company are the PCA Series integrated amplifier/DSP processors. Among other things, the DSP circuit in the PCA 2250 and PCA 2450 is designed to predict and protect against excessive voice-coil heating without amp sense lines. The PCA 2544

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also includes an integrated crossover.

Computer-controlled amps continue to thrive. **Crown** (Elkhart, Ind.) forged ahead with its IQ control system, showing several interesting new modules, including a 6x2 stereo mixer and a computer-controllable automatic mic mixer, which includes expander/gate processing for each input. Finally, the company's COM-Q uses analog audio tape to store and recall IQ system commands, making system changes possible without a computer being present. **Crest** has begun delivering NexSys systems, with a

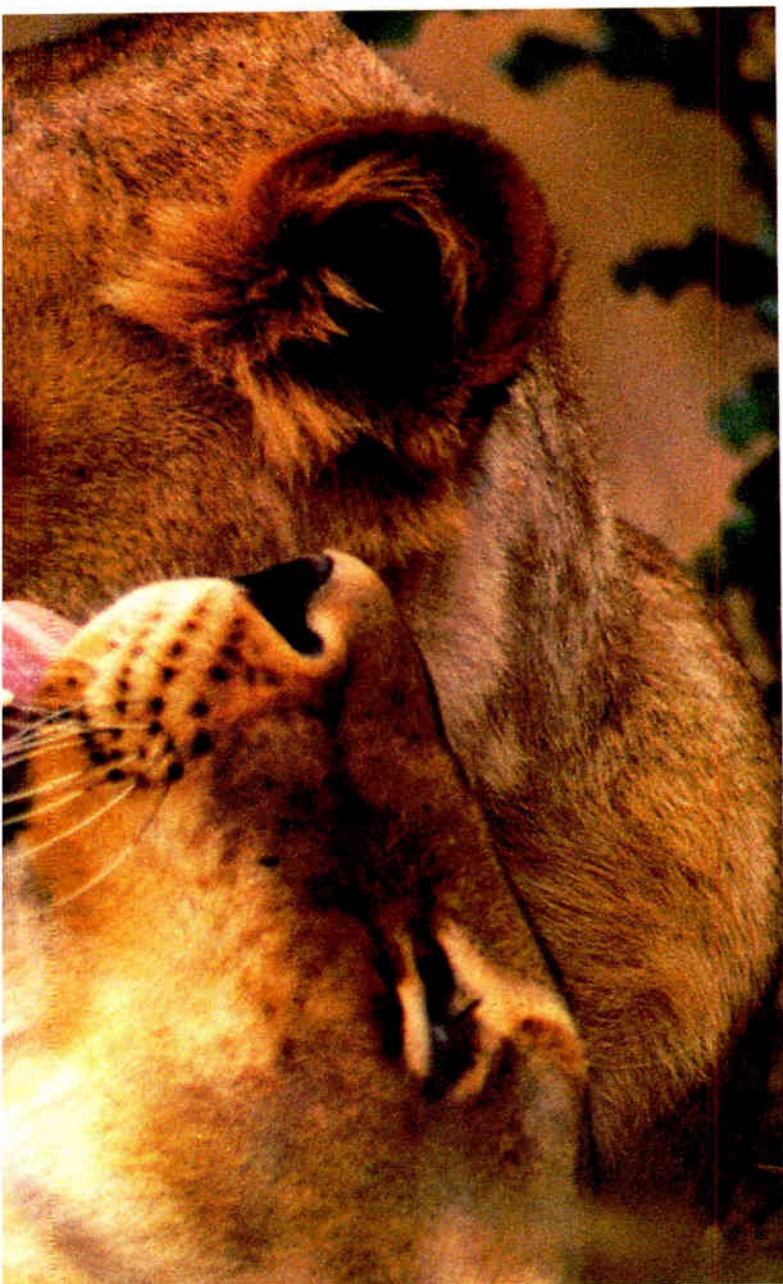
major installation in Moscow being a notable example.

Despite the growing number of processor- or computer-controlled amps, there was still plenty of interest in straight power amplification. **Australian Monitor's** (Gladesville, NSW, Australia) AM2200 tri-amplifier is designed to provide three bands of power for Turbosound TMS-3s, with peak power of 1,800W, 800W and 450W. The company also showed its 2-channel 1K2 (550W into 4 ohms) and K7 (350W into 4 ohms). **Peavey** (Meridian, Miss.) launched its dual-supply DL 1500 power amplifier. **Ramsa** also

showed three power amps: the WP-1000, WP-1200 and WP-1400. **Stewart Electronics** (Rancho Cordova, Calif.) unveiled preliminary data on its new PA-800 amplifier, which uses switching power-supply technology to pack 400W @ 2 ohms/channel into a single-rack, 9-pound package.

Speakers

There were a number of new cabinets and transducers at the show. **TAD** (Long Beach, Calif.) launched a new line of two- and three-way loudspeaker enclosures. The TCM-1821 is a 72x30x30-inch unit using two 18-



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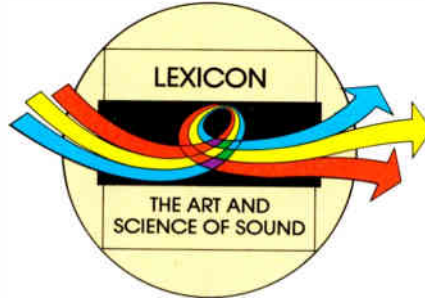
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inch LF drivers, one mounted forward-firing, the other reversed. The driver—the TL-1801—is the company's new Kevlar fiber/paper cone device. High frequencies are covered by the new TD-4002 compression driver. The TCM-1621 is a similar design with 16-inch cones. Finally, the TCM-1631 system comprises four different enclosures, each containing two 16s, two 12s and a TD-4002 in various component layouts. The different enclosures are specified as top/bottom and left/right units.

EAW (Whitinsville, Mass.) announced it would fund the 120+ member Virtual Array Technology Association, with Scorpio Sound's Mark Frink as the group's first head. The organization will continue to allow members to put together larger systems than they'd be able to on their own, but the new charter also calls for more sharing of information. EAW also showed four new enclosures: the SB330 subwoofer, SM200 wedge and two special-purpose cabinets, the UB22 (fill, monitoring and foreground fill) and UB42, a low-profile, under-balcony device.

Acoustical Supply (Chattanooga, Tenn.) is the domestic distributor for kg systems, whose line of small-venue composite-cabinets is said to be 60%-70% lighter than plywood enclosures. Bag End (Barrington, Ill.) showed its Extended Low Frequency (ELF) technology, based on patents held by Long/Wicker-sham Labs. Also present was the company's AF-1 three-way enclosure, which houses an 18-inch woofer, a 12-inch cone and 1-inch constant-directivity horn. Clair Brothers (Lititz, Pa.) showed a prototype, low-profile, trapezoidal enclosure designed for low-ceiling hangs or front-fill applications. The P-4's smooth sound belies its extreme geometry—the "Piston" is slightly over a foot wide at the front, several feet deep and tapers to just a few inches



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"She's very charismatic," says Bob McCarthy, director of Source Independent Measurement (SIM) engineering for Meyer Sound. "She's got a smile that is totally disarming, and her lyrics are very clever. It's Western-style pop, but all in Japanese. She's strictly addressing the domestic market; she doesn't try to be international.

"She's been a star in Japan for close to 15 years," McCarthy contin-

Yuming's costumes, staging and special effects have grown more elaborate each year, and the production values are strictly top-of-the-line.

ues. "She came out as a folk artist, playing piano and singing ballads—kind of a Japanese Joan Baez. But she's evolved, and she has captured a fresh young audience while holding on to people as they age."

"When I'm out in the audience, I see people from 13 or 14 years old all the way up to their 50s or 60s," adds Kyle Takemori, another SIM engineer who has worked on several Yuming tours over the last several years. "That's unheard of anywhere else, except for Grateful Dead concerts.

"One of her more interesting songs is a housewife singing about vegetables," Takemori adds. "She is choosing to cook one instead of the other, and the one who's not getting cooked is jealous."

Yuming's costumes, staging and special effects have grown more elaborate each year, and the production values are strictly top-of-the-line. There may be eight costume changes for the star and four for her singers, McCarthy says, and "a lot of technology."

Yuming's husband, Masataka Matsutoya, is the chief of Kirarasha, her production company. In addition

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to producing her records and collaborating on her songs, he also filled in on keyboards when the regular player, Satoshi Takebe, came down with the measles. "He watches all the big shows," says McCarthy. "When he sees a piece of technology that he likes, his company goes and gets it, and they figure out how to use it. They've picked up ideas from Pink Floyd, Paul McCartney and others, and they've implemented those ideas in their own production."

Yuming's year is divided into recording and touring phases, but live concert production is a year-round concern. The stage for this

year's "Gates of Heaven" tour sported a couple of rows of cubes, each large enough for a musician or dancer to occupy. There was a wall of 18 video screens that tilted up from the stage at various times (and occasionally split into three sets of six) for routines such as Yuming and her singers appearing on the screens and then walking out of the picture to emerge in the flesh.

That sort of precision is typical in this company. Over the years, control of the lights and machinery has been taken over by "Maddie Rocky," a SMPTE-based "Synchrosystem" that strings all the departments together,

according to McCarthy: "It synchronizes the Varilites, of which there were 70 the last time I counted.

"Even more impressive is a secondary lighting system of huge fluorescent lights. The lights have nearly instantaneous on and off times, and they're synched to drumbeat envelopes." Maddie Rocky controls robots, trapdoors and stages that rise and descend. One tour, McCarthy recalls, featured the Zig-Zag Sisters, "6-foot robots that rolled onto the stage to dance and blink and do various things and then motorize offstage."

Then there's Yuming's MIDI skirt. "She wears a radio pack, and lights on three circuits blink in time to the music on one song," says McCarthy.

The time code controls tape machines that contain horn tracks, additional keyboards, and vocal tracks that are used to cover Yuming when she is indisposed or in transit. In one routine she is lifted in front of the speaker stack while singing; a pre-recorded vocal track is substituted until she clears the P.A.

Maddie Rocky is "essentially Yuming's cottage industry," McCarthy explains. "I've seen it evolve over the five years I've been going to her concerts. In 1985, it was a guy standing over a console of momentary switches, playing it like a keyboard; the next year he was typing on a keyboard, and the next year he was watching it as it went through presets. The system has been getting more deeply linked into the time code, and it's become the central part of the system. If Maddie went down, the show would stop."

But the system never goes down. Not in concert, anyway. And that may be because this production is so thoroughly shaken down before and during the tour. Every day, says McCarthy, "they go through the most exhausting soundcheck. Even on the eighth day of a run they'll go through every instrument, all of the guitar and keyboard presets. They go through pretty much the entire show." It's important not just for the technicians, but also for the dancers and musicians. Navigating the set takes some practice, with all the trapdoors, conveyor belts, lifts and video monitors. "If you don't walk in the right place, you could fall off a cliff," McCarthy says.

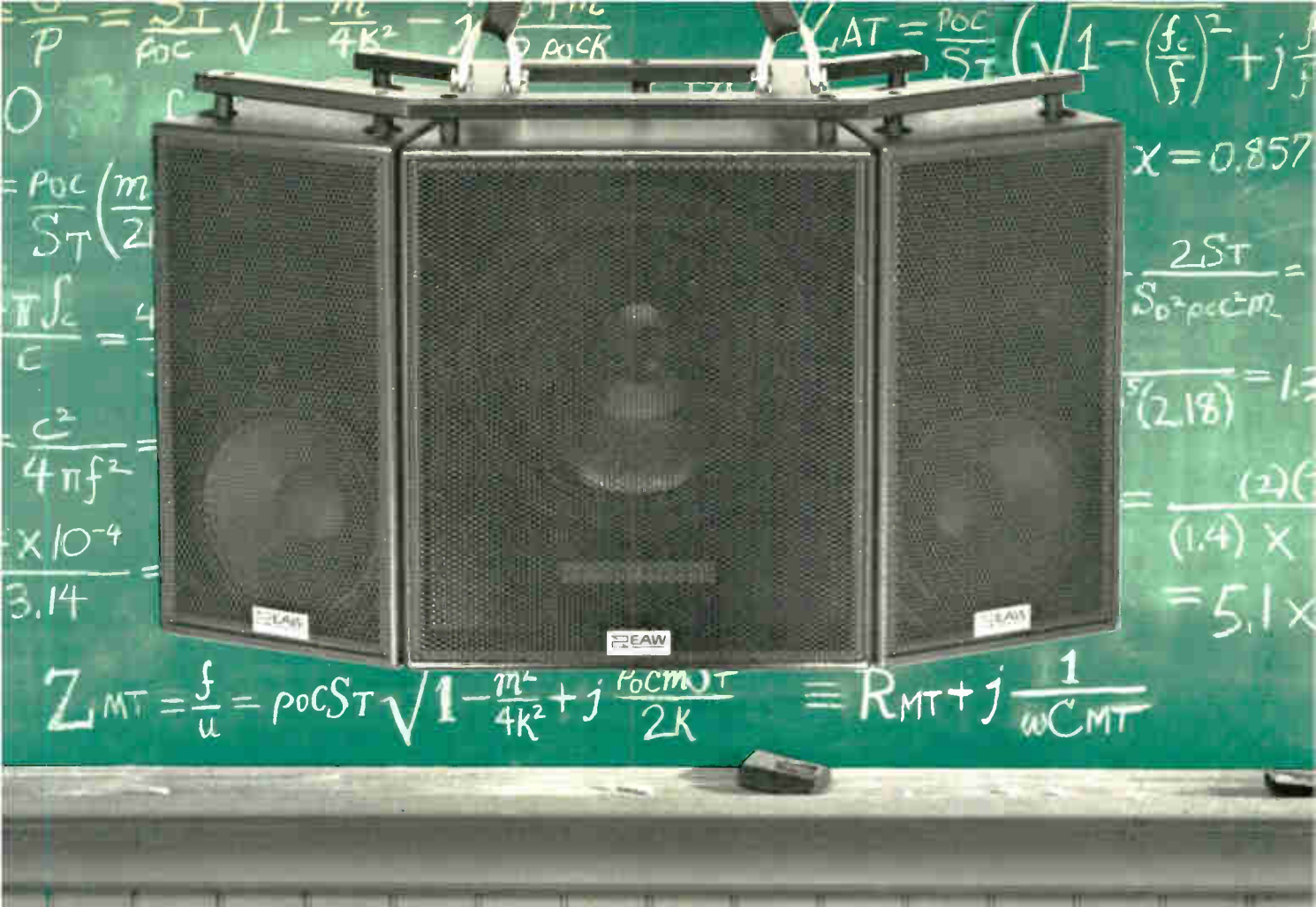
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covering several zones on three levels. "Only the keyboardist and drummer stay put; everybody else can be anywhere," McCarthy explains. "The monitor mixer has to move the sound around the stage." All of these highly mobile performers are wireless, of course. Each instrumentalist has one or two people tending the offstage amplifiers and effects. "Most of the amps are

Navigating the set takes some practice, with all the trapdoors, conveyor belts, lifts and video monitors.

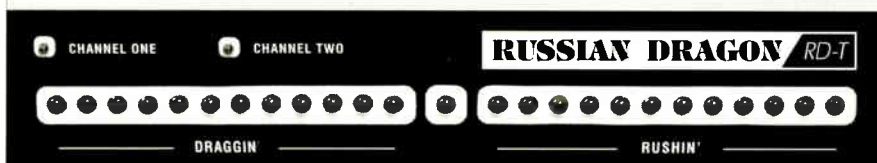
hidden under the speaker towers, running direct into the mixer," Takemori says. There are separate communications and cue systems for the guitarists and bassist and for the keyboardist (assisted by a "manipulator" and a synth operator) and drummer. Maddie Rocky supplies click track and a voice count-off to start each song.

Each side of the stage has six speaker systems (see fig. 1, page 190), totaling six MSL-10s, six 650 subwoofers and two UPA frontfills, MSL-3 sidefills, and "a couple dozen Ultra Monitors onstage," according to Takemori. SIM, Meyer Sound's proprietary system of speaker equalization, "has a whole platform, along with one for the mixer, one for the lights and one for Maddie Rocky."

More importantly, SIM has a place in the tech timetable. "They typically gave us a three- to four-hour slot for the initial setup," says McCarthy. "Then, every second day in a hall they give us a two-hour slot, which we use for touch-up work based on what we experienced the night before, as well as for pure research. For example, I might put eight microphones in one 20-foot area 150 feet from the speaker system and check

—CONTINUED ON PAGE 190

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by Dan Daley

PARAMOUNT SOUND

THE RENOVATION OF NYC'S OLD FELT FORUM



**The
Paramount,
Madison
Square
Garden.**

The first week of September was testing week for the computer-controlled sound system at the newly renovated Felt Forum—now known as The Paramount—adjacent to Madison Square Garden. Preparations were being made for a September 25 opening night bash with headliner Barry Manilow. Thankfully, The Paramount is big enough to provide New York with a badly needed large-hall venue with adequate sound reinforcement.

So it was with some difficulty, as the complex test series went

on, that I found Larry Dahlstrom, the sound system designer. Dahlstrom was formerly with IFA—Imero Fiorentino Associates, the overall acoustic and systems design firm for the project—and is now an employee of MSG Network, part of the Paramount family that owns the Garden and for whom the new theater is named. (The original Paramount, where Frank Sinatra, Benny Goodman, Alan Freed and others performed, was located at West 43rd and Broadway and closed in 1964. At the time, it was the flagship of the Paramount Theater chain.)

As part of the \$200 million redesign of the entire facility, including the Garden itself, the interior of The Paramount was turned to face 180° away from the erstwhile Felt Forum plan. Additional seats were added to bring the total to 5,600 (the old Paramount held 3,600 seats). 70% of which are within 130 feet of the stage; no seat is further than 170 feet away. Promoter Ron Delsner told a reporter on opening night, "It's the most intimate 5,600-seat theater in the country." A five-story stage house, located on the Eighth Avenue side, was also incorporated into the plan. The area that was once the Garden's 48-lane bowling alley is now a plush lobby. The idea behind the more ambitious physical plan, says Dahlstrom, was to let The Paramount be the site of more complex stage performances, in addition to the boxing and other sporting events it has traditionally hosted. This expands the venue's rental base and gives Madison Square Garden Enterprises a better pitch for its own planned in-house music productions.

The old sound system was totally removed. "It never really was built for the kind of stage production that will be presented here regularly in the future," Dahlstrom says.

However, Dahlstrom acknowl-

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edges that the budget for the sound system implementation, originally estimated at \$400,000, was cut back to \$300,000. But, he adds, the original intent of the system is still achieved; it was never intended to be all things to all performers, but rather to be as facile a basic system as possible to interface with the traveling SR systems that headliners usually bring on tour. "The basic system is geared to handle moderately sized stage shows," Dahlstrom says. "This system is designed so that they can feed parts of traveling systems into our basic system, including the delay systems, out into the house and to backstage."

To that end, Dahlstrom, working with Mack Privette of IFA, cut back the original plan for all bi-amp power and switched to single amplifiers. They also cut the spec for Apogee AE-5 speakers down to Apogee AE-4 models to match the power change. They then opted for a smaller board. The original plan called for a Yamaha PM3000 console; instead, they went with a 24-input Yamaha PM1800 with eight groups, a quad matrix and six aux sends. In addition to providing feeds to the house mains from the matrix outputs, says Privette, the console's aux outputs can be used to drive the eight stage monitors. All inputs, outputs and internal patch points can be accessed at a 12 x 24 patch panel on the console.

The monitors are four Yamaha S2115 HII slants and four Yamaha SM10H slants, with plugging boxes stage right and left. The monitors are powered by four Yamaha P-1250-C amps, fed either from the house mixer or by an external mixer from an outside SR company.

Around the console are the outboard components of the system, including a Sony ten-CD cartridge player, Yamaha C-300 audio cassette recorder, four dbx 160X compressor/limiters, a pair of Aphex Compellers and two Yamaha SPX90 digital effects units. The console and all its accessories are configured as

portable equipment and may be replaced easily by outside equipment. Feeds from stage microphones and feeds to house amplifiers are available on multipin connectors at the console position. Tielines to MSG Network positions are available, too.

"We had to engineer economy into the system," Dahlstrom says. "But those compromises didn't affect the ultimate result."

What hasn't changed much is the acoustical treatment of the facility, which is still rather limited, according to Dahlstrom. This led the redesigners to settle on an individually controlled zone approach in which juice is supplied to populated areas of the house while emptier sections get lower SPLs, to decrease reflections from those areas to the rest of the house. This controlled-zone approach is in turn guided by software developed by Crown, Oxmoor (whose EQs are used in the system) and Altel Sound, the audio contractors on the implementation. The software runs on a

Macintosh in conjunction with Crown's IQ software, which monitors the amp load and adjusts a range of parameters, including input levels. "This is all used on an ongoing basis," Dahlstrom says. "We were adamant about keeping that aspect in the system and making the required budget cuts elsewhere."

In the arrangement at The Paramount, each speaker is considered a zone, including the subwoofers, as is each amp channel. And each zone can be grouped as well as individually controlled. The manifestations of these zones, aside from the amps mentioned earlier, are ten Apogee AE-4 speakers, center-hung in a cluster for main audience coverage, and four Apogee AE-3 speakers positioned for rear coverage of certain sporting events, such as boxing, according to Privette. In addition, Apogee AE-12 subwoofers are located on either side of the stage. Along with the main speakers, 12 Apogee AE-4s and three AE-10s

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Please see Nov. 1991 Mix, p. 125, "Live Sounds"

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LIVE SOUND

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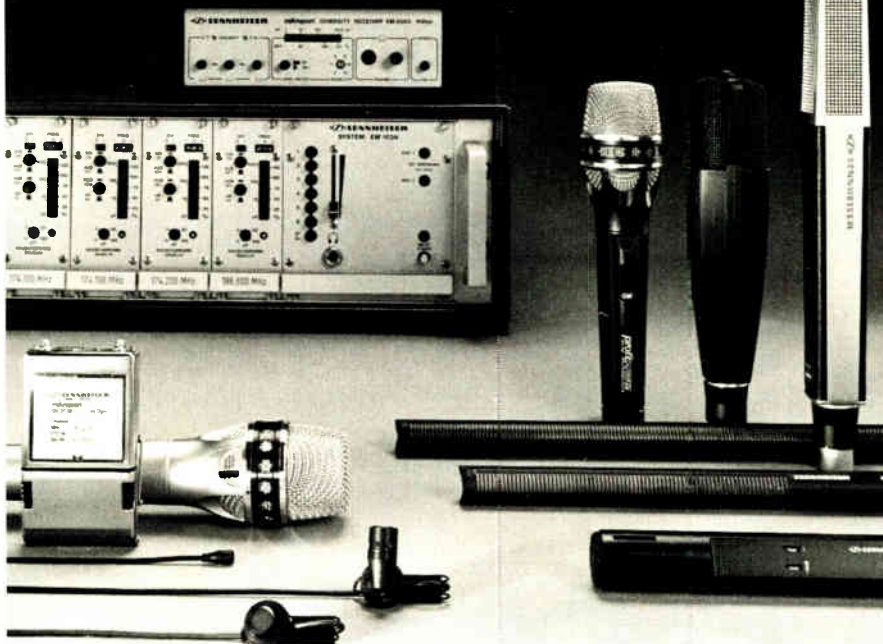
Rounding out the installation are ten Shure SM-58 mics, Atlas and Beyer stands, an infrared system for hearing-impaired listeners, and two hanging microphones above the boxing ring that are automatically mixed and fed to the house sound system if the house console is not in place. There are also two Clear-Com TW-12B interface units, which permit mating of external intercoms with the house intercom.

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Dan Daley is Mix's East Coast editor. To get to Madison Square Garden, you can use the same directions as for getting to Carnegie Hall: Practice.

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by Robyn Gately

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I assume that you already know what the sound engineer does. A road manager (often referred to as an RM) is responsible for everything that goes on—or goes wrong—on the road. Generally, an RM does not make travel and hotel

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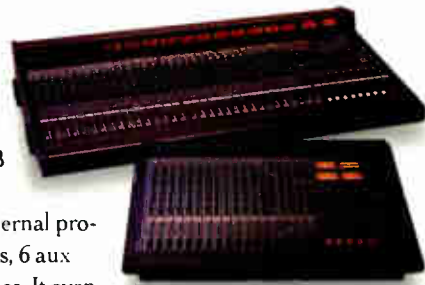
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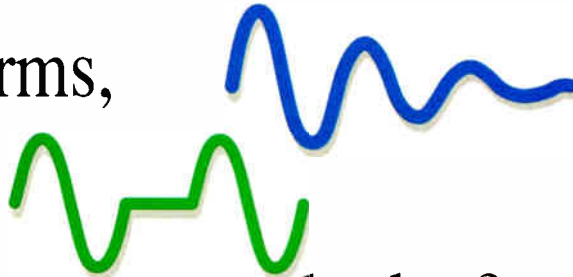


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arrangements; that's what the tour manager (or the office) is for. But the RM does deal with any problems on the road, so if the hotel or venue screws up, it becomes your job to make things right.

The biggest challenge facing the novice RM is learning how to think fast. Artists are not known for their patience, so it's crucial that you be able to quickly alleviate any worries.

One of the acts I work with is Judy Collins. She is well-known for having accomplished the impossible several times in her life. In the first five minutes I spent with her, I realized that any answer containing the word "no" would result in chaos. Nothing is impossible, so if she is told "no," she must then prove it *can* be done. Therefore, impossible requests need answers like, "I'll see what I can do," "I'll do the best I can," or, "I'll take care of it."

Road management is an extremely stressful occupation. You are required to have all of the answers *now*. For instance, at the end of the show, the promoter and concessions want to pay you; the band wants to know their pick-up times for tomorrow; the stage crew wants to get your stuff packed; the record company has 45 people coming backstage; and the star wants to know if the limo driver is waiting—all at the same time. And remember that the order you choose for handling all these people can determine whether you have a job tomorrow!

In situations where the promoter is paying a flat rate, I try to arrange to receive the check during the afternoon. Every RM can tell you stories about the promoter leaving without paying you—sometimes on purpose.

Organization Is Essential

The most important part of being a good S/RM is advancing the gig. At least a month before the show, you should obtain from your management office a work sheet (sometimes called a "gig sheet") containing the following:

- ✓ Date of show

- ✓ Travel arrangements, including plane flight number and time, car, van pick-ups at the airport
- ✓ Hotel with address, phone number and room service hours
- ✓ Distance from the airport to show
- ✓ Distance from the airport to hotel
- ✓ Distance from the hotel to show
- ✓ Venue name, address and phone number
- ✓ Promoter's name and phone number
- ✓ Sound, lighting and band equipment suppliers' names and phone numbers
- ✓ Any record company support
- ✓ Setup, soundcheck and show times

This information will allow you to call everyone connected with the show. Be aware that initial conversations establish the tone for the entire day of the show. If the promoter dislikes you after the initial conversation, your gig may go badly, so try not to react too negatively when you encounter any difficulties at this point.

This is also your first chance to discuss the promoter's responsibilities and your first opportunity to gauge the promoter. Someone who rushes the conversation is usually trouble. Be prepared to take 20 to 30 minutes to do it right.

Make it clear from the start that the artist pays for these phone calls. My phone bill averages \$250 per month, and I try to get everyone to call *me*.

Next, find out if the production people (sound, lighting, etc.) can do the job you want. Realize that your ability to help and teach may become extremely important, since XYZ Productions has never done a show this big before (and there is no other local choice). The "world's friendliest guy" can get the local crew to perform miracles and like it. If they label you a *!@=#, they can easily sabotage your efforts just by being slow to cooperate.

Starting your advance work four to six weeks ahead of time allows everyone time to prepare, and lets you eliminate potential

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problems and answer all questions.

A week before the date, I try to touch base with all of the principal parties. This gives me time to warn people if I see storm clouds forming on the horizon. Keep in mind that people will sometimes say things that reveal more than they might want. A promoter may not tell artist management if ticket sales are slow, but this is crucial information if the date is being played for a percentage of the door. So, pay close attention to the kind of information revealed to you.

A day or two before the show, I check the travel arrangements again. Always try to have the driver stand at the airport arrival gate (not in baggage claim) with a sign with *your* name on it, *not* the artist's. Artists generally like to travel unmolested, so don't call attention to them.

On the first day of the tour, go to the management office to pick up plane tickets, per diems for the

band members, copies of all contracts, itineraries and "road float" (money for tips, expenses, emergencies, etc.). Having a copy of the contract can be extremely useful. You will be amazed at how many times changes have been agreed to, and then forgotten, by management. When the promoter makes changes, it's a good thing to have your own copy. When your artists object to the changes, at least you have proof that someone agreed to the changes.

Upon arrival at the airport, check all baggage with the skycaps. Skycaps are convenient, but more importantly, if you are a bag or two over the limit, a skycap will usually let you go, but a counterperson can't.

This brings up the question of what baggage to check. Unfortunately, you can't carry everything onto the plane, so carry on the one piece that would stop the show if you were without it. With Judy, this is the dress bag.

Next, go to the gate and check

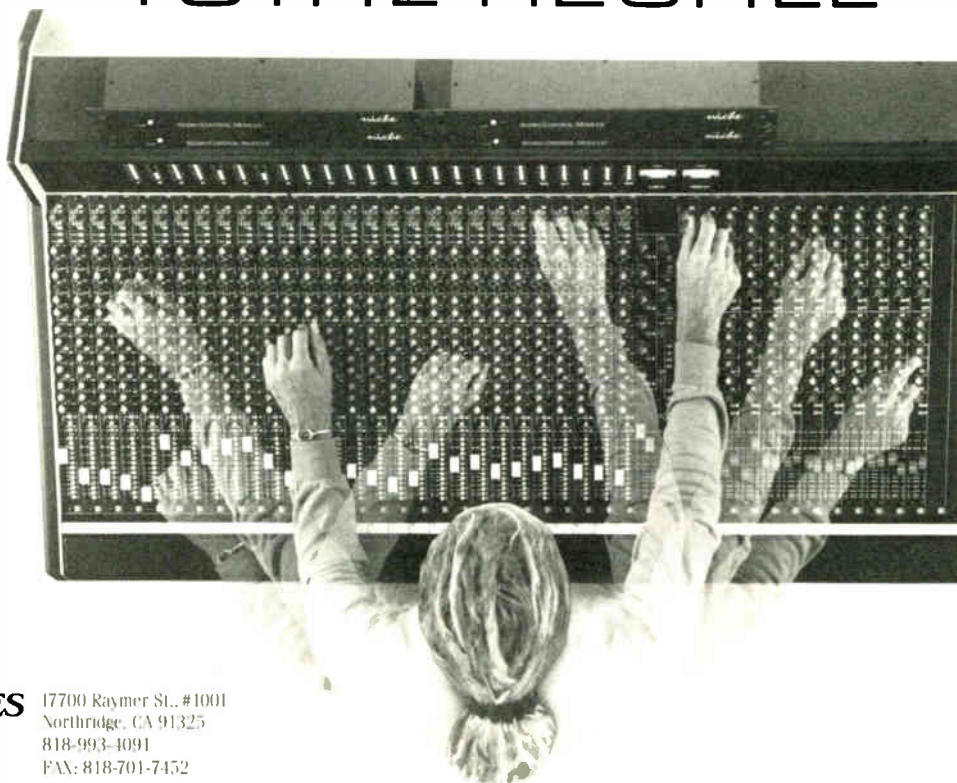
your tickets as early as possible. Have the gate agent confirm that all tickets and seat assignments are correct, and that your frequent flier mileage is put on the computer. This last point is important, because the only person who can use this mileage is *you*.

At the hotel, the RM usually checks everyone in and inspects the star's room. When checking in, give everyone in the band a list with the band's room numbers on it. Some hotels don't like to give out this information. For this reason, it's always best to have the travel person take care of this in the original conversation.

Next, take the artist to their room and check it out with them. In most instances, you probably could just hand the artist their key, send them on their way, and everything would be fine. But 10% of the time something is screwed up, so it's best to go with them. If you really want to impress, send performers shopping while you and the bellhop get the room ready.

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After the artist is situated, you're ready to prepare for the show. Once you arrive at the venue, the first ten minutes are crucial. During this time, everyone formulates their opinion of you and decides whether they're going to work with you or against you. I always carry the artist's newest release on cassette and CD so that I have a "gift" when I meet the promoter. In that meeting, I try to establish that we are all going to have a good time, and we are all working toward the same goal: a profitable show everyone would like to do again someday. After all, your artist wants to come back and play this town every few years, forever.

Your goal is to establish a friendship with the crew in general; then, ten minutes after you get there, deal with any problem areas. Never grapple with problems immediately on arrival: You will destroy the tone of the day. If, after you've established your rapport, you are aware that someone has screwed up, then take care of the situation. I have occasionally had to take someone to another room to read them the riot act. It doesn't help for everyone to know you can be a monster, but everyone expects that RMs can hold their own in any situation.

Due to the nature of Judy Collins and how I run her show, I actually mix her sound and semi-call her lighting. This requires the lighting company to provide a lighting intercom at the sound board. Even if you don't call your act's show, this is a good idea, because communication regarding the house lights, bringing the band onstage, etc., is almost always done on that intercom.

While the stage is being set up, see that the dinner arrangements are correct and make sure that the dressing rooms have what you need—mirrors, towels, bathrooms, etc. If your act requires showers, please check them! You don't need the aggravation caused by showers that don't work, or ugly, moldy shower curtains. I have never had a promoter complain about the

three dollars a new shower curtain costs.

Once I know all the necessary equipment is on site, I use the artist's CD to check out the main PA system. Everyone has their own opinion on how to do this. I prefer to keep it simple: Get rid of the EQ and make the system sound as good as possible by balancing the levels of the crossover, take a quick walk of the room to make sure you have even coverage, then re-insert the EQ to fix any minor problem and go!

If there is a great deal of EQ necessary to "fix" the system, something is wrong somewhere. Now the question becomes, how much to do? It all depends upon your experience and point of view. There are times when I have just dealt with the system as is, and others when I have re-worked the gain structure and aligned the system for the sound crew. Part of that decision should be based on time and the friendliness of the crew. I believe in sharing information in the business. If you know something that might help someone, why not share it?

After the mains are ready, get the band onstage and do their monitors. The only way to pull a quick soundcheck off is to prevent the band from taking over. It takes a lot more time for everyone to yell their request to the monitor man than for you to walk the monitor mixer through your act. With Judy, we start from stage right and go straight across to the musicians on stage left. The entire process should take less than 15 minutes. Now you're ready to do the house sound.

The biggest conflict in being a sound engineer/road manager is *time*. There are no two-hour soundchecks any more. If you can't make it sound great in a song and a half, it's time for a new engineer. You have to be speedy. My personal goal is always get drum sounds in under two minutes. This means that I take my first good listen to the drums (and all other instruments) while the band is playing. After a quick song or two, I throw the



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LIVE SOUND

band off the stage.

If I still need to work with one or two instruments, I have those particular musicians stay behind and work with me. If the band needs more time for soundcheck, then in all probability, they really need rehearsal time. As far as I am concerned, rehearsal time is *their* time. I may stay at the house console to touch something up a bit, but, in general, once that second song is over, I am up on the stage making sure everybody is cool with their monitors, and then I'm off to the next thing on my list.

Concessions are important to any mid-level act. The extra money daily can often be equated to paying your salary. If you do have concessions, they'll almost always be sold by the theater. This means that you're paying the theater a percentage, usually 20%-30%. Recently, a theater asked for 40%. I turned them down because the return for the act was not enough.

After soundcheck, talk to the piano player and see if the piano needs to be retuned. If your show is outdoors, the piano should be re-examined after soundcheck and kept covered. You also might want to ascertain whether any doors from the stage to the outside might be opened during wintertime. Sometimes, the opening act gets the door opened, completely destroying the previous tuning.

When soundcheck is over, do a quick lighting check. Now, it's assumed that most sound engineers/road managers do not know a whole lot about lighting. It may or may not be helpful to learn something about the subject, but you should realize that the more you know, the greater chance you have of getting bogged down in what is already a *very* busy day.

My lighting stays on the simple side. I establish a simple color scheme and leave the "fun" to the local lighting technician. I do take the time to lead the spot-light operators through the show. After all, no one is going to know the solos, etc., better than you.

Once you've finished with the lighting, see if the guest list is ready. Since guest seats are usually in a prime position, having these seats empty may result in a noticeable hole in the audience. If your show is sold out, giving up these unused seats is the equivalent of handing the promoter extra dollars. They *like* that.

Have the local crew sweep and wash the stage after soundcheck. I remember working with Lionel Hampton once when the stage wasn't washed. When he hit the part of the show where he does his dance/shuffle across the width of the stage, the horn section (which was downwind) was incapacitated by the huge clouds that rose up with every step.

I carry a written printout of everything that needs to be done in a day. Some of the duties include placing water glasses onstage together with set lists, and ensuring that any guitars are in tune. (Bet you're glad you bought a digital tuner!) Also, write the name of the town you're in on the star's set list, and see that the driver is really going to be there after the show.

And Finally, Ladies and Gentlemen, It's Showtime!

Before I get the act, I check the monitors to hear all the instruments and vocals; then I have the house turned on to hear the most important vocals coming back from the house. After I get the act to the side of the stage, I cruise as fast as possible to the house mixing position. Once I'm there, I grab the lighting intercom, have the house lights turned down and bring the stage lighting to 100% blue, which signals the act that I'm ready to go.

The pinnacle has been reached, and it's all downhill from here. If you've forgotten anything, well, it's too late anyway. Hopefully, you won't hear about it later.

So, the show happened, nobody died onstage and the audience went away happy. You're not done yet. Remember the flurry of activity I described at the

—CONTINUED ON PAGE 166

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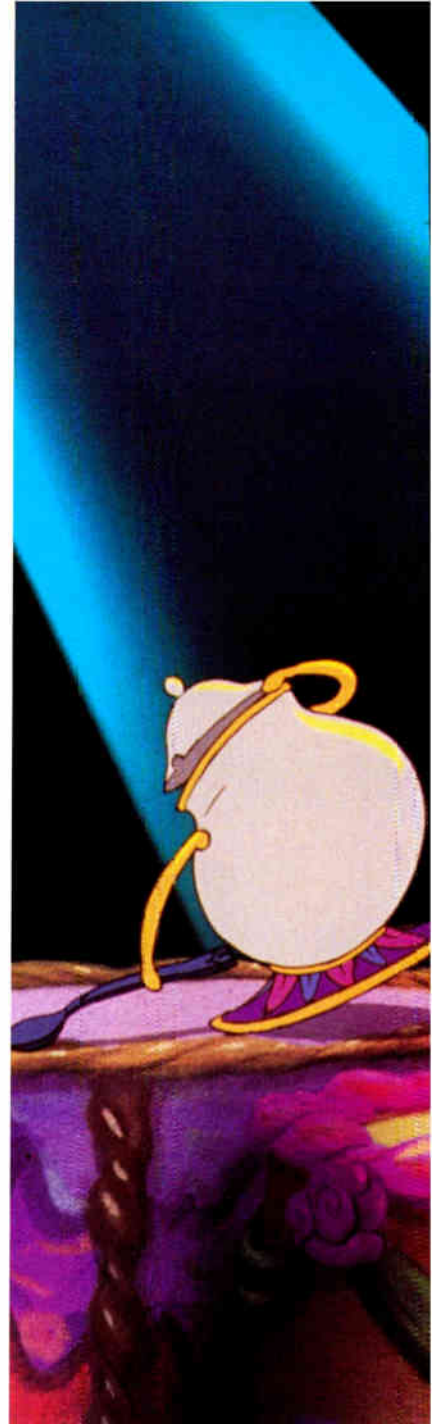
AND THE BEAST

*I*t is difficult to get past picture and talk about sound for *Beauty and the Beast*. The animation is so rich, detailed and lively that you walk away wondering, “How do they do that? How do they paint a ballroom scene with such spatial textures? How do they so convincingly humanize a candelabra? Who dreamed up those colors?”

Then a little later you start humming the “Belle” song, throwing in an odd lyric or two. The memory of an operatic wardrobe brings a smile. And who can forget the snarls and growls of the wolves on the way to the Beast’s castle? The animation, you realize, gives the picture life; the soundtrack gives the picture punch.

Beauty and the Beast, released Thanksgiving weekend 1991, is Walt Disney Pictures’ 30th animated feature film, its fifth classic fairy tale adapted for the screen. The project spanned three-and-a-half years,

by Tom Kenny *Animation Stills: ©The Walt Disney Company*



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Buena Vista Sound's D Stage, where Beauty and the Beast was mixed. From left to right, the re-recording team of Terry Porter, Mel Melcalfe and Dave Hudson at the Harrison PP-1.



PHOTO: RICHARD GLENN

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World Radio History

requiring more than one million drawings—226,000 individually painted cels! As is typical in Hollywood these days, the sound engineers for the final mix were allowed four weeks.

Luckily, the re-recording team of Terry Porter, Mel Metcalfe and Dave Hudson—all Buena Vista Sound staffers with impressive sound portfolios—were handed premium elements. The score includes six original songs created by Oscar-winning composer Alan Menken (*The Little Mermaid*), with lyrics by the executive producer, the late Howard Ashman (to whom the film is dedicated). Effects were created by co-supervising sound editors Mark Mangini and Dave Stone of Weddington Productions, with assistance from John Pospisil. And voices? Some of the best from stage and screen: Angela Lansbury, who plays Mrs. Potts and sings the title track, David Ogden-Stiers, Paige O'Hara, Richard White, Jesse Corti, Rex Everhart, Jo Anne Worley and...Robby Benson as the Beast.

Voicing the Beast

Robby Benson as the Beast? The same boyish voice from *One on One* and *Ice*

Castles? Apparently, dozens of people auditioned for the part, and Benson sold the producer, directors and everyone else on the strength of his performance, blending the warmth of a human prince with the ferocity of an eight-foot monster. Still, the first question asked of Mark Mangini in his initial interview was, "What would you do with the Beast's voice?"

"My suggestion was to re-voice him," Mangini remembers, "a more stentorian voice that we could grab onto with processing gear to deepen up. But they were sold on the performance, and their biggest concern was, 'What can we do to make this better?' I told them quite frankly that I had no clue. I was worried about it. I think I flunked my first interview.

"Actually, I knew then that I would add animal sounds in and around it," Mangini adds. "His performance was just spoken word, but he had to behave like a beast. He was animated to prowl and growl and roar. So we came up with a technique of cutting fore and aft of everything that he said with growls and purrs and things like that from tigers and camels. Then, of course, for sounds that stood in the clear like a big

beast roar, it would be stand-alone, processed tiger mixed with camel mixed with bear—live animals, all sounds that I went out and recorded, getting in a pen with my Nagra or DAT.

"Most of the beast turned out to be camel," Mangini explains. "Camels seemed to be the animal that sounded most like Robby Benson, if that makes any sense. Occasionally, Robby would come into or go out of a line with a growl, trying to make the track as complete as possible when they recorded two years ago. When it was pitched down, some of that stuff sounded okay, and we thought of it as a bridge between Robby's voice, Robby's growl and an animal to finish it up. We figured if we could match that with the other material, we would have this seamless blend."

About six months before Mangini started adding in camels, however, lead mixer Terry Porter began experimenting with processing on the voice. According to Porter and others, the tim-

The songwriting team of the late Howard Ashman (l) and Alan Menken, with the orchestra behind the glass.



PHOTO: ©THE WALT DISNEY COMPANY

See Page 192 for Reader Service

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M A G I C T H I N G S

bre just didn't match the visuals, so they brought it into pre-post for a little magic. The main processing tool ended up being a pitch-shift program from an Eventide H3000 Ultra-Harmonizer.

"We had to address it line by line and shift him down depending on the delivery," Porter says. "I also found another program on the Eventide that created lower harmonics, which I could add to the voice to reinforce the low end. Besides dropping the voice, this created another part of the voice in the lower spectrum, which helped. I also used a limited-band dbx [120X] boom-box to again reinforce some of the low tones. For a voice, you could get it down way too low, so I had to cut off a lot of low frequencies and pick up a spectrum somewhere between 50 and 100 cycles. That one I used for salt-and-pepper—just a little bit."

As expected, once Porter started harmonizing and dropping the voice down, intelligibility became a concern. "We were able to bring back some of the intelligibility with just pure equalization on a line-by-line basis," Porter explains, "making sure that we kept a nice clean top end with a little spike in the upper-mids to put some bite in his voice. When he's angry at the beginning of the movie, I'm using the tools a lot more—a lot stronger on the low end. And we do decrease that as the movie goes on."

While the Beast's voice was by all accounts the most challenging sound design element, the film lends itself to all sorts of interesting effects and sound moments. The creepy forest that separates the town and castle is filled with plaintive baby cries and cat meows, slowed down to half- or quarter-speed, not to mention the wolf sounds, which are actually 90% pit bulls. The candelabra character, Lumiere, constantly waves his "arms," gesticulating with fire. Strangely enough, the fire sound is Foley, because it needed to be articulated to match the action. Foley artist John Roesch simply blew across a Sony ECM-50 lavalier mic, and with a little bit of highpassing to take off the rumble, it turned into fire. And just listen to the transformation from Beast to prince, the climactic moment when inner beauty reveals itself—it sparkles. Finally, much of the action takes place in a cavernous 18th century French castle, with all the ambiances that implies.

Reverb, Reverb, Reverb

Back when Mangini and Porter teamed

up on *Star Trek IV*, Porter came up with a system for creating a separate reverb premix so that ambience wasn't locked to the dry dialog tracks. That way, if someone didn't like the feel later, it could just be dumped. But the reverb was textured to fit every scene, so if you needed it, it was there. No futzing in the final.

In this film, Porter and company were dealing with enormous rooms, intimate dinner table settings, courtyards in a storm...you name it. And, of course, the voices and lyrics had to be heard. "I try to mix a dimensional dialog," Porter says. "So often when you're trying to play perspective on dialog, the most common thing is to adjust levels. You want distance, you drop it way back. I find that in the real world—meaning, the audience reaction—dialog gets lost when you try dropping levels too much for perspective. I try to keep basic levels the same and give dimension with echos, delays and slap echos. I alter levels a little bit, but not as much as you normally would."

Porter makes extensive use of his Quantec Room Simulator (accessed via the Macintosh) and writes programs into a Lexicon 480. He also uses a Lexicon 200, the Eventide H3000 and even an old 949 for the delays. He often combines, layers and blends into a single machine.

"Most of the reverbs that come out of a single machine are really nice," he says. "But in stereo it's nice to spread them out left-center-right-surround with multiple reverbs and characteristics, all within one reverb. On some of the big shots, I would probably have ten different channels of reverb spread out into the different speakers, with different delays, contouring, reverb times—to make one reverb."

One scene, in particular, stands out. It's Mangini's favorite sound moment, though he had nothing to do with it. Gaston, the rival for Belle's affection, has stormed the castle to kill the Beast. They are outdoors, in a second-story courtyard, with thunder, lightning and rain cascading all around. Gaston yells for the Beast to show himself, and his voice becomes an eerie, operatic tenor, bouncing off the walls, so that for a moment, you ask, "Is he inside or outside?" Porter reveals it was more than a slap delay:

"That's a combination. I used both Eventides to get four separated delays, and then sent each of those through my 480 and Quantec to pick up reverbs on the delays. And I used the 200 to pick

up a real thin reverb on the dry voice. On the 480 you can get secondary delays within the reverb. So the main component is the delay, but with each delay there are secondary delays with reverb on them. Definitely, with the effects and music in the scene, you hear the slap. But a dry slap wouldn't sound right. The combination smooths the slaps out and elongates them.

"Again, that one is sent out left-center-right-surround, with a very large delay reverb in the surrounds so that it trails out behind you with each delivery of the line. That always helps to keep the focus on the screen. I find that when I go into surrounds with reverb, it's best to keep the delay quite a bit away from the front screen. The last thing you want is to start hearing—especially if you're in the back of the theater—something in the surrounds preceding the front screen. Very distracting. You don't notice it if it's a far enough delay behind the screen. It just becomes part of the ambience."

"He's one of the few mixers who loves tasty, unique reverbs in every scene," Mangini says of Porter. "He not only loves to ride reverbs, he loves to work those delays and ride them through a scene. He loves to ride EQ as a character turns. In animation, you record the voice on-mic, up-front. But Terry will put that sort of live recording quality back into it—you know, if somebody turns off-mic, he'll roll off a little top, roll off a little bottom. The character turns back on-mic, and he puts that curve back into it. He gives it a live-action feel, which creates that verisimilitude you need to help sell something that's such an artifice, which is a cartoon."

Actually, cartoon is a no-no word on the Disney lot, and this animated film feels nothing like Saturday morning. Part of that is because most of the animated characters in *Beauty* are human-based—no anthropomorphic dogs here (though there are anthropomorphized tea pots and dinnerware). And studio head Jeffrey Katzenberg wants to move away from previous Disney projects, which called for very few effects, and toward a live-action soundtrack. The seam that holds the two eras together is the traditional Disney music. And in *Beauty*, the music is stunning.

Original Score Recording

Beauty and the Beast is wall-to-wall music. You never really get away from it—six songs and a beautiful, melodic,

pastoral underscore. The songs were recorded in New York City with a 65-piece orchestra (mostly from the New York Philharmonic) at BMG's Studio A, mixed by Mike Farrow; the underscore was recorded on the Radford stage at the Sony lot (formerly the MGM lot) in Culver City, Calif., mixed by John Richards at Evergreen in Burbank. Overseeing the 18-month process was music editor Kathleen Bennett.

"This film is the music," Bennett says, "and I know I say that from a biased viewpoint, but it truly is built around the songs. They are integral to the story."

All songs were recorded well in advance of final picture, as storyboards and pencil tests were coming together. The orchestra came in first and recorded to a Mitsubishi 32-track digital machine. Vocalists came in for overdubs. When the songs called for a choir, such as the opening number, "Belle," or "The Mob Song," a 24-track vocal slave was added for appropriate size. The 16-voice choir was doubled and sometimes tripled when action called for the whole town to sing. Then everything was remixed to 24-track analog with Dolby SR.

"On the 24-track, we had three channels of left-center-right orchestra, with all the vocals separate," Bennett explains. "Because the process was so long, many times over the past year the people in editorial had to pull mag from that 24-track. So we tried to mix it into a configuration that was going to be useful for any purpose."

