

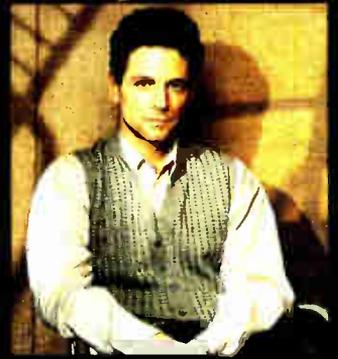
MIX

FILM SOUND SPECIAL

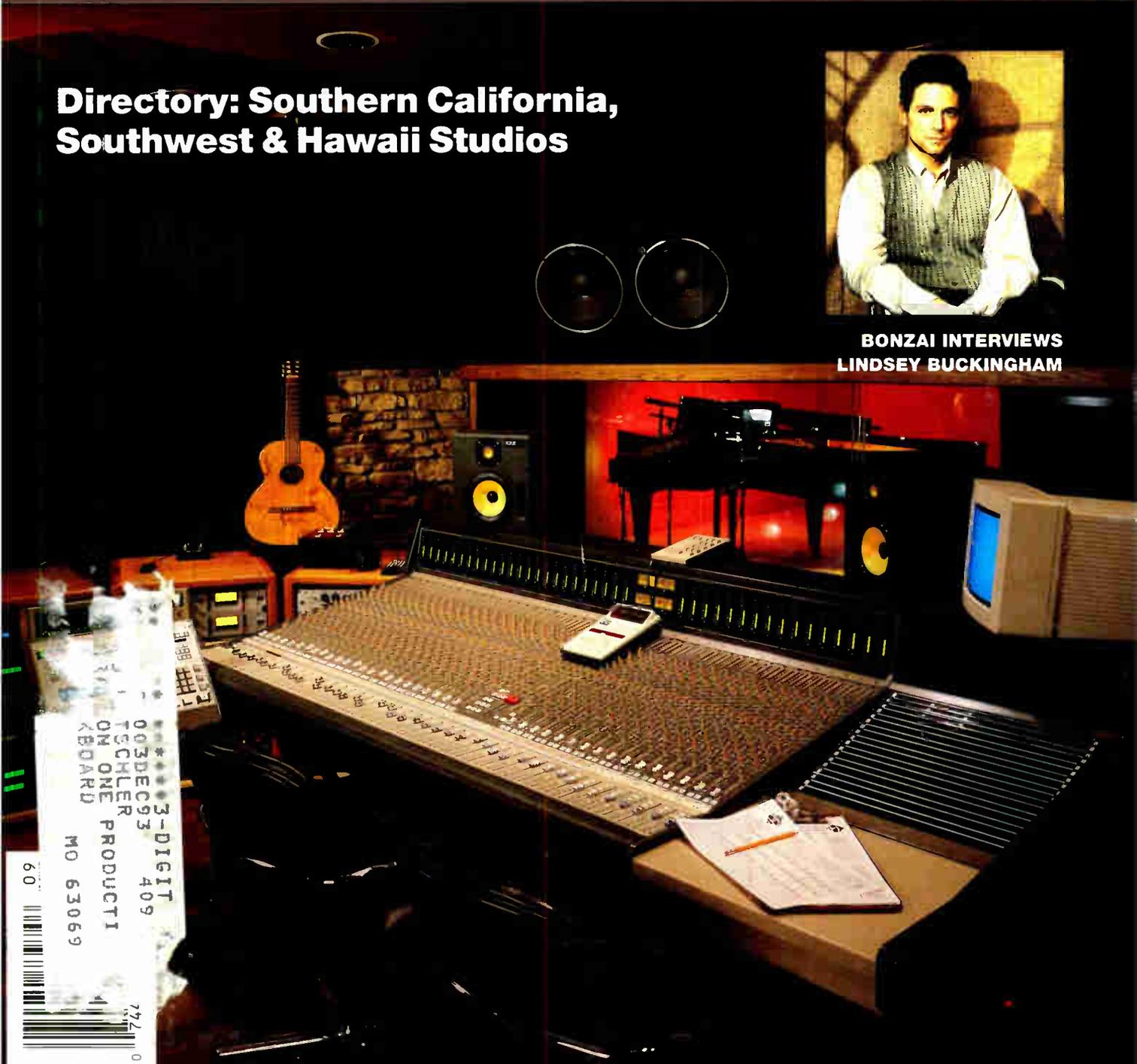
- Time Code DAT in Production
- Post Pioneer James G. Stewart
- Digital Film Sound Formats
- Capturing Dialog for Robert Altman

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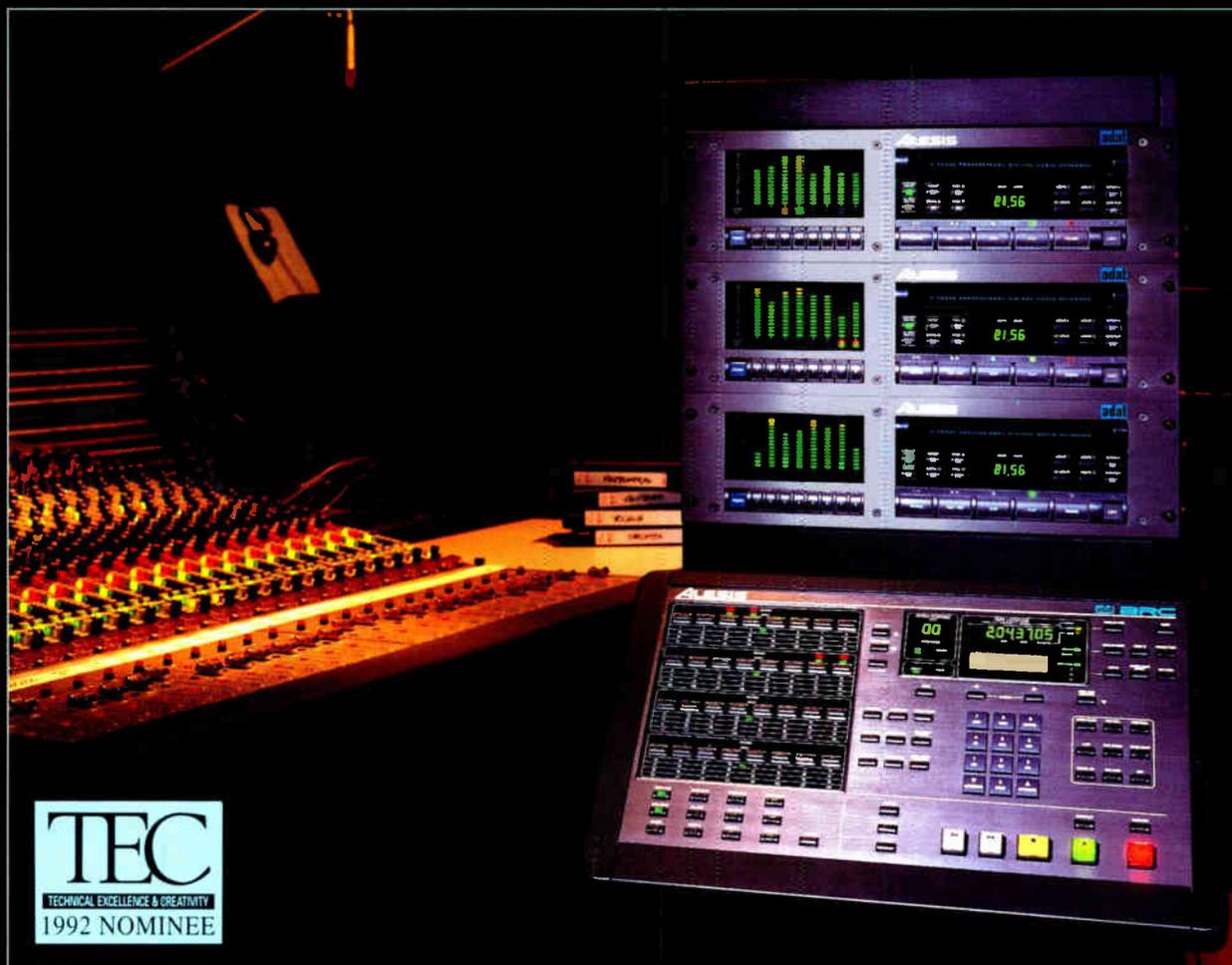
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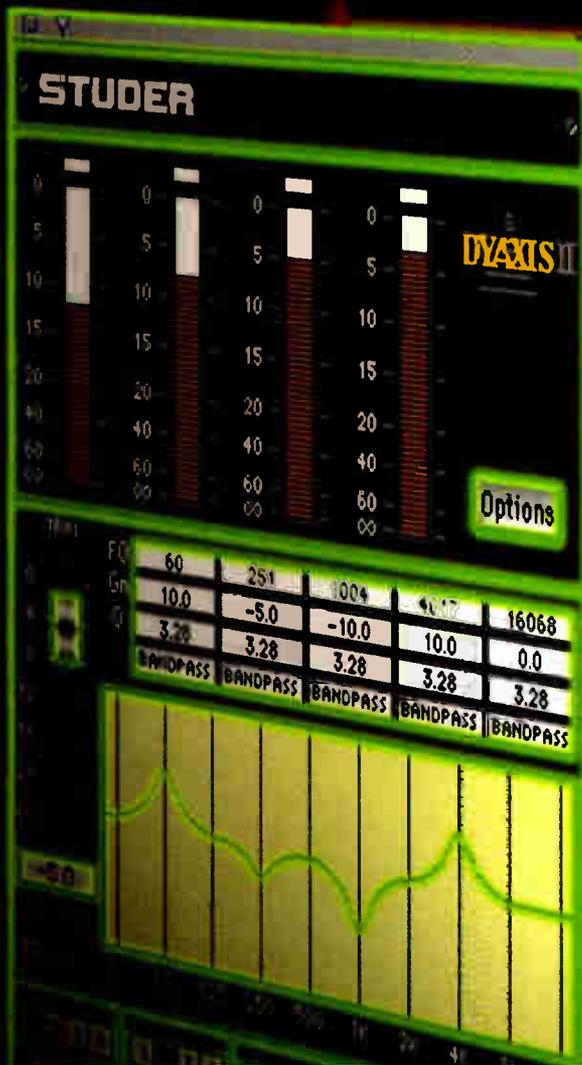
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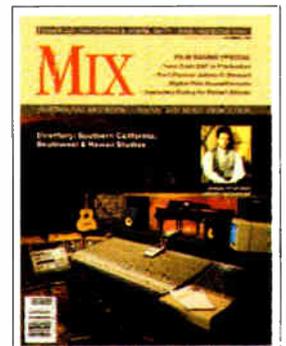
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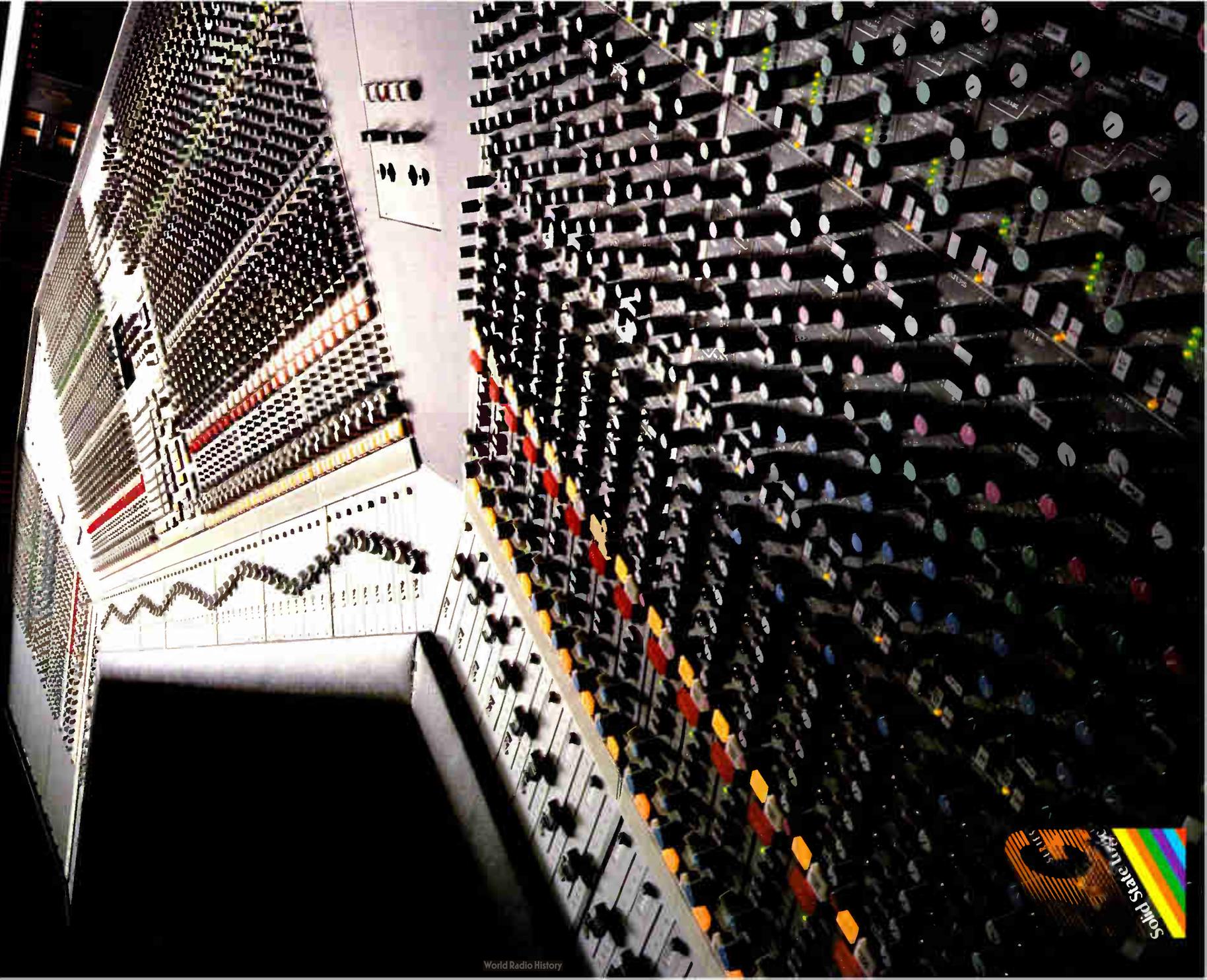
Cover: Pedernales "Cut N' Putt" Recording Studio, located in the country club of a championship golf course overlooking the Pedernales River in Spicewood, TX, is the facility where Willie Nelson cut many of his hits. The renovated studio features a 40-input Tascam M-700 console with moving fader automation, interfaced with a 24-input, vintage Neve 8024 console; 24-track analog and digital recorders; and custom TAD monitors by Steven Durr.
Photo: Greenwood/Van Ozdal.

DIRECTORY

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World Radio History

FROM THE EDITOR

“You had big crews in those days, six or seven men just for sound,” recalls film sound pioneer James G. Stewart of the days when the talking picture was making its first appearance on the silver screen. “In some cases the production mixer’s power on the set rivaled the director’s. Recordists were able to insist that cameras be isolated in sound-proof booths and even had the authority to ‘cut’ a scene in progress whenever they didn’t like what they were hearing.”

Certainly when sound was new to the film medium, those who could craft it had a special significance to the creative art form. Their stature gradually subsided as directors rebelled against the artistic restrictions these new requirements of sound presented. In the process, however, the demands from the filmmakers to the sound people “brought about improvements in both recording technique and equipment, such as directional microphones and better booms,” says Stewart.

For many years following those early talkies, sound by and large stayed out of the way (with a few notable exceptions, such as the work being done at RKO Studios). Audio quality gradually improved as theaters were able to upgrade their playback systems, Foley and sound effects became more important, and music emerged to play a larger role in film. Then Dolby Stereo burst onto the screen in the 1970s, and sound once again became a power player, spurred on by the sensory-loading styles of directors such as George Lucas and Francis Coppola. Their commitment to audio’s critical importance in film paved the way for the era of the sound designer, a title that still rubs some people the wrong way two decades after its introduction. Nobody, however, disputes the impact of sound on picture.

Truly the status of the film sound engineer has returned to its high-profile roots. But more than a creative opportunity, it is today a serious marketing demand, driven by CD-literate moviegoers who won’t settle for less than wide dynamic range and high-fidelity surround sound. To make matters trickier, points out Tomlinson Holman (Mr. THX), eight different and incompatible systems to supply digital sound to motion picture theaters have sprung up in the past several years.

Making sense of where we are in film sound isn’t as easy as reading a marquee, but perhaps some of this month’s film sound editorial focus will put the situation in perspective for those of you in the sound-for-picture world.

Also this month, you’ll find a format change in our directory section, to make our listings easier to read and extract the essential information. We hope you like the changes.



Keep reading,

David Schwartz
Editor-in-Chief

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David Schwartz and Penny Riker Jacob

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NED UPDATE

First, to clear up some misconceptions. New England Digital, makers of the Synclavier and PostPro recording and editing systems, has shut down operations and released its employees, but they did not default on a \$3.6 million loan to Bay Bank of Boston. The bank foreclosed on June 16, two weeks before payment was due. All indications are that NED management knew the foreclosure was coming.

And, the four parties that initially expressed an interest in purchasing the assets of the company are not "bidders," as we referred to them last month. They have simply "expressed an interest in the future of the company," we are told.

As of press time, two of those companies are no longer involved in negotiations. Fostex Corp., which was rumored at one time to have all but purchased the company, and Harman International, which many speculated would purchase the patents and copyrighted software, are no longer interested, according to Bay Bank sources. That leaves the Synclavier Owner's Consortium and an unnamed party.

Meanwhile, three regional groups of the "Synclavier Owner's Consortium" have re-formed—in New York City, Chicago and Los Angeles—in an effort to keep users informed and their equipment maintained. Each of the three groups has hired a full-time technician, each a former NED employee. Local users put in "\$100 per tower, \$200 for the first tower," according to David Klein of RMI, representative for the New York group, and in return they get priority service and an attractive hourly maintenance rate.

"We hope to hire a second tech in each location," Klein says, "and

we may have Nashville involved soon as well. Since the announcement in June, we have really seen a cooperative spirit among active users across the country."

East Coast Synclavier and PostPro owners who need more information on the Consortium's plans should call Mike Thorne at (212) 929-2675; West Coast owners call Bruce Nazarian at (310) 478-8060; Midwest owners call Terry Wellman at (312) 649-9000.

FIRST PUBLISHED DRAFT OF AVID'S OMF PROPOSAL

The formal publication of Avid Technology's Open Media Framework proposal for data exchange between digital audio workstations and editing systems took place on July 27. According to Mack Leathurby, Avid audio product manager, a formal meeting of the several dozen audio and video firms—known as Partner Participants—is scheduled for late September. "At that time, OMF's various technical and operational proposals will be discussed and revisions will be suggested," Leathurby explains. "Final publication of the Open Media Framework is still scheduled to occur this fall." For more on OMF, see this month's "Byte Beat" on page 35.

ORANGE COUNTY MEDIA CENTER TO OPEN

The Orange County Media Center, a new complex designed for film, television, radio, telecommunications, multimedia and related businesses, has announced plans for a January 1, 1993, opening. The intent is to provide a permanent location for businesses and professional associations, while maintaining a showplace and activity center for media events, conferences, meetings and seminars. Plans call for a permanent exhibit

floor to display manufacturers' products and educational activities, and it will contain a media and broadcasting school.

The complex will include a multiproduction three-camera studio with online edit bays, a recording studio, multimedia and graphics stations, a software library, and scanning, color proofing and prepress facilities.

The O.C. Media Center is located on McCabe Way in Irvine. For more information, contact Dan Fields at (714) 851-6262.

AMERICAN FILM INSTITUTE TECHNOLOGY PROGRAM

In celebration of its one-year anniversary, The American Film Institute-Apple Computer Center for Film and Videomakers appointed Harry Marks (Marks Communications Inc., Los Angeles) its creative director and formed the Advanced Technology Council. The Council will serve as a "support group and forum for the exploration and development of advanced technologies for the moving image arts, including computers, HDTV, interactive media and telecommunications," according to a company release.

The AFI-Apple Computer Center was made possible by a grant from Apple Computer and donations from more than 90 companies. Activities and programs focus on the computer's role in every aspect of film and television production—from budgeting and scheduling to special effects and set design. It is located in the Warner Building on the AFI campus in Los Angeles. For more information, call Nick DeMartino at (213) 856-7690.

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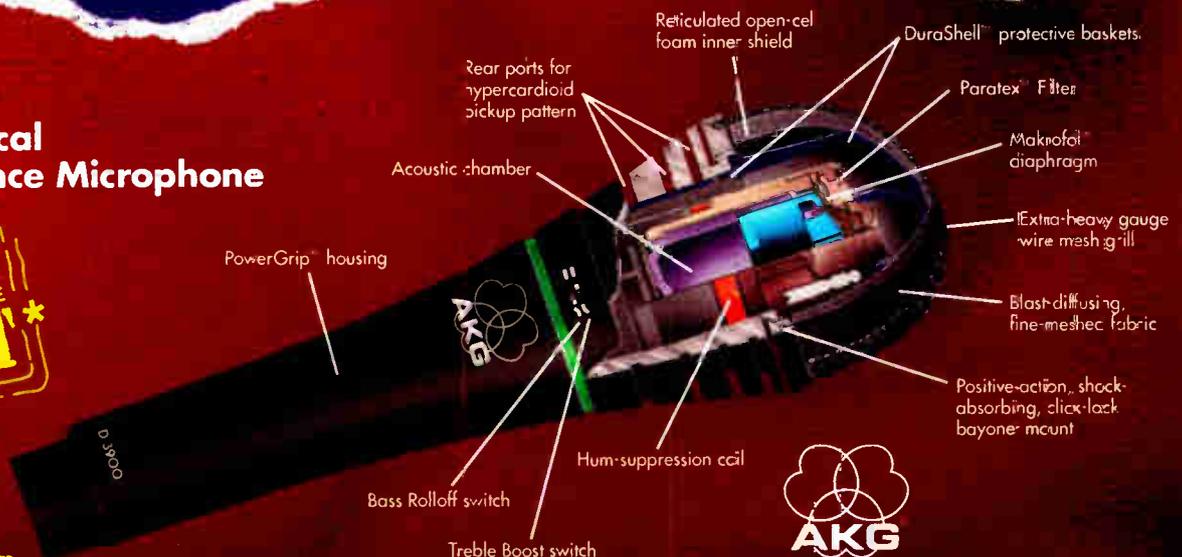
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INDUSTRY NOTES

Studer Revox Canada Ltd. promoted **Prodromos Constantinou** to general manager for the Toronto-based division. Constantinou, previously manager of sales/engineering and special projects, is now responsible for sales, engineering, service, personnel and marketing...**Micro Technology Unlimited** (Raleigh, NC) appointed **Michael Stierhoff** director of marketing. Stierhoff will help implement a new marketing program designed to reach potential MTU direct-to-hard disk customers. New **MicroSound DAW** developments include software and hardware for audio post, recording studio and mastering clients...**Quentin R. Nelson** was named national sales manager for **FOR.A Corporation of America**. He will direct sales and marketing efforts for the company's pro audio and video products from headquarters in Natick, MA...**Pacific Recorders and Engineering Corporation** of Carlsbad, CA, announced a joint venture with the German company **Thum + Mahr Audio GmbH**. They formed **Pacific Recorders Europe**, which can be reached at 02173/78060 (phone) or 02173/81497 (fax)...Seattle-based **Symetrix** welcomed **Walt Lowery** to the customer service and information department...**Barry Diamant Audio** (Riverdale, NY) appointed **Allen Geauer** intergalactic ambassador of marketing, which we can assume is a new position...**UCLA Extension** now accepts enrollment through electronic mail. The school's Internet mailbox is Enroll@Unex.ucla.edu. Full details of the procedure are in the Extension's summer-quarter catalog (call [310] 825-9971 for a copy)...A new company that specializes in maintenance and overhauls of Sony professional DAT recorders, **NXT Generation**, was formed in Greendell, NJ.

NXT Generation may be phoned at (201) 579-4849. Their address is 249 Kennedy Rd., Greendell NJ 07839...Westbury, NY-based **Korg Pro Audio** named two new dealers for its random access digital audio production system, **SoundLink**. **Sam Ash Professional Audio** covers the New York area, while **LD Systems** handles southern Texas...**Pioneer Electronics** (Long Beach, CA) changed the prefix of all employees' direct telephone numbers. The area code remains (310), but prefixes were changed from 816 to 952...**Burlington Audio/Video Tapes** of Oceanside, NY, is celebrating its 22nd year in business...**KAT's West Coast** sales and marketing office relocated to 50-066 Calle Rosarita, La Quinta, CA 92253. New phone number is (619) 564-8618; new fax is (619) 564-8619...**Tektronix Inc.** (Beaverton, OR) is hosting free seminars across the country this fall to train attendees in oscilloscope and logic analyzer test and measurement techniques. For further information, call (800) 426-2200, ext. 579...**Jan Hebel** is a new field sales representative at **AFA/Martin Pro Audio Group**, a division of A.F. Associates Inc., in Northvale, NJ...**Schumacher Communications Group** (Van Nuys, CA) acquired the equipment assets and customer base of **Visual Dynamics** (Santa Ana, CA)...The **Audio Engineering Society** will hold its 93rd convention in San Francisco, October 1-4...The **CyberArts International** conference will be in Pasadena, CA, from October 29-November 1. For more information, write to **CyberArts**, 600 Harrison St., San Francisco, CA 94107; or call (415) 905-2496, fax (415) 905-2232...We are sad to announce that **Jenny Blackwell**, owner and studio manager of **Soundtrack Inc.** of North Miami, FL, passed away on July 16, 1992. ■

—FROM PAGE 12, CURRENT

industry from around the world will gather in Newport Beach, Calif., next July 29 for a three-day economic summit on the trends and issues affecting the worldwide industry and shaping its future.

Of special significance will be the Summit's emphasis on music education, a longtime National Association of Music Merchants commitment. "The key to developing the next generation of music makers is for our industry to get behind music education in every country where we have a presence," says **Barry Linkin**, NAIMM president. "That's just good economic sense."

CONVENTION NEWS

The **Audio Engineering Society** will host the 93rd AES convention in San Francisco, October 1-4. Contact the AES at (212) 661-8528. On October 2, *Mix* will sponsor the eighth annual **TEC Awards** at the **Westin St. Francis** in SF. Call (510) 939-6149 for more information.

For those New Englanders who can't make it to San Francisco, **Parsons Audio**, Wellesley, Mass., is hosting a **Digital Audio Conference** from September 14-16. For a schedule of events, call (617) 431-8708.

NAB Radio takes place this month, from September 9-12 at the **Convention Center** in New Orleans. Call (800) 342-2460 for registration information.

More regional notes: The **Society of Broadcast Engineers**, Central New York Chapter, is hosting a regional convention September 25 at the **Sheraton Inn Convention Center**, Liverpool, N.Y. For more information, call **John Soergel** at (315) 437-5805. ■

CORRECTION

In our May Northeast Studio Directory for **Gregmar Studios**, Eatontown, N.J., we left some equipment out of the facility's expanded MIDI suite. **Gregmar** has a **Roland U220**, **D550**, **S550** with monitor and 80MB hard drive, **Yamaha TX802**, and **Alesis D4** drum module. ■

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Ambience



Phase Shifter



Stereo Pitch Shifter



Stereo Flanger



Multi-Band Chorus



Vocoder



Delay



Rotary



Reverb

Yes, that's right. You too can become a schizophrenic.

All you have to do is buy an RSP-550 Stereo Signal Processor and follow these instructions. The possibilities are limitless—you can become 10, 20, even 30 different personalities—so read on and read carefully.

You can choose from as many as 39 personalities (algorithms). The somewhat disturbed illustrations to your left are examples of but 9 of them.

Technically speaking, these algorithms are as follows: (Please excuse us as we lapse into our decidedly multifaceted personas here. It can't be helped.)

1. The Delay algorithms range from

duces warm tube amp-like distortion.

5. When combined with Roland's pioneering high-definition chorus effect, the chorus algorithms sport innovative effects such as Multi Band Chorus. This particular effect features two separate stereo or four separate mono bands, each with its own adjustable parameters. With the Penta Chorus algorithm, the input signal is divided into different frequency ranges, with each range independently processed so that you'll experience the most subtle or radical sound.

6. The Phase Shifter also has independent left and right channels and provides a 12-stage phaser per channel.

7. The RSP-550's Reverb has the

pitch shifters simultaneously each with a four octave range.

There are 30 more algorithms where these came from, but more on this later.

One of the truly cool things about the RSP-550 is the true stereo ins and outs that both create spacious-sounding stereo effects and retain the integrity and panning of the input signal.

No doubt that by now you've already guessed that this machine is for serious users only. This is because only serious users will quite know what to do with a dynamic range of 95dB coupled with a frequency response of 15Hz-21kHz and a THD of 0.02 or less. Not to mention signal processing

Now, just about anyone can become a schizophrenic.



simple single-line to genuine stereo and multi-tapped delays featuring up to eight independent delay lines, with up to 2700 ms of delay time each. With the RSP-550's Tempo Delay function, you can automatically assign the delay time according to, believe it or not, tempo. Or, if you'd rather, you can simply tap in the delay time.

2. The Stereo Flanger can be used for bi-flanging effects or independent left/right flanging.

3. Ambience is an effect that simulates the pickup from an ambience microphone and may be further modified with the Edge Expander function to emphasize the attack of a sound. It lets you create a realistic "presence," for instance, with the ambience of a recording studio or small club.

4. The Rotary algorithm delivers a detailed simulation of the distinctive rotary speaker sound—complete with independent rise/fall times for the horn and rotor. An Overdrive parameter repro-

duces high-density spaciousness that acoustic environments create as well as a smooth and natural release. The Hall/Room/Plate algorithms feature options for a wide range of reverb time settings—0.1 to 480 seconds—with a frequency response of 15Hz to 21kHz.

Parameters such as Pre Delay Time and Early Reflection enable you to set the apparent "length" of the room while HF Damp simulates reverberation from different wall materials.

By the way, all of the reverb algorithms also include three-band EQ for tonal adjustment of effected sounds.

8. Only the RSP-550 has a Vocoder algorithm which superimposes your voice onto other sounds, such as brass or a jet taking off, to give your voice characteristics of that sound. Incidentally, brass makes you sound like a robot.

9. The Stereo Pitch Shifter allows an independent pitch shift per channel because it features independent left and right channels. Or you can use up to four

conducted at a CD-quality sampling rate of 48kHz, with fully independent 16-bit A/D and D/A converters for each channel.

Beyond all of these qualities, the gonzo-in-straightjacket effects, the commensurate professional sound quality and the ability to control effects via foot-switches, the RSP-550 has tremendous MIDI capabilities. With MIDI, you can control up to four parameters simultaneously from controllers, aftertouch, velocity, note range or pitch bender.

Now, as we promised, here's more on the 30 additional algorithms. To hear them, you need to visit a Roland dealer, who, in this case, can be thought of as a kind of reverse psychologist. If that makes any sense. It does to us, but then we're already schizophrenic.

No we're not. Yes, we are.

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USE READER SERVICE CARD FOR MORE INFO

by Ken C. Pohlmann

ROGER

THE STORY OF A MAN, A WOMBAT AND A RADIO STATION

In our last episode, Rex blew into town and seduced Jessica, the rock 'n' roll wannabe, the night before she married billionaire-industrialist-lead singer Spike, in spite of the objections of her stockbroker, who purchased an AK-47 assault rifle and 666 rounds of soft-point, and in a drug-crazed rage mistakenly wounded state representative/sleaze peddler Julio's older quarter-sister Margarita, the tractor-pulling champion/ex-CIA operative with a tormented past, throwing cold water on the midnight rendezvous between Sheila, the psychic transsexual who has been dead for three years, and Roger, the station manager who is rumored to be half-man, half-wombat.

As today's episode opens, we find Roger spread-eagled over the console, his hands and legs tied. Margarita limps into the control room, breaks open the disc jockey's first aid kit, puts a compress on her wounded shoulder and turns to Roger.

"Dammit, Roger, the develop-

ment of Digital Audio Broadcasting in America is starting to look more and more like a soap opera. Everyone involved in radio knew it was going to be a bumpy ride, but the intensity of the drama is now getting juicy, if not a bit squishy."

"Margarita, the DAB plot has more convolutions than Einstein's brain, but perhaps the most basic and controversial issue is where DAB will operate. Spectral space is worth more than Ross Perot because it is a limited resource, which has, for the most part, already been allocated. Furthermore, the frequency of the DAB transmission band will affect the technology's quality, cost, worldwide compatibility and public acceptance, among other things. Another big issue is the type of broadcast technology that will be selected to transmit and receive the signal. Many companies are pursuing that financial windfall, all the while lining up crucial political support from organizations like the National Association of Broadcasters."

"But the NAB likes to throw



ILLUSTRATION: JIM PRALISON

Bottoms Up



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

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

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

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

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

rolloff of a woofer in a sealed box.

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

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

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

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curve balls. Roger. In 1991 they surprised everyone by endorsing the Eureka 147 technology and its L-Band (1,500 MHz) system. They proposed that existing AM and FM licensees be given DAB space in the L-Band before phasing out existing frequencies. Meanwhile, opponents to the NAB plan started arguing for an in-band DAB that would allow existing stations to gradually phase in while still operating AM and FM. Meanwhile, the military volunteered that it would rather give the L-Band to Saddam Hussein than to the FCC."

"That's right, Margarita. Then it got really crazy. The NAB abruptly reversed itself, coming out in favor of an in-band system. The standard would accommodate current AM and FM broadcasters because, of course, the NAB clearly opposes any satellite delivery since that would negatively impact terrestrial stations. Overnight, domestic support for the L-Band vanished into thin air. Scrambling, the European Eureka 147 folks started looking into an in-band version of their technol-

ogy, much to the chagrin of American in-band companies that thought Eureka had been dealt a mortal blow."

"Roger, exactly how does an in-band system work?"

"Basically, an in-band DAB system would place digital signals under both AM and FM transmissions. DAB receivers extract the digital signal, free of analog interference. Multipath problems would apparently be overcome as well. USA Digital Radio, for example, has demonstrated this technology with its Project Acorn. It employs 21 digital carriers, each 43 dB below the FM signal. DAB data is conveyed inside the RF envelope of the FM signal. The receiver's extractor does the rest. USA Digital Radio is now working on an AM system that would provide audio with a 15kHz frequency response and 96 dB of S/N, operating with AM antennas."

"Well, Roger, I guess it was inevitable. The U.S. government rejected the L-Band for military reasons, and the S-Band (2,310-2,360 MHz) isn't suitable for terrestrial DAB, so you're left with terrestrial in-band. You are quite

attractive—for a station manager."

"Interestingly, the S-Band is where microwave ovens operate. I played some high school football, you know."

"How soon could an in-band system be developed, Roger?"

"It isn't all that easy. Interference and crosstalk problems could be a nightmare, especially in mobile environments. In fact, some argue that in-band DAB would be a minor improvement over AM and FM. Instead, some say that L-Band DAB should entirely replace AM and FM because it would be much more effective. That raises the question: Would an in-band system be as good or robust as an L-Band system? When the NAB uses marketplace and political realities as its primary constraint and endorses in-band, does it condemn DAB to a marginal status? Interestingly, it also pits American research companies against European ones. The former are mainly working on in-band systems, while the latter aren't even convinced it will work outside the laboratory. Remember, over in Europe the Eureka 147 system is a foregone conclusion. I guess we're



heading for different American and European systems."

"Oh, sweetheart, it's so complicated and confusing."

"Margarita, you can blame your nemesis, the World Administrative Radio Conference, for the latest crisis. The WARC met last February to discuss satellite DAB bandspace. They considered the U.S. delegation's support for the S-Band, weighed it against Canada's and other European's bid for the L-Band, as well as splinter-group fondness for 2,600 MHz, and then, after meeting for a month, the bastards agreed not to agree on anything."

"Not entirely true, Roger. They allocated 40 MHz at 1.5 GHz for digital audio broadcasting, but gave countries the option to do as they damn well please. The U.S. immediately stated that 1.5 GHz was not acceptable, and they were sticking with the S-Band, while other countries said they wanted 1.5 or 2.6 GHz, or whatever. In other words, the chance for a worldwide satellite standard looks pretty grim, and things will be messy. The U.S. may wind up with a 2.3GHz system, and neighboring Canada and Mexico

with 1.5 GHz. Europe, too, is far from unified. The EBU supports 1.5 GHz, and the CEPT would prefer 2.6. God, you're beautiful in the moonlight."