"Another one of my jobs," she continues, "was to provide editorial/animation staff with a variable click tempo for what's known as beat readings. That's how they determine where a particular action should take place. Part of where I got that information was the 24-track. We recorded all of the songs free-time, so after we recorded I had to build a variable click track for all the songs. It also helped in case we wanted to go back in later and sweeten a particular character movement with harp gliss or a horn blat on the orchestra track. We did this extensively on *Little Mermaid*, and this is where I learned to do it right. On *Mermaid* I was provided with a final vocal track, laid against a scratch synth and piano track. I had to build a variable click track that we recorded the orchestra against. We then had final orchestra with final vocal, but it was like putting the cart before the horse."

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Disney lot, and Bennett arranged for song tracks to be delivered to editorial in various formats—single-stripe, full-coat, whatever—to fit all potential purposes. Editorial then took the tracks and cut rough animation to fit the music tracks, in individual units.

"We had very little trouble in the final dub, just a little EQ," Bennett says, a sentiment echoed by music mixer Mel Metcalfe. "And you'd never know that [the score and underscore] were recorded not only in two different places, but at two different times with two different orchestras and two different mixers."

"You go out whistling those songs and singing the lyrics," adds Terry Porter. "And the whole feeling under the songs—with the input of Mark and our effects mixer, Dave Hudson—of keeping a live-action sound always underneath it, is absolutely wonderful. There are no egos here. If music handles a moment just right, Dave is more than happy to pull the effects out. And if an effect is playing a moment right, Mel will make sure that he pulls the music back in the right spot. In animation, you can get away with not playing a real effect if the music is

stinging something, where it just doesn't feel right in live action. That's what I love about animation: There are no rules."

"You have to look for the abstraction of the action as opposed to taking it literally," Mangini interjects. "That's true in all animated material because it's this make-believe world where you can do anything. Of course, it's a natural playground for sound nuts." ■

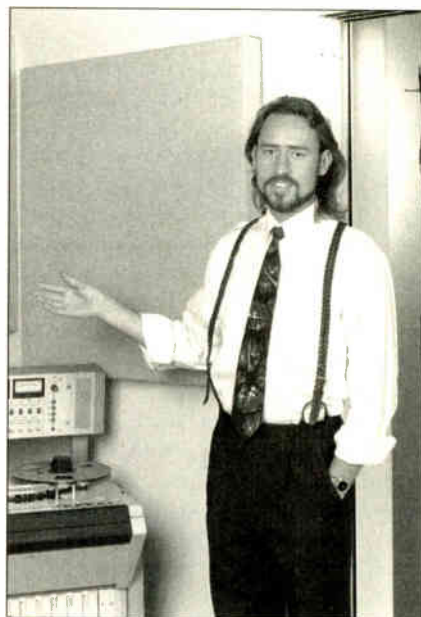
Tom Kenny is a Mix associate editor.

Buena Vista Sound Goes Full-Service

Not many sound facilities can boast a 51-year history. Released in 1940, *Fantasia* was the first animated feature to come out of the Disney lot. Now, half a century later, *Fantasia* has been restored and released on video, bringing the process full-circle, with the remix handled in essentially the same building as the original.

In those 51 years, Walt Disney Studios has become much more than a

producer of animated features, and Buena Vista Sound has become much more than an in-house sound department. Disney is a tremendously prolific producer of entertainment products. Most of the feature film work is still handled on the lot's soundstages,



Chris Carey, director of Buena Vista Sound, in Studio 5A.

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though much of the television sound work is sent off-site. Disney gets first crack at booking the stages, but it's now to the point where roughly 50% of Buena Vista Sound's business comes from outside clients.

To attract those clients, Buena Vista Sound now offers complete, full-service post-production facilities. "For us to be a full-service department," says Chris Carey, director of Buena Vista Sound, "the last area we needed to expand into was sound editorial—that is, the actual recording of sound effects, cutting them into sync with picture and preparing them for the dub stage. We have been hired for a Hollywood Pictures feature film—the newest of the three filmmaking companies under the Disney umbrella—called *Straight Talk*, which will be released this spring. That will be our first full post-production sound feature, where we will have done everything from the ADR, Foley, editing, sound effects recording, mixing and print master." Sound editorial will open with conventional film-style editing, though Carey expects to add electronic editing systems within the year.

The company also has acoustically redesigned a small, all-purpose, high-

quality monitoring environment known as Room 5A, opening on January 1. It houses a Neotek Encore console, JBL monitoring and an Otari DTR-900 32-track digital recorder. Its genesis was to handle the archiving of the entire Disney sound catalog (see *Mix*, September 1990, p. 33), transferring to digital multitrack. The archive department is now one year into the seven-year project.

But 5A has taken on so many roles that it might soon need a twin. It's being used to shoot stereo optical sound negatives, to ensure Disney quality right up to the final phase. It doubles as a mixdown room for foreign home-video variant mastering, where dialog tracks are provided in up to 20 foreign languages and assembled into a print master for worldwide release. Finally, it serves as a listening room for new pieces of equipment—basic testing and experimentation are done here before new equipment hits the dub stages.

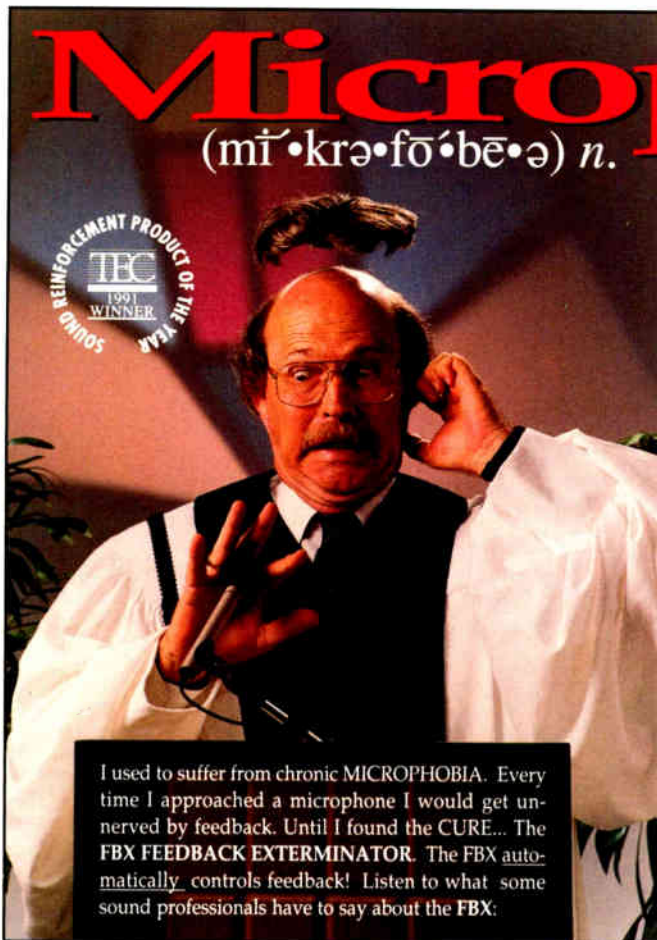
Buena Vista Sound has also renovated and restored all sound facilities on the lot over the past three years. Stage A was renovated in 1989 and now offers video and 35mm film-based dubbing capability. A Harrison PP-1

console was installed, along with a custom THX monitoring environment (Electro-Voice components) and 33 Magna-Tech 10000 and 2000 Series dubbers linked with Otari 24-track analog and 32-track digital recorders.

Stage D, where *Beauty and the Beast* was mixed, also received a structural overhaul, mainly a shortening of the hall and complete rewiring of the building. Again, a PP-1 was installed, as were custom THX monitoring, 32 Magna-Tech reproducers, three 35mm recorders and the capability for three 32-track Otari digital machines (two are there currently).

Stage C now holds a Solid State Logic 5000 console, with many of the same machines as the other two dub stages. Stage B features a custom Larson Technology/Sound Workshop board and is used for ADR/Foley work. Stages A and B feature a JSK Engineering motion control system, allowing machine room operators to manipulate any combination of picture or sound elements from tape or film sources. Buena Vista Sound also operates two ADR/Foley stages, named Buena Vista East, on the site of the former Rubber Dubbers in nearby Glendale.

—Tom Kenny




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by Mr. Bonzai

BRUCE SWEDIEN

THE MASTER TOUCH



The day after Bruce Swedien's induction into the TEC Awards Hall of Fame in early October, I had lunch with him and his wife, Bea, at their old and elegant Manhattan hotel. Our surroundings established a reflective mood for an illuminating conversation with an engineer who has broken some records. Michael Jackson's Grammy-winning *Thriller*, which Swedien engineered, is the biggest-selling album in history. Swedien's engineering earned him another Grammy for Jackson's *Bad*, the first album in history to have five consecutive Number One pop hits by a single artist.

Swedien, the master of modern recording, started out when mastering was done on a lathe in the control room. He captured some of the finer moments of the '50s with greats like Duke Ellington, Tommy Dorsey, Count Basie, Stan Kenton and Woody Herman. The '60s yielded such pop classics as "Big Girls Don't Cry," "The Duke of Earl" and Jackie Wilson's "Higher and Higher." Swedien's four-decade friendship with Quincy Jones

culminated in a 1990 Grammy for *Back on the Block*.

Swedien's round-the-clock recording schedule was luckily suspended the weekend of the TEC Awards. As Bea pushed the room service cart away, Bruce and I retired to the sofa for coffee. His incredible history rolls out in a Swedish-tinged baritone, frequently punctuated with deep belly laughs. He has a Kris Kringle twinkle in his eye, and I felt like it was time to open some gifts. Alas, Swedien is legally forbidden to discuss his work with Michael Jackson (how '90s!), but his work with MJ is just a small part of this recording legend's story.

Bonzai: I understand you're working on a book about the evolution of the recording industry. Why are you the man to tell the story?

Swedien: I'm one of the few guys fortunate enough to have been through the musical revolution and seen it from the inside of the control room. And I'm still doing it, still in the studio scuffling to get a hit record today. [Laughs]

To take you back to the beginning,



PHOTO: MR. BONZAI

Bruce Swedien
at Larrabee
North in
Universal City,
Calif.

I come from Minneapolis and a conservative Scandinavian background, where there's not a whole lot of emotion shown. It wasn't until I got to Chicago and met Duke Ellington that I found out it was okay to be insanely involved in what I was doing. It consumed every moment of my life, and it was all I thought about.

When I started in this business as a youngster in Minneapolis, the goal of recording a popular record, or any kind of record, was to present the music as though the listener were there, and to re-create the original sound field with as much accuracy and clarity as we could. I graduated from high school in 1951, but I had already been working for several years in small recording studios. I was thoroughly immersed in music.

One record, in my estimation, is responsible for the major revolution I'm talking about: Les Paul and Mary Ford, "How High the Moon." It was so successful and broke through like a shining light. All of sudden it dawned on me, and perhaps subconsciously the public realized it as well, that it was no longer necessary to present popular music in concertlike form. I discovered that it was perfectly all right to bend reality. On that record there is only one instrument and one voice—Les Paul plays all the instrumental parts, and Mary Ford sings all the vocal parts. There isn't a shred of reality on that record.

From that point on, recording took a lot of turns—all of which are fascinating to explore. But that one record *forever* changed popular music. I talked to Les last night about it, and he, of course, denies that there was any real pioneering being done by him. But that record was a turning point, and we've never looked back.

And Bill Putnam, my mentor, made incredible contributions to the evolution of recording. He brought me from Minneapolis to Chicago in 1957. When I was young, I used to talk to my mom and dad about these records that I heard on the radio. One in particular stands out in my mind: "Peg O' My Heart" by The Harmonicats. Bill made this recording at Universal in Chicago, while I was just starting in high school. I wore out many copies of that record. I believe it was one of the first, if not the first time, that anyone used echo for artistic effect.

Bonzai: How did he do it?

Swedien: Actually, he used the men's room in the Civic Opera building in Chicago. Bill would put up a sign outside the restroom—"Men at Work" or "Wet Paint"—so they could use the room as a chamber. Sometimes they would be recording, with a speaker and a microphone in there, and people would ignore the sign and you had the sound of a flushing toilet on a take.

Anyway, I was trying to figure out how it was done. Bill was inventing the way that we use reverb today, which is to have a separate audio send from the microphone into the chamber and then return the output of the chamber to the mix, thereby using artificial reverberation for artistic effect.

Bonzai: It's easy for us to take these things for granted, because they seem so obvious.

Swedien: Yes, I know, and Bill literally invented that concept. That's pretty serious. Think of him coming up with that, from ground zero. You see, I was driving my parents nuts, and they are responsible, along with my wife Bea, for any success I have. My mom and dad were totally supportive—as Bea is—of everything I did. I almost burned the house down on many occasions. Plaster falling off the walls, short circuits, blown fuses, holes drilled through the walls for speaker wire and that sort of thing. Their attitude was, "No problem, just go ahead with what you have to do." I even built an illegal radio station in the garage.

I finally found out who recorded that Harmonicats record. It wasn't easy, because in these days engineers weren't credited. I could hear the reverb, but I wanted to know why that record sounded so much better than anything else that was being broadcast. I found out that Bill Putnam was responsible. I think my parents just got sick and tired of me talking about Bill Putnam this and Bill Putnam that. I had been telling them about Universal Recording in Chicago, so when my mom and dad were in Chicago on a business trip, they went to see Bill Putnam. He took my mom and dad—total strangers off the street—into the studio. They told Bill about me and how I loved what he was doing. Bill was doing a session and brought them in and introduced them to everybody, and they sat in on a gig with Bill! After that I started talking to him on the phone and

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that. After a while you just don't think about it. It's kind of like "Tracks R Us." The concept of using the multiplexing technique with multitracks makes it impossible to have a worry in your mind. If I want to overdub an instrument and feel it will have more of an emotional effect in the final product as a stereo image, then I will do anything to get that.

Bill taught me that as soon as you get away from stereophonic miking, you lose the polar image of the sound source. By stereophonic, I don't mean left-right mono. To me, that is one of the most boring techniques ever. I'm mortified when I see people recording a piano, and they have a mic over the low strings and another over the high strings. That has nothing to do with how a piano sounds. To me, that is left-right mono and not very interesting.

Bonzai: How do you record a piano?
Swedien: I usually use a coincident pair to preserve the overall image. The low frequencies are non-directional anyway, so you will hear them on both mics. That's a fact, and there's nothing you can do about it.

Bonzai: Could you comment on your use of the best of what digital and analog have to provide?

Swedien: I love digital. I really do. What it does well, it does so dramatically well that there is really not much discussion. But, by the same token, I have a little voice inside that says, "Don't give up your analog machines." I learned from Quincy Jones to listen to your instincts. That's hard for a lot of people in our business. We have a tendency to cerebralize what we are doing, and it's wrong. Music is organic in the human being. What we are doing must provoke an emotional response, not a cerebral response.

There is a big difference between a "beat" and a "groove." I'll go for a groove any day. The beat is repetition, but a groove can have dynamics and be very emotional.

Bonzai: So, if you go by your instincts, you must keep trying new things?

Swedien: Every day. I'm always messing around with something. I love new equipment and new techniques. A lot of people my age don't like to get into new things, but I've enjoyed a lot of major changes in recording formats. When I started in Minneapolis, there were no tape machines. It was direct-

—CONTINUED ON PAGE 191

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Phil Ramone photos by Michael Bloom

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Multimedia. The nouveau-chic word with the amorphous definition. It's not that multimedia hasn't become a pervasive word in the technical vernacular, it's just that no one seems comfortable enough with it to actually define it. Better to avoid such formality in case our usage of the word proves incorrect.

So how can we make money from multimedia if we can't even define it? Well, some people are convinced that they know what it means, and they're even willing to pay good money for it. These people are the ones who have information—volumes of it—that they want to communicate to other people. The traditional methods of communication are not working well enough for them; they want to reach more people, and they want to do it more efficiently and effectively.

Corporate clients are the patrons of the first wave of multimedia, with their demand for pro-

gram-length sales and training aids. Unfortunately for them, but fortunately for us, most of these companies are inexperienced in putting together audio-visual program materials. More and more, corporate clients are turning to firms specializing in advertising and promotion to produce

these programs. In turn, the ad agencies look to various studios to provide the technical work. Instead of the usual stream of 30-second spots, studios are now facing editing projects as complex as producing a television show. Not only must the video be edited, but narration and dialog must be re-recorded and synchronized with the video—and music has to be added.

So what's really new about multimedia? After all, you've been doing this type of work all along, right? There is a hitch: The way that information is presented to the consumer is changing significantly, which means shifts in the very fundamentals of our business. These changes involve the equipment used in producing the product and in the technical and creative roles that must be

filled. In particular, multimedia is a wide-open field for a new class of producers who can combine their knowledge of traditional audio and video production with technical chops of a different kind: computer literacy

Most multimedia productions start

with the client dumping a disparate collection of video, audio and text onto the producer's desk. Often, the clients have little more than a rough idea of what they want and expect the producer to sort it out. If you're putting together a training presentation, expect to learn a fair amount about the subject, and keep those plaid jackets handy, folks, just to get in the mood for that corporate sales promo. Polishing your writing skills isn't a bad idea, either, as the agencies may be good at coming up with a script for a commercial but pretty much lost when it comes to scripting multimedia. They'll expect your guidance (and enthusiasm) for their project all the way through.

In choosing the elements that go into a multimedia production, it's best to think like a television news producer. Even if the ultimate

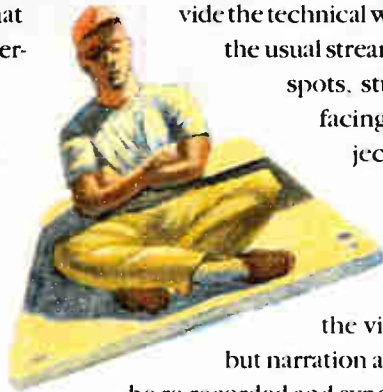


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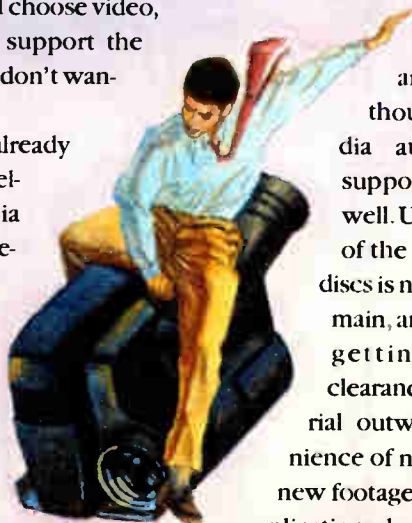
by **Brian D. Markey**

MEDIA

goal is entertainment, it's important to keep things concise and choose video, dialog and music that support the program's purpose and don't wander too far off base.

Most facilities have already worked with the basic elements of multimedia production. Video is recorded in much the same manner as any other program, though the editing process is a bit different. The videotape editor is normally responsible for taking a

number of short segments and assembling them



into one running program. The video sources are usually tape, although most multimedia authoring systems support videodiscs as well. Unfortunately, most of the material on videodiscs is not in the public domain, and the hassles of getting copyright clearance for that material outweigh the convenience of not having to shoot new footage. Since training applications dominate the demand for multimedia at the moment, you'll probably end up shooting a lot of custom video anyway.

The audio in multimedia comprises the usual stuff: dialog, music and sound effects. Some of the dialog will be synchronized with the video and may require ADR treatment. Other dialog may serve as narration and require synchronization with elements of the production other than video. The use of SMPTE time code as a timing reference

is still fairly pervasive, regardless of the elements being synchronized.

As for music, don't expect many clients to bankroll the production of custom music. Most still think of music as icing on the cake, and they're usually more interested in making a commercial statement than an artistic one. Needle-drop and sampled libraries usually suffice for the music and sound effects. However, this may not apply to multi-



media programs that are intended to provide entertainment, as commercial and artistic endeavors are not necessarily mutually exclusive.

Text is another common element in multimedia productions. Text is particularly important in training applications, because it allows the presentation to proceed at the user's pace, and it's easier to memorize text than spoken dialog.

In the production of a multimedia program, as with any A/V project, the best place to start is with a storyboard. In fact, most current-generation authoring tools—such as MacroMind's Director and IBM's Storyboard Live—use the storyboard paradigm in their user interface. Initially, you should build up a list of scenes and figure out the

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resources needed for each (e.g., video clips, audio, text, etc.). Then arrange the scenes on the storyboard. The frames go in presentation order, but in some systems (usually referred to as hypermedia rather than multimedia), the user can take little detours through the program material as he or she sees fit. The producer must plan these alternate routes for the user and create little signposts—called *hyperlinks*, in hypermedia lingo—for them to follow.

An old favorite, the edit decision list, comes into play in the final stages of the production. After all of the video and audio tape is edited according to the rough storyboard framework, paint and animation programs can be used for special effects, subtitling and general spicing up of the finished piece.

Once the production is complete, it has to be stored somehow for distribution to multiple machines. This is where things get sticky. First of all, if the presentation has any more than a trivial amount of digital video or audio, it won't fit on a floppy. Unbolting your hard disk and shipping that around, even if the presentation fits on it, is not a very attractive solution, either. Optical disc is the wave of the future, but currently available recordable optical discs are cost-prohibitive given the relatively small amount of data they can hold. The best bet is to store the presentation on the computer-data version of DAT, or some other computer backup-oriented magnetic storage format. From there, a number of services can convert it into CD-I format, which can be distributed on high-volume, read-only discs.

CD-I format is not the ultimate answer, however, as it has fairly limited applications. At the moment, there is no standard for a general-purpose, multimedia data interchange format. A group known as the Interactive Multimedia Association (IMA) is trying to change this, but progress has been slow. Apple is offering its Movie File Format—part of the QuickTime multimedia environment, which was scheduled for release at the end of 1991—as one possible solution to the interchangeability problem. Two multimedia data interchange formats—known as HyTime and MHEG—are also under development by International Standards Organization working groups, but it's likely to be two or more years before they appear as a part of commercial products. The current problem has a nasty side-effect: The multimedia program must be replayed

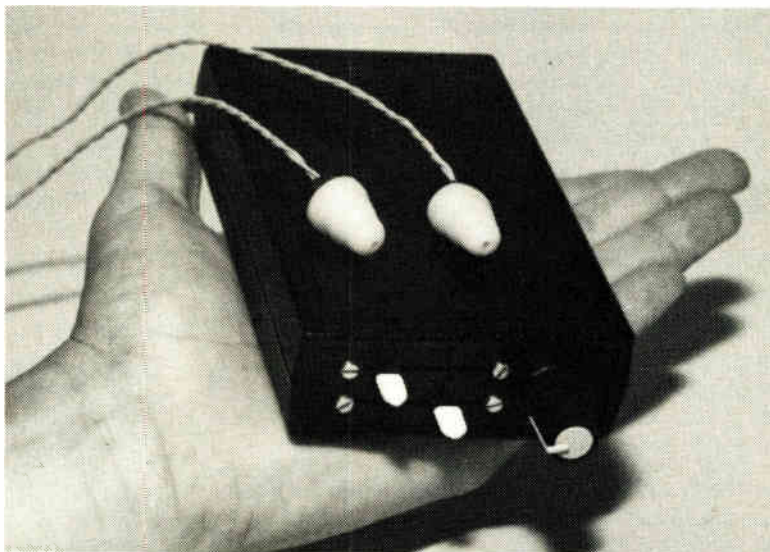
in the same hardware and software environment in which it was authored. This is why multimedia is not a hot consumer craze at the moment. Within a few years, the chaos should boil down to a reasonable number of interchange formats. Expect multimedia-oriented consumer appliances within five years.

Equipping a multimedia production studio is a matter of adding a few specialized machines and lots of software to a traditional audio-video editing suite. For multimedia authoring, a computer system with ample hard disk storage and a high-capacity backup

device are needed. Good graphics resolution is a necessity, and in some cases it is best to have multiple monitors and video cards installed. At the moment, the Macintosh is the authoring computer of choice. The Mac's position will probably be strengthened by the imminent appearance of QuickTime.

A word of warning: Do not expect one computer system to fill all of your production needs; the computer will run out of power long before you run out of uses for it. At the moment, it's not unusual to need three separate computer systems: one for authoring, one

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for video editing, and one for audio editing.

For videotape editing, it's best to stick with one format and subcontract any conversions. Industrial S-VHS is ideal; the quality is good, and the cost is not excessive. The quality of video that gets presented on a computer screen usually isn't an issue, as the video signal typically gets scaled, compressed or chopped way past discernible differences in input format. An Amiga with NewTek's Video Toaster makes a fine video editing and effects controller, with output recorded onto another S-VHS deck (or directly into the

video inputs on the multimedia authoring system).

For audio editing, a digital workstation provides the most flexibility. AMS, Lexicon, New England Digital, Studer and Digidesign all make systems ideally suited for this purpose. Typically, no more than four actual outputs are needed, but it's nice to have the capability to define many virtual tracks internally in the workstation. Direct digital connections between the authoring system and the audio workstation further simplify the editing process.

As you may have already con-

cluded, multimedia is not the bold, uncharted territory that some people are making it out to be. The technology problems are mostly centered around equipment we already use. The audio and video editing processes are shifting from the analog to digital domain, resulting in huge demands for data throughput in computer systems. And as old analog interchange formats fall by the wayside, new digital formats must be defined.

The bad news is that this definition will take a fair amount of time. The good news is that while chaos reigns in multimedia at the moment, there is still sufficient corporate demand to support a niche market for producers and facilities. Growth is certain to come, and those that stake their claim now will likely find even greater success later. ■

Brian Markey owns and operates Permanent Wave Productions, a Massachusetts-based multimedia production company. He has been a musician, software engineer, writer and ethnic foods enthusiast, with only the food enthusiast part having any tangible effect.

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A Multimedia Case History

I've been doing multimedia productions through my own company, Permanent Wave Productions, for a little over a year. Permanent Wave started out as a small project studio, mostly intended to satisfy my own needs for a place to record my band. The band fizzled, but we were still interested in utilizing the small studio we had built. We looked to fill a niche in video post, but that limited market was already being addressed by a few greater-Boston facilities. Ditto for commercial production.

So, I got involved with multimedia through my software engineering alter-ego, working for a large computer company. It was during this time that I met Ahmad Shreatch, the owner of Solutions Etc. Inc., a technical consulting outfit specializing in software and hardware training for computer companies and their Fortune 500 clients. The multimedia wave has already

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- ANALOG I/O: +4 dBs (+24 dBs MAX.) ADJUSTABLE**
- PARALLEL REMOTE: TTL COMPATIBLE, D-SUB 37**



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swept through the computer industry, but most computer-related training is still done with an instructor standing in front of a classroom. At any one time, there are thousands of people traveling all over the world to get to training.

A few visionary companies, such as Solutions Etc., are realizing that it's much more cost-effective—even profitable—to sell multimedia training programs as an adjunct to classroom instruction. Some companies already offer full-length courses that are distributed on various media. The three most prevalent formats are videotape,

video and audio.)

A majority of the work we do falls into the laserdisc category. Here's a quick overview of the functions we recently performed when putting together a fairly typical training presentation using laserdisc and interactive computer technology:

* Storyboard the production, first on paper and later on the Macintosh.

* Condense the training material. The course ran five full days in the normal classroom context. We helped the clients determine which part of the instruction required live video/audio

occasionally two, cameras. The main goal is to keep enough variety in the camera angles and effects to maintain viewer interest. We recorded the audio using a wireless lapel mic onto one of the stereo S-VHS tracks, with an alternate shotgun mic set above the instructor (but out of camera view) on the other track. The alternate track is good in cases where, at a critical point, the lapel mic falls down inside the instructor's shirt. In general, I find alternate tracks to be too ambient to be used alone.

* Edit the video. We do this using an Amiga with NewTek's VideoToaster and the editing features on our JVC S-VHS equipment. We might use a wipe or fade here and there, but most of the time we just need to break the video into manageable segments that start and stop without a lot of effects. The titling features of VideoToaster are very helpful when adding commentary or subtitles (we support multilingual and hearing-impaired applications) and for credits.

* Edit the audio. We copied the voice tracks off the videotape, synchronized with SMPTE, to a multitrack recorder. Our budget doesn't allow us to have a full-blown digital video-post editing system, so we use a combination of standard razor blade techniques and what I like to call "poor man's ADR": We re-record whatever we need into an Akai S1000 sampler and then fly the sampled voice in using a MIDI sequencer with SMPTE-lock capability. Unfortunately, this method doesn't work too well for foreign language voice-overs and other aspects of ADR, so we're in the process of evaluating several digital systems. We're hoping to sell our stock of razor blades any day now...

* Add the music and effects. All of PWP's staff members are musicians, including composer/arranger/key-boardist extraordinaire Charles Carpenter. It's no problem for us to whip a little something together on the multitrack. Effects, what little call we have for them, come from a sampled library for the Akai S1000.

* Mix the audio tracks back onto the videotape. In our case, the mixed result is copied to the S-VHS Hi-fi tracks. At this point, the videotape is equivalent to the master for the laserdisc(s) that we'll produce later. In other words, we've boiled all the video and audio down to a number of S-VHS tapes. The tapes usually get transferred to 1-inch format at a larger video studio and then

**The multimedia wave
has already swept through the computer
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still done with an instructor standing in front of a
classroom. At any one time, there are thousands
of people traveling all over the
world to get to training.**

laserdisc with computer control, and CD-ROM Interactive multimedia.

Videotapes are an obvious choice, because virtually everyone who buys training materials has access to a VCR, and the production of videotape is a fairly inexpensive and well-understood process. Laserdisc is similar to videotape, but with the additional advantage of random-access and computer control, which makes it possible to provide interactive training. The newest wave is CD-ROM Interactive multimedia, but that has certain limitations; among them is a limited storage capability of around 660 megabytes. (It sounds like a lot, but it's not much when you start talking about uncompressed digital

and which parts could best be expressed through other means (e.g., text or graphics). The goal was (and always is) to put as much material onto as little media as possible. In this case, we condensed the video down to five laserdiscs for a run-time of about seven and a half hours (it still takes two to three days to go through the entire training program).

* Record the video and audio. Once we determined what sections needed to use live video, we sent out a camera crew that we hired from a local cable television facility. The video was shot using the same instructor who gave the classroom version of the course, with the classroom as the set using one, or

sent to the laserdisc mastering facility. The mastering process is most often out of our hands. Large companies, especially the computer companies that make up the bulk of our clientele, produce a lot of digital media and generally have a strong relationship with mastering and manufacturing facilities.

* Hire graphic artists who use various paint and presentation programs for the Macintosh to create the text and graphic images. In some cases, the artists scan images from the books that are used in conjunction with the classroom version of the course.

* Put in the cues for the graphics and text. We've built a box that makes our videotape machines act as if they're really laserdisc players, so we can control them (start, stop, seek and pause) through a Macintosh serial port. Our box's main function is to translate frame number—the addressing mechanism used by most multimedia authoring tools—into SMPTE time code. The box allows us to finish the presentation without waiting for the laserdisc prints to be manufactured (although the presentation doesn't run in real time due to the access times on the tape). Using MacroMind Director

and some software magic of our own design, we create all the cue points where we want to bring text, graphics or animation onto the video display. Custom software will no doubt be a sticking point for some people, and, frankly, I don't think we could put together the kind of presentations we do if we had to rely solely on what can be purchased off-the-shelf. The functional gaps and corresponding issues of program transportability are being addressed by products like QuickTime from Apple and the multimedia extensions in Microsoft Windows 3.1, and the software situation promises to get much better within the next couple of years.

At this point in the production we have two types of media: videotape—with all the video and audio stuff—and computer disk files, which contain all the other aspects of the presentation that are not on the videotapes, such as graphics, text and the MacroMind Director script written in the Lingo programming language.

Before we can begin manufacturing the media that the program will be distributed on, a few more problems must be addressed. First, it's not un-

usual for all the text and graphics of a long program to eat up enough space to fill a hard disk, so we need to compress the files so that they fit on a reasonable number of floppy disks. In some cases, we may need to distribute all the non-video/audio portions of the program on a CD-ROM, but we try to avoid this in the interest of addressing lowest-common-denominator computer hardware configurations.

Secondly, we need to supply an installation guide and a short user's manual that tells the viewer what hardware and software they need and how they should invoke the controlling software for the presentation (a runtime version of the MacroMind software is embedded in the presentation). We have templates for the user's manual that make this an easy task.

The completed production consisted of five laserdiscs, eight floppy disks of compressed files and a 30-page installation/user's manual. It's been my observation that the process of putting together a multimedia presentation lies somewhere between the painfully obvious and alchemy. In other words, nothing any good engineer isn't used to.

—Brian Markey

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by Paul Potyén

CHIP SHOTS

NEW AND NEWSWORTHY FROM AES

The presence of computer-based pro audio equipment at the New York AES show was noteworthy both in its abundance and in the unprecedented levels of sophistication offered. A trend that began several years ago with the introduction of MIDI control has continued with the rapid advancements in digital audio technology. Here are a few highlights from the show floor. In the coming months, we'll look at more interesting computer-based products from the show in "The Byte Beat" and our other product columns

Sonic Solutions SonicStation

Sonic Solutions (San Francisco, Calif.)—already known for its premastering and NoNOISE systems—entered the digital audio workstation fray with the AES debut of SonicStation, a Mac II-based system that features eight channels of playback from disk, real-time filtering and mixing, and background loading. It includes two channels of digital inputs and outputs, and sophisticated waveform editing and filtering software used in the more elaborate Sonic System for audio post-production. A/D-D/A converters (also offered by Sonic Solutions) can be added to SonicStation as an option. The basic system (not including a Mac) is available for \$4,995.

Hybrid Arts ADAP IV and Digital Master

Hybrid Arts debuted its 4-channel, turnkey, digital audio recording and editing system, the ADAP IV. It consists of a CPU, a 4-channel A/D-D/A converter module, a DSP module, a MIDI interface and a SMPTE controller board. Up to seven hard disks can be connected for a maximum of 14 hours of recording time. Proprietary multitasking software allows recording, editing and mixing of 32 internal tracks and flexible synchronization options.



Alongside ADAP IV was Hybrid's Digital Master. Priced at \$4,500, it's an inexpensive way to get into hard disk stereo recording and editing. Included in the system is a CPU, monitor and mouse from Atari, a 105MB hard disk, A/D and D/A converters, MIDI and SMPTE interface, and software for performing non-destructive editing, as well as recording and playback. Digital Master is targeted for broadcast, recording and post-production facilities.

**Hybrid Arts
ADAP IV 4-
channel digital
editing system.**

Digidesign Pro Tools

Riding high on the success of its award-winning Sound Tools package, Digidesign was showing its Macintosh-based Pro Tools multitrack digital audio production system [see "Byte

Beat," 10/91) to substantial audiences. The system combines recording, editing, MIDI sequencing and automated digital mixing into a single environment. Tower of Power's Lenny Pickett was on hand at the booth with his tenor to help attract crowds and provide a live audio source for the Pro Tools system.

In related news, Digidesign and TimeLine announced an alliance for the purposes of developing a video

optional 750MB drive is \$4,695.

Digigram PCX3

Digigram (Montbonnot, France) presented its PCX3 digital audio system designed for use with PC-AT compatible computers. Each PCX3 card allows two channels of A/D/A and signal processing, with real-time, CD-quality compression/decompression using two DSP 56001 processors and an ISO/MPEG-approved MUSICAM al-



Digidesign's Peter Gotcher (left) and TimeLine's Gerry Block announced a joint effort to develop the Pro Tools Interface, a card that permits full multimachine synchronization with ProTools.

clock card, known as the Pro Tools Interface. The new product enables Digidesign's digital audio production system to operate with full multimachine synchronization in a professional audio-for-video post-production or music production environment. The Pro Tools Interface was scheduled for delivery in December 1991.

Digital Expressions SoftSplice

Bellevue, Washington-based Digital Expressions previewed SoftSplice, a 4-track digital audio editor that can use any Macintosh (including a portable) as a front end. Designed for use with DAT recorders, SoftSplice is an external SCSI device (330 and 760MB hard drives are optional) with AES/EBU and S/PDIF inputs/outputs and software that permits both graphic- and EDL-based editing, mixing, sample rate conversion, EQ and other DSP on up to four simultaneous tracks. Playback of four tracks is possible via DAT (or any other) D/A converters. SMPTE synchronization is included in the package. SoftSplice was scheduled to be available in the first quarter of '92. Tentative price for a system with an

algorithm. Compression ratios are selectable from 6:1 up to 12:1, significantly reducing disk storage requirements. Several software packages are available with the hardware. Among the most interesting is Xtrack, which incorporates from one to four PCX3 cards to manage up to eight independent digital tracks (as well as 16 virtual tracks) of audio in one PC environment and hard disk or MO disk. The user interface is intuitive, powerful and swift.

Steinberg Topaz and TimeBandit

A 4-track version of Topaz, a digital recording and editing system from Steinberg of Germany, was demonstrated. The system uses its own audio processor to perform a variety of real-time DSP functions, using the Macintosh only as a control interface. MO drives are used for recording and editing up to four hours of stereo information at up to a 48kHz sample rate. The software allows digital audio files to be accessed and edited together with MIDI files via multitasking with any Mac-based sequencer. Stereo units can be combined to achieve a total of

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THE BYTE BEAT

eight tracks. The basic 4-channel version is available for \$17,000. With the optional MLTC 1 time code synchronizer, Topaz can be synced to all standard SMPTE/EBU formats.

Also at the Steinberg booth was



Spectral Synthesis AudioEngine.

TimeBandit, an offline time, pitch and harmonization program for the Macintosh that uses proprietary algorithms to achieve outstanding sound quality. Included as part of the Topaz DSP software, TimeBandit is available sep-

arately and can be used with Sound Tools, Pro Tools or Audio Media cards to process any Sound Designer or AIFF file. TimeBandit was expected to be available by the end of 1991 at \$495.

Spectral Synthesis AudioEngine

The Woodinville, Washington-based Spectral has integrated its digital audio sub-systems into a family of rack-mount, PC-based environments. Several plug-and-play versions were on display, demonstrating the wide variety of options available, including 4- to 16-track recording; 20 MIPS to 140 MIPS of DSP processing power; two to 16 channels of digital and analog I/O configurations; and a choice of multitasking software products.

Opcodes Studio 5

Opcodes Systems (Menlo Park, Calif.) unveiled its Studio 5 MIDI interface/processor/synchronizer/patch bay for use with the Macintosh. When em-

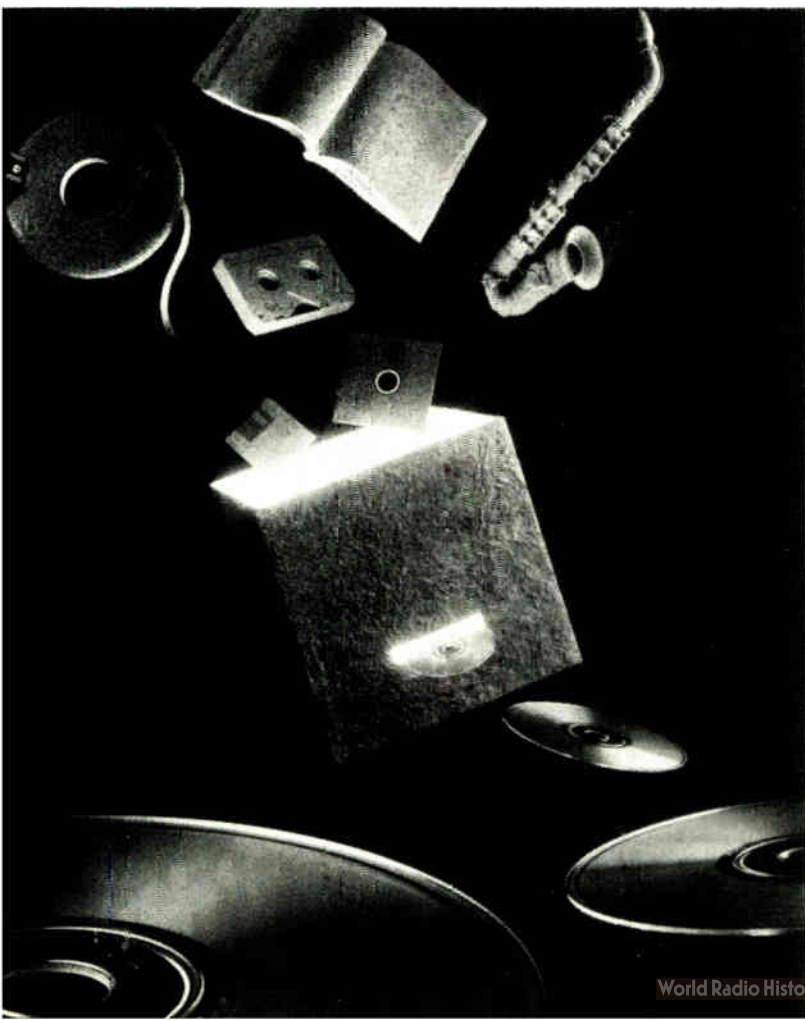
ployed with the company's OMS software (included with Studio 5) and compatible software, 15 MIDI-in and -out ports can be addressed separately for 240 distinct MIDI channels. A microprocessor allows MIDI processing, mapping and RAM storage for up to 128 patches.

The Studio 5 will convert SMPTE time code into MTC, and can read and write SMPTE code in all formats, as well as jam sync and flywheel from an incoming SMPTE signal. It retails at \$1,295.

DynaTek Track

DynaTek Automation Systems of Toronto introduced its Track Series of rack-mount data storage products for the music and recording market. The Tracks are compatible with Macintosh, IBM, Atari and Amiga computers. Stand-alone samplers by Akai, E-mu, Ensoniq, Roland and Dynacord are supported as well. All devices are fully shock-mounted and easily removable. MO, removable and fixed hard drive systems from 45MB to 2GB capacity are offered. ■

Paul Potyen is a Mix associate editor and a freelance composer/producer.



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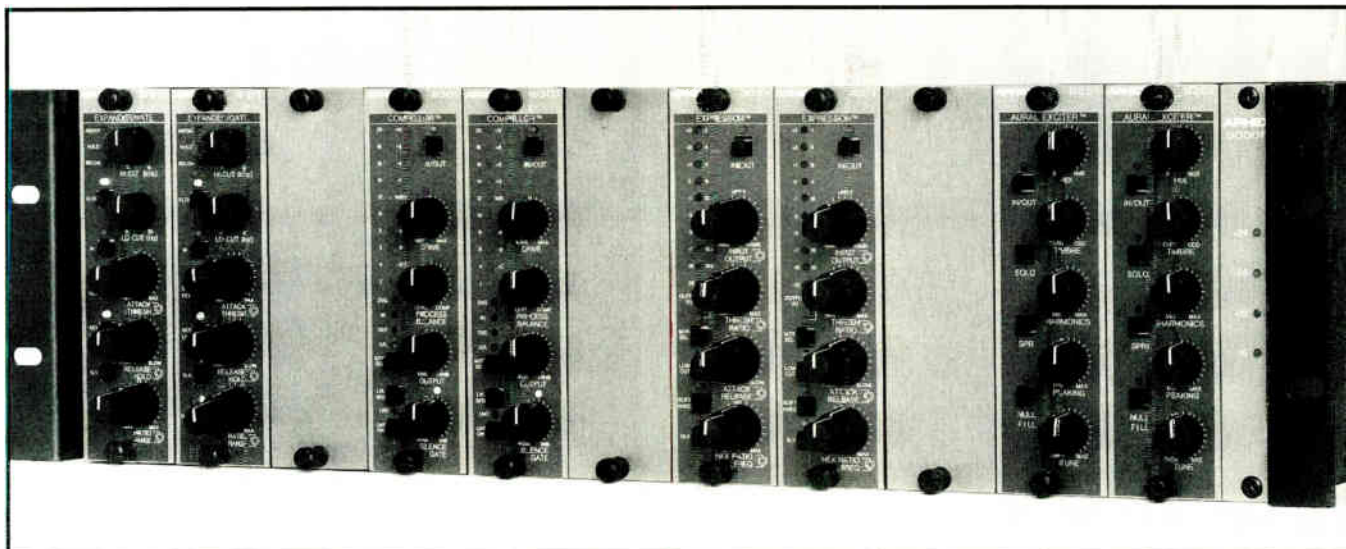
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World Radio History

by Dan Daley

MIDI

THE FOUNDATION OF THE PROJECT

MIDI. That wacky, wonderful protocol. Can't attribute the entire downsizing revolution in the recording industry to it, but can't talk about that phenomenon without mentioning it, either. If MIDI were a virus it would be world class, because those five-pin receptacles have shown up on virtually every piece of gear made in the last five years, from hand-held signal processors to full-scale consoles.

It's also showing up on equipment not strictly musical, either, according to Lachlan Westfall, president of the International MIDI Association (IMA) in Los Angeles, who told me that the protocol has been extended to equipment used to coordinate pyrotechnics and other visual phenomena for live shows.

But the main purpose of my call to him was to find out about MIDI's future, and in particular any plans for a new MIDI generation, the so-called MIDI-II. "That rumor started about six months after MIDI first came out around eight years ago," Westfall says. "There is no MIDI-II protocol on the

drawing board. Such a new protocol would make all existing MIDI implementations obsolete."

The existing configuration has no room to accommodate the upgrades Westfall says are most clamored for: more channels and faster baud rates. There are, however, a number of ways to get more out of the existing MIDI protocol, he explains. One simple, albeit somewhat expensive, approach is to get a computer with multiple outputs and use it to control multiple systems. One approach that's gotten pretty hot lately is to piggyback MIDI onto other high-speed systems, such as Local Area Networks between computers. "It goes out and comes back as MIDI information," Westfall explains. "But it's shuttled much faster between rooms in a studio and even between different studios over phone lines."

Westfall mentioned several products that have been developed to implement this approach, including Lone Wolf's Media Link system for fiber optic networks. But no industry-wide standard has been put forth.

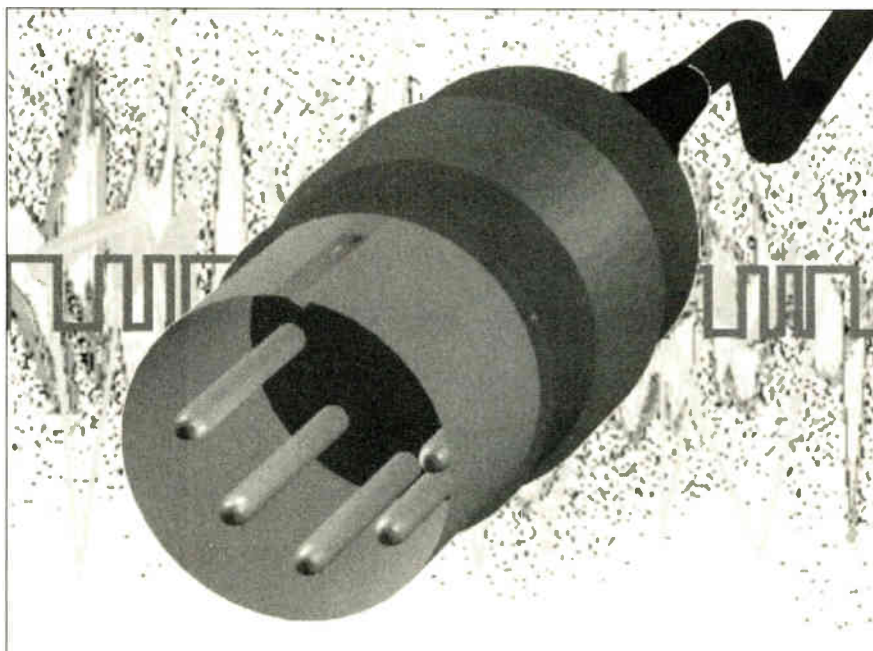


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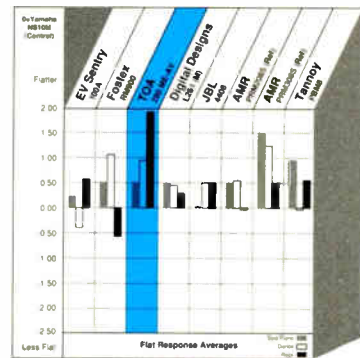
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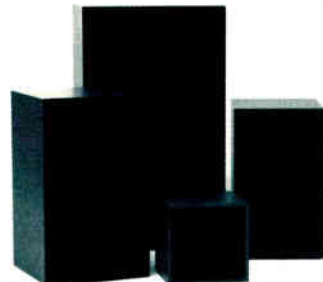
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Aside from a few commercial facilities that jumped on the protocol when it first appeared, like Unique Recording in Manhattan, project studios have been the largest consistent users of the system as an integral part of their technology strategy. That figures, since most of those types of studios are run by musicians, the original benefactors and patrons of MIDI. Westfall notes that early on, a number of studios complained about MIDI, regarding it as a sort of semipro "consumer format." That's changed now, with the protocol's sheer ubiquitousness guaranteeing it a place in professional facilities to one degree or another.

On the project front, MIDI implementation is still strong and central to operations. "It's what enabled people like me to own studios," says Billy Cobin, owner of Uptown Sound in New York. "It's what gave power to project studios." He controls the MIDI between his Yamaha, Roland, Voyetra and Linn gear through Magnetic Music's Texture software on an IBM ("I hate using a mouse") computer.

"I use MIDI on a number of levels," says Cobin, who has been using MIDI right from the beginning, first with an 8-track and now with a 24-track deck and 3/4-inch video lockup. "It's a good way to quickly put together a sketchpad idea for a client. I build some drum and keyboard tracks with the sequencer, then run it in sync with the 24-track and lay in guitars or vocals and put those elements to tape. Then I adjust the MIDI information to fit the live recordings. I get a live feel to a track, and I think people respond better to something that sounds live. Basically, I use MIDI as an auxiliary multitrack."

Cobin feels the channel squeeze as well, and figures that multiple ports will be his approach to resolving it. Further down the line, he expects to see more comprehensive and powerful sound, sequence and sample control from computer MIDI systems as well as digital signal processing, a sort of MIDI workstation effect, although he acknowledges that most of the leading edge will involve Macintosh computers. He will learn to like mice. "Eventually, we'll be looking at the video program itself on the computer screen," he says, "particularly in Windows-type environments." But as a

guitarist by trade, he views the protocol as a mixed blessing: "I work electronically, not necessarily because I like it but because it's expedient, particularly in light of what people have

**MIDI
is still
central to
project studio
operation.**

come to expect to pay for music these days."