"At least the people at Satellite CD Radio are happy. The 2.3GHz decision is exactly what they wanted, and now they are anxious to develop a commercial-free music service delivered to listeners via satellite. While the NAB pursues its own agenda, the government is apparently supporting an S-Band satellite service."

"Roger! Who would have believed it? Digital audio right up there along with microwave ovens. You have such firm muscles!"

"That's right, Margarita. The S-Band isn't much good for terrestrial broadcasting, but it's great for satellite. Companies such as General Motors would appreciate a satellite service because it would be ideal for long-haul motorists traveling away from urban areas. The satellite system could both extend the effective range of terrestrial stations and offer unique national stations as well."

"So where do we stand?"

"For now, the U.S. government

refuses to allocate the L-Band because we need it for military aeronautical testing purposes. So Canada, Mexico, Europe and others are on their own up there, along with Eureka 147. The government got WARC's agreement to pursue the S-band for satellite systems, but the FCC refuses to let Satellite CD Radio proceed with its plans. And the NAB supports a terrestrial in-band system, and many American companies are pursuing it, but it may be very, very tricky to pull off."

"No, I mean where do *we* stand—you and me?"

"Do you know what a wombat is?"

Will L-Band make a surprise comeback? Will the NAB change its mind again? Rather than suffer an incompatible DAB system, will Canada ask to become the 51st state? Will Margarita unlock the animal passion burning in Roger's soul? Tune in tomorrow. ■

Ken Poblmann is a professor of music at the University of Miami. He gave up early on a career as a pulp fiction writer, and, obviously, he has a lot of time on his hands.

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World Radio History

by Stephen St. Croix

VIRTUALLY REALITY

Reality? Reality? Do we really *need* reality? Exactly how aware are you of what is and is not real?

ALTERED STEAKS (WHAT ARE THE STAKES?)

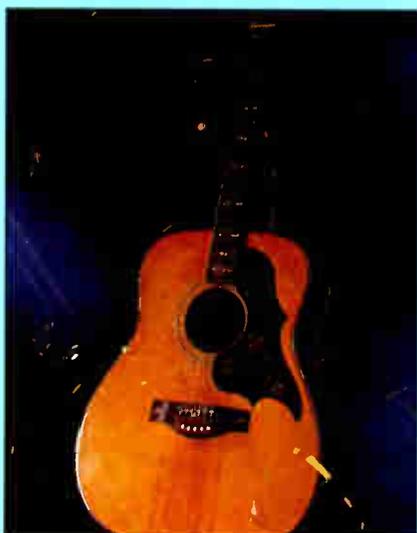
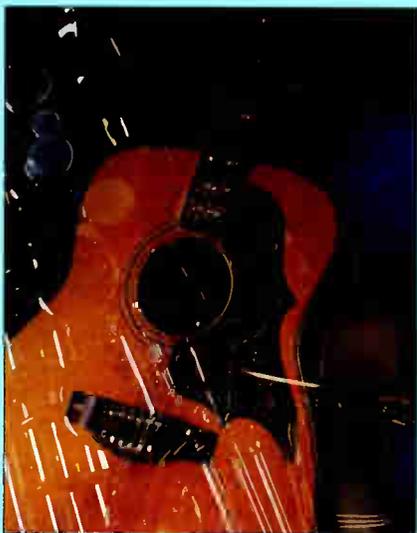
Let's see now, first there are your standard alternate realities. Any of you who may have accidentally done acid, mescaline or peyote during the '60s (or last Saturday, for that matter) should be pretty much aware of what alternate realities are all about.

Research from the last decade

showed that stuff learned while straight is best remembered while straight. (For those of you who have always been straight and do not know the term, it means unaffected by any psychoactive substance.)

Okay, no big deal here, but this same research further revealed that things learned while stoned are much more easily and accurately recalled if the subject is again stoned. The same goes for alcohol. It turns out that it also applies to high levels of stress.

So our memories are partitioned



PHOTOS: BILL SCHWOB



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system's speed, the greater creative options and outstanding quality. In the same amount of time it used to take to get a single audio sweetening project done, our clients are now getting several cuts—all with the same pristine quality as the visuals. It gives them a better product—faster.”

“At POST EDGE, our clients are our most important asset. We simply wouldn't trust our client's material on any other digital audio system other than Opus.”

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TASCAM II.

into various sections, one for each altered state. While it is possible to cross-access, optimum performance for each partition is achieved when in the appropriate reality. Which of these realities is real, then? Are any of them less real than the others?

A QUICK TRIP THROUGH A SLICK TRICK

Over a decade ago, I learned an interesting trick that I still use today. It was at a time when synthesis was very young and sounded, well, terrible.

After a typical short burst of ignorant panic (when the unions were claiming that synths would replace all honest, hard-working real musicians within a year), synthesizers were just finding their seemingly rightful position in the instrumental arsenal as monophonic oddities capable of gaseous bass-like sounds or buzzy, obnoxious, thin, stringy leads.

There simply was no way to build convincing voices, so we were forced to use this new technology for artificial "electronic" sounds. Minimoogs

and ARP 2600s were as identifiable in a mix as Strats or Les Pauls.

If your dream was to synthetically construct a convincing alto saxophone, for example, medication was available for you, as was involuntary commitment if you went so far as to actually attempt such an insane thing.

I had done considerable research in the area of psychoacoustics by then, and I had a theory that I had wanted to try for some time. Finally a recording project came along that did in fact require a synthetic sax. To make matters even worse, this synthetic sax was necessary because it was to change into a guitar while it played, much to the amazement of the buying public. Right.

Anyway, my research led me to believe that the human mind apparently has better things to do than spend all day trying to identify sounds, so it uses a clever shortcut (no matter how powerful your CPU is, performance optimization routines are always helpful) to free itself up for other functions.

Here is how it works. You hear a new sound, and your brain immedi-

ately searches the appropriate database for a match. If it cannot find one, it stays interested and learns enough about the new sound to build an internal model of the acoustic event and the physical conditions surrounding it.

If on the other hand (other lobe?) it *can* find the sound, it says, "Okay, this is Fred's sister Raquel [hopefully it only does this if it *is* Fred's sister Raquel]. She looks like this [and calls up a fast snapshot along with a helpful little memory package], and...oh yeah, I owe her \$32.50." You have then been briefed, and you can proceed with a reasonable conversation as if you actually knew what was going on, because you do. Your brain can do this even if the voice was in the form of an incoming phone call.

It seems that once the brain is confident that it has properly ID'd the audio, it simply stops trying to re-ID it or confirm it. In other words, when you are convinced that it is in fact Raquel on the phone, you won't spend any more time trying to figure out if it is *still* Raquel. Your brain is so serious about not wasting time

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once the ID is made that Raquel could go through some pretty extreme changes while she talks to you, and though you might be aware that she is starting to sound different, it would take *extreme* alteration of her voice character before your brain would let go of the ID and re-question whether or not it was still the same person.

She could tell you that she has severe allergies, and as long as she stayed involved in conversation with you while her voice mutated, she could actually become so hoarse over several minutes that you could not

even *understand* her; and though you might ask if she were okay, you would *not* ask if she were still Raquel.

If, on the other hand, she called you at 1:30 and sounded fine and then called you back in 15 minutes and was that hoarse, you might well ask who it was.

Well, back to the saxophone problem. By now it's probably obvious how I solved it. I recorded a real sax, and then I built a synthetic sax that sounded as close as I could get to the original. After a few bars of real sax (long enough for the listener's brain to recognize it as a sax), I slowly crossfaded from the real one to the

horrible ARP 2600 synthetic version, using every trick possible to keep them sounding the same in the mix.

Then I performed the morph from (synthetic) sax to (synthetic) guitar, and before the listener could determine that the guitar didn't really sound convincing either, I crossed over to a real guitar track. It worked beautifully. They paid me. I got rich and famous (for a couple of weeks).

The listener heard the song, identified a saxophone as existing in the mix, believed the ID, and stopped testing for it. Once the sax was established, the deception was reasonably simple; well, at least it was achievable.

I have been using variations of this trick ever since. It *still* works.

PHONY PHONES AT HOME

Think about all the audio things that are not real that we accept as real: voices on phones (only remotely resembling the person's real voice, yet we accept it as such), radio, movies, CD players, car stereo systems...All false realities that we have been trained to accept.

Granted, a good CD player coupled with an excellent playback system can sound pretty convincing, and we do all enjoy pretending that it is real, but nobody ever really forgets that it's not, unless they are employing significant recreational pharmaceutical assistance.

TVs, phones, radios and the like just don't sound real. Yet we adapt, and we do it quite rapidly. We automatically learn to extract the most from what is available, and the mind fills in the rest, just so it doesn't have to go on and on trying to identify the same thing over and over. Interesting system.

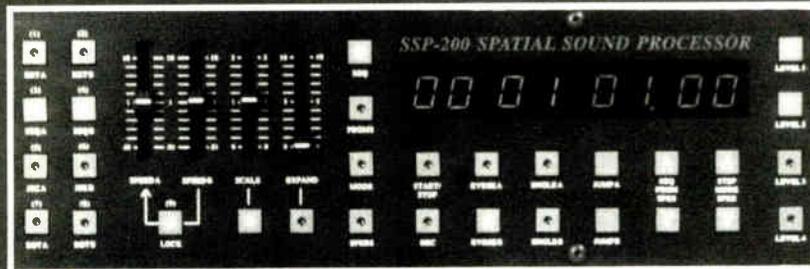
Put a little cotton in your ears when you first get up in the morning, and you will be acutely aware of the high-frequency attenuation this produces. Leave it in all day. Within half an hour you will only notice occasionally, and by lunch everything will sound totally normal. At 3 p.m., rip it out and get a big surprise: The entire world has a 10dB boost at 12 kHz!

Reality is a matter of reference. Try this test. It is much more of a shock than you think it is from just reading about it. ■

Stephen St. Croix has a lovely collection of colored cotton balls to go with his fine, sophisticated wardrobe.

FINALLY,

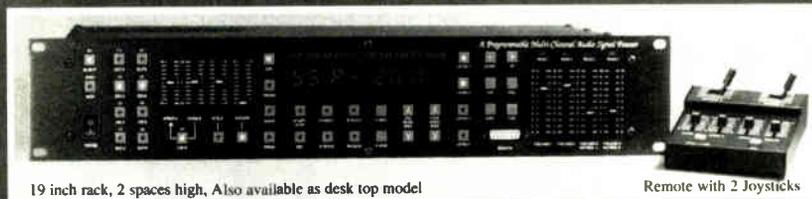
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World Radio History



T H I A M R E D S

ILLUSTRATION BY JOHN HYATT

THE LOS ANGELES RECORDING MARKET STRUGGLES WITH RECESSION AND OTHER DEMONS

The music recording studio industry in Los Angeles is slowly hemorrhaging. The good news is that not everybody is hurting. The bad news is that *most* are hurting, and some people are hurting badly. In years past, some studios were able to survive—heck, prosper—just on the business that came knocking. But at many studios, fewer projects are finding their way to the door. Add to that a host of other problems, some endemic to Los Angeles and some more pervasive, and you have an industry full of people who can't take many more punches.

The list of those problems is extensive. First, the recession. It's real. "We have to make deals and add services," says Ron Lagerlof, management consultant for Ground Control in Santa Monica, "like offering 48-track for no extra money or giving rentals back. Everything is negotiable. I think it's safe to say that nobody is in a position to turn away business in the current economy."

Virtually every studio owner I speak to says that music recording business is down, and those projects that are being done have smaller budgets. Only the "elite" studios and facilities that have aggressively attracted other types of business are relatively unaffected. "We're trying to compete at a service and facilities level, not at a price level," says Rick Stevens of Record Plant, which will actually double in size later this year, from two rooms to four.

But even a top studio might glean a sizable chunk of its business from a handful of clients. The only thing that keeps their position from being precarious is that their clients—typically big-name acts—continue to make and sell records even when other artists' sales are down. These studios do not represent some kind of "ray of hope" in this depressed industry.

There is a historic oversupply of studio time in this town. It's not just temporary, or even cyclical, but chronic. As I pointed out in last month's "L.A.

Grapevine" column, a trend that's become evident over the last year or so is the "coming out of the closet" of numerous studios that were originally built for private use. I don't mean to imply that any of them ever operated illegally. I only mean that for one reason or another many private studio owners have decided they should go commercial (the assumption is that when they make the jump they do it legally). Maybe it's the recession—perhaps their personal earnings are down, and they suddenly see their studios as potential income producers. Or maybe they are working *more*—at studios other than their own—and it just doesn't make sense for their own rooms to stand empty.

Whatever the reason, this trend means that the normal weeding process that takes place in an economic downturn (the clichéd "survival of the fittest") isn't happening. For every studio that goes under, there's another to take its place. In the foreseeable future, there's still going to be a glut of studio time, and with demand only stable or diminishing, room rates are bound to stay low.

There's a second side effect, too. Although anyone who wants to operate a studio is certainly entitled to do so, it's a different matter to run one for the purpose of recouping one's investment than to run one for the purpose of earning a living. "The fact that so many studios are owned by people who do not have to make the studio profitable in order to make a living has created a real problem," one long-time studio owner (whose studio is his only source of income) told me confidentially. This situation tends to depress prices—think about how much less you'd pay for groceries or clothing if no one had a strong incentive to make a profit from the transaction.

Few studio owners will admit how much they are really discounting time off their card rate, but there are rumors of people slicing it 50% and even more. One-third off is not unusual by any means. And who

by
Amy
Ziffer

ECONOMY RECORDING

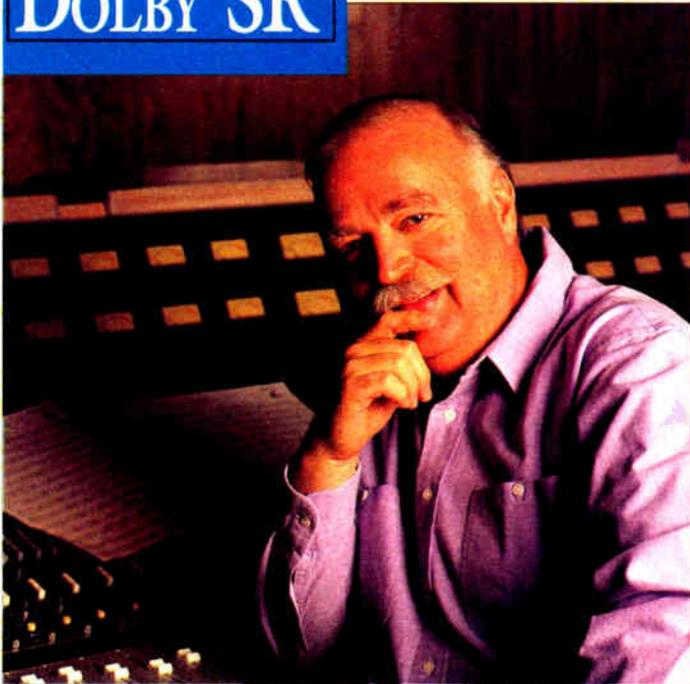
TOP
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HOURLY
RATES

Bruce Swedien

DEMANDE DOLBY SR



Alan Siffen

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Co-produced 5 and engineered 11 songs on Michael Jackson's "Dangerous." Currently working with Michael Jackson, Sérgio Mendes and Rene Moore.

Career credits

At age 19 recorded Tommy Dorsey, and hasn't stopped yet: Quincy Jones, The Chicago Symphony, Duke Ellington, Count Basie, Stan Kenton, Oscar Peterson, Sarah Vaughn, Natalie Cole, Barbra Streisand, Dizzy Gillespie, Diana Ross, Nat 'King' Cole. Awards: 3 Grammy's (8 nominations); TEC Hall of Fame.

Career direction

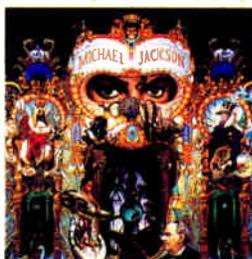
"I want to do more co-producing and song writing along with engineering."

On his technique

"Lately I have returned to recording directly to analog recorders, later transferring the final elements to digital for editing and storage."

On Dolby SR

"Dolby SR allows the inherent beauty of analog recording to come through without annoying hiss, hum, or print-through. I use Dolby SR on all my projects."



*Michael Jackson's "Dangerous" (Epic)
5 songs co-produced, 11 engineered
by Bruce Swedien*

Dolby SR, now over 61,000 tracks worldwide.

can blame them? \$1,000 is better than \$0, no matter how you slice it. And that client *will* go to another studio to get a lower rate.

"Unfortunately, I think there are a lot of facilities on the ropes that are willing to take whatever action is necessary to generate income day to day," says Paul Camarata of Sunset Sound. Because the industry is quite small, everyone knows where they can get the lowest price. If you do give someone a deal, it gets around fast.

"It's lucky that we have an overall facility with five rooms," Camarata adds. "Some of them are more budget-oriented, so I've been able to accommodate clients by moving them into less-expensive rooms for certain parts of their projects, like overdubbing." Although that kind of maneuvering has always been a negotiating tool, he says it is even more important now to keep an entire project in-house, because some studios will make incredible bargains just to get anything in the door.

Illegal home studios are definitely putting pressure on rates. This topic is so emotionally charged that it's hard to gauge the real size of the problem and difficult to control regardless. (At least one person has a sense of humor about the matter: "I just want the city to decide about the legality of home studios [run commercially]," says Skip Saylor of Skip Saylor Recording, "and then regulate it, because if they decide commercial home studios are legal, I'm setting the speed record to my home.")

"The record companies want to do records more cheaply," confirms Al Morpheu, studio manager of Track Record in North Hollywood, "so we get beat up on the price, or they go to an illegal studio that doesn't have a high overhead." Studios in all price ranges are seeing tapes come in from illegal facilities. Those studios able to attract mix work from producers who don't have the ability to mix in their own studios are ahead of the game, but that's only making the best of a bad situation. In this type of climate, card rate is virtually meaningless.

While most people say their card rates are the same as they were five years ago, expenses have definitely escalated. I hear lots of complaints about the cost of doing business in Los Angeles. When I asked Paul Camarata about taxes, he laughed. "They're never ending," he says.

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Bryston's Model 4B, at 250 watts per channel has long been considered something of a legend in professional applications such as studio monitoring, theater and soundstage amplification, even arena and nightclub installations. Although there had been many improvements in the design over time, the basis of the 4B had remained relatively stable. Recently, however, our research showed we could make a substantial step forward in amplifier design. The result is the 4B NPB.

The power supplies employ multiple smaller filter capacitors per channel, rather than the single pairs of large filter cans as has been traditional practice. This allows better high frequency response and reduces overall losses in the supply. The wiring harness has been eliminated, and the channels plug directly onto the power supply PCB, further reducing resistance for improved current flow and better filtering.

The inputs feature a special, proprietary buffer circuit which establishes the inverting input for bridging the amplifier, and also is used for the balanced inputs, which are standard. This buffer can actually help the performance of source preamps because its input impedance is perfectly linear at high frequencies, a situation which is not always the case with power amplifiers.

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more conducive to the creative process," he says. "We're far less concerned where [a recording is done] than we are that the creative process goes forward in an exciting way. If a band wants to work in a particular place, you're not going to find many record companies who'll say they can't.

"Function and atmosphere are what distinguish those studios that get the work," Gerston continues. "Some bands walk into Capitol Records and want to record there because Frank Sinatra did. One band really liked Sunset Sound because they have a basketball court. And then you sometimes have a producer who only wants to mix on an SSL or a Neve."

He acknowledges that while, from a revenue perspective, the record business is doing well, unit sales are flat or down. Revenues are only up because of the higher cost of compact discs. He denies that Arista is paying less attention to new talent or cutting the amount of product being made, despite the slump.

The effects of a depressed studio business trickle down to all the people who rely on them for work. "I've

seen fully qualified first engineers looking for second work, anything to keep them alive," Ron Lagerlof says. This in turn opens up another can of worms that can adversely affect studio business. Clients like to see the same faces, and they like to know that the staff is experienced in the room. They also want instant technical support if a piece of equipment should go down. But many simply aren't willing to pay the price for that kind of security and service.

Consequently, most studios are running with less staff, sometimes having no full-time employees, relying entirely on freelancers. Many owners have taken over bookkeeping and traffic chores in an attempt to reduce overhead.

An analysis of the situation in Los Angeles can't be complete without some self-examination. To some extent, the recording studio industry has engaged in deception, in self-destructive practices that are coming home to roost. There's still a common perception that this type of enterprise is exempt from the normal rules of business because it's "showbiz." It's music, entertainment, fun stuff. The

real world doesn't intrude here.

But lease payments, worker's compensation insurance and collecting on past due bills are real-world problems. Just today I heard this telling story: A media facility president was negotiating a purchase with a sales manager, and the president's knowledge of sales and lease agreements surprised the manager. "What a pleasure it is," said the manager, "to do business with someone who knows what I'm talking about for a change."

Few studios have anything approaching a real marketing plan, although there are exceptions. "I'm starting a more aggressive phone campaign to bring some of our past and present clients in," says Al Morphew. Rick Stevens, who was VP of A&R for PolyGram from 1973-81, has extensive contacts at labels and makes sure he knows who is going into the studio and when and how to reach them. But he stresses that even with personal contacts it's competence that clinches deals. "You may have access to those people," he says, "but once they're at your studio,

—CONTINUED ON PAGE 155

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by Paul Potyen

AVID TECHNOLOGY'S OPEN MEDIA FRAMEWORK

A PROPOSED DIGITAL STANDARD

Among the other participants at Digital World '92, held at the Beverly Hilton Hotel at the end of June, was Avid Technology. Based in Tewksbury, Mass., Avid is a manufacturer of non-linear digital video-editing systems for post-production, broadcast, corporate and emerging integrated media applications. Founded in 1987, Avid has sold close to 1,000 Media Composers to date and shows no signs of slowing down.

Digital video was one of the hot topics at the conference, as indicated by the presence of Digital F/X, RasterOps, SuperMac and Radius, each of whom was showing its set of digital video production tools. In addition, video software developers abounded, from relatively low-end QuickTime applications to C-Cube Microsystems, which revealed its latest strides in video compression technology. In fact, many of the confer-

ence sessions were devoted at least in part to compression, which many consider to be the last remaining barrier to successful multimedia applications.

But what attracted me to Avid was its recently announced commitment to developing a multiplatform initia-



tive for digital media types. First announced at the NAB show in April, Avid's proposed Open Media Framework was being demonstrated at the DemoCenter. Since that time, many manufacturers have expressed their support for the goals of OMF, and as part of its plan, Avid has elicited the support of many big guns in the video, audio and computer industry (see Table 1, pg. 39). One big gun I talked to—Steve Mayer of Digital F/X—expressed enthusiasm for the concept, adding that “we just re-

Left: Carol Peters of Silicon Graphics and Avid's Jim Ricotta

ceived the specs a week ago, so I haven't had time to look at it in depth, but in general I have nothing but good things to say about Avid."

I talked to Jim Ricotta, director of product marketing at Avid, and Carol Peters, director of emerging markets at Silicon Graphics Inc., about the goals of OMF. According to Ricotta, the aim is to develop a common means of moving digital media—whether they be graphics, video or audio—among the different operating systems currently in use. "Our users in the post-production world

have told us that systems like ours are great, but they ask, 'How can we incorporate our character-generating system or our digital audio workstation? How can we move this digital information around?' That's what we want to address."

Avid put together a demonstration sequence of video, audio animation and graphics that originated from different systems and could be played back and edited from its own system. This included an animation built in Electric Image on the Macintosh; digital video created on the Media Composer coming off its own disk; a still image from Kodak's Photo CD and

another one that was scanned using the Polaroid scanner in through the Mac; a Chyron graphic; an animation that was done on the Macintosh using AT&T software; and another animation done on the Indigo using Alias software. All elements were networked together via Ethernet.

"Open Media Framework consists of two components," Ricotta explains. "There's OMF Interchange and the OMF Engine. The idea with OMF Interchange is to be able to bring these disparate types of elements into your particular system—whether it's an Avid or some other system that supports OMF—and use

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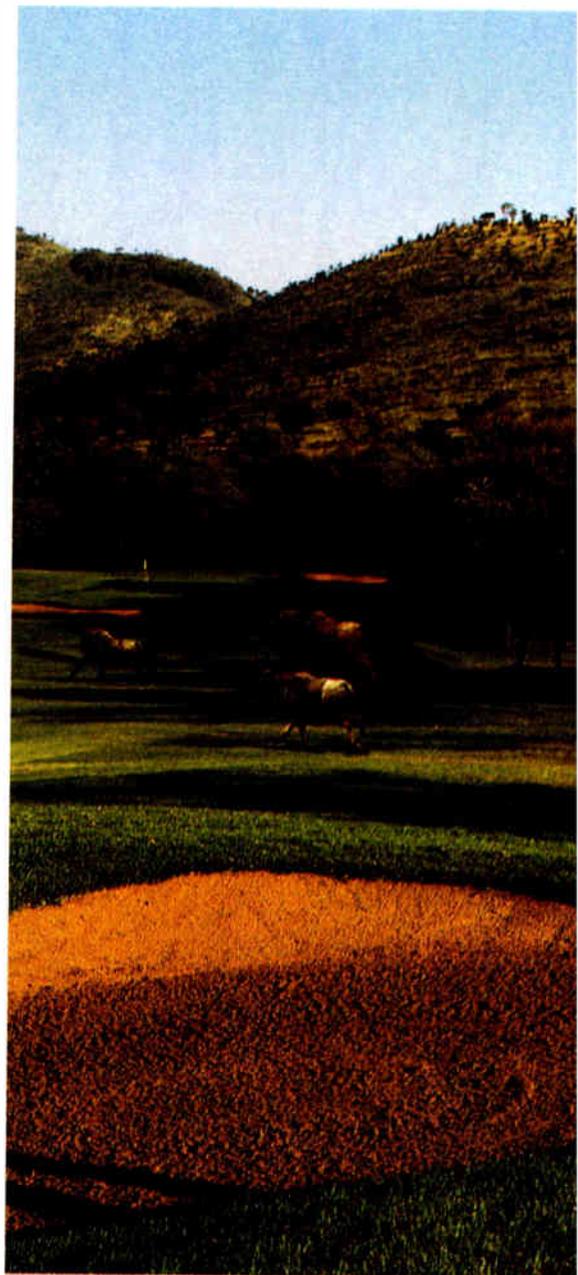
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THERE REALLY IS IN STUDIO ONE.



it the same way you use a clip of video on this system. You could also send from a system like this out to other devices. Let's say you want to capture a frame of digital video created on the Avid and send it out to another platform like a Silicon Graphics or a PC. With OMF you could do that."

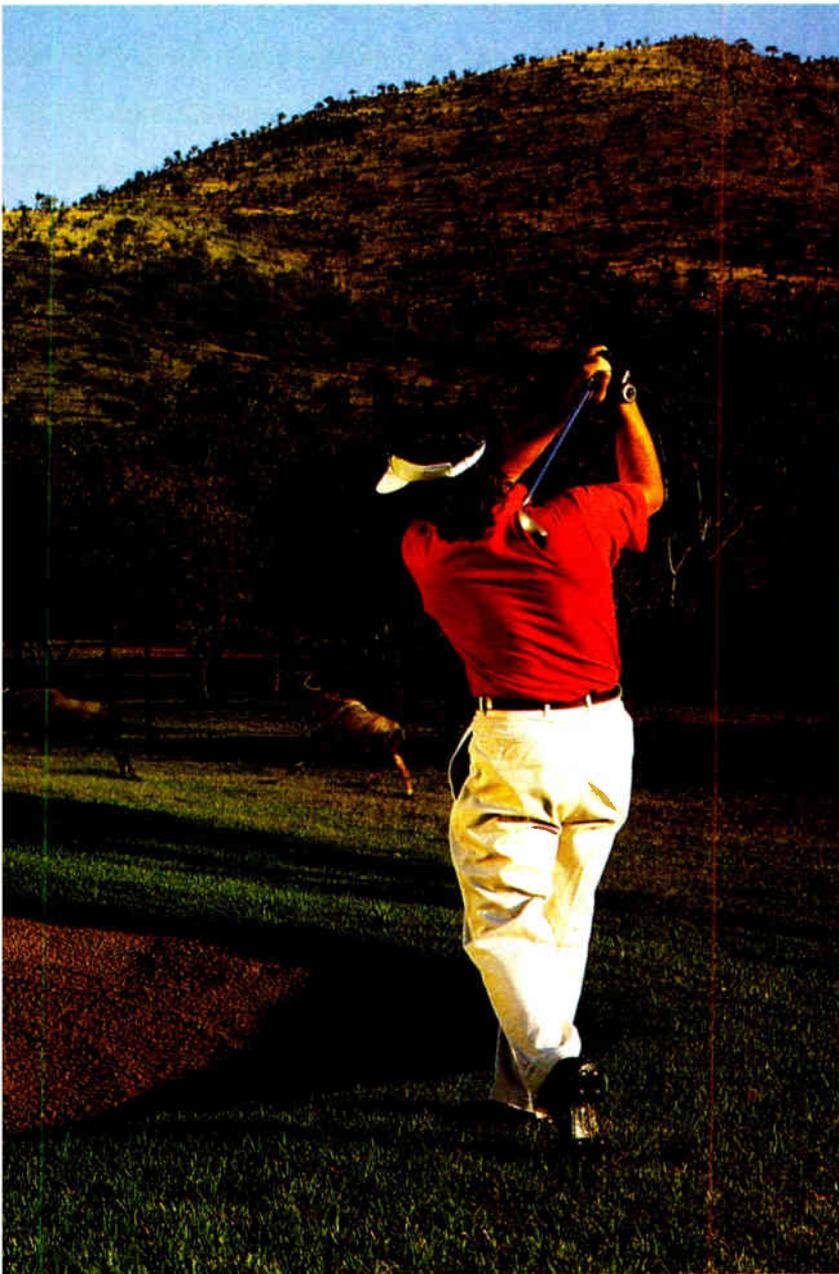
Exact synchronization of video and audio at full-screen, full-frame rates is considered an immediate requirement, not a hoped-for future goal. However, if you want to export to a platform that doesn't support broadcast-quality frame rates or resolutions, such as QuickTime, the OMF standard would allow scalabil-

ity to that level of resolution. The philosophy is to embed the computer inside the media environment, as opposed to embedding the media inside the computer environment. Also critical is the concept of modularity. Just as media computers will become modular communications devices, Avid feels that the supporting media framework software must be modular in design. And finally, OMF is specifically designed to run on different hardware platforms and operating systems and to take advantage of widely accepted standards whenever possible.

"Our schedule is to work with

these partners and others to complete a draft of the OMF Interchange format by the end of July," Ricotta says. "By the end of the fall we hope to have a final format. People who want to participate can support the format in their products, and we'll all be able to write OMF files.

"[With OMF] our customers would bring their material in and cut picture on the Avid," Ricotta continues. "They could set up a couple of simple audio tracks and then go out to the NED or the SSL and do more sophisticated audio layout. Right now they have to dump out a CMX EDL, and they lose a lot of information about level



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setting and audio editing. The way OMF works is that the composition—the description of where the cuts are and so on—is separate from the data itself.”

The second part of OMF has to do with the OMF Engine. As Ricotta puts it, “We’re taking some of the underlying pieces of the Media Composer software—mainly those pieces that allow you to digitize media to disk, to play it back, to synchronize video and audio, to build compositions that include many tracks of video and audio—and making the applications programming interfaces available for use by any software developer. One way this is already happening is that we are porting these pieces to the Silicon Graphics platform. So SGI will ship a demo of the OMF Engine with every

workstation. That can be used by other developers to write digital media applications for the Indigo.”

The next generation of Avid products, including future releases of the Media Composer, will be developed using OMF Engine applications pro-

gramming interfaces. As with OMF Interchange, Avid plans to publish draft standards for the APIs and open them up for a period of public comment and review.

In brief, the OMF Engine has two functional layers: the Media Integration layer and the Media Structure layer. The Media Integration layer moves media into and out of OMF applications. It is the interface between media in its “native” form and the digital media formats used by OMF. The Media Structure layer adds the structure required to store, edit, composite and copy OMF media through the computer.

The issue of incompatible operating systems is a big one. Says SGI’s Carol Peters, “Today an optical disc from an Avid system can’t be recognized by an NED or an Akai, because system vendors, software vendors and peripheral vendors haven’t agreed on a sin-

Avid Open Media Framework™ Partners

Table 1

Audio

Otari Corporation
WaveFrame Corporation
Digidesign
Lexicon
Studer Editech Corporation
Fairlight Esp Pty. Ltd.
Solid State Logic Inc.
The Blue Ribbon SoundWorks

Film/Video

Grass Valley Group
JVC
Chyron Corporation
Truevision Inc.
Rank Cintel Inc.
ARRI

Evertz Microsystems Inc.
Pandora International

Animation/Graphics/Multimedia

Eastman Kodak Company
AT&T Graphics Software Labs
Polaroid Corporation
Alias Research Inc.
ElectroGIG
DiVA

Technology

Silicon Graphics Inc.
C-Cube Microsystems Inc.
Aware Inc.
Starlight Networks
Apple Computer

SEYBOLD DIGITAL WORLD INCHES CLOSER TO THE REAL ONE

While there was no lack of speculation about the future of digital technology at this third Digital World conference, the discussions seemed less removed from reality than at the previous two. Maybe that’s because reality is moving forward. Last year Apple used the conference to announce its QuickTime technology (watch for a QuickTime Primer in next month’s “Byte Beat”), with the result that this year’s conference was filled with QuickTime-related products. SuperMac, maker of the successful VideoSpigot card, hosted a series of 90-minute, hands-on QuickTime workshops for interested attendees.

But just as important to the subtle shift in direction was the inclusion of people like Lily Tomlin,

Shelley Duvall, Bay Area New Media artist Abbe Don and sculptor/set designer/hit songwriter Allee Willis. The entertaining and often outrageous input of these and other left-brain types added a nice balance to the comments of Apple’s John Scully, Sony’s Ron Sommer, IBM’s Lucie Fjelstad, Intel’s Andrew Grove—you get the picture.

Once again, stimulating debates were generated around recurring unanswered questions. Will cable TV or the telephone company be the purveyor of the new digital media? Will satellite transmission beat both of them to the punch? Is multimedia a consumer electronics industry or a computer-based industry? Are we couch potatoes or do we crave interaction? And last but not least, where do we stand vis-a-vis intellectual property rights and distribution of digital media? Here’s a hint: SCMS is only the tip of the iceberg.

Among the more interesting developments revealed at the conference were the appointment of A. Nathaniel Goldhaber as CEO of Kaleida, the joint venture between Apple and IBM. Goldhaber was on

hand to announce the company’s first product, a set of software extensions designed to work on all major platforms and focus on the media/publication industry. Other developments included an announced partnership between Apple and Toshiba that will result in a “multimedia player” code-named “Sweet Pea.” SuperMac announced a new video digitizing board with hardware compression called Digital Film. It is said to be capable of full-motion video and able to print to videotape. Radius brought out its VideoVision card, which also provides output to tape. Unfortunately, neither card supports 16-bit audio. Both companies claim that the problem is with Apple, which has yet to support 16-bit audio in its Sound Manager software. More about this next month.

In any event (and this wasn’t just *any* event), Seybold Digital World ’92 once again delivered an exciting and thought-provoking package of speakers and topics for three days of stimulating discussion and dazzling technodemos, most of which worked. ■

gle format. Part of the goal of OMF is to overcome those limitations. That's where OMF is going. We have the ability on the Indigo to read floppies that were written by DOS systems as well as Mac systems, and to write to those formats as well. Some of this is being done by third parties. It continues to be an unsolved problem, but we're addressing it. Silicon Graphics will be at the next Mac World Expo, and we'll be highlighting this very issue. We'll be showing a first-class Mac connectivity so-

lution with Macs and Indigos on a network, and we'll be transferring floppies from one system to the other."

Ricotta adds, "We're looking at using the same kind of media and formatting that the NED uses, which is a IGB magnetic drive with a 3 1/2-inch form factor. Also, people are starting to incorporate networks using Ethernet."

"We believe that the operation system issue is coming together, although speed is still a problem. We're addressing the issue this way: Now that we can all see each others' files on the

desktop, let's make sure that all the composition and the data contained in those files is something we can all understand."