Talking MIDI

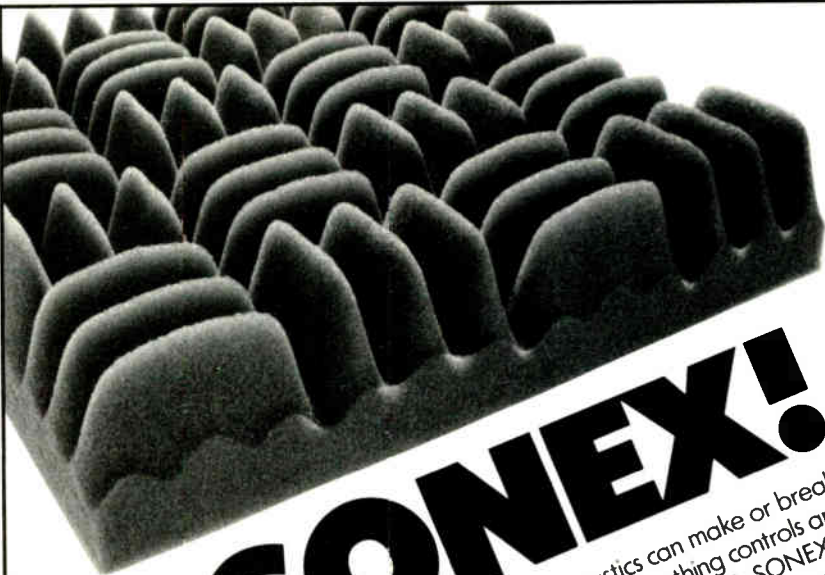
That's not far from another assessment, this time by Bruce MacPherson, a music computer systems designer at Sam Ash Professional in New York, who also has a home-based project studio. "You can do amazing things with a relatively modest setup," he says. "A personal computer, a small multitrack and mixer and a DAT ma-

chine. And most of this equipment addresses MIDI in one way or another, as will much of the new generation of digital equipment coming along. You can see MIDI's impact on the industry and the equipment."

MIDI's potential for an improved human interface intrigues MacPherson, who was fascinated at the last AES show by SynchroVoice's MidiVox, a sort of high-tech scarf that, once wrapped around someone's neck, translates human vocal resonances into MIDI signals. "It's the ultimate human interface," he says. "It's the closest thing to actually connecting with the brain. It's not perfected yet, but once it is, it'll put tremendous compositional power into the hands of anyone who can hum a tune."

That same fascination has a darker edge, though, when MacPherson acknowledges how something like that can exacerbate the problem of semi-professional tendencies creeping into the pro world. "The problem is that there's so much more to a real studio than meets the amateur's eye," he says. "An educated listener is the only hope we have."

But aside from that, MacPherson



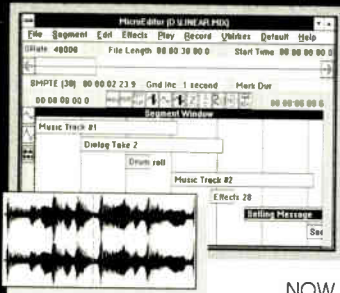
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nominates the incorporation of actual digital audio into MIDI sequencer packages and affordable automated mixing as the best examples of how MIDI has grown without expanding in terms of channels or baud rate. "The software packages are getting way more powerful," he says.

The Legal Interface

Suzanne Ciani, producer, composer and owner of Musica International, her project studio, encountered another novelty of MIDI recently that might presage a trend. In the process of creating personal musical themes for the characters on the network soap *One Life To Live*, the show's producers not only bought the music but the MIDI sequences as well. "They own the rights to the sequences themselves," says Ciani, who used Performer to create them. "That way the library is totally updatable and flexible in a way tape or even disk could never be."

All of the sequencing on *Hotel Luna*, Ciani's recent album, was done while she was composing the music in Italy. "I was committed to getting the flavor of Italy into the music as well as how I felt about being there," she says. "Although the album was finally recorded in Los Angeles, I had all the performances on disk, all the sensations that went into the composing. I had the best of both worlds."

Ciani also used Roland's RSS spatial processor on that record. The RSS can be MIDI-controlled, and that, she says, made a world of difference, because MIDI controls enabled her to program spatial moves into the mixes. "With MIDI controllers, you can design a non-continuous space for the music," she explains. Ciani is also using Yamaha's MIDI grand piano on tour, replacing the ton of computer gear she used to travel with. She designed a MIDI program for a Korg M1 that allowed assignment of eight separate sounds, as well as other parameters like velocity, to different parts of the keyboard. "The result was the illusion of a multichannel sequencer," she says.

"Even though the basic language of MIDI hasn't changed, our ability to make use of it has grown incredibly," Ciani says. ■

Dan Daley is Mix's East Coast editor. His N.Y. Metro Report appears monthly in the Coast to Coast section.

by George Petersen

AES 1991

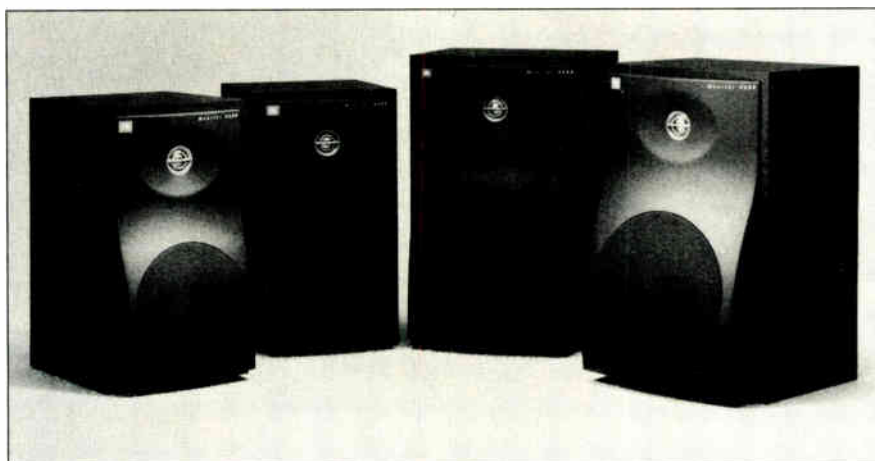
RECKONING WITH THE REALITIES

In keeping with its annual U.S. convention, the Audio Engineering Society selects a theme—essentially a catch phrase that reflects the state of the society and the audio industry as a whole. The theme of last year's meeting in Los Angeles was "Creating Illusions in Sound—The Fusion of Art, Technology and Imagination."

Returning to New York City from October 4-8, 1991, the 91st Convention

live sound guru—checks out new sound reinforcement products from AES in his column on page 48.

JBL Professional started things off with the launch of its 4200 Series of monitors, designed specifically for console-top listening. Both models in the series are two-way, rear-ported designs featuring a 1-inch, titanium-diaphragm tweeter. The 4206 (\$395/pair) has a 6.5-inch woofer; the 4208,



**JBL 4200
Series Studio
Monitors**

of the AES was definitely in tune with its streetwise theme: "Audio Fact and Fantasy: Reckoning with the Realities." Attendees were more interested in discovering new tools and techniques for dealing with the economic realities of 1991 than pie-in-the-sky dream-boxes. Exhibitors seemed mainly interested in promoting advancements on existing products, while emphasizing real-world solutions.

Following are observations on some products that caught our eye at the show. Due to space restrictions, we'll focus on just a few, with coverage on other products in our regular new products columns in the months to come. In this month's "Byte Beat," Paul Potyten investigates workstation developments and new computer-related gear, while Rudy Trubitt—our intrepid

with 8-inch woofers, are \$525/pair. Besides lending a distinctive "Alfred Hitchcock" profile to the series, the curved surface of the monitors' unique Multi-Radial™ sculptured baffle places the drivers in acoustical alignment, improves HF dispersion, reduces diffraction effects and directs the driver's axial output for optimum summing at a typical near-field listening distance of three to five feet. All of this and mag shielding, too. Clever.

While we're on the subject of magnetic emanations, **Peavey** introduced a shielded version of its PRM 308 studio monitors. Largely unnoticed by the audio industry, the PRM 308 is a splendid little three-way monitor with an 8-inch woofer, 5.25-inch mid and 1-inch, soft-dome tweeter.

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AUDITIONS

Dynaudio Acoustics Series of professional studio monitors. Distributed by Group One Limited of Farmingdale, N.Y. (now also the importers of Milab microphones), the Dynaudio line was designed as a joint venture between noted British acoustician/studio designer Andy Munro and Dynaudio A/S, a Danish driver manufacturer. Models range from the PPM1 pro personal monitor (with optional satellite sub-woofer) and compact M1 console-top speakers to the M4 active four-way studio mains. The latter is powered by 5,000 watts of amplification, driving four 12-inch—or dual 15-inch—woofers, 8-inch and 2-inch mid drivers and dome HF in each cabinet. Typical THD specs are said to be in the range of 0.6%, while maximum SPL at the mixing position is 130 dB. Clean. Loud.

Finally en route to North American shores are the Quedsted Q108s—high-performance, powered, two-way monitors for near-field listening. Distributed in the U.S. by AKG, the Q108s incorporate an 8-inch woofer and a 1-inch dome tweeter with 100-watt bi-amplification and active electronics in each cabinet. Quedsted monitors are a leading force in UK studios; perhaps these Q108s will be the catalyst that gives Quedsted a foothold in the U.S. market.

KRK (distributed by Audio Inter-visual Design of Hollywood, Calif.) exhibited the Model 9000, the big brother version of KRK's acclaimed 703 monitors. The 9000 is a two-way design combining KRK's trademark, 1-inch, inverted-Kevlar-dome tweeter, time-arrayed with a 9-inch woofer, providing tight imaging and gutsy bass response. Price is \$1,950/pair.

I had heard some rumors about the Genelec (distributed by QMI of Natick, Mass.) compact 1031A reference monitors. Priced at \$2,998/pair, this is a two-way powered system with a 1-inch, aluminum-dome tweeter set into a proprietary DCW (directivity control waveguide) "horn" and an 8-inch woofer in a 9x12x16-inch cabinet. Onboard 110W bi-amplification can drive the 1031As to 121 dB, but what impressed me about these little dynamos was the sound. When I entered Genelec's demo suite, I was facing a wall of speakers, ranging from the 1031As to the gargantuan 1034As (an even larger system, the no-holds-barred \$50,000 Genelec 1035As, was

recently installed at New York's Right Track studios). I asked to hear the 1031As. After a minute or so, I told the Genelec guy to turn off the 15-inch woofer monitors so I could hear the *little* system. He regretfully informed me that I *was* hearing the 1031As. Scary.

Wherever you went on the show floor, it seemed that everybody was talking mics. Brüel & Kjaer announced that Tannoy's distribution company (TGD) would be distributing B&K mics in North America, so expect the availability and visibility of these renowned Danish microphones to increase dramatically in the years to come. Now distributed by Sennheiser, Neumann sales remain strong and Neumann's TEC Award-winning TLM50 proves that there is more than casual interest in high-end mic designs. Many show attendees dropped by Gotham Audio's booth to check out the Gefell Microtech line of mics produced in the former Neumann factory, including the UM70S, which utilizes the same large-diameter M7 capsule as the classic U47 mic. Priced at \$1,150, the three-pattern UM70S could be a classic in its own right in a couple of years. Time will tell.

Audio-Technica, whose pro condenser mics have garnered an appreciative audience over the past few years, expanded its 4000 Series with the AT 4033. The new addition com-



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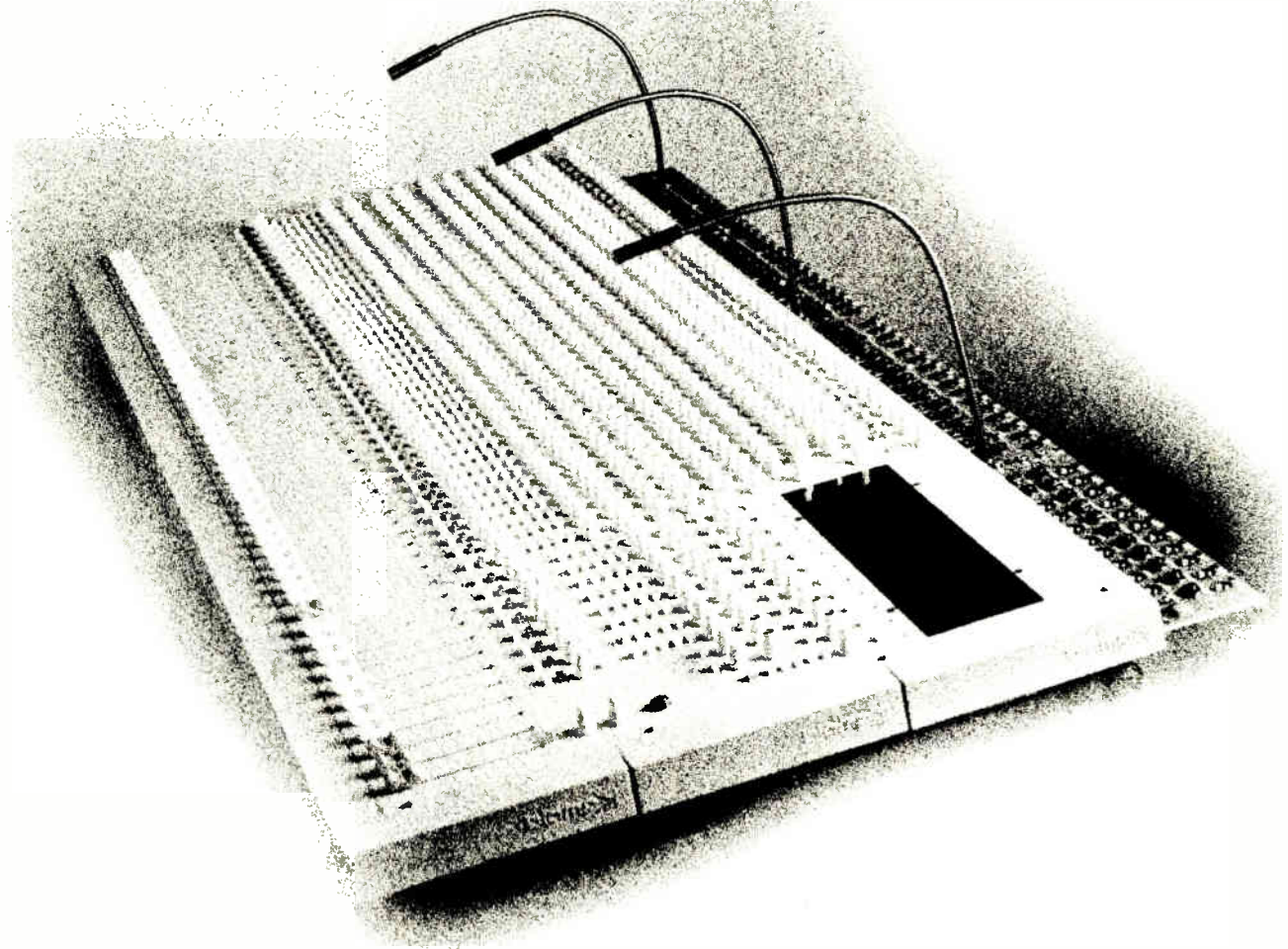
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AUDITIONS

to the output connector. SPL handling is said to be 140 dB. At an affordable \$699, this one could be a winner.

San Jose, California-based **Josephson Engineering** is now manufacturing its own series of high-quality microphones, consisting of a measurement mic, two interchangeable capsule bodies, a Jecklin disk foam barrier for OSS stereo recording and the C-700 pressure-gradient microphone. Designer David Josephson always comes up with novel approaches—for example, his omni and cardioid capsules are also available in “open” versions, built without a front grille for optimum sonic transparency. The new C-700 mic combines two gold-sputtered

capsules: an 8mm pressure capsule mounted on a 32mm diameter sphere; and a 16mm, pressure-gradient capsule. Three models are available: The basic C-700 brings the two signals out on separate leads, and the elements can be combined via a mixer or optional remote control; the C-700A has internal polar pattern control electronics and one output; and the C-700S is a stereo version with a second pressure-gradient capsule at a right angle to the first one.

In 1957, Sony introduced the C-37A, its first tube microphone. Now, more than three decades later, Sony has re-entered the high-end tube mic market, launching its C-800 and C-800G models. Both combine condenser capsules with advanced vacuum tube electronic



Sony C-800G

designs, but the C-800G pushes the state of the art one step further by incorporating a Peltier cooling device.

Alesis ADAT: The Revolution Begins...

The hottest buzz of the show came from the Hilton's sixth floor, where a tiny demo room provided attendees a chance to hear Alesis' much-heralded ADAT 8-track digital recorder. Offering up to 40 minutes of recording on an S-VHS cassette, ADAT features 16-bit linear resolution, variable sampling rates, dedicated SMPTE time code track, balanced +4dBu connections via a 56-pin Elco connector and unbalanced 1/4-inch inputs/outputs. An AES/EBU-to-ADAT digital interface will be optional. ADAT pricing is \$3,995, and with the optional \$1,995 BRC remote controller, up to 16 ADAT's can be slaved for 128 tracks.

90%! Other points worth considering stem from the modular aspects of such a system. Users can upgrade to more tracks by simply adding another recorder unit, and systems are downwardly compatible—a 24- or 32-track system would have no trouble playing back 8- or 16-track sessions. That trick is a lot harder to pull off using a conventional reel-to-reel multitrack.

Perhaps more significant than price alone is that modular recording systems may bring new ways of looking at the entire recording process. As an example, a bass overdub in a typical digital recording session requires a facility with an expensive digital multitrack, probably accompanied by a big-

ticket console and nice recording room as well. So the time is booked, and the producer, engineer, second and bassist all converge at a studio for a couple of hours. Add in the cost of studio time and salaries, and this quick overdub becomes an expensive proposition. As an adjunct, the acoustics of the recording room become just another irrelevant fixture as soon as the bassist plugs into a direct box. With a modular system, the producer could give the bassist a time-coded slave tape with a scratch track; working at a suitably equipped home studio, the player lays down several tracks at a convenient

time. Later the player gets paid, the producer chooses from up to seven different bass takes; the slave tape is SMPTE-locked to the master and the selected track is digitally transferred. Megatracking becomes reality.

A prediction: Expect announce-



ments of several video-based digital multitrack systems this year, from numerous companies. At AES, some Mitsubishi engineers presented a paper on the development of a dual-mode digital recorder/player (4 tracks at 96 kHz or 8 tracks at 48 kHz) storing up to 2.7 hours of audio on 1/2-inch videocassettes. While this particular system was designed for specialized HDTV broadcast and exhibition applications, it is clear that the future of videotape-based multitrack audio is an area of intense interest to both manufacturers and production pros.

—George Peterson



The implications of ADAT—and the similar systems now under development by several other companies—could spell a major recording revolution in the making. At suggested retail, a complete 24-track ADAT digital system costs under \$14,000, a price point comparable to the *least* expensive 1-inch analog 24-tracks; and videotape-based recording systems also offer a substantial savings in tape costs—up to

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AUDITIONS

The latter solves the problem of tube heat build-up by flowing a DC current across a junction of dissimilar metals, thus dissipating heat at the source. Radical.

Tube technology was HOT. Demeter Amplification made its first appearance at AES, as this Los Angeles-based company unveiled several vacuum tube products. The VTMP-2 (\$1,395) is a stereo mic preamp in a two-space rack; priced at \$850, the STD1B-2 is a stereo version of Demeter's popular Tube Direct Box in a rack-mount package. Summit Audio (Los Gatos, Calif.) debuted its DCL-200, a stereo/dual mono compressor/limiter based on a modern tube design. Just the thing for vocals or program material.

Another topic of considerable interest was write-once recordable CD. Numerous systems were on display (all of which were covered in the CD-R report in last month's *Mix*), but the big buzz was system pricing, which seemed to be spiraling downward on an hourly basis. In fact, Studer lopped nearly \$5,000 off the price of its D740 to \$12,950 the week before the show. Expect CD-R systems to become *the* hot ticket this year, with stand-alone (non-computer-based) units becoming particularly popular with audio rental companies.

You didn't need a soothsayer to predict that DAT would be big at AES. Fostex announced its PD-2, the industry's first professional, four-head, portable, time code DAT. The \$10,000 unit reads and writes both Fostex and IEC time code, and it can lock to word sync, composite video reference, frame pulse or jam sync to incoming time code. Features include 44.056/44.1/48kHz sampling, AES/EBU digital ports, balanced XLR analog I/O, and switches for phase reverse, mic pad,

limiting and 48V or T12 phantom power. Three power supply options are available: rechargeable standard NP1B nicads, disposable "C" cells or a 4-pin XLR connection to external 12 VDC. The monitoring capabilities are formidable, with source or off-tape monitoring, decoded M/S matrix feed to headphones, momentary time code monitoring (as audio signal) and separate level controls for phones and internal monitor speaker. Combine this with a large, comprehensive, backlit LCD and the ability to create and store up to four user operating templates, and the PD-2 becomes an awesome production tool for the location recordist.

If you're on a budget, check out Tascam's new DA-P20, a portable DAT deck featuring XLR mic inputs, -20dB mic pad, RCA outputs, S/PDIF digital I/O, and rechargeable nicad pack—all in a 3.1-pound package. Price is \$999.

Ready for another portable DAT? Sony's TCD-D10 PRO II (\$3,300) updates its predecessor with absolute time capability (which speeds search operations and simplifies DAT editing on Sony's editing systems) and improved digital interfacing, now said to be compatible with any AES/EBU device. A \$400 kit upgrades the original TCD-D10 PRO to the new functions.

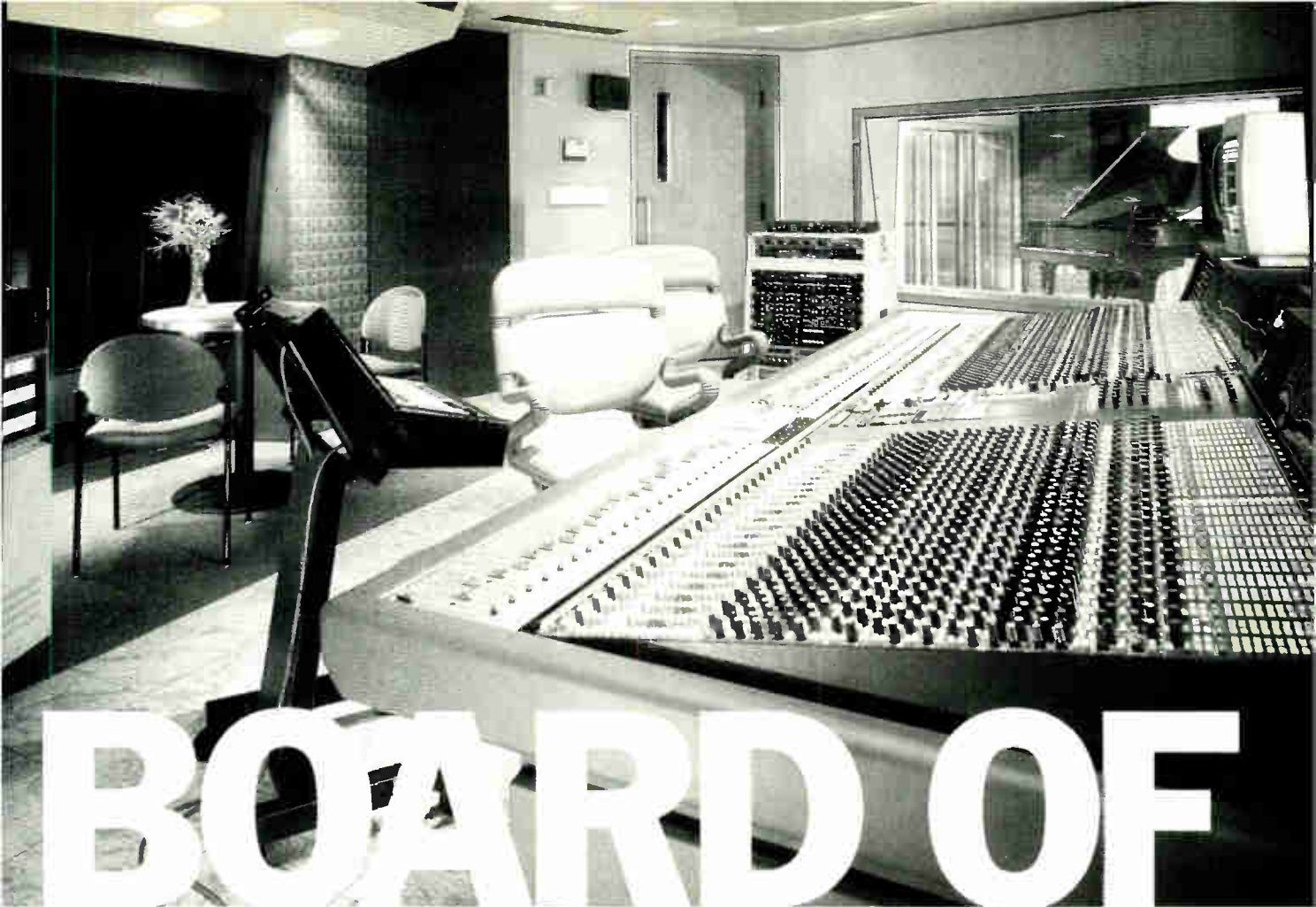
Priced at \$1,590, the PCM-2300 is Sony's most affordable pro studio DAT, with balanced analog I/O, S/PDIF digital ports, 44.1/48 kHz recording, 1-bit ADCs and DACs and a special long-play mode for doubling the recording time at 32 kHz.

Otari announced its new R-DAT Series, ranging from the DTR-7 (a basic pro DAT priced at \$2,300) to the DTR-90, a high-performance pro machine with a removable front panel that doubles as a remote controller. To handle specialized tasks, the DTR-90 offers a bevy of options: an edit controller for assembly editing using

two DTR-90s; plug-in edit memory board (providing non-destructive edit preview functions); S/DIF-2 digital port (AES/EBU and S/PDIF I/O are standard); a memory start RAM buffer for instantaneous cue playback; and a time code generator/reader/synchronizer option.

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AUDITIONS

Wheaties anymore... JVC expanded the serial control capabilities of its DS-DT900N time code DAT recorder, allowing it to interface with audio and video editors and other DAT machines. And speaking of control protocols, Panasonic launched an IBM PC-compatible software developer's "toolkit," allowing users to create routines for controlling its SV-3900 pro DAT deck in specialized applications. A Macintosh toolkit has been available for six months.

But let's not be too quick to forget about analog. With the availability of advanced noise reduction systems and

American market. Logic 2 is a powerful, all-digital console in a small package where 28 faders can control up to 112 fully equipped, dynamically automated stereo channels; 63 faders can control up to 252 channels, etc. The board can be individually reconfigured with user-storable assignments of channel strips to any input, output or group, and up to 48 fully automated aux sends. Also standard are 4-band EQ, external machine control, four-function dynamics section, Logicator™ rotary controls and dynamic moving-fader automation.

Beyond Stereo? Solid State Logic unveiled its first entirely new console design in three years, the SL 8000 G

Series. Designed to handle television, motion picture and music recording formats—all under Ultimatum moving fader/VCA automation control—the SL 8000 combines the sound quality and signal processing capability of SSL's G Series mixers with advanced post-production features previously available to users of custom SL 5000 film consoles.

The SL 8000 also has automated joystick pan controls; left, center, right and surround panning available on every channel; and four stereo mix buses (A,B,C,D), enabling the creation of



Ampex 499 Grand Master Gold

a massive worldwide user base of multitrack and 2-track decks, our old friend analog isn't likely to disappear for years to come. Ampex launched Grand Master® Gold 499, a premium analog mastering tape incorporating a non-porous, high-energy ferric oxide formulation that allows for operating levels of +9 dB, with a print-through spec far less than Ampex 456. By the way, the latter remains in production to serve those users whose decks can't tolerate the +9dB signals. The new tape is priced slightly higher than 456 and is available in 1/4-, 1/2-, 1- and 2-inch widths.

As in past AES conventions, consoles were a major area of interest among showgoers. The hot scoop was Focusrite consoles on display at the George Massenburg Labs booth; now that GML is handling Focusrite distribution in North America, it's a safe bet that these sonic powerhouses will become a bit more commonplace in American facilities.

Of major significance was the intro of the AMS Logic 2 console to the North

Solid State Logic's SL 8000 G Series Console



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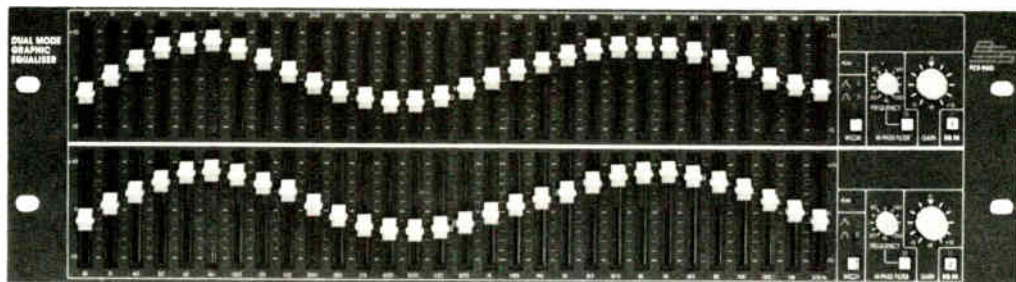
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So why all this excitement about ATC professional monitors? Is it that they are hand-built to extraordinary standards, or because of their unique ability to deliver clarity and detail at any sound level? One thing is certainly clear, the revolutionary soft-dome midrange driver manufactured by ATC is the envy of monitor designers worldwide.

The ATC range is comprehensive. There

are two free-standing, self-powered models for instant plug-in-and-listen professional monitoring. The remarkable SCM100A – with its hefty 312mm driver – provides a low frequency performance to match studio control systems three times its size. There's also the SCM50A, a smaller three-way unit equally popular amongst leading broadcasters and recording engineers. The top-selling passive model is the SCM20, a compact but powerful loudspeaker that's rapidly becoming a near-field monitoring standard. And if you want to build ATC into your control room, the SCM200 and SCM300 provide a choice of large-scale systems to meet the most demanding requirements.

ATC loudspeakers can be auditioned at HIB and a network of leading distributors worldwide. Once you've heard them, you won't stop talking about them either.



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AUDITIONS

growing market requirement for surround mixing at all levels from commercials to feature films, and with new technologies such as HDTV right around the corner—as well as an increasing number of music CDs being released in surround sound formats—the SL 8000 G is right in step with the production needs of the 1990s.

If you were seeking a crowd, one could be found at the Euphonix booth, where this Palo Alto, California-based company made the first U.S. showing of its CSII console. A second-generation design based on the Crescendo mixer, the Euphonix CSII improves on the original with enhanced audio circuitry, while retaining the ability to house 72 inputs in a frame under five feet wide. The secret, of course, is CSII's digitally controlled analog design, where what appears as a console is actually a control surface that manipulates audio in a rack located up to 50 feet away. The CSII support computer runs the Dynamic Mix Automation, SnapShot Recall and the MixView software, with onscreen display of EQ curves, console setups, track sheets

and an interface to Time Line's CCU, a compact, built-in transport synchronization controller, which is optional.

API demoed the latest incarnation of its all-discrete console, now available with Touch Reset, providing the total reset-ability and storage of all console switches (within one frame) via a gas plasma, touchscreen computer built into the console's master section. Optionally, all rotary pots can be reset via a three-LED visual nulling system, and the touchscreen system also offers a simple way of controlling the GML moving fader automation package. All audio pathways are discrete; simple and clean, based around the original API 2520 and the new 2510 op-amp designs. A 32-channel board is priced from \$192,000. On a budget? API also offers the Compact Series of expandable, all-discrete consoles, with a 32x8x2 version (with P&G faders, 550S equalizers and 568 input modules) priced from \$78,900.

From Conneaut Audio Devices (Conneaut, Ohio) comes the CAD Icon, a large-format, customizable console that builds on the excellent audio specs of the company's Maxcon Series and takes it to the next step.

Standard features include 3-band, fully parametric EQ with variable Q, sweepable highpass and lowpass filters, 32 balanced output buses, 12 balanced aux sends, and inboard Mega-Mix automation. A comprehensive master status section reconfigures Icon for tracking, overdubbing or mixing, as well as global control over input module switching and automation functions. Consoles are available in various input configurations, with a choice of straight or crescent-shaped mainframes.

Tascam is now delivering its long-awaited M-3700 console, offering dynamic automation of level control adjustments and signal routings. The M-3700 also features an onboard disk drive for storing mixes, along with a built-in SMPTE generator/reader, six aux sends, 4-band EQ with sweepable mids and a dual signal path. The latter doubles the input capacity on mixdown, so a 24-input version handles 48 channels; the 32-input accommodates up to 64 channels. The 32x8x2 board is \$14,999; the 24x8x2 retails at \$12,999.

One surprise was Ensoniq's DP/4, its first dedicated effects processing

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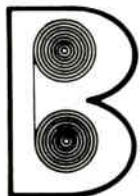
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AUDITIONS

device. Given the excellent quality of the onboard effects processing on Ensoniq's keyboard products, the real surprise was why they didn't think of doing this earlier. Equipped with four



Ensoniq DP/4 Parallel Effects

discrete inputs and outputs, the DP/4 is a true parallel effects processor, utilizing four custom 24-bit DSP chips, software-based patch bay and internal submixing, allowing users to process from one to four audio signals simultaneously. Effects can be chained in any order or combination, with up to 16 effects at the same time. The \$1,395 unit stores 400 factory user patches, including 39 effects algorithms, such as linear and non-linear reverbs, delays, effects, parametric EQ, compressor/limiter/gate, pitch shift, preamp distortion, rotor speaker, vocoding, panning and aural enhancement. Effects parameters can be manipulated in real time by modulators such as foot-switches, CV pedal, key velocity and MIDI controllers, but best of all, its silver knobs add an air of sophistication to any effects rack.

As always, there were a lot of little things that don't draw headlines in the audio press but are worthy of checking out. Yamaha unveiled a digital output option for its SY99 synth; while such ports have appeared on samplers for some time now, Yamaha's action signals a significant step toward the reality of the all-digital studio. Lexicon added to the dream with its LFI-10, providing bidirectional conversion between AES/EBU, SDIF-2 and S/PDIF formats—as well as fiber optic (consumer digital)—and a 9-pin D-connector for interfacing directly with the Lexicon 480L. The LFI-10 can show all data embedded in the audio bitstream, with access to channel status and user blocks such as format, emphasis, copy prohibit, sample count

and CRCC. Display of various error types is provided, along with memory registers for storing the parameters of frequently used interfaces.

Transport synchronizers broke new levels of affordability. Priced at \$2,495 and aimed at the project studio market,

TimeLine's Micro Lynx is a compact rack unit and remote keyboard combo that supports two machine transports plus MIDI and SMPTE time code generators, a Macintosh interface, MIDI-to-SMPTE sync, and synchronizer/resolver units for two transports; options include third transport capability, VITC reader, an inter-

face for syncing a digital workstation and a video sync generator. Basically a MIDIiZER without the MIDI functions. Tascam's ATS-500 is a low-cost (\$799) transport synchronizer that will lock any two Tascam serial interface transports (238, 688, 644, TSR-8, MSR-16, MSR-24). The optional IF-500 (\$550) serial-to-parallel interface syncs any common, parallel interface VTR or ATR to the system.

Paul Lehman described it as the "MIDI Dog Collar": It's MidiVox, from SynchroVoice (Harrison, N.J.), a precision device that accurately tracks the nuances of a vocal performance and converts it to MIDI. While previous attempts to achieve this goal using pitch recognition circuitry have not fared well, MidiVox uses a neck-worn biosensor that directly translates vocal fold movements into MIDI pitch and velocity data. Best of all, MidiVox really works, offering instantaneous tracking and mondo expressiveness. *Très cool!*

What's an AES convention without a party? A pretty droll affair, but BASF livened up the show with a swinging bash at FAO Schwarz, Manhattan's mega toy emporium. Great food, great music, great conversation, and you gotta give those folks at BASF credit for having the nerve to let about half of this planet's audio industry run amok inside a toy store. But it was one heck of a soirée...a tough act to follow. ■

Having worked in professional audio for 25 years (with over ten years at Mix), George Petersen has finally fooled himself into thinking that he knows what he's talking about.

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NEW PRODUCTS

MIDI METRO

From Euro-Stuff (Torrance, CA) comes Q-Logic's MIDI Metro, a S-15 rack-mount unit that translates MIDI clock data into a large, bright metronome display. Designed for studio applications, MIDI Metro simulates the motion of a conductor's baton, replacing the traditional click track, which can bleed into overhead mics when recording drum or orchestral parts. The device can also be used as a stand-alone 40-240 bpm digital metronome.

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SHURE HTS MONITORS

Shure HTS, a division of Shure Brothers (Evanston, IL), has launched four products designed for professional playback and monitoring applications, including Stereosurround™ encoded music, and TV and film productions. The HTS400SPA is a bridgeable, 2-channel, 100W/ch (into 8Ω) power amp with 12 modes for matching the loudspeaker's response characteristics and a DMode™ switch for powering two subwoofers. The HTS680CF mag-shielded, two-way monitor has a configurable port for adjusting LF performance; the HTS640LRS has a smaller enclosure for fitting into any production environment. The HTS650SW is a vented subwoofer with a front-firing, 12-inch driver.

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KURZWEIL K2000

Now available from Young Chang America (Cerritos, CA) is the Kurzweil K2000, a \$2,995 pro keyboard instrument based on proprietary Variable Architecture Synthesis Technology™ VAST allows any multisample, noise or waveform to be processed using a variety of synthesis techniques. The 61-key K2000 has 24-voice polyphony and is stocked with 8 MB of 16-bit linear sounds in ROM—pianos, strings, brass, guitars, bass, percussion and more—with onboard stereo multi-effects. Standard amenities include a 3.5-inch floppy drive and six polyphonic audio outs; a stereo sampling input board is optional.

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RUSSIAN DRAGON RD-SA

From San Antonio's Jeanius Electronics is the Russian Dragon RD-SA, using SignAlign™ analysis to provide for the precision settings of driver and loudspeaker signal delays within 20 microseconds of zero. The \$995 unit measures the time offset between the delayed speakers and the transducer components in main or cluster systems for sound reinforcement, touring and contracting applications.

Circle #277 on Reader Service Card

RAMSA WR-S4400 MIXERS

Available in 12-, 16- and 24-input versions is the WR-S4400 series of 4-bus sound reinforcement mixers from Ramsa/Panasonic Audio Systems of Cypress, CA. Standard features include 100mm faders, 3-band EQ with sweepable mid, individually switched 48V phantom power, four aux sends and four stereo aux returns. A "D-Out" switch on each input channel increases the available number of aux sends by routing any channel's aux 1 output to a direct-out jack. Pricing ranges from \$1,995 to \$3,195.

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NEUTRIK A1 UPDATE

Neutrik USA (Lakewood, NJ) now offers an optional soft carry case to enhance the portability of its A1 professional audio test and service system. Combining a sweepable generator, analyzer and oscilloscope, the \$3,900 A1 measures level, noise and crosstalk, frequency, THD, wow and flutter, drift and noise. A large, backlit LCD displays measurements numerically, or graphically as bar graphs or response curves, and hard copies can be made from a standard dot-matrix printer. Options include an RS-232 interface, software control package and the carry case, with pockets for cables and accessories.

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KORG 01/W

Korg USA's (Westbury, NY) 01/W Music Workstation offers 250 PCM sounds, 119 drum and percussion samples and Korg's new AI² synthesis, along with WaveShaping technology for modifying the actual harmonic content of PCM sounds. The 01/W has 32 voices, 47 digital multi-effects (with real-time control) and a 16-track sequencer with 7,000-note capacity. The 01/W FD version has a built-in disk drive with 48,000-note capacity.

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FAIRLIGHT MFX 2

Fairlight ESP of Sydney, Australia, has upgraded its MFX system, now the MFX 2, a 24-track hard disk recording/editing system developed for film and video post applications. New features include a Turbo SCSI drive bus (allowing up to 16 tracks to be played continuously from a single hard disk drive); data backup at 5x real time using inexpensive 5-Gigabyte 8mm tape cartridges; and double-resolution color displays of tracks, audio waveforms and fades. Also standard are an integrated video transport synchronization system and "Audio Freeze Frame," which plays one frame of audio at normal pitch, down to zero speed. Up to six 1,200MB drives can be connected; an optional rewritable optical drive allows stereo recording to its removable disk while other tracks are playing back.

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E-MU PROTEUS MPS

The Proteus Master Performance System from E-mu Systems (Scotts Valley, CA) combines the sound quality of the Proteus into an integrated five-octave keyboard controller with onboard digital effects and four polyphonic outputs. The \$1,595 unit features 4 MB of 16-bit sounds from the Emulator III library, RAM card preset storage, 32-voice polyphony, performance mapping, "quick key" recall of any preset and extensive programming capability by merging MPS samples with digital waveforms.

Circle #283 on Reader Service Card



DYNACORD DRP20X

Dynacord's DRP20X was unveiled at AES (distributed by Klark-Teknik of Farmingdale, NY). It's a 2-channel processor offering 32-bit reverb and digital effects: echo, chorus, doubling, phasing and combination effects such as reverb+echo or reverb+chorus. Audio parameters can be edited in real time or controlled via MIDI; 128 user memories are provided. Inputs and outputs are balanced XLR-type.

Circle #284 on Reader Service Card

MACKIE MICROSERIES

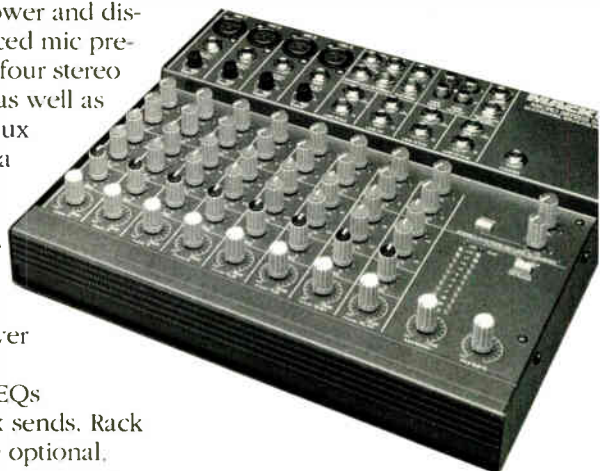
Priced at \$399 and occupying less than one square foot of space is the MicroSeries 1202, a 12-channel mic/line mixer from Mackie Designs of Woodinville, WA. The 1202 uses the same electronics and steel construction as Mackie's CR-1604 16-channel mixer. Provided are four mono mic/line inputs—with 48V phantom power and discrete, balanced mic preamps—and four stereo line inputs, as well as two stereo aux returns and a stereo tape input. Also standard are 12-segment LED meters, internal power supply, 2-band input EQs and two aux sends. Rack adapters are optional.

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ART SGX-2000

From Applied Research & Technology, Rochester, NY, comes the SGX-2000 guitar preamp/processor system for studio or live applications. The two-rackspace, \$829 unit combines a 12AX7 tube pre-amp section with digital effects and internal routing, all of which are programmable. Twenty effects functions can be used simultaneously, with up to eight under real-time MIDI control. The SGX-2000 features more than 70 effects (24 reverbs, 20 delays, exciter, panning, 7-band EQ, rotor, compressor/limiter, two-octave pitch shift, sampling and more), stereo balanced XLR outputs, LED and LCD status displays, and 200 memory locations. Based on ART's new ASIC 24-bit VLSI chip, SGX-2000 specs include a 90dB signal-to-noise ratio and a 20kHz bandwidth.

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PREVIEW



**TECHRON
TEF 20HI**

The TEF 20HI from Techron (Elkhart, IN) expands the abilities of the TEF System 20 with a high-speed interface that—via third party software—could provide functions such as digital oscilloscope, RTA, filter-generating unit and data capture/analysis/display. Hyper-

signal software turns the TEF 20HI into a digital recorder for storing acoustical information for later analysis and manipulation, including real-time filtering and convolving the characteristics of one signal onto another. Using the latter, an environment's impulse response could be convolved and compared with an anechoic recording of music or speech to

reveal a room's early sound field. Hypersignal also provides 2-D and 3-D spectrograph viewing of a signal. TEF 20HI is priced under \$5,000; the Hypersignal-Workstation software from Hyperception is \$989; Hypersignal-Acoustic from SignalLogic is an enhanced version priced at \$1,489; both companies are Dallas-based.

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HOT OFF THE SHELF

"Studio Seconds: The Assistant Sound Engineer Manual" (\$99.95), hosted by Tom Lubin, is a video course covering all the basics, from tape deck alignment to SMPTE time code. Call First Light Publishing at (800) 777-1576 or (213) 558-7880... Ideal for general synchronization purposes. ESE's ES-219 Black Burst Generator has four BNC composite video outputs and is priced at a bargain \$195. Call (213) 322-2136 for info... Saki Magnetics has expanded its maintenance and relapping services for analog tape heads from any manufacturer. Head restoration includes relap, recontour, polishing, edge slotting, grounding, base plate rebuilding, reassembly and optical alignment. Prices start at \$40. Call (818) 880-4054... The most flexible MIDI-to-CV converter ever?

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Clarity's Retro (\$595) has eight outputs to control analog synths, digital delays and other gear via MIDI. Call (914) 424-4071... **Kimber Kable's PostMaster™** a spade-like crimp terminal for use with five-way binding posts, has radial ridges and a high-rebound, sandwiched inner layer that intensifies contact pressure while damping enclosure vibrations that could loosen the connection. This cold-rolled OFC copper connector accepts wire gauges from 6 to 16. At your dealer or call (801) 621-5530... **Electro-Magnetic Components'** replacement heads for Otari MTR-10/12/20 tape recorders are priced from under \$400, with all formats available. Heads feature a patented two-piece design, allowing the worn crown to be replaced for much less than the cost of a new head. Call (516) 878-1789... **Mount Rockmore's "Mr.**

Two" (\$49.95) is a two-space rack-mount utility shelf, fabricated from a weld-free, single sheet of aluminum alloy, with a load capacity of over 100 pounds. At your dealer or call (415) 621-2178... Version 3.0 software for the **Lexicon Opus** adds the ability to control pro video recorders directly from the console and supports Automix™ console automation and Cpex™ stereo compression/expansion/pitch shifting functions. Call (617) 736-0300 for info... **Analog Devices' SSM-2142** balanced line driver chip replaces the need for transformer-based solutions, while eliminating external trim circuitry. It can transmit 10V RMS signals over cable lengths of up to 500 feet; pricing is \$2.95/each in quantities of 100. A companion receiver IC (SSM-2141) is also offered. Call (408) 562-7513... Version 5.0 software for the

WaveFrame 1000 (formerly the AudioFrame) adds manual punch-in/out capability, time compression/expansion, Windows 3.0 support and a Multichannel Digital Interface (MDI-32) for direct connection of 32 digital inputs and outputs in PD or SDIF multitrack formats. Call (303) 447-2351... **REM Music Products' RadRacks** is a line of studio racks, in 8- to 20-space sizes, with straight- and slant-front styles available. Call (800) 624-6766 or (805) 379-4252... **Ac-Cetera Rubber-Necks** are non-creaking/non-glare/non-rusting mic goosenecks, available with or without internal-locking XLR connectors. Call (800) 537-3491 or (412) 344-1520... An integral patch bay option for the **Soundcraft Sapphire Series** of mid-priced, in-line recording consoles is available on 20- to 44-input versions. Call (818) 893-8411.

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by Bob Hodas

VALLEY INTERNATIONAL DSP 815

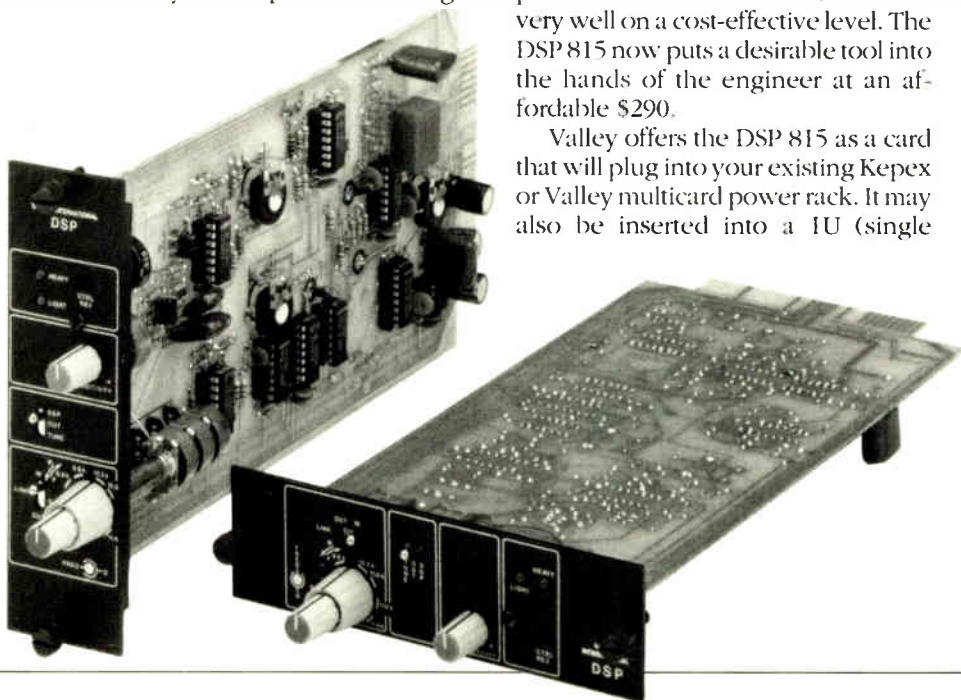
No, Valley has not come up with a new digital signal processor (we are all falling prey to digital acronyms). It's a unit that will be very useful in the modern studio, solving an age-old problem as well as a new problem created by the age of synthesis. The DSP stands for Dynamic Sibilance Processor, but don't make the assumption that this is just another de-esser. The DSP 815 is a sophisticated piece of gear that works very effectively in removing sibilance from individual or mixed tracks, without removing the "S" from the material. Its operationally simple design also offers the ability to zero in on offending frequencies with pinpoint precision.