"One solution is FDDI [a fiber optic standard that follows the Ethernet protocol]," says Peters. "In fact, some of us think that as film studios and post houses move further into the digital domain, they'll go directly from non-networked shops into FDDI, without ever going through the typical Ethernet-coaxial solution."

With transfer rates around ten times that of traditional Ethernet, the fiber technology could indeed be an attractive networking scheme. It's still somewhat pricey today, but there's a perceived demand—and an effort to change the economics—on the part of SGI. The company has a subsidiary that's busy just designing and manufacturing FDDI chips as a way to make the economics more realistic.

While the current Media Composer is focused at the top of the pyramid, the Indigo product will be directed to a more broad-based market: the corporate communicator who is not a media professional but maybe a product manager, a sales manager or a journalist who wants to combine a model they've built on the computer with some video they've shot and add audio and graphics to create a communication that's a step beyond a slide show. Avid plans to have the Indigo product out by the end of the year.

Another part of Avid's relationship with Silicon Graphics centers around video compression technology. Says Ricotta, "We're having them build a JPEG video-compression board for the Indigo. We intend to build on the technology we used to make the JPEG board for our current system, which has been available for about 18 months."

With its respected position in the digital video market, Avid could well be the right company to orchestrate the creation of a valuable digital media standard. The company is removed enough from the competitive and often-guarded digital audio manufacturers to offer a face-saving way for everyone to get what they want. And facilities that deal only with digital audio production could also stand to reap the benefits of such a standard. Stay tuned. ■

Paul Potyén is an associate editor at Mix.

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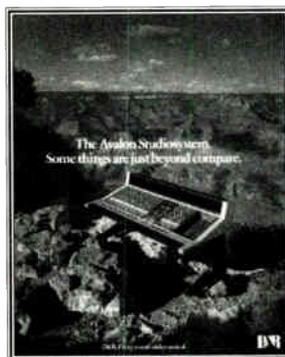
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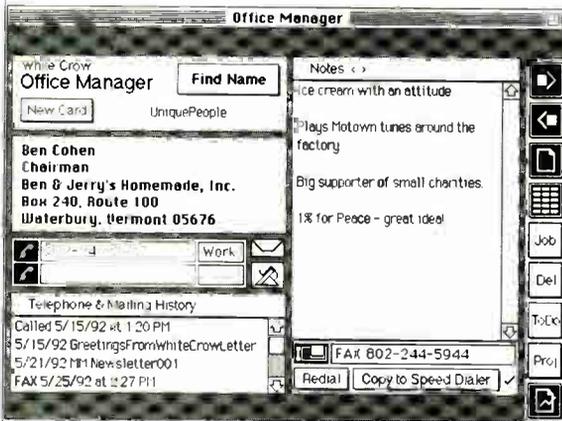
CHIP SHOTS

WHITE CROW OFFICE MANAGER

Office Manager, from White Crow Software (Burlington, VT), was developed by studio manager Todd Lockwood, of sister company White Crow Audio, for small busi-



nesses. The sophisticated Macintosh Hypercard program features customizable address files, letter processing capability, automated to-do lists and job tracking files,



project files, telephone dialing and faxing and letter/envelope printing/merging options.

Office Manager is not intended to offer accounting features; but what it does, it does well, and it's well-suited to the business needs of recording studios. The standard Office Manager package retails for \$99 including the HyperCard 2.1 application. A second package, selling for \$149, also includes Mail Manager. Finally, Office Manager Remote (\$79) is a special version of Office Manager that allows other Macs to share files with the "master" program without being

on a network. The family of products is designed to run on any Mac with 2 MB of RAM and System 6.0.5 through System 7. It also includes excellent documentation.

Circle #250 on Reader Service Card

DATA TRANSLATION MEDIA 100 VIDEO PRODUCTION SYSTEM

Media 100 is a random-access, online, non-linear, video production system that creates NTSC or PAL video programs directly from a Macintosh computer. The system, from Data Translation (Marlboro, MA), inputs and outputs a single NTSC composite or S-Video video signal along with two channels of 44.1kHz 16-bit audio synced to video. The audio subsystem features a built-in 32-bit digital signal processor for audio mixdowns and sweetening.

Through the use of JPEG video compression, 20 minutes of high-quality compressed video and uncompressed audio can be stored on a 1.2GB drive. Additional system requirements are a Mac IIx, Quadra 700 or Quadra 900 with 8MB RAM; System 7; QuickTime; QuickDraw graphics; a high-capacity SCSI drive; a video monitor; and a VTR, VCR or camcorder. Media 100 is priced at \$11,995 and includes all

Media 100 NuBus hardware, software and cables.

Circle #251 on Reader Service Card

ANTEX AUDIOPORT

Audioport is an external audio adapter that offers stereo, broadcast-quality, digital audio capabilities for laptop, desktop and notebook PCs. Designed for applications where portability and space are at a premium or for remote recording, Audioport plugs into the printer port of any PC or compatible. Stereo recording and playback of audio

with sample rates up to 36.5 kHz with 12-bit resolution are supported. Audioport is available at a list price of \$495.

Circle #252 on Reader Service Card

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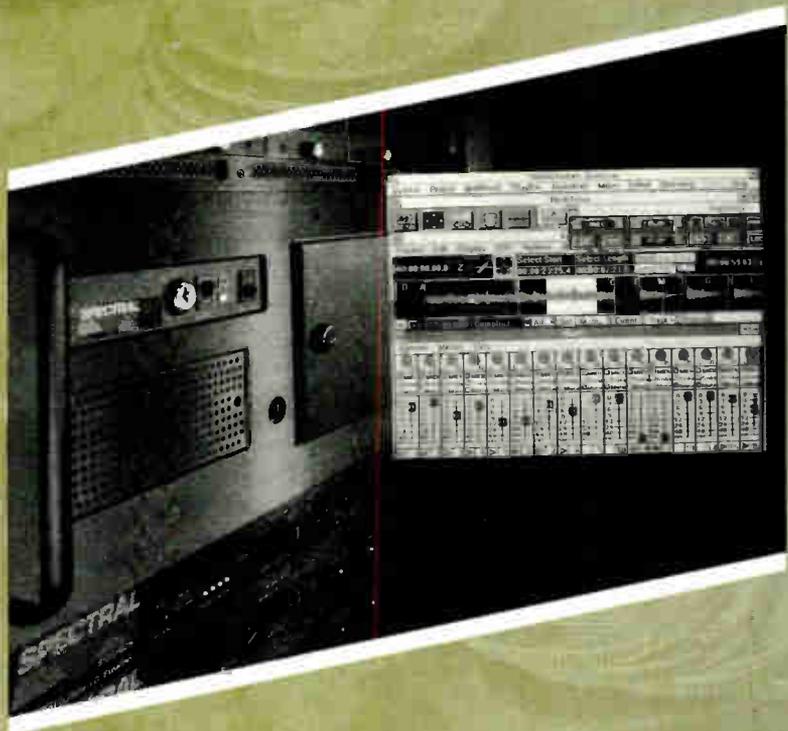
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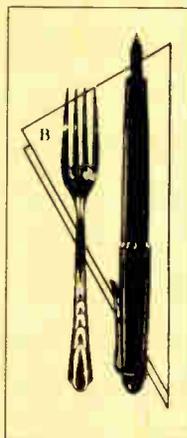
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World Radio History

by Mr. Bonzai

LINDSEY BUCKINGHAM

ENDLESSLY ROCKING



Like a star athlete hitting his prime, Lindsey Buckingham is at the peak of his powers on his new album, *Out of the Cradle*. He's got the reserve energy of a long distance runner, the accuracy of a cross-court sharpshooter, the torque of a gymnast and the brains of a pool shark.

Buckingham is best known for his guitar, vocal and songwriting mastery with Fleetwood Mac, that best-seller gang of the '70s and '80s. Responsible for such hits as "Tusk," "Big Love" and "Go Your Own Way," he also delivered two solid solo albums: *Law and Order* in 1981 (remember "Trouble?") and *Go Insane* in 1984. It's been five years since he stepped away from the big

Mac machine, and he's been working out alone.

He plays almost all of the instruments on *Out of the Cradle*, and he engineered most of the album at his home studio with co-producer Richard Dashut. Toward the end of the project, he called in Kevin Killen to choose some champion overdubbers and turned over the mix to Killen and another master maker, Chris Lord-Alge. From the mix point of view, it's an education in craftsmanship listening to Killen at the Neve and Lord-Alge at the SSL.

The title of the album is taken from a poem by Walt Whitman. The old renegade's full title reads "Out of the Cradle, Endlessly Rocking."



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Bonzai: Judging from the album package, there's a family theme in this album...

Buckingham: Only in a general sense. It's just about any long-term period put into a healthy perspective. I was making an association with my family and the band—two different kinds of families.

Bonzai: Is this really a new beginning?

Buckingham: I would hope so—I perceive it that way. That's the way I am approaching it in terms of where I place my energies. Touring is something I never had a chance to do in the past with my solo records, and now I have an open-ended feeling for the first time. I made a few changes in my life that make me more accountable to certain things, one of which was to make myself happy.

Bonzai: You weren't happy before?

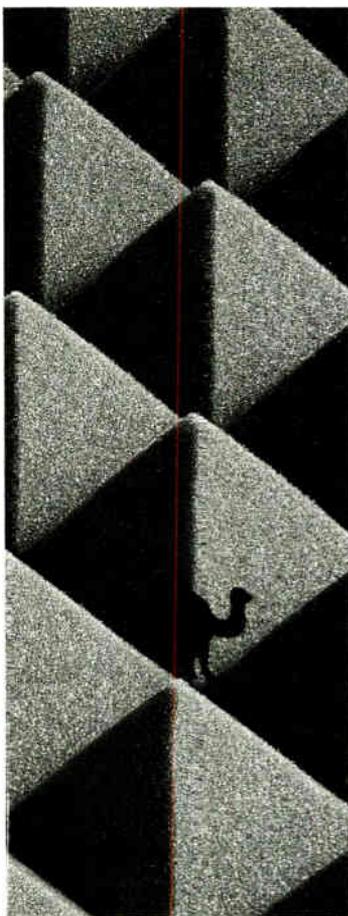
Buckingham: I wasn't that happy in the last few years in the band situation. It was kind of a tough atmosphere to be around, for me anyway.

Bonzai: What makes you happy now?

Buckingham: My previous solo work was squeezed into four-month windows, smaller periods of time between the needs of the band. The approach to record-making with the group was like moviemaking in some ways. It was more of a conscious—even a political—situation. I felt I had earned the right to spend a few years looking at what I wanted to do and trying to get as close to right as I could—to tap into my potential in a deeper sense.

Bonzai: I notice there are a number of engineers on this album, including yourself. Did you do a lot of the work totally alone?

Buckingham: Well, I work closely with Richard Dashut, who has been a good friend for nearly 20 years. He was co-producing much of the time, but I would take periods where I would work on my own. In the sense that my previous band involvement was like moviemaking, this project was like painting. You've got a canvas, and you start off with a certain intent. But because it's a quiet and intuitive process, you put strokes on the canvas, and the work starts to speak to you, taking you off in a direction you didn't expect. In



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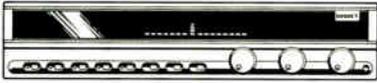
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many ways, it was easier to discover things, to be surprised by things coming out of nowhere. I wasn't that anxious to work with another group of musicians. I wanted to get a sense of myself and get my feet on the ground. Now I'm hungry to put a band together and tour.

Bonzai: I notice only a few musicians credited on selected cuts: Alex Acuna on percussion, Mitch Froom on organ, Larry Klein and Buell Neidlinger on bass. Does this mean you played everything else?

Buckingham: Yes, I played about 95 percent of what's on the album. There are some drum machines, and some drums led to a click track in playing off the Fairlight, just to keep it kind of sloppy. And some had no drums at all. My writing process is very intertwined with the process of making a record. Sometimes I have a whole track and don't have a melody yet.

Bonzai: Was this done in your own studio?

Buckingham: Yes, I don't think I could have spent three years making a record at regular studio rates.

Bonzai: Although Fleetwood Mac were pretty famous for spending big bucks...

Buckingham: Sure were.

Bonzai: Where is this little cubby-hole studio of yours?

Buckingham: It's a converted garage in my house. There's just a control room; there is no studio space. If you wanted to play live drums you'd have to move them out into the bathroom or the hallway. That didn't happen very often. We experimented with a lot of direct recording and a lot of mono recording. We were going for a sense of containment, and there is a denseness to the sound in some of the songs. A way to deal with that on the heavier production numbers was to record direct, which keeps it very contained and undynamic in some ways. Using mono, instead of getting a spread on an acoustic guitar, you've got a point. You have all these visual points from left to right. That was our intent.

Bonzai: Of course, you played all the guitars.

Buckingham: Yes, I really wanted to emphasize the guitar playing more. In the band, and to some de-

gree in my solo work, the approach was more orchestral, in the sense that you can make a great record by working out parts that are complementary and supportive. The listener may not be aware of them, and that goes for rhythm parts and melodic parts but also solos as well, where it just becomes a texture of the track. In my solo work—certainly on *Go Insane*—I was taken with the Fairlight, and a lot of the guitar playing took a back seat. For this new record, I thought it was important to flaunt it—even to go over the line with the guitar playing. I can do that, and it's a part of me. It was just something that hadn't been touched on in a while.

Bonzai: There's quite a range of guitars, from soft classical acoustic to the wangly-jangly guitar on "This Is The Time." That's a strange sound—it gives me the jerks listening to it. How did you get that sound?

Buckingham: [Laughs] Well, that was a Telecaster, not through speakers. We have a distortion preamp that goes right into the console. You just go for it, and a lot of it is how you respond to that sound. Put a little slap echo over it. That track cracks me up—something a 42-year-old has no business recording.

Bonzai: Your vocals go through some rather odd permutations, from ear-tingling whispers to stepping back and projecting. Was that different microphones or different processing?

Buckingham: Not even processing; it was a cubist sort of approach. Some of the vocal parts were triple-tracked, with one talked, one sung on a note and another sung on a dissonant note above that. You get this triad of dissonance along with something spoken.

Bonzai: You also do "All My Sorrow," the old Kingston Trio song...

Buckingham: I first heard that in the early '60s. It was a song that the three members of the trio had taken writing credit for, even though it had been a public domain folk song for some time. This was something that happened all through the popularization of folk music—tons of stuff laying around and nobody had publishing on the material. I didn't take the writing credit on this, but I did make it my own in another way by changing the melody, changing the

chords, to make it like a '40s number. Also, Dave Guard died last year, and I thought it would be a nice nod to him.

Bonzai: I don't want to dwell on Fleetwood Mac, but contrary to the big commercial image of the band, there is a strong folk influence that may be overlooked.

Buckingham: If people only remember certain hits, they may be pigeonholing. You can go to the *Tusk* album, which may not be that representative of the band as a whole, the quirky album, but much of the sound is almost living room-ish, very underplayed in a lot of ways.

Bonzai: Getting back to the new album, "Street Of Dreams" has some interesting sounds of a rainy night.

Buckingham: Richard and I were working on that one day, and it had just started to rain. It's not the first time that it's been done, but we tried to use it in a musical context, and then at the end it came up so loud that it was as if someone was riding the cymbals. Two tracks of rain, and then when we mixed in Hollywood, we went out on the street and got cars going by.

Bonzai: This song talks about your father.

Buckingham: Yes, it certainly does. He died long ago, but I found myself remembering how I would go and just talk to him. It's a song about loneliness, and it was during a period of disillusionment when I wrote that. Actually, that section about my father was written earlier than the rest of the song. Also, the Rodgers and Hammerstein number "Say We'll Meet Again" was one of my father's favorite songs, and the two became a pair in my mind.

Bonzai: What did you learn from your dad?

Buckingham: A sense of joy, enthusiasm and compassion—not judging people, which I don't always adhere to, I admit. He was the greatest father you could imagine. I have two brothers, and he shared in all the activities, games—he was just always there. He wasn't caught up in business, maybe to the point of it being a fault. He wasn't the best businessman in the world, but that wasn't his priority. Many friends had fathers who were caught up in the business world, and they suffered because of it.

Bonzai: Was he a musician?

Buckingham: No, that's weird—

there isn't a musical bone in my family. For me, it all started when I was six and my brother, who is seven years older, brought home "Heart-break Hotel." It was a revelation compared with records by Patti Page and the Sons of the Pioneers, or *South Pacific*, for that matter. I was suddenly hit with that song, and the image of a guy with a guitar. A lot of kids must have run out and got guitars at that time. That was it, and I managed to collect a lot of 45s, a lot of the great '50s classics. I don't read music and never had any lessons. Just played through listening to records. I'm a real primitive—what can I say? [Laughs] Who could tell?

Bonzai: Could you tell me about your engineers? What did Kevin Killen contribute?

Buckingham: When we were at the point where we felt we were as done as we could be at the house, we sought out someone who could not only mix, but could provide some perspective. I had made the decision to not mix at the house, because the room isn't very flexible, and, also, Richard and I were a little too close to everything. Having made that decision, we looked for someone who could go through the material with us and say, "Well, that one doesn't need anything, but this could use a little something." Kevin brought in the outside musicians.

Bonzai: What format were your tapes in?

Buckingham: I have a 24-track Sony digital and an Otari analog, so some songs were synched together and were eventually dumped over to a 48-track digital. Afterward, we went ahead and mixed with Kevin and with Chris Lord-Alge.

Bonzai: Who mixed what?

Buckingham: Chris Lord-Alge mixed "Don't Look Down," "Wrong," "All My Sorrows," "Soul Drifter," "Surrender the Rain," "Doing What I Can," "Turn It On" and "Say We'll Meet Again." Kevin mixed "Countdown," "This Is the Time," "You Do or You Don't" and "Street of Dreams." I mixed "This Nearly Was Mine." It's interesting because Kevin works on a Neve, which has a transformer kind of sound, a little bit softer. Chris uses an SSL, which is a little different sounding—has a little bit tougher sound.

Bonzai: It's a very colorful album with lots of different textures and

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sounds, but it all holds together real well as a unit.

Buckingham: Yes, just holding by a thread there [Laughs]. From Rodgers and Hammerstein to "This Is the Time." Whoa!

Bonzai: So, how do you like the music business?

Buckingham: [Burst of laughter] What kind of a question is that? Well...I like it, but what can you say—it's like any other business. You've got the same problems; you've got politics to deal with. The competition is fierce right now. When you think of the demographic for someone who has been around for a while like me, there's more of a challenge to make a dent in something like MTV, which in itself has changed a lot in the past year or two. The demographics seem to be being pushed down; they've made it into a lifestyle kind of channel. But that's just a slice of it. It's a challenge like anything else. There is more competition now than there was when Fleetwood Mac were doing their thing. The way that the economy has gone isn't helping.

That's the bottom line stuff, but it doesn't affect what I do in my garage. On another level, I would be lying if I said I wouldn't like to sell some records. But I'm still doing the work for the work. I saw the machine greased up to the max in Fleetwood Mac during the *Rumours* time, and I was a bit ambivalent about all that.

Bonzai: It must have been quite a feeling when you surpassed the Beatles and other groups in sales...

Buckingham: Yes, and there was a focus on the phenomenon and the soap opera aspect. It became a little more important than the music in a way. There was also the momentum of that machine, and the idea that "If it works, then run it into the ground." I didn't relish making "Rumours II" because it felt like making it for the wrong reasons. Obviously I did a total 180, and maybe I was being a little subversive with *Tusk*. It might have been a way of keeping myself honest. Actually, you could pull out my material from that album and call it my first solo record.

Bonzai: How long were you a part of the Fleetwood Mac machine?

Buckingham: From 1975 until '87, after *Tango in the Night* came out. I produced the album but didn't tour, and that was the jumping-off point. The first year I was just resting, letting the dust settle. It was a long stint. After that I lived a very monk-like existence. I was in the studio, working single-mindedly.

Bonzai: As you establish a separate identity, do you think that the audience knows your specific input with Fleetwood Mac?

Buckingham: There is a certain faction who do, a certain number of people who followed my efforts within the band from 1979 when *Tusk* came out. That and my two previous solo albums were sidebars to the mainstream activity. There are some who understand the course I've taken, and there are those who just think of me as the guitar player from Fleetwood Mac who wrote some hits.

If you listen to *Tusk* and go through my solo records it would provide background, but all you can say is, "Is this new album worthy of attention on a big scale?" But commerciality is only one validation. I think some people will appreciate my attempt to pursue things aside from the pursuit of money. I am in a position where I have the luxury to do that.

Bonzai: You mean if you wanted to just put your feet up on the front porch and relax, you could?

Buckingham: Pretty much. I have a healthy mortgage, but I could do that. And there are options open to me, like producing one album a year. I could remain low-key and go fishing, but I don't know if I have that in me. There are ideas that come to me, and I have to be accountable to myself. I really need to be responsible to my work—to the gift, as they say.

In many ways, this album is a starting point for more. I just feel like I'm coming into a good time. On this record, I took the solo sidebar, which was a valid and truthful thing alongside the mainstream thing, and tried to reconcile the two into something greater. We'll just have to wait and see if it works. ■

In the spirit of Stevie Nicks, roving editor Mr. Bonzai made four costume changes over the course of this interview.

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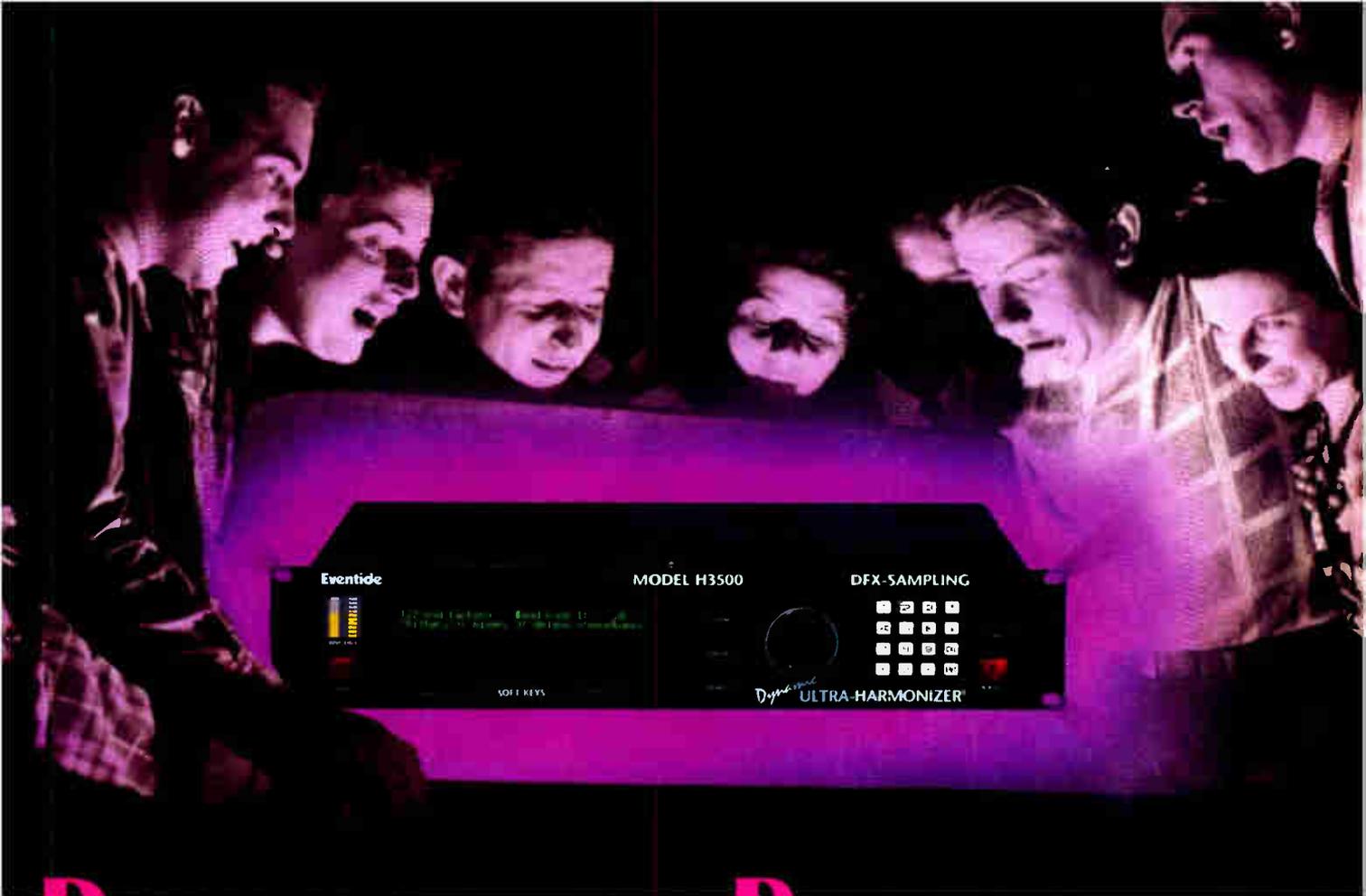
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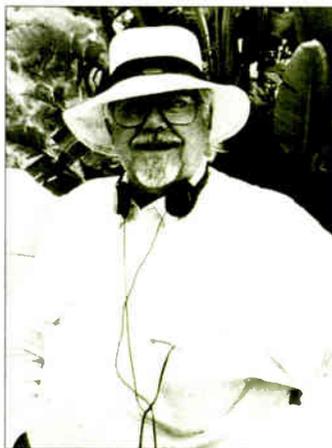
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Fostex Time Code DAT in Film Production

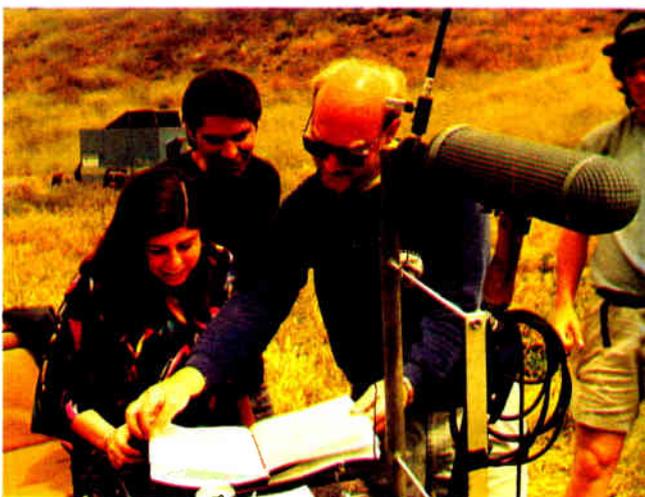
Think back to the June Earth Summit in Rio. First, President Bush was not going to attend, then he decided to attend, for better or worse. Well, buried in the publicity hoopla, a music video produced in

Robin Winter, Steve Hawk and Mike Riner looking through the Fostex manual on location for the "Please Save Us the World" film shoot.

L.A. for the United Nations Environment Programme Global Youth Forum made its worldwide debut. *Please Save Us The World* is noteworthy because a lot of professionals in Los Angeles, many of them

union, donated their time and equipment to make this no-budget film come to life. It also was the first 35mm music film shoot to make use of the Fostex PD-2 time code portable

a year now, but independent production sound mixer Steve Hawk, C.A.S., purchased the first production model from Audio Services Corporation following last April's NAB



DAT machine from beginning to end.

Prototype PD-2s have been in the field for nearly

show. At the same time, angered by Bush's initial decision to not attend the Sum-

—CONTINUED ON PAGE 59

FACILITY SPOTLIGHT

Todd-AO/Glen Glenn Scoring Stage

The big get bigger. Todd-AO/Glen Glenn, the country's largest audio post-production company, recently opened the country's largest and most technologically advanced scoring stage. Acoustically, aesthetically and technically, it truly stands alone.

Known in previous incarnations as the Republic Stage, the Rad-

ford Stage and the Evergreen Stage, this marks the third time in 40 years that the huge, open space on the CBS Studio lot has been overhauled. Todd-AO spent \$3 million and more than nine months in



PHOTOS: JOHN TAYLOR

The newly redesigned and refurbished scoring stage of Todd-AO/Glen Glenn, with room for 150 musicians. Also, the custom Neve in the spacious new control room.

construction getting the facility up for a June 23 re-opening. With solid bookings through October (scheduled before the grand opening), it seems

—CONTINUED ON PAGE 60

L.A. Post Impressions

The Los Angeles post-production market is unique. Nowhere in the world do the demands of film, television, music and commercial sound production

word-of-mouth can spell doom.

Walk into any L.A. audio or video post facility these days and the term "full-service" will eventually come up. For a video post house, full-service may mean adding a high-

as complex as providing satellite uplinks.

What, then, does full-service mean in the L.A. market today?

ADVANTAGE AUDIO, BURBANK

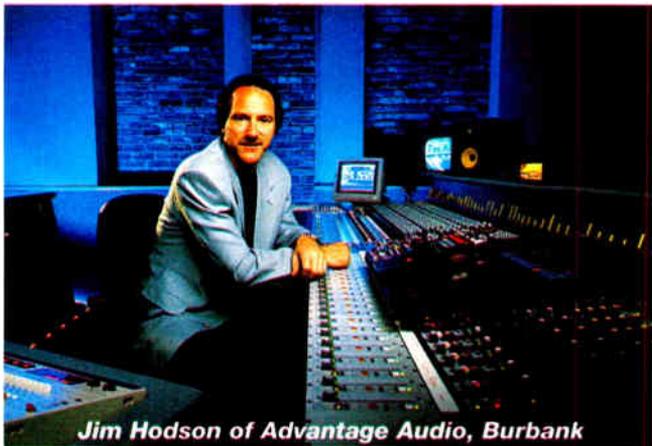
Bill Koepnick and Jim Hodson, co-owners

Featured clientele: Emmy Award-winning Saturday-morning sound; cartoon noises on Cool World; expanding into commercials and live-action.

"Post-production clients tend to look either for full-

service facilities or those specializing in one particular area. Advantage Audio is a smaller facility designed for soundtrack production for broadcast television. The majority of our clients want complete editorial services, meaning dialog, music and sound effects, as well as recording Foley and performing the final mix. We pay special attention to providing extensive capabilities for the creation of custom sounds. Many of our services transfer well to film,

—CONTINUED ON PAGE 61



Jim Hodson of Advantage Audio, Burbank

converge so dramatically. Burbank, Hollywood, Studio City, Santa Monica—facilities and support services abound, yet the trick is to keep clients in *your* building from beginning to end, and keep them coming back. Repeat business is crucial, and bad

end audio room or a telecine suite. For an audio house, it may mean adding a D-2 digital video deck or some type of pre-production room. Full-service can be as simple as making sure the *L.A. Times* is in the room when the producer walks in, and



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Al Schmitt

Armin Steiner

Woody Woodruff

Producers

Andre Fischer

David Foster

Tommy LiPuma

Artist

Natalie Cole

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Capitol Studios

Conway

Group IV

Hit Factory

Hollywood Sound

Recorders

Johnny Yuma

Lighthouse

Ocean Way Recording

Pacifique

Schnee Studios

Tracks

Twentieth Century Fox

Scoring Stage

Westlake Audio

Dangerous

Engineers

Matt Forger

Jean-Marie Horvat

Teddy Riley

Thom Russo

Bruce Swedien

David Way

Producers

Michael Jackson

Teddy Riley

Bruce Swedien

Artist

Michael Jackson

Studios

Larrabee Studios

Ocean Way Recording

Record One Studios

Record Plant

Smoketree

Westlake Audio

Luck of the Draw

Engineer

Ed Cherney

Producers

Bonnie Raitt

Don Was

Artist

Bonnie Raitt

Studios

Capitol Studios

Conway Studios

Ocean Way Recording

Magic and Loss

Engineers

Roger Moutenot

Mike Rathke

Lou Reed

Producers

Mike Rathke

Lou Reed

Artist

Lou Reed

Studios

Electric Lady

The Magic Shop

High Lonesome

Engineers

Joseph Bogan

Tom Knox

Kyle Lehning

Producer

Kyle Lehning

Artist

Randy Travis

Studios

Groundstar Lab

Nightingale

Recording Arts

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—FROM PAGE 52, DIALOG FOR "THE PLAYER"

arate tracks," Altman says. "We use half-inch tape and two Otari 8-tracks, so we can have as many as 14 separate channels. Then that's all re-employed in the final mixing. I haven't done any looping in 20 years. I'll occasionally go in and add a line, but we don't even put looping deals in the actor's contracts."

No looping? In today's Hollywood? "Bob is committed to the idea of not looping—for any reason," says production sound mixer John Pritchett, who has worked with Altman on *Streamers*, *O.C. and Stiggs* and now *The Player*, a wry, often acerbic portrayal of behind-the-scenes Hollywood. "He believes the performance is compromised in a way that's not worth it. That's why he wants the option of gathering all these bits and pieces from the performance, rather than trying to get people to re-create."

Gathering those bits and pieces was Pritchett's job on *The Player*, and it sometimes involved as many as 15 mics—radio and boom and plant mics everywhere—two Sonosax mixers, two Otari MX-5050 8-tracks, phone taps, even a wireless monitoring system for Altman and others to hear what was going down to tape. The equipment all fits on "the largest sound cart ever made," measuring 6.5-foot-long by 5-foot-high by 28-inches-thick, "so it can still fit through a door."

During the shoot, Pritchett made a work-track mix down to a prototype Fostex PD-2 DAT machine for the picture editors (supervised by Geraldine Peroni). At the same time, he kept the seven open channels discrete (the eighth was for a 60Hz sync pulse) so that dialog levels could be varied in the final mix. Submixing was crucial to scenes such as the complex *eight-minute* opening shot and the parties. Joel Shryack handled the submixing.

"We used one 8-track and two Sonosax mixers," Pritchett explains. "They're built with pre- and post-fader line outputs on each input. I had a large patch bay built by John Eldridge that allows me to feed the left-right-aux as submix buses into the first Sonosax, which goes straight to the multitrack. On the opening scene, we had 15 mics and only seven tracks. The mix that you see in the final is pretty close to what we did, but we wanted to give the post-

production people handles on either end. Just because I'm fading mics out here and there doesn't mean they necessarily have to.

"When Bob edits," Pritchett continues, "he pulls individual tracks from the multitrack just to see what was there—to listen to conversations—and he may actually use the conversations in sync, but he may just pull them out and use them as extra sounds. The post people have to go back and figure out where everything is. It's a lot of material to sort through." (For Altman's next film, *L.A. Shortcuts*, currently in production, Pritchett will use the PD-2's time code function, which not only gives him automatic cue points, but also allows post-production access to all tracks at any point through the use of an autoassembly system.)

So many scenes in *The Player* involve complex dialog associations and, consequently, complex technical requirements: the voyeuristic phone calls (radio mics and a cellular phone tap), the restaurant scenes (plant mics and radio mics) and the parties. For Pritchett, the party at Sydney Pollack's house, where our hero first betrays his guilt, was the most difficult.

"We had all these very high-powered personalities, none of whom were given lines to say but almost all of whom were given microphones," he says. "We didn't know when they

were going to appear, what they were going to say or what they were going to do. And the principals are carrying on a very quiet, confidential conversation, but they are wandering through all of these other conversations. We only had three hours to do it, because for them it was just a party. When the party was over, we were through shooting. It was a very short work day."

On to the final. Six weeks on the Otari Premiere in Stage 3 at Skywalker South (Santa Monica) with Matthew Iadarola on music and dialog, Stanley Kastner on effects. This is where the foreground/background dialog blend is created, with everything in balance.

"It's just the way music is done," Altman says. "You put a mic on all the instruments, isolate them as much as possible and do your mixing."

"I compare it to mixing a drum sound," Iadarola adds, "where you have all these channels of tom toms and snares and kick; they all make up a drum sound, but they have to be balanced against one another. If I have radio mics and booms for one shot, I have to EQ them all to sound natural. Then I have to do that all over again for the next shot. It isn't like you just open them up and they all play. Each shot needs tuning, which makes it more methodical in

—CONTINUED ON PAGE 56

PRODUCT SPOTLIGHT

InterlockDisk Digital Recorders/Dubbers

WaveFrame and Magna-Tech Electronic have teamed up to create the InterlockDisk line of disk-based, dubber-style recorders and players due for debut in September. Based on magneto-optical (MO) technology, each unit uses readily available erasable disks, providing up to eight tracks of digital audio. The random-access environment offers the ability to instantly advance or retard any track, while the layout of the front panel simplifies operation with familiar, dubber-style controls.