Sibilance can be a real pain in the (r)ear. It is often overlooked in the recording process because tape is much more forgiving than either record vinyl or compact disc. The high-

frequency, sinusoidal information (heard as whistles) produced in the letters "S" or "Z," as well as the combinations of "SH," "CH," and "ZH" can generate untrackable sections for a record stylus, which turn into distortion for the listener. This same information on CD can cause noticeable distortion on many speaker systems. The problem is not the "S" sound itself but speech artifacts created when air is forced through a narrow passage such as through the teeth or between the tongue and roof of one's mouth.

We've all run into the problem of sibilance on remixes, tracking or mastering. The goal is to eliminate the problem (*before* it gets to the mastering stage), without significantly changing the frequency response of the material. In the past, sibilance problems have not been dealt with very well on a cost-effective level. The DSP 815 now puts a desirable tool into the hands of the engineer at an affordable \$290.

Valley offers the DSP 815 as a card that will plug into your existing Kepex or Valley multicard power rack. It may also be inserted into a 1U (single



space) powered rack that accepts two channels of processing. Both may be operated with balanced or unbalanced connections, via barrier-strip connections. Be forewarned that the strips are mini (#6 spade lug) and metric, so don't lose your screws. Channels may also be linked to track dynamically for stereo or multichannel program.

Overall operation of the DSP is quite simple, and layout is uncluttered and logical. The offending target frequencies are selected in the same manner as one would use a parametric equalizer. The center frequency of the control passband may be selected by sweeping through a pot labeled from 4 kHz-16 kHz. Bandwidth (Q) is adjusted from narrow to wide via a continuously variable, concentric pot. Sweep frequency and bandwidth selection offers the engineer greater control over suppression, while avoiding the unnecessary removal of large sections of transient program. This is a welcome change from the de-essers that simply shelve the entire top end.

A "Tune" function makes the DSP 815 a breeze to operate. The DSP/Tune/Out switch selects the processor as either enabled (DSP) or out. (Out routes the input directly to the line driver at unity gain.) "Tune" allows the user to listen only to the control passband. When listening to the passband in this setting, the most irritating frequencies are quickly and easily identified. I suggest performing this operation at a modest listening level, as the offending sibilance can be quite harsh to the ears.

The "Sensitivity" control adjusts the response of the DSP control circuitry to the information within the passband. This should not be construed as a level-dependent threshold device. The DSP constantly compares the passband information level to the broadband energy at the input.

Two LEDs indicate level of operation. The yellow "minimum" LED indicates that the unit is on the threshold of operation, with -3 dB of suppression at the selected frequency. When the green "max" LED lights, the processor has sensed sibilance within the passband and is removing it.

A "Control Rejection" trimmer is provided for removing DC offset from the line driver stages, which could be caused by the control circuitry. VCAs may drift from time to time, especially if exposed to radical swings in tem-

perature. Valley also states that the trimmer may be thought of as a "noise-nuller," since DC offset may show up audibly when low-level information or tape hiss is present. I found the factory setting to be sufficient and did not need to make adjustments.

I fed some sibilant vocal tracks into the DSP and couldn't have been happier with the results. Sibilance was removed while the "S" remained totally recognizable. The "S" wasn't turned into an "F" or ducked out as is the case with de-essers I have used in the past.

Valley claims that this is because the DSP works on the resulting sinusoidal whistle and not on the program, thus an "S" becomes softened but not removed. In any case, it certainly was effective.

The next test involved mixed stereo program. I am not a mastering engineer, and dealing with sibilance in program material was not as simple for me as it was with individual tracks. Yet the DSP allowed me to remove sibilance without creating significant holes or causing pumping in the program. The link function made the unit even more desirable, as I targeted two sep-

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FIELD TEST

arate frequency trouble spots in the stereo mix. The DSP will dynamically track linked channels, and thus several frequencies may be covered without having to stack units.

Next, I tried the DSP on something it was not designed for. I have always been especially annoyed by the fuzz that appears on top of low-frequency programs such as bass in FM synthesizers (a DX7 was used in this case). Previously, I have tried equalizing the fuzz out, but this substantially degraded the tone of the instrument, es-

The DSP allowed me to remove sibilance without creating significant holes or causing pumping in the program.

pecially at the keyboard's higher registers. I was amazed when the DSP removed the fuzz with only the slightest transient suppression and virtually no tonal change. Valley may not have designed the DSP for this purpose, but it certainly solved my problems and would be a welcome addition to outboard racks of those engineers dealing with lots of keyboards.

Valley supports the DSP with a good owner's manual. It contains schematics for the studio technicians, and the PCB layout is uncrowded and extremely well-labeled. There are instructions and diagrams for connecting the unit (balanced or unbalanced) in both new and older-style power racks. Along with the usual operational descriptions are sections on tuning in the system and a little education on sibilance and de-essers.

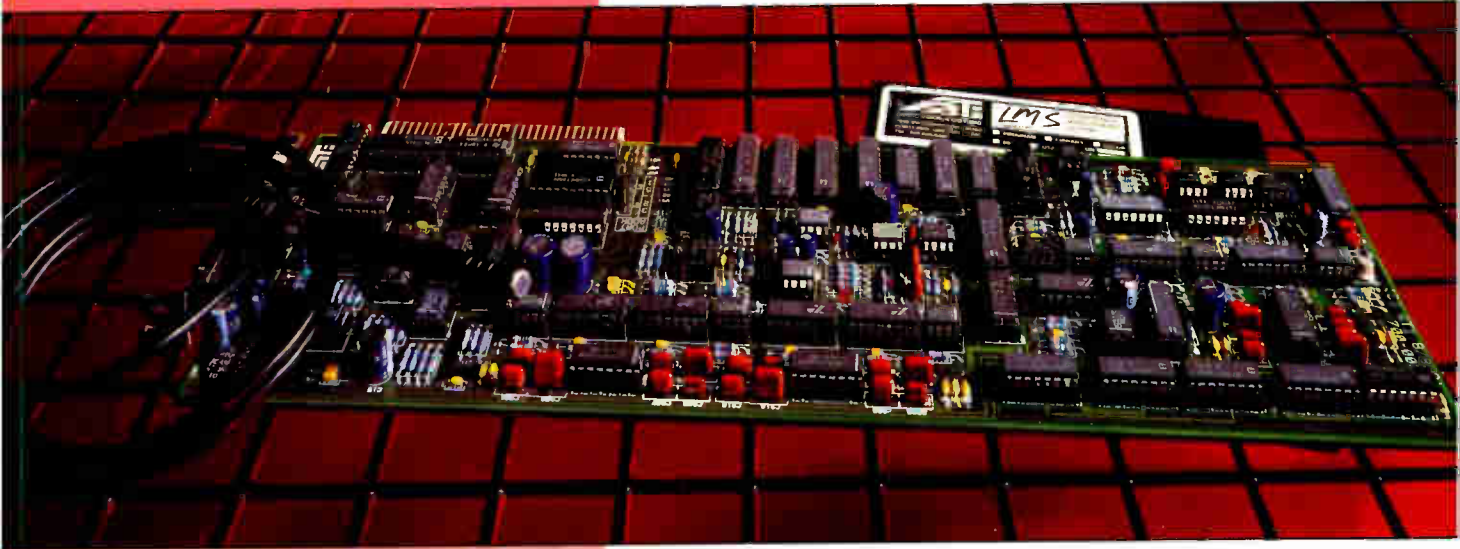
With the versatility the DSP 815 exhibits both in removing sibilance and synthesis fuzz, I believe that it will find its way into a good many studios (broadcast and recording) as well as keyboard racks for the serious session musician.

Valley International, 616 Bradley Court, Franklin, TN 37064; (615) 370-5901. ■

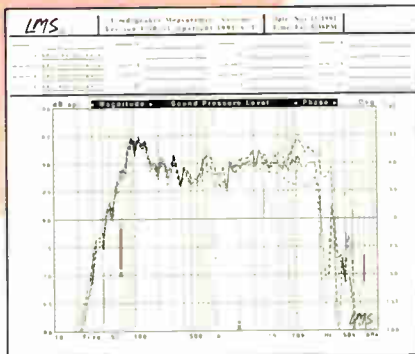
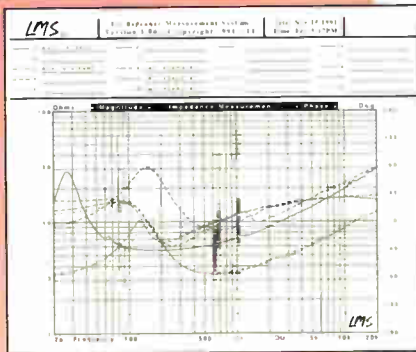
Bob Hodas is a San Francisco Bay Area-based engineer and producer.

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by Hank Bordowitz

JON BON JOVI

BUILDS HIS OWN SANCTUARY



PHOTO: MARK WEISS/MMA

“Jon wanted this to be separate from his home,” Obie O’Brien says as we sit in the control room of Sanctuary, Jon Bon Jovi’s home studio in New Jersey. “so his wife and company wouldn’t have to hear the drum set and be killed by the same song being played over 400 times in an hour. He wanted this place to still be his house, not a business.”

O’Brien swivels around in his chair, looking through a window to our right into a 295-square-foot room where a drum set sits. As he continues his scanning arch, he looks over the 40-input DDA console into the 200-square-foot vocal room. He completes his 180-degree swivel looking through a window at the mock stone wall of the 230-square-foot guitar room.

“I do like this studio,” he smiles, “and I love this control room. I don’t know what it is, but you’re down here and you forget you’re in a house. And

what’s nice is, in the summer, you go out and play baseball in the backyard, or go and swim, take the bikes. Sea Bright [a Jersey Shore beach town] is only about two minutes away—you go over the bridge and there’s the ocean.”

O’Brien is no stranger to Bon Jovi’s basement. He designed Sanctuary several years back, and when it came time to refit it a year or so ago, he supervised that, too. A pretty space, it looks more like a professional recording studio than a home operation. The various rooms are enlivened by highly polished hardwoods. In the front/vocal room, there’s a slate floor. The guitar room has a wall made of the type of stone facing people put on houses. Yet, you also notice the fact that there are several small rooms in the studio, as opposed to one large one.

“This was all just unfinished cinder block, concrete slab, all exposed joists,

Jon Bon Jovi (L) and Obie O’Brien in the studio.

2x6s, 2x10s, with two 2x10 laminates running the length of the house," O'Brien recalls of the space that first confronted him. "The first thing we talked about was ripping the floor up, [but] the slab is eight inches. To go down there probably would have cost us a hundred grand, just to get an extra two feet. It's not worth it. It's not a commercial studio. It's for his own personal use.

"When I was first down here with Jon, we were standing here talking and the phone rang," he continues. "I thought it was down here. I thought there was a phone on the wall or something. It was upstairs in the kitchen, and you could hear the conversation like you were standing there! So, right away, I'm thinking, 'Oh, yeah. Sure. This is good.' I wanted to make sure that we had great isolation between this studio and the rest of his home.

"I realized I couldn't do what would be a conventional studio, control room and then the area out in front of you, because of the ceiling height. That was my restrictive dimension. So, I came up with the idea of putting the control room here, a room on each side, and a room in front. But I wanted sight lines, too. So you put the drums in the middle there, and you have sight lines all the way through to the guitar room and the control room."

Beyond necessitating the three smaller rooms, the low ceilings also called for some drastic carpentry.

"I couldn't afford to lose any more ceiling height," O'Brien says. "There was 7 feet 11 inches to the bottom of the pre-existing joist to the first floor. When you come in, and you say, 'Well, boy, we've got 7 feet 11 inches here, and then if I put in a 2x10, and then the treatment on top of that, two layers of drywall, and then I've got to have an angle...'

"There are certain formulas in construction—when you have a load, you have to use certain thicknesses of wood," O'Brien continues. "But we tried to use laminates whenever we could. They're half the weight and twice as strong. So I said, 'We have to use a 2x4 instead of the 2x10.' And everyone said, 'No, you can't use a 2x4.' So I sat down with the contractor, Al Campbell, and I said, 'Look, we'll take two 2x4s, get them pressure-treated dry, glue 'em and bolt 'em to-

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gether. Then let's come up with some clever way to take the load off by going to the pre-existing joist, but we've got to have a decouple."

"There's only about 3/4 of an inch between this ceiling and the actual joist. We didn't have much to work with. The hooks were hanging from the sides of the joist. We used lag bolts and put a big washer in the front, a washer in the back and then a big locknut going through the joist, so you could hoist a motor."

This process involved enormous amounts of drilling. Beyond that, they had to have custom washers made up to decouple the ceiling from the rest of the house. They even devised a way of making sure the pressure on the hooks was uniform.

"But, you know what? It worked!" O'Brien says. "I have this heavy-duty ceiling that isolates great and we're totally decoupled. We have no mechanical transference to upstairs and none from the floor to down here. So, we were able to hang the ceilings, and I got as much height as you could conceivably get out of this basement."

Each room in Sanctuary is separated by air and ten sheets of drywall. The wiring runs in the airspace. Rails are attached to the cement floors with glue, surrounded by acoustic caulk. The drywall was then brightened with wood or stone facing, the floors either parqueted or slated.

As well- and thoughtfully built as these rooms are, they are equally well- and thoughtfully equipped, thanks in large part to the Philadelphia-based, pro audio supply company TekCom and its vice president Lou Maresca, a longtime friend and associate of both O'Brien and Bon Jovi's producer, Lance Quinn. In fact, TekCom supplied that duo's Philly studio called The Warehouse in the early '80s. Maresca was even on hand for many of the sessions for Bon Jovi's records, so he intimately knew the singer's equipment wants and needs.

"I put the stuff we have in here so he could come down at two in the morning, turn it on and make it work," O'Brien says of his criteria for equipping Sanctuary. "I put gear in here that I thought would work fairly well and that would be easy to work with."

"Most of the outboard gear is stuff he's been familiar with from years in the studio. The limiters are very simple,

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the LA-2As. We've got the Yamaha stuff, the REV5—we usually have four in the rack—and four SPX90IIs. There are Drawmer gates, which I really like. He also has two racks of Aphex gates. We have two PCM-70s—one we keep in the box, one we keep in the rack. We have the Drawmer stereo tube limiter, which is a nice piece I got through TekCom. We got the MX-80 from another artist's studio, and that's absolutely my favorite tape recorder."

When it came time to upgrade Sanctuary not too long ago, Bon Jovi called O'Brien back in, and for all intents and purposes gave him an open checkbook. "I could have put *anything* in here," O'Brien says. "The first thing you want to do is put in the stuff you really like. I wanted to put a big old Neve in here, or an API, but then you're talking incredible maintenance. You just have to have somebody to keep on top of it, and Jon's not going to want that. So I wanted to get a newer console that was easy to operate and had a lot of features, but I also wanted a good-sounding equalizer. So, basically, I was looking around, and it came down to two companies: DDA and Neotek. The Neotek I was familiar with. They've got a nice equalizer, and I think it's a good console for the price. Then I heard the DDA DCM-232's equalizer section, and I said, 'This is great.' It sounds like the older British consoles. The low end's fat, the high end's nice. It really pulls in strong. So I went and looked at the console, and I really liked it. I told the company, 'I need a console in the house in two weeks.' And they said, 'No problem. We'll have one for you. No big deal.'"

With the current refit, Sanctuary could rival many pro facilities. A good-looking, tough, hard-working studio (not unlike its owner), it serves its purpose.

"For a home studio, this is really over and above what most people expect," O'Brien concludes. "I've been in a lot of home studios, and a lot of them are rat holes. The wires are crummy and there's stuff hanging all over. I just didn't want this place to be like that. Building a studio for this guy was a pleasure. Even with all the work, it was a pleasure, because he's such a cool guy." ■

Hank Bordowitz is a New York-based freelance writer.

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by Iain Blair

RICK RUBIN: FOREVER DEF

THE ROAD FROM RUN-D.M.C. TO THE RED HOT CHILI PEPPERS

Producer Rick Rubin seems to revel in his controversial image. Staring menacingly out of his publicity shots like some demonic biker on acid, the 28-year-old co-founder of Def Jam and current owner of Def American Records is a self-made millionaire and self-taught studio pro whose current roster of acts (including Slayer, Andrew Dice Clay and Danzig) all seem guaranteed to upset the establishment.

So it's a bit of a shock to find that, in person, the man responsible for unleashing the Beastie Boys and the Geto Boys on an unsuspecting world is a soft-spoken pussycat whose Hollywood Hills home is full of Beatles CDs and books on the Fab Four. In this interview, he talks about his influences and his studio methods.

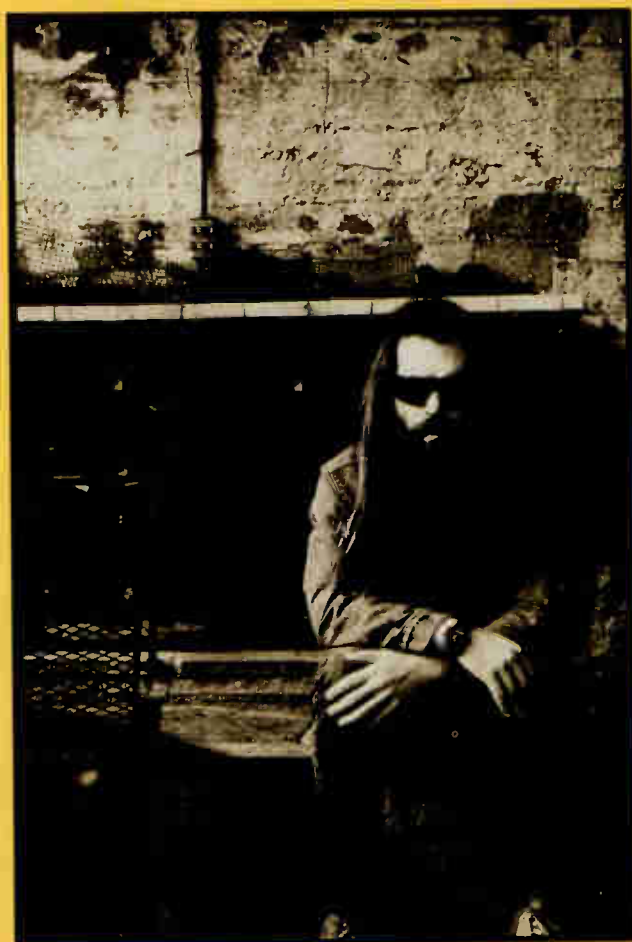
Mix: What were your musical influences growing up?

Rubin: Aerosmith was the first group that I actively pursued. I was in junior high school, heard an album and then bought all of them. Before that, when I was real young, I listened to the Beatles a lot, although I didn't understand what I was listening to. But then looking back, I'm really glad that I did, and I'm still a huge Beatles fan. After Aerosmith, I got into Ted Nugent and AC/DC, and then into punk rock—everything from Black Flag and the Circle Jerks to Discharge and Minor Threat. I also started listening to new wave music, such as Talking Heads, The Cars, The Ramones and Hüsker Dü. At the same time, I'd gotten into funk, especially James Brown, so all of these influences kind of spread into each other. And then I started listening to rap a great deal when I was at high school, and by the time I got to college,

I was listening exclusively to rap.

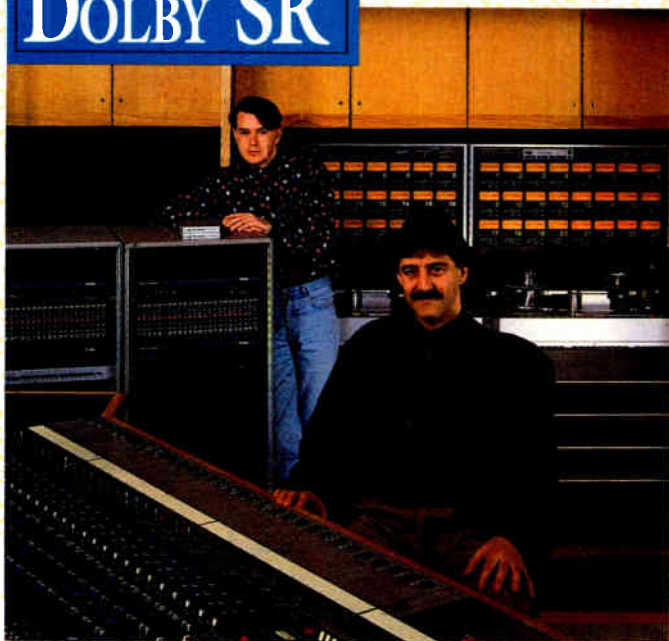
Mix: How did you get into the music business? Didn't you train to be a lawyer?

Rubin: That's true. My parents' plan was that after college I'd go to law school, but instead I got into making records. At first it was strictly a hobby—I never intended it to become a business—but then we started selling a lot of records. My label at the time was



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called Def Jam, and I produced seven 12-inch singles that we released independently. In fact, I was running the company out of my dorm room at NYU, which wasn't so unusual. What was unusual is that the hobby grew into something so big, and then I was offered a production deal through CBS to form my own label. All this happened right while I was graduating. I'll never forget getting my first check from CBS, which was for just over \$600,000, and I sent a photocopy to my parents and they said, "Okay, you have one year to be successful in the record business, and if not you have to go to law school." Luckily, it was a good year.

Mix: Your first single was "It's Yours" by T. La Rock and Jazzy Jay. How did you produce it without any training?

Rubin: I'd recorded a couple of punk rock records before that, and I had a band called Hose when I was in college, and I put out a 12-inch and a 7-inch single, so I kind of had a feel for it. Also, I was deejaying at clubs, and I made friends with Ed Bauman at 999 Records, who sort of walked me through the whole process, including how to get records pressed and where to go for mastering, etc. But in terms of production, I knew very little.

As far as rap went, I thought all the records sounded musically just like disco, but then when I went to the clubs, I saw that rap was a whole different sound. In clubs, with DJs scratching and mixing tracks—which was really a precursor to sampling—DJs were really part of the record and sonic effect. They were the stars of rap, and as a fan I wanted to make records that reflected that sound. I think that when disco came along, it really replaced funk as the black music [that] label executives understood. So when rap came along, they used the same producers and the same old techniques to make rap records, but they were really still making disco records, only with people rapping on them, which isn't what rap was about. So being a fan and understanding what rap was really about, I just tried to capture that on record, and, ironically, part of the answer was not knowing anything about the technology and what was considered "right" or "wrong" in the studio. It was about capturing some really awkward sounds at times. Looking back, they're

pretty funny-sounding records, but that was what was going on.

Mix: How did you get involved with Run-D.M.C.?

Rubin: My partner at Def Jam, Russell Simmons, is Run's brother, and when we had success with LL Cool J, he asked me to produce them. I was already friends with the band, and I'd played some guitar on their previous album.

Mix: How did you put together the famous Run-D.M.C./Aerosmith col-

laboration on "Walk This Way" that way at all. I think they're very much in tune with each other.

Mix: The Beastie Boys' *Licensed to Ill*, which you produced, broke a lot of new ground. Were you aware at the time what its impact would be?

Rubin: No. We were just trying to make a great record, and it took a long time to make—nearly two years to complete. We'd cut a song or two every month. It was very casual, and I think that's why it has so much variety—the writing took so long.

Mix: What was the wildest thing you did on that record?

Rubin: It was done long before the sampling craze started, and I'll never forget when we started recording at Chung King, this studio in Chinatown, we had tape loops going all over the studio. Sonically, it was pretty wild using hard rock guitar. I got the guitarist from Slayer to do some solos, and he thought it was pretty bizarre to be doing a rap record. Everyone thought I was nuts.

Mix: Even the Beastie Boys?

Rubin: They hated it. There was a big fight, but luckily I prevailed.

Mix: Why didn't the collaboration continue after the multiplatinum success of that record?

Rubin: I think they were very uncomfortable with all the press reports about me as some kind of Svengali figure pulling their strings. They felt they weren't being taken seriously and wanted to prove they could do it on their own.

Mix: How has living in L.A. affected your musical vision?

Rubin: L.A.'s a very rock 'n' roll city, versus New York, which isn't at all. New York's very Euro-disco: Go to a club there and you hear house music and European dance music. In L.A., you hear Led Zeppelin, and you can go to clubs and see ten different bands in a night. I think it's great that community exists, and I feel there's a very positive artistic community here, which I didn't feel in New York. The weird thing is I used to hate L.A., even though I came here all the time. Now I love it.

Mix: You admit to being a self-taught producer. Does that give you a different perspective on the job?

Rubin: Definitely. I look at producing in a very different way from most other producers. I think of it as being more like the director of a film or a play. By that, I mean that for the technical side of it, I hire engineers who I think are competent, much like a director hiring

I think the most important thing a producer can do is spend time getting the songs into shape before recording. The material is so much more important than the sounds.

laboration on "Walk This Way"?

Rubin: I'd finished the Run-D.M.C. *Raising Hell* album, which didn't have that track on it, and after listening to it thoroughly, I called Russell and said, "It's good, but we need that little extra something to make it great." So I started looking for a great track to cover, and the moment I heard "Walk This Way" I knew that was it. It had a groove rap audiences would understand, and lyrically it was a song rap artists could deliver without much change. It really was a rap song. Looking back, I'm pleased because I feel it opened the eyes of both sides—rock and rap—and showed them that they're not so radically different after all. It's so strange to me when people say, "How can you produce rap and heavy metal? They're such opposites," because I don't see it

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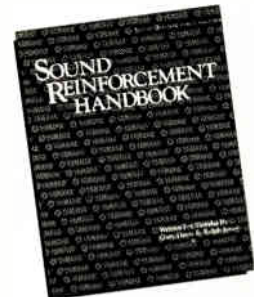


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a cinematographer, and I let them do their gig. That doesn't mean I don't have very strong ideas about what I want to hear, but I don't technically know all the bells and whistles to make it sound that way. I think the most important thing a producer can do is spend time getting the songs into shape before recording. The material is so much more important than the sounds.

Mix: Give us an example of that approach to a record.

Rubin: I just finished producing the new Red Hot Chili Peppers album, and we were in pre-production for seven months, working on the material. Then we recorded the whole album in three or four weeks. So the process of getting the music onto tape is very simple, but getting the music to the point where it's even ready to be recorded is very tough.

Mix: A lot of bands like to write in the studio.

Rubin: I know, but I'm totally against that. The studio is not a place for writing. It's a place to make magic happen, not to think. I'm a huge fan of pre-production, and that should be done at home or in a rehearsal studio. So with this Chili Peppers album, I'd say we got the material to the point where if I'd left the project before we recorded, and they'd basically kept to what we'd worked out over those seven months, I think the resulting album would have been the one I wanted.

Mix: What producers have influenced you?

Rubin: I love the way The Beatles' records sound, and Led Zeppelin's, and I think Mutt Lange has made some amazing records—*Highway to Hell* [by AC/DC] is my all-time favorite—I like those old records best. Of the newer stuff, I like the sound of Lenny Kravitz's, although that's really trying to sound like the '60s again. I really like Jeff Lynne, too, though I'm not exactly sure why, because I'm opposed to a lot of the stuff that happens on his albums. They're lighter sounding and more processed than I'd like them to be, but he gets the best vocal sound. It's magical.

Mix: What engineers do you like to use?

Rubin: My current engineer is Brendan O'Brien, who's younger and newer than my usual guys. I like to work with Jim Scott, Andy Wallace,

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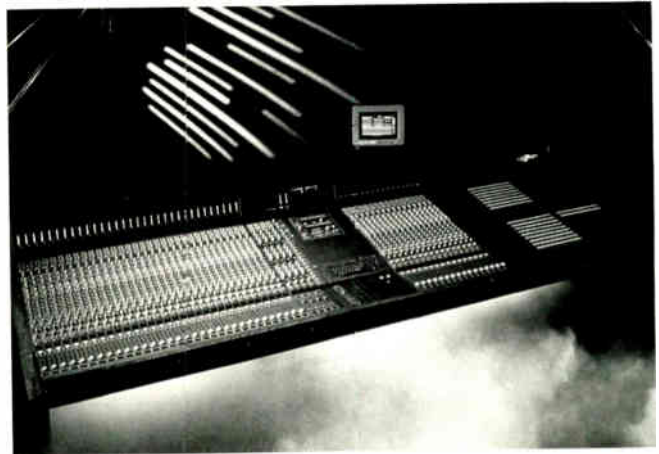
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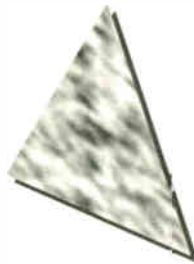


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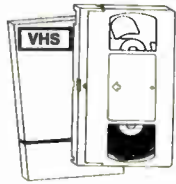
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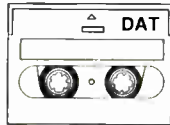
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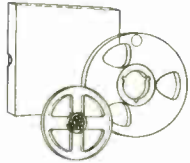
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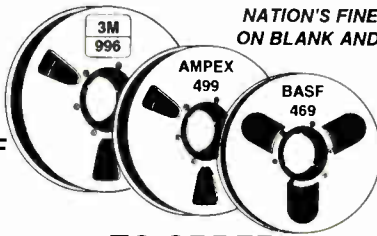
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Mix: What studios do you like?

Rubin: I don't really like studios, period. That's why I liked doing this [Chili Peppers] album in a house. If I have to go, I like Ocean Way and Hollywood Sound, which is a small, old dumpy place with a great Neve board.

Mix: Since forming Def American and signing acts like the Geto Boys, Danzig and Slayer, you seem to have gone very hard core.

Rubin: I don't think I've changed that much. *Licensed to Ill* was a very aggressive record, as were LL Cool J's records. There was a lot of stuff about smoking crack and rape on the Beastie Boys album, so I think I've always made consistently aggressive records, both lyrically and sonically. At the same time, the label has the Black Crowes, so there's diversity there. The main thing for me is not to get stuck in a rut. That's why I stopped producing rap records. It just got tired and old. And that's why I had such problems with Geffen. They were very unhappy with me when I stopped making rap records. They didn't understand it at all. I feel I've never made any records to capitalize on a trend, but labels don't think like that.

Mix: You've produced a wide variety of artists. Is there a "Rick Rubin sound"?

Rubin: I think so, although it's easier for me to say what I don't like than what I do. I don't like reverb, and on the Chili Peppers record we didn't use any, which is very unusual because most bands prefer to be enveloped in some reverb. So I like to make dry records that capture a performance. I hate technically slick records that have no sense of emotion or of the artist's performance, and all my records sound like the artists—whether it be the Beastie Boys or LL Cool J or The Cult or Slayer or the Masters of Reality. I'm not one of those producers who has a stock sound and then adds different personalities on the top as icing. I think I'm good at making very personal records for the artists. ■

Mix's post-production editor Iain Blair is a freelance writer based in Southern California.

by Phil De Lancie

DUPLICATION OUTLOOK

IS THE RIAA REPORT OR AES SHOW A BETTER INDICATOR?

The only thing certain about the future of the prerecorded music industry is that forecasting it will continue to be a risky business. Even as the general outlines of DCC and Mini Disc become clearer, opinions on how and when the new formats will affect the market remain varied. And the impact of a slow U.S. economy is unclear as well, with some observers claiming that music is recession-proof, while others are bemoaning the bad times in the entertainment industry.

One thing we do know, based on the latest figures from the RIAA, is that the first six months of 1991 were far from booming for record industry tape duplicators. While six months is too short a period for gauging long-term trends, the RIAA's comparative look at the first halves of 1990 and 1991 hardly makes encouraging reading for duplicators. The value (at list price) of industry shipments remained steady, and net CD shipments rose 16%. But overall net shipments fell 11%, mostly because of a startling 23% drop in cassette shipments. Music videos, which had been a small but rapidly growing category a year earlier, were also down by 18%.

Adding to the gloomy news, long-time industry stalwart Electro Sound Group Inc. recently decided to close its doors after more than 15 years of prerecorded music manufacturing. According to a company statement, the decision to commence an "orderly liquidation of assets" was based on a "continuing decline in demand for, and ... prices of, the company's products and services." A major independent that has been struggling in recent years, Electro Sound was reported in *Billboard* to have a duplication capacity of

150,000 cassettes per day.

Given the above, one might be inclined to draw dire conclusions about the direction of the cassette duplication market. But October's AES Convention, another important indicator of industry vigor, revealed a duplication sector that's far from ready to simply press "stop" and go home. In fact, the general impression among exhibitors seemed to be that a healthy rebound is already in progress, especially if one considers that the prerecorded cassette market isn't just a music market anymore.

To help sort out these apparently contradictory signals, *Mix* turned to some leading manufacturers of duplication equipment and supplies. Each was asked to describe the new products they showed at AES, their expectations going into the show, the response they received and their view of the outlook for 1992:

Robert Coningsby III, sales manager, Apex Machine Company: We introduced our new CA-20, which is a high-speed, compact, two-sided audio cassette printer for small and medium-sized duplicators. We also introduced our Z-100 semi-automatic overwrap machine for the cassette Norelco box, which was received with tremendous enthusiasm. We sold a number of machines at the show.

Overall, the show was wonderful—the best we've ever attended. We went into the show very optimistically. We took a very large booth: four booths for the first time. We spent more money and exhibited more equipment than we ever had, and it paid off. We knew that a lot of customers were looking to

buy new equipment before the end of the year. We felt that the industry was going to pick up, and, sure enough, it's moving right now.

Everyone I've spoken to is going full blast. A hell of a lot of them are going 24 hours. The first six months of this year were dead, but I think you'll find the second six months to be easily comparable to the second six months of 1990. Everyone is extremely enthusiastic, and that's why they're buying new equipment.

I don't think the analog cassette is

The latest RIAA figures were bad news for music industry duplicators. But October's AES Convention revealed a duplication sector that's far from ready to simply press "stop" and go home.

going anywhere but up in 1992, or that we are going to see a significant decline in prerecorded cassette volume. All the major duplicators now have digital bins, so they are spending a lot of money to produce a better quality cassette.

At Apex, we will have new, more highly automated equipment for the standard cassette that will go 200 parts per minute and produce high quality in four colors. With luck, the equipment will be introduced in March at the AES in Vienna. We also have equipment ready to go for DCC as soon as people start duplicating in that format.

Kathleen Farrow, technical writer, Concept Designs: The new equipment we had for AES was the DAAD R². It's basically two DAAD digital bins in the same cabinet, sharing memory. The

memory can be divided between two programs in any combination of lengths that doesn't exceed the total memory capacity. It gives you all kinds of flexibility, because you don't have to have a bunch of memory sitting there doing nothing. You can be working on a cassette and a full-length program at the same time.

The new system allows our smaller and medium-sized clients, who aren't prepared to invest as much as the major duplicators, to get into the quality of digital duplicating. It doesn't cost as much as two separate DAADs. You can use it with our high-speed load, or load both sides at once in real time from DAT. But since you can do more than one job at once, high-speed loading doesn't become the critical issue that it is for people with one DAAD dedicated to a single program at one time. And if you don't need high-speed load, you can save a lot of money.

We don't sense a great slump in equipment manufacturing for cassette duplication. We often gauge the health of the industry by the sales of our modified loaders, and judging by the AES show, we aren't seeing any decline. The RIAA doesn't count spoken word, and that's a big, big market.

As far as 1992 goes, we are very customer-driven. And our customers are not intimating to us that they're not going to be doing next year what they're doing now. We're still getting a lot of orders.

Jim Williams, president, Gauss and Electro Sound: The MAX digital bin is our most significant new product. We decided to bring it to AES in a somewhat early state. We will be finished with MAX around the end of the first quarter of this year.

The system will be switchable between any three duplication ratios, from 32:1 to 128:1, specified by the purchaser. The memory is expandable up to 120 minutes in blocks of 6.2 minutes per card. We're also coming up with a way to ensure linearity in the 16-bit D/A converters, using a self-calibration scheme. The system will be capable of both real-time loading and loading from one of the existing VLDS high-speed loading systems. We are not planning on offering our own high-speed downloading unit.

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cuity of all the various Gauss and Electro Sound machines that are out there. Also, we are incorporating DCC specifications into the final design process for MAX, so that it will have optional DCC capability available from its introduction.

The reaction to MAX at AES was quite positive. The real question is how to convert that initial enthusiasm into people putting money down on the table. But obviously, the more interest you start with, the better the outcome should be. I was pleasantly surprised at the positive attitudes in general at the

show.

Everybody I talked to at AES is extremely busy right now, although the first six months of the year were much slower than normal. Typically, the peak duplication season starts a little earlier than it did this year, and I'm not sure where the figures will end up. But the RIAA numbers are strictly addressing the prerecorded music market. There's still continued growth in the non-music areas, and a lot of the growing companies that we are selling equipment to are heavily involved in that.

I think people feel strongly that the prerecorded cassette has a good bit of

—CONTINUED ON PAGE 158

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Tape & Disc News

Sony, Philips Reach New Format Accord

In a joint statement issued by Philips Consumer Electronics and Sony Corporation, the companies have announced that they will "work together to provide the DCC and Mini Disc technologies with a smooth market introduction, with sufficient support from all interested parties." They've also reached an agreement to jointly license the patent portfolios necessary for software and hardware companies to work on MD-related products. Sony apparently needed the cooperation of Philips, its partner in the development of the compact disc, before moving ahead with MD licensing.

With their respective software arms, Sony Music and PolyGram, the two hardware giants are obviously well-positioned to aid or impede the roll-out of each other's pet formats. So the companies' cooperative stance marks an important departure from previous, more partisan comments made by boosters of the competing systems. But it remains to be seen how long the mutual support will last once DCC and MD are both on the market.

Meanwhile, the audio hardware and software communities continue to ready themselves for DCC's second-quarter introduction. Gauss and Electro Sound, the sister companies that jointly dominate the world's cassette duplication slave market, have announced the successful completion of a DCC licensing agreement with PolyGram Record Service. The license allows Gauss/Electro Sound access to "all technology and know-how related to the high-speed duplication process of DCC." A DCC duplication system is expected from at least one of the companies in 1992 (see Jim Williams' comments in the T&D feature, p. 153).

On the consumer side of the business, BASE, described by Philips as an "official licensee" of DCC, has announced its support for the development of high-speed duplication systems for the format. Philips' co-developer in the DCC project, Sony rival Matsushita, has exhibited "working samples" of deck-type and portable-type DCC recorders at audio shows in Japan.

BASF Goes to Greater Lengths

BASF is in the news for a flurry of duplication-related activity. At AES, the company featured its new PE 668/968 C-60 and C-90 audio duplication tape. The tape uses a high-bias IEC Type II cobalt-enhanced ferric formulation.

BASF also continues to encourage a switch by duplicators to the use of C-90 stock on programs of all lengths. Final results of a company study of C-90 print-through, first presented at last year's ITA cassette seminar (see "Tape & Disc," August 1991), have now been released. The study indicates that improper manufacturing techniques and excessive heat are more important factors in print-through than stock thickness.

Underlining its commitment to C-90 stock, the company is offering four new long-length C-90 pancakes: LNS ferric in 15,000 and 17,300 feet, chrome in 17,300 feet and SuperChrome dual-layer in 10,800 feet. It has also introduced a long-length tape for real-time video duplication, the "Pro Long" High Grade T-180.

In addition to its new products, BASF has restructured its sales force. The shuffling brings Joe Ryan to the new position of national sales manager. The company also announced its donation of duplication tape to the National Missing Child Search Society child safety program, and the sponsorship of a *Dances with Wolves* college scholarship for a Chippewa Indian.

Dupe Gear Sales at High Speed

U.S. manufacturers may be having a tough time in many sectors of the economy, but duplication gear makers appear to be holding their own. Gauss reports the sale of systems to ten companies in Europe, including four in Poland and three in Germany. ElectroSound recently sold to five duplicators in Mexico, three in Europe and two in Israel.

In the U.S., Versadyne has placed a 16-slave 1500 Series system, its second, with the American Printing House for the Blind. The company is also offering a 1/4-inch bin version of the 1500 Series. The system

is intended primarily as a cost-effective option for dedicated mono spoken-word operations.

Meanwhile, the "remanufacturing" of existing duplication gear for improved performance seems to be a growth area. Eagle-Tape Duplication Technology has been at it for a while, having just added a dual-reel servo system called "Equitense" as a stock feature on all of its systems. The company also introduced two new slaves designed for ratios of up to 128:1 and above.

Accurate Sound of Menlo Park, Calif., recently joined TDT in the remanufacturing field. Targeting its efforts toward smaller duplicators, the company buys and rebuilds older brand name systems, boosting performance to 32:1 and 64:1. Remanufactured 1/2-inch master units run up to 240 ips and include 5MHz bias, microprocessor control and T-bar mounted ferrite heads. Slaves include packing arms and Tentrols. Accurate also makes upgrade kits offering some of the same performance enhancements.

Sony Debuts Video at Carrollton

Sony Music Entertainment opened a videocassette duplication operation in its existing prerecorded music plant in Carrollton, Ga. The \$5.4 million facility will become Sony's primary supplier of prerecorded videocassettes for the North American market. Real-time and high-speed duplication, high-speed loading and automated packaging will all operate in clean room environments.

KABA Switches to Digidesign

Last year, KABA was at AES selling real-time cassette duplication systems using a well-known, Macintosh-based digital editing system as a digital source. By



David Dering, Beth Eller, Mark Feingold and Jim Boyer of American Helix with John Denver (see Splices).

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reading B-side program out of memory in reverse, the system cut duplication time in half. KABA was back with a similar system in October, but the company switched the featured digital editing system to Digidesign's Pro Tools. According to KABA, the 4-channel, Mac-based Digidesign system "processes the reverse file algorithm in a fraction of the time required by the previous system...and sells for \$27,000 less." The company also expanded its sales staff with the addition of Nathan Hazing and Ted Straton.

SPLICES

The International Conference & Exposition on Multimedia and CD-ROM is scheduled for March 10-12 in San Francisco. For information about the event, which will feature 85% more exhibition space than last year, contact Jon Leibowitz at (203) 964-0000...**American Helix** (Lancaster, PA) honored John Denver for his "leadership in shaping a positive vision of our planet's future." At a recent Denver concert, the company presented the singer/songwriter with an Ecology Award, featuring a special "PictureDisc" edition of his "Earthsongs" CD...**DADC** began laser-disc production a little more than a year ago in its Terre Haute, IN, CD plant. The operation recently pressed its millionth disc, Walt Disney's *Fantasia*...**Automatic Inspection Devices** (Toledo, OH) integrated its CD-5A Metallized CD Inspection System with spindle-to-spindle automated disc handling equipment to create the CD-Batch Automated Flaw Detection System. The company also introduced an alphanumeric CD catalog ID reader. Sales and service of AID gear in Southeast Asia is now being handled by Globe Precision Products of Singapore...**Pomeroy Audio** of Brooklyn, NY, has taken delivery of a CEDAR real-time, single-pass digital noise reduction processor. The company specializes in restoration of audio from disc and tape sources...**Europadisk's** Jim Shelton is up to his ears in Marsalises. The engineer recently mastered two albums for trumpeter Wynton Marsalis and one for his brother, saxophonist Branford Marsalis, all for Sony Music...**Marc Senasac** joined Rocket Lab (San Francisco), expanding his skills to the field of mastering...**Buffalo, NY**, duplicator **Eastern Standard Productions** appointed Colleen Eoannou to the position of sales manager. ■



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—FROM PAGE 154. *DUPLICATION OUTLOOK*
life left in it, which can be stimulated with a fine tuning of the analog process, particularly if they can invest in improvements that also let them move into DCC at the proper time. At next year's AES, I'm sure our intent will be to show a duplicating system for DCC.

Mike Ingalls, marketing director, Sunk-yong Magnetic America: MCX was the most significant new product we showed at AES. It's a Type 1.5 cobalt-modified ferric duplication tape. We're starting to see large quantities available, and we'll be making a concentrated push on the product over the next few months, getting out samples and spec sheets.

There was a keen interest in MCX at AES. Cobalt seemed to be the buzzword of the show when it came to tapes. With these digital bins, people have pushed the ferric tapes to the maximum, and they're looking for a tape that they can put more level on and make it sound better. They want something that performs like chrome, that has a better bottom to it, but they don't want to pay the chrome price.

Overall, the show was about what we expected. There were a few clients who came in and told us that sales had been off a little bit, but there were quite a few who told us that their audio duplication was up over last year. So it depends on who you speak to, and what area of duplication they specialize in, as far as spoken word, music or a combination. It's mostly a case-by-case situation.

One of the factors we'll be looking at for 1992 is DCC, to see when that might have some impact on duplication. We're also closely watching Mini Disc, because that might be a factor that would subtract from cassettes. But, basically, we expect 1992 to be a business year very much like 1991. What we'll be adding for 1992 is a Type II cobalt tape, which should probably be out in the early part of the year.

Doug Booth, national industrial sales manager, TDK: We introduced two new pancake formulations specifically designed for the high-speed duplication market. We've been developing these for a number of years in conjunction with the Warner Group and Specialty Records. The Pro D Ferric is a normal bias tape, and the Pro SA is a

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variation of our consumer high-bias SA tape, but toughened up specifically for high-speed digital bin applications. We developed the Pro SA for that market, because people seem to like the sound of a cobalt ferric tape better than chrome. It has a tighter bottom end, and smoother, sweeter high frequencies. The Pro SA will take a real punchy signal, so they don't have to roll their levels down.

All the major duplicators had sampled our product before AES, so we knew we had something good. But we got a better reception than we expected. A lot of people came out of the woodwork, and we got a tremendous number of great leads. It was a hell of a good show for us.

There's been an across-the-board change in the industry in the last 18 months or so. The duplicators and the record companies are trying to dramatically upgrade the quality of their product to put some life into the analog cassette. That means better tape, better shells and better equipment. So the "bean counter" mentality that has always been part of the business has been put on the back burner. The jury is still out on DCC and other new formats. In the meantime, people are saying to themselves: "Maybe we'd better make as good a product as we possibly can, because the analog cassette is still where the money is."

As far as DCC goes, we wish them all the luck, because we can make that tape, too. But we feel that there's a lot of life left in the analog cassette. I don't think the market is necessarily going to grow in 1992, but I don't think it's going to fall through the floor. Nobody was really releasing anything at the start of 1991 because of the war and everything else. But now there are some good releases out that are selling well. So, we are very positive about the coming year because of the attitude in the industry. Everybody is seeing how good of a product they can make, which is refreshing.

Bryan Ekus, technical manager, Tape-matic USA: We presented the Tapecentre 4000 for the first time here in the United States at AES. It's one chassis with four individual loading stations, designed to load into both compact cassettes and DCCs. There's a small kit that transforms each station to DCC in a matter of minutes, so you won't need to purchase new machinery in a couple of years if DCC takes off. And there's a

sliding door covering the main winding section, which provides a clean room environment around the machine.

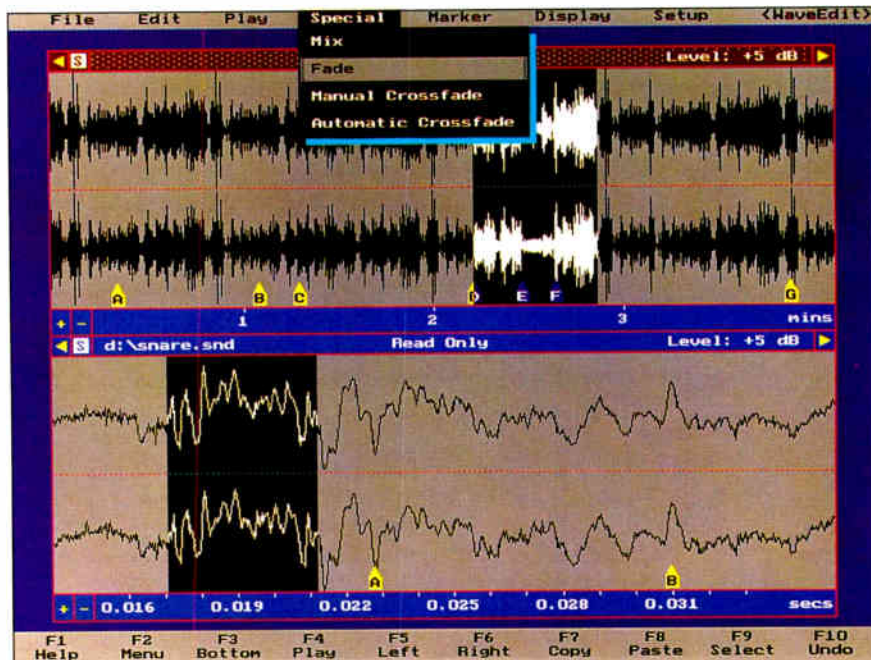
There's also a robotic arm and grip to ensure that pancakes don't need to be handled again after being loaded into the unique 16-pancake magazine. And the modular construction makes it very easy to put a spare winding unit into the Tapecentre when removing a defective unit for maintenance. We're excited about the machine.

Regarding the show itself, the overall magnitude was much higher than we expected. Nobody thought it would be like that this year because of the recessionary times. We were impressed

with the amount of traffic that stopped by the booth to see the Tapecentre 4000, and they were very impressed with the machine. So, the show was very positive.

At this point, it doesn't look like the prerecorded cassette is going to die, especially with DCC becoming available. We're hoping that DCC takes off, and we'll be right there in the thick of it. But as far as what new products we might have for next year, it's pretty much a wait-and-see market. ■

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



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C O A S T

L.A. GRAPEVINE

by Amy Ziffer

I know this is supposed to be the worst year in a long time for the record business and advertising industry, but somebody has to be booking time, because studios just keep expanding. Over at Alpha Studios in Glendale, where billings are 80% music and 20% post-production, office manager Jeannie Tangen says the two-room facility will be opening a third primarily for pre-production, overdubbing and editing with Digidesign's Sound Tools. One of the existing rooms can be 24- or 48-track analog or digital, with a 56-input AMS/Calrec automated console. The

—CONTINUED ON PAGE 162

After recording Kenny Loggins from the south rim of the Grand Canyon, L.A.'s Design FX remote truck checked in to their luxurious accommodations.



REMOTE ROUNDUP

by Jeff Forlenza

The Who said, "Watch the police and the taxman miss me...when I'm mobile." Well, none of the remote engineers I spoke with had a "get out of jail free" card, nor did they recommend remotes as an effective tax shelter. But many were counting their mobility as a blessing in these recession-rocked times.