The line is designed to smoothly integrate with conventional sprocketed devices. As a bi-phase master, the

InterlockDisk acts as a bi-phase controller, simulating the ballistics of physical transports. In slave mode, the system is said to follow the acceleration curve of the master, and any unit may be taken offline without losing the sync relationship. Rear panel sync connections include six bi-phase inputs, bi-phase output, LTC in/out, VITC in, composite video/house sync, internal crystal AES/EBU clock and TTL level word clock. Among the supported control protocols are MIDI; and RS-422A/485, RS-232C and Centronics parallel ports are available for peripheral control.

A front panel headphone jack is provided; the rear panel has eight balanced analog inputs and outputs, two analog monitor outputs and AES/EBU digital in/out ports. For more info, call Felix Kur at Magna-Tech Electronic in New York City at (212) 586-7240.

—George Petersen

—FROM PAGE 55, DIALOG FOR "THE PLAYER" the mixing process."

Individual sound units were delivered to the dub stage on 3-band magnetic film. The film is not common three-stripe, as Iadarola points out, and it's rather unusual stock these days. "They did it that way so that they could use very traditional editing techniques of wiping and scraping with a razor blade," he says, "or wiping with an acetone, to get rid of pops and clicks while manipulating the sound mechanically. The drawback is that you only have three of the seven possible tracks. You have to select and then transfer at some point. I also had John [Pritchett's] DAT work track, which I

used a lot of the time. His choices were very good in the mixdown."

Because everything comes in unlocked on separate tracks, there was quite a bit of flexibility in the final. Radio mics from Tram, Sanken and Lectrosomics provided the isolation on the set (though Pritchett is quick to point out that they don't prevent bleeding; you can maintain acceptable bleeds as long as you obey the 3:1 rule), while booms from Neumann and Schoeps provide the ambience. Plant mics go everywhere, most notably on the tables in the restaurant scenes.

As on the set, the trickiest scenes for the mixers were the party scenes because of the visual shifts and con-

stant introductions of new characters. Equally tricky, however, was a scene that takes place in a screening room, where Lily Tomlin and Scott Glenn appear onscreen, with the studio types watching from the seats and carrying on conversations.

"Everybody was untreated," Iadarola explains. "We had to try to create the feeling of their coming off the screen, in a screening room, with people talking to each other in the background about the screening, and people talking in the foreground, with all of it shifting. In terms of dialog texture, that was the most difficult and probably the most fun." Sounds like a typical Altman film, if there is such a thing. ■

Entertainment Digital Network

When Ron Howard wanted to supervise the final mix for *Backdraft*, he went to a screening room at Skywalker South in Santa Monica. Same for Barry Levinson on *Bugsy*. Both films were being mixed 350 miles away at Skywalker Sound in Marin County, but neither director had time to leave L.A. Thanks to a dedicated T1 phone hookup and some new technology from Dolby Labs and LucasArts, they didn't have to. The output came directly from the console and was sent down south. With the projectors locked as well, there was synchronized picture and sound on both ends—the world's longest screening room.

Tom Kobayashi, general manager of Skywalker Sound, and Tom Scott, director of engineering, pleased by the *Backdraft* and *Bugsy* success, began to consider an expanded network business that would stretch coast to coast. The initial foray into long-distance screening, remote ADR and transfers caught the eye and ear of Howard Schwartz, owner of a multiroom post house in New York City.

"Tom and Tom presented to me that they had hooked up Skywalker North and South," Schwartz remembers. "I thought, 'What a fabulous thing. What would happen if we got it down so that we could do remote voice-overs?' Fiber optics gave us multichannels, whereas with satellite we occasionally have stereo, but it is not necessarily discrete stereo."

While Schwartz acknowledges that he can't move completely away from satellite because he does too many overseas voice-overs, "I wanted to go to a system that would be discrete, be the same price for up and downlink or in and out, and handle multichannel. We're sending 6-channel mixes, 4-track with time code and multichannel digital material, back and forth from the coasts and England all the time in the commercial business. When Tom showed us this, we said, 'Holy cow. It's 20 to 20k, total repeatability, bidirectional, synchronizable, multichannel—go for it.' So they hooked me up, and I've been using it ever since."

That collaboration has led to the formation of Entertainment Digital Network, a new long-distance, terrestrial-based digital audio network spearheaded by the two Toms, together with LucasArts colleagues Wayne Wagner and Andy Hendrickson. E.D. Net has been in business since July, transferring audio and data across the U.S.

Nobody involved with E.D. Net expects to replace satellite communications any time soon. The goal is to "shrink the country down," as Schwartz says, with a commitment to high-quality digital audio transmission. Along the way, member studios save on air fares, hotel costs, faxes, lunches, and so on. You need Michael Jordan in New York for a Nike spot while the Bulls are playing in L.A.? No problem.

To test the viability of terrestrial digital audio transmission, initially only major-market studios will come

online. Besides the two Skywalker facilities and Howard Schwartz Recording, member studios include Dolby Labs in San Francisco, L.A. Studios, Ron Rose Productions in Detroit, Chicago Recording Company and Steve Lawson Productions in Seattle. At a member studio, E.D. Net installs a black box of phone equipment, called a channel bank, which terminates the T1 line and breaks it out into appropriate serial data. The Dolby DP501 and DP502 encoder/decoder units, which make up the Dolby AC-2 transmission standard, provide A/D and D/A conversion and low bit-rate coding (data compression).

Obviously, it's the Dolby units that run the network machine. "The two channels in the Dolby AC-2 scheme are encoded into a single 256 kilobit datastream, but the audio stays completely separate," Scott says. "Even though they are multiplexed together—so that they are really locked in phase—when you pull them apart at the far end there is no crosstalk, which I found a little hard to believe. We did a bunch of tests, putting distorted, high-level time code down one channel, with quiet audio on the other. It was amazing. No crosstalk."

"Our screening experience led us to create and patent a system for synchronizing machines, using bi-phase signal sent down a data channel," Scott continues. "That's how we lock two projectors or two recorders or a roomful of dubbers."

In the not-too-distant future, digital video as well as audio will be

—CONTINUED ON PAGE 59



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—FROM PAGE 56, DIGITAL NETWORK

sent over the phone lines, though right now the data requirements are too high. Typically, you need 90 megabits a second for an NTSC digital TV picture. T1 (or DS1) has a limit of 1.5 megabits. Several systems are being developed for squeezing that information into a smaller bandwidth. Teleconferencing at 320 to 768 kilobits a second is an example of a practical, compressed video application. Small-screen picture phones with data rates as low as 56 kilobits are on the market now, though the picture does not translate well to a larger screen.

E.D. Net post sessions have already taken place, even though the legalities of forming the company are still being worked out at press time. Schwartz gives an example, in inimitable Schwartz-ese: "An announcer in New York. Sound designer/producer in Skywalker North. Client is IBM. Picture sent the night before on 3/4-inch with time code. Matches the time code at Skywalker. But we forgot to put the music on the 3/4. Locked up our 3/4 to their 3/4 and shot the music down the line. Announcer read to music and picture. No controls being used in New York. My engineer only started and stopped a time code DAT as protection. Punch-in, which is another channel, with so little delay, was seamless. Very scary. We walked in the room and asked, 'Is it working?' My engineer said, 'It's unbelievable.' And we all smiled. It was a Wow."

Look for an Entertainment Digital Network sample session from the AES floor at the convention next month in San Francisco. ■

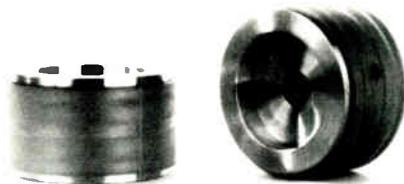
—FROM PAGE 52, FOSTEX TIME CODE DAT

mit, line producer Robin Winter (whose careers in journalism, live sound and production include numerous "firsts") and director Glenn Goodwin were conspiring to make a U.S. video entry to the Rio Earth Summit. They had five weeks to get a finished product to the UN for inclusion on the program, and they had no money. Where to begin?

On the phone, naturally. This is L.A. To make a long story short, Winter, Goodwin, production manager Ken Calauastro and others as-

—CONTINUED ON PAGE 60

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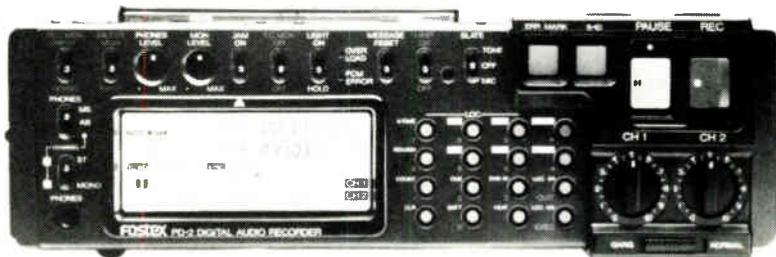
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—FROM PAGE 53, TODD-AO/GLEN GLENN

the effort is appreciated by both the local and international recording communities.

The company also scored a significant coup by naming Shawn Murphy, whose music engineering for feature film scores includes *Dances With Wolves*, *Glory*, *Far and Away* and, most recently, *Batman Returns*, as supervising sound mixer for the new facility. He'll direct a four-person staff, which includes two engineers, a recordist and a full-time manager.

The stage itself is approximately 74 feet by 102 feet, with 32-foot ceilings. The control room has been moved from the left back corner to the center of the back wall; the ta-

pered end contains the big screen, with a drum/iso booth at stage-right. The acoustical treatment of the stage was handled by Charles Salter Associates of San Francisco. The architects for the project, also responsible for the control room acoustics, were Boto Architects Inc., under the guidance of company president Bret Thoeny.

"When we went in and measured the room, it wasn't an even reverb time," says Clay Davis, VP of engineering at Todd-AO and project manager for the redesign. "We took down the linear glass on the side walls and put a layer of gypsum all around, then remeasured the room. We added more diffusion toward the screen to pick up extra floor-to-ceil-

ing reflections and make the reverb compatible. It's now around two seconds." Acoustical wedge diffusers were also placed along the beams in the ceiling; fiberglass panels dot the walls.

The control room was moved back and center and significantly enlarged. A double-glass window (four feet between panes) was installed, angled back at the corners to allow for wide sight lines, while four feet of bass trap were added to the back wall/ceiling. ATC monitors, powered by Krell and Ramsa amps, handle the 4-channel surround monitoring.

The centerpiece of the control room is a 60-input custom Neve V3, spec'd by Shawn Murphy and containing a custom 6-channel Neve

—FROM PAGE 59, FOSTEX TIME CODE DAT

sembled a small army of volunteers, facilities and equipment manufacturers, all of whom donated time and materials. "These are people you don't just work with," Winter says. "These are people you invite over to dinner. And every one of them shared this commitment to the environment."

Goodwin, meanwhile, found the perfect song, "Please Save Us The World," by 13-year-old Love Hewitt, which had been released in Japan on CD and made into a rough video. Hewitt's manager, David Helfant, served as executive producer for the Rio project.

The process of shooting and producing was not much different than a normal music video, except perhaps that there were six days from initial shoot to the airing in front of the UN General Assembly. And the PD-2 was used no differently in the field than a typical Nagra 1/4-inch. However, the PD-2 sped up the process because it can locate to an A-time number, time code number or program number. And it has two memories that can be used to access programmed cue points through other keys. No more "waiting for the sound team" when you want playback on the set.

But, the PD-2 has no time code cross-resolving capability, which meant compensations had to be made at some point for the .1% telecine slowdown. This is where things got interesting.

Transfer from CD to DAT for playback in the field took place at

Mix Magic in Los Angeles, supervised by Gary Frakin. "The CD of the master song was sped up .1% and laid down on the Fostex D-20B DAT machine, with 30-frame code on it," explains "codemaster" Mike Riner, senior product specialist at Audio Services Corporation, North Hollywood. "On the set, Steve Hawk played it back at the correct sampling frequency, so there wasn't any alteration of speed. When they got into telecine, they fed it code from the Rank Cintel at 29.97, and that pulled it down."

But this is just one way of doing it. According to Riner, there is no standard method of dealing with the telecine slowdown and DAT material, because the machines haven't been out long enough. At Fototronics, Burbank, he says, they have the D-20 interfaced to their TJC editing system, accomplishing the .1% slowdown through the RS-422. The D-20 can also be fed an appropriate word sync to pull it down.

"You can do it before, or you can do it after," Winter explains. "I chose to do it before. Because we were doing playback on the set, I wanted to make sure that we had all compensations working prior to the shoot. That way, when we went from the set to telecine, we could lock up immediately and not have to transfer again. As long as Love was singing to the track, she matched up."

Telecine took place at Image Transform (with the help of Gavin Schutz and Merl Sharp), where the Fostex manuals were pulled out, and everybody learned about DAT lock-

up as they went along. "Image Transform had a D-20B, which has a built-in chase synchronizer," Riner says. "They just fed it 29.97 code that was incremented by the Rank Cintel. That pulled down the 30-frame tape and caused the .1% slowdown to keep sound in sync with the image."

The audio from the telecine stage was used on the final master, and, according to Winter, she had never heard such quality sound in that environment. "The lockup was so perfect," she says, "that even Love's accentuated 'esses' and her lips smacking together could be seen *and* heard. It was incredible. It blew me away. We were jumping up and down when it locked in, because we weren't sure that it would. We had backup. Analog was standing by, and I'm very happy that it wasn't used."

Then came offline and online, at First Light Video and Santa Fe Communications. There are a thousand-and-one stories surrounding this "never-ending miniseries," as Winter calls it, perhaps none more important than the dedication and volunteerism of so many in the L.A. production community. The credit roll is as long as the film.

Besides the huge list of individuals, there was Fostex, Audio Services Corporation, Sony Tape, 3M Tape, Panavision, PASKAL Lighting & Grip, Technicolor, Limelight Productions, Lorimar, Paramount, Walt Disney Productions, Audient Marketing and countless others. Look for it to be bumped back to film this fall to run in theaters. ■

film monitor module. Typical racks of outboard gear line the producer's desk and one side wall; the Sony 3348 48-track digital recorder, two Studer A827 24-tracks, DATs, video decks, Albrecht and Magna-Tech dubbers, synchronizers—all are in an adjacent machine room. Four fully restored EMT 140 plate reverbs are housed in a concrete storage space off the main room. A DDA D Series console serves as the cue mixer out on the stage. ■

Tom Kenny is an associate editor for Mix.

—FROM PAGE 53, L.A. POST IMPRESSIONS

but clients must be willing to transfer to video while we work.

THE ENTERPRISE, BURBANK

Thom Brown, studio manager

Big-time additions: This extremely hot music house also does post: brought in two SSL 8000s, a 96-in and an 80-in; also grabbed Brian Malouf and made him a staff engineer; own eight Sony 3324s through their rental house. Audio Affects.

"I believe anybody can buy the right equipment, and I believe we have more than anyone. But it really comes down to how you take care of your client. I guarantee my clients that if they book time at The Enterprise, and for any reason I then cannot give them the time, I will book a room at a comparable facility and supply all outboard gear, multitracks—you name it—that you would have gotten here, right down to the fresh fruit, fresh pastries, fresh vegetables and *L.A. Times*. For the exact same rate, even if we must pay for it. And it's happened."

525 POST, HOLLYWOOD

Tom Davis, director of audio

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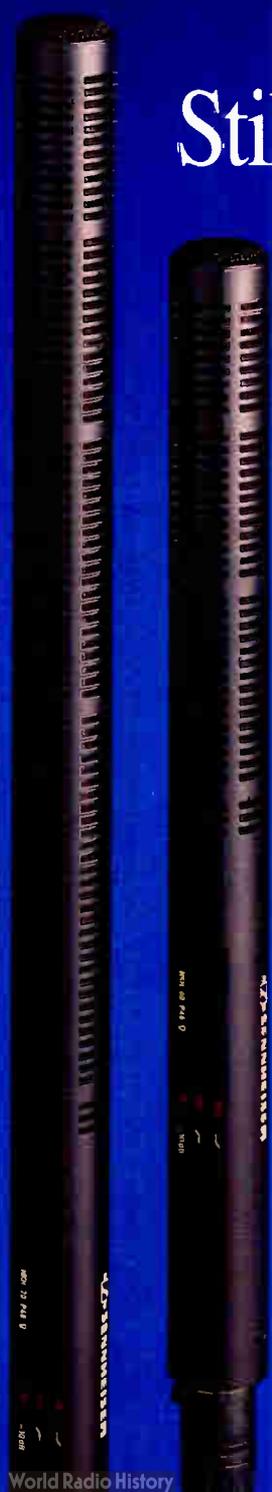
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—CONTINUED ON PAGE 63

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can handle some form of all the major requirements of posting a project once the shoot is done—from telecine, through offline to online, into graphics and special effects, and then to audio for sound effects and mixing. But editing and mixing a motion picture or theatrical trailer is nothing like editing and mixing a 30-second promo for Fox Television. The monitor requirements and editorial techniques are in different worlds. I think the most important consideration is the personnel. Audio mixers and cutters are not generically the same across the whole post audio spectrum. When people say 'full-service,' they are speaking of their specific audio point of reference and the specific capabilities of their facility and personnel."

Post Logic, Hollywood
Miles Christensen, CEO
Bill Frazee, president

Massive Expansion: Three floors, all reconstructed, one strictly for client's offices; SSL and Neve mix suites; Akai DD1000s; Gefen M&E Organizer; two telecine rooms, with Alpha Image 501

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Christensen: "Hollywood has overbuilt its capacity in servicing the television client. A lot of facilities offer transfer, editorial, Paintbox, and audio prelay and mix, but they are all capitalized, staffed and run to service long-form TV. This facility is literally on its own in the Southern California market. Talent and support staff are specifically geared for the spot market. The audio facilities in town that primarily do advertising do not offer video post. The post facilities that handle the ad market do not support audio as a business. You can't put the client in a corner creatively or operationally. The expansion supports the split in our client's needs."

Frazee: "You cannot imagine the chaos when a client finds out that their spot has been sold and is due on the air in 12 hours or less. They virtually run on fire to meet their revised deadline, and this Post Logic scenario supports their business and creative needs. The advertising client is not too predictable, but if you know their needs and build to suit...that is the

goal here."

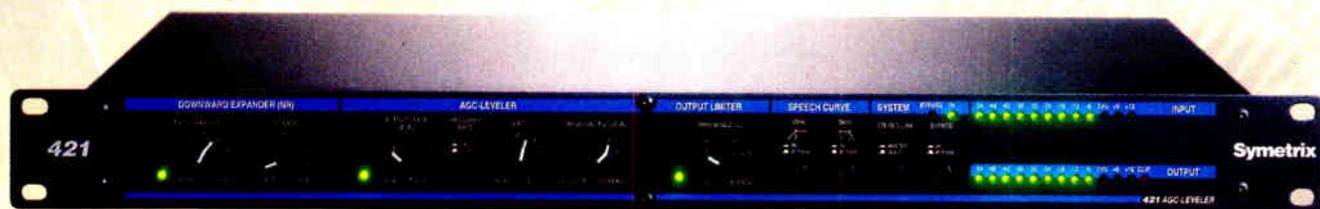
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Jeremy Hoenack, president

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POST-PRODUCTION PIONEER

James G. Stewart



James G. Stewart (left) and Terry Kellum seated at the RCA console that Stewart helped design for RKO's recording stage (circa 1937).



Again at the RCA console, with Orson Welles leaning over the top to confer with the sound engineers (circa 1937).



W

BY
JOHN MICHAEL
WEAVER

When James G. Stewart arrived in Hollywood in the late 1920s, the “talking picture” was still in its infancy. During the 50 years that followed, he remained consistently on the forefront of the technical and artistic advances made in film and television sound. Retracing the course of his career reveals a great deal not only about Stewart’s personal accomplishments, which include nine Academy Award nominations and three Oscars, but also about how audio post-production evolved from a shaky new craft into the complex and sophisticated process it is today.

GETTING IN ON THE GROUND FLOOR

Stewart’s first love was radio. In 1920 at the age of 13, he participated in the experimental AM broadcasts conducted by Westing-

James G. Stewart's career in film sound spanned the first fifty years of the medium's history.



James G. Stewart adjusting a condenser microphone on an RKO sound-stage during the early 1930s.

Hall theater, one of the largest cinemas ever built.

Stewart's first job in a Hollywood studio was with RKO (then owned by RCA), which hired him in 1931 to help develop a noise reduction system for the company's optical recording equipment. When the studio decided shortly thereafter that this type of research was a luxury it couldn't afford, Stewart was transferred to the production side of the operation and worked as a "stage man" (boom operator) on many early sound film classics, among them George Cukor's *A Bill of Divorcement* (1932), Katherine Hepburn's film debut.

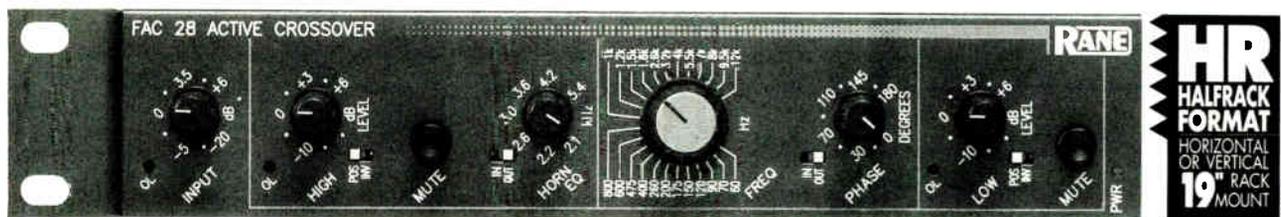
"You had big crews in those days, six or seven men just for sound," Stewart recalls. "You had a mixer in a booth, a stage man, maybe two sound electricians and two sound grips. When we went on location, half of the time I didn't even know everyone on the sound crew." Stewart also points out that, for a short time during the early days of Hollywood's conversion to sound, the production mixer's power on the set sometimes rivaled the director's.

house engineer Frank Conrad that led to the setting up of KDKA Pittsburgh, America's first commercial radio station. When he was just out of high school, Stewart started his own radio repair business the same year that Warner Bros. released its first Vitaphone (sound-on-disc) feature, *Don Juan* (1926).

Two years later, Stewart's techni-

cal expertise and knowledge of sound reproduction helped him land a job in New York with the newly formed RCA Photophone Company, manufacturers of film sound recording and playback systems. While working for RCA, he designed, installed and maintained some of the first sound systems put in movie theaters, including the Radio City Music

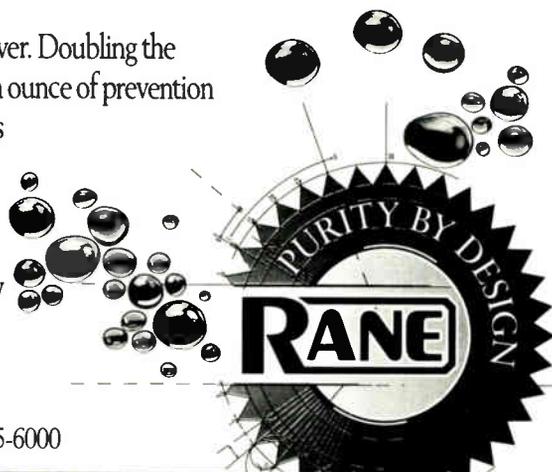
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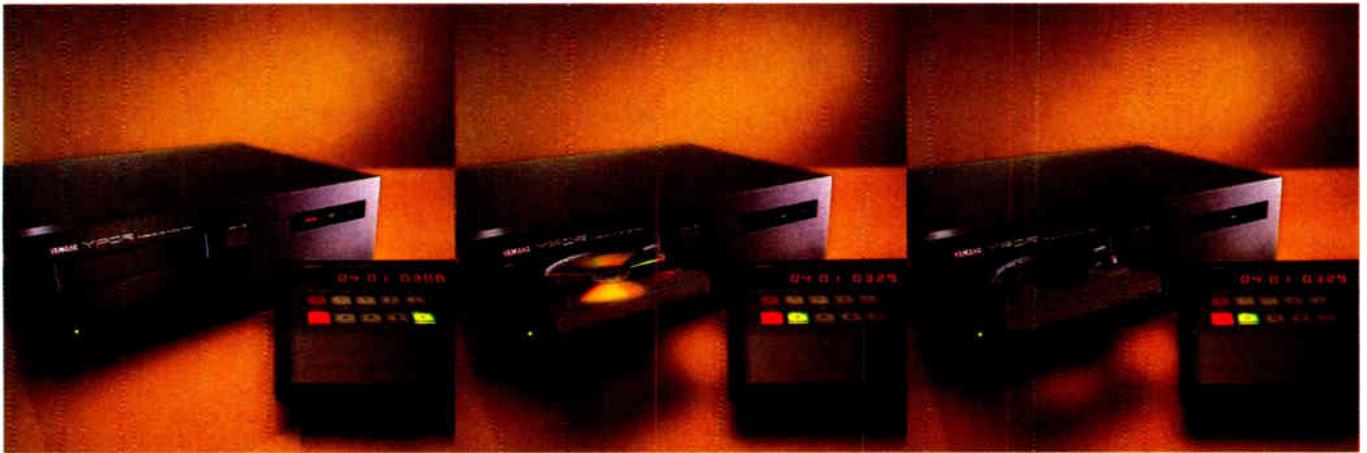
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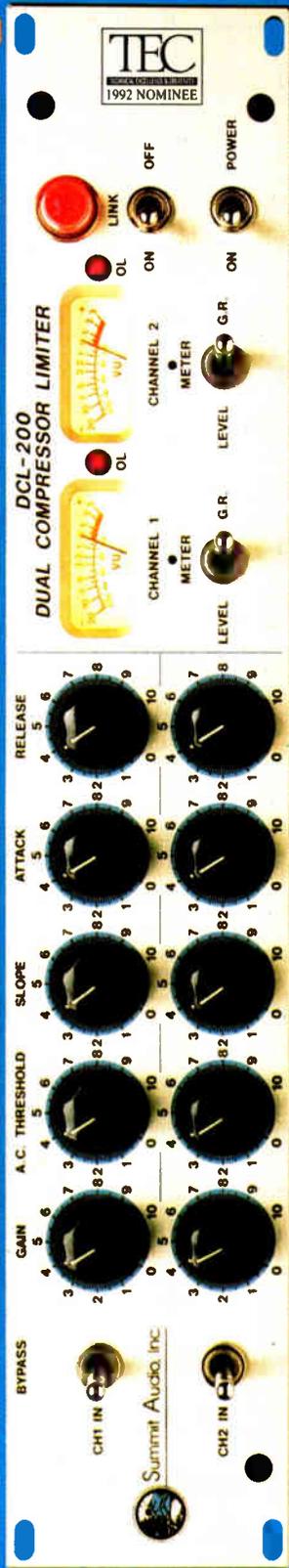
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Recordists were able to insist that cameras be isolated in soundproof booths and even had the authority to cut a scene-in-progress when they didn't like what they were hearing.

The results were not always pleasing. "If you *look* at pictures made in the first year after sound was introduced, they have a static quality that's terrible," Stewart says. It wasn't long before directors rebelled against the artistic restrictions being foisted on them. "The demands the creative people put on the sound technicians [brought about] improvements in both recording technique and equipment, such as directional microphones and better booms."

FROM THE DESERT TO DUBBING

Stewart's move into post-production was partially the consequence of a sunstroke he suffered in 1933 while on location in the Yuma Desert, where he was recording production sound for John Ford's *The Lost Patrol*. While recuperating back in Hollywood, he was asked to sit in on some "dubbing" (re-recording) sessions at RKO and write a report on what he observed.

"In the early days, re-recording was a process you indulged in only if it was absolutely necessary," Stewart says. "The release track on most pictures was 80-90% unaltered original sound." Whenever re-recording was deemed unavoidable, only specific sections of a reel would be worked on and later intercut with the production track.

At first, RKO productions were re-recorded using equipment originally designed for other purposes and under working conditions that were far from ideal. Individual optical tracks were played back on modified film projectors and were combined via the same extremely simple consoles used for mixing production sound. RKO's original dubbing room was a cramped, unventilated booth, in which the mixer watched the film through a window and listened to the soundtrack through a small speaker mounted on the wall *behind* the console.

As primitive as this sounds by today's standards, the biggest problem was not the equipment or facilities, but the way mixing was being approached conceptually. The process was mostly handled by people from the music department.

Stewart in Print

The following are articles and papers written by James G. Stewart:

•
Application of Non-linear Volume Characteristics to Dialog Recording (*Journal of the Society of Motion Picture Engineers*, September 1938). Written with John O. Aalberg, this paper describes experiments at RKO Studios with an early form of compression for optical film sound.

•
The Rerecording Process (*Audio Engineering Society Reprints*, May 1970). Outlines the state-of-the-art post-production techniques in Hollywood circa 1970.

•
Development of Sound Technique (The American Film Institute, 1977). Book-length autobiography, based on interviews conducted by Irene Kahn Atkins for the Louis B. Mayer Foundation Oral History project.

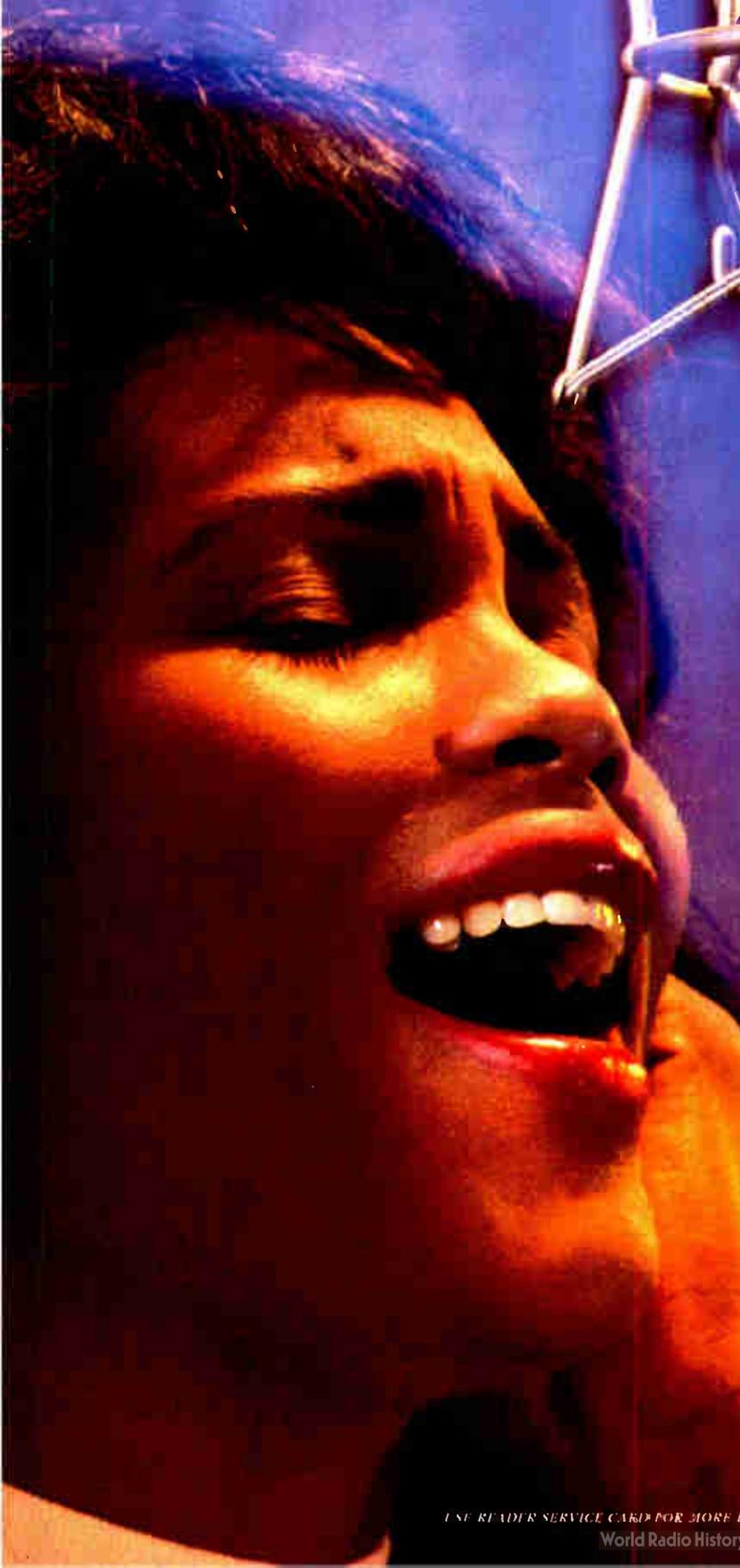
•
The Evolution of Cinematic Sound: A Personal Report (Contained in the book, *Sound and the Cinema*, Evan Cameron, ed., Redgrave, 1980). An essay written for the landmark conference on film sound held in 1976 at the Eastman House in Rochester, New York.

—John Michael Weaver

"They would make three or four takes of a reel, each one with the music a little louder, and then print them all," Stewart remembers. "The next day they would listen to them and maybe the music was a little too loud, even in the softest one. So they would have to go back and do more takes."

Stewart felt that with more rehearsal and less emphasis on music alone, it would be possible to do fewer takes and then intercut between them when necessary. After reading his report, RKO put him in charge of the studio's re-recording operations. During his tenure as

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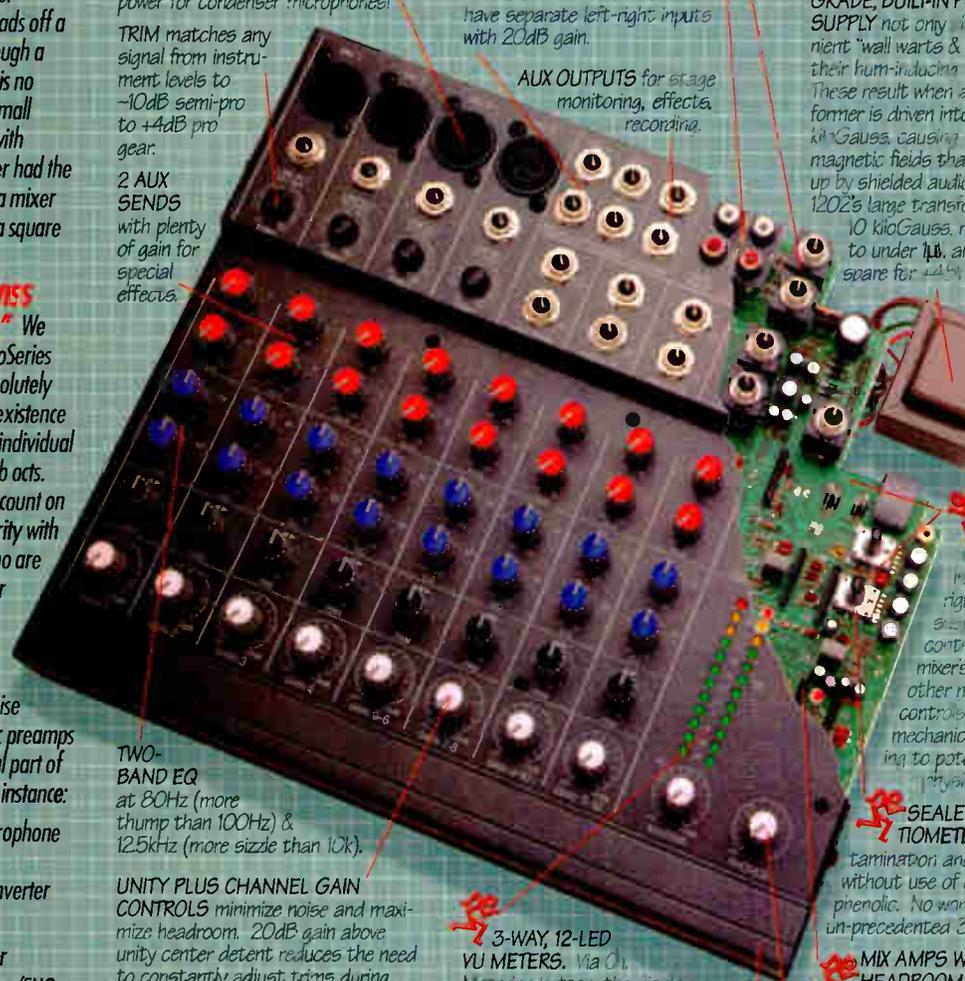
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chief re-recording mixer (1933-1945), he was at the console for nearly 250 films, among them such classics as *Bringing Up Baby*, *Gunga Din*, *The Hunchback of Notre Dame*, the Marx brothers' *Room Service* and almost all of the Fred Astaire and Ginger Rogers musicals. He also played a key role in many technical milestones reached at RKO, including the making of the first three-strip Technicolor feature, Rouben Mamoulian's *Becky Sharp* (1935), and the introduction of electronic compression to the post-production process.