Guy Charbonneau, who operates Le Mobile out of L.A., had an interesting project recently: "For Morrissey's show at the UCLA Theater we got a little riot. My first riot in 18 years. We were recording Morrissey for Warner Bros., and after three songs he says to the fans, 'Leave your seats...you can come down to the stage.' And all the kids rushed to the stage, and I was about to get crushed. They had to stop six songs into the show. Everything went fine, though it was a little scary at first, because the [remote] truck was parked right by the exit door. But



Omega Productions remote truck out of Dallas.

mostly I've been doing small projects this year, I did a theater piece for PBS, some scoring for Disney. We did Pat Benatar on her blues tour from a little club called the Coach House. We did Jane's Addiction at Irvine Meadows as part of the Lollapalooza tour. Ziggy Marley at the Irvine Meadows. We went with Guns N' Roses producer Mike Clink and rented a house in Malibu and did a band called Roxy Blue. We did all the tracking inside a house on top of a hill with a 180° view of the ocean."

Omega Productions (Dallas) purchased the original Wally Heider Unit 2 (the legendary remote for projects such as *The Last Waltz*) from Chris Stone and the Record Plant in 1986. "Since then the unit has done hundreds of projects," reports Omega president Paul A. Christensen. Recently, Omega captured Garth Brooks from the Dallas Reunion Arena (see the Dec. 1991 *Mix*). The two nights were shot to 35mm film, with the Omega truck providing 24-track recording services.

C O A S T



Garth's recording engineer, Mark Miller, engineered with assistance from Omega chief engineer Steve Lowney. Allen Reynolds of Nashville produced. Another Omega project of note was the all-digital recording of piano virtuoso Peter Nero and the Ft. Worth Symphony, to be used as one of the first releases demonstrating the Digital Compact Cassette (DCC). Intersound International of Atlanta, known for its large catalog of jazz and classical digital recordings, hired Omega for a project featuring classic

pop and Broadway tunes, engineered by Steve Lowney and Omega assistants Julie Haldeman and Mike Williams. Intersound, it seems, was interested in Omega's vintage API console and Mitsubishi X-850 32-track digital recorder.

WQCD's Mobile Production unit works in conjunction with New York's WQCD-FM (CD 101.9). Andy Bater is the technical director of the remote, which is specifically designed to bring CD-quality audio back from location. WQCD's truck provided a digital audio link for the live broadcast of Paul Simon from Manhattan's Central Park. The digital audio link "hopped" via microwave from Central Park to the Westwood One/NBC Radio network's 1700 Broadway headquarters.

Another project Bater worked on was The Radiators from Carrington's nightclub in the Hamptons, Long Island: "WQCD's mobile was leased by NY's WNEW-FM, who brought in their own mixing engineer Dave Van Der Haden.

They used our link between the club and the station's central receive site." WNEW-FM ran a live broadcast of the Radiators gig.

Ed Eastridge, owner of Big Mo, Kensington, Md., reports: "On Labor Day, we did the Solidarity Day at the Washington Monument with Willie Nelson and Pete Seeger. We recorded 24-track analog. I've been doing a lot of gospel: John Key in Atlanta, Edwin Hawkins in Philadelphia and the Wilmington Chester Mass Choir in Chester, Pa." Recording Washington, D.C.'s renowned guitarist Danny Gatton's second album for Elektra, Eastridge used his project studio to track and used the truck as a control room.

Big Mo's recipe for capturing gospel: "We specialize in it, we've become the gospel gurus. The instrumentation is normally drums, bass, piano, B3 organ and a synthesizer or two, and we record those in the standard way, but I usually trim the drums down to four inputs if we're using 24 tracks. There's



N.Y. METRO REPORT

by Dan Daley

Sigma Sound closed its doors as an audio recording facility on October 26. The studio is expected to re-open around June as a video facility. According to general manager Gary Robbins, the studio fell victim to a tightened recording business and general economic malaise. "The atmosphere for audio in the music business is very competitive, and we saw a decline in the return for our dollar investment," he says. While Sigma's recent crop of records includes Little Steven Van Zandt, Jesus Jones and Keith Sweat, Robbins said the future looked brighter in video. "We had to look at the overall picture," he says. "The dollars in [video] post-production simply make more sense."

—CONTINUED ON PAGE 165

three sections to the choir—normally from audience perspective—soprano, tenors and altos. There will either be one, two or three lead vocal mics. And on the choir, we ambient-mike them

—CONTINUED ON PAGE 163

Ed "Zeke" Volker of the Radiators (shown above in flash-form) was captured by the WQCD remote for a live radio broadcast.

— FROM PAGE 160, L.A. GRAPEVINE

other has a custom API and is adjacent to a 50x50 soundstage.

Aire L.A. studio manager Eve Glabman says that facility is putting the finishing touches on a new mixing room and a digital audio editing suite. The former Yamaha R&D site now has a large room with a 64-input SSL G Series board, and a smaller room with a 48-input E Series with a G computer. Aire L.A. (owned by producer/engineer Craig Burbidge, who recently had a hit with Teddy Pendergrass, and Black Dot Management owner Raymond Shields) started out doing mostly R&B, but has successfully expanded their clientele and is "trying to build the studio up into more of a complex." The editing suite will be based around the Akai DD-1000, Sound Tools and the Alchemy sample editor. Glabman is hoping for an online date of January 1, 1992, with the mixing room soon to follow.

Speaking of Yamaha demo sites, that company has entered into a lease agreement with Ocean Way for a room in the former United/Western building for a showroom and training facility. Yamaha's Peter Chaiken explained

that the studio contains one each of Yamaha's pro digital product line, interfaced digitally, along with a set of Yamaha drums and a baby grand.

After a three-year reconstruction effort, Andora Studios (the former Britannia) just took delivery of a Neve VR 72 console and should be opening its doors soon. Darryl Parry, who co-owns Andora and Chatsworth's Smoketree Ranch with brother Doug, says Andora will have two studios. The larger of the pair will be 1,500 square feet and house a Neve VR 72 with 72 channels of GML automation, two Studer A827s, Studer 4- and 2-tracks, Genelec speakers from Finland, and 48 channels of Dolby SR. It has an 1,800-square-foot, second-floor lounge from which the tracking room can be viewed through windows, and an 800-square-foot kitchen. Design was done in-house.

B&J Studios is named for its owners, Barbra Streisand and John Arrias. In fact, composer/producer Arrias completed the Streisand retrospective there, and will now be remixing her entire catalog of 45 albums for re-release on CD. Film work includes sequencing and mixing for Streisand's

holiday film release, *Prince of Tides*, and remixing the soundtrack for the video release of Simon Wiesenthal's *Genocide*. Although the studio opened three years ago, it's just now actively going after outside work—and succeeding with the likes of afternoon drama *Santa Barbara*. To help with the new work load, B&J purchased a Mitsubishi X-880 and an X-86 to flesh out its equipment list, which includes an NED Direct-to-Disk system and Synclavier.

Santa Monica's Ground Control is also making upgrades. Studio manager Thea Inoue says the upstairs room will have its Neve V3 replaced by a VR; Flying Faders will be refitted to the new board. Recent projects include Linda Ronstadt doing voice-over for Amblin' Entertainment's *American Tail II: Fievel Goes West*, and a Bangles/GoGos album collaboration under the name Matchbox, with Humberto Gatica at the board. That's one I want to hear! ■

Have you got news, good, bad or ugly? Send it 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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— FROM PAGE 161, REMOTE ROUNDUP

with two condensers. If it's a large choir, we'll put one orchestra boom deep into the choir and then one on a regular boom—a pair of U87s or U89s. Then each section gets a pair of big condenser mics. On the front of the choir, we've been pulling out two of the best singers and giving them their own mic—an AKG 535—and close-miking them. They get their own track. So you have a pair of close voices on one track and then a pair of large condenser mics grouped to another track. It makes mixing a lot nicer."

Larry Anshell of Turtle Mobile, out of Vancouver, tells of some Turtle tracking: "One of the really cool projects we did was work on the soundtrack for the Warner Bros. film *Singles* starring Matt Dillon, which is about the Seattle nightlife scene. Cameron Crowe, who did *Fast Times at Ridgemont High*, is directing." Turtle recorded Alice In Chains and Soundgarden in Seattle for live performances in the film. Chief engineers were Tom Penunzio and Terry Date, while Larry Anshell and David "Trigger" Trgovcic assisted. "We did an audio-for-video/live concert for Mother Love Bone to 24-track digital. Currently, we're doing a radio series for CMFI Canada Rocks. We also recorded Sara McLachlan at the Discovery Theater in Vancouver." [See *Mix*, Nov. 1991.] The shows were produced and engineered by Anshell, with Trgovcic as second engineer.

The 1991 TEC Award winner, Westwood One (L.A.), keeps pretty busy. Vice president of artist relations Richard Kimball reports the following sessions: Crosby, Stills and Nash at the Warfield in San Francisco for the "In Concert" Series; Tom Petty in Seattle, Portland and Oakland; the Doobie Brothers from Las Vegas and Reno; and Sting's 40th birthday concert from the Hollywood Bowl. The rest of the Westwood crew is made up of Biff Dawes, chief recording engineer; Doug Field, maintenance; Phil Kneebone handles the stage feeds; and Ron Morgan is the driver.

Phil Edwards Recording out of Hayward, Calif., worked with producer Melvin Seals and his MS Productions as they captured the Oakland Interfaith Gospel Choir live at Laney College in Oakland, Calif. Edwards also recorded IRS artist Pato Banton with producer Chris Lord-Alge from Slim's nightclub in San Francisco for an upcoming live CD. Other PER projects include recording piano greats for Concord

Records' Maybeck Series: At Maybeck recital hall in Berkeley, Edwards and producer Nick Phillips have been recording jazz pianists such as Cedar Walton, Jaki Byard and Buddy Montgomery.

Tim Powell of Metro Mobile ("Chicago's first and only 48-track



Larry Anshell (left) & Dave Trgovcic aboard the Turtle Mobile.

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truck") reports the following activity: **10,000 Maniacs** from the Reg Lenna Center in Jamestown, N.Y.—what Powell describes as "tracking in a haunted theater"; **Bluesfest, Gospelfest and Jazzfest** from Grant Park in Chicago for NPR; the **Indigo Girls** live record, *Back on The Bus Y'all*; **The Replacements'** supposed "last concert" on the Fourth of July from Grant Park, with **NRBQ** and **Material Issue** in front of about 250,000 people; a gospel record from the **Clay Evans Fellowship** for Savoy Records; and **The Mekons** from the Cabaret Metro club for a possible live album.

Random remotes...**Sheffield's** remote truck (out of Phoenix, Md.) recorded the **Violent Femmes** for Warner Bros. Films at the Boat House in Norfolk, Va. **Philip Waters** produced the five-camera/24-track session with assistance from **Alan Selk**. Engineering was handled by **David Vartanian**, with **Garth Michael** and **Steve Weinkam** assisting...**Goin' Mobile** (Boston) hit the road with engineer **Drew Townson** to record **Tall Richard & the Night Owls** live-to-16-track from Portland, Maine. **Goin' Mobile's** owner/operator, **Lonnie Bedell**, assisted the session...**Steven M. Miller** and **Tom Fallat** of **Sound Sound**

Location Recording (Seattle) co-engineered a digital recording of **Nora Dunn's** one-woman show, "Nobody's Rib," at Seattle's **Group Theater**. The recording is scheduled for a May '92 release on **Gang of Seven Records**. ■

SESSIONS

SOUTHWEST

Manny Guerra, one of the founding producers of Tejano music and owner of **Amen Recording Studios** in San Antonio, recorded Tejano/rock 'n' roll legend **Sunny Ozuna's** latest release. **Sunny Ozuna** and the **Sunglows** had a Top 10 hit in 1963 with "Talk to Me." **Guerra** played drums in the original **Sunglows**, and then went on to engineer/produce his childhood friend, **Ozuna**. **Guerra's** current label is **Manny Music Inc.**, and **Ozuna's** *Mr. Magic* is on it...**At Cedar Creek Studios** (Austin), **Girls In the Nose** recorded with engineer **Tim Dittmar** and producer **Becky Escamilla**; and **Joe Rockhead** worked with engineer **Fred Remmert** on their self-produced project...

SOUTHEAST

Although **Dr. John** virtually grew up in New Orleans studios, he just finished his first album recorded locally. The "rock 'n' roll Doctor" worked at **Ultrasonic Studios** with producer **Stewart Levine** and Grammy-winning engineer **Al Schmitt** for the Warner Bros. release. Nineteen cuts were recorded in anticipation of a double-length CD release...**Producer Don Dixon** wrapped up a five-week session with the **Lonesome City Kings** at **Reflection Sound Studios** of Charlotte, NC. The debut album was engineered by **Mark Williams**, with **Tracey Shroeder** seconding...

SOUTHERN CALIFORNIA

Motown artists **Boyz II Men** remixed their single "Hard to Say Goodbye" at **Aire L.A., Glendale**. **Rex Salas** produced, with **Craig Burbidge** engineering and **Anthony Jeffries** assisting...**At Dodge City Sound** (Glendale), **London After Midnight** recorded with producer/engineer **Randy Pekich** and assistant **Jeff Shannon**...**LL Cool J** brought his posse to **Music Grinder Studios** (Hollywood) to record two new tracks for an upcoming film release. **LL** produced, **Lawrence Ethan** engineered and **James Ross** assisted...**The Yellowjackets** stopped in at **Sunset Sound** (Hollywood) to do overdubs with engineer

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Bill Jackson, producer Mick Guzauski and assistant Tom Nellen...

NORTHEAST

Omega Recording Studios (Rockville, MD) had engineer Brian Smith remixing previously unreleased master tapes of Jimi Hendrix for a compilation album. "Omega is working with a group of lawyers that control the estate of Jimi Hendrix," Brian Yesbek of Omega reports. "Recently they found a room full of tapes—2", 1", all kinds of strange, old format master tapes. They're finding some interesting stuff." At the moment, there isn't any talk of which label will have rights to the masters... Brielle Music Studios, in NYC's TriBeCa area, had the Uptown Horns cutting their album with guests Albert Collins, Steve Chapin and the original Harry Chapin Band, and even Sandra Bernhard doing a dance remix of the Human League's "Don't You Want Me Baby"... Also in Manhattan, Will Schillinger completed recording Stanley Turrentine's new record for MusicMasters at Marathon Recording Studios. Joe Delia produced the project, assisted by Gordon Davies. Turrentine's all-star studio quartet included Ron Carter, Cedar Walton and

Billy Higgins...

NORTHWEST

The Groove Factory of Seattle had NastyMix's Emerald City Posse and Kid Sensation in with Ken Griffey Jr. of the Mariners to lay down vocal tracks... Veteran rockers MDC (Millions of Dead Cops, Multinational Death Corporation, etc.) finished mixing their new release for Boner Records at Hyde Street Studios (San Francisco). Wendy Bardsley engineered the project with assistance from Jeff Katzman and Matt Kelley... Chuck Prophet was in with producer Craig Leon (Ramones, Roches) at San Francisco's Coast Studios. They cut tracks for Prophet's new China Records LP and a number for an upcoming Bob Dylan tribute album...

NORTH CENTRAL

Blues/rock 'n' roll piano legend Johnnie Johnson stopped by Smith/Lee Productions (St. Louis) to make a guest appearance on Fairchild's soon-to-be-released album for Blueberry Hill Records. The session was produced by Dana Walden and engineered by Steve Higdon... Miami Street Studios (South Bend, IN) completed mixing 11 songs

for Grammy-nominated songwriter/saxophonist Danny Lerman on Steel Warehouse Records. John Nuner engineered the sessions, assisted by Tim Bennett. ■

— FROM PAGE 161, N.Y. METRO

Sigma Sound Studio of New York opened in March 1989, when Sigma Acquisition Corp. purchased the studio's assets. Michelle Pruyn, president of Sigma Acquisition, also heads M&M Syndication, a television distribution company, as well as Edit Masters, a video production and post-production facility in Voorhees, N.J. They operate as related companies, so Sigma's new incarnation will work off an existing video business base. Of Sigma's 14-member staff, most were laid off, although a few "key players" were retained.

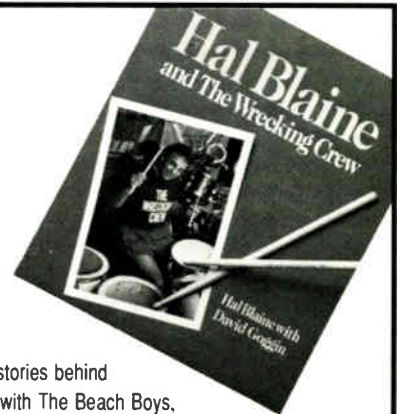
"Sigma is redirecting its energies," Robbins says. "On one hand, I'm torn because I love music and that's what we got involved with Sigma for in the first place. But from the overall perspective, we had to look forward."

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Brian Wilson and Hal at Western Studio, mid '60s

— FROM PAGE 165, N.Y. METRO

facility. The two-year-old radio and television audio post house, on the site of the old Delta Studios, benefited from a half-million-dollar expansion designed by owner Bob Liebert and chief engineer John Colucci. The architect was Steve Killoyne.

Three Sony/MCI JH-24 multitracks were added, as were a Trident Tri-Mix console, an Allen & Heath Sigma desk with JL Cooper automation and a TAC Scorpion. A DAR workstation arrived in early November and will be hard-patched to two of the new rooms.

What sets Liebert apart aesthetically is its use of themes rather than the alphabet to identify rooms. Instead of Studio A, Studio B, etc., Liebert offers the Cockpit room, designed like an aircraft control deck, the Tropical room, the Fifties room and the Art Deco room. Most of the rooms also have windows for natural light. "It's a combination of fun and psychology," says Liebert. "Everybody should have a bit of fun in this business." ■

Please fax New York stories regarding upgrades and general business trends to Dan Daley at (212) 889-8874.

— FROM PAGE 82, TOUR MANAGER

beginning of this article? Here it comes...the record company, the band, the guests, the promoter, the concessions people and everyone in the world who wants an autograph. Priorities, priorities. Stay in touch with your act during this time, and when they're ready to go, have everything set for them.

Once everything is put away, you're almost done—be sure that you thank everyone.

This brings us to an interesting point. Suppose someone screwed up all day long? Usually, I believe it's best to let sleeping dogs lie, and think of some way to pep them up before the next show. It's rarely a good idea to put your complaints in writing or lambast someone in front of other people, if for no other reason than people will remember you for a long time and be laying in wait next time you arrive. It's better to leave it alone and try to psych them into an acceptable

performance before the next show in that town.

When you get to the hotel and are safely in your room, you can finally call the band with their pick-up times, call the front desk for your wake-up call and pull out your portable alarm, because hotels sometimes screw up. Now turn on the TV and take a couple of hours to wind down. (I hope your hotel has "Nick at Nite!")

Organization is the key to this job. It's to your advantage to use anything that helps you to be organized: laptop computers, etc. Ideally, you're going to do this perfectly for 40 or 60 days in a row. If you think it's easy, you've obviously never done it; if you think it sounds impossible, just remember that every day of the year a couple hundred of us are out there doing it. ■

Robyn Gately is part owner of Modular Sound Technologies and is currently on the road with The Rippingtons as road manager and chief engineer.



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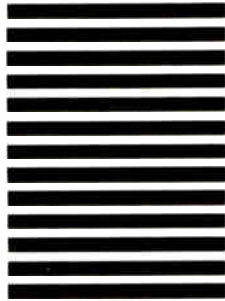
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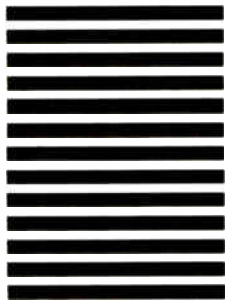
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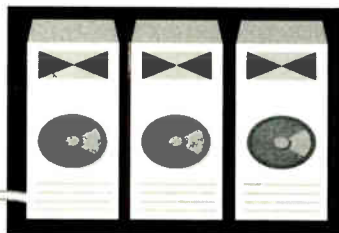
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EARSHOT SOUND; Sound; 7 Carol Ave.; Neptune, NJ 07753; (908) 922-8711. Contact: Donald Gspann, Frank Marra.

ECHO AUDIO; Sound & Equipment Rental; 328 Third St.; Dunellen, NJ 08812; (908) 968-2871.

EIGER ENGINEERING; Sound, Staging & Lights; 222 Palfrey St.; Watertown, MA 02172; (617) 924-6514. Contact: Thomas P. Scheuzger.

GRECO MOTORS CHAIN HOIST RENTALS; Equipment Rental; Trent Bldg.; Irvington, NY 10533; (314) 591-6667. Contact: Chris Greco.

GSD PRODUCTIONS INC.; Sound, Staging, Lights & Equipment Rental; PO Box 79; Locust Valley, NY 11560; (516) 671-1360; FAX: (516) 759-3632. Contact: Glen Davis.

GUSSOUND; Sound & Lights; 2809 Lakehurst Ave.; Forestville, MD 20747; (301) 967-7267. Contact: Shawn (Gus) Vitale.

IN PHASE AUDIO; Sound, Lights & Equipment Rental; 73 Pond Rd.; Wilton, CT 06897; (203) 761-1366. Contact: Jim Durkin.

KLONDIKE SOUND CO.; Sound & Equipment Rental; 16 Silvio Conte Drive, I-91 Industrial Park; Greenfield, MA 01301; (413) 772-2900. Contact: John "Klondike" Koehler. Touring Radius: Regional. Maximum Venue Size: 10,000. Vehicles: Cargo van, Cube van, Ryder contract. **House Loudspeakers:** (12) EV Delta Max 1152 APF, (2) 2181 AP sub, (12) Turbosound TMS4, (8) Turbosound TSE 111/118 split, (20) various EV two-way fill speaker. **Flying System Available: Yes. Monitor Loudspeakers:** (12) EV FM 1202 ER, (12) EV FM 1502 ER, EV Delta Max or Turbosound sidefill/drumfill. **House Consoles:** Yamaha PM1800 A-32, Wheatstone 8000-24, (2) Soundcraft 200 Delta-24, Yamaha 1604, various EV and Yamaha 8x2 and powered mixers. **Monitor Consoles:** Yamaha PM2800 M-32, Soundcraft 400 B-24. **Outboard Equipment:** Multiples of : Yamaha SPX900, REV7; Lexicon LXP 1, 5, 15, 60; Klark-Teknik DN360, Yamaha Q2031-A, Rane GE27, SM26; dbx 160, 166, 363; BSS crossovers. **Power Amplifiers:** (9) Crest 8001, (3) Crest 7001, (2) Crest 4801, (16) QSC MX1500, (6) ass't QSC, Yamaha. **Microphones:** Professional assortment of Shure, EV, Sennheiser, AKG, Crown, Sony and Countryman. **Staging:** (4) Complete scaffold sections for sound wings/delay towers, (2) 8x8 drum risers. **Lighting:** 6K ETA 12x12 w/PAR 56 & 64 CANS. **Other Equipment:** 40-channel 200' snake w/1 direct, 2 iso output, (2) custom 100 A distros, bass amps: SWR 400, Goliath 4x10, Fender Showman, 2x15 Ampex B-15, guitar amp: (3) Fender Twin, 2x2 JBL, Roland HC-120; drums: Yamaha Stage Series, 5-pc. w/Sabian cymbals. **Rates:** Competitive: regional tour discounts. **Specialization & Credits:** Klondike Sound Company specializes in acoustic music reinforcement for architecturally challenging venues and outdoor music festivals, requiring full-bandwidth, low-noise systems. Clients served for New England appearances include Wynton Marsalis, Lyle Lovett, Nanci Griffith, Arlo Guthrie, Paul Winter, Beausoleil, Mary Chapin Carpenter, Billy Bragg, MJQ, Chick Corea, Mel Torme, Portland Symphony Orchestra, Ladysmith, the Neville Brothers, Chet Atkins, Sun Ra, Jonathan Edwards, and many more. KSC has the capability to field multiple systems for festivals. Clients include Hudson River Revival, Maine Arts, Traditional Irish/NY, Cajun-Bluegrass/RI, Falcon Ridge/NY, La Kermesse/ME, New England Vaudeville, Jackie Robinson Jazz/CT and numerous First Night celebrations. KSC has a production services office in Portland, Maine. Contact Gary Massey, manager; (207) 799-0372. John "Klondike" Koehler is the Audio Director of the New Orleans Jazz and Heritage Festival, and a regular house mixer for Garrison Keillor's live radio broadcasts.

MAJOR SOUNDWORKS; Sound & Equipment Rental; PO Box 28; Salem, NJ 08079; (609) 299-3858; FAX: (609) 935-9525. Contact: Mark Major, Bruce Campbell.

NORTHEAST Sound Reinforcement

MAX SOUND; *Sound, Staging, Lights & Equipment Rental;* 11 Montrose Rd.; Yonkers, NY 10710; (914) 793-9735. Contact: Christopher Greco.

METROSOUND®; *Sound, Staging, Lights & Equipment Rental;* 2647 Broadway, Ste. 2W, New York, NY 10025; (212) 316-0426. Contact: Alan Thompson.

MODULAR SOUND; *Sound;* 1380-C.S. Pennsylvania Ave.; Morrisville, PA 19067; (215) 736-8727. Contact: Matthew Szabo, George Williamson, Mark Sweeney.

NORTHWOOD SOUND SERVICES OF MARYLAND; *Sound & Lights;* 12509 Rosebud Dr.; Rockville, MD 20853; (301) 933-0800. Contact: Nick Cavins.

OMNI-TECH OF ALBANY INC.; *Sound & Equipment Rental;* 1177 New Scotland Ave.; Albany, NY 12208; (800) 225-8002; FAX: (518) 453-2377. Contact: Dan Toma, Matt Ele, Steve LeBarron. Touring Radius: National. Maximum Venue Size: 15,000. House Loudspeakers: Electro-Voice MT-2 manifold system (MTH-2/94 high pack, MTL-2 subs). Flying System Available: Yes. Monitor Loudspeakers: Clair Brothers 12AM, Electro-Voice FS-212, Electro-Voice 1502. House Consoles: Soundcraft Delta 200/32, Soundcraft 200SR/8. Monitor Consoles: Soundcraft Delta monitor/40. Outboard Equipment: Lexicon PCM42, Lexicon PCM70, Aphex Compellor, dbx compression, Klark-Teknik DN360 EQ, Klark-Teknik DN410 parametric EQ, Klark-Teknik DN716 delay, Yamaha SPX900, Yamaha REV5. Power Amplifiers: QSC EX4000, QSC MX2000, QSC MX1500, QSC MX700, Carver PT1250. Microphones: Many assorted mics by AKG, Shure, Electro-Voice, Sennheiser, Beyer Dynamic, Crown. Staging: Wenger staging available. Other Equipment: Wireless microphone, LCD video projection, sound effects library. Rates: Please call for quotes.

PHOENIX SOUND; *Sound & Equipment Rental;* 101 Azalea Pl.; North Wales, PA 19454; (215) 393-1875. Contact: Robert Burke.

RAY PRO SOUND; *Sound, Staging, Lights & Equipment Rental;* 1902 Wharton Rd.; Jenkintown, PA 19046; (215) 885-8885. Contact: Greg Flynn.

RJK PRODUCTIONS; *Sound & Lights;* PO Box 248; Peekskill, NY 10566; (212) 641-2600. Contact: Rob Killenberger.

RTM AUDIO; *Sound & Staging;* 710 North Ave.; Garwood, NJ 07027; (908) 789-9352; FAX: (908) 789-2428. Contact: Tom Mathews. Touring Radius: Regional. Maximum Venue Size: 10,000. Vehicles: (2) GMC 7000 Series 22' trucks, Ford E350 Super Van. House Loudspeakers: (10) Meyer MSL-3, (6) Meyer 650-R2 subs, (12) RTM 2x15" subs loaded w/Gauss 4582, (12) RTM 2x12" mids loaded w/JBL 2204H, (12) RTM HF packs loaded w/(2) JBL 2445 and (2) JBL 2402. Flying System Available: Yes. Monitor Loudspeakers: (20) Bi-amped floor monitor loaded w/JBL drivers, (6) tri-amped sidefill/drum monitor loaded w/JBL drivers. House Consoles: (2) Soundcraft 600 32x8, Audioarts 32x4, Yamaha PM1000 16x4, APSI 32x8 house console. Monitor Consoles: Soundcraft 500 32x12, Yamaha MC2408, Yamaha 16x6. Outboard Equipment: (8) dbx 160 comp/limiter, (2) dbx 166 comp/limiter, (2) dbx 162 comp/limiter, (6) Klark-Teknik DN360 stereo 1/3-octave EQ, (12) Klark-Teknik DN27A 1/3-octave EQ, (2) Gateg 4-channel noise gate, Lexicon PCM42 digital delay, Lexicon PCM60 digital reverb, Lexicon PCM70 digital reverb, (2) Yamaha SPX90, (2) DeltaLab digital delay, Yamaha REV7, (4) Brooke-Siren FDS310 crossover, (8) Ashly SC22 two-way stereo crossover, (2) UREI 525 three-way stereo crossover. Power Amplifiers: (12) Crown DC 300A II, (24) Crown PSA-2, (12) BGW 750C. Microphones: (12) Shure SM58, (12) Shure SM57, (2) Shure SM81, (4) AKG 451, (2) AKG D-12E, (9) Sennheiser MD-421, (2) Sennheiser MD-431, (2) Sennheiser MD-441, (4) EV RE20. Staging: 60'x40' Biljax custom scaffold stage w/adjustable screw jack legs from 4' thru 6' in height. Lighting: Subcontracted. Other Equipment: Full backlines available. Rates: Please call for rates.

SCAVENGER SOUND INC.; *Sound, Staging, Lights & Equipment Rental;* 5647 Belle Grove Rd.; Baltimore, MD 21225; (301) 636-1951. Contact: J.J. Harding.

SELECT SOUND COMPANY; *Sound;* 15 Carteret Ct.; Madison, NJ 07940; (201) 966-0387. Contact: Tom Presnell.

SIGNET SOUND; *Sound;* 115 E. 87th St., Ste. 10A; New York, NY 10128; (212) 348-9335; FAX: (212) 439-9109. Contact: D.B. Weiss.

S.K. SYSTEMS INC.; *Sound, Staging & Lights;* 1560-5 Ocean Ave.; Bohemia, NY 11716; (516) 563-7375. Contact: Thomas Fencich, James McKeveny.

SLUGGO AUDIO; *Sound, Staging, Lights & Equipment Rental;* 4112 Spruce St.; Philadelphia, PA 19104; (215) 382-0536. Contact: Bill Coe.

SNOW SOUND; *Sound, Staging, Lights & Equipment Rental;* 441 Baileyville Rd.; Middlefield, CT 06455; (203) 349-8211. Contact: Bob Neumann, Deb Patten.

SPL SOUND INC.; *Sound;* 27 Temple Rd.; Vineland, NJ 08460; (609) 691-6690. Contact: Steve Ponzetto.



PRICE STEVENSON ACOUSTIC RESEARCH
Dowington, PA

PRICE STEVENSON ACOUSTIC RESEARCH; *Sound & Equipment Rental;* 1591 Broad Run Rd.; Dowington, PA 19335; (215) 383-1083. Contact: Price, Jay, Mary Beth.

SUN SOUND AUDIO INC.; *Sound;* 518 Pleasant St.; Northampton, MA 01060; (413) 586-3465. Contact: Bob Humphreys.

TAPESTRY SOUND & RECORDING; *Sound & Equipment Rental;* 151 W. 19th St., 4th fl.; New York, NY 10011; (212) 741-0076. Contact: John O. Williams. Touring Radius: National. Maximum Venue Size: House Loudspeakers: Apogee 3x3, AE3, AE2, AE-1, Klipsch LaScala, Heresy. Flying System Available: Yes. Monitor Loudspeakers: EAW, JBL. House Consoles: Soundcraft, Ramsa, Hill. Outboard Equipment: Yamaha, Symatrix, Hill, UREI, Rane. Power Amplifiers: Carver, Crown, Crest. Microphones: AKG, Shure, Crown, Audio-Technica, HM Electronics R/F. Other Equipment: Numerous custom-designed communication systems for in-venue theatre, RTS communications w/wireless, Panasonic SV-3900. Rates: Please call Chuck, Marty or John for a quote.

TECHNICAL SUPPORT SERVICES; *Sound, Staging, Lights & Equipment Rental;* 45 Olive St.; New Britain, CT 06051; (203) 827-9103. Contact: Doug Fay, Michael Zorena.

TPA SYSTEMS; *Sound, PO Box 31;* Devon, PA 19333; (215) 647-1570. Contact: Tom Pohorila.

WARM BROWN SOUND; *Sound;* PO Box 1888; Brattleboro, VT 05302; (802) 254-4283. Contact: Chris Kelly



SOUTHEAST

Alabama, Florida, Georgia, Kentucky,
Louisiana, Mississippi, North Carolina, South Carolina,
Tennessee, Virginia, West Virginia

ADVANCED AUDIO TECHNOLOGY SOUND AND LIGHTING PRODUCTION INC.; *Sound, Staging, Lights & Equipment Rental;* 62 Fairway Lakes; Myrtle Beach, SC 29577; (803) 626-3173. Contact: David Doward.

AFFORDABLE SOUND & LIGHT; *Sound, Staging, Lights & Equipment Rental;* 1526 Montclair Rd., #126; Birmingham, AL 35210; (205) 841-5804. Contact: Bill Barron, John Robinson.

AFM SOUND AND LIGHTING; *Sound, Staging, Lights & Equipment Rental;* 6953 Sugarbush Dr.; Orlando, FL 32819; (407) 345-9478. Contact: Jim. Specialization & Credits: Specializing in professional quality for smaller events. Full complement of sound and lighting equipment for ballrooms,

clubs and outdoors. Unique, crane-mounted system for large, outdoor events. Sets up in only two hours and covers up to two square miles. Sound systems by JBL, EV and Bose. Yamaha consoles, Sennheiser, EV and Shure Pro mics, plus complete range of effects, delays and 1/3-octave equalization. CAE lighting consoles with wide choice of fixtures. ENG (location) package for video. Have it your way for a change. Rental package, delivery and setup or full production service. Twenty-three years of experience.

ALPHA SOUND & LIGHT; *Sound, Lights & Equipment Rental;* 1824 Freedom Dr.; Charlotte, NC 28208; (704) 372-1264. Contact: AID, Forbes. Specialization & Credits: Alpha Sound & Light has been in operation 16 years, providing sound, lighting and band gear rental for all types of events. We specialize in large outdoor venues, including stadiums, and indoor venues that do not require hanging systems. We have the equipment and personnel to handle large festivals with multiple stages or large areas requiring delay stacks. Our systems feature equipment by Midas, Wheatstone, Soundcraft, Yamaha, Klark-Teknik, dbx, UREI and Lexicon. We maintain an inventory of over 150 specialized microphones (including wireless), and if we don't have what you need, we'll get it. Systems are powered by Crest amplifiers; speaker components are JBL. Several monitor configurations are available, all bi-amped. We have a large stage equipment inventory and can quote on complete packages including sound, lighting and stage gear. We have vast experience with all types of music, including symphony. Systems travel in three company-owned trucks.

ATLANTA SOUND & LIGHTING; *Sound, Staging, Lights & Equipment Rental;* 2368 John Glenn Dr.; Atlanta, GA 30341; (404) 455-7695. Contact: Scott C. Waterbury.

AUDIO & LIGHT INC.; *Sound;* 1604 Holbrook St.; Greensboro, NC 27403; (919) 294-1234. Contact: Jim Reece, Jim Hoyle.

AVRES LIGHTING & SOUND; *Sound, Lights & Equipment Rental;* 233 No. Main St.; Petal, MS 39465; (601) 582-1169. Contact: Carroll Burt.

BACKSTAGE INC.; *Sound, Staging, Lights & Equipment Rental;* 310 W. Broad St.; Richmond, VA 23220-4258; (804) 644-1433; FAX: (804) 644-4913. Contact: Fred Brumbach. Touring Radius: Regional. Maximum Venue Size: 10,000. Vehicles: 26' high cube Rollings lease, 16' Iveco 15/14. House Loudspeakers: (20) PAS MRS-1 stack w/double 12" mids, (16) Ramsa WR-S200 for small venues. Flying System Available: Yes. Monitor Loudspeakers: (22) Renkus-Heinz 2' and 1'x15' bi-amped and passive wedges, (8) Community RS 440 sidefill. House Consoles: Ramsa WR-S852 house. Soundtracs M Series 32x8, Soundcraft Delta 200 16x4x2. Monitor Consoles: Soundtracs M Series 32x12, Allen and Heath SR Series 24x8. Outboard Equipment: (6) Rane GE-30 house EQ, (8) dbx 166 house compressor, (8) dbx 166, (2) Omnitape 4-ch. gate, (4) dbx 160X, (2) Klark-Teknik 1/3 stereo EQ, (2) Yamaha 1/3 stereo EQ, (2) Yamaha SPX900 digital reverb, Yamaha REV5 digital reverb, Lexicon PCM70 digital reverb, (3) DeltaLab 1024 digital delay, (4) Alesis MIDverb II, ART DR-1 digital reverb, (2) Lexicon LXP-1 & 5. Power Amplifiers: (24) QSC MX1500 house mains, (2) Carver 1.5, 2.0 house mains, (4) QSC 3500, (8) 1400, (2) 1700 monitor amp. Microphones: Sennheiser 431, 421, EV 757, 408, PL95, PL6, Shure SM58, 57, AKG D-112, 460, Countryman ISOMAX III, Audio-Technica 812, 813, 841A, Sennheiser wireless Broadcast series. Staging: (130) 4'x8' sections. Lighting: 320' truss w/aluminum cans—ground or flown, 100' Unipar units, Avoc boards, Strand CD-80 matrix control. Other Equipment: Scenery and soft goods, props, sets, costumes, livie, K-T and Audio Control RTAs, Technon TEF12 (on request), tents, stage covers, Anchor band shells. Stage gear back line: DX7, DX7II, Roland D-50, Korg M1, Yamaha CP70, Fender Twin reverb, GK 800 RB w/Hartke 410/15, Tama Grand Star 7-piece w/Sabian cymbals and accessories.

BRANTLEY SOUND ASSOCIATES INC.; *Sound, Staging & Equipment Rental;* 204 Third Ave. S.; Nashville, TN 37201-2202; (615) 256-6260. Contact: Lee Brantley.

CHOSEN SOUND & LIGHTING; *Sound, Staging, Lights & Equipment Rental;* 1335 Bennett Dr., Ste. 169; Longwood, FL 32750; (407) 830-8200. Contact: Bob Hardtke.

KENNETH DARNELL, PROFESSIONAL SOUND REINFORCEMENT; *Sound, Staging & Lights;* #R1 Box 437, Dept. MX; Benton, KY 42025; (502) 437-4712. Contact: Kenny Darnell.

DONOVAN AUDIO; *Sound, Lights & Equipment Rental;* 13654 No. 12th St., Ste 4; Tampa, FL 33613; (813) 975-0059; FAX: (813) 975-0022. Contact: Karen Campbell, Joseph Donovan.

DOVE SOUNDS; *Sound & Lights;* 1305 Glen Eden Dr.; Raleigh, NC 27612; (919) 782-1095. Contact: Chris Droessler.

ELECTRIC EAR PRODUCTIONS INC.; *Sound, Staging, Lights & Equipment Rental;* 60 Parris Ave.; Nashville, TN 37210; (615) 255-3821. Contact: Keith C. Meek.

FORCE MAJEURE SYSTEMS; *Sound & Equipment Rental;* 2500 Hillsboro Rd., #23; Nashville, TN 37212; (615) 386-3740; FAX: (615) 386-3742. Contact: Gary Daniels.

GARRETT SOUND & LIGHTING; *Sound, Staging, Lights & Equipment Rental;* 9314 NW 102nd St.; Medley, FL 33178; (305) 884-8339. Contact: Ron Watkins, Wally Watkins.

INDEX AUDIO; *Sound, Staging, Lights & Equipment Rental;* PO Box 22654; Nashville, TN 37202; (615) 399-8830. Contact: Tim Prince.

JC CONCERT SOUND & LIGHTING; *Sound, Staging, Lights & Equipment Rental;* 9314 NW 102nd St.; Medley, FL 33178; (305) 884-8325; FAX: (305) 884-8313. Contact: Kevin Dillon.

MR. O SYSTEMS; *Sound, Lights & Equipment Rental;* 2080 Phillip St.; Columbus, GA 31903; (404) 687-6221; FAX: (404) 687-8999. Contact: Maurice Owens. **Touring Radius:** Regional. **Maximum Venue Size:** 18,000. **Vehicles:** Volvo 28' and rental trucks for dependability. **Flying System Available:** Yes. **Monitor Loudspeakers:** (16) OAP two-way Biamp wedges (15"71" comp. driver w/90-degree horn), Mr. O 52T (sidefills), Mr. O KA1 drum monitor (2 15"71" comp. driver w/90-degree horn). **House Consoles:** Soundcraft 200 24x4, Soundcraft 500 40x8, Wheatstone 40x8, Soundcraft 200 24x4, Yamaha 2404, Yamaha EM300 12x4. **Monitor Consoles:** Soundcraft 500 40x12, Yamaha 2408. **Outboard Equipment:** Yamaha 1500 delay, Valley Gate 4-ch. gate, TDM 2-way monitor crossover, Brooke-Siren FDS-360, Klark-Teknik DN360, dual octave graphic EQs, dbx 166 comp/limiter, Lexicon 95 Prime Time II, Yamaha REV7, Yamaha SPX90, Yamaha SPX90II, 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, Eventide H910 Harmonizer, Rane AC22 and AC23 crossovers. **Power Amplifiers:** Crown MA-1200, Crown MA-2400, Crown PSA-2, Crown MT-600, Crown DC-300A, Crown D-75. **Microphones:** Beta 58, Shure SM94, Shure SM58, Shure SM57, Sennheiser 421, AKG 414, Samsun/Shure wireless, AKG D-112, AKG 408. **Lighting:** (186) PAR 64 w/(2) 40' trusses, 36 channels of Lepressen (2.4K) and Scimmer (4.8K) dimming, CM Loadstar 1-ton chain hoists. **Other Equipment:** Ensoniq EPS 16+ turbo, Oberheim DX drum machine, Korg Poly-61M, Moog Minimoog Model D, 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 RX-11 drum machine, Conn Stronboturner. **Rates:** Call for rates.

MODERN METHOD PRODUCTIONS INC.; *Sound, Staging, Lights & Equipment Rental;* 1333 Meridian St.; Huntsville, AL 35801; (205) 536-8025. Contact: David or Bobby Hendricks.



MUSE PRODUCTIONS
Birmingham, AL

MUSE PRODUCTIONS; PO Box 381235; Birmingham, AL 35238-1235; (205) 631-8834; FAX: (205) 985-0780. Contact: Robert Hawthorne, Russ Thatcher.

NASHVILLE CARTAGE & SOUND; *Sound, Staging, Lights & Equipment Rental;* PO Box 121742; Nashville, TN 37212; (615) 386-3700. Contact: Sheila D. Barnard, Jim White.

NATIONAL EVENTS; *Sound, Staging, Lights & Equipment Rental;* PO Box 1177; Newington, VA 22122; (703) 550-7090. Contact: Steve Fisher. **Touring Radius:** National. **Maximum Venue Size:** 1,000,000. **Vehicles:** 22 vehicles from local delivery to 24' Mercedes Sleeper, straight trucks, also trailers—call. **House Loudspeakers:** National Events proprietary system (large format/outdoor events), four-way all EV/JBL, 4-box system, Woodworx SR1s, JBL/TAD, four-way 2-box (Subs), N.E. SR3, JBL/TAD, three-way 1-box (all BSS 200 crossovers). **Sundry others—call. Flying System Available:** Yes. **Monitor Loudspeakers:** Side & Drum: Woodworx SR1s, 3-way JBL/TAD, N.E. 3-way JBL/TAD. **Floor:** N.E. 2x12 JBL/TAD, N.E. 1x12 JBL/TAD, N.E. 1x12 EV/JBL. All bi-amps and others—call. **House Consoles:** Soundcraft, Soundtracs, Yamaha, APSI, EV to spec—call. **Monitor Consoles:** Ramna, Soundtrac, Yamaha, A&H. **Outboard Equipment:** API, dbx, K-T, Lexicon, White, Ashly, Valley People, Roland, Yamaha, BSS. —LISTING AND PHOTOLOGO CONTINUED TOP OF NEXT COLUMN



NATIONAL EVENTS
Newington, VA

DDA, Sony, Tascam, Technics, ART, Gold Line, IVE, Nakamichi, NEI, Teac, SAE, Korg to spec—call. **Power Amplifiers:** Crown MA2400, MT1200, 1000, 600, PSA2, DC300A, D-75, M-600, Crest 3501, 2501, FA901, 4001, QSC MX2000, 1500, 700, 1400, SCS 2150, Carver PM-1.5 **Microphones:** AKG, A-T, Beyer, G-Ducer, Crown, EV, Nakamichi, Sennheiser, Shure, Sony, Samsun Pro wireless, EV & Shure capsules covers, (100) D.I.s. Over 400 mics.—call. **Staging:** 4'wx4'x6'h to 130'wx60'x68'h with roof and lighting truss. To spec—call. **Lighting:** Sales, rental and service of lighting systems: local, regional and national. CAE, Celco, Thomas, Tomcat, Slick, LMI, etc. **Other Equipment:** Generators, PDs, media mults (over 100 holes). **Rates:** Call our offices. **Specialization & Credits:** SPECIAL EVENTS: Earth Day '90 New York & Washington, D.C., Earth Day '91 New York, USO Desert Storm Victory Celebration 6/8/91 Washington, D.C., July 4 Washington, D.C., John F. Kennedy Center Open House '90/'91, Texas Festival '91, Festival of American Folklife at Smithsonian Institute, Summer Concert Series at Carter Baron Amphitheatre, Washington, D.C., etc. ENTERTAINMENT: Barbara Mandrell, Marvin Hamlisch, National Symphony Orchestra, American Folklife Entertainment, Frankie Beverly & Maze, Dizzy Gillespie, Motorhead, Jefferson Airplane, John Denver, Olivia Newton-John, Cher, Charlie Daniels Band, Regina Belle, Sheena Easton, Rod Stewart, Spyro Gyra, Chubby Checker, President Bush & V.P. Quayle, Boris Yeltsin. CORPORATE: IBM, Xerox, Cellar Door Productions, Fortune Magazine, Apple Computers, Folger Shakespearean Theatre, Invent America, Library of Congress, Howard Lanin Productions, Ray Bloch Productions, Williams Gerard Production. FASHION: Macy's, Bloomingdale's, Saks Fifth Avenue, Woodward & Lothrop, Hecht's, Lord & Taylor.

PROPAGANDA PRODUCTION LTD.; *Sound, Lights & Equipment Rental;* 5609A Crawford St.; New Orleans, LA 70123; (504) 733-8211. Contact: David Humphreys.

PYRAMID AUDIO PRODUCTIONS INC.; *Sound, Lights & Equipment Rental;* 849 Fulton St.; New Orleans, LA 70130; (504) 522-5473; FAX: (504) 581-5413. Contact: Don Drucker.

RAMSOUND; *Sound & Equipment Rental;* PO Box 906; Mary Esther, FL 32569-0906; (904) 664-6859. Contact: Bob McTyre.

RM AUDIO; *Sound, Staging, Lights & Equipment Rental;* 3586 Pierce Dr.; Atlanta, GA 30341; (404) 458-6000. Contact: John Lewis Tyler. **Specialization & Credits:** Production services—not problems. Assets as required with competitive rates. No rip-offs.



ROADWORX AUDIO & LIGHTING SPECIALISTS
Greensboro, NC

—LISTING CONTINUED ON NEXT PAGE

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SOUTHEAST Sound Reinforcement



—SEE PHOTO/LOGO ON PREVIOUS PAGE

ROADWORX AUDIO & LIGHTING SPECIALISTS; *Sound, Staging, Lights & Equipment Rental;* 913 S. Chapman St.; Greensboro, NC 27403; (919) 378-0650; FAX: (919) 378-1498. Contact: Hugh K. Sarvis Jr., Vickie Hutchins. **Touring Radius:** National. **Maximum Venue Size:** Unlimited. **Vehicles:** Tractor trailers and 30' vehicles. **House Loudspeakers:** (32) Woodworx SR1 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-1621 full-range enclosures. **Flying System Available:** Yes. **Monitor Loudspeakers:** (96) Woodworx MAX-1, (48) 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 Venue Series 40-channel. **Monitor Consoles:** Ramsa WR-S840 40x18, Soundcraft 500 40x12, Soundcraft 8000 40x16. **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, Drawer gates and limiters. **Power Amplifiers:** AB Systems 1200C and 1100A, Crown 3600, 2400 and 9420. **Microphones:** AKG, Shure, Beyers, Sennheiser, Neumann, Samson wireless. **Staging:** Concert staging available in various sizes. Thomas load-bearing roof with Peak structure. **Lighting:** (20) Thomas truss pre-rigged w/240K and Genie Supertowers, Avolites Roloques 60-channel, Leprecon LP-1000 and LP-2000, Leprecon LD-2400, dimmers in racks w/patch bays. **Other Equipment:** TF 12 system, various backline gear available on request, Milissa Test System.

SSI

Seriously Sound Inc.

SERIOUSLY SOUND
Atlanta, GA

SERIOUSLY SOUND; *Sound, Staging, Lights & Equipment Rental;* 550-C Amsterdam Ave.; Atlanta, GA 30306; (404) 872-0346. Contact: Gary Sharp, Dave Lowell. **Touring Radius:** National. **Maximum Venue Size:** 15,000. **Vehicles:** Hino 24', Rydler 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 drumfills. **House Consoles:** Yamaha PM3000 40-channel, Yamaha PM2000 32-channel. **Monitor Consoles:** Ramsa S840 40x18, Yamaha 24x8. **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; Beyers M88, M69, full Synchronic mix package. **Staging:** Yes. **Lighting:** In-house 200-light system, CAE-Thomas format etc. Full theatrical inventory; ellipsoidals, 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.

SOUND PRODUCTION; *Sound, Lights & Equipment Rental;* PO 2703; Orangeburg, SC 29116; (803) 531-6147. Contact: Nan Mercer.