The first experiments at RKO with compression, conducted in the mid-1930s, were instigated by an executive who thought that an "automatic volume control" might be able to replace mixers altogether. Although this dubious scheme was quickly abandoned, Stewart and his assistant, Terry Kellum, discovered that compression did actually help solve a major technical problem that RKO and many other studios had with RCA's variable-area optical recording equipment.

"Theoretically," Stewart says,

A Very Short History of Film Sound Techniques

by Larry Blake

If we think that things are happening fast in the world of sound these days, picture this: The sound-on-disc Vitaphone system used for *The Jazz Singer* in 1927 was considered the most "mature" and highest-quality format—even though electrical recording was only a few years old!

By the early '30s, though, rapid improvements in the eminently more practical optical recording (which had been researched since the 1890s) brought about its adaption as the standard for recording and exhibition. Not only could the sound be physically spliced, but it could also be placed next to the picture area on the release print. (Considering the abysmal standard of

projection today, it's amazing that sound films ever involved synchronizing a turntable with a projector!)

For the next two decades, optical sound ruled, with some studios using the Western Electric variable-density system, while others used the RCA variable-area system. All sound recordings were made onto optical negatives, which, of course, could not be heard until processed and printed. On music scoring sessions, a wax disc was frequently recorded simultaneously to check for performance and balance.

Although the optical track on a release print occupies an area approximately one-tenth of an inch wide, studio recordings were often made on 200mil double-width tracks, in order to have the best quality right up to the final mix, which was the printing soundtrack negative for the film.

Magnetic recording first made

—CONTINUED ON PAGE 78

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"area track was much better than [variable-density, the competing format]. In practice, it flunked. It had tremendous range, but it was loaded with distortion. When we inserted compression circuitry into the re-recording chain, we got much better results." Not long after Stewart reported his findings to his superiors, the studio's parent company, RCA, began manufacturing a compressor designed specifically for re-recording purposes.

"This device was absolutely revolutionary," says Stewart. "Now you could produce a track that was low in distortion and had at least 8 to 10

dB more gain. It caught on right away." By demonstrating and writing about the effect of compression on variable-area recordings, Stewart was instrumental in securing the format's widespread acceptance and long-term viability (see sidebar: "Stewart in Print").

MAKING HISTORY WITH WELLES

Stewart is probably best known for his work on Orson Welles' *Citizen Kane* (1941), regarded by many as one of the greatest films ever made. Although Stewart collaborated with many legendary directors during his career, including Frank Capra,

George Cukor, Howard Hawks, Alfred Hitchcock, Fritz Lang and Jean Renoir, his association with Welles remains a high point. Welles had already established a name for himself with his original and flamboyant theater and radio productions. "He came to the motion-picture business totally sound-minded," Stewart says. "I don't know of any person I worked with who understood the soundtrack better."

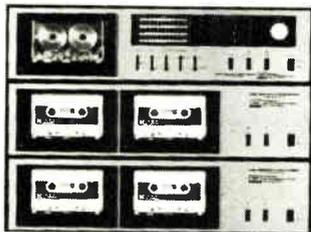
Citizen Kane was the 25-year-old Welles' first major film, yet it is still studied today as a visual and aural masterpiece. "There is so much innovation in *Citizen Kane*," Stewart says. "Orson had complete control over the picture—nobody interfered with him, whatever he wanted to do. He didn't believe in any of the conventional things that stop imagination. He also had a cameraman and a soundman who were wide-open to suggestion. Whatever Orson dreamt up, we tried to do. I learned a great deal from him that I was able to apply later in my career."

Stewart illustrates the nature of his working relationship with Welles by describing how the soundtrack for the famous Madison Square Garden scene in *Citizen Kane* was created. In the completed film, Kane, played by Welles, appears to be giving a political speech in an enormous auditorium. In fact, most of what we see of "the audience" and "the hall" is actually the work of a matte painter. Stewart's job was to make Welles sound as if he really was speaking before thousands of people in a huge, reverberant space.

Stewart says that Welles usually allowed him to work on a scene independently and would critique what he had done after it was finished. In this case, Welles had laid the groundwork by saying his lines in the slow, deliberate way a skilled orator would in a highly reflective environment. This inspired Stewart to not only add diffuse artificial reverberation (via RKO's acoustic echo chamber), but also to synthesize the kind of distinct echoes one would expect to hear in such a setting. He accomplished this by having additional prints of the original dialog track made and then offsetting these copies by varying amounts to create multiple repeats of Welles' words.

"I did the most elaborate track you can imagine," Stewart says, "but when I ran it for Orson, he said,

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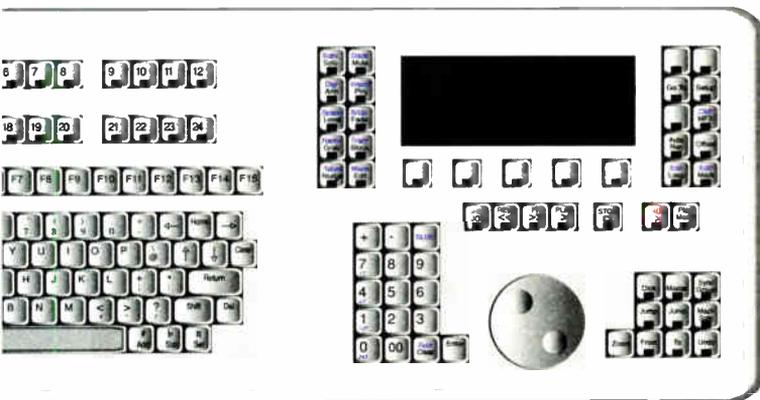


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Alien 3: Audio Post Production and Sound Design by
Harry Snodgrass, Gary Gerlich and Greg Gerlich of VisionTrax.



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'Jimmy, with all that in there, who in the hell is going to listen to me?'" Despite all the time and effort Stewart had invested, he saw Welles' point immediately and proceeded to rebalance the mix so that the effects enhanced rather than dominated the scene.

SURROUNDING SELZNICK

Stewart left RKO in 1945 to work for David O. Selznick, producer of epic films like *Gone With the Wind*. Stewart was eventually named head of all technical operations for the producer's independent production company. Selznick's penchant for spectacle allowed Stewart to experiment with an early version of "surround sound" in the 1948 release *Portrait of Jennie*, a romantic fantasy about eternal love, which culminates in a spectacular, surrealistic hurricane sequence. Ironically, even though the film earned Stewart an Academy Award for Best Special Sound Effects, very few people saw or heard the most audacious version of its finale.

Selznick wanted to dramatically increase the image size for the cli-

mactic storm scene, and Stewart followed suit by augmenting the main soundtrack by means of a separate surround channel. "For the preview in Oakland, I recorded a special track that had nothing on it except wind and waves," recalls Stewart. "In addition to the regular speakers behind the screen, we put six more speakers around the room, three on each side. I had two gain controls, one for the main speakers and one for the side speakers, so I was able to open up the 'storm track' as the picture increased in size on the screen.

"On the way out of the theater, without asking me anything about how it was done, Selznick said, 'Jimmy, I want a hundred of those!'" Unfortunately, logistical and financial realities prevented anyone other than preview audiences from experiencing the film's ending as Selznick and Stewart had envisioned it.

THE TELEVISION AGE

In 1950, Stewart moved to yet another innovative organization, Glen Glenn Sound, where he remained for nearly 25 years. During this peri-

od of radical transformation in Hollywood, Glen Glenn was often in the vanguard of technological change, laying claim to the introduction of such breakthroughs as synchronous 1/4-inch magnetic tape recorders, ADR and reversal tape recording.

Glen Glenn also made an early entry into the fledgling TV market. Stewart's previous experience at RKO mixing hundreds of inexpensive, tightly scheduled B-pictures proved to be the ideal preparation for working within the time and budgetary constraints of television. "At RKO, I used to figure that to mix a reel a day on an A-picture [about ten minutes of screen time] was a pretty good job," recalls Stewart. "But on a B-picture we did three reels a day. Later, when I was doing TV, I mixed two complete shows a day, three reels per show." Thus, while he continued to do some feature films, the bulk of Stewart's time at Glenn was spent mixing the numerous TV productions posted there, among them the *The Jack Benny Show*, *The Real McCoys*, *The Andy Griffith Show* and *I Love Lucy*.

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It was the advent of reversal re-recording techniques in the 1960s that made it easier to sustain the grueling pace demanded by television production schedules. Before "rock and roll" transport systems and punch-in recording were developed, an entire reel had to be mixed in real time. If any portion of the mix was unacceptable, the whole thing had to be redone. Once it became feasible to stop, roll back to any point on a reel and begin recording again from there, the necessity of multiple retakes was eliminated.

As often happens, though, the validity and value of this new technique was not immediately recognized by many in the industry used to working in the traditional way. "There was a lot of sophistry about not interrupting the 'dramatic flow' of the reel," Stewart says. "But mixing six reels was a normal day in television, which is almost impossible if you have to go back to the beginning of a reel and start over again every time somebody makes a mistake."

A HALF-CENTURY OF HINDSIGHT

In the mid-'70s, Stewart went to work for the studio that had ushered in the sound era nearly 50 years before, Warner Bros., and stayed there until he retired in 1980. Today, he looks back with both pride and some misgivings on how the post-production process has changed since the days when "talkies" were deemed by some to be a fad that wouldn't last.

Stewart feels that sound has not changed much from an artistic standpoint. "For the most part, people do many of the same things now as we did in the early days, but they do them faster and meet higher technical standards." Ben Burt (*Star Wars*, *Raiders of the Lost Ark*), a prominent member of another generation of audio trailblazers, acknowledges that people like Stewart discovered the creative potential of sound. "We re-discovered it [in the '70s and '80s] with portable tape recorders and other electronic equipment that wasn't available to previous artists."

Stewart believes that one of the most significant changes to occur during his career was the gradual fragmentation and compartmentalization of the filmmaking process. When he first came to Hollywood, almost every phase of a project was

handled in-house, and there was a great deal of creative collaboration between everyone working on a film. As the old studio system disintegrated, the people working on various facets of a production became increasingly isolated from one another.

"Today, the people who are actually sitting at the re-recording console with their hands on the knobs often have never seen the picture [they are mixing] before," Stewart says. "In many instances, they become merely an extension of the hands of the director. In the early days, I saw a film many times, in various stages of completion, before it came to the re-recording stage. It is much better if the people responsible for the soundtrack are in on a picture from its conception to its completion, so that they and the director can discuss things like motivation and pattern."

STAYING POWER

Having worked for so many years in such a demanding and volatile profession, how does Stewart account for the fact that he and his work have been able to stand the test of time?

He believes that one of his most valuable assets, particularly in the beginning, was his strong technical background. This enabled him to understand and explain to the people he worked with the capabilities and limitations of the available tools. Equally important was his appreciation of the dramatic function of both the aural and visual elements within a film. This insight made it possible for him to not only interpret and execute the concepts of others, but also to contribute ideas of his own. In addition, his ability to adapt to different situations, combined with an eagerness to experiment, made him equally comfortable with a few hours to re-record a TV show, a few days to mix a B-film or a few weeks to perfect a complex soundtrack.

Although Stewart is no longer professionally active, his effect on the sound of American film and television continues. A large number of the films and shows he worked on can still be seen and heard on television, in revival theaters and in college classrooms. His presence can also be felt in the soundtracks created today by the many audio post-production specialists who

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have been influenced, either directly or indirectly, by the legacy of professionalism and artistry that Stewart established during his long and distinguished career. ■

John Michael Weaver is head of the Recording Arts Program at Loyola Marymount University in Los Angeles. He gratefully acknowledges Megan Weaver's research assistance.

—FROM PAGE 71, HISTORY OF FILM SOUND

its way into films in the early '50s by replacing the optical cameras on location. A production channel could now be carried around in a few cases instead of a truck. In the early days of mag, sound editors often continued to edit on optical tracks because they were able to see the waveforms of what they were cutting. (Sound familiar to you digital workstation users?)

By the mid-'50s, mag recording was pretty entrenched in sound recording, with optical tracks used only for mono release prints. With the exception of *Fantasia* in 1940, stereo sound did not come to motion pictures until 1952, when *This Is Cinerama* was released with 7-track sound running on an interlocked mag dubber. (The wide-screen image was provided by three 35mm images, side-by-side.) Wide aspect-ratio image and stereo sound came together on one piece of film the next year with the 20th Century Fox CinemaScope system, which used narrow perforations on release prints to fit four magnetic stripes.

Fox went all out for stereo sound, even to the point of recording the dialog in stereo with three microphones! This cumbersome procedure was scrapped by the next system, Todd-AO, which recorded the dialog in mono and then panned (they called it "swinging") it across the screen. Todd-AO, like Cinerama, used five speakers behind the screen, with a sixth channel feeding the surround speakers in the auditorium. The picture was shot on 65mm film, then printed on 70mm film to allow for room outside the perforations for wider magnetic stripes. From 1955-1970 this was the picture/sound format of choice in Hollywood and was used on such films as *Oklahoma!*, *West Side Story*, *Lawrence of Arabia*, *The Sound of Music*, *2001: A Space Odyssey*, etc.

After 1970, the industry turned away from big-budget spectacles, and stereo sound and 65mm photography became virtually extinct. Around this time Dolby Laboratories

was investigating the use of its A-Type noise reduction in motion pictures. By 1975 the company developed a stereo optical system that brought stereo sound to standard optical release prints at no additional cost. In 1979 they introduced the current system of matrix-encoding four channels of information onto two Dolby NR-encoded optical tracks, which are then decoded back to four channels in the theater. An equally important addition to the chain was the 1/3-octave equalization inside Dolby Cinema processors. The aggregate result was a (potentially) more reliable match in the real world of what was heard during the final mix. Today, virtually every film is released in stereo, with the audience's awareness of what stereo really means enhanced by the proliferation of Dolby Surround decoders for home stereo systems.

Digital recording's start in film sound was not unlike that of magnetic recording's beginnings in the early '50s: recording part of this film, some of that film, and (allegedly!) all of a few films. At this point, a large percentage of the widespread use of digital recording in film sound relates more to its being part of the entourage of disk-based, random-access sound editing than it does to any drastically improved quality. (To wit, what really attracts people is the speed and flexibility of this style of editing. The fact that the sound is "digital" is the icing on the cake.)

With the exception of one-off roadshow engagements, digital sound didn't come to theaters until June 1990 with the release of *Dick Tracy* in the Cinema Digital Sound process. This past June Dolby introduced its SR•D process on *Batman Returns*. SR•D places six digital tracks between the sprocket hole of a standard 35mm print, with the standard stereo optical track remaining untouched. ■

Larry Blake is a sound editor and re-recording mixer. He is currently working on three books that he will self-publish next year.

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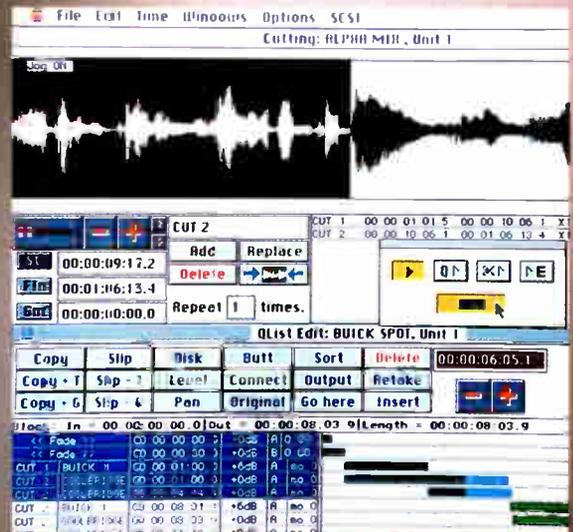
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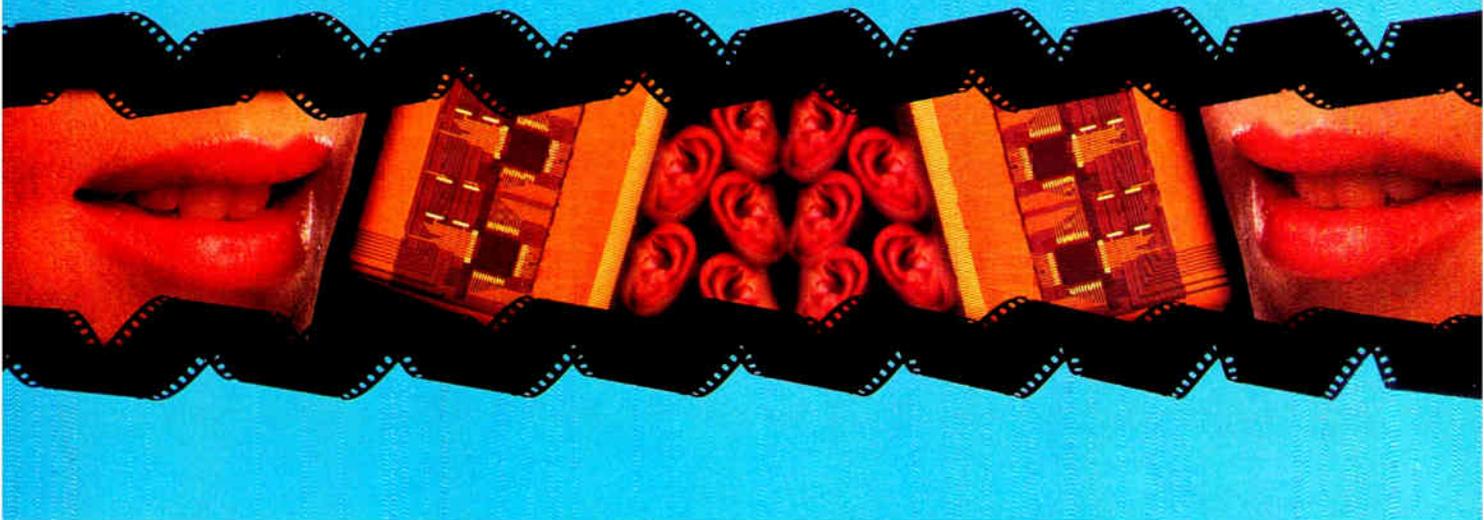
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DIGITAL DELIVERY

BY TOMLINSON HOLMAN

Springing up over the last several years have been eight different and incompatible systems to supply digital sound to motion picture theaters. Some are sound-on-film systems, while others are double systems. Some use compatible prints, while others require specialized ones. Many use data compression schemes to hold the amount of information that must be stored; others find that to be a problem. Are we

PHOTO: ALAN LEVENSON



Tomlinson Holman

headed for a new era of format wars? It is a time of great confusion, but all proposed systems share some common properties that make them have an impact on post-production.

The technical reason for digital systems is simple: Digital technology is a way to make a great many

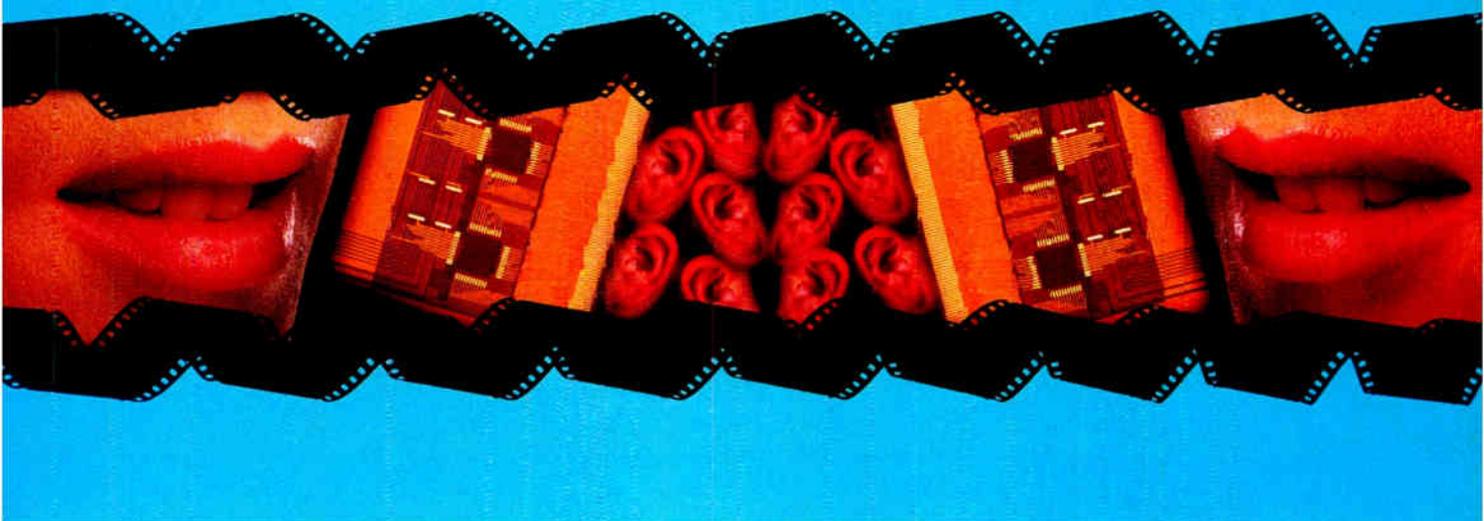
Where Analog? Where Digital?

Analog excels today at the beginning and end of the process: the microphone preamplifier and the power amplifier driving the loudspeaker. In addition, it is often the most practical of post-production processes, despite the advances clearly made by digital audio workstations. It is still cheaper to hire lots of sound editors for a short period of time on large-scale projects and let them use Moviolas and flatbeds than it is to equip enough digital workstations to get the job done quickly.

We are up against two problems here: the post-production squeeze and a peak-to-RMS ratio problem. The post-production squeeze has to do with the economics of film production, which call for ever tighter post-production schedules. By the time the producer hits post, the money is mostly spent, and it is easy for

CONTINUED ON PAGE 192

The text of this article appeared originally in the April issue of *Boxoffice*, the trade magazine for the motion picture exhibition industry, based in Hollywood. The author has added information pertinent to *Mix* readers



OF FILM SOUND

copies of an original that have all the properties of the original. The marketing reason is also clear: The expectation of the audience—due to the overwhelming popularity of the compact disc—is that sound will be improved by the application of digital techniques.

But the inherent problem with digital is in conversion back and forth from the analog to the digital world. While the conversion technology for the system used on the CD, called linear Pulse Code Modulation, is well-developed, most systems for digital sound-on-film require new, more complex methods. There is simply not enough space on the film to represent the sound using linear PCM. Thus, data must be reduced before it is stored, which may have consequences for the sound quality.

Given the way that digital information is generally represented on media, there tends to be a hard limit as to whether a system works or not. While not inherently associated with digital systems, this problem nevertheless plagues many implementations. Because of this hard-limit problem, the user can mistakenly assume that the systems are working when in fact they are growing closer and closer to the edge of com-

plete failure. Analog systems, by contrast, often fail “gently,” giving some sonic warnings of degradation before utter failure. Of course, this is well-known and appreciated in professional sound circles, but don’t count on it being known in the local cinema.

COMMON FEATURES FOR THE PROPONENT SYSTEMS

All of the proposed digital systems produce discrete loudspeaker signals at the end of the chain. The amplitude-phase matrix known as Dolby Stereo or Ultra Stereo is not used. This has often been the largest audible difference when comparing analog 35mm optical systems with digital ones, since the analog always employed the matrix.

I have written extensively about the pros and cons of the matrix in “Surround Sound Systems for Use in Cinemas and Homes,” published by the Audio Engineering Society in the proceedings of the 1990 Washington Conference. To greatly simplify that work: The matrix tends to narrow the stereo soundstage for much program material, while also producing sound from the surrounds that wasn’t necessarily there in a discrete mix. The effect of removing the matrix and having perceptually discrete

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tions already resolved, so there is little remaining debate on these issues.

The consequences of having such a relatively pure means of delivery, with wide frequency and dynamic range, remind me of the changeover from LPs to CDs. The potential clarity of CDs meant that the techniques used to push the program material through the smaller window of the LP, such as choices of microphones, equalization, compression and the like, were misplaced in the digital era. There was a problem period when the source methods were pre-distorted for the older medium.

This might be expected to occur once again, now in film sound, where the very properties that make digital better may cause some difficulties. Mixers will have to learn that they may not need quite such a presence peak in voices to make them clearly intelligible, for instance. On the other hand, we're still dealing with the old B-chains in many theaters, which would benefit from such boosts. One way to handle this would be separate passes for recording the digital and the analog, with different equalization, since it could be expected that the older theaters won't go digital anyway. But this gives up on an important possibility, that of using the analog tracks as a fairly transparent switched-in backup if needed (see sidebar: "Sound-on-Film vs. Double-System Sound").

PROCESSES MADE OBSOLETE BY DIGITAL

Perhaps surprising to some is the fact that every 70mm release, having potentially high sound quality, must have the sound system "tuned" to the prints, or the inherent quality does not have a hope of being recovered. The variation in frequency response from release to release is an amount plainly audible to the casual observer.

I recently saw a picture on the dubbing stage at the end of post-production, then one week later in a premiere 70mm presentation. The difference was startling. In the theater, the bass was very weak despite the fact that the dub stage and the theater were equipped with the same B-Chain sound systems—and were even roughly the same size! The difference was the performance of the 70mm analog print; the amount of bass actually recorded on the print was much less than that on

the printing master. There was no way one could say that the audience had the same experience as the director intended.

So the fact that any of the digital systems proposed will produce day-to-day results more consistent than the release-to-release variations of the current 70mm format is extremely important and useful to the business. This means that all the digital systems should get rid of the A-Chain adjustment blues that every technician knows about: the month-to-month variations that occur due to aging of the exciter lamp, mechanical drift (often best called screwdriver drift!), head wear and other maladies that such systems are subject to. Of course, the question remains as to how "tweaky" the new digital systems are.

THE REST OF THE SOUND SYSTEM

Of course, feeding a pristine source into a poor reproduction system makes little sense. It could be said that "room equalization" has been used more to ameliorate loudspeaker problems than room problems. When we set out in the early '80s to improve the theater experience, it was with knowledge of the difficulties faced by traveling road show sound systems: Each venue presents a new set of problems. For this reason, THX took the easy way and has always had the prerequisite of a known, controlled set of room acoustics.

We started with the notion that sound systems in theaters are *reproduction* systems, not production ones. In a concert hall, the hall itself is a vital part of the performance. It provides feedback to the musicians and warmth and envelopment through its reverberation processes. But in a motion picture theater, we are trying to reproduce what is on the soundtrack, and if that includes a reverberant component, then we have sound system elements available to correctly spatialize them—we need no reverberation from the room.

This problem was studied, interestingly, in the 1930s by workers from Bell Labs who asked the question: What is the effect of reverberation in the theater when there is already reverberation on the soundtrack? The answer was an undesirable lengthening of reverberation

—CONTINUED ON PAGE 192



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New Directions in Amplifier Design

Over the past quarter-century, power amplifier design has undergone a complex evolution. In the 1960s, the transition from tubes to transistors began, and cost per watt became a major issue. The 1970s brought about an increased focus on reliability, with protection devices becoming de rigueur as the 1980s approached. In the decade that followed, most manufacturers centered their energies on smaller—yet higher-powered—designs that seemed impervious to dead shorts or torturous 2-ohm loads.

Today, the amplifier market is di-

verse, ranging from a revival in the retro-technology of high-end vacuum tube designs to the incorporation of computer control into the amp/speaker interface. We talked to a number of companies that specialize in power amplifiers, soliciting their views on the future directions of amp design and how their current models reflect those trends. As always, the responses were varied and informative.

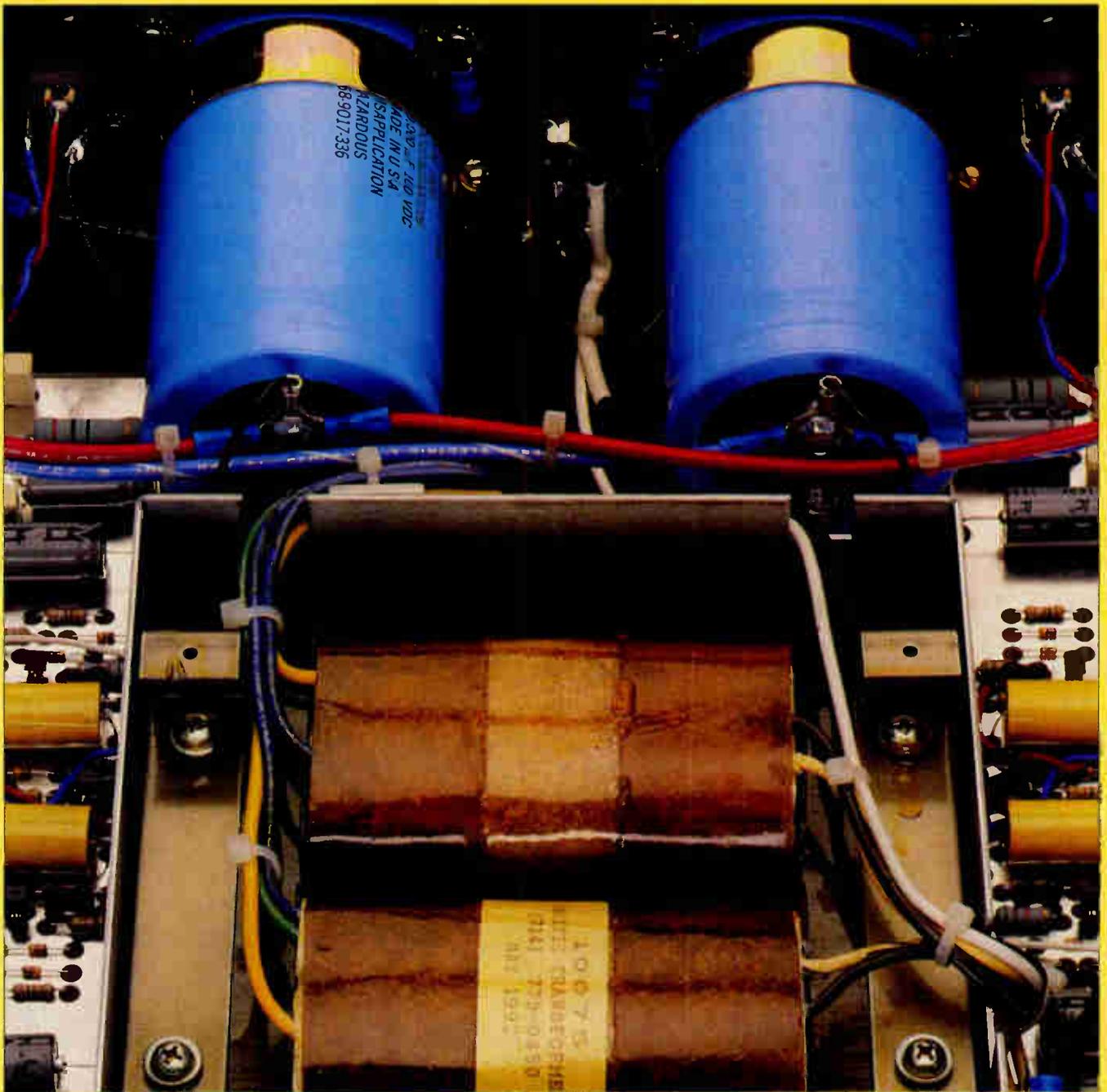
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John Russell: "I've seen a fair number of attempts to build a new and better amplifier using a special sliding power supply and things like that, which squeeze amps into small-

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—STEVE PAYNE

by **George Petersen**



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This does a couple of things. A smaller filter capacitor responds more quickly than a larger one, and they can be packaged more closely into the circuitry—it doesn't need a wiring harness to connect it to the amplification circuitry.

"I assume that in the future we'll probably reduce distortion and noise, but that's speculative since we're basically at the threshold of what's really available from technology today. We are working on computer control of the amplifiers for large installations, and a couple of manufacturers are doing that at present. These systems are good, but there's always room for improvement in terms of the user interface,

degree of reliability and consistency in the performance."

CARVER PROFESSIONAL

Steve Payne: "We are one of the few manufacturers taking a different approach to amplifier power supply design, and I don't see any major changes to our approach in the near future. Initially, we were the only ones using that technology, and everybody said we were mavericks. Other manufacturers—like Morenz, Peavey and Stewart—entered the market with products incorporating switching power supplies, adding

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more credibility to what we've been doing.

"Manufacturers are still more or less in a race to downsize product—make it smaller, lighter, more powerful and more reliable. We've seen that in products like the Crown VZ3600, with more power in a smaller package, although they haven't trimmed the weight down as much. QSC's new series of MX amps are lighter, and they use a switching tiered-rail approach that we've been using for 15 years. Some people are concerned about the reliability of switching power supplies, but these have been used in Sony televisions for years, as well as by NASA and the military—any application requiring highly stable, reliable performance in a lightweight package.

"By combining DSP and computer networking systems available through Lone Wolf and other companies, the amplifier will become a smart device that can monitor conditions happening around it, making modifications on its own or operated from a remote location. Amplifiers will become more sophisticated, yet systems will become simpler because many functions can be precisely controlled via microprocessors on an instantaneous basis, especially in cases where you have to make a change in 30 amplifier channels simultaneously. There are definitely better ways to do that than a roadie clicking level controls.

"Incorporating computer networking capability and DSP into amplifiers doesn't require much physical space within the amp, yet allows unlimited potential in terms of what you can do in the amplifier itself. Ultimately, everything will be networked. The console, signal processing and amplifiers could all be controlled by one system. The possibilities are limited only by your imagination. We're having to look at things in a completely new light. A lot of neat things will come out of this, from us and other manufacturers. It's exciting."

CREST AUDIO

John Lee: "The industry is becoming more and more demanding, making us all work harder to produce a better product: a cost-effective, highly reliable, good-performing amplifier. This comes about from a selection of components, the design itself, optimizing every parameter and a will-

ingness to spend the money to bring this to fruition. There are certain segments of the market where cost is not a primary concern, but, generally, people are very cost-conscious these days.

"When we discuss sound quality, we really refer to strenuous conditions. A lot of amplifiers sound reasonable when handling light-duty loads, like driving 8-ohm woofers, but if you put a heavy load on an amplifier, drive it up to clipping and run it that way all night, that separates the men from the boys. You can really hear a difference in the way some amplifiers sound when you first turn them on, as opposed to how they sound at the end of the evening. It's one of the reasons we've done well in the touring sound market.

"Weight is a factor in a limited part of the marketplace. There are some portable applications where the user is willing to sacrifice some positive aspect of the amplifier in order to reduce weight. You don't get something for nothing. If you don't put a decent power supply and sufficient heat sinks in the amplifier, you'll have problems.

"When the lightweight amplifiers first hit the market in the mid-'80s, we were all nervous for a while, thinking that maybe we should get rid of our heavyweight designers, but it didn't turn out that way. In the '90s, as technology progresses, there will be a quality approach to producing a lightweight amplifier at a cost-effective price. But right now it's a bit premature."

CROWN INTERNATIONAL

Vern Searer: "Over the past 20 years, I think we've made a significant improvement in almost every parameter, whether it's reliability, sonic quality, or doing some support things, such as making our three-year warranty into a no-fault, full warranty that covers the product even if you drop it or pour Coca-Cola into it.

"When we introduced the Crown IQ System, we portrayed it as amplifier control and monitoring. All along it was intended to be more than that. Now we're introducing the SMX and MPX stuff to input signal level control, with the idea of complete sound system control and monitoring.

"The most significant thing about

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the Macro Reference is that we tweaked everything to the extreme. The signal-to-noise ratio is in excess of 120 dB. We spent a lot of time to get bass-end control with the damping factor, so we did some ingenious feedback control with the split-feedback/dual-velocity circuit to get even better control of that speaker line. A lot of other things we had done with other amplifiers we just refined to the *n*th degree, in terms of design parameters and component selection. We experimented with a number of esoteric capacitors but did not see an overall improvement: The amplifier may sound sonically smoother, but when we started looking at it critically, we found that those components may cause near-clipping instabilities or IM distortion. We were looking at a synergism in that amplifier, so two economical components may have worked in our favor, vs. one esoteric component.

"Some of the advances from the Macro Reference have already filtered down to other products, such as our VZ-3600 and VZ-5000. Not necessarily the extended signal-to-noise, but we used a variation of the

split-feedback circuit in the 3600 to improve its subwoofer capability. Most people have thought of the damping factor as being significant from, say, a couple hundred Hertz on down, but it's actually noticeable in the midrange when you have the driver control you can get with that extremely low-impedance or high damping factor, whichever way you want to look at it.