STAGE SOUND INC.; *Sound, Staging, Lights & Equipment Rental;* 103 8th St. SE; Roanoke, VA 24015; (703) 342-2040. Contact: Reid Henion/owner, Jeff Moore/store manager.

TREETOP SOUND AND LIGHTING; *Sound, Staging, Lights & Equipment Rental;* 4711 George Washington Hwy.; Portsmouth, VA 23702-2407; (804) 487-6671. Contact: Cecilia E. Kelly.

UNITED SOUND & ELECTRONICS; *Sound, Lights & Equipment Rental;* 309 Broadway Ave., PO Box 3000; Clarksburg, WV 26301; (304) 622-6461; FAX: (304) 622-0148. Contact: Rob Harold.

WOLF SOUND INC.; *Sound, Staging, Lights & Equipment Rental;* 1881 NE 146th St.; N. Miami, FL 33181; (305) 956-9522.



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ACCUTRACK RECORDING & SOUND CO.; *Sound;* 298 E. Dennis; Wheeling, IL 60090; (708) 459-0879. Contact: David Levit.

AERIAL ENTERPRISES INC.; *Sound, Staging & Equipment Rental;* 10106 Industrial Dr.; Whitmore Lake, MI 48189; (313) 231-2500. Contact: Steve Fisher, Ed Learned, Jim Lillie.

ARROW AUDIO INC.; *Sound, Staging, Lights & Equipment Rental;* 101 W. Edison Ave.; Appleton, WI 54915; (414) 731-4888.

AUDIOLIGHT; *Sound, Lights & Equipment Rental;* 21601 Grand River; Detroit, MI 48219; (313) 531-8892. Contact: Russ Jewell, Denis Davison.

AUDIO-PRO; *Sound;* PO Box 1515; Springfield, MO 65801-1515; (417) 882-8404. Contact: John Pitts.

CLEARWING AUDIO & CASE CO. INC.; *Sound & Equipment Rental;* 3313 N. 124th St.; Brookfield, WI 53005; (414) 781-8383. Contact: Gregg Brunclik. **Touring Radius:** National. **Maximum Venue Size:** 20,000. **Vehicles:** 24' Mercedes boatail. We lease larger. **House Loudspeakers:** (24) Martin F-2, (12) racks loaded / bass bins, (12) Martin RS-1200, (8) Martin VRS-800, (16) LRC (proprietary). **Flying System Available:** Yes. **Monitor Loudspeakers:** (16) Martin LE 400, (8) EAW SM155. **House Consoles:** Midas DADI 36x4x2, Soundcraft 800, 600, 200, 400, Yamaha 2408. **Monitor Consoles:** Midas Pro 04, Yamaha 2404, Addy 16x6. **Outboard Equipment:** (4) REV7, (4) SPX-90, (2) dbx 900 racks loaded, (8) Klark-Teknik DN360, wireless mics, (12) dbx 166 gate/compressor. **Power Amplifiers:** (70) Carver 1.5/1200, AB Systems 1100. **Microphones:** EV, Sennheiser, Shure, AKG, Beyers, Countryman. **Other Equipment:** Complete musical instrument rental inventory including, Fender amplifiers, Roland amps/keyboards, Yamaha keyboards, Korg keyboards, Ampex bus rigs, Tama/Yamaha drums, Hammond organ.

DAVETEC; *Sound;* 33306 Lake Rd.; Avon Lake, OH 44012; (216) 933-2288. Contact: David Booth.

EMERALD CITY ENTERPRISES INC.; *Sound, Lights & Equipment Rental;* 2586 Cleveland Ave. N.; Roseville, MN 55113; (612) 633-8700. Contact: Dave Cowan, Rob Koester.

E.P. SOUND & LIGHTING INC.; *Sound, Staging & Lights;* 9914 W. 62nd Terr.; Merriam, KS 66203; (800) 886-6771. Contact: Rental Dept.

HALF STREET PRODUCTIONS; *Sound, Lights & Equipment Rental;* 5835 Victoria Ave.; St. Louis, MO 63110; (314) 644-0992. Contact: Ken Bohannon.

HURRICANE AUDIO; *Sound, Lights & Equipment Rental;* PO Box 741; Newark, OH 43058-0741; (614) 522-6778. Contact: Les Edwards.

LINNEMANN SOUND INC. (LSI); *Sound & Equipment Rental;* 1020 Somonauk St.; PO Box 452; Sycamore, IL 60178; (815) 895-8219; FAX: (815) 895-7837. Contact: Terry Linneemann. **Touring Radius:** Local, regional and national. **Maximum Venue Size:** 40,000. **Vehicles:** Call. **House Loudspeakers:** (20) Blocks of HD-3/HD-4 or MTL/MTH. **Flying System Available:** Yes, insured. **Monitor Loudspeakers:** MT2, HDB-3, LD12, LP15. **House Consoles:** Yamaha PM3000,

Ramsa WR-S840, Soundcraft Series 4, Yamaha 2408, Soundcraft 500 house 500 mon. **Monitor Consoles:** Ramsa WRS840, Soundcraft 500M, Yamaha 2408M. **Outboard Equipment:** Klark-Teknik, Brooke-Siren, Drawer, dbx, Lexicon, Yamaha. **Power Amplifiers:** (40) Crest 8001, (40) Crown PSA II, (20) Crown MA1200, (20) Crown MA2400. **Microphones:** Call, too many to list. All major brands, EV, Shure, Sennheiser, Crown, etc. **Staging:** Subcontracted. **Lighting:** Subcontracted. **Other Equipment:** Trucking service, stage gear and equipment repair, system design, system repair, instrument rentals.

C.V. LLOYDE; *Sound & Equipment Rental;* 102 S. Neil St.; Champaign, IL 61820; (217) 352-7031; FAX: (217) 352-4679. Contact: Robert "Bub" Philippe. **Touring Radius:** Local, regional and national. **Maximum Venue Size:** 12,000. **Vehicles:** Rent, lease Rydler. **House Loudspeakers:** (48) CVL C-2F custom full-range cabinet, (8) CVL C-1S custom subsystem cabinet. **Flying System Available:** Yes. **Monitor Loudspeakers:** (16) CVL CX1526 bi-amped wedge, (4) CVL C-1F custom full-range cabinet. **House Consoles:** Yamaha PM3000 40C. **Monitor Consoles:** Yamaha PM2600 40M. **Outboard Equipment:** Yamaha REV5, (4) SPX90II, (6) dbx 166, (3) Drawner LX20, (3) Drawner DS201, Delta Lab DL4, (6) Klark Teknik DN360, (2) Brook Siren FDS360, Yamaha DDL3, additional equipment available. **Power Amplifiers:** Crown MA2400 (main and monitor), Crown MT-1200 (main and monitor), Crown MT-600 (main and monitor), Crest 8001 (sub). **Microphones:** Shure, AKG, Audio-Technica, Samson, Crown, Yamaha, Sennheiser, Countryman, C-Duler. **Staging:** Upon request. **Lighting:** Upon request. **Other Equipment:** 3-phase AC distro, 250' 52-channel, parallel and transformer snake, Clear-Com, backline equipment, JBL 4725, CVL C1B subs, Yamaha MC2404. **Rates:** Upon request.

MIRAGE SOUND & LIGHT; *Sound, Staging, Lights & Equipment Rental;* 155 N. Elmwood; Oak Park, IL 60302; (312) 472-6405. Contact: Robert Berggren. **Specialization & Credits:** With our "top of the line" equipment (JBL, Soundcraft, BSS, Klark-Teknik, etc.) and excellent prices, we have been able to please hundreds of acts each year. The following is a partial list, but not a legal endorsement, of customers who have used Mirage Sound and Light equipment and/or services: Eric Clapton, Living Colour, Thompson Twins, Billy Idol, Chubby Checker, PL, Grateful Dead, Tower of Power, Tanya Tucker, Tony Bennett, Bangles, Steve Dahl, Dick Clark, Phyllis Diller, James Brown, Hyatt and Hilton Hotels, along with live TV and radio. Let us know how we can serve you.

MODERN MINSTREL MIXING AND RECORDING; *Sound & Equipment Rental;* PO Box 19112; Minneapolis, MN 55419; (612) 824-4135. Contact: C.W. Frymire.

NIPTRON SYSTEMS; *Sound, Lights & Equipment Rental;* PO Box 23124; Minneapolis, MN 55423; (612) 823-3860. Contact: Steve Akanip.

R.G. SOUND AND COMMUNICATIONS; *Sound, Lights, Staging & Equipment Rental;* 414 N. Mill St.; Celina, OH 45822; (419) 586-3671. Contact: Andy Godwin.

R/J RECORDING & SOUND; *Sound, Staging, Lights & Equipment Rental;* PO Box 302; 530 Lark St.; Geneva, IL 60134-0302; (708) 232-1932. Contact: Richard J. Peck. **Specialization & Credits:** We at R/J Recording & Sound pride ourselves on providing the highest quality in every facet of our business: sound reinforcement for corporate events, seminars, theaters, local entertainment and national touring groups. Also major festivals, county fairs and concerts. **Credits:** Elkhart (Indiana) Jazz Festival, Ideas of March, Linda Davis, Asleep at the Wheel, Ray Stevens, Neil Sedaka, Pat Boone, Florence Henderson, John Gary, New York Voices, Drifters, Platters, The LOOP FM 98 and WGN AM 720. **Specialization:** Our regular customers call us "the most consistent high-quality sound company in Chicagoland." We have full monitor mixing, Soundcraft consoles, multiple systems, with competent sound engineers and friendly people who care about your events. We'll promise you a worry-free production and the best quality in the Midwest. Call us first and let us prove it to you!

RODEWALD SOUND & LIGHTING CO.; *Sound, Lights & Equipment Rental;* 4700 N. University; Peoria, IL 61614; (309) 692-4222. Contact: James M. Rodewald.

SGA PRODUCTION STAGING; *Sound, Staging, Lights & Equipment Rental;* 16450 Felton Rd.; Lansing, MI 48906; (517) 323-0000; FAX: (517) 323-0219. Contact: Mark Reed, Keith Menne. **Touring Radius:** National. **Maximum Venue Size:** 20,000+. **Vehicles:** Tractor-trailer, straight trucks. **House Loudspeakers:** Meyer Sound Labs MSL-10, Meyer Sound Labs MSL-3, Meyer Sound Labs UPA-1, Meyer Sound Labs 650-R, Meyer Sound Labs USW. **Flying System Available:** Yes. **Monitor Loudspeakers:** Meyer Sound Labs UPA-1, Meyer Sound Labs UM-1, Meyer Sound Labs USW. **House Consoles:** Yamaha PM3000 40-channel, Harrison HM-4 40-channel, Yamaha PM1800 24-channel. **Monitor Consoles:** Ramsa WR-S840 40-channel. **Outboard Equipment:** As required, dbx, Lexicon, Meyer CP-10, Klark-Teknik, Yamaha. **Power Amplifiers:** Crest 8001, QSC 1500, QSC 2000. **Meyer Sound Labs MS-10. Microphones:** As required, Shure, AKG, Beyers, Countryman, EV, Sennheiser. **Staging:** Stage Right 4'x8' decks. **Lighting:** Thomas PRT Truss as required, Avo-

lites QM-500 desks, Thomas, Altman, Lydian fixtures. **Other Equipment:** Distributor of Pioneer and Universal Videowall projection Cubes & Electronics. **Rates:** Call for details, package rates available.

"SOUND PRODUCTIONS"; *Sound, Lights & Equipment Rental;* 1402 College Dr.; Emporia, KS 66801; (316) 342-9245. **Contact:** Bob Phillips.

SOUTHERN THUNDER SOUND INC.; *Sound, Lights & Equipment Rental;* 2814 Washington Ave. N.; Minneapolis, MN 55411; (612) 521-2356. **Contact:** Art Welter.

STAGE AND SPORTS AUDIO; *Sound, Staging, Lights & Equipment Rental;* 365 N. Bradley; Charlotte, MI 48813; (517) 543-0347. **Contact:** Clyde E. Bodell. **Touring Radius:** National. **Maximum Venue Size:** 100,000. **Vehicles:** (2) 45' Semi-trailer with tractor, (2) 24' straight truck. **House Loudspeakers:** (150) SSA 215 front horn loaded 3-way w/JBL components 2-15", 1-2" and 7 custom tweeters, (32) SSA folded horn subs, (20) SSA front horn loaded low mids, (20) SSA 2" high mids, (20) SSA 1" high frequency. All JBL components. **Flying System Available:** Yes. **Monitor Loudspeakers:** (48) wedges w/JBL 15" and JBL 1", (18) wedges w/2 JBL 12" and JBL 2", (12) wedges w/2 EV 12" and JBL 1", (16) side fills w/2 JBL 15" and JBL 2". **House Consoles:** (3) Yamaha PM3000 40-channel, Soundcraft 800B 40x8x2, (2) Walker 32x8x2. **Monitor Consoles:** (2) Ramsa WR-S840F 40x12, TAC Scorpion 40x12, Soundcraft 800B 32x16, (2) Walker 32x8. **Outboard Equipment:** Lexicon PCM-70, Lexicon LXP-1, Lexicon LXP-5, Lexicon MRC controller, dbx 160X, dbx 166, Yamaha SPX-900, Yamaha SPX-901 II, REV5, Klark-Teknik 1/3 EQ, TDM cross-overs, BSS noise gates, Audio Logic noise gates. **Power Amplifiers:** QSC, Crest. **Microphones:** Shure, Sennheiser, AKG, Beyer, EV. **Staging:** Stage Roofs: variety of sizes with load bearing roofs up to 10,000 pounds. **Staging:** built to whatever size needed. **Lighting:** Lydian 400 spotlights, Thomas truss, CAE dimmers, LP-2000 96-channel board, smoke machine, strobe lights. **Rates:** Available upon request.

TKO PRODUCTIONS; *Sound, Staging, Lights & Equipment Rental;* 3811 McDonald Ave.; Des Moines, IA 50313; (515) 262-0906. **Contact:** Joe R. Denton.

Turn of The Century Productions Inc.

TURN OF THE CENTURY PRODUCTIONS INC.
Janesville, WI

TURN OF THE CENTURY PRODUCTIONS INC.; *Sound, Staging, Lights & Equipment Rental;* 137 Freedom Ln./PO Box 8035; Janesville, WI 53547-8035; (608) 754-2403; FAX: (608) 754-4133. **Contact:** 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 drumfill, tri-amped stereo sidefills. **House Consoles:** Yamaha PM3000/40C, Ramsa WR-S840, Soundcraft 800B 40x8, Soundcraft 800B 32x8, all w/spare power supplies. **Monitor Consoles:** Amek-TAC Scorpion 40x12 w/balancing update, Soundcraft 40x12, Audioarts 24x8. **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 SPX901, Yamaha SPX90, Yamaha R1000, Eventide H3000 Ultra-Harmonizer, Eventide H910, Eventide P21, 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, E-V PL20, AKG D-12E, AKG D-112, AKG C-451, AKG 451, Beyer Dynamic M88, Sennheiser MD-421, Sennheiser MD-431, Sennheiser MD-441, Crown PZM, Crown PCC-160, C-ducer, Sony wireless, Countryman DI, Whirlwind DI, combiners, splitters, etc. **Staging:** 48x40 stage w/load-bearing roof. **Lighting:** Avolites QM 500-90-channel lighting console, Avolites C 60-channel lighting console, Leprecon LP 2000 lighting console, Thomas Trusses, color blocks, Thomas spot chairs, custom dimmer racks, utilizing custom Leprecon LD 2400 & Electrol DP6-2500 dimm Lydian HTI 400 truss spots, Altman HMI follow spots. **Other Equipment:** Yamaha Stage Series drum kits, Yamaha CP80 piano, Yamaha CP70 piano, Yamaha DX7HFD, Roland D-50, Roland JC-120, Fender Twin, Marshall 100-watt w/4x12 angle tops and bottoms, Gallien-Krueger 400RB, Guild-Houtke 4x10, SVT heads and 8x10 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; Smitherens/USA and Canada—sound, lights and trucking, April-May; Bad English/Northeast 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.

WILLIAMS SYSTEMS; *Sound, Lights & Equipment Rental;* PO Box 5901; Lafayette, IN 47903-5901; (317) 447-2435; FAX: (317) 448-6383. **Contact:** Mark Williams.

YARDCO SOUND; *Sound & Equipment Rental;* PO Box 36431; Kansas City, MO 64111-6431; (816) 361-8630; (816) 561-2826. **Contact:** C.B. Price, Chris Fowler.



SOUTHERN CALIFORNIA/
SOUTHWEST/HAWAII

Arizona, Arkansas, Hawaii, Alabama
Nevada, New Mexico, Oklahoma,
Southern California, Texas

A-1 AUDIO INC.; *Sound & Equipment Rental;* 3780 Scripps Way; Las Vegas, NV 89103-3001; (702) 364-0203; FAX: (702) 362-7607. **Contact:** Glenn Kern, Dave Mauro, Tony Caporale, Rick Sachs. **Touring Radius:** International. **Maximum Venue Size:** Unlimited. **House Loudspeakers:** A-1 Audio fully integrated flying P.A. w/Meyer Sound Labs MSL-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-S840, Yamaha PM3000-40C, MC240B, 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, Infrared systems. **Specialization & Credits:** With its facility located next to 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. Recent Showrooms Include: Arizona Charles, Bally's, Caesar's Palace, Colorado Belle, Dessert Inn, Dunes, Golden Nugget, Imperial Palace, Las Vegas Hilton, Riviera, Sands, etc. In addition, A-1 Audio has provided sound reinforcement and production services for the following large industrial show clients: AFLAC, Ford, General Motors, Honda, IBM, Intel, NFDA, Mazda, etc.

A-1 AUDIO INC.; *Sound & Equipment Rental;* 6322 De-Longpre Ave.; Hollywood, CA 90028-8191; (213) 465-1101; (800) 446-9967; FAX: (213) 465-9467. **Contact:** Al Siniscal, Bobby Ross, Jan Cash Landy, Bob Marshall. **Touring Radius:** International. **Maximum Venue Size:** Unlimited. **House Loudspeakers:** A-1 Audio fully integrated flying P.A. w/Meyer Sound Labs MSL-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:** —LISTING CONTINUED ON NEXT PAGE

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SO. CALIFORNIA Sound Reinforcement

—LISTING CONTINUED FROM PREVIOUS PAGE

Ramsa WR-S840, 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 similar 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 edition 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. Recent Clients include: Paul Anka, Ann Margaret, Natalie Cole, Harry Connick Jr., Joel Gray, Engelbert Humperdinck, Chris Isaak, In Concert 91 (ABC-TV), Michael Feinstein, Long Beach Civic Light Opera, Shirley MacLaine, Barry Manilow, Johnny Mathis, MC Hammer, MTV Unplugged, Oba Oba, Jeffrey Osborne, REO Speedwagon, Frank Sinatra, Starlight Express, Lily Tomlin's In Search of Intelligent Life In the Universe, Music of Andrew Lloyd Webber, Dionne Warwick.

ADVANCED PRODUCTION SOUND SERVICES; 1035 S. Tyndall; Tucson, AZ 85719; (602) 884-8550. Touring Radius: National. **Maximum Venue Size:** 12,000. **Vehicles:** 5-ton local. **House Loudspeakers:** (20) APS mid-high, (20) APS-1 sub. **Flying System Available:** Yes. **Monitor Loudspeakers:** (13) JBL bi-amped wedge monitor, (8) JBL passive, (4) Ramsa passive. **House Consoles:** Ramsa WR-S852 52x8, Yamaha PM2000 32x8, Yamaha MC2404 24x4, EV/Topco 16-channel. **Monitor Consoles:** Yamaha MC2408. **Outboard Equipment:** (6) White Instruments 1/3-octave EQ, (12) Rane 1/3-octave EQ, (2) Yamaha REV7, (2) Yamaha SPX90, KT quad gate, KT quad limiter, (2) dbx 160X, (2) Roland SDE 1000 delay, (3) KT DN7 16 delay, (20) Clear-Com station, (4) Clear-Com PS, IVE IE30 1/3-octave analyzer. **Power Amplifiers:** (14) Crown MT1200, (4) Crown MT 1000, (2) Crown MA2400, (2) Crown MA600. **Microphones:** (20) Shure SM57, (20) Shure SM58, (6) Shure SM81, (8) AKG 452-EB, (4) Sennheiser 421, (2) RE-20, (12) Crown PCC160, (16) Samson VHF wireless, (6) Samson UHF wireless, (30) Sennheiser MKE-2 lavalier. **Lighting:** Available upon request. **Other Equipment:** IBM PC 1/3-octave analyzer, IVE 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.

ATM GROUP; Sound, Staging, Lights & Equipment Rental; 20960 Brant Ave.; Carson, CA 90810; (213) 639-8282. Contact: Nicholas Sodano, Kerry Bullis.

ATOMIC SOUND; Sound, Lights & Equipment Rental; 2808 N. Naomi St.; Burbank, CA 91504; (818) 840-9119. Contact: Glona, Bryan.

AUDIO SERVICES CORPORATION; Sound & Equipment Rental; 10639 Riverside Dr.; North Hollywood, CA 91602; (818) 980-9891. Contact: Mike Riner.

BBE SOUND INC.; Sound; 5500 Bolsa Ave., #245; Huntington Beach, CA 92649; (714) 897-6766. Contact: Rob Rizzuto.

CONCERT SOUND CONSULTANTS; Sound; PO Box 831; Julian, CA 92036; (619) 765-2220.

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, (18) Bose 802, (4) EAW KF-300, (2) Turbosound TMS4, (12) Peavey 3020 HT. **Flying System Available:** Yes. **Monitor Loudspeakers:** (12) PAS-TOC 15" slant w/2" JBL Neodymium drivers—time aligned and processed, (20) Crossroads bi-amp 15" slant w/JBL drivers, (4) Crossroads bi-amp 2x12 w/2" JBL drivers, (12) Crossroads 12" 3-way passive, (4) Crossroads C-1502 drum monitor, (4) 2x12 slant w/JBL 2" drivers. **House Consoles:** (2)

Yamaha PM3000 40-ch, Peavey Mark 8 35-channel, Yamaha MR1642, Yamaha 2404, several small 8-16 channel utility mixers. **Monitor Consoles:** Ramsa WRB-S40 40-channel 18 mixer, Yamaha PM2800-32, Midas Pr-04 24x8, Yamaha MC2408. **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, Roland SDB-3000, (4) Peavey PC-4XL digital crossover, (2) Loft 3-way crossover, Audio Logic quad noise gate, (12) Yamaha Q2031 dual-channel EQ, (50) Clear-Com beltpack/main station, (8) TEAC or Technics cassette deck, (4) Technics CD player, Telex five-station wire intercom. **Power Amplifiers:** (6) QSC EX-4000, (36) QSC MX1500, (6) QSC MX700, (34) QSC 1400, (8) Peavey Deca 724, (2) Peavey Deca 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 Unpoint, (10) Sennheiser 421, (10) AKG C-451E, (8) Beyer M88, (60) Audio-Technica Pro 4L, most other popular models in stock. **Staging:** 20x30 sectional platform 2' high. **Lighting:** (2) 40' Tomcat "Drop Down" box truss w/120KW PAR 64 w/Socadex connectors and O-Flex cable, (2) Genie air trees w/24K PAR 64, ETA and Spectrum dimmers with pin matrix, (2) Ultra Arc spotlights, (3) Lycian club spot, Diversitronics strobes, 9x12 & 19x18 LECOS, turbo-fog machines, 80" universal 18" triangular truss w/120K PAR 64s on "Bars of Six" fitted w/Socadex connectors 72-channel Sands computer lighting board, 30-channel Celco computer board. **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, Onan 30kW portable generator on trailer. **Rates:** On request.

CROSSWIND SOUND SYSTEMS INC.; Sound, Staging, Lights & Equipment Rental; 3501 Dime Circle #113; Austin, TX 78745; (512) 441-1631.

DALLAS BACKUP INC.; Sound, Staging, Lights & Equipment Rental; 12569 Perimeter Dr.; Dallas, TX 75228; (214) 686-4488. Contact: Charles Belcher.

DELICATE PRODUCTIONS INC.; Sound & Lights; 1390 Flynn Rd., Unit A; Camarillo, CA 93012; (805) 388-1800. Contact: Spy Matthews.

ELECTRIC EAR PRODUCTIONS INC.; Sound, Staging, Lights & Equipment Rental; 1616 Ave. F; Lubbock, TX 79401; (806) 763-9794. Contact: Tom Prather.

ELECTROTEC PRODUCTIONS INC.; Sound; 6735 Eton Ave.; Canoga Park, CA 91303; (818) 888-8687. Contact: Pierre D'Astugues.

FILAMENT PRO AUDIO; Sound, Staging, Lights & Equipment Rental; 143 E. Arrow Highway; San Dimas, CA 91773; 401 Radio Rd, B15; Palm Springs, CA 92262 (714) 592-2848; (619) 322-6942. Contact: Frank Offenstien, Todd Tracey. **Touring Radius:** Regional. **Maximum Venue Size:** 20,000 seats outdoors. **Vehicles:** 16-30ft. trailers, Chevy C30s, Dodge 350s. **House Loudspeakers:** (16) JBL 4870 midhigh, (8) JBL 4842 subwoofer, (4) JBL SR4718, (4) JBL SR4725, (20) JBL 4560, (8) JBL 4550, (8) JBL 2380 horns w/2441, (6) JBL 2360 w/2441. **Flying System Available:** Yes. **Monitor Loudspeakers:** (18) JBL 12" two-way, (6) JBL 15" two-way. **House Consoles:** Soundcraft Venue 32x8, Walker 32x4x4, Biamp 1642, Ramsa 8716. **Monitor Consoles:** Studiomastr 32x12, Canary 16x6. **Outboard Equipment:** dbx 166, 160 comp limiter, Valley People 430, Valley People GateX auto gate, dbx 383 quad gate, Yamaha SPX90II, ART Multiverb LT, ART Multiverb III, ART DR 1, DeltaLab 1024, EXR exciter, UREI 5547, Rane ME27, ME30, ME6, TDM crossovers, Crown UFXA2 crossover. **Power Amplifiers:** QSC EX4000, QSC 1700, Carver PM1200, PM300, B&W 750, B&W 7000-500. **Microphones:** Shure SM57, 58; AKG D112, 451; Beyer 201, 280 TGX, 580 TGX; EV ND 257, 357, 757; Audio-Technica ATM 41, 63, 11, 10, 91, 31; Sennheiser 421, 441. **Staging:** Up to 80x40x4. **Lighting:** (100) PAR 64 1000 watts, (2) 40-ft. Truss, 40 channels of 2.4K dimmer. **Other Equipment:** Wireless mic, spotlights, radio, intercoms, power distros. **Rates:** Negotiable.

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 stack, (2) Renkus-Heinz MR-1 stack. **Flying System Available:** Yes. **Monitor Loudspeakers:** (13) Renkus-Heinz bi-amped cabinet, (4) Renkus-Heinz W-1 cabinet, (2) Renkus-Heinz SR-2 cabinet (sidefills), (4) Renkus-Heinz SR-1 cabinet. **House Consoles:** Wheatstone MTX-80 40x8x3, Audioarts LM-80 24x8x2, Audioarts M-44 16x4x2, EV BK 2442 24x2. **Monitor Consoles:** Wheatstone M16 32x16, Yamaha 2408 24x8. **Outboard Equipment:** Lexicon, PCM 60, dbx, Alesis, Audioarts, DeltaLab, 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 prerig truss (132 fixtures), Leprecon dimming (144 kW), Genie Supertowers, Martin loggers.

FRONTIER AUDIO-LIGHTING; 3353 Chicago Ave.; Riverside, CA 92507; (714) 683-5860. Contact: Daryl Bailou.

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LD SYSTEMS INC.; *Sound, Staging, Lights & Equipment Rental;* 467 W. 38th St.; Houston, TX 77018; (713) 695-9400. **Touring Radius:** Local, regional & national. **Maximum Venue Size:** No limit. **House Loudspeakers:** LD Systems 2x4 (2-box, 4-way), LD Systems 1x3 (1-box, 3-way), Turbosound TMS-3, Meyer UPA-1A/USW, EAW KF-850, KF-600, SB-850, EV Delta Wax. **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, Ramsa, Soundcraft. **Monitor Consoles:** Ramsa, Soundcraft. **Outboard Equipment:** Lexicon, dbx, Eventide, Yamaha, Klark-Teknik. **Power Amplifiers:** QSC, Crest. **Microphones:** Shure, EV, Beyer, AKG, Sennheiser. **Lighting:** Thomas, upright and interlock trussing, Celco control, CAE, dimmers. **Other Equipment:** CM Lodestar chain motors, Gene Super towers, Intelibeam, DataFlash, ColorPro, Color Ranger, Color Fader. **Rates:** Negotiable.

MAUI SOUND SYSTEMS INC.; *Sound & Equipment Rental;* 335 Hoohana St. Bay E/R; Kahului, Maui, HI 96732; (808) 871-8383. **Contact:** Joe Arias.

METROPOLITAN AUDIO-VISUAL INC.; *Sound, Lights & Equipment Rental;* 1039 N. 24th St.; Phoenix, AZ 85008; (602) 244-0494. **Contact:** Anthony Daniel.

METZGER ENTERPRISES; *Sound, Lights & Equipment Rental;* 5151 Oceanus Dr., Ste. 109; Huntington, CA 92649; (714) 373-3938; (800) 564-5352. **Contact:** Tim Metzger.



QUICKBEAM SYSTEMS INC.
Albuquerque, NM

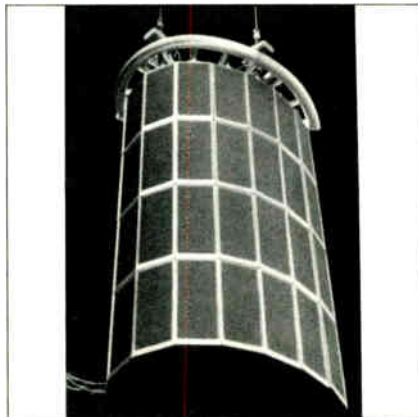
QUICKBEAM SYSTEMS INC.; *Sound & Lights;* 3716 High St. NE; Albuquerque, NM 87107; (505) 345-9230; **FAX:** (505) 345-4604. **Contact:** Gary Mathews. **Touring Radius:** Local, regional, national. **Maximum Venue Size:** 30,000 outdoors. **Vehicles:** 1989 Kenworth, Fruehauf 40' w/air ride, Hertz/Penske, Ryder. **Budget national accounts.** **House Loudspeakers:** (16) Apogee 3 x 3, (8) Apogee AE-5, (16) QSI H-1 bass w/JBL 2240 18" driver, (16) QSI H-3 3-ways mid-bass horn w/JBL 2225 15" driver, JBL 2445/2385, (2) EV ST350, (8) Apogee AE-5. **Flying System Available:** Yes. **Monitor Loudspeakers:** (10) QSI 2x12, (2) JBL E120, JBL 2425/2370 bi-amped, (6) QSI 1x15, JBL 2225, JBL 2425/2370 bi-amped, (6) QSI 1x12, JBL E120, JBL 2202 passive. **House Consoles:** Yamaha PM3000 40x8, Soundcraft 800B 32x8 plus, (10) F/X, Soundcraft Delta 200 24x4, Yamaha 2404 24x4, Yamaha PM1000 16x4, **Monitor Consoles:** TAC Scorpion 40x12, Yamaha PM1000 32x6. **Outboard Equipment:** Yamaha REV7, Yamaha SPX900, Roland SDE-3000, SDE-1000, dbx 903, dbx 902, Lexicon PCM60, Deltalab DL-4, Lexicon LXP, Yamaha SPX900i, Yamaha KX900U dual cassette, Carver CD player, Klark-Teknik DN27A, Klark-Teknik DN360, UREI 525 crossover, dbx 162, Klark-Teknik DN360 (monitors), Rane AC22 (monitors). **Power Amplifiers:** (26) Carver PM 1.5 A, (5) Carver PM 350, (8) Crest 8001, (4) Crest 7001, (4) Crest 4801. **Microphones:** (18) SM58, (24) SM57, (8) Sennheiser 421, (8) AKG 451, (4) AKG C-747, (4) Beyer M88, (20) Isomax IIC, (12) Countryman DI, (4) Cetec/Flamer R42A/T-88 w/SM87-77 and Sennheiser Mke-II, many other mics, DIs and pickups. **Staging:** Wenger staging available w/crew. Load-bearing roof systems also available. **Lighting:** (300) PAR 64, all bulb sizes and ACLs, (148) 2.4K dimmers (Technics-CAE), Celco Series II. **Other Equipment:** Tomcat truss systems, QSI power bars, multicable, 6,000-watt "B" system, custom sound and light systems for extended rentals, Clear-Com, Cetec, Motorola communications rentals. **Rates:** Negotiable. **Specialization & Credits:** Denver; (303) 571-1919, Albuquerque; (505) 345-9230, National; (800) 227-6239. **Fax:** (505) 345-4604. 20,000-watt Carver or 25,000 watt Crest, 40x8 w/patch bay house, 9,000 watt, 40x12 monitors, 300 can, two truss Tomcat stage lighting system. All gear fits easily into company-owned 40' air-ride van. Most complete and versatile quality-oriented rigs available in the Rocky Mountain states. Mains feature Apogee 3x3 and AE-5 systems. Also JBL component main and monitor enclosures designed and constructed in-house and individually tuned to maximum specs. State-of-the-art monitor system quality and performance. 52-channel transformer snake sys-

tem. Systems flyable, sound in the round for medium-size (12,000 seat) arena. Quality, veteran house and monitor engineers and lighting designers available with or without systems for special events or touring. Extremely good references. Company specializing in outdoor festivals, corporate and industrial production. New Orleans Jazz and Heritage Festival, Jazz Aspen, Colorado State Fair, Albuquerque International Balloon Fiesta, outdoor concerts at Vail, Aspen, Breckenridge, CO, numerous outdoor events throughout the Rockies and Southwest. Call for complete referral list.

RAT SOUND; *Sound;* 11800 Sheldon Unit #D; Sun Valley, CA 91352; (818) 504-2930; **FAX:** (818) 504-9232. **Contact:** Dave, Brian or Tommy.

GARY RAYMOND SOUND SYSTEMS; *Sound, Lights & Equipment Rental;* PO Box 1722; Thousand Oaks, CA 91360; (805) 492-5858. **Contact:** Gary.

SCHUBERT SYSTEMS GROUP; *Sound;* 7325 Hinds Ave.; N. Hollywood, CA 91605; (818) 503-1234. **Contact:** Dirk Schubert, JD Brill.



SHOWCO INC.
Dallas, TX

SHOWCO INC.; *Sound;* 201 Regal Row; Dallas, TX 75247; (214) 630-1188; **FAX:** (214) 638-3245. **Contact:** Robin Magruder, M.L. Prociase. **In Japan—Hibino Corporation/P.A. Division;** 3-5-14, Konan, Minato-ku; Tokyo 108, Japan; (03) 3740-4351; **FAX:** (03) 3740-4350. **Contact:** Casey Miyamoto. **Specialization & Credits:** PRISM® sound system and PRISM® digital control system. Recent credits: ZZ Top, INXS, Rock in Rio, Rolling Stones, Reba McEntire, Paul McCartney, George Michael, Steve Winwood, Eric Clapton, George Harrison/Eric Clapton, Phil Collins, Diana Ross, Joe Cocker, Beach Boys, Willie Nelson, James Taylor, Linda Ronstadt, Little Feat, the Highwaymen, Santana, Extreme, Clash of the Titans featuring Anthrax, Megadeth, Slayer and Alice in Chains, Robert Palmer, Moody Blues, Ozzy Osbourne, Operation Rock & Roll featuring Judas Priest, Alice Cooper, Motorhead and Dangerous Toys, Arizona State Fair, Chesney Hawkes.

SOUND IMAGE; *Sound;* 258 La Moree Rd.; San Marcos, CA 92069; (800) 962-9422. **Contact:** Michael Adams. **Touring Radius:** National. **Maximum Venue Size:** Unlimited. **Vehicles:** Tractor-trailer & BMC bobtail. **House Loudspeakers:** Unlimited Phase Loc/JBL. **Flying System Available:** Yes. **Monitor Loudspeakers:** Unlimited Phase Loc/JBL. **House Consoles:** Yamaha, Soundcraft, Ramsa, Gamble, Paragon. **Monitor Consoles:** Yamaha, Ramsa, Midas. **Outboard Equipment:** Unlimited. **Power Amplifiers:** Unlimited QSC. **Microphones:** Unlimited. **Staging:** Yes. **Lighting:** Yes. **Rates:** Contact Michael Adams.

SOUND SERVICES; *Sound & Equipment Rental;* 2201 Cottontale Lane, Ste. 7; Little Rock, AR 72202-2042; (501) 666-4214. **Contact:** Richard Thornton.

SPECTRATECH SOUND/LIGHTING SYSTEMS; *Sound;* PO Box 13171; Austin, TX 78711; (512) 444-1990. **Contact:** Rusty Buckner.

SPECTRUM AUDIO; *Sound, Lights & Equipment Rental;* 220 N. Crescent Way, Ste. C; Anaheim, CA 92801; (714) 991-5628. **Contact:** Roy.

STAGE SOUND INC.; *Sound;* 3434 E. Kliendale; Tucson, AZ 85716; (602) 325-5858. **Contact:** Mark Miceli. **Touring Radius:** National. **Maximum Venue Size:** 70,000. **Vehicles:** Ryder. **House Loudspeakers:** (60) Meyer Sound Labs MSL-3, (4) Meyer Sound Labs MSL-10, (40) Meyer Sound Labs UPA, (10) Meyer Sound Labs 650, (8) Meyer Sound Labs USW. **Flying System Available:** Yes. **Monitor Loudspeakers:** (28) Meyer Sound Labs UM1. **House Consoles:** (3) PM 3000-40. **Monitor Consoles:** Midas Pro 40 32x12, Meyer Sound Labs AY6 32x12. **Outboard Equipment:** Yamaha, Lexicon, Roland, etc. (6) dbx limiter, (15) Klark-Teknik EQ. **Power Ampli-**

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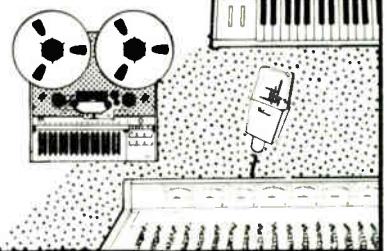
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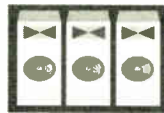
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fiers: (10) Crest 8001, (10) Crest 7001, (20) Crown MT1200, (20) Yamaha 2200. **Microphones:** (12) Shure SM58, (12) Shure SM57, (12) Beyers 88, (12) Sennheiser 421 and various assorted. **Lighting:** Thomas truss 400 instruments, Auto dimmers, Al-derham showboard. **Other Equipment:** G.E. video projectors, large-scale lasers, Crown TEF system 12+.

SUNBEAT SOUND; Sound; 15900 Crenshaw Blvd., Ste. I-332; Gardena, CA 90249; (213) 532-9443. Contact: John Lackner.

WESTERN ELECTRO-ACOUSTIC LABORATORY INC.; Sound; 1711 Sixteenth St., Santa Monica, CA 90404; (310) 450-1733. Contact: Neil A. Shaw.



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ARMADILLO PRODUCTION SERVICES; Sound, Staging, Lights & Equipment Rental; 2496 S. Memphis Way; Aurora, CO 80013; (303) 755-5239; FAX: (303) 750-4959. Contact: Waldo White. **Touring Radius:** Regional. **Maximum Venue Size:** Arena, theater, club, etc., and outdoor up to 10,000. **Vehicles:** International w/24" box. DT-466, 5+2. **House Loudspeakers:** (12) APS trapezoid w/(2) JBL 2204 12", JBL 2245 2" driver, McCauley horn and JBL 2205 slot tweeter. Speakers are individually horn loaded. Foam grille, EP-4 connectors, each is three-way w/passive tweeter. (12) JBL double manifold bass cabinets w/JBL 2255 15". **Flying System Available:** Yes. **Monitor Loudspeakers:** (12) JBL E-140 15" w/JBL 2425 drivers, double 15", JBL 2225 w/JBL 2440 2" driver (drum monitor), double 12" JBL 2204 w/JBL 2425 driver (key wedge), 14 wedges total plus stereo sidefills. **House Consoles:** Yamaha PM1800 40x8 w/6 aux sends, Wheatstone 8000 32x8 w/4 aux sends, smaller consoles upon request. **Monitor Consoles:** Yamaha PM2800 40x14, Peavey Mark IV 24x8. **Outboard Equipment:** Yamaha REV7, (3) SPX90, (4) dbx 166, Lexicon Prime Time delay, GateX 4-channel gate, Aphex Aural Exciter, Yamaha Q2031 EQ (house) and (8) Audioarts EQ. **Power Amplifiers:** BGW 8000, BGW GTA. **Microphones:** Shure 58, 57, 81, Sennheiser 421, ATM-25. **Staging:** Monroe sections 4x8 sections, WACO scaffolding, any size needed. **Lighting:** Celco controls, Spectrum dense packs, Genie Super towers, CM chain hoist, double hung box or triangle truss and follow-spots. **Other Equipment:** Clear-Com, drums, guitar amps, key-boards, etc. **Rates:** Variable. Call for quote.

AUDIO ANALYSTS U.S.A. INC.; Sound; 3286 N. El Paso St.; Colorado Springs, CO 80907; (719) 632-8855. Contact: Bert Pare.

BEAR AUDIO; Sound & Lights; 1528 Stone Ave.; Pueblo, CO 81004; (719) 561-4511. Contact: Barry Jansen, Dan Garrett.

CARAWAY AUDIO; Sound; 1775 Old County Rd. #19; Belmont, CA 94002; (415) 594-1790. Contact: Doug Caraway.

DOWLEN SOUND INC.; Sound & Lights; 1260 Everett Ct.; Lakewood, CO 80215; (303) 232-3540. Contact: Bret Dowlen. **House Loudspeakers:** (24) Dowlen Sound custom trapezoid enclosures containing (2) 15" cone, horn loaded 12", JBL 2450 2" and horn, McCauley 15" & 12". (12) long-throw trapezoid boxes. (24) Dowlen Sound 218 subs loaded w/McCauley 6254 18" drivers. **Flying System Available:** Yes. **Monitor Loudspeakers:** (15) Dowlen Sound 15"+2" wedge, (4) Dowlen Sound dual 15"+2" wedge, (4) Dowlen Sound dual 12"+2" wedge, (8) Dowlen Sound 12"+2" wedge. **House Consoles:** Soundcraft 800B w/hw op amps and capacitors, Yamaha M916. **Monitor Consoles:** Ramsa WR-S840 40x18, Soundcraft 400B 32x10. **Outboard Equipment:** (3) SPX900, (2) SPX90, Lexicon PCM70, (8) dbx 166, dbx 160, (4) dbx 363, (2) Valley 4-channel gates, (2) ART Multiverbs, Yamaha REV7, (4) SCV 1/3-octave EQ, (2) Yamaha 1/3-octave EQ, (30) Ashly 1/3-octave EQ, (2) BSSFDS-360, Ashly 4-channel gate, (4) Ashly SC52 compressor, (2) SPE 1000, (2) Effectron II ADM 1024. **Power Amplifiers:** (16) Crest 8001, (16) Crest 4000, (8) QSC X4000, (4) Crest 2001, (10) Ashly FHT 500, (2) Crown Macro-Tech 3600 V2. **Microphones:** (2) AKG C-460, AKG C-535, (2)

AKG C-451, AKG D-12, AKG D-112, (7) Sennheiser 421, (10) Sennheiser 431, (2) Sennheiser 441, (22) Shure SM58, (50) Shure SM57. **Lighting:** 80' pre-hung box truss, 100' triangle truss. **Other Equipment:** (4) CM Lodestar one ton chain motors, 16 motor control system. **Rates:** Call for quotes.

ELECTRONIC ACOUSTIC RESEARCH; Sound; 116-B Center Ave.; Pacheco, CA 94553; (510) 682-7081. Contact: Mark Wayne.

FRONT LINE SOUND AND LIGHTING; Sound, Staging, Lights & Equipment Rental; 1470 N. 4th St.; San Jose, CA 95112; (408) 453-8481. Contact: Kimberly Dugas.

HI-TECH AUDIO & LIGHTING; Sound, Lights & Equipment Rental; 701 Ronan St. #5; Missoula, MT 59801; (406) 721-5160. Contact: Jacob Straw.

I.A.M.P.; Sound; 1815 A Contra Costa St.; Sand City, CA 93955; (408) 394-1260. Contact: Anthony Nocita.

LACKEY SOUND AND LIGHT COMPANY; Sound, Lights & Equipment Rental; 3425 Stone Way Ave. North; Seattle, WA 98103; (206) 632-7773. Contact: Nic Lee, operations manager.

LINEAR PRODUCTIONS; PO Box 3032; Oakland, CA 94609; (510) 652-6048. Contact: Kaj Kline, Janine Amberg. **Touring Radius:** Local, regional and national. **Maximum Venue Size:** 20,000+. **Vehicles:** 16' and 24', air-ride tractor/trailer available upon request. **House Loudspeakers:** EAR M2000, EAR M8000. **Flying System Available:** Yes. **Monitor Loudspeakers:** LP M-150, LP 1502, Harbinger 524. **House Consoles:** TAC Scorpion, Soundtracs, Gamble, Yamaha, Ramsa, ATI Paragon. **Monitor Consoles:** TAC Scorpion, Soundtracs, Gamble, Ramsa, Yamaha. **Outboard Equipment:** Yamaha, Lexicon, Roland, Kark-Teknik, BSS, Eventide, Drawmer, dbx, Rane. **Power Amplifiers:** EAR M-2000. **Microphones:** Shure, Beyer, Sennheiser, AKG, EV. **Wireless:** Telex, Samson. **Staging:** Consultation and coordination. **Lighting:** Consultation and coordination. **Other Equipment:** AC power distribution system, generators.

M&M AUDIO; Sound; PO Box 2276; Danville, CA 94526; (510) 820-0377. Contact: Alex Moran.



NARROW ROAD PRODUCTIONS
Walnut Creek, CA

NARROW ROAD PRODUCTIONS; Sound, Lights & Equipment Rental; 1609 Countrywood Ct.; Walnut Creek, CA 94598; (800) 733-9510. Contact: John Putis.

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PERFORMANCE AUDIO; Sound, Staging & Equipment Rental; 2358 S. Main; Salt Lake City, UT 84115; (801) 466-3196. Contact: Craig Hyllton. **Touring Radius:** Regional. **Maximum Venue Size:** 20,000. **Vehicles:** (2) Iveco diesel 17' box. **House Loudspeakers:** (32) JBL 2x12" and 2" on CD horn, (16) JBL 2x18", (8) JBL SR 4732/4718, (24) Ramsa WSA 200/WSA 80, (8) JBL SR4725, (6) JBL SR4722. **Flying System Available:** Yes. **Monitor Loudspeakers:** All bi-amped, (8) EAW SM222, EAW SM252, (4) custom 1x15" w/1" driver, (14) custom 1x12" w/1" driver, (8) JBL SR4732/4718. **House Consoles:** Ramsa WR-840, Soundcraft Venue 32, Soundcraft Delta 200-24. **Monitor Consoles:** Soundcraft Venue 32x10, Soundcraft 500B 32x12. **Outboard Equipment:** (5) White Instruments 1/3-octave EQ, (9) Ashly Audio GQ231 2-channel 1/3-octave EQ, (4) BBS FDS-310 3-way crossover, (6) dbx 166 2-channel gate/limiter, (2) Valley People Gate 4-channel gate, (3) Lexicon LXP-1 digital reverb, Lexicon LXP-5 digital effects, Lexicon MRC MIDI remote controller, Klark-Teknik DN780 digital reverb, Yamaha SPX90 digital reverb, (3) BBE 802, Klark-Teknik DN700 digital delay. **Power Amplifiers:** (8) Crest MA2400, (27) Carver PM-1.5, (15) Carver PM-1.75, (5) Crest LA1201. **Microphones:** (14) Shure SM81, (14) Shure Beta 58, (15) Shure SM57, (6) Shure SM87, (8) Sennheiser MD-421, (6) Sennheiser MD-441, (6) Shure SM91, (3) EV RE20, (3) AKG 451, (4) AKG D330BT, (2) AKG 535, (2) Shure SM98, (2) Shure SM99, (4) ESM56P, (10) Countryman DI, (4) Samson Concert Series wireless, (10) Shure L Series wireless. **Staging:** Quickform modular staging up to 40'x32' with sound wings, mix position and spot towers. **Lighting:** Referrals available. **Other Equipment:** (60) KM Boom microphone stand, (6) Atlas MC20 microphone stand, (6) stereo cassette deck, (2) Technics CD player, Klark-Teknik DN60 Real Time Analyzer, (2) Fender Twin reverb, (2) Roland stereo chorus, Yamaha DX7 synthesizer, Hammond B-3 organ with Leslie speaker. All system cables Mogami high-definition audio cable. **Rates:** On request.



RANDALL SCHILLER PRODUCTIONS
San Francisco, CA

RANDALL SCHILLER PRODUCTIONS; Sound & Equipment Rental; 1207 Fifth Ave.; San Francisco, CA 94122; (415) 661-7553. Contact: Fandy Schiller. **Touring Radius:** Local, regional. **Maximum Venue Size:** 20,000 people. **House Loudspeakers:** (6) Eastern Acoustic Works K7-850 full-range systems, (8) Eastern Acoustic Works SB-850 sub-bass systems, (16) Harbinger 12x8 horns w/JBL 2441 drivers, (6) Eastern Acoustic Works SF-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 stereo tweeters, (4) JAW SF-300. **Flying System Available:** Yes. **Monitor Loudspeakers:** (8) Harbinger 524, (2) Harbinger 514 (bi-amped), (4) Gauss HF-4000 drivers on Gauss horns, (4) Altec 916 bass bin w/Gauss 5849 driver, (4) JBL 4628B speakers. **House Consoles:** Soundcraft 200B SEQ 24x4x2, Biamp 16x2x1 Biamp 882 8x2x1, Tascam 6100R3/610CEX 14x1. **Outboard Equipment:** Yamaha REV7 digital reverb, Yamaha SPX90 digital reverb, Eventide H91 Harmonizer, DeltaLab 2048 digital delay, DeltaLab DL-2 digital delay, dbx 161, dbx 63 compressor/limiter, Urei 117E stereo compressor/limiter, Orban 622B parametric equalizer, parametric equalizer, Fosgate DEM3602 360 digital space matrix. **Power Amplifiers:** (2) Crest 801 750-watt/channel, (3) Carver M1.5T 360-watt/channel, (12) SAE A-501 2x0-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, (2) EV RE 15, (4) Shure SM81, (2) Shure SM58, (16) Shure SM57, (2) Sennheiser MD-421, (4) Sennheiser MD-421, (2) AKG D-12, (2) Sony ECM-33P, (12) Countryman DI. **Lighting:** Phoebus Ultra Quartz. **Other Equipment:** (2) RTS #24 distribution amplifier, RTS 444 stereo buffer amplifier, (5) Crown VFX 2A stereo electronic crossover, (2) Rane AC-22 stereo 2-way electronic crossover, Rane AC-20 stereo 3-way elec. crossover, Uni-Sync MS-1C 10x 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:** Randall Schiller Productions has been serving the community for 16 years, designing and installing sound, lighting and video for the Bay Area's hottest clubs, bars and restaurants and full production services for concerts, clubs, parties, parties, street fairs and special events. Check out our new EAW SF 850 system at the Kennel Club and come in and visit our new showroom and offices in the BPM Music Factory at 1141 Polk Street in San Francisco.

PM ENGINEERING; Sound & Equipment Rental; 6448 S. Skyline Dr., PO Box 3040; Evergreen, CO 80439; (303) 674-5933. Contact: Craig Patterson.

PRATT SOUND; Sound; 840 W. 1700 South #15; Salt Lake City, UT 84104; (801) 973-4222. Contact: Ed Pratt.

PRO-FORMANCE LIGHTING AND SOUND INC.; Sound, Lights & Equipment Rental; 5806 Peladeau St.; Emeryville, CA 94608; (510) 658-5411. Contact: Mickey Morgan.



PRO MEDIA
El Sobranite, CA

PRO MEDIA; Sound; 3563 San Pablo Dam Rd.; El Sobranite, CA 94803; (510) 222-0307; FAX: (510) 223-9147. Contact: John Monitto.

GEORGE RELLES SOUND REINFORCEMENT; Sound; 2021 Kincaid St.; Eugene, OR 97405; (503) 686-9325; (503) 720-3132 (cell.). Contact: George Relles. **Touring Radius:** Regional. **Maximum Venue Size:** 6,000. **Vehicles:** 1990 GMC W6 truck. **House Loudspeakers:** (8) Meyer MSL-3, (8) Meyer 650-R2 subs, (6) Harbinger 508, (6) Harbinger 512, (2) Community Boxer. **Flying System Available:** Yes. **Monitor Loudspeakers:** (4) Meyer UM-1, (4) Meyer UPA-1A, (4) EAW 222J, (6) EAW 122AT. **House Consoles:** Gambale HC-40, 40x16 8 line returns, Hill Concept 4400 32x8x8 line returns w/(4) VCA groups. **Monitor Consoles:** Ramsa WR-S840 40x18 w/patch bay, Soundcraft 500 32x12. **Outboard Equipment:** Lexicon 200, Lexicon PCM70, (4) Lexicon LXP-1, MRC, Lexicon LXP-5, Yamaha SPX900, (2) Valley PR-10 racks, Audio + Design Scamp rack, (2) Drawmer M500, BSS quad gate, Meyer CP-10 parametric EQ, Klark-Teknik DN410 parametric EQ, (12) dbx 1531 1/3-octave EQ, Aphex Type B Exciter, (2) BBE 202, (2) Audio Digital ADD-2 DDL, Panasonic SV-250 R-DAT. **Power Amplifiers:** (8) Hill LC1200, (2) Crest 7001, (13) Hill DX1500, (3) Crown Micro-Tech, (3) Carver PM-1.5, (4) Halfer P-500. **Microphones:** (6) Neumann KM84, (2) AKG C-460, (6) AKG C-451, (8) Shure SM81, (10) AKG C-535, (2) AKG C-414, (8) Shure SM58, (10) Shure SM57, (8) Sennheiser 421, Sennheiser 431, (4) EV 408, Beyers M88, (2) EV RE20.

SHYNE SOUND; Sound & Equipment Rental; Box 2280; San Rafael, CA 94912; (415) 459-2833. Contact: Leroy Shyne.

SOUND CONSULTING; Sound & Equipment Rental; PO Box 43; Sacramento, CA 95812-0043; (916) 395-2599. Contact: Kevin Smith.

SOUND-TRONIX; Sound & Equipment Rental; 840 King Dr.; Daly City, CA 94015; (415) 878-4536. Contact: Jake Ocampo.

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THIRD EAR SOUND COMPANY; *Sound & Equipment Rental;* 601 S. 8th St.; Richmond, CA 94804; (510) 233-2920. Contact: David Trincherio, 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" bi-radial horn pack, various one-box systems available. **Flying System Available:** Yes. **Monitor Loudspeakers:** 2-way floor wedge systems w/15" 2" and compression driver sections w/JBL, EV and PAS components, 2- or 3-way drum and sidefills w/15" or 18" bass and 2" high-freq. sections. **House Consoles:** 40-channel Soundcraft Europa, Soundcraft 800B 32x8, Soundcraft 500 32x8, Soundtracs FM Series 24x4, Soundtracs FM Series 16x4, others by request. **Monitor Consoles:** Soundcraft 800B 32x10, Soundcraft 400B 24x10, Yamaha PM1000 modified 16x6, others by request. **Outboard Equipment:** White Instruments, Klark-Teknik, Audio Logic, UREI, Orban, Audioarts, dbx, Gatex, Yamaha, Roland, Eventide, Aphex, etc. **Power Amplifiers:** Carver PM-2400, PM-1800, PM-1200 and PM-175. **Microphones:** Samson CR2X RF, Shure, Sennheiser, AKG, Electro-Voice, Beyerd 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.

XXXX AUDIO SYSTEMS; *Sound;* 6384 Freeport Blvd.; Sacramento, CA 95822; (916) 443-3535. Contact: Doug Pumphrey.



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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 MH212, (24) JBL 2445, (36) tweeters, (24) ASD 1502 top boxes, (12) ASD 1802 subwoofers. **Flying System Available:** Yes. **Monitor Loudspeakers:** Blamp 1x15" high-power wedges w/2" horns, Blamp 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, —LISTING AND PHOTO/LOGO CONTINUED TOP OF NEXT COLUMN



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HALF NELSON SYSTEMS INC.; *Sound, Staging & Lights;* 943 Notre Dame Ave., Sudbury, Ontario, P3A 2T7 Canada; 555 Eastern Ave., Toronto, Ontario, M4M 1C8 Canada; (705) 524-2700. Contact: Bert Brady/Dave Lawler. **Touring Radius:** International. **Maximum Venue Size:** 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 40x12. **Outboard Equipment:** Lexicon, Yamaha, Aphex, BSS, Revox, Klark-Teknik, Roland, Nakamichi, Clear-Com. **Staging:** Custom packages and risers. **Lighting:** Avolites, Celco, LMI, Thomas, Wybron, High End Systems, Genie and CM. **Other Equipment:** Band equipment. **Specialization & Credits:** Specializing in large outdoor events, North American concert hall tours, convention services and production management.

K.S. SOUND; *Sound;* Site 17, Box 46, RR3; Armdale, Halifax County, Nova Scotia, B3L 4J3 Canada; (902) 876-1166; FAX: (902) 876-1188. Contact: K. Stuart Lorman.

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, EV FM1202 ER. **House Consoles:** Hill J Series III 24x8x2 w/Multipin 200' snake. **Monitor**

Consoles: Allen and Heath Brennel SRM 186 18.6 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 R631A 30-band graphic EQ, Carver TL3200 CD player, dbx 166. **Power Amplifiers:** (3) 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) AKGD-125, D-1200, (2) AKGD-112, (4) AKG C-408, (2) C-535, (3) 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) 6x7x1 rser. **Lighting:** (2) LDS 12-8 desk, 76' of trussing, (3) LDS DR1200 dimmer packs—36,000-watt 2x12 channels, follow spot, ACL, PAR 64, 56, 46, 36-3.5Q, Lampo ET, Optikinetics, smoke, fog, cobweb spinner, gobo patterns. **Other Equipment:** Dry ice maker, (2) isolation transformers, (2) smaller systems for rent. **Rates:** Negotiable.

RAIL SYSTEMS PA SERVICE; *Sound, Lights & Equipment Rental;* St. Stephansplatz 23; D-7750 Konstanz, Germany; 00 (49)-7531-26219. Contact: Alexander Friedrich. **Touring Radius:** National. **Maximum Venue Size:** 10,000. **Vehicles:** Mercedes Benz G14 D 8t, Mercedes Benz G13 D 6, 3t, Fiat Ducato 3.5t, plus rental trucks. **House Loudspeakers:** (20) KS T-12 mid/high stacks, 2-way active JBL loaded w/built-in Amps (5kW), (10) KS TW/R5 double 18" subwoofers JBL loaded w/built-in Amps (2kW), (8) Meyer Sound Labs UPA-1, (8) Meyer Sound Labs USW subwoofers. **Flying System Available:** Yes. **Monitor Loudspeakers:** (12) Meyer Sound Labs UM wedges, (12) EV 1202 ER wedges, (6) EV 1503, (4) KS CPA 3-way active JBL loaded 1kW drumfill, etc. **House Consoles:** Yamaha PM3000 40x8x2, DDA Q series 32x8x2, DDA S series 32x8x2, DDA S series 24x4x2, Soundcraft 200 16x4x2. **Monitor Consoles:** Soundcraft 500 32x12, Midas 30x10, Peavey 24x8, Soundcraft Delta 32x10. **Outboard Equipment:** (12) Yamaha 1027 EQ, (12) ART HD 31 EQ, Lexicon 224XL, (4) Lexicon PCM70, (2) Lexicon LXP-1, PCM60, (3) Yamaha SPX90, SPX90II, (2) Yamaha REV, (2) Yamaha SPX1000, SPX 900, (8) dbx 166, (4) dbx 160, (10) Lake People noise gate, (4) Rebis noise gate, (4) Drawmer dual gate, (4) Roland SDE 2000 delay, (2) Yamaha D1500 delay, (2) UREI 1178 limiter, (2) Lake People limiter. **Power Amplifiers:** (6) Daub MS 500, (6) d&b, (8) Yamaha 2002, (4) Crest 400. **Microphones:** (20) Shure SM58, (20) Shure SM57, (15) Sennheiser 421, (6) Sennheiser 441, (3) Sennheiser 422, (6) EV PL76, (4) EV PL10, (4) EV PL20, (4) EV BK-1, (6) AKG 451, (4) AKG 414. **Lighting:** (180) PAR 64 spot, (48) PAR 56 spot, (48) PAR 36 spot, Celco, MA, LLT, Desks. **Other Equipment:** Trace Elliott 500 bass amp w/4x10" box, Fender Concert amp, Roland Jazz Chorus amp 120, complete Pearl GLX drumset w/22", 10", 12", 13", 14", 16", 14" snares, Peavey KB300 keyboard amp, (2) Yamaha 8-channel power mixer, (2) 3-way passive 32- and 40-channel splitter, 40-channel active 3-way splitbox. **Rates:** On request. **Specialization & Credits:** We specialize in jazz and classical productions; credits include: Miles Davis German/Switzerland 90/91 Tour, Keith Jarrett, Art Ensemble of Chicago, John McLaughlin, Chick Corea, Manhattan Transfer, Herbie Hancock, Wayne Shorter, Stanley Clarke, Omar Hakim, John Scofield, Astor Piazzola, Carla Bley, Ray Barreto, Gruppo Niche, Arturo Sandoval, Al Dimeola, Jan Garbarek, Kansas, Waitors, Asia, Dizzy Gillespie Big Band, Maynard Ferguson Big Band, All Summer Jazz Festivals in South Germany like: Singen, Rottweil Friedrichshafen and Freiburg, nearly all Salsa Productions in Switzerland and Classic Open Airs in Germany and Switzerland.

SENNHEISER (CANADA) INC.; *Sound & Staging;* 221 La-brosse Ave.; Pte-Claire, Quebec, H9R 1A3 Canada; (514) 426-3013. Contact: Colin Bernard/Jhulio Solis.

SHOWTECHNOLOGY; *Sound, Staging, Lights & Equipment Rental;* 111 N. Bridge Rd., #07-26; Singapore 0617, Singapore; (065) 732-1900; FAX: (065) 732-7292. Contact: Richard Ong, Alan Ho.

SOUND ART PRODUCTIONS; *Sound & Equipment Rental;* 134 Brentford Rd.; Winnipeg, Manitoba, R2M 5B9 Canada; (204) 253-9420. Contact: Dave Cousins.

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con 200, Sony DRE-2000, Lexicon 224, (2) Neve 33609, (10) API 560, (2) API 5502, Eventide 3000SE, TC 2290, (16) asst. dbx limiters, gates, de-esser; Sontec stereo EQ, (8) Drawmer 201 gates, (4) Tube-Tech EQs, (2) Tube-Tech limiters, (2) UREI 1178, Drawmer 1960 stereo limiter, Smart/SSL outboard stereo limiter. **Microphones:** World-class selection. **Monitor Speakers:** (4) Meyer HD-1, assorted near-fields. **Power Amplifiers:** Bryston. **Video Recorders:** Sony BVU-800. **Video Monitors:** (5) Sony, Panasonic. **Switchers:** SSL. **Video Effects Devices:** Dirty lens. **Cameras:** (2) Semi-pro color for on-site monitoring only. **Other Major Equipment:** 48-channel Hardy M-1 discrete microphone preamplifiers for on-stage use, line-level audio to truck, 96-channel Jensen passive split. **Specialization & Credits:** Recent credits include: Paul Simon—Central Park '91, Peter Gabriel—POV, Kathleen Battle/Jessye Norman—Spirituals, Eric Clapton—Albert Hall '91, Lincoln Center classical jazz, Grammys, REM—tour film, plus a bunch of great sounding Jim Anderson records. Effanel's unique "porta 48" flight case system facilitates 48-track digital recording worldwide.

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Boston, MA

GBH MOBILE; Audio: 125 Western Ave.; Boston, MA 02134; (617) 492-2777 x2302. Contact: John Voci. **Vehicles:** MCI bus. **Mixing Consoles:** Amek 39x24x2, (4) Yamaha M406 sub-mixer. **Audio Recorders:** (2) Otari MTR-90II 24-track, (2) Panasonic SV-3500 DAT, (2) Otari 5050 MK III 2-track. **Noise Reduction Systems:** 24-channels Dolby SR. **Outboard Equipment:** Lexicon 224 reverb, (8) dbx 903 compressor/limiter, (2) Amek PM01 EQ, (2) Amek BPF01 EQ, (2) Amek CL01 compressor/limiter, Lexicon PCM70 reverb, (2) Lexicon PCM41 delay, dbx 162 stereo compressor/limiter, RTS TW intercom system, Belden multicable containing 40 microphone lines, communication, video and telco hookups, custom Jensen

equipped microphone splitter, (3) 12-pair stage snakes on winders, (3) 4-pair stage snakes on winders, Panasonic WVCD20 video camera, Panasonic 19" color monitor. **Microphones:** B&K 4006, 4011; Neumann KM83/84, SM23, U87, KM130/140/150, SM69; Shure SM57, SM58, SM81; AKG C414B; Sennheiser MD211, MD421, EV RE20, RE16; Schoeps CMC5, MK8/MK4; Crown PZM; Countryman DI. **Other Major Equipment:** Production lounge w/seating for five, central HVAC, Uniden cellular telephone. **Specialization & Credits:** WGBH TV and Radio, PBS, National Public Radio, American Public Radio. TV credits include: Evening at Pops (1980-1991) with John Williams, Bobby McFerrin, Peter, Paul and Mary and Dave Brubeck; American Playhouse; Let the Good Times Roll with B.B. King. Recording credits: Aerosmith, Maurice Starr, Darius Brubeck, Tom Rush, WBCN Radio live broadcast series (1981-1991) including: Animal Logic, BoDeans, The Cars, Toni Childs, Godfathers, Georgia Satellites, Little Feat, Ziggy Marley, NRBQ, 10,000 Maniacs, Todd Rundgren, George Thorogood, Three. **Festival Recording & Broadcasts:** New Orleans Jazz & Heritage, Newport Folk, Boston Early Music, American Jazz Radio Festival recordings of Henry Threadgill, David Murray, Carla Bley, John Scofield, NPR World of Opera: Philip Glass "The Juniper Tree". Winner of 1989 Edwin R. Armstrong award for Technical Achievement for live festival recording of 1989 Newport Folk Fest.



GOIN' MOBILE
Boston, MA

GOIN' MOBILE; Audio: 304 Newbury St. #110; Boston, MA 02115; (617) 232-7969. Contact: Lonnie Bedell. **Specialization & Credits:** Goin' Mobile operates a 16-track remote recording truck based in Boston. We offer live concert recording, on-location sessions and broadcast mixes to clients from New England to Florida. Equipment includes: Seck 1882 console, Hill Multmix (total 28 inputs), Tascam MS-16 16-track w/dbx, 32-channel splitter snake, CCTV monitoring, mics, outboard and more, all in a comfortable working environment w/wood interior and dimmable track lighting. Our clients include local and regional acts, independent record labels, churches, production companies, engineers, recording studios and others. We offer a 20% discount to producers and recording studios who resell our services. At a small fraction of the cost of 24-track, let us quote before you decide. Call or write for free brochure and video demo.

HARRISON DIGITAL AUDIO SERVICES; 670 Amherst Rd.; Granby, MA 01033; (413) 467-3737. Contact: Jeff Harrison.

IRIS SOUND STUDIOS; Audio & Video: 237 Main St.; Royersford, PA 19468; (215) 948-3448; FAX: (215) 948-3141. Contact: Vince Kershner, David Ivory, Todd Marsden, Paul Brown.

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, Tascam 42 2-track analog, Marantz portable cassette, Sony 6011 digital processor w/(2) SL-2000 Beta, Panasonic SV-3700 DAT, Awa HX-1 portable DAT. **Noise Reduction Systems:** Dolby XP Series SR 24-channels, Dolby 363 SR/A 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 Compeller stereo, Henry mono summing D.A., UREI 565 notch filter. **Microphones:** (2) Neumann KMR81, (4) 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 Active DI, (2) Whirlwind Active DI, (4) Whirlwind DI Passive. **Monitor Speakers:** Meyer Sound Labs HD-1 (primary), Yamaha NS-10M (secondary), Calibration Standard MDM-4 (auxiliary), Auratone Sound Cubes (auxiliary). **Power Amplifiers:** Yamaha F2100. **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. **Rates:** Always affordable. Call for solid package quotes. **Specialization & Credits:** The Muddy Hole remote truck was designed to provide effortless, simultaneous live mix and 24-track Dolby SR recording for broadcast, compact disc, or any other audio medium where quality counts. Our expertise will get it right the first time, and our prices will make your project possible. Some clients and credits: Blues Alley, Ramsey Lewis, Charlie Byrd, Praise Records, Wynton Marsalis at the Village Vanguard, Kirk Lightsey, Abdullah Ibrahim, National Public Radio, Folkways Records (Johnny Shines, Robert Jr. Lockwood), WSCL-FM "Radio Free Delmarva", CBS/Sony, WETA-TV, WETA-FM, Ed King (Lyndr Delmynd), World Folk Music Association, KCRW-FM, Airshow, Talbot Chamber Orchestra, WPFW-FM, Don Cherry, Andrew White, Don Pullen, Max Roach "Sacred Drums," Carter Jefferson, Malachi Thompson, Nasar Abadey and Supernova, PRS Guitars, WBUR-FM, Paul Winter "Winter Solstice Broadcast", TV-48, Country Music Foundation "Nashville Acoustic Christmas" (Emmy Lou Harris, Steve Wanner, Chet Atkins), The Capitol Steps.

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 8/24-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, Sescam, custom-made snake (200') and splitter (52x2), 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.

POMEROY AUDIO; Audio: 193 Baltic St.; Brooklyn, NY 11201; (718) 855-2650. Contact: Doug Pomeroy.

PRODIGAL SOUND; Audio: 64 Sip Ave.; Jersey City, NJ 07306; (201) 653-3354. Contact: David Vanderheyden. Vehicles: 22' International truck. **Control Room Dimensions:** 7'x7'x18'. **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 splitters with snake.



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 GUW. **Control Room Dimensions:** 8x23. **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:** 24-channel Dolby SR. **Synchronization Systems:** TimeLine Lynx/BTX, Audio & Design TCR-1 reader/reshaper. **Outboard Equipment:** (1) API 560 graphic EQ, (5) API 550A parametric EQ, Yamaha SPX90II 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 D5201 stereo gate, dbx 900 rack with (8) dbx 903 compressor, BBE 822, Eventide H3000SE, Aphex compellor. **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:** (2) Bryston 4B, Bryston 2B. **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-snake, (2) 27-channels 3-way (w/Jensen JE-MB-D) splitter boxes, 600' main snake Belden 54, 600' 6- and 12-channel main sub-snake, 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, *International Rock Awards I and II*, Howard Jones, Bon Jovi, James Taylor, Joe Walsh, Billy Joel, Laura Nyro, New Orleans Jazz and Heritage Festival, Betty Carter, Soul II Soul, Johnny Cash, J.J. Kale, AFRO POP Live Series, Richard Marx, B-52's, Lenny Kravits, Living Colour, Guns N' Roses, INXS, 1991 Grammy Awards, Prince, Whitney Houston, Harry Connick Jr., Vanilla Ice, Emmy Lou Harris, Pavarotti, Ricky Skaggs, Patty LaBelle, Wynton Marsalis. Video, film or live satellite broadcast can be handled with ease. Four independent auxiliary snake systems and a comprehensive video code/sync patch bay, combined with our custom API line distribution network, guarantee that signal quality is of the highest standard.

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 JSB-TV, NHK-TV, MTV, VH-1, BBC, WBCN-FM, WQCD-FM, WPIX-TV, A&M, Epic, RCA, MCA, Relativity, CBS, Chrysalis, Def Jam, EMI/Manhattan, FM Osaka, FM Tokyo, Geffen, Giant, Metal Blade, Time Capsule and Showtime, to name a few.



REMOTE RECORDING SERVICES INC.
Lahaska, PA

REMOTE RECORDING SERVICES INC.; Audio; PO Box 334; Lahaska, PA 18931; (215) 794-5005. Contact: David Hewitt. **Vehicles:** "Silver Mobile Studio" 8.5x44 feet. **Mixing Consoles:** API Discrete Series 48x48, 560 EQ, Massenburg faders, Auto reset, Studer 961 10x2, Studer 962 14x4, Audio Scopes 64-channel video level display. **Audio Recorders:** (2) Studer A820 24-track, (2) Sony PCM-3324/3348 digital 24/48-track available, (2) Studer A810 2-track w/time code, Sony PCM-1610 digital w/Apogee filters and BVU-820 VCR, Sony PCM-701 and Sony DAT available, Nakamichi cassettes. **Noise Reduction Systems:** Dolby SR available (48-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, (2) API 560B EQ, Aphex Compellor, (2) Dynaflex dynamic noise filter, Lexicon PCM60, (4) API 525 compressors. **Microphones:** AKG, Beyer, Countryman, EV, Neumann, Sennheiser, Shure, Sony, Wahrenbrock, PZM. **Monitor Speakers:** KRK, CSI MDM-4, Hartke M-18, Yamaha NS-10, Auratone. **Power Amplifiers:** Bryston 4B, Bryston 3B. **Video Monitors:** (2) Mitsubishi 13" multisync, Phillips 27", (3) Sony 5", (2) NEC 12". **Switchers:** Videotek Video DAS, Panasonic 6x1. **Cameras:** Sony CD color, (2) Sony B/W. **Other Major Equipment:** 72 inputs of Jensen mic splitters, extensive video patch bay, Videotek sync generator, video humbuck coils, extensive cabling for large tours or shoots, PCM-1610 mastering system

and Studer consoles available separately in road cases. **Rates:** Please call for quote. **Specialization & Credits:** Our new third generation "Silver Studio" is a 60' tractor trailer designed from the ground up for remote recording. The interior is designed for the way people really work on location, with room for your clients to comfortably sit without being in the traffic flow. There is plenty of room and patching for extra consoles, your favorite outboard equipment and up to five multitrack machines. Then there is the acoustically isolated back room with its own air conditioning and isolated power. Uses range from live radio control room and overdub booth to Betacam or Chyron setups for video. Recent credits include platinum video features from Billy Joel, "Live at Yankee Stadium," and Harry Connick Jr., "Swingin' out with Harry"; Live television credits for music on the Academy Awards and ABC's "In Concert" series with the Grateful Dead and Don Henley. Plus live records: Jimmy Buffett's "Feeding Frenzy," Donald Fagen's "New York Rock and Soul Revue".



RIGHT COAST RECORDING INC.
Lancaster, PA

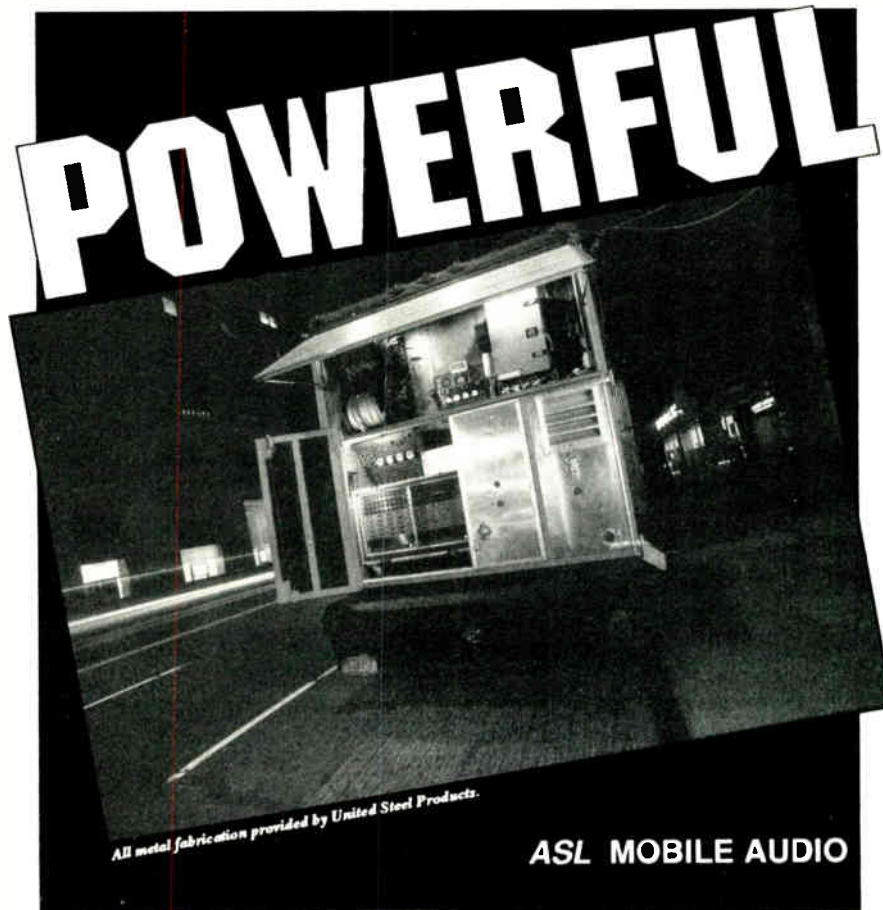
RIGHT COAST RECORDING INC.; Audio; 151 Delp Rd.; Lancaster, PA 17601; (717) 560-1530/560-0433. Contact: Dave Wilkerson. **Vehicles:** Portable system—sets up anywhere. **Control Room Dimensions:** Varies—minimum 12 x 16'. **Mixing Consoles:** TruderT custom Series 24 26x24x24, Hill Multi-Mix 16x4x2. **Audio Recorders:** All formats of analog or

digital multitrack, Tascam DA-50, Sony TCD-D10, Tascam 122II. **Noise Reduction Systems:** Customer's choice. **Synchronization Systems:** Customer's choice. **Outboard Equipment:** (2) Lexicon 224, (2) Lexicon 200, (2) Lexicon 97, Yamaha REV5, (2) ADR vocal stresser, (2) Eventide 910, Eventide 1745M, Eventide flanger, Valley People rack, (4) dbx 165, (4) dbx 160, (2) dbx 162, (2) dbx 902, (4) dbx 903, (4) dbx 904, (4) dbx 905, (5) UREI 1176LN, Spectra Sonic 610, (2) Court GE-60 EQ, (6) Kepex II, (2) Gain Brain, (3) Maxi-Q. **Microphones:** (3) B&K 4007, B&K 4011, (2) AKG 414, (3) Sennheiser 416, (4) Sennheiser 406, (3) Milab LC-25, Milab DC-96, (2) Countryman Isomax, (4) Beyer M-160, (2) Beyer M-88, (3) Sennheiser 421, (4) Sennheiser 441, (4) Countryman DI, (4) Jensen DI. **Monitor Speakers:** JBL L 112, custom Dynaudio near-field. **Power Amplifiers:** (2) Phase Linear 700B, Crown D-75. **Video Recorders:** Sony SL-2000. **Video Monitors:** (2) B/W CCTV. **Cameras:** (2) B/W CCTV. **Other Major Equipment:** 16-channel custom line isolation system, automatic voltage regulator/filter AC distro, (2) 32-channel video bargraph generators, 300' 76-channel snake, 60-channel Jensen transformer splitter, 6-station intercom system. **Rates:** Call. All equipment also available for individual rental.



SHEFFIELD AUDIO-VIDEO PRODUCTIONS
Phoenix, MD

—LISTING CONTINUED ON NEXT PAGE

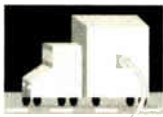


All metal fabrication provided by United Steel Products.

ASL MOBILE AUDIO



NORTHEAST Remote Recording



—LISTING AND PHOTO/LOGO CONTINUED FROM PREVIOUS PAGE
SHEFFIELD AUDIO-VIDEO PRODUCTIONS; *Audio & Video;* 13816 Sunnybrook Rd.; Phoenix, MD 21131; (301) 628-7260. **Contact:** Richard Van Horn. **Vehicles:** 48' custom air-ride trailer (audio), 30' custom diesel Mack (video). **Mixing Consoles:** SSL 4048 E/G. **Audio Recorders:** (2) Sony digital multitrack, (2) Otari MTR-90 MKII. **Noise Reduction Systems:** Dolby SR available. **Synchronization Systems:** TimeLine Lynx. **Outboard Equipment:** (12) Sontec mic pre amps w/4-band parametric EQ, Eventide H3000, TC-2290, UREI LA-4, (2) UREI LA-3A, (5) UREI 1176, (4) Kepex gates, (4) Valley People Dynamites, Ashley stereo gates, Lexicon 200, Yamaha SPX90, 3/4" and 1/2" video decks and much more. **Microphones:** AKG, Neumann, Sennheiser, Shure, Crown PZM. EV, Sony, Beyer, B&K. **Monitor Speakers:** UREI 815C, Yamaha NS-10M. **Power Amplifiers:** Crest, Crown. **Video Recorders:** (5) Betacam SPs & 1". **Video Monitors:** Sony and Ikegami. **Switchers:** Grass Valley 1600L. **Cameras:** Ikegami HL-55 w/CCUs. **Other Major Equipment:** Closed circuit video system w/(2) 25" color monitors, (3) 20" color monitor, Jensen transformer splitter system. **Rates:** Upon request. **Specialization & Credits:** Glona Estefan, Kenny Loggins, New Orleans Jazz Festival, Aretha Franklin, Violent Femmes, Billy Squire, CBS, Epic, Nocturn, Clear Bros., Combat, Bruce Springsteen, Westwood One, Disney/MGM, Maryland Sound. BB King, etc. Not just a truck, a complete remote audio facility for recording and mixing.

STRAIGHT ARROW RECORDINGS (FORMERLY BACK-TRACKS); *Audio;* 3 Kent St.; Montpelier, VT 05602; (802) 223-2551. **Contact:** Mike Billingsley. **Specialization & Credits:** Our specialty is completely faithful and natural recording in good halls and on location. Using all 44.1k digital recorders (R-DAT and Apogee-modified PCM), we capture the nuances of live performance, ambience and action. As inventors and patent holders of the Crown SASS™ microphone, we continue our pioneering work with stereo imaging, including a special 4-channel SASS-plus-digital recording system for on-site discrete surround. We use all the best components for accuracy and detail, including modified mics and power supplies for our SASS-Ps and Bs. Star-Quad cables and well-maintained, custom-modified recorders, as well as a full complement of standard remote and field recording gear. We do not do multitrack remotes but are well-versed in live performance mixing. Our new studio and post-production facility is set up for comfortable editing and compact disc premastering, giving us full control over the final stereo or 4-channel image. Our many credits include acoustic ensembles (folk, international and classical), percussion, location samples and sound effects, environmental ambience and artist installation.

THREE COMMUNICATIONS PRODUCTIONS; *Audio;* 510 Main St.; Middletown, CT 06457; (203) 347-8439. **Contact:** Mike Arafeh.

WARM BROWN SOUND; *Audio;* PO Box 1888; Brattleboro, VT 05302; (802) 254-4283. **Contact:** Chris Kelly.

WQCD MOBILE PRODUCTION TRUCK; *Audio;* 220 E. 42nd St., Ste. 2812; New York, NY 10017; (212) 210-2773; **FAX:** (212) 210-2771. **Contact:** Andy Bater. **Vehicles:** Custom-built Midwest M-22 truck. **Control Room Dimensions:** 8x8. **Mixing Consoles:** Soundcraft Delta 32-channel. **Audio Recorders:** Sony, Panasonic, Tascam digital audio tape (DAT), Otari 2-track, Tascam cassette. **Noise Reduction Systems:** ANT. **Outboard Equipment:** Aphex, Yamaha, Orban, dbx. **Microphones:** Neumann, Shure, Electro-Voice, AKG, Samson wireless. **Monitor Speakers:** Electro-Voice. **Power Amplifiers:** Haller. **Video Monitors:** Sony color monitor/receivers. **Cameras:** Panasonic color CCD camera. **Other Major Equipment:** WQCD's unique digital audio remote pickup (RPU) system utilizes a highly advanced digital data compression system developed by Audio Processing Technology (APT), a subsidiary of Solid State Logic. Offering real-time compression and retrieval of audio data, with no subjective loss of quality, the aptx 100 system allows the satellite and terrestrial transmission of CD-quality digital audio previously unattainable within an economical data bandwidth. Benchmark mic preamp system, 24-channel Windrind mic splitter, Denon CD players, JVC and Sansui F1 encoders/decoders, Comre wireless IFB system, two-channel RTS intercom system, (2) TFT 450MHz RPL transmitter, (2) TPL 100 watt power amplifiers, on-board 6.5 kW generator with Solar regulator, 42-foot heavy duty Wilbur mast with quickest pan/tilt. **Rates:** Available upon request. **Specialization & Credits:** With its revolutionary digital audio remote pickup (RPU) system, WQCD's Mobile Production Truck is specifically designed to bring compact disc-like audio back from remote locations, enabling concerts or any event to be heard live over the radio with the highest quality digital audio. Credits include the key digital audio link for Westwood One's

live broadcast of Paul Simon's Central Park Concert, the National Public Radio (NPR) Winter Solstice Whole Earth Christmas Celebration, Tuck & Patti, New York Voices, Keiko Matsui, Dave Samuels Group, Tania Maria, Bob's Diner, Angela Boffill, Robert Cray, Grover Washington Jr., Dave Valentin, Acoustic Alchemy, Michel Camilo, Take 6, Neville Brothers, The Radiators, George Benson, Alex Bugnon, Diane Reeves, Strunz & Farah, Jon Lucien, Special EFX, Joe Sample, Roberta Flack, Billy Childs, T. Lavitz, Vinx, Dave Koz & Phil Perry, Radio France, RTE Dublin.



SOUTHEAST

Alabama, Florida, Georgia, Kentucky,
Louisiana, Mississippi, North Carolina, South Carolina,
Tennessee, Virginia, West Virginia

AIRSHOW INC.; *Audio;* 7021 Woodland Dr.; Springfield, VA 22151; (703) 642-9035. **Contact:** David Glasser. **Specialization & Credits:** Specializing in location recording, engineering coordination, and consulting for remote recording and broadcast, we can supply a portable recording system featuring AMS/Calrec console, DAT recorders, API preamps and audio distribution, packaged for efficient on-site set up and transport. Recent projects and clients include: Paul Winter Consort; Smithsonian Jazz Masterworks Orchestra; Festival of American Folklife; Manchester String Quartet; Pete Seeger; Folkways Records; Rounder Records; NPR. AIRSHOW also offers hard disk digital audio editing and CD mastering for clients such as Rounder, Folkways, Flying Fish, Positive Music, Rebel & Sugar Hill Records. Please give us a call to discuss your next remote recording, broadcast or digital editing project.

BRANTLEY SOUND ASSOCIATES INC.; *Audio;* 204 Third Ave. S.; Nashville, TN 37201-2202; (615) 256-6260. **Contact:** Lee Brantley.

MAGNETIC MEMORIES; *Audio;* PO Box 3373; Kingsport, TN 37664; (615) 246-3010. **Contact:** Lawrence Morris.

NASHVILLE CARTAGE & SOUND; *Audio;* PO Box 121742; Nashville, TN 37212; (615) 386-3700. **Contact:** Sheila D. Barnard, Jim White.

REELSOUND RECORDING CO. EAST; *Audio;* 1701 Green Hills Dr.; Nashville, TN 37215; (615) 385-0220. **Contact:** Dave Perkins.

RM AUDIO; *Audio;* 3586 Pierce Dr.; Atlanta, GA 30341; (404) 458-6000. **Contact:** John Lewis Tyler. **Specialization & Credits:** We've got whatever it takes to get your sound on tape—the way you've always heard it. Our Trident-equipped, dual 24/48-track mobile can assist you in audio for film/video, live broadcast/teletext and, especially, live album projects. Recently we've worked with the Neville Brothers, Yellow Jackets, Jeff Healey, BoDeans, Letterman, The Tams, Joe Satriani, Wynton Marsalis, and Michael Franks. Soon we'd like to work with you!

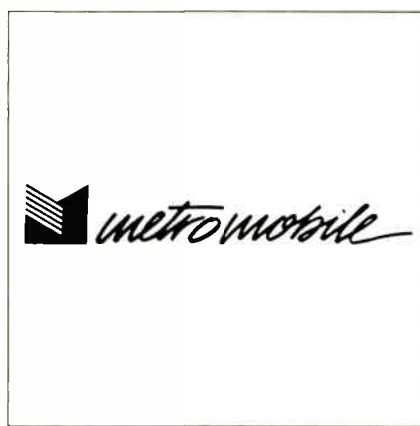
TRAVELING TRAX MOBILE RECORDING STUDIO; *Audio & Video;* 810 Harbour Dr.; Punta Gorda, FL 33983; (813) 624-4521. **Contact:** Don Brown.



NORTH CENTRAL

Illinois, Indiana, Iowa, Kansas, Michigan,
Minnesota, Missouri, Nebraska, North Dakota,
Ohio, South Dakota, Wisconsin

METRO MOBILE RECORDING; 2097 John's Ct.; Glenview, IL 60025; (708) 998-6420; **FAX:** (708) 998-6421. **Vehicles:** 1983 Chevy Hi-Cube truck. **Control Room Dimensions:** 14' x 8". **Mixing Consoles:** Neotek Elite 50x26, 100-input mkxdm, (2) Hill Multi-Mix 16x4 rack-mount, Hardy M-1 4x4 mic preamp, Valley People Dyna-Mic 4x2, Shure FP-42 4x2. **Audio Recorders:** (2) Sony/MCI JH-24 24-track, Panasonic SV-3500 DAT, Sony TCD-10 Pro DAT portable, Sony 300ES DAT, Fostex E-16 16-track 1/2", Tascam 40-4 4-track 1/4", Scully 280B 2-track 1/4", (2) Technics 1500 2-track 1/4", Sony 601 PCM digital processor w/Sony SLHF-900 and SLHF-450 Beta, (2) Tascam 112R auto-reverse cassette, Nakamichi MR-2 cassette, (10) Yamaha KX630 for real time dupes. **Noise Reduction Systems:** 8-channels dbx, 16-channels Dolby C. **Synchronization Systems:** Adams-Smith Zeta-3 transport w/SMPTE reader/generator. **Outboard Equipment:** Eventide H3000SE Ultra-Harmonizer w/sample card, Lexicon PCM60. —LISTING AND PHOTO/LOGO CONTINUED TOP OF NEXT COLUMN



METRO MOBILE RECORDING Glenview, IL

Lexicon Prime-Time digital delay, Yamaha REV7, SPX90 and SPX90II, (4) Yamaha D1500 digital delay, DeltaLab ADM-256, Sound Workshop 262 stereo spring reverb, Roland SRV-200, Dimension "D", Alesis Microverb II, (2) Studio Technologies AN-2 stereo simulators, Aphex Compellor limiter and Type C Aural Exciter, (5) dbx 160X, (5) dbx 166 limiter, dbx 165A, dbx 163X limiter, dbx 463X noise gate, (2) dbx 2623X de-esser, (2) dbx 563X "silencers", UREI 1176LN, (2) UREI LA-4 limiter, Burwen DNF 1201A dynamic noise filter, Phase Linear 1000 Auto-Correlator, USAudio Gatex noise gate, Omni Craft GT-4 noise gate, Orban 622 EQ, MXR dual limiter, NAD 4300 AM/FM tuner, Eventide Omniphosor. **Microphones:** AKG: (2) C-414 ULS, (2) C-414 P48, (2) C-414 EB, (4) C-61, (2) C-451 EB, (2) C-452 EB, D-112E, (2) D-202E; Audio-Technica: ATM-11R, ATM-81, ATM-811, ATM-857QM; Beyer: MC740, (2) MC713, (2) M160, (4) M260, (3) M88, M69; Bruel & Kjaer: (2) 4006, 4007; Countryman Isomax; Electro-Voice: (4) ND-357, (2) ND-75, PL77A, 655C; Fostex M88RP; Milab DC96B; (3) Nakamichi CM-300; Neumann: KM84, U47, (8) KM88, (2) KM86, KMS85; RCA: (2) 44-DX, (2) 74B; (2) Schoeps SKM-5U w/Mk-4; Sennheiser: (1) MD-421, (2) MD-409; Shure: (6) SM81, SM99, (10) SM57, (6) Beta SM68, (2) SM58, (2) 545; Sony: (2) C-47, C-500, (2) ECM-377, (2) ECM-22P, (2) ECM-55B, ECM-150. **Monitor Speakers:** UREI 809, Yamaha NS-10, AF Red Box II, Tannoy PBM-6.5, JBL 4313, Fostex RM-780, MDM-4, Auratone 5C. **Power Amplifiers:** Bryston 3B, Carver 1.0T, Crown D-150, (2) Crown D-75, Yamaha P2075, Sony Tan-5550, Rane HC-6, Marantz 8B. **Video Monitors:** (2) Sony CVM-1270 color, Sony PVM-1380 color. **Cameras:** Panasonic WV-F2 CCD color video, Toshiba IK-2000 color video. **Other Major Equipment:** 120 AMP single-phase power distribution w/350 feet of cable, 48-channel three-way transformer splitter, 52-channel multipair snake system w/275 feet of cable, Clearcom intercom system w/5 belt-pack/headsets, Talkman wireless intercom; Direct boxes: (8) Missing link active, (2) Stewart active, (8) Pro-Co passive, (5) Sescum passive, cables; stands, subsnakes, headphones and more; portable drum baffles, (12) studio blankets, Plexiglass drum booth, complete cue system w/(6) Beyer DT-220, (6) Koss Pro-4AAA and (6) Sony MDR-V6 headphones, Otari CE-201 SMPTE time code reader. **Rates:** Day rates available upon request. **Specialization & Credits:** Featuring Chicago's first and only 48-track audio truck, Metro Mobile offers the finest in location audio services for live radio & TV broadcasts, audio-for-video and film production, on-location commercial recording, and live album and CD production. Recent clients include David Bowie, The BoDeans, Indigo Girls, John Cougar Mellencamp, The Replacements, Living Colour, Chicago Blues, Jazz and Gospel Festivals, Eleventh Dream Day, Poi Dog Pondering, Jesus Jones, Don Dixon, Circus of Power, The Descendants, Ministry, Revolting Cocks, Tattoo, Big Bash, The Drovers, Material Issue, Free Hot Lunch Band, Dream Syndicate, Adrian Belew, Soul Asylum, John Hiatt, KISS, Winger, Robert Cray, Lonnie Brooks, Lonnie Mack, Shriekback, The Nylons, House of Love, The Pixies, Neville Bros., REO Speedwagon, Jonathon Brandmeier, Kevin Matthews and Ed Zepplin, The Church, The Winans, Edwin Hawkins, Santana, WXRT's Sunday Night Concerts, WLUP, WFMT, WBBM-TV, VTTW-TV, WBEZ, HBO, MTV, ShowTime, Westwood One, The A&E Network, PBS, National Public Radio, The Disney Channel, A&M, MCA, Alligator, PolyGram, CBS, Atlantic, Island, Elektra, Warner Bros., Epic and Geffen Records.

MODERN MINTREL MIXING AND RECORDING; *Audio;* PO Box 19112; Minneapolis, MN 55419; (612) 824-4135. **Contact:** C.W. Frymore.

PRODUCERS VIDEO SERVICE INC.; *Audio & Video;* PO Box 1865; Palatine, IL 60078; (708) 934-0999. **Contact:** Jerry Skora.

R/J RECORDING & SOUND; *Audio;* PO Box 302; 530 Lark St.; Geneva, IL 60134-0302; (708) 232-1932. **Contact:** Richard J. Peck. **Specialization & Credits:** We at R/J Recording & Sound pride ourselves on providing very high-quality recording services. We do on-location digital recordings of live events such

—LISTING CONTINUED TOP OF NEXT PAGE

as symphony orchestras or corporate functions. We also have a complete studio facility for projects such as band recording, commercial music production and editing. Credits include: *Ides of March*, Fox River Valley Symphony Orchestra, New Philharmonic Orchestra, The LOOP FM 98 and WGN-AM 720. Specialization: Our educated staff of friendly engineers will work with you to help you get the most out of your studio time. We'll promise you a worry-free production environment and high-quality results. So give us a call today because we sound terrific!