"We do some wild things in amplifier design in our Techron division, where a 30,000-watt amplifier used to drive a coil is not uncommon. The VZ technology used in the 3600 and 5000 originally came from that market, and there will be some new things in amplifier and power supply design. I'd expect some real surprises."

HAFLER PRO AUDIO

Jim Strickland: "Our new Trans Nova Series is an unusual amp, but not unconventional in the sense that it's using permutated power supplies or digital tracking or anything like that. Ours is a very straightforward arrangement with floating power supplies, where we take advantage of

the output stages—by voltage and current gain—thereby getting a higher transfer efficiency from the front end to the total output stage. The amplifier thus becomes very short—three stages, as opposed to the older Hafblers that typically have five stages. This yields an amplifier with better stability and distortion. You don't have to compromise one to get the other.

"We're using the same MOSFETs in the regular Hafblers as in the high-end Trans Nova models; the connections are different. In the three smaller Hafblers, the MOSFETs are used in a follower circuit, where the output stage only gets current gain. In the 9300 and 9500 Trans Nova models, they're used in a way where the source is grounded, so it's operating about as close to the way that an older tube connection operated with a grounded cathode loop when full voltage and current gain are present.

"Most of our concentration has been on the straight evolution of Class AB amps, but there's been a lot of interest in variations of Class D amplifiers and things that involve

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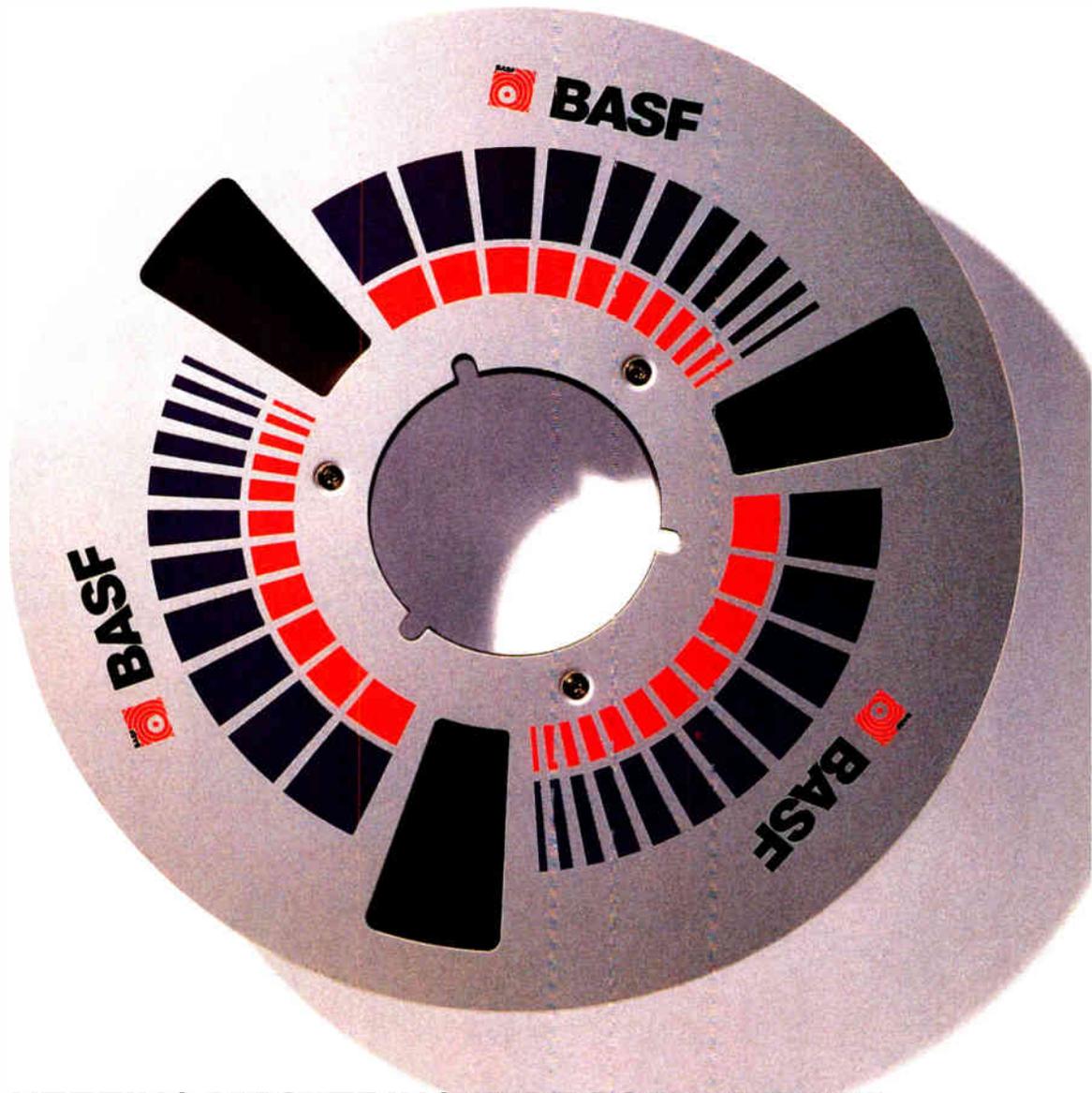
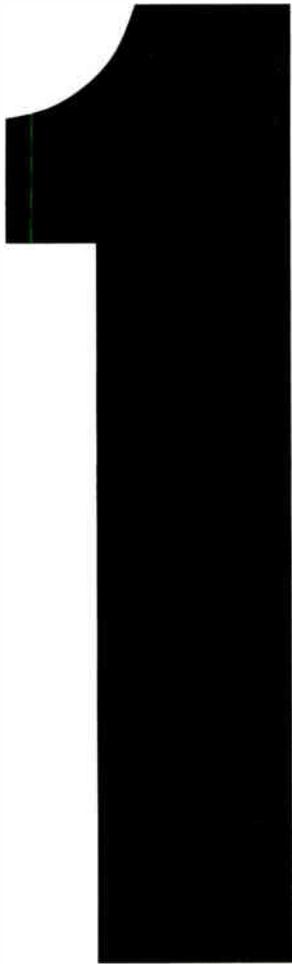
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pulse width modulation. Fully digital amplifiers have always been this elusive thing on the horizon. There has been discussion of amplifiers based on some sort of pulse-density principle, instead of pure pulse width. It's like an analogy of how bitstream conversion works in a standard compact disc mechanism, or something of that nature. So far I haven't seen any numbers on the practicality of such systems, although it looks like the clocking rates would get outrageous. This may have to be hybridized with something else so that part of the time you alter the density of digital pulses and part of the time you alter the pulse width.

"It's difficult enough to even make linear amps behave well, so when you move into digital amps, all the problems you had in the analog domain just wind up showing up in the time domain."

HOT HOUSE AUDIO

Richard Rose: "Since we're handmade, we never really expect to be at the production levels of the mass-produced amplifiers. Our thrust is in the Krell/Levinson audiophile direction. We're handmaking Ferraris, and if we were mass-producing Chevys, the amp would end up being an entirely different animal.

"To get our amps' sound, we do a lot of unusual things, capitalizing on what's been there all along but nobody's paid attention to. Ours is a very low-feedback amplifier—there's no global feedback. Audiophile amps have been doing that for some time, but commercial amps just never addressed things that way.

"Commercial amp manufacturers—and the industry as a whole—are so specification-driven that people forget that listening to the amp is what matters. Lo and behold, you'll find that some amplifiers that have a higher-distortion product (particularly in the midrange) may have a sound that is more musical. An amp with triple-zero distortion may measure great but may not sound musical. Sometimes you find that building amplifiers according to what sounds good—as opposed to what reads well on a spec sheet—gives you the amplifier that everybody wants. That's essentially what we've done: worked from the sound back to the design.

"We're not doing anything futuristic. We just do things that every-



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body ought to be doing and nobody bothers to do. The 900-nanosecond rise time for our mono amps is really impressive for a commercial amplifier and is up there with the best of the audiophile amps. Cracking that 1-microsecond barrier is like going 200 miles an hour in your sports car. Pulling that off has a lot to do with the transparency of the overall musical presentation."

QSC AUDIO

Pat Quilter: "There aren't many opportunities to make revolutionary breakthroughs in conventional linear technology, which we would define as ordinary AC power transformers and linear Class AB or Class C output devices. We have moved the state of the art forward through the use of the multistep rail, which has primarily had an impact on heat sink size. It doesn't do much for power consumption, which dominates the size of the AC transformer. But it's still impressive that power-to-weight ratios have gone up by a factor of three to four times, when compared to, say, a [Crown] DC-300. Of course, when the DC-300 came out [in 1968],

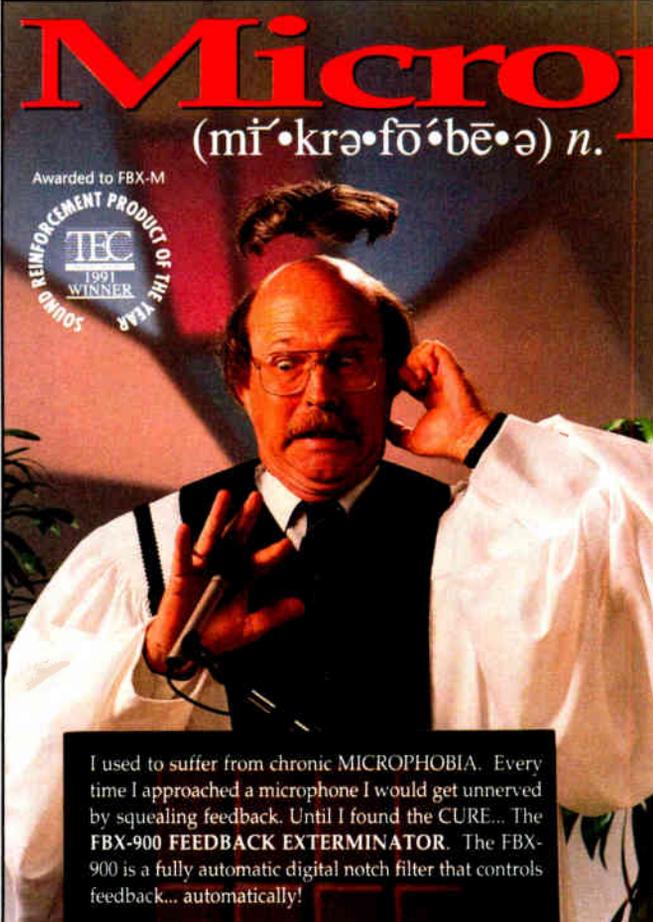
it was revolutionary because a 50-pound tube amp was lucky to put out 50 or 100 watts total, while the DC-300 was putting out 250 watts/channel into 4 ohms.

"We've introduced the Open Architecture Input on the backs of our EX Series products, to permit the inclusion of circuitry to augment the performance of the amplifier, specifically crossovers or the remote control system. But we think the appropriate kind of signal processing to put there will be speaker-dependent. Why have 100 electronic crossovers scattered around in your amplifiers, when you could have one or two at the front end of a system? In small systems where you only have one or two amplifiers, that may not be an appropriate place to put that particular type of signal processing. On the other hand, protecting the speaker against overdrive with a sophisticated load-monitoring scheme is a natural type of processing to put in every amplifier, because each is connected to individual speakers.

"As the price of digital signal processing comes down by the middle of the decade, there will be some

real breakthroughs in adaptive equalization and other things in the amp-linked-to-speaker. We can tighten that link and get the amp and speaker working together as a unit. When this starts happening, an amp's capability for doing such tasks will become a real axis of competition. Suddenly, there will be obvious and dramatic differences in function and sound from one amp to the next, depending on how they respond to sensing the speaker. This should be an interesting area of development.

"In high-end installs, fiber optic system integration should be common in a couple of years; certainly fiber optic control and, very possibly, signal transmission as well. There's an AES working group addressing the whole computer network thing. They are working on both the control language protocol as well as evaluating a recommendation for hardware, although that's obviously a more iffy area due to the competitive nature of the business. There may well be some unification on protocols, regardless of the physical media that they are sent down." ■



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(mī·krə·fō·bē·ə) n. The fear of feedback.

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Dean Sims - Intelligo Inc, Winona, MN

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NEW PRODUCTS



NEUMANN "FRITZ III" DUMMY HEAD

The KU 100 from Neumann (Old Lyme, CT) is the third generation of the company's binaural, artificial head, condenser microphone system, which features transformerless FET 100 circuitry and both XLR and BNC outputs. Powering is via external 48VDC phantom sources or internal batteries.

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SOUNDCRAFT BVE100

Soundcraft (Northridge, CA) now offers the BVE100, a compact, professional console designed for smaller video suites that don't require the larger Delta AVE mixer. A VCA on each of the eight input modules allows levels to be controlled by an edit controller, and individual LEDs indicate VCA, depth of fade and crosspoint status. The BVE100 is controllable directly via its parallel interface; a serial interface is optional.

Circle #230 on Reader Service Card

ROLLS ROTOR SIMULATOR

Rolls Corp. (Midvale, UT) offers the RPI47 Rotorhorn (\$199.99), a rack-mount device for electronically simulating rotating horn speaker cabinets. The stereo in/out unit can be controlled via MIDI or a momentary footswitch; it simulates rotary horn motion in fast, slow and braking modes, along with chorus and vibrato effects.

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JL COOPER AVSIX

The AVSIX from JL Cooper Electronics (Los Angeles) is a 6-input, dual-channel mixer that can be interfaced with most popular video editing systems, yet is priced at an almost unbelievable \$995. Housed in a compact 13x8.5x2.5-inch chassis with oak side panels, AVSIX lets an editor control audio signals directly from the EDL or operate the audio controls manually. Besides working with standard GVG-100, RS-422, GPI and ESAM protocols, AVSIX features precise control of preview monitoring, transition starts/stops/durations and a preview switcher, along with balanced inputs and 1kHz oscillator.

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AUDIO-TECHNICA AT835A SHOTGUN

Audio-Technica (Stow, OH) updated its popular AT835 condenser shotgun mic. The new AT835A can now be powered from any 9-52VDC phantom source or from an internal AA battery.

Circle #227 on Reader Service Card

AKAI S1100 VERSION 2.0

Akai Professional (Fort Worth, TX) has a new operating system for the S1100 stereo digital sampler, making it the first instrument of its type to combine RAM sampling with direct-to-disk recording capability, using standard SCSI hard drives or magneto-optical disks, with DAT backup. RAM and disk-based samples can be used simultaneously; varispeed playback and SMPTE-based QList functions are standard.

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DYNACORD DRP15

Distributed by Pinnacle Audio (Farmingdale, NY) is the DRP-15, a single-rackspace reverb/multi-effects box for studio or live performance. All effects (reverb, delay, modulation, pitch shifting, EQ, compression and distortion) can be stored in 128 user presets; 100 factory sounds are also included. Up to six effects can be used simultaneously, and effects can be controlled or accessed via MIDI.

Circle #232 on Reader Service Card



ROLAND SRC-2

The SRC-2 from Roland Pro Audio Video (Los Angeles) is a sample rate converter with the ability to mix two stereo digital signals at differing sample rates into a single stereo digital output (at any sampling rate), with control over balance and levels. Features include AES, consumer coaxial and optical digital inputs; 24-bit AFS/EBU implementation; emphasis switching; sync input for locking to house or video sync; 48/44.1/32kHz inputs; and 48.048/48/47.952/44.1/44.056/32kHz outputs.

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PS SYSTEMS' THE POWER TOOL

From PS Systems (San Diego, CA) comes The Power Tool, featuring a reactive load speaker simulator, 50-watt amplifier, 4-band active EQ and balanced and unbalanced outputs, with a choice of open-back or 4x12 speaker simulations. Designed for stage or studio, the unit can be used alone or combined with an amp head or guitar preamp, allowing the guitarist to obtain a particular sound and route it to any location at any level, with or without a speaker cabinet.

Circle #234 on Reader Service Card

GRAHAM-PATTEN DIGITAL EDIT SUITE MIXER

From Graham-Patten Systems (Grass Valley, CA) comes the D/ESAM 400, a digital mixer with up to 32 analog and digital inputs; and four analog, four digital and four monitor outputs. The unit has a base price of \$18,000; options include parametric equalization and tabletop/rack-mount configurations.

Circle #235 on Reader Service Card

FOSTEX D-20B TIME CODE DAT

Fostex (Norwalk, CA) has unveiled an updated version of its popular studio time code DAT recorder. The new D-20B adds a time code generator, chase-lock synchronizer and the ability to transcode time code from tape. Other features include 4-head confidence monitoring, jam sync capability, VTR emulation with multiple editor support, and time code stripping during, before or after a recording is made. Additionally, the D-20B can generate SMPTE time code from absolute time, allowing engineers to use non-time coded tapes as pseudo-time code masters.

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NEW BEYER HEADPHONES

Beyerdynamic (Farmingdale, NY) introduces a new range of headphones. The top-of-the-line DT911 (open) and DT901 (closed) feature neodymium elements, as do the successors to Beyer's DT990, the DT811 (open) and DT801 (closed) versions. All have cloth-covered cushions for increased comfort.

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DIGIDESIGN AUDIOMEDIA II

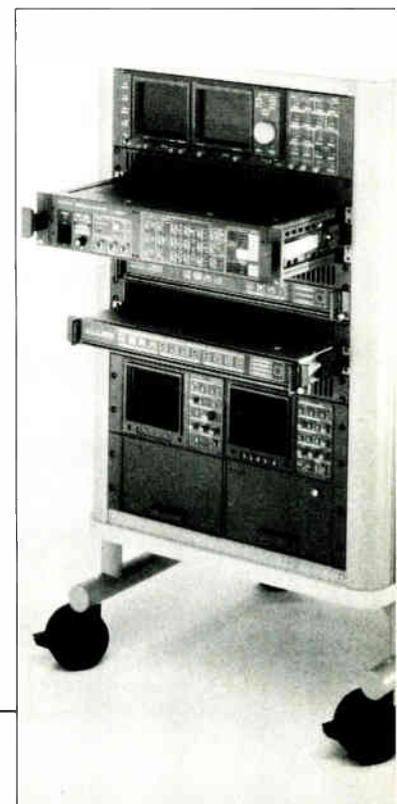
Digidesign (Menlo Park, CA) debuts Audiomedia II, the second generation of its entry-level digital recording/editing system. Audiomedia II consists of Sound Designer II software and a NuBus DSP card (fits in your Mac II), with unbalanced analog inputs/outputs and S/PDIF digital I/O. Features include non-destructive editing, SMPTE sync, real-time digital EQ and pitch shift with time correction. Retail is \$1,295.

Circle #238 on Reader Service Card

ANTHRO RACKCART

RackCarts from Anthro (Portland, OR) are roll-around rack solutions for studio applications. Available in tower (shown) or workstation (with space to accommodate computer keyboards and monitors) versions, the carts have rounded sheet metal corners, dual 4-inch rubber casters, front and rear rack rails, and removable, vented side/rear panels.

Circle #239 on Reader Service Card





RAMSA UHF WIRELESS

Designed for ENG/EPF work is the Ramsa WX-RP410/RP700 wireless system from Panasonic Pro Audio, Cypress, CA. Operating at the 800MHz UHF band, this diversity system offers 30 channels and features a compact body-pack transmitter with miniature condenser mic and lightweight receiver designed for camera/recorder mounting.

Circle #240 on Reader Service Card

NEOTEK ESPRIT

Designed for production/on-air tasks is the Esprit console from Neotek (Chicago, IL). Esprit features eight mono or stereo group buses, eight aux buses, mix-minus on every channel, 4-band parametric EQ, and extensive talkback facilities.

Circle #241 on Reader Service Card

AC-CETERA FLEX-EZE

Now patented, Flex-eze™ (from Ac-cetera of Pittsburgh, PA) combines a clamp and 3- or 5-inch flexible section for simplified mic placement in cramped quarters (such as drumsets) or in film, video or stage productions where an unobtrusive mic support is required. Retail is \$30.95.

Circle #242 on Reader Service Card

GEORGE MASSENBURG LABS HRT 9100 MIXER

New from George Massenburg Labs (Van Nuys, CA) is the High Resolution Topology™ HRT 9100, a modular line-level mixer in a rack package designed for studio or remote recording applications. Each input has controls for gain, pan, four aux sends and insert, solo, and mute switches. Master metering is via two 30-segment peak/RMS LED displays, and six units can be chained for up to 80 inputs. The mixer uses an all-discrete, minimum amplifier topology design; specs include a 170kHz bandwidth and under 0.005% THD.

Circle #243 on Reader Service Card

PACIFIC RECORDERS ADX RADIO PRODUCTION SYSTEM

Expandable from 8 to 32 tracks is the ADX™ from Pacific Recorders (Carlsbad, CA). ADX is a disk-based system that offers multitrack digital recording/editing and moving fader mixing with snapshot and dynamic automation. ADX features familiar tape recorder-style controls and lighted pushbuttons for editing functions such as cut, copy, loop, splice and crossfade. Supplied as a turnkey system, ADX includes the computer, 16-inch color monitor, rolling floor console and 1GB hard drive with four track/hours of storage.

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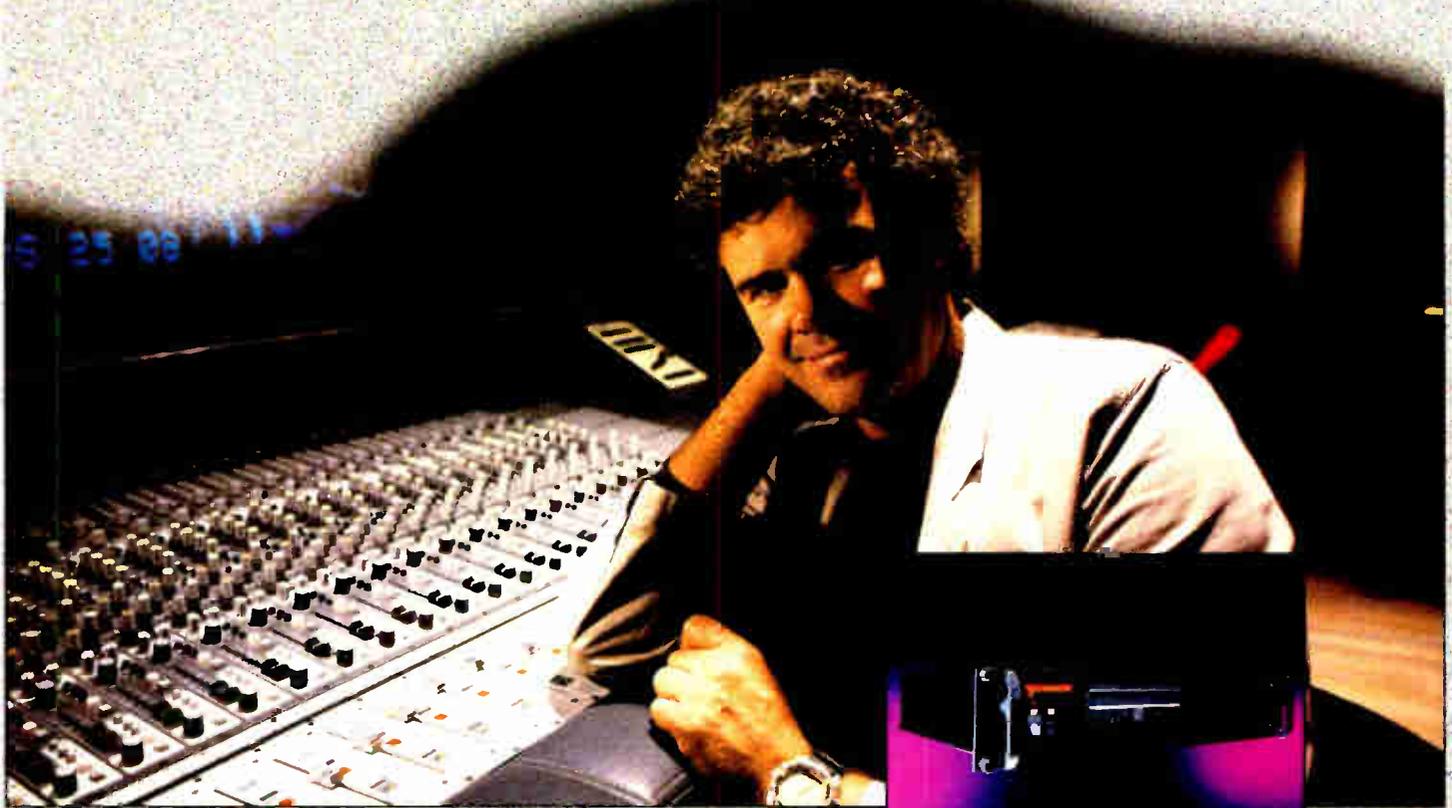
The Hollywood Edge Cartoon Trax (\$395) is a CD library of cartoon sound effects, with both classic and newly recorded sounds, fully cross-referenced and indexed. Production pros should call (800) 292-3755 or (213) 466-6723 for a free demo CD...**Gefen Systems' Express FX™** provides fast, click-and-point access to sound effects on the Akai DD1000 magneto-optical disk recorder. The program runs on any Mac with 1MB of RAM. Call (800) 545-6900 or (818) 884-6294...**Tobin Cinema Systems' Audio Reference Generators** (\$150) offer either 440Hz or 1kHz tones, as well as pink noise. The ARG sets include circuit board and DC wall power supply. Call (206) 932-7280...Prices have been reduced 20%-25% on the **WaveFrame 1000**: The core system is now \$15,850; 8-track disk

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"The Lawnmower Man" image courtesy of Allied Vision Lane Pringle Productions and New Line Cinema Corporation. "CyberBoogie" created by Angel Studios.

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FEATURING



SyQuest
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by George Petersen

PRODUCT

CRITIQUES AND COMMENTS

SYMETRIX 425
COMPRESSOR/LIMITER/EXPANDER
 Over the past 15 years, Symetrix has developed a reputation for delivering solid, well-designed tools for professional users in broadcast, studio or live sound applications. In my experience, Symetrix gear has always been reliable, good-sounding and affordable; the company's latest offering, the model 425, is no exception.

A dual-channel compressor/limiter/expander in a single-rack chassis, the 425 can be operated in dual mono or stereo modes. Its 1/4-inch and XLR inputs/outputs can be used balanced or unbalanced; 1/4-inch TRS jacks provide sidechain access. The power supply is internal, although no AC switch is included.

On the front panel, eight LED lad-

dollop of control for those innumerable situations that fall outside the "typical" application. The 425 is a compromise between a flat panel with a pilot light and on/off switch, and 400 knobs with controls for everything from altitude to wind chill factor (two factors known to have a marked effect on sound propagation). The 425's controls, however, strike a workable balance between ease of use and tweakability—rather like an SLR camera automated for great results 90% of the time, with manual override to handle tricky situations. At the same time, the 425 employs a minimalist approach to audio componentry: Under program-dependent control, the three processor sections in each channel are routed through a single VCA, even when limiting, compres-



der displays indicate action of the three dynamics sections on each channel as well as output level. The expander sections have threshold and release controls; the compressors offer threshold, release and ratio pots, and the peak limiter provides manual control of threshold only. A link switch selects stereo or dual mono operation, and each channel has an in/out bypass switch.

While the 425 combines a lot in a single box, some points are worth noting. The unit is designed to be easy to use and still offer a decent

sion and expansion are used simultaneously.

When the link switch is set for stereo operation, channel 1's knobs define all parameter settings, as is common with most stereo-linkable dynamics controllers. However, unlike most other such devices, the 425's program-dependent circuitry monitors *both* incoming channels and makes changes based on whichever channel is most appropriate. One minor peeve concerning stereo operation is that the identical red LEDs that indicate stereo or dual

THESE CONSOLES SO MANY FEATUR COULDN'T FIT THE ALL ON THIS PAGE



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



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mono status are placed side by side; from more than a few feet away, it's tough to tell which mode you're in.

My first test for the 425 was vocal processing for a chatty, *Entertainment Tonight*-style radio series. I always record the dialog direct to digital and later transfer the "good" takes to analog 2-track for editing. During the transfer, the dialog is compressed, equalized (often for telephone or racetrack-type announcer effects) and appropriate ambience is added. On this production, the Symetrix handled the task admirably: The compression was natural, providing even gain without any pumping or breathing artifacts, while a touch of downward expansion eliminated extraneous noises such as script rustling, vocal smacks and the inevitable quick, deep breath that a narrator always seems to take before delivering a line.

The 425 came into play again as a stereo peak limiter for the one-hour show's final mix, which combines the dialog with CD production music, sound effects, MIDI sequences, disk-based jingle playback and client-supplied commercial spots that vary widely in level. The production can get pretty chaotic as we mix all these elements to digital in real time, and the last thing we want to worry about is digital overload when we're 26 minutes into a 30-minute side.

The limiter section only has a threshold knob, and since I wasn't sure what the limiting ratio was, I actually broke out the 425's user man-

the mild peaks and the limiter section for overload protection. This worked well, and I liked the combination. Maybe I should read manuals more often.

Bread and butter studio chores (lead vocal limiting, compressing bass guitar and leveling background vocals) proved to be no sweat for the 425: The results were smoooooth. I also tried using the compressor to create a squashed rock guitar effect but was far less successful. However, I was impressed with the 425's performance as a vocal ducker for some commercial voice-over spots. While not a "true" ducker (the unit lowers the background music level to match the level of the trigger vocal, rather than to some preset level), I liked the effect, which seemed more like a finger riding a music fader. Besides inputting mic signals for ducking, the sidechain access also came in handy for de-essing hissing vocals. No problem here.

Priced at \$579, the Symetrix 425 is a versatile studio toolkit that's affordable and sounds good. The company sold nearly 10,000 of its model 525, the predecessor to the 425. Having used the new box, I wouldn't be surprised if it does as well.

Symetrix, 4211 24th Ave. West, Seattle, WA 98199; (206) 282-2555.

SABINE FBX-900 FEEDBACK EXTERMINATOR

Two years ago, Sabine introduced the FBX, a revolutionary product that automatically detected the onset of feedback and assigned a notch fil-

ter to eliminate the offending squeal. Now Sabine has unveiled its second-generation product, the FBX-900.

Housed in a one-rackspace chassis, the FBX-900 is a single-channel unit that combines nine independent, narrow-band (0.1 octave) -50dB filters that are under DSP control. Depending on user needs, any of the filters can be either fixed or dynamic. During the initialization

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procedure—when the unit determines the problem frequencies in any setup—the FBX assigns fixed filters to the strongest resonating frequencies. The dynamic filters are left unassigned to control any intermittent feedback that can occur during a program. Filter activity is indicated by an LED display on the FBX front panel. Controls are minimal, consisting of an input level adjust pot (with 4-step LED indicator), reset button and power and bypass switches.

Setup is straightforward. The FBX is placed between the mixer and the power amp, using either its balanced XLR (pin 2 hot) or unbalanced 1/4-inch connectors. Stereo operation requires two FBX units, and each monitor mix output from the console requires its own FBX, also placed between the mixer and power amp. If equalization is used for room correction, the FBX can be placed either before or after the equalizer in the chain. A simple initialization procedure (outlined in the manual) requires the operator to raise console master levels until feedback occurs, which allows the FBX to "learn" the problem frequencies and set its filters to counteract them. Once the filters are set, the unit retains the setting in nonvolatile memory, protected against power losses and saved even when the unit is off.

Clearly outlined in the manual, the procedure is fairly simple once you've done it a few times. While the FBX-900's setup is more straightforward than its predecessor, the original FBX had the instructions silk-screened on the top of the unit. Perhaps Sabine could do the same for the new model, just for those occasions when the manual may not be handy.

The power supply is an outboard wall block with cable terminating in a 3-pin DIN plug, which can wiggle out fairly easily. A bit of gaffer's tape took care of the problem, although Sabine should look into finding a more robust connector, or preferably an internal power supply. The latter is a must in many permanent installa-

tions, as local codes often prohibit outboard power supplies or require that all installed gear be UL-approved. [According to Sabine, future units will have 5-pin DIN plugs that should hold more securely—Ed.]

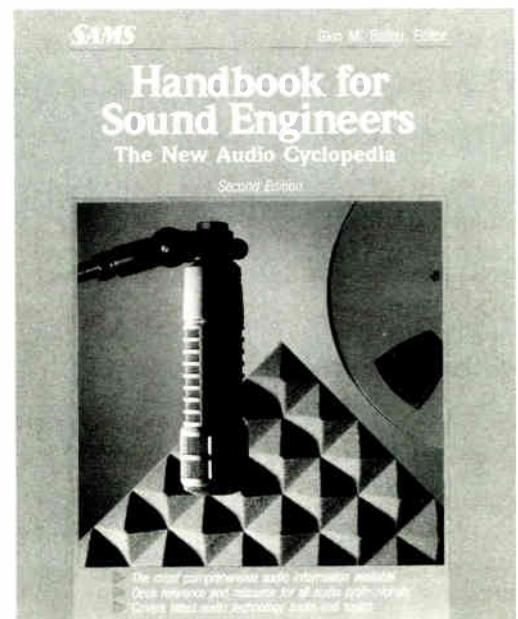
Over a period of weeks, I had the opportunity to use the FBX-900 on a variety of situations, both as mains and monitors. Like its predecessor, the FBX-900 is an extremely effective feedback suppressor, adding another 6 dB-9 dB of gain-before-feedback in any system. The difference is really amazing, as a 9dB gain increase is the equivalent of an eight-fold increase in amplifier power.

The FBX-900 yields a noticeable improvement in any feedback-prone situation. As an added plus, Sabine improved the 900's signal-to-noise ratio (now typically 86 dB, which is 16 dB better than earlier FBX models). The filter action is fast—typically in the half-second range—and the nine filters can handle just about anything. For those cases when you're mixing 120dB rock monitors in a glass room, you can always run two FBX-900s in series for 18-filter action. Priced at \$599.95, this one's a winner, a powerful tool for anyone seeking a simple yet elegant solution to feedback problems.

Sabine Musical Manufacturing, 4637 NW 6th St., Gainesville, FL 32609; (904) 371-3829.

Handbook for Sound Engineers: The New Audio Cyclopedia

Editor Glen M. Ballou has done an exemplary job with this second edi-



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tion of the 1,500-page classic text, packing this \$99.95 reference work with concise, up-to-date information on every conceivable audio topic. The work is not entirely that of one person, as Ballou has assembled a formidable panel of authorities with decades of experience in divergent fields to handle specialized topics with expertise. Besides Ballou, familiar names such as Chips Davis, Don and Carolyn Davis, F. Alton Everest, Al Grundy, David Miles Huber, Ken Pohlmann and Emil Torick (to name a few) contributed to the work.

Among the topics covered are sound fundamentals, acoustics, electronics, microphones, loudspeakers, room design, filters, consoles, recording and playback systems, CD, DAT, MIDI, sound system design, audio for broadcast, and audio testing and measurement techniques.

Theoretical concepts are covered in detail, but one of the strengths of *Handbook for Sound Engineers: The New Audio Cyclopedia* is its combination of theory with practical application. For example, the "Details of the Session" chapter by Chips Davis and Linda Jacobson presents the theoretical concepts of room acoustics, monitoring and microphone use, and follows them up with interviews of noted engineers like Bill Porter, George Massenburg, Allen Sides, Ron Estes and Tom Jung, who add their tips and insider techniques for the production process.

My only complaints about the book are minor—for example, the chapter on visual projection is longer than the section devoted to DAT. Petty quibbling aside, the *Handbook for Sound Engineers: The New Audio Cyclopedia* is a monumental work with much to offer for the novice, veteran or lifelong student of audio technology.

Published by SAMS, a division of Macmillan Computer Publishing, Carmel, Ind. Also available through Mix Bookshelf: (510) 653-3307 or (800) 233-9604. ■

George Petersen lives in a 100-year-old Victorian house on an island in San Francisco Bay. He can be found any weekend for the next two months in the archery booth at the Renaissance Pleasure Faire, Marin County.

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by George Petersen

GENELEC 1031A STUDIO MONITORS

For years Genelec, a small company in Finland, has been quietly manufacturing high-quality monitoring systems, which have found acceptance in studios and broadcast facilities throughout Europe. In the States, however, recognition of the Genelec name has been slow to come about, partly due to limited distribution in the past, yet the speakers have garnered an appreciative audience among those who have experienced them.

Genelec has focused its research on the interaction of transducers with matched electronics—crossovers and amplifiers—to provide optimal performance. Consequently, all Genelec monitors are powered systems with active crossovers and multiple amplifiers. Priced from \$1,999 to \$49,999 per pair, Genelecs are not inexpensive, but when factoring in the amplifiers and crossovers included in the systems, the price becomes more reasonable.

In terms of providing a reliable, repeatable reference, nothing beats the powered monitors concept. Amplifiers have a major influence on a

monitor's sound, so how do you know what you're hearing if your own monitors are powered from different amps as you travel from studio to studio?

At last fall's AES show, I heard rumors about the Genelec 1031A, a new, high-performance, near-field system. Entering a fifth-floor demo suite at the NYC Hilton, I gave the Genelec rep a familiar CD to play on the 1031As and moved to the back of the room for a listen. After a few minutes, I told the rep that I wanted to hear the *little* speakers, not the large, 3-way, 12-inch system. When he said that I *was* hearing the 1031As, I asked him to turn off the subwoofer. However, no sub was connected; what I mistook for a large system was actually the 1031As, a 2-way, 8-inch system. Scary.

Evidently I was not the only one impressed with these, as Genelec and its U.S. distributor, QMI, were deluged with orders based on hearings of the prototypes at AES. Once production began earlier this year, it took the company several months to



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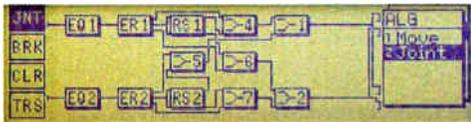
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select the size and shape of the room, the number of early reflections, and the time and amplitude of each individual reflection.

Or you can have two different choruses going at the same time, each with its own depth and rate. So you think the left input should go through a chorus and then to the reverb section, but you want the right input to bypass



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the chorus and go into the reverb,

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



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

Actually, those two words best describe the idea behind buying and using all our digital processors. “No sweat!”

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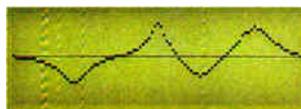
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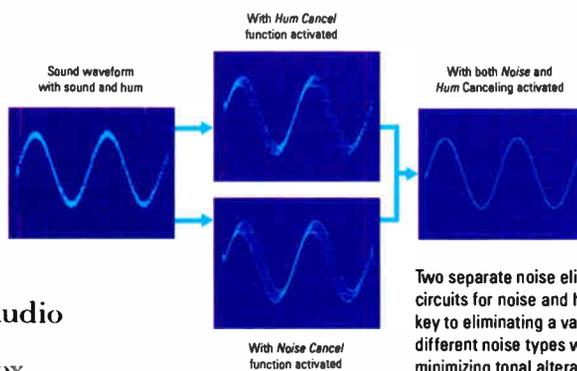
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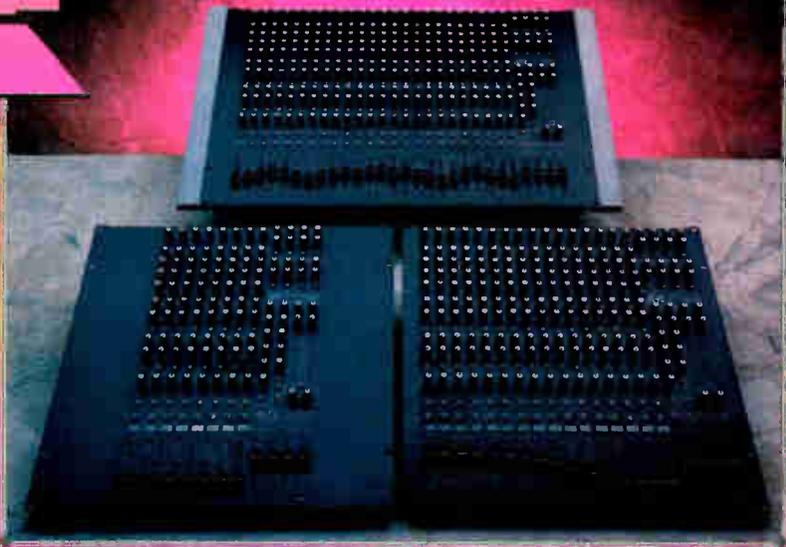
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catch up with back orders, even those from Big-Time Audio Journalists. Fortunately, it was worth the wait.

Physically, the 1031A has a compact (10 x 15-3/8 x 11-3/8 inches) enclosure, with an 8-inch polymer composite cone woofer and 1-inch metal dome tweeter mounted in a Directivity Control Waveguide. Also on the front face are LEDs indicating AC power and clipping/overload conditions. Two 120-watt amplifiers and the active electronics are housed entirely within the speaker cabinet. Three DIP switches (each with four positions) for bass roll-off, bass tilt and treble tilt are located on the rear panel, along with power on/off switch, AC fuse, input sensitivity pad and XLR input connector.

A vibration isolation (shock-mount) system protects the electronics from in-transit damage, which should be appreciated by engineers or producers who tote monitors to studio gigs. And a built-in 110/220-volt transformer comes in handy for the bi-continental independent.

The speakers are designed for either horizontal or vertical use, and, if desired, the tweeter can be rotated 90° so the logo reads correctly. To avoid interference and unwanted reflections from the console surface, the manual recommends using the 1031As in a vertical position on floor stands, although most users will place these horizontally on console tops. At 26 pounds each, these shouldn't pose a threat to the average meter bridge.

The 1031A's unique array of DIP switches for frequency tailoring provide repeatable, predictable LF and HF shaping. Leaving all the switches in the off position provides a "flat" response. The bass (-0, -2, -4, -6 dB) and treble (+2, -0, -2, -4 dB) "tilt" switches have gentle shelving curves, as well as "mute" positions that disconnect the driver from the system for testing. The bass roll-off switches have a much steeper curve and range from -0 to -8 dB in -2dB/octave steps.

In practice, the treble switches are not really required unless you are in an extremely live room—such as a makeshift control room set up in a backstage dressing room. The bass tilt and roll-off switches are more useful, especially given the

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typical applications for which the 1031As are suited. On a console top, either the -2 or -4dB bass tilt settings are appropriate in reducing the bass emphasis caused by the console surface. In extreme conditions—such as corner placement in a small van or video edit suite—the bass roll-off can be combined with the bass tilt to provide appropriate LF attenuation.

The input gain can be adjusted from -6 to +6 dBu for matching the

console's output level. However, I found this control to be unnecessary in the typical studio situation. First of all, when mixing, you want as much amp headroom as possible, so an attenuated setting is not of much value, particularly in a system that is capable of a short-term SPL of only 110 dB at one meter. Secondly, rotary controls provide little chance of precise level matching, so full up or full down are your only options in the field—stepped level attenuators would have been far more useful in this application. I just set the pots to

maximum volume and left them there, which was perfectly suitable for driving the system from either +4dBu or (at a lower output SPL) -10dBV consoles. Concerning the latter, the 1031A's balanced input can also accept an unbalanced signal using a suitable adapter.

Mixing and tracking on the 1031As over a period of weeks proved a pleasurable experience. The 1-inch, metal-dome tweeter is surprisingly smooth, even in the critical 2.2kHz crossover range. The tweeter is inset into a Directivity Control Waveguide, which offers the dual advantage of bringing the tweeter's voice coil closer in acoustical alignment with the plane of the woofer as well as reducing diffraction effects. The DCW's gently flared horn shape provides a wide sweet spot, with a constant directivity response that remains consistent until the listener is more than 45° off-axis. Stereo imaging was accurate, and the monitor's tonal character never changed when reaching to equalize drums, which for some reason are always on the first ten faders—the farthest stretch for the engineer!

The LF response was well-damped and tight. The -3dB downpoint is 47 Hz, which is truly remarkable for an 8-inch driver in an enclosure with a volume that's barely over a cubic foot. The slotted vents really move some air, which was just the thing when mixing on a hot summer night, but the net effect of mixing or tracking on the 1031As was a feeling that I was working on a much larger, multiway system.

After using these Genelecs on rock, jazz and radio sessions, I felt confident about the mixes, which is a feeling I rarely experience with new studio monitors. And mixes translated accurately to other systems, both large and small, a major consideration when doing critical live-to-2-track work, where a chance for a second take just doesn't happen.

If you mix at moderate (sane) levels and need a quality reference monitor, the Genelec 1031As are an excellent choice. While their \$2,998/pair price may dissuade some buyers, serious listeners may find that these are well worth checking out.

Genelec, distributed by QMI, 15 Strathmore Road, Natick, MA 01760; (508) 650-9444. ■

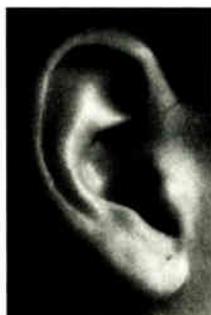
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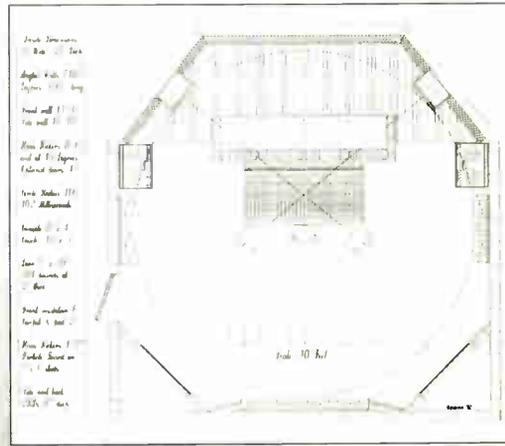
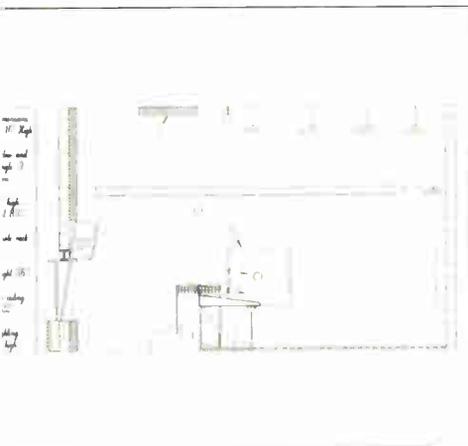
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MODERN CONTROL ROOM DESIGN AND CONSTRUCTION

Part II: Floors, Walls and Materials



by Malcolm Chisholm



Floors

Since most studios are built into commercial properties, we usually deal with concrete slabs—the worst floors in the world. Miserably uncomfortable, these floors also don't offer a place for cable runs and can't be soundproofed.

Example: When Chicago's Universal Recording built new studios in the late '50s, Doc Sabin designed a 90dB soundproof wall between studios A and B. The wall was about four feet deep and worked beautifully, but somebody forgot to cut the floor slab, so the bass from one studio transmitted almost perfectly to the other. When two sessions ran at the same time, it was fun to watch one band try to hold its tempo

while hearing a different tempo from the other studio. The clients didn't see the humor in it, though, so studio B got two inches of industrial cork and a second brand new floor over the first brand new floor.

Universal was designed as a second-floor addition to a building in construction, so the slab could have been cut. Unfortunately, most studios are on the ground floor, and slicing up a foundation slab is verboten. Therefore, the control room must have its own floor.

As a first step, seal the slab. Untreated concrete will wick up an amazing amount of water from the soil beneath it. The water will produce 100% humidity under your new floor and

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quickly wreck it.

To check humidity levels, lay a sheet of plastic food wrap on the floor slab overnight. If it's beaded up in the morning, paint the slab. If not, give it a wash coat of shellac anyway. It might rain.

Specifications for a control room floor include cable access, sound-proofing, good looks, durability, ease of cleaning and comfort.

For sufficient cable space, the floor needs to be elevated to allow runs underneath. Standard 27-pair snake cable is about 7/10-inch thick, so 2x4s laid flat will allow one cable to cross over another with room to spare. Unless you want to use the under-floor space for air conditioning returns, there's no advantage to going higher.

Isolation from the main slab is achieved by laying the 2x4s down on 1-inch felt weather-stripping to prevent solid contact. Sound travels more slowly in soft materials than in hard, so going from hard to soft attenuates it, rather like going from high resistance to low in an electrical circuit. Similarly, soft to hard does nothing.

No nails in the felt, please, but you can use the office stapler, if you bang the staples down deep with a hammer.

Use short 2x4s with serious space between them so you can make cable runs in any direction. Two feet long with 6-inch gaps in each direction is about right, as the casters on tape machines and such concentrate their weight on very small areas. Whatever spacing you use, build and use a gauge for it. Precision counts.

Also, run a bead of vinyl caulk or silicon adhesive between the felt strips to keep them put until you lay a sub-floor.

Before laying the sub-floor, get a bag full of nylon clothesline and run it side to side and end to end between every 2x4 on the slab. This will give you fishlines. Given a known starting point and exact spacing, you'll be able to drill little holes and fish new cables for new equipment from anywhere to anywhere else in the future. Saves ripping up the floor *when*—not if—things change.

The sub-floor will likely be single 3/4-inch plywood or staggered, double 1/2-ply. Either is good. Don't nail the sub-floor down. Common nails

attract rot, especially in the high humidity one finds under an airtight floor no matter how well the slab has been sealed. The best things are galvanized building screws. They don't rot the wood, and they grip so well that you only need about a third as many as with nails. Start the sub-floor at the edges instead of the middle of the room, and shim the panels an eighth-inch or so away from the walls so you can caulk them in without actually touching.

This process produces a floated, airtight, soundproof sub-floor. After a coat of shellac to guard against cleaning leaks, you're ready to consider the finish flooring.

I like parquet squares. They're not the cheapest thing available, but they meet all the specifications for a control room floor and present two outstanding advantages over the competition. The first is that the pattern of dark and light wood will hide the damage that inevitably occurs when things get dropped on or dragged across the floor. The second is that if a square has to be replaced, it won't stick out like a sore thumb. Hardwoods don't change color over time. Neither do the modern finishes used on parquet tiles when they're properly treated.

Whether the platform floor extends to the front walls or stops at the front edge of the console depends on how the mic and speaker cables are to be run, the location of the peanut gallery and whether or not the mixer can see any part of the floor between the mix position and the speakers.

If the mixer can see the floor between the mix position and the monitors, there will be a short-path reflection to the mixer that *must* be eliminated. Short of leaving all that space unused, the only practical treatment available is carpet. In passing, don't use nylon, which is reflective at very high frequencies.

As for the peanut gallery, I have a long-standing preference for seating visitors in front. Keeps 'em away from the console, reduces the conversation level and lets me keep track of who's doing what. Given that the area up front will probably need carpet for acoustical reasons, it makes sense to set a wide sectional couch up there as well.

The only downside to a front peanut gallery is that people moving

—CONTINUED ON PAGE 182

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Live Sounds

Genesis



PHOTO: STEVE JENNINGS

Phil Collins is two-way wireless with Beyer and Future Sonics gear.

mixer, Rob "Cubby" Colby. I was there to listen to the P.A. and find a good position for mixing. I ended up at 165 feet back, which I'm really happy with. That distance accommodates a lot of seats in front of the mix position, which helps the sight-line problem."

After the concept was tested, pre-production began overseas. "We had four weeks in England getting the songs tight, listening and recording," Page says. "That was mostly for the band's benefit." Back in the States, they moved to an empty blimp hangar in Houston for full production rehearsals. "We spent two-and-a-half weeks there fine-tuning things, but we never took the full P.A. in—there was no point."

"I only listened to very small amounts of P.A. ten feet away," Cubby explains. "It wasn't a great place, but at least we knew it wouldn't get any worse." The full P.A. was finally added to rehearsals at Dallas Stadium during the four days leading up to opening night.

The tour's itinerary includes numerous overnights. Although some parts of the set exist in duplicate or triplicate for leap-frogging between venues, there is only one set of sound gear. Quick setup and tear-down is necessary to meet each day's

Performer: Genesis
Venue: Oakland Coliseum, June 20, 1992
Rental Company: Showco
FOH Mixer: Rob "Cubby" Colby
Monitor Mixer: Phil Christensen
System Engineer: Cowboy Conyers/Howard Page

by David (Rudy) Trubitt

When Genesis began planning their first tour in five years, they were looking for something different. "They didn't want it to look like a normal stadium show, where from 200 feet

away they look like stick figures playing in a box," says Showco's VP of field operations, Howard Page. Instead, the band wanted an open look that would also improve sight-lines and free up more seating. "One of the things we did to achieve that," Page says, "was to make the sound system free-standing and move it 140 feet between inside corners."

Moving the arrays that far apart required some experimenting. "Last August we set up the whole system at the Dallas Stadium," explains the band's house

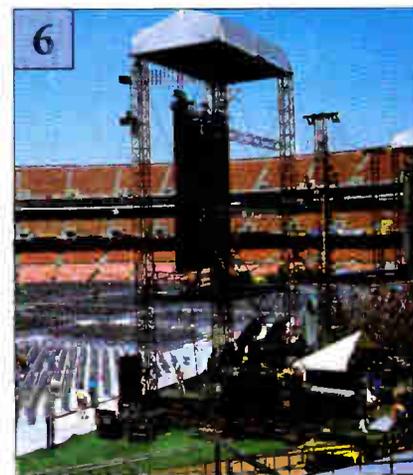
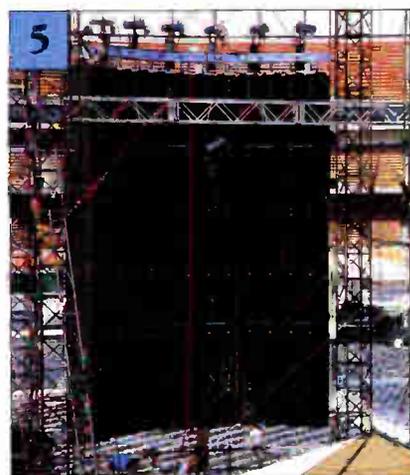
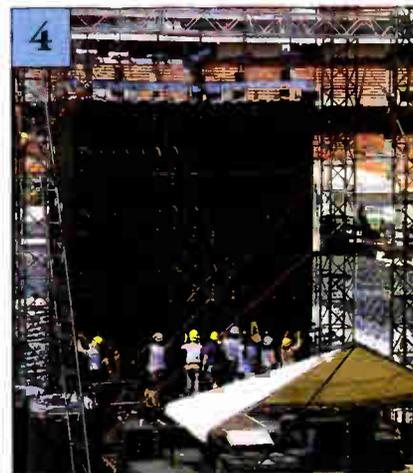
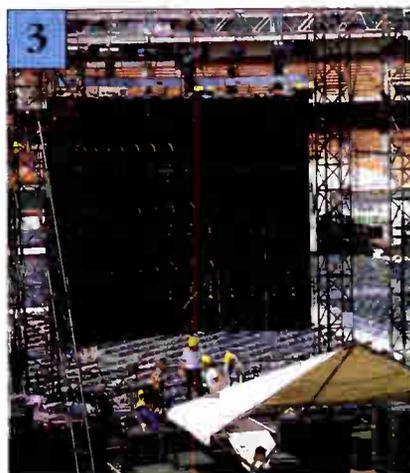
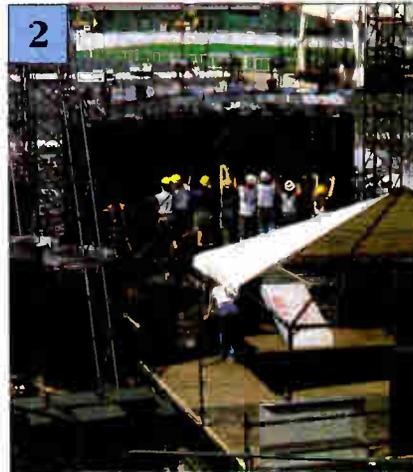
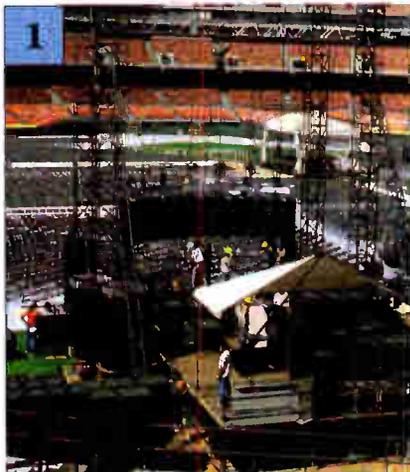
"We can put it up as fast as we can get it," says crew chief Cowboy Conyers. This sequence of photos shows one hour of work.

schedule. Free-standing arrays and the Prism's interlocking cabinet design help make it happen. "We roll the boxes underneath and pin them exactly the same way we would on a flat arena floor," Page says [see photos at right]. "We're achieving better times on setups and load-ins than we often [achieve] with half the amount of gear in an arena configuration." The main system consists of a left and right array, 13-wide x 6-deep, using Showco's Prism "stadium" system, which presumably contains longer-throw mids and highs (yup, it's proprietary, but I had to ask). These are complemented by 64 subwoofers. Everything is Crown-powered.

A front fill and small delay system are also used. "Obviously," Page says, "at 140 feet apart you've got the potential for a big hole in the middle. We delay the front fill so that it blends with the main P.A., rather than it being an isolated source. You can walk down the corridor and the image doesn't shift."

"I wanted to make sure that the infield P.A. made the most expensive seats sound really tight with a lot of impact," Cubby says. "The stereo separation is, of course, phenomenal because of the width of the P.A. I started using much broader pans, but I wasn't able to keep that because I was losing level at the center [compared to] the outsides. So I've been bringing keyboards and guitar and vocal harmonies tighter in and giving the drums the full pan effect. And of course there are all the stereo effects, so you start to create a sort of three-dimensional sound. It's new having the P.A. so far apart, but I adjusted to it right away."

One delay tower was erected behind the FOH position at the Oakland show. "They clean up the high-end projection," Page



says. "The [main] system itself is quite capable of covering back there in the configuration we've got; on shorter fields we don't even put it up. My philosophy with delay systems is that unless you get them dead right, they create more problems than they solve. It's often better to have someone get used to a sound

that's a little distant than to have a delay in their face that's wrong. I try to be discrete."

FOH centers around two Midas XL-3s. "It is a wonderful console," Page says. "They're incredibly reliable. The company did its homework on connecting two boards. The control voltages and signals that could fight be-

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tween the two power supplies for ground reference are opto-isolated. You can connect anything to anything and never get a ground loop or a problem."

Page also uses a Mackie CR1604 mixer to create a mix for TV crews. "They like to get a shot of the show for their news that night," Page says. "Rather than give them a dry board mix, we put some audience mics up and create a mix that matches their [video] image. That gets fed to isolated outputs here at the FOH and up in the pit." The mixer's alternate stereo bus is used to submix the FOH playback devices (CD, DAT and audio for pre-show videos). "It gives me a lot of flexibility without tying up channels on the XL-3," Page adds.

And what of microphones? "We're using the newest series of Beyer UHF wireless," Cubby says, "and we're really happy with those. The two drum kits are mainly Beyer outfitted—201s, 420s, M88 in the bass drum and

their big studio condensers on the overheads. On guitar are [Shure] SM57s, and there are two [EV] RE20s on the bass amplifiers, which we take direct as well."

"Because we're working outdoors at pretty strong SPL levels," Page says, "gates play an important part in keeping the stage sound under control. Limiters, and in some cases de-essers in series, are used on the vocals. The effects are dictated by the album's sound—Eventide Ultra-Harmonizers, AMS reverbs and the SPX900s."

The venue also dictates effects usage to some extent. "We've been doing a lot of domes," Cubby says. "In the domes, you've got to use the bare minimum [of effects] and get into the enunciation of the show and the music mix. We use more compression on the P.A. than we would outdoors, where you need everything you have. Indoors you get a little relief because the reverb in the room gives you that extra volume. You have to meet the

domes with just enough saturation from the P.A. that you hear only the P.A., but hopefully not the room.

"I go for excitement and impact to get people energized," Cubby continues. "I build from that point—I never let go of the fact that the music mix is very important. Then I wait for the opportunity to get some impact: drum rolls, snare stuff. Most important for me is that people can always understand what Phil's singing and saying between songs. I try to get as much reverb on him as I can without getting in the way. I do a lot of long reverb slams where he holds notes and sometimes harmonizes with himself. It's a matter of getting excitement into the mix and having a good time for myself, as well as the audience. I do love my job!"

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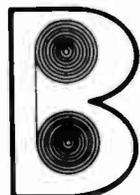
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keyboard or a full drum kit) at the monitor console and fed to a small fader box at each stage monitoring position. Monitor engineer Phil Christensen explains: "The whole band has to agree on what [the balance within] each mix is going to be, but each musician can adjust his level of that particular mix. It was invented by one of my predecessors because Phil Collins demands a lot of attention during the show, and the other fellows felt left out. This solution got around having two mix engineers. It works really well for this band—they're all responsible musicians, and they know that if they push something too far it will be a problem."

Christensen uses two main consoles—a Harrison SM-5 and a Yamaha PM3000. The 3000 is used to submix the three drum kits and guitars, and it generates individual instrumental mixes for the Genesis monitor mixing system. "The subgroup outs on the Yamaha are for Phil's mix," Christensen says, "so he gets mixed on the faders, and the rest of the band gets mixed on the pre-fader aux sends."

Two DMP7s are interposed between the PM3000's outputs and the matrix monitor system. "These are the inputs that change the most," Christensen says. "Rather than doing the cues [manually], I have a MIDI controller that sets the whole thing up for each song." The individual mixes from the Genesis matrix system return to the Harrison, where they are assigned to the appropriate stage wedges. The Harrison is also used to create a stereo mix for Phil Collins, who is using Future Sonics wireless Ear Monitors for the first time this tour.

"On previous tours, I found myself always struggling for level and the right sound," Christensen says. Collins adds, "Every night we'd have this autopsy afterwards, trying to

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work out how we could get more volume at the piano or whatever. Most people dread the load-in and think the gig's the easy part. I'm sure Christensen was starting to dread the gig, because it became a series of finger signals—a sort of Morse code. One was vocal, two was effect; you'll see that all the way through the *But Seriously* live video. Now some nights go by without me saying a thing.

"I can't believe I'm not having

more trouble with my voice on a tour like this," Collins continues. "Open-air shows are usually lethal for singers. I prefer singing in an environment where there's natural reverb. In an outdoor situation, it's very dry and the sound just falls off the stage. With [the Ear Monitors], I get the same environment every night."

Finding the optimum gain structure for the Future Sonics system can be tricky, according to Christensen. "I'm not certain I've accomplished that yet.

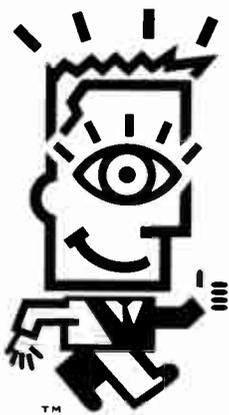
We've only been out a month now—it's a whole new world. I'm learning how to mix it, and he's learning how to listen to it. But we both decided that it's a hell of a lot better than it was."

The Ear Monitors have also added to the show visually. "When I first started singing with the band," Collins explains, "I was quite happy to be stuck behind two wedges and a mic stand, since I was used to the security blanket of the drum kit between me and the audience. I never took the microphone off the stand, because I didn't really know what to do. I didn't want to wiggle me bum like everybody else. On my last tour, we used a radio mic for a couple of songs, and that started to feel easier. But I was still tied to monitors. Now I'm all over the place. I've got the radio mic and the head set, and I can go anywhere I want."

The show sounded great. Cubby's mix was immediately powerful and commanding, filled with the moments of impact he described. Much detail was present in the mix: for instance, the two drum kits could easily be distinguished when playing at once (and sounded great to boot). The system did well—bright and intelligible without being strident, and a solid, but not soft, low-end. The front fill was sonically integrated with the main P.A. Up in the stands, the in-your-face presence was somewhat diminished as the stadium's contribution to the ambience became more of a factor, but vocal intelligibility remained excellent even in the nose-bleed seats. A definite thumbs up.

This tour meets its demanding schedule on the backs of the crew, a fact Cubby doesn't overlook. "The crew has been exceptional. The Showco guys have done a fantastic job. My hat's off to them for doing it every day, because we're using the same P.A. every night." ☺

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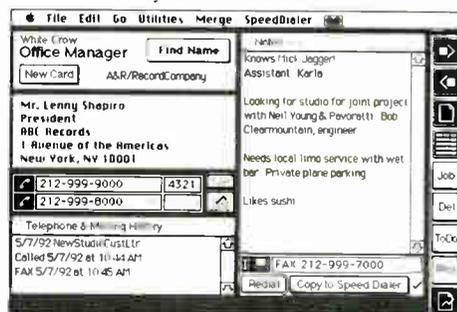
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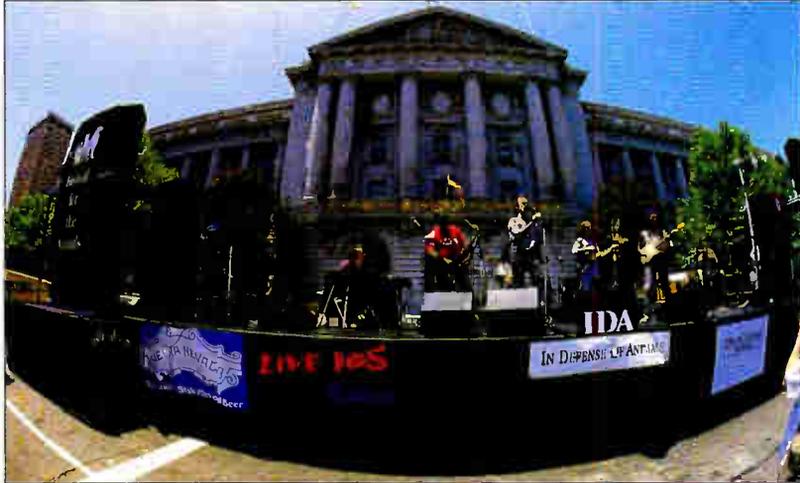


PHOTO: JAY BLAKESBERG

A CAUSE FOR THE PAWS

M & M Audio (Danville, CA) provided sound for "Festival For The Animals," a benefit for In Defense of Animals, held in San Francisco's Civic Center Plaza. A variety of bands and speakers appeared on the outdoor stage behind City Hall. M & M's P.A. uses Excel Audio cabinets, designed by Richard Guy. Guy, who attended the event, provides a bit of his design philosophy: "One of the things wrong with the speaker business today is that there are a lot of big-name companies putting out systems with no-brand components. We're the no-name company with the big-name components. I use the best components I can find."

"System engineering is always more important than a magic bullet," Guy continues. "It's never the device, but the way the device is employed that is important. People understand synergism—one plus one plus one equals seventeen. But they don't understand that it also works in reverse. If you take a shortcut here and pinch a few pennies there, the results are devastating."

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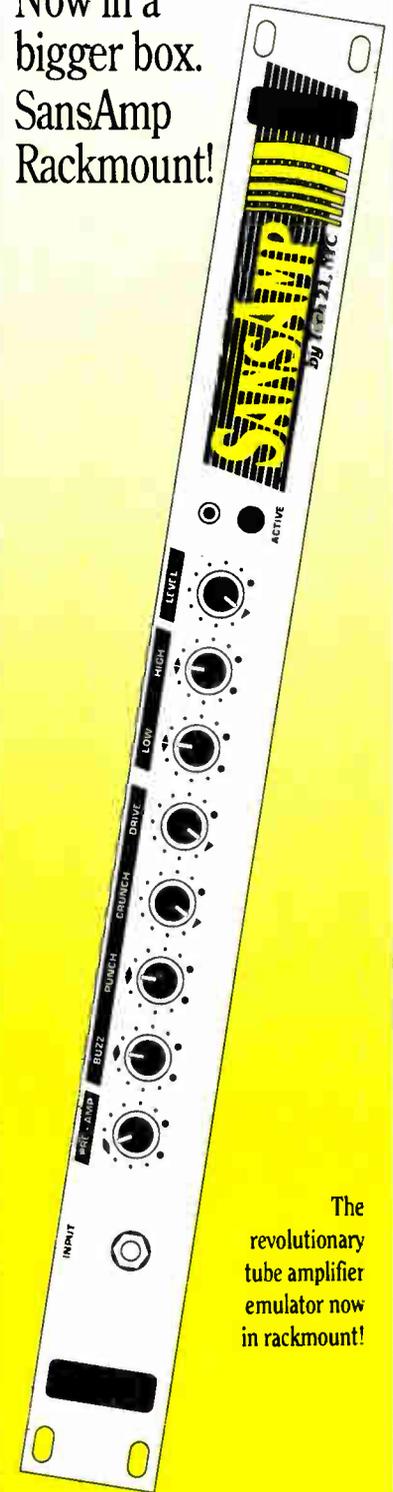
San Francisco's Civic Center Plaza was the venue for an In Defense of Animals benefit. Pictured is the band Zero. Sound by M & M Audio.

4-way trapezoidal cabinet, the show also used the company's sub box, a 27-inch woofer in a ducted box. "The subwoofer box is tensioned and stressed, which doubles the output in the bottom octave. The device has full power in the 20-100Hz band," Guy explains. M & M's Alex Moran adds, "I do raves with four of these boxes. It takes me 16 18-inch subs to get the same amount of low end as four of these."

MARSALIS LIVE

Rosewood Sound (Syracuse, NY) recently joined forces with the Eflanel remote truck on a Wynton Marsalis date. The 1,200-seat Princeton McCarter Theater performance was the site for the premiere of a new Marsalis composition, commissioned by the Lincoln Center Jazz department. Rosewood Sound used their 4-way linear-phase system to provide sound for the sextet, which included

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bass, drums, trumpet, trombone and two reed players. Band mixer David Robinson mixed the house.

Mix asked Rosewood's Mark Fitzgerald if there were any compromises made to accommodate the truck. "We let them choose the mics," Fitzgerald says. "If we needed to, we added another mic. They preamp all their stage mics with Hardy M1 mic preamps. That prevents roll-off of the highs from line loss—it makes a better impedance match for line driving." A variety of mics were used, including six of the Gefell Perestroika, a Neumann TLM50 on trombone and bass, AKG 451 on bass, EV RE20 on kick, Countryman clip mic on the snare and AKG 414s for the audience. No compression or limiting was used, and very little EQ was required.

"No [stage] monitoring was used," Fitzgerald says, "except for a short appearance by a gospel vocal singer. The piece incorporated hymns as well as traditional jazz. The overall tone of the piece was meditative, while the second half was more jubilant and celebratory." Rosewood's Len Marizio also worked the show.

A TEXAN THEME

Fiesta Texas is a new 200-acre theme park in San Antonio. The park contains several venues where music and dance are performed. The largest is a 4,000-seat amphitheater that uses 16 Vega UHF 600 Series wireless mic systems. Half of these employ EV N/D857A hand-held mics, with the remainder using lavalier mics made by Audio Services Corp. "The ASC mics were tested at Opryland last year and worked very well," Fiesta Texas technical services manager Bob McCrobie says. "This performance, combined with the reliability and reasonable price of the mics, were the deciding factors in our choice."