SOUTHERN CALIFORNIA/ SOUTHWEST/HAWAII

Arizona, Arkansas, Hawaii, Southern
Nevada, New Mexico, Oklahoma,
Southern California, Texas

**AUDIO SERVICES CORPORATION; Audio & Video; 10639
Riverside Dr.; North Hollywood, CA 91602; (818) 980-9891.
Contact: Mike Riner.**



DESIGN FX REMOTE RECORDING
Culver City, CA

**DESIGN FX REMOTE RECORDING; Audio; PO Box 491087;
Culver City, CA 90049; (213) 838-2400; (213) 838-6555;
FAX: (510) 527-1505. Contact: Terry Stark. Vehicles: GMC
35'x9'. Control Room Dimensions: 7'x27'. Mixing Consoles:
API (custom) 44x24 (24 bus) w/550-A EQ, custom patch bay,
various rack mixers available, Sony MXP-61 12x4. Audio
Recorders: (2) Sony PCM-3348 48-track digital, (2) Mitsubishi
X880 32-track digital, (2) Otari MTR-90 24-track, (2) Mitsubishi
X850 32-track digital. Noise Reduction Systems: (2) Dolby XD
SR24, Dolby A (48-channel). Synchronization Systems: (2)
Lynx TimeLine. Outboard Equipment: GML stereo EQ, (2)
Pultec EQP-1A3, (2) Teletronix LA-2A EQ, Summit Audio stereo
EQ, (44) API 550-A EQ, (4) UREI 1176 limiters, (4) dbx 160
limiters, Summit Audio TLA 100 tube, (4) GML preamps, DMX
DDL/harmonizer, AMS RMX reverb, Yamaha SPX90 reverb,
Lexicon PCM 70 reverb, Roland SRV-7 reverb, Yamaha REV7
reverb, Yamaha REV1 reverb, (10) Drawmer DS 201 gate,
Aphex Compeller, Aphex Dominator. Microphones: Neu-
mann, AKG, Sennheiser, Sony, Shure, RCA, Crown, B&K, EV,
Schoeps. Monitor Speakers: (2) KRK 15" custom, (2) Meyer
Sound Labs ACD 15", (2) Yamaha NS-10. Power Amplifiers:
Perreux 600 stereo, BGW 750 stereo, Bryston 4D stereo.
Video Monitors: Panasonic 19" color, (2) Sony 9" color, (3)
Panasonic B&W. Cameras: (2) Sony color. Other Major
Equipment: Panasonic SRV-3700 DAT, (2) Yamaha C300
cassette recorders. Specialization & Credits: Producer/en-
gineer Gary Ladinsky's Design FX Audio, L.A.'s long-time, re-
spected rental headquarters for digital recorders and exotic,
vintage audio equipment, has recently purchased Record
Plant's "Big Truck", MU3. It has been torn apart and rebuilt to
meet the needs of today's discriminating engineer/producer/
director. Headed by ex-Wally Heider/Record Plant director
Terry Stark and Wally Heider/Record Plant chief remote engi-
neer Jack Crymes with ex-RP remote staffers Mark Eshelman,
Gary Long, Brent Walton and DFX engineer Allen Baca, the
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will need. With our vast inventory of "yesterday's and today's
toys," we're a convenient "one stop" for all your remote record-
ing needs. Crew credits go on forever (McCartney, Stones,
Elvis, Who, CSNY, Academy Awards, Emmys, Grammys, etc.,
ad infinitum). Since our recent "Inauguration" with the 1991 MTV
Video Music Awards, we've been booked solidly with pro-
ductions such as Kenny Loggins at the south rim of the Grand
Canyon, ABC-TV "In Concert," "Foundation '91" and various
HBO/Disney/A&E/Showtime specials. Rates on request at
(213) 838-2400.**

**DIGITAL SERVICES REMOTES; 5805 Chimney Rock;
Houston, TX 77081; (713) 664-5258. Contact: John Moran.
Vehicles: Chevrolet C-50 truck. Mixing Consoles: MCI 636,
Neve 5442. Audio Recorders: (2) Sony PCM-3324, Otari MTR-
90II, Sony PCM-1610, Tascam DA-30 DAT, (2) Nakamichi cas-
sette, Otari MTR-12 1/4". Synchronization Systems: Time-
Line Lynx modules. Outboard Equipment: (2) Lexicon PCM70,
Lexicon LXP-1, Lexicon LXP-5, (4) dbx 160X, (3) dbx 166, (4)
Audio & Design compressor, (8) Audio & Design noise gate,
DeltaLab delay, RTS intercom, RTS audio distribution amp.
Microphones: Neumann U69, U87, U89, TLM170, Sennheiser
421, 441, Shure SM57, SM58, SM81, SM89, AKG 414, 460,
Crown PCC 160, Isomax, Countryman DI, Electro-Voice RE20,
RE10. Monitor Speakers: JBL 4412, Yamaha NS-10, Aural-
tones, Ed Long MDM-4. Power Amplifiers: QSC 3500, Crown
D-75, Crown PS-400. Video Recorders: Sony BVU-800.
Video Monitors: Panasonic 1020. Other Major Equipment:
SSL studio for post-production and mixing, 2500' soundstage,
Fairlight/MIDI production room, ScreenSound digital post
room, Foosball table. Rates: Not expensive at all. Special-
ization & Credits: Clients: B-52's, JVC Jazz festival, Houston
Grand Opera, Houston Symphony Orchestra, Van Cliburn In-
ternational Piano Competition, B.B. King, Neil Young, Edwin
Hawkins, KUHT, KTRK, et al. Specialization: 24-/48-track lo-
cation audio, audio/video mixing, satellite and broadcast audio
distribution. Pulling rabbits out of hats and putting off fires
before they start. Top equipment and an experienced crew.**

**MIDCOM REMOTE SERVICES; Audio; 3 Dallas Comm.
Complex, Ste. 108; 6311 N. O'Connor Rd., LB-50; Irving, TX
75039; (214) 869-2144; FAX: (214) 869-0898. Contact: Mike
Simpson. Vehicles: 1982 GMC 24' straight truck. Control
Room Dimensions: 8'x20'. Mixing Consoles: Soundcraft TS-
24 32-channel console w/custom, 8 stereo/16 mono sub-
master routing system, 32x24x16x2x1, Amek/TAC bullet
10x4x2. Audio Recorders: (2) Otari MTR-90II 24-track, Studer
A810 2-track w/center-track time code, Nakamichi MR-1B,
Panasonic SV-3500 DAT. Noise Reduction Systems: TTM
24-channel noise reduction will accept Dolby, dbx, Telcom.
Synchronization Systems: Cipher Digital Shadow II w/Sha-
dowpad, Cipher Digital "Cypher" time code generator/reader.
Outboard Equipment: Lexicon 480L digital effects processor,
Lexicon 224XL digital reverb, Lexicon Model 95 Prime Time II,
Eventide H910 Harmonizer, dbx Series 900 frames w/903
comp/limiters, 904 noise gates, MICMIX dynamex/exciter cards,
Lexicon PCM70 digital reverb, (2) dbx 160X compressor/lim-
iter, Aphex stereo Compeller. Microphones: Neumann U89,
Neumann TLM170, Neumann KM84, AKG C-414, Sennheiser
MD-441, Sennheiser MD-421, Beyer M69, Beyer M88, Beyer**

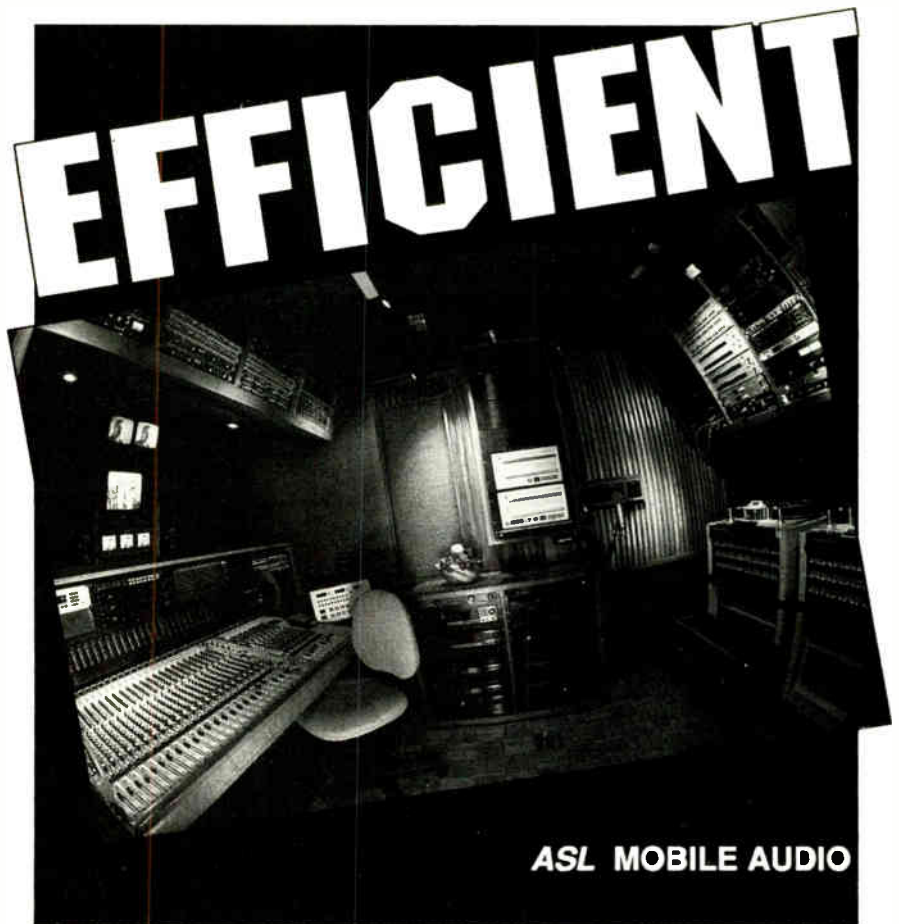
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MIDCOM REMOTE SERVICES
Irving, TX

M500, Beyer M201, Beyer MC734, Shure SM58, Shure SM57,
Shure SM81, Shure SD85, Crown PZM 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) Pan-
asonic 12x1 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 Aspen Papers*, Great Performances
Series for PBS; *Daily*, ABC-TV prime time; "The Texas De-
bates" presidential debates for American Public Radio; live
broadcast for Z-Rock Radio Network including: Metallica, Dio,
King's X, Black Crowes, Nevada Black, Every Mother's Night-
mare, Network; George Strait, MCA Home Video; 7th Van Cliburn
Competition, American Public Radio; Benjamin Lees'
Memorial Candles, American Public Radio; score for *Texas*,
Dramaflex production at Palo Duro Canyon; *Fashion Hit Re-*

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SO. CALIFORNIA

Remote Recording



—LISTING CONTINUED FROM PREVIOUS PAGE

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 PRODUCTIONS; Audio and Video; 7027 Twin Hills Ave., Ste. #5; Dallas, TX 75231; (214) 891-9585; FAX: (214) 891-9623. Contact: Paul A. Christensen. Vehicles: 1986 Ken-



OMEGA PRODUCTIONS
Dallas, TX

worth diesel, 40' fixed unit with 1,700-mile refueling range. **Control Room Dimensions:** 30'x8'x10'. **Mixing Consoles:** API 32x32 mixing console w/API 550A EQ 32 program buses w/8 stereo VCA groups, Hill 16x8x4x2, Yamaha PM3000. **Audio Recorders:** (2) Otari MTR-90 24-track, (2) Sony 3324 24-track, (2) Mitsubishi X-850 32-track. **Noise Reduction Systems:** Dolby SR, 24 tracks. **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, MXR 01a digital reverb, (3) Yamaha SPX90 special FX processor, (4) DeltaLab Super Time Line, (2) dbx 162 limiter, Dyna-Mite limiter. **Microphones:** (8) AKG C-414EB, (4) AKG C-451EB, AKG D-12E, (6) Beyer 201, (2) Neumann U47, (4) Shure SM81, (12) Shure SM58, (8) Shure SM57, (4) Shure SM53, (6) Crown PZM315, (7) Sennheiser 421, (5) Sennheiser 441, (3) Sony ECM-22P, (2) Sony ECM-50, (2) 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. **Power Amplifiers:** (2) Yamaha P2200, Yamaha P1000. **Video Recorders:** JVC 6600U. **Video Monitors:** Sony Trinitron 14", Panasonic 19". **Rates:** Call for rates. Varies with job requirements. **Specialization & Credits:** Omega 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. Omega Audio has received two Platinum Records, five Gold Records, two Ampex Golden Reel Awards, three Grammy nominations and six Dove Awards. Partial credits include: Garth Brooks, Clint Black, U2, REM, Lynyrd Skynyrd, Amy Grant, B.B. King, Dizzy Gillespie, Joe Walsh, Fats Domino, Ray Charles, Paul Shaffer, Prince, Cameo, Johnny Cash, The Judds, 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.

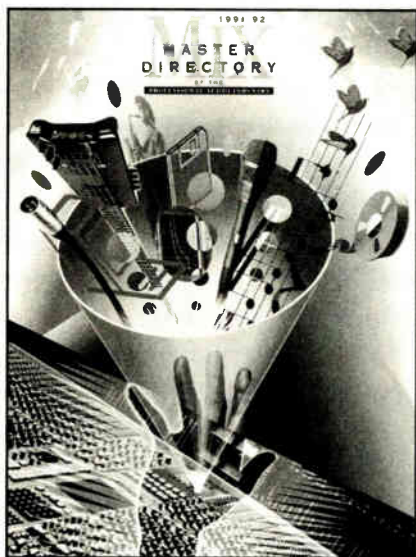
REELSOUND RECORDING CO.; Audio; 2304 Sheri Oak Ln.; Austin, TX 78748; (512) 472-3325. Contact: Malcolm H. Harper Jr.

SIDESTREAM SOUND; Audio; 5013 1/2 Narragansett Ave.; San Diego, CA 92107; (619) 222-0238. Contact: Ken Toltten.

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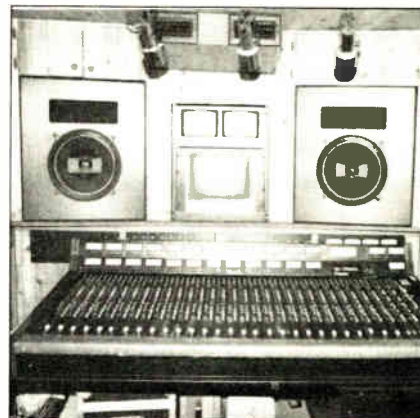
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STUDIO ON WHEELS
Glendale, CA



STUDIO ON WHEELS
Glendale, CA

STUDIO ON WHEELS; Audio; 339 W. Windsor Rd., Ste. 6; Glendale, CA 91204; (818) 243-6165. Contact: John Falzarano. Vehicles: MU-1 GMC step van, MU-2 Dodge 23' bobtail, MU-3 GMC bobtail w/full air cond. & heat, air, ride suspension. **Mixing Consoles:** MU-1: Spectra Sonics 28x8 w/fader reverse. MU2: Amek 28x16, (2) Yamaha 406 6-channel, Sound



FORMER RECORD PLANT

MOBILE STUDIO

STUDIO ON WHEELS
Glendale, CA

Workshop 8-channel for total of 48 inputs. MU3: API 44x32 designed specially for live & recording of broadcast w/in-line monitoring. **Audio Recorders:** MU1: 3M M79. MU2: (2) Ampex 1290. MU3: (2) Ampex 1200, (2) Sony 3324, 3348. **Noise Reduction Systems:** Dolby SR. **Outboard Equipment:** (10) UREI 1176 limiter, (5) dbx 160X compressor/limiter (10) dbx 163X compressor/limiter, LA-4, (4) SPX 90 digital processor, (2) Midverb reverb. **Microphones:** 50 mics: Sennheiser, Shure, AKG, Neumann, Beyer, Sony EV, CAD, RCA, Altec. **Monitor Speakers:** MU1: JBL 4310, Tannoy 6.5. MU2: Altec 604E w/Mastering Lab crossover, Tannoy 6.5. MU3: JBL 4320 bi-amped, Yamaha NS-10M. **Power Amplifiers:** MU1: QSC, Sony. MU2: BGW. MU3: Phase Linear, Studer. **Video Monitors:** MU1: 19" color. MU2: 13" color, (2) 9" B&W. MU3: 21" color, (3) 5" B&W. **Cameras:** (3) color camera. **Other Major Equipment:** (5) 27-channel splitter boxes w/Jer. sen transformer and individual ground lifts for each channel, multitap AC lines transformer, custom time code reader, RTS Comunication, White Instruments 4000 equalizers.



WESTWOOD ONE COMPANIES
Culver City, CA

WESTWOOD ONE COMPANIES; Audio: 8966 Washington Blvd.: Culver City, CA 90232; (310) 840-4000. Contact: Richard Kimball. Vehicles: 45' trailer. Control Room Dimensions: 30' x 8'. **Mixing Consoles:** MCI 636 (36:24), Neve 8x6, Spheer 16x4, Yamaha 6x2. **Audio Recorders:** (2) Ampex 1200 24-track, Ampex ATR-102 2-track, Technics 1500 2-track, Panasonic 3500 DAT, (2) Technic: M85. **Noise Reduction Systems:** Various. **Synchronization Systems:** Various. **Outboard Equipment:** 24-48-track digital machines available on request. **Microphones:** Various. **Monitor Speakers:** Altec 604Es w/Mastering Lab crossovers in custom Demedco cabinets, Yamaha NS-10. **Power Amplifiers:** BGW 600. **Video Monitors:** (2) Sony. **Rates:** Upon request. **Specialization & Credits:** MTV Awards Show, Sting Live from the Hollywood Bowl with NHK (Pay-Per-View), Paul Simon Live from Central Park, George Michael, The Who, Don Henley, Madonna, Frank Sinatra, Guns N' Roses and scores more covering all musical formats.

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NORTHWEST

Alaska, Northern California, Colorado, Idaho, Montana, Northern Nevada, Oregon, Utah, Washington, Wyoming

AKASHIC RECORDS GROUP; Audio: PO Box 395; Danville, CA 94526; (510) 837-7959. Contact: Stephen Jarvis.

DOG FISH SOUND; Audio: 17385 NE Hillsboro Hwy.; Newberg, OR 97132; (503) 538-5638; Fax: (503) 538-3885. Contact: Drew Canulette. Vehicles: Ford F700, air ride w/24' box. **Mixing Consoles:** Harrison Raven 40x24 w/Mastermix automation. **Audio Recorders:** MTR-90II 24-track, MX 70 16/8-track, (2) RS 1500 2-track, Nakamichi MR-1, Panasonic 3500 R-DAT, dbx 700 digital audio processor. **Noise Reduction Systems:** (18) dbx type 1, (2) Dolby SR/A. **Synchronization Systems:** EC101, MTR-90II. **Outboard Equipment:** (2) LA-4, LA-2A, Altech 635C, (2) dbx 106X, 900 rack w/(4) compressor,

(2) gate, de-esser, flanger, compellor, 224X, H3000, (2) Aphex gate, (2) ADR comp/limiter. **Microphones:** (2) Neumann U89, (3) C4 14-EB P48, (5) C451-EB, AKG D-12, (2) Sony C-37A, (2) ECM-33P, (8) 441, (4) 421, (2) Electro-Voice RE20, (8) ND 457, (6) Shure SM58, (6) SM57, Countryman DI, (2) Stewart DI, (2) Audio-Technica DI, vacuum tube DI, (8) custom trans DI. **Monitor Speakers:** JBL 4435, (2) JBL 4408, HD1, Auratone 5C, Rogers LS35A. **Power Amplifiers:** (2) Crown DC-300A, UREI 6250, BGW 250, QSC 1500. **Video Recorders:** JVC 8600U. **Other Major Equipment:** 36-channel, transformer-isolated microphone splitter.

PHIL EDWARDS RECORDING; Audio: 1522 W. Winton Ave.; Hayward, CA 94545-1311; (510) 784-1971. Contact: Phil Edwards. Vehicles: 31' GMC 6500 bobtail w/lift gate, Ford van. **Control Room Dimensions:** Mobile II: 20x8x8. **Mixing Consoles:** API 40x24x24 w/550A EQ, API 1604 w/550A EQ. **Audio Recorders:** (2) 3M 7924-track, (2) Sony DAT, (2) PCMF1, 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 PCM70 digital processor, Yamaha REV5 digital processor, Yamaha SPX90II, (2) Pultec

—LISTING CONTINUED ON NEXT PAGE

NATIONWIDE



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and/or Booking, Contact:

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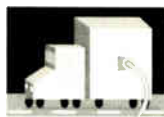
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NORTHWEST Remote Recording



—LISTING CONTINUED FROM PREVIOUS PAGE

MEQ-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 SM87, (32) Shure SM56, Sony ECM-22P, (2) RCA 77-DX, (6) Countryman FET 85 DI, stereo C-Tape, (4) EV RE15. **Monitor Speakers:** (2) UREI 811A Time Align, (4) Auratone, Dolby Surround Encode & Decode System. **Power Amplifiers:** Crown DC-300A, (2) McIntosh MC2100, McIntosh MC250. **Video Recorders:** (2) Sony SLO-323 Beta I, (2) Sony SLHF-1000 Beta, Panasonic PV-1363 VHS. **Video Monitors:** Sony KX-1901 Profeel color, Sony 12" B&W. **Cameras:** Sony 1900 color. **Other Major Equipment:** (34) line-isolated mic splits, (5) Clear-Com stations, 200' 50 amp, 220-volt line, 300' 27-pair snake, 125' 19-pair snake, (150) mic cables. **Rates:** \$1,500-\$2,300 per day, mileage and expenses extra.

KLAY ANDERSON AUDIO INC.; Audio; 4689 S. Holladay Blvd.; Salt Lake City, UT 84117; (801) 272-1814.

COLOSSUS DIGITAL STEREO

COLOSSUS DIGITAL STEREO

MOBILE FIDELITY PRODUCTIONS OF NEVADA
Incline Village, NV

MOBILE FIDELITY PRODUCTIONS OF NEVADA; Audio & Video; PO Box 8359; Incline Village, NV 89450; (702) 831-4459. Contact: Brad S. Miller. **Specialization & Credits:** Credits: founder, Mobile Fidelity Sound Lab, Mobile Fidelity Records and Productions; creator of the Mystic Moods Orchestra and producer/engineer of numerous special effects recordings. Principal in development of Colossus digital audio system with Louis Dorren. Services offered: location/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; and/or 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 library into Colossus format and then to optical hard disk also available. Written information package available upon request.



PACIFIC MOBILE RECORDERS
Carmichael (Sacramento), CA

—LISTING AND PHOTO/LOGO CONTINUED TOP OF NEXT COLUMN

PACIFIC MOBILE RECORDERS; Audio; 2616 Garfield Ave.; Carmichael (Sacramento), CA 95608; (916) 483-2340. Contact: Kat Coffey Hibbard. Vehicles: Mack MS 200 diesel with 26' box, air conditioning, lift gate. **Control Room Dimensions:** A: 18'x7'6". B: 8'x7'6". **Mixing Consoles:** Hamson MR-4 36x24x36 w/VCA grouping (control A), Tangent 3216 24x16x24 (control B). May be used in tandem for a total of 60 mic inputs w/2 discrete 24-channel monitor mixes. **Audio Recorders:** Otari MTR-90 24-track w/autolocator, Sony/MCI JH-110 B14 2-track, Panasonic SV-3700 DAT, TEAC and Yamaha cassette decks. **Noise Reduction Systems:** Dolby 24-channel SR on request. **Outboard Equipment:** Lexicon 200 digital reverb, Lexicon PCM60 digital reverb, Yamaha SPX90, UREI LA-4 limiters, gates, digital delays and distribution amplifiers. **Microphones:** Neumann U87, AKG 414, AKG 451, Sennheiser 421, Sennheiser 441, EV RE20, Shure SM58, Shure SM57, Countryman, Shure and Whirlwind direct boxes, Crown PZM. **Monitor Speakers:** EV Sentry 500, JBL 4313, M&K close-field monitors. **Power Amplifiers:** Yamaha, Crown. **Video Recorders:** Sony VHS-Hi-Fi. **Video Monitors:** Sony. **Cameras:** Panasonic color. **Other Major Equipment:** 72-input snake including: 36-input, 3-way transformer-isolated split, 325' mic/line snake, 65' sub-snakes, 125-amp AC distribution, wired and wireless intercom systems. Truck is pre-wired for additional 24-track. **Rates:** Base rates start at \$1,550. Call for quotes.



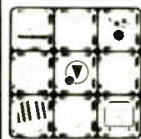
THE PLANT RECORDING STUDIOS
Sausalito, CA

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'x8', lounge: 10'x8'. **Mixing Consoles:** Sound Workshop Series 30, 36x24. **Audio Recorders:** (2) Otari MTR-90L 24-track, (2) Panasonic 3700 DAT, Tascam 122B, additional units available. **Noise Reduction Systems:** Noise reduction interface patch bay for Dolby SR 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 limiter, (2) Dyna-mite gate, additional equipment available. **Microphones:** (20) Sennheiser: 421, 431, 441, (12) Shure: 546, SM53, SM56, SM57, 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, DO54; Sony ECM-23, (3) Countryman, Isomax and more on request. **Monitor Speakers:** UREI 811A, Auratone. **Power Amplifiers:** Phase Linear, Yamaha. **Video Recorders:** Sony 5850, JVC 850. **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. Rover 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, Testament, Paul Williams, Peter, Paul and Mary, Al Jarreau, Les McCann, Robert Cray, Jane's Addiction, Neil Young, Crosby, Stills & Nash, Hawkins Family, Huey Lewis and the News, Miles Davis, Aaron Neville, Exodus, Holly Near, Greg Kihn, The Yellow Jackets, Otmarr Liebert, Joe Satriani, America, Bob Hope, Chambers Bros., Steve Miller, Taj Majal, 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:** 7x14. **Mixing Consoles:** Soundcraft 1624 24x16x24, Rowland Research 8x2 Audio-philie, Soundcraft 200B 16x4. **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-RX 3-head cassette

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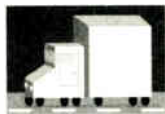
deck, Panasonic SVDA-10 DAT machine. **Outboard Equipment:** Lexicon PCM60, Yamaha REV7, Yamaha SPX90II, (2) Symetrix 501 comp/limiter, Symetrix 511 noise reduction unit, dbx 900 rack w/(4) compressor, (2) parametric and (3) gate, (2) Symetrix 522 comp/limiter, BBE 202R stereo processor, UREI LA-3 compressor. **Microphones:** (2) AKG C-414 EB-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.

RENDEZVOUS RECORDING; Audio; PO Box 353; Gold Bar, WA 98251; (206) 979-1715. Contact: Randy Perrella. Vehicles: Relifted Class-A Motor home. Control Room Dimensions: 20'x8'. Mixing Consoles: Akai MG1214 12x3, Tascam M30 8x4x2, Fostex 2016 line mixer, (2) Shure microphone mixer. **Audio Recorders:** Akai MG1214 12-track, Tascam 80-8 8-track, Sony 7ES DAT, Harman/Kardon HK100M. **Noise Reduction Systems:** (2) dbx 563X, TEAC DX-8. **Synchronization Systems:** Yamaha MSS1. **Outboard Equipment:** (2) Niche ACM (audio control module), Drawmer DL241 compressor, Lexicon LXP5 effects module, dbx 263X de-esser, dbx 1531X equalizer, Aphex Aural Exciter Type C, ART DR-X digital multi-effector/dynamics processor/sampler, ART Multiverb-LT 16-bit digital multiple effects processor, ESS Eclipse subsonic frequency filter, Shure level-lock audio level controller. **Microphones:** Over (30+) microphones from AKG, Sennheiser, Crown, Shure, Audio-Technica, Audix, Electro-Voice, Sony, CAD. **Monitor Speakers:** (2) JBL 4408, (2) Bose 101, (2) JBL/Peavy PA/monitor speaker systems. **Power Amplifiers:** Nikko Alpha II, Kenwood. **Other Major Equipment:** Lexicon MRC MIDI remote controller, Roland CM-32 PCM sound module, (3) computer system: 386-PC, MC68332-BCC, Sun Microsystems Sparcstation 1, Rane SM26 splitter/mixer, Roland S-10 sampling keyboard, Hewlett-Packard 205AG audio signal generator, controlled power/digital equipment AC isolation/distribution system, Korg MR-16 MIDI Rhythm Sound unit. Rates: \$35 per hour (within 100-mile radius of Seattle); additional \$50 per session fee for locations beyond 100-mile radius.

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 ODYSSEY; Audio; 7 Embarcadero W., Ste. #204; Oakland, CA 94607; (510) 465-1757. Contact: Paul Stryer.



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. Contact: Doug McClement. 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:** QSC 1500, (2) BGW 100, (2) Amrcorn 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-pair mic snake, Clear-Corn 2-channel intercom system, SOLA 5kva power regulator cleaner. **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, Oscar Peterson, Jeff Healey Band, Super Dave Osborne Show, live radio broadcasts, telethons, award shows and concerts. Digital multitrack available on request. With over 900 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.

KARISMA RECORDING INC.; Audio; 1565 Iberville, Ste. 203; Montreal, Quebec, H2K 3B8 Canada; (514) 522-0802. Contact: Marcel Gouin. Vehicles: 40'x8'x13'. Control Room Dimensions: 25'x8'. Lounge/iso booth: 10'x8'. **Mixing Consoles:** Mitsubishi Westar 8000 52-input full parametric bar graph, DiskMix automation, Soundcraft 600 40 inputs for up to 92 mic inputs. **Audio Recorders:** (2) MCI JH-24 14" reels 48-track or 24 in-tandem, MCI JH-110B 2-track 1/2" and 1/4", MCI JH-110 4/2-track 1/2" and 1/4", Otari MTR-10-2TC 2-track 1/4" center-track code, Sony 7030 time code DAT recorder and Fostex D-20 time code DAT. **Noise Reduction Systems:** Dolby SR 50 channels, Dolby A 50 channels. **Synchronization Systems:** BTX Softouch 4-machine system. **Outboard Equipment:** (16) Aphex Expressor, Valley stereo de-esser, (2) Aphex stereo Compellor, Valley stereo Dyna-Mite, (4) Aphex 612 stereo noise gate, Lexicon 480L digital reverb, Lexicon PCM70 digital reverb, Lexicon PCM60 digital reverb, Eventide H949 Harmonizer, Eventide H3000 SE, Roland SDE-3000 delay, TC Electronic 2290 sampler, Marshall 5002 time modulator, EXP SP-1 exciter, Sony MUR-201 digital reverb. **Microphones:** Neumann: U87, U47, KM84; AKG: C-414EB, C-451; Sennheiser: MKH-416, MD-441, MD-421; Electro-Voice RE20; Shure SM57; and more Schoeps, Sony. **Monitor Speakers:** (2) Westlake BBSM-10, (2) JBL 4406, (2) Auratone 5C, (2) Studer 2706 (lounge). **Power Amplifiers:** QSC 3500, Studer, (2) Bryston 3B/2B, BGW, (2) Klark-Teknik DN410. **Video Recorders:** Sony/MCI JH-110C-3LB 1" videolayback, JVC 8250U 3/4" VCR, Toshiba DX-900 Hi-Fi VHS w/digital audio processing. **Video Monitors:** (2) Panasonic CT-1350 14", Toshiba 21". **Cameras:** Panasonic color. **Other Major Equipment:** (92) mic line, Jensen transformer 375', MTC computer AC regulator/filter (audio), MTC multitap AC line matching transformers/Focusrites, Eventide H3000, AKG "The Tube" available from our studio facility, second smaller remote packages available. Rates: 24 and 48 tracks, 2 tracks or direct-to-video, call.

SENNHEISER (CANADA) INC.; Audio & Video; 221 Labrosse Ave.; Pte-Claire, Quebec, H9R 1A3 Canada; (514) 426-3013. Contact: Colin Bernard/Julio Solis.

WHITE LINE LOCATION RECORDING LTD.; Audio; 1052 E. 61st Ave.; Vancouver, B.C., V5X 2C4 Canada; (604) 325-2595. Contact: David Kell. Vehicles: 35' Ford bus, chassis divided into audio control room and lounge/live announcers booth. Control Room Dimensions: Control room: 7.5'x15'. Lounge/live announcers booth: 7.5'x11. **Mixing Consoles:** Soundcraft TS-12, Soundcraft 200. **Audio Recorders:** Otari MTR-90 24-track, Otari MTR-10 1/2-track, Revox B77 1/2-track, Tascam DA-30 DAT, Sony F1 EIAJ processor, Nakamichi 581 cassette. **Synchronization Systems:** Lynx TimeLine. **Outboard Equipment:** Lexicon, Valley, Roland, Loft, DeltaLab, ART, Audio Logic, Audioarts, etc., anything you want by arrangement. **Microphones:** (2) AKG 414, (2) B&K 4006, (4) AKG 451, (3) Sennheiser 441, (2) Sennheiser 421, Sennheiser 431, (4) Beyer M160, radio and other mics by arrangement. **Monitor Speakers:** S.O.T.A. 250, Yamaha NS-10, PSB Passif II. **Power Amplifiers:** Bryston 4B, SAE Mark XXXB, Telefunken. **Video Recorders:** Sony Beta Hi-Fi, Toshiba VHS Hi-Fi, 3/4" available by request. **Video Monitors:** Toshiba CX474C RGB/NTSC. **Other Major Equipment:** Jensen 36-channel transformer splitter, on-board maintenance facilities, climate controlled, cellular and fax equipped. Rates: Please call. **Specialization & Credits:** We provide location recording and live broadcast services ranging from direct-to-2-track for classical and jazz with an in-hall setup, to 24-track analog for television, film and larger recording projects with our new 35' mobile. We can provide up to 48 tracks if required. Although White Line is a new company, our crew has mobile experience that includes live production featuring Kenny Rogers, Sheena Easton, Chilliwack, David Foster, Vancouver Symphony, Michel Petruccianni, Anthony Davis, World Sax Quartet, numerous classical ensembles, etc., and we have provided services to C.B.C., C.T.V. television network and the National Film Board. Our specialty is providing our clients with intelligent, experienced service. We can provide complete audio production planning/technical direction and engineering and production for your projects anywhere in Western Canada. Our mobile has been designed to provide a good sound with a controlled acoustic and to give you a comfortable place to be and work while you're on location. We make a difference.

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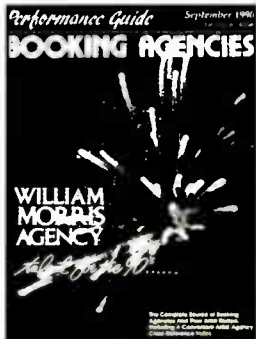
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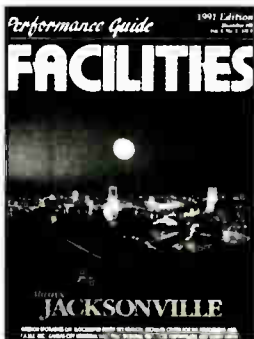
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—FROM PAGE 60, SOUNDCHECK

parametric EQ. The company also showed the FDS-318, a quad two-way, dual three-way or dual four-way device. Also under the AKG banner is dbx, who announced the availability of the 363X, a half-rack, dual-channel noise gate. Lexicon (Waltham, Mass.) showed its Acoustic Reverberance Enhancement System, or LEARS. Using the company's 480L signal processor, microphones, speakers and proprietary software, the system can change the reverberant character of the listening space. Peavey debuted a number of new items, including the HDL 1000 multitap audio delay line, a 2-in, 3-out device with a 20.8-microsecond minimum delay increment. Summit Audio's (Los Gatos, Calif.) tube compressor/limiter has found a place in many touring racks. Joining it soon may be the company's new dual-channel unit, the DCL-200, which also sports variable attack, release and slope controls. Symetrix (Seattle, Wash.) showed a new crossover and quad expander/gate. The 524E crossover can function as a dual two-way or mono three- or four-way unit. The 564E is a frequency-sensitive 4-channel expander/gate.

Odds and Ends

The PA-422 machine control standard (see *Mix*, September '91) has been approved, with the AES Working Group on computer control now turning its attention to a more sophisticated successor. After a thorough survey of existing networking systems, three options were presented at a meeting of interested companies. Intelix's (Madison, Wis.) MindNet, Lone Wolf's (Redondo Beach, Calif.) MediaLink and Echelon's (Palo Alto, Calif.) LonWorks were cited as viable options, and a December date was set for determining criteria for an eventual selection. Speaking of computer control, Stage Accompany of the Netherlands now has domestic distribution for its full line of computer-controllable amplifiers, outboard gear and loudspeakers. Based in Rego Park, N.Y., Stage Accompany USA should help the

company continue improving its U.S. footing.

Last but not least, let's talk digital snakes. Digital audio snakes don't necessarily mean fiber-optics, according to BEC Technologies (Orlando, Fla.), whose system can run 16 audio channels over ruggedized twisted-pair cable or 128 channels bidirectionally over fiber. The company is hard at work with touring companies who may give the system a spin soon.

SR Shorts

Still time to make plans to attend the hands-on Concert Sound Reinforcement Seminar following the January NAMM show. Instruction will be provided by representatives of top touring sound companies. The not-for-profit, three-day seminar costs \$650. For information contact SYN-AUD-CON at (812) 995-8212 or fax (812) 995-2110. Recent OAP installs include a FR-112 portable system for the city of Baltimore, delivered by R&R Audio (Towson, MD), and a four T-122/two T-118 loudspeaker

system was put into the Attractions Nightclub in Rock Hill, SC, by local rep Paragon Productions...The Big Apple Circus went looking for a system capable of providing 320-degree coverage. They also wanted to avoid using subwoofers, as the likely locations for their placement tend to accumulate cotton-candy and soda. "You can't believe what that does to your subs," says house engineer Rusty Richardson. GDS Productions (Glen Head, NY) provided 16 RS-2 PAS coaxial cabinets, which were hung without impairing sightlines or aerial acrobatics...Edwards Technology (El Segundo, CA) installed 96 QSC amps and EV loudspeakers at Queensland, Australia's Warner Bros. theme park...Eighth Day Sound (Cleveland, OH) is out with Squeeze on a month-and-a-half national tour. Equipment includes a PM3000, 24 TMS-3s, and eight TWS-124 speakers, Crown MA2400IQ amps, and a Soundcraft Series IV 40-input monitor console. ■

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—FROM PAGE 70, YUMING

in detail how much continuity I have. I've learned so much by getting that kind of time in that kind of laboratory: the real world."

"We do full SIM at every show, from soundcheck through to the final encore," says Takemori. Meyer Sound's own SIM squad is represented (by McCarthy or Takemori) at the larger venues on Yuming's tour: Yokohama, Osaka, Nagoya and twice in Tokyo. Takemori speculates that it is at least partly a matter of the Japanese culture: "It is very prestigious to have people from the American manufacturer come to the show. They also have representatives from Varilite of Texas, and this year some of the tracking was brought out from Hollywood. Yuming is the biggest act in Japan, so she'll bring 'em all."

Speaker configurations vary slightly with the shapes of the arenas: "Some are deeper, some have very high seating," says Akio Kawada, vice president of Sound Craft (not to be confused with the console manufacturer), Yuming's sound contractor. "We design the speaker system and then we send the maps to Bob, who advises us regarding the vertical and horizontal [arrangement]. For the deeper halls we sometimes have delay speakers." Meyer UPAs are used for the delays.

Sound Craft has been with Yuming since she was a solo piano act. According to McCarthy, "Yuming was the first client to use Meyer Sound speakers in Japan—UPAs, MSL-3s and MSL-10s. She was also the first one to use SIM there."

Kawada has been designing Yuming's concert sound systems for 11 years. His first systems suffered from distortion problems. "Yuming's show, like rock 'n' roll, needs very

points in the house. Proprietary hardware isolates the measurement system to prevent ground loops and related problems while allowing the SIM engineer to compare the signal

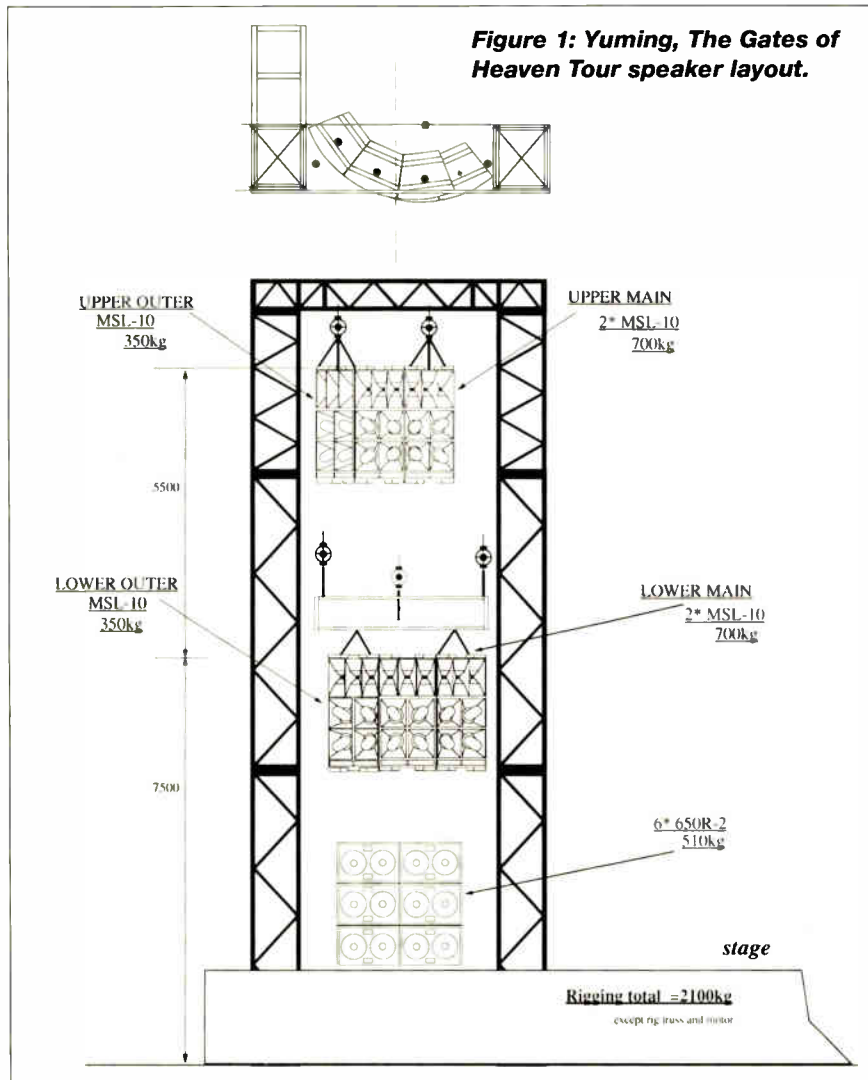
coming from the mixing console (after the CP-10 program equalizer) to the sound coming out of each speaker subsystem. There's a CP-10 and a delay line for each speaker system, allowing the SIM engineer to compensate for irregularities in frequency and/or phase response; the goal is uniform coverage of the entire audience, so that everyone hears exactly what the mixing engineer hears.

"Uniform coverage is easy to say and very difficult to do," McCarthy says. "Halls are not all shaped the same; you can put in a standard array, but you've still got to configure it. How far does each speaker have to throw?"

Making that array into a uniform coverage device is not an artistic decision, it's a scientific one.

"We're no longer in the days of eight-channel boards," McCarthy concludes, "when you could set the mix and then go walking through the audience to check it out. We're talking about extremely complex systems. Engineers can't get two feet from that board, because they've got the artistic job of mixing the house and a lot of technical stuff to attend to."

Oakland, California-based David Gans is the host of the nationally syndicated radio program The Grateful Dead Hour, and the author of several books on music.



high power," Kawada explains. "The musical director [Masataka Matsutoya] wanted accurate, precise sound and low distortion. My staff and ATL [Acoustical Technical Laboratories, now Meyer's Japanese distributor] staff came to visit Meyer Sound, heard the MSL-3, and came back to Japan saying it was wonderful—so I ordered them without having heard them."

The CP-10 parametric equalizer, an essential component in Meyer's SIM system, found a home in Yuming's P.A. system as the program equalizer, replacing the standard 1/3-octave graphic.

The SIM system for Yuming's most recent tour consisted of eight B&K microphones at appropriate

LUNCHING WITH BONZAI

—FROM PAGE 98, SWEDIEN

to-disc. We had a traditional control room, with a console and two record lathes. When tape came along, it was wonderful. So I've been through it, and I welcome change. Also, I'm an equipment junkie.

Bonzai: What's the hardest part of being an engineer?

Swedien: The hardest part of being an engineer/producer, because they both fall into the same category, is to be willing to give of yourself to the project. To commit totally to what you are doing. And there *are* things you have to give up, like free time. [Big laugh]

But you get out of it what you put into it. I've been lucky with Bea. We were married very young and grew up in the business together. Everybody knows her. She's been a big help in my work. Even long ago when I was doing all-nighters with Basie, we'd get a babysitter and she'd come to the studio. Joe Williams would have her writing out lyrics for him.

Bonzai: How did you meet Quincy Jones?

Swedien: It was the late '50s. I was 23 and Quincy was 24, and we were at Universal in Chicago. Quincy was vice president of Mercury Records and was writing the arrangements for Dinah Washington. Jack Tracy was producing, and I was recording. Then we recorded Sarah Vaughan and many other artists for Mercury.

Bonzai: Why do you think you two hit it off so well?

Swedien: I don't really know, but Quincy and I are a lot alike in many ways. Our tastes in music are similar, and we think alike. And we have a lot of fun together. Quincy is a wonderful companion in the studio. He's got a zillion jokes. And we're friends, which is built on mutual respect.

Bonzai: You worked on *The Wiz* with Quincy, didn't you?

Swedien: Here's how it happened. I recorded one Pizza Hut commercial too many [Laughs]. And I called Bea and told her I'd had it in Chicago. I wanted to go to L.A. This was 1975, and I had made 14 trips to Los Angeles that year working with Quincy. So Bea started packing, and we moved out in '76. Stayed a year and I got homesick. We moved back to Chicago in '77, recording commercials, and I knew it wasn't working out. I called Quincy and said, "Help—you gotta get me out-

ta here. I made a mistake." He phoned back an hour later and said, "Guess what? We're going to New York to do a movie called *The Wiz*." Quincy and I ended up living together for a year and a half at the Drake Hotel. He was in charge of food and wine, and I was in charge of laundry.

Bonzai: It sounds like "The Odd Couple."

Swedien: Yes, but there wasn't a neat one. We were both messy, but I guess I'm neater than Quincy. This was one of the happiest times of my life. You'd look up one moment and there'd be Billy Eckstine. Then Miles Davis. Dizzy Gillespie. We had a ball. Poor Bea was back in Chicago, trying to figure out where we were going to live. I was finishing up *The Wiz*, and Bea got things set up again in California.

Bonzai: You have your own studio now—do we call it a project studio?

Swedien: I'll tell you what it is, and you decide what to call it. We've got a ranch near Santa Barbara, and I put up a building that looks like a little chapel: combination recording room and screening room. Designed it myself, and had some help from Peter D'Antonio. I've got an RPG Acoustics back wall. Beautiful, vintage Neve desk—rebuilt and spiffed up. It's a dream studio really—a room that reproduces a 30Hz full wave. As a result it got a little large—35 feet long.

Bonzai: What's your prediction for the future?

Swedien: Well, I used to love the graphics you got with an LP, and I think we've taken a giant step backwards with cassettes and the CD package. With this new digital compression coming along, I think we're going to have some great electronic graphics—just think of the visuals we'll have to go along with the music. Something really slick is coming. Maybe a hologram will pop out of your CD. And maybe with Cinema Digital Sound we'll have SMPTE and MIDI tracks to set off special effects in the theaters, all sorts of things.

Bonzai: So here we are, you've been inducted into the Hall of Fame, but it doesn't sound like you're ready to pack it in.

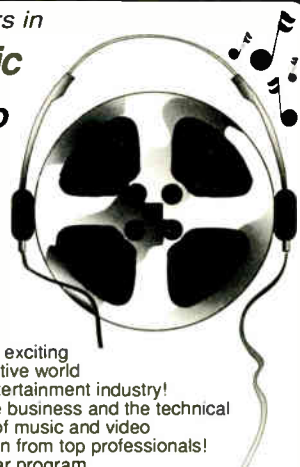
Swedien: Shoot, I'm just getting organized! ■

Roving editor Mr. Bonzai cordially invites all of you to lunch next Tuesday at 12:15 at the Tail O' the Pup on La Cienega.

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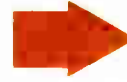
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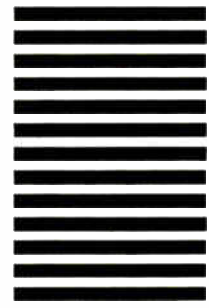
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FEEDBACK

Capitalism 101

Are audio engineers overworked and underpaid? Ken Pohlmann presented and analyzed this question as a "people" issue in the October '91 issue of *Mix*. He talked about minimum wage pay scales for jobs that require highly skilled, strongly motivated individuals. He talked about the long hours and the low benefits. He talked about the apparent injustice of it all.

These are the very conditions that have caused most of my University of Miami comrades (Class of 1980) to leave the profession of audio engineering. Many of us are still connected to the industry in one way or another. Some have walked away after a year of two of "paying their dues" and never looked back. I believe that all of us are very sympathetic to the issues Ken has raised. Nevertheless, it seems inaccurate to frame these issues as "people" problems. These conditions are caused by simple economics.

Wall Street calls it capitalism. This is the way price levels, including the price of labor, are set in our economy. When demand exceeds supply, prices are bid up. When supply exceeds demand, prices begin to tumble.

On the supply side of the equation, labor resources have always been abundant. Studio managers receive hundreds of resumes each year for perhaps one or two possible job openings. Competition is always a good way to keep prices down.

On the demand side of the equation, you have to measure two factors: a studio's *desire* to bid prices up for high-quality labor and the *ability* to pay these prices. Unfortunately, most studios must devote the lion's share of their funds to the purchase and upkeep of equipment. In 1991, very few music stu-

dios generate the type of revenues that support state-of-the-art technology along with high pay scales, pension funds and healthcare benefits. Even if studios have the desire to increase wages, lack of ability to fund these increases will keep demand from driving prices up.

This combination of expanding supply and stagnant demand has created the existence of minimum wage positions for highly skilled technicians at small, cash-poor studio businesses. (These businesses may be worth millions, but those dollars are not in the bank, they're in the equipment!) Back in "the good old days," aspiring engineers obtained valuable technical skill through in-house apprenticeship programs. The deal was fair: Studios provided a unique training opportunity, and in return candidates worked at menial tasks for a nominal wage in order to receive this training. Now the deal is very lopsided: Candidates receive up to four years of extensive technical training from programs like Miami's, yet studio owners still bring these apprenticeship terms to the bargaining table—they offer minimum wage salary in exchange for giving highly skilled technicians the opportunity to "pay their dues." This is capitalism at work. Uncle Ken...not justice. Sally Dorgan Potts
Jam Creative Productions
Dallas, TX

ANSD Responds

I would like to take this opportunity to clarify the record regarding Myers 3-D Audio and the work of Pete Myers discussed in the article "Psychoacoustic Satisfaction" (Oct. '91).

The system being used by Myers is not the one for which a patent was granted; nor is it "his" system in regards to its ownership. US Patent 4,817,149 (Three Dimensional

Auditory Display Apparatus and Method Utilizing Enhanced Bionic Emulation of Human Binaural Sound Localization), issued on March 28, 1989, and for which Myers is the inventor, is owned by American Natural Sound Development Co. American Natural Sound has not given Myers permission to use the patented system.

Myers was once affiliated with the predecessor company to American Natural Sound when it was located in Los Gatos. But things change, and Myers currently has no involvement with the company other than a minority ownership interest.

Ralph Schaefer
American Natural Sound Development Co.
Oroville, CA

Not Hot on The Peppers

For the most part, your magazine is interesting and very informative. However, in your October 1991 issue there is one article that I was very disappointed in: "Red Hot Chili Peppers—Some Like it Hotter," by Mr. Bonzai.

In short, the article disgusts me. I did not learn anything from this article other than the fact that the Red Hot Chili Peppers are a bunch of immoral, disgusting, slimy creatures. This article does not contain the type of information I would expect to find in a professional recording magazine.

Robert Moyle
Enterprise, UT

Correction: In our 3-D Audio article in October '91, the producers of the "Rocketeer" audio cassette were incorrectly identified. George Morency was executive producer; Ted Kryczko, producer; George Charouhas and Randy Thornton, associate producers; Mr. Charouhas, principal engineer.

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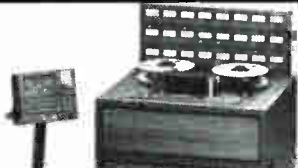
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It's designed to withstand the rigors of the road. The frame is immensely strong, built to prevent twisting. Handles run the length of the console to make it easy to lift. Multiway connectors are recessed to reduce strain, mounted to resist damage.

The smallest detail has been scrutinized. The knobs, for example, combining "grippability" with style so ingeniously, we patented them too. No dual concentric controls on the entire console — you won't tweak the wrong thing. All switches are illuminated or associated with LEDs.

Europa combines superb design and audio quality with value for money. Without compromise. A full eight groups plus mono and stereo buses, twelve aux sends, matrix sections with external inputs for additional submixes and eight stereo inputs are standard. Full VCA facilities with non-destructive soloing and multiple assignment. You can even continue a soundcheck while playing a CD to the audience. And fade the entire console on one fader. If you've always wanted something on a live sound console, it's probably on the *Europa*. You asked for it; we put it there.

Now you need to listen to *Europa*. Try it out. Experience a level of sound quality that you'd usually associate with a digital studio. Hear why *Europa* is in a class of its own — virtuoso class.

Europa. Between us, we've designed the best.

Soundcraft

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