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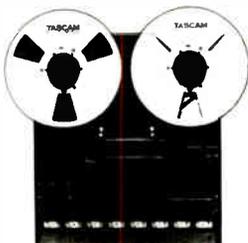


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NEWS FLASHES

Delicate Productions (Camarillo, CA) provided sound and lights for Yanni's early summer tour. House engineer Tom Sterling used a Midas XL3 console with 16-channel extender and a Martin house system including 24 F2, two F1 and four BSX cabinets, driven by Crest and Carver amps. Sterling was assisted by Delicate's Tracy Kunstmann. Monitor duties were performed by Paul Sarault, who used a Ramsa WR-S840S console, K-T EQ and Martin wedges, including the new LE700, which Delicate has deemed "outstanding"...**Eighth Day Sound** (Cleveland, OH) hit the campaign trail earlier this summer, providing sound for numerous candidates, including multiple same-day dates with the Clinton campaign. Eighth Day was also out for the ten-week MTV Sports tour, as well as the band Curve. They also provided sound for the Great American Rib-Cook-Off for the tenth straight year...**Brandywine Electronics Ltd.** (Newport, DE) has added P.A.S SW-2 wedges to their inventory. BEL vice president Dirk McAlpine described his evaluation process: "Most artist riders we receive require a bi-amped stage monitor with a 2-inch driver. We compared six different monitors and found the SW-2s to provide the cleanest, loudest sound available." BEL also plans to use the wedges on stands and flown as fills for certain applications...**GSD Productions** (Hicksville, NY)

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recently expanded its extensive P.A.S TOC System-2 loudspeaker system. The company added eight RS-2s, six SW-2 wedges and two EB-2 bass extension systems. GSD also provided sound for the NYC Central Park's Summerstage events, using Adamson Acoustics' MH255s, B218s, S218s and B118s. This year's setup hosted the Neville Brothers, Al Green, Los Lobos and many more. Other Adamson sales include SPL Productions

(Tullinge, Sweden), which will install that system in Stockholm's Museum of Modern Art; 3L Sound and Lighting of Mississauga, Ontario; and Berger Son and Lumiere (St-Jean-Sur-Richelieu, PQ)... Phillips Pro Audio (Bethany, OK) recently ordered



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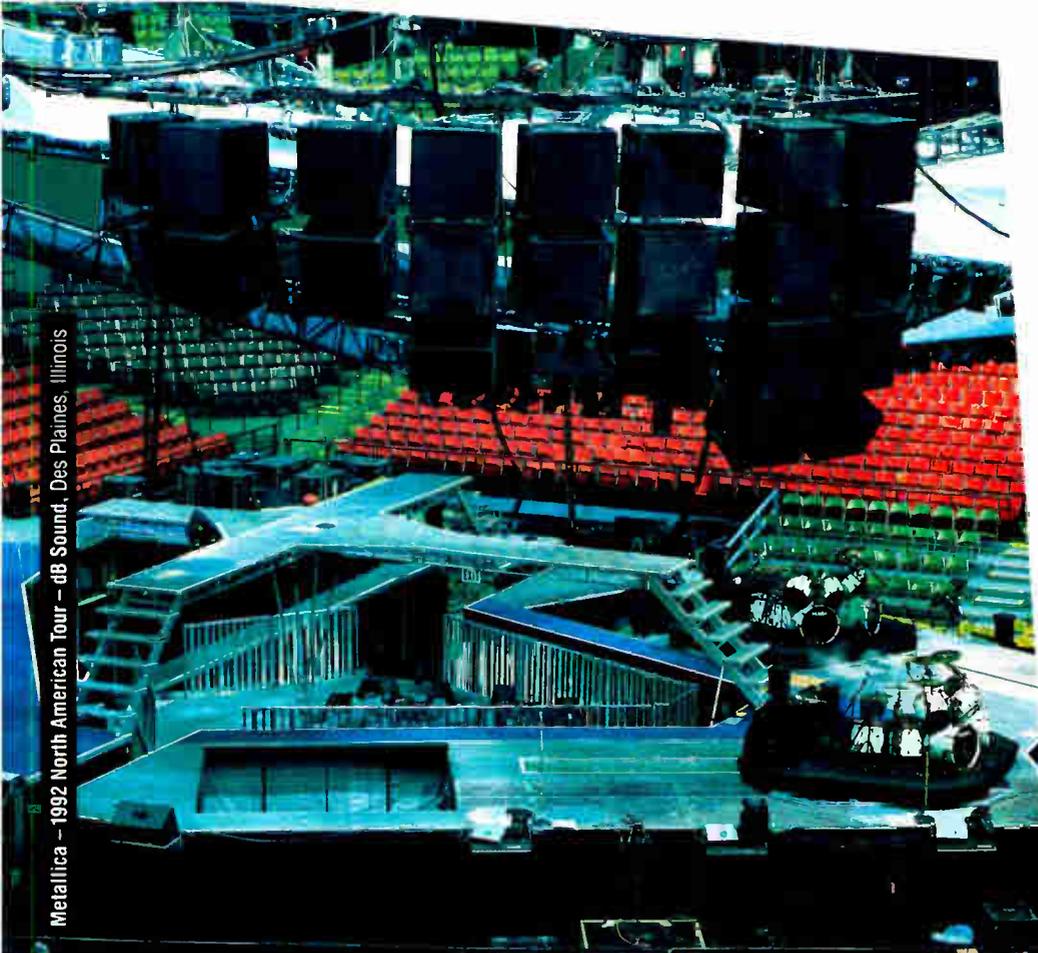
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four new TAC consoles—three 40-input TAC Scorpion IIs and a 40-input SR6000. The mid-sized SR6000 has seen plenty of service, including tours with Simply Red (which used two linked 6000s), Wet Wet Wet and The Wonderstuff...The Paris, Osaka and Berlin Hard Rock Cafes installed QSC Series One and MX Series power amplifiers. Manhattan-based Ted Rothstein designs the sound systems for many of the Cafes. He also recently completed a jazz lounge on the 56th floor of the Hotel Shangri-La in Hong Kong, including QSC MX1500 amps...db Music and Sound recently installed four Tannoy CPA-12 cabinets and Rane MA-6 amplifiers in San Juan Capistrano's Community Christian Church...Two Yamaha DMC1000 digital mixing consoles were used for the Paul Winter Consort's recent tour of Spain. House engineer Les Kahn mixed the shows, which were recorded for a forthcoming CD. The boards were chosen because of their transportability and ability to recall all console parameters... VJ Electronics (Torrance, CA) installed a Soundcraft Europa in the Rolling Hills, CA, Covenant Church. "The church evaluated several FOH mixers over a two-year period," says Gary Ford, VJ's president. "The Europa meets the needs of the church with flexible inputs, aux output busing and ease of use." ☺

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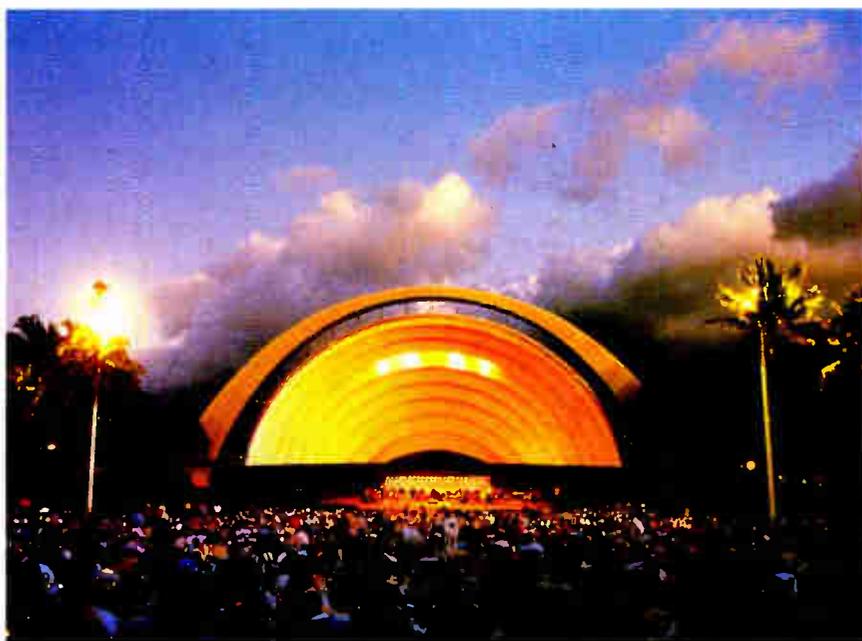


PHOTO COURTESY HONOLULU SYMPHONY

Honolulu's Waikiki Shell is one of many venues around the nation at odds with its neighbors.

Until recently, I lived just over a mile from the San Francisco Bay Area's Shoreline Amphitheater, a major stop on the summer shed circuit. Like many similar venues, Shoreline gets its share of noise complaints. On evenings when an atmospheric thermal inversion hangs low over the site, sound is reflected north from the venue into my old neighborhood. On such evenings, I could step outside and find the music of Rod Stewart or Phil Collins wafting in the breeze. It didn't bother me, but then part of my livelihood depends on concert tours! On the other hand, those with no vested interest were happy to register their disapproval—as many as 67 complaints in one night.

The problem is a serious one all over the country. Many outdoor venues face lawsuits, and no apparent solution is in sight.

The problem begins with definitions. What is noise, when is it too loud and how is it measured? "Sound is a measurable, objective quantity," says Doug Jones of Electro Acoustic Systems Inc. "Noise is a strictly subjective experience. This is a very important distinction to make. It's a matter of perception whether any individual sound is objectionable, i.e., is noise or not. No piece of measurement gear can make that determination—it's impossible to objectively measure an inherently subjective experience."

Jones speaks from experience—he is currently working for World Amphitheater as an independent consultant. That facility is now being sued by the Illinois Pollution Control Board. Illinois law has two very different provisions for initiating such action. The first is subjective com-

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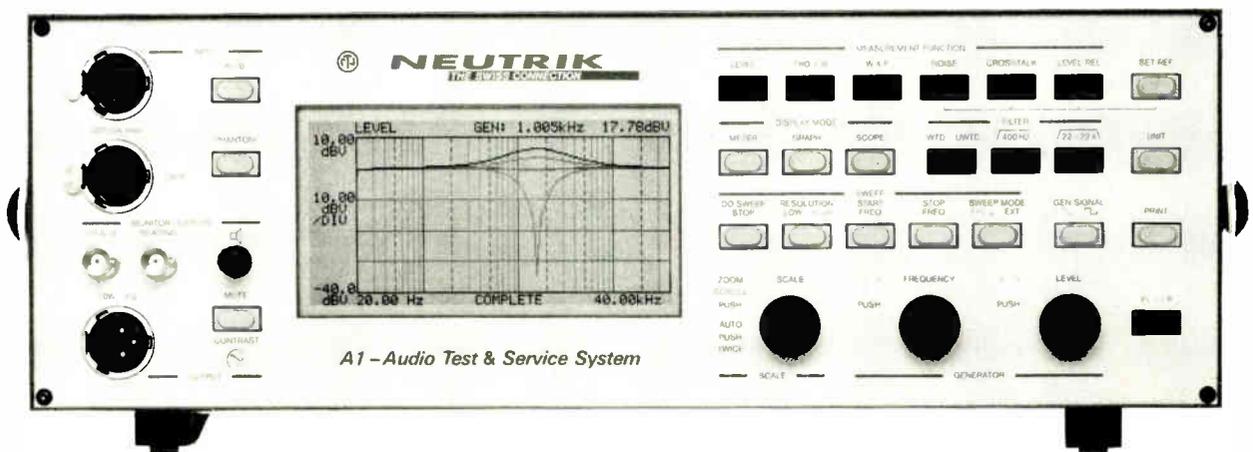
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plaint. If there are complaints, by definition there is a problem. In other words, if they can hear it, it's too loud. (Jones notes that a sound must be 10 dB below background noise levels to be inaudible.) In the second case, a claim can be made against any facility that generates noise in excess of a measurable limit. Currently, the World is being sued based on subjective noise complaints, although it is likely that the debate will soon include objective measurements as well.

However, even if the dispute is based on measurement, facts remain elusive. Most local noise ordinances are ambiguously worded, making compliance difficult. Marshall Long Acoustics has been working with the Pacific Amphitheater in Costa Mesa, Calif. "The first thing I'd advise anyone working on a problem like this," cautions Long, "is to find out what the real ordinance is and read it very carefully, particularly the definition section. These definitions [dB, ambient levels, etc.] are often poorly written. Cities tend to copy ordinances from some other city, so if you get one bad phrase in an ordinance, it crops up everywhere else."

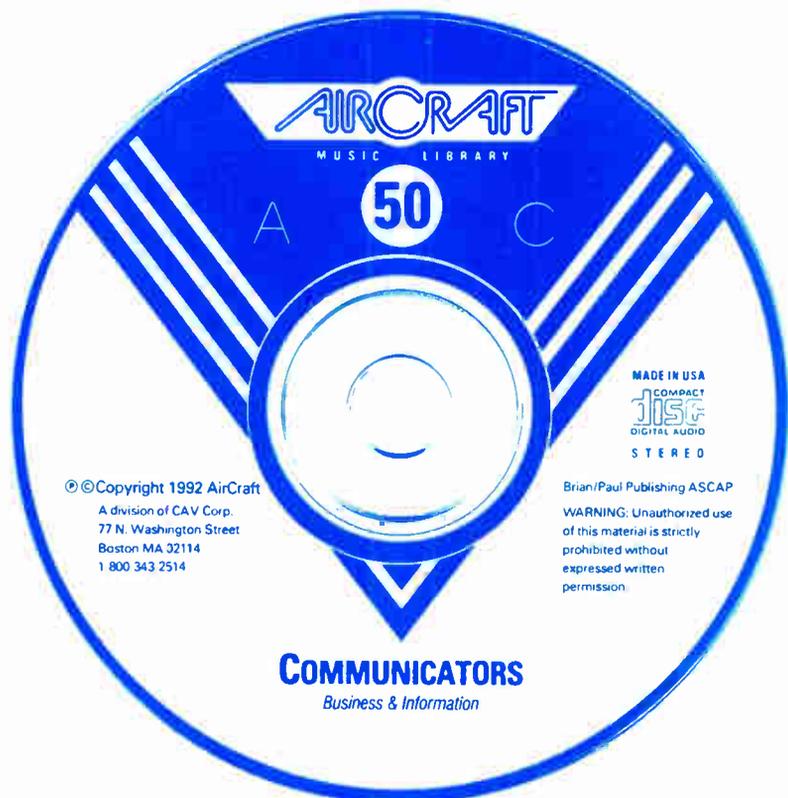
Overlooking the contribution of ambient noise levels is a common problem in local ordinances. "When the Pacific Amphitheater was built," explains Long, "there was a noise ordinance enacted. The maximum specified was 50 dBA 50 percent of the time at the property line, dropping to 45 dBA later in the evening. The ordinance did make a reference to ambient noise but didn't say exactly how to account for it. One aspect of the site is that it's near an airport, and there's a lot of light plane over-flights. There's also a lot of traffic and other activities, so the ambient level in the neighborhood ranged from 55 to 60 dBA, dropping to about 50 dBA in the later evenings. So the ambient at the site was higher than the spec, and there was minimal accounting for this in the ordinance."

"The ordinance was enforced by the Orange County Health Department," continues Long. "In addition, the concerned home-owners hired their own guy and each used a different methodology, neither of which properly accounted for ambient noise. So for years the Health Department kept citing the amphitheater. Whether they were actually over or not is very difficult to judge because of the missing ambient information in the records. In some cases it

may have been in violation, and in others it probably wasn't."

Disagreement over measurement practices can devolve into a brawl between expert witnesses, often leading to the befuddlement of local officials. Randy Bauske of Baus Engineering works with the Waikiki Shell in Honolulu, which is also involved in a long dispute with its neighbors. "Nobody really explained to the city council what a decibel is and how it's measured," Bauske says. "Then we've got

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[resident groups] with their experts confusing everyone. There are ways to manipulate the equations to get all sorts of crazy numbers. We were trying to amend to the noise ordinance to increase the spec by 20 dB, which is a 100-fold increase in power, and they were saying it would be 100 times louder."

Fortunately, there are cases when expert witnesses can be advantageously convened. Mar-

**Insulation
being added to
interior of the
Waikiki Shell.**

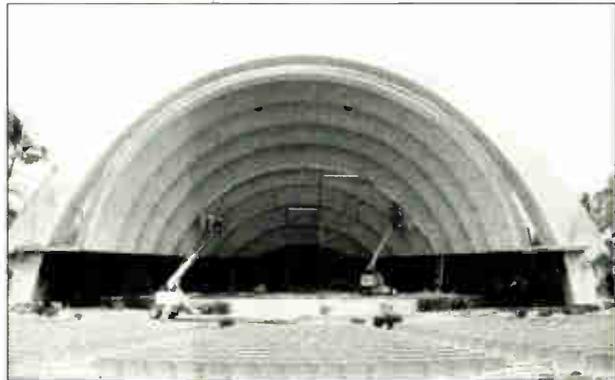


PHOTO: RANDY BAUSKE

shall Long describes a pre-trial hearing ordered by the second judge involved in the Pacific Amphitheater case. "It was very helpful," Long says. "It allowed the judge to learn about noise and sound levels."

With or without a legal ruling, venues attempt to minimize the problem for PR reasons, if nothing else. Attempting to quiet the Waikiki Shell required a more thorough acoustical evaluation than when the facility was built. Ron Darby of Darby and Associates Ltd. provided the acoustical consultation. "We were called in to make some recommendations," says Darby. "We found that the shell was not designed too well in terms of reflecting sound to the audience. Instead, it was reflecting *over* the audience and into the noise-sensitive areas. We found this by using a 1/32-scale model of the shell and ultrasonic and optical measurements. They were most revealing. You can confirm some of these focusing effects in real life—you can hear the Kodak Hula show coming in [from a distance] on stage left and guys

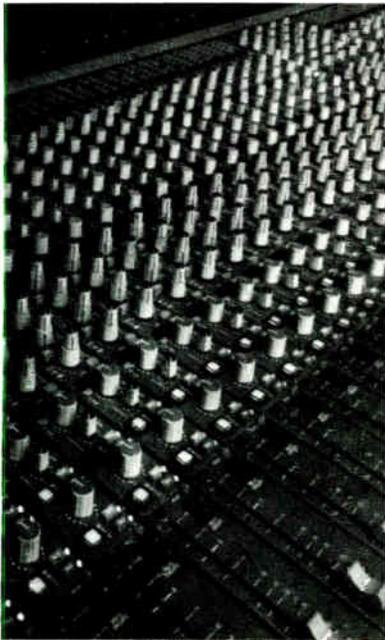
talking on the soccer field from stage right on quiet days. The shell was focusing [sound] all over the community."

Treating the interior of the shell's reflective plaster surface solved some of the problems. A 4-inch layer of Fiberglas covered with fabric was used to deaden mid- and high-frequency reflections. In addition, the use of Wenger portable shells helped properly focus the sound of the symphony to the audience.

"The shell structure is still a horn and will project the frequencies that are not being absorbed," Bauske says. "We found the problems at the property line (almost a mile away) were mostly mid and low frequencies. The true highs wouldn't get there anyway, due to molecular absorption. The treatment took away a lot of the mid and high products. The audience got the primary benefit—the sound in the venue is now crystal clear. It took away the masking quality that the reflections were causing." However, the improvements may not be the end of the story, as the debate continues.

Remedying the problem with the Pacific Amphitheater began with the imposition of a new noise ordinance. "The judge decided that the original ordinance did not apply," Long says. "Since some of the noise was generated by applause, he ordered the ordinance to be modified to exclude a 5dB music penalty, thereby raising the limit to 55 dBA. The ambient level in the community, which was usually between 50 and 55 dBA, ended up not contributing that

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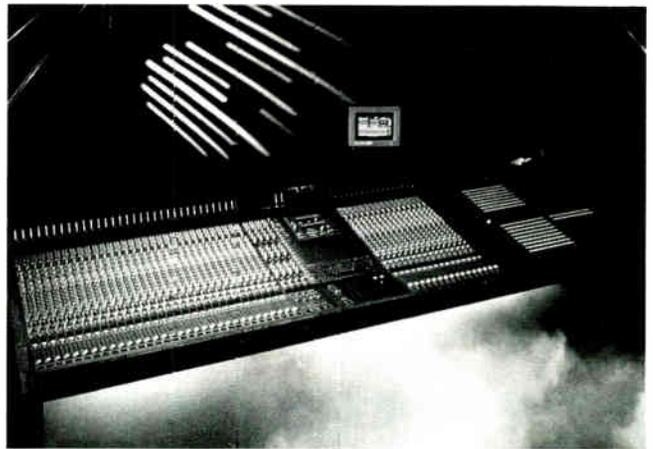
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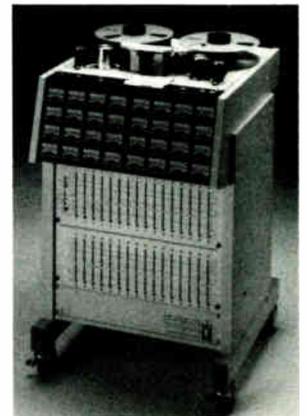
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much to the level above 55. The amphitheater has nevertheless been monitoring noise during concerts using a computer-driven system and a mic in the community. They can tell if they're over 55 dB for a certain period, and they know they have to bring the level down.

"Many ordinances use a 55dB L_{eq} [equivalent level]," Long continues. "It is defined as the steady level that has the same average energy as the time-varying level.

That particular averaging process emphasizes the high levels because energy increases by a factor of 10 every 10 dB. If you're 20 dB over, you're 100 times the energy level, so if you get a short-term peak at 80 dB, it's going to dominate the average. [This is] fine for an annoyance standard, because human reaction is dominated by the peaks. That's why most cities and the EPA's model noise ordinance call for an L_{eq} measurement"

The second part of the equa-

tion involved changes to the house sound system. "The mixers and groups don't trust house sound systems, but they're running into more and more ordinance problems," explains Long. "And if you're going to get consistent [noise] results, you need a system that will behave the same for every concert. The amphitheater came to us and said, 'Design us a rock 'n' roll sound system that everybody's going to accept.' We worked with Audio Analysts, which measured horizontal and vertical polars of their loudspeakers. I plugged that into a computer program I wrote and mapped the sound in the amphitheater and the community. We played around with position, coverage and angle and what would happen over the berm to the neighbors. The other thing we did was place the bass cabinets in a 32-foot-tall line array. If you're on-axis, the speakers all combine and you get lots of bass. If you're up close, the difference in distance between speakers is large and the resulting low-frequency cancellation makes for a pleasant sound next to the stage. Not only did we help ourselves as far as the community was concerned, but we helped the sound in the amphitheater. And the reputation of Audio Analysts helped sell the house system to the touring acts. The first few groups grudgingly agreed to use the system, but as word got out that it was okay, more and more people use it.

"That's where we are now," Long concludes. "They've been doing it for a year or two, with success. The moral of the story is that you have to have someone who can read the ordinance, make sure it is clearly written, that it will account for the ambient and hold up in court. You also have to have a way to make clean measurements that account for the ambient levels." 

The venue nearest to sound reinforcement editor David (Rudy) Trubitt's current home is fully enclosed, forcing him to leave the house to hear the show.

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TAD TCM PRODUCTION BEGINS

Technical Audio Devices (TAD), a division of Pioneer Electronics (Long Beach, CA), has begun production of its TCM Series of high-SPL (135 dB), near-field speakers for touring and fixed installations. Unveiled at last year's AES, the TCM enclosures will be manufactured by Woodwox in its Greensboro, NC, facility. The line includes the TCM-1821 two-way with dual 18-inch woofers and mid/high compression driver/horn; the TCM-1621 with dual-16 woofers; and the TCM-1811 with an 18-inch sub-woofer.

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EAW HIGH DEFINITION MONITORS

The SM200 from Eastern Acoustic Works (Whitinsville, MA) is a flat frequency response monitor that combines a 12-inch woofer and 2-inch, titanium-diaphragm compression

driver, coupled to a wide-dispersion, 120° conical coverage horn that is said to have less throat distortion than conventional horns. The SM500 has a 15-inch woofer for drum, keyboard and higher-SPL vocal monitoring.

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BBC COMPRESSION DRIVERS

The Italian-made BBC line of cost-effective, flat-response compression drivers is now available in the U.S. through MAC2 Inc. (Lansing, MI). The CDX1 is a two- or three-bolt, 1-inch driver with 16-ohm impedance, 1.5-17kHz frequency response and 80-watt power handling (with 12dB/octave crossover at 2.5 kHz). The CDX2 is a four-bolt, 8-ohm model with 2-inch throat, 500-18k Hz response and 120W power handling (at 800Hz, 12dB/octave).

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SESSIONS RACK PANELS

Container hardware manufacturer J.H. Sessions & Son of Bristol, CT, debuts a line of black-finish steel rack panels: one- to four-space blank panels; single-space panels pre-punched for male/female XLR, 1/4-inch or combination cutouts; one- and two-space vent panels; and three-space panels for one, two or three fans.

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LECTROSONICS DR195 WIRELESS

Lectrosonics (Rio Rancho, NM) debuts the DR195, a wide-band wireless system using a modular design, allowing users to change channels or even convert from VHF to UHF operation in minutes. A unique dual-band compressor separately handles low and high frequencies, while an Opti-Blend circuit mixes the audio outputs of the two diversity sections into one signal after comparing the noise components in each signal. A variety of handheld and body pack transmitters are available.

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SHURE BETAGREEN MICS

Shure Brothers (Evanston, IL) unveils BetaGreen, a new series of entry-level mics for live sound and home recording. The line includes two condensers (\$220) designed for vocal or instrument miking and three dynamics (retailing from \$60 to \$130). All have on/off switches and come with an unbreakable stand adapter; select models feature neodymium magnets.

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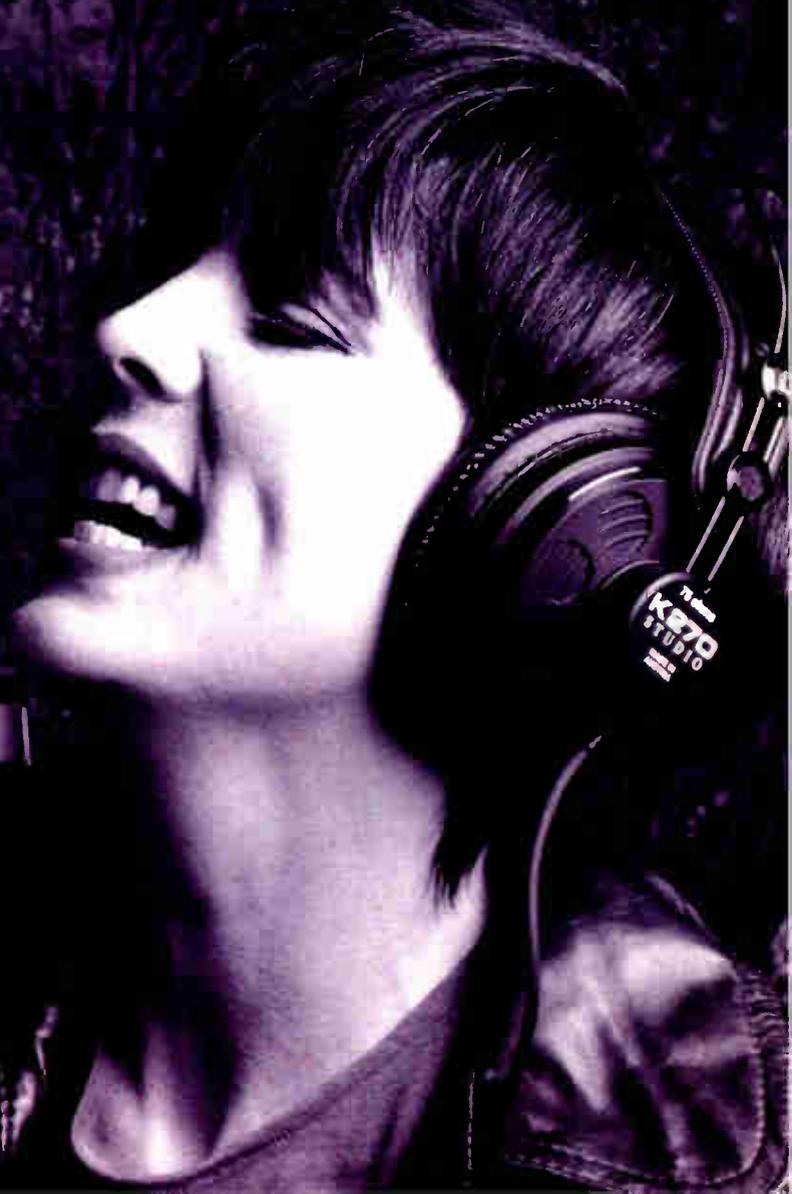
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The 414 is available in two models, the C414 B-ULS and the C414 B-TL.

Classic.



by Dan Daley

DECLARATION OF INDEPENDENTS

The wretched excesses of the 1980s merger-mania had their effect on the record business. In case you haven't noticed, you can count the number of major labels in the Western world on the fingers of both hands, and that's even after you've been drinking and playing with power tools.

That same decade, however, saw

often, the indie was purchased by a major and set up as a custom label.

(A separate and distinct phenomenon is the so-called "vanity label," of which Michael Jackson's Nation and Madonna's Maverick are two recent and high-priced examples. Historically, vanity labels have a lousy profit track record and develop little outside of egos.)

There are hundreds of independent labels running around now, virtually all of which use recording studios that they don't own. This symbiotic relationship is still strong and healthy. The recession's effect on purchasing power and the concomitant tightening of belts, combined with the major label policy of throwing more resources toward established money-makers at the expense of baby acts, has put independents into the breach once more.

TALKING MONEY

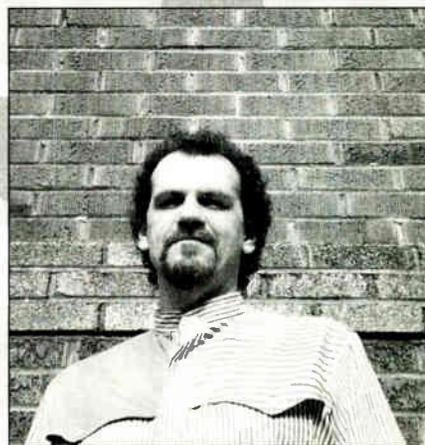
While few studio owners are pleased by the fact that rates haven't changed much in ten years, that same situa-

PHOTO: RICK OLIVIER



Nauman and Hammond Scott, co-founders of Black Top Records, with Earl King (seated).

the largest increase in the number and influence of independent record labels since the '50s, when so-called "race records" essentially launched rock 'n' roll before the major labels and Pat Boone managed to sterilize and mainstream it. During the Reagan years, rock went corporate. Major labels basically defaulted their A&R development functions to small, independent companies, which discovered and nurtured talent. Eventually, those acts were either wooed away by the promise of big bucks, or, as happened quite



Scott Tutt, president of Reptile Records.

tion has also worked to the independent labels' advantage. Their average budgets are about 10% to 20% of those of major labels, and they can find a wide-ranging pool of facilities in which to make records. In the meantime, the cost of high-quality, affordable equipment—digital and otherwise—has bolstered the capabilities of the forgotten middle class of commercial studios. The result is a facility base that, while not exactly vacationing in the *Sud de France* every winter, is at least remaining competitive, thanks in some degree to a vigorous market that needs exactly what they now offer: affordable, quality recording services.

Budgets would seem to be the primary concern among independents when they are considering facilities, but a quick survey of several independent labels shows that other considerations are at least tantamount. While acts signed to blues/R&B-based Black Top Records usually record at nearby Ultrasonic Studios in New Orleans, Black Top president Hammond Scott says that the criteria for other studios his acts use around the country include a large room and a specific console—in his case a Neve—as well as budget-conscious rates.

Labels such as Black Top identify themselves with a certain sound as well as genre, and Scott says that large recording rooms provide the ambience he wants. "The Neve is a plus, but it also has to have a large room with hardwood surfaces," he explains. "I need to find places that understand what it takes to get live recordings and to be able to do that at a reasonable price." Scott also looks for Dolby SR and a good microphone selection, pointing out that competition has kept quite a number of rooms within his price range. "There's always a second room that meets our needs in the same market, so we can play one against the other," he says unabashedly.

"The budget is always a consideration; you can't get away from that," says Scott Tutt, president of Nashville-based Reptile Records, which is looking to mainstream its country and country-rock roster. Tutt, who produces his label's acts, also prefers large rooms, frequently using Nashville's Sound Emporium. He'll take downtime and off-hours in search of a better rate deal. "I'll cut every corner I can before we go in, from rates to rentals,"

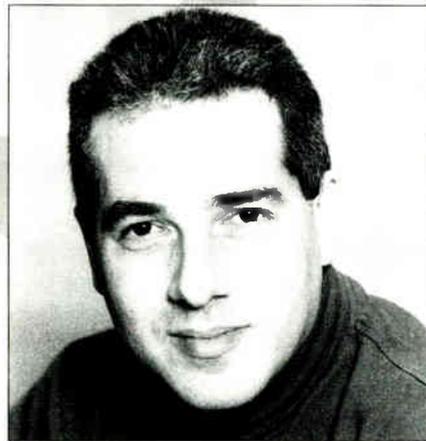
he says. "Because once we're in working, I don't want to think about it. After we cut our best deal, then it takes as long as it takes. I won't save myself \$200 and cost myself a record in the process."

Most independent labels seem happy with analog 24-track decks, especially the hard rock acts who prefer analog's inherent musicality. However, Tutt notes that one of his acts, Government Cheese, which has since left the label, was aimed at the college/alternative market, so he recorded them on a Mitsubishi 32-track digital machine to get the "clean digital effect" appropriate for that niche. He also recently mastered his first recording on a Macintosh-based Sonic Solutions Sonic System.

DAT has evolved into the digital mastering format of choice for independents: its low cost and wide avail-

able availability with its own marketing and distribution operations. While wheeling and dealing on rates is an integral part of record-making for Relativity's newer acts (it also has megasellers like Steve Vai and Joe Satriani, who can be somewhat choosier about their recording environments), Cultreri says that he's seen many studio owners who are sympathetic to the situation of independent labels. "They make it possible for us to work on a much larger scale than the budgets would otherwise allow," he says. The balance between studio affordability and independents' needs is a stable one that he expects to continue for some time.

The same sentiment is evident from the studios' point of view. Not everyone likes to be pushed hard by some independents, but on the other hand, independents account for substantial



Cliff Cultreri, vice president of Relativity Records.

ability have made it the poor man's 1630. "DAT used to be a safety for us," says Tutt. "Now it's our main mastering medium." Others, though, still prefer analog all the way through the process, even though a very large percentage of independents now release partially, or solely, on CD.

THE STUDIO'S VIEW

There is an interesting détente evolving between midlevel studios and independent labels, says Cliff Cultreri, vice president of Relativity Records, a large independent now owned by Sony Music but operating as an au-

tonomous entity with its own marketing and distribution operations. While wheeling and dealing on rates is an integral part of record-making for Relativity's newer acts (it also has megasellers like Steve Vai and Joe Satriani, who can be somewhat choosier about their recording environments), Cultreri says that he's seen many studio owners who are sympathetic to the situation of independent labels. "They make it possible for us to work on a much larger scale than the budgets would otherwise allow," he says. The balance between studio affordability and independents' needs is a stable one that he expects to continue for some time.

percentages of many studios' bookings. At Baby Monster Studios in Manhattan, company president Jamie Berg says that indies represent half of her bookings for her one-room, 24-track analog studio. The facility is used by labels like Earache, Relativity and Caroline Records. "It's a trade-off," she admits. "We get paid less [than with major labels], we have to make deals, and we wait longer to get paid. But they're very important to our business." Berg says that she deals with independent labels much the same way she deals with their larger cousins, always

getting a purchase order before each booking, even if it's just a verbal P.O. backed up by a fax. She'll also make different rate structures for different acts from the same company, depending upon the circumstances.

At Reflections Studio in Nashville, where labels like Alpine and Step One cut tracks for their country artists, budgets are usually the first things talked about with independents. "Otherwise, it's like dealing with any other label," says studio manager and chief engineer Joe Weber. "If a budget for a small major-label project squeaks out at \$50,000, a \$10,000 independent budget is generous," he says. Weber tries to avoid deal-making altogether with independent labels, citing already low rates in Nashville's high-density, competitive studio environment. "I'd rather give the deals to the major labels," he says, "since they're the ones who can keep coming back with more business."

If a studio has staff engineers, they are sometimes negotiated into the rate. But the overall industry trend has been toward freelancers over the last few years, and many engineers have developed relationships with independent record labels. Ultrasonic engineers, David Farrell and Steve Reynolds are two reasons Black Top's Hammond Scott chooses the studio. "We're comfortable with them, and they know what we want," he says.

NOT FOR THE PROJECTS

While personal recording technology factors into the pre-production stage of independent recordings, it usually only does so when an artist has his or her own equipment; budgets simply don't allow for pre-production costs beyond a few days in a rehearsal studio. That same effect has kept project studios on the periphery as far as independents go, except in the case of dance and rap, which rely more intensely on the MIDI and keyboard-type environments found in many project studios.

At a time when technology and economics have conspired against the comfortable existence of the recording industry's middle class, the relationship between it and the independent record label community shows a brighter promise of stability through the next set of changes to come. ■

Dan Daley is Mix's East Coast editor and guerrilla warfare expert.

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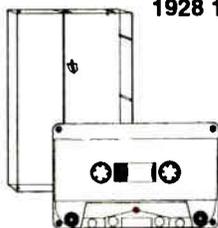
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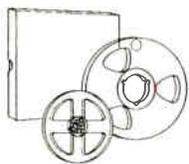
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FEEDBACK

FEAR FOR THE FUTURE

Re: "Neumann's Future as a Sennheiser Company" (June 1992). I have spent more than 30 years making excellent recordings with Neumann microphones. My favorites are still the M49, U47 (tube) and U87. For a microphone manufacturer such as Jörg Sennheiser to consider "the positive effect of these vintage microphones" to be "outside normal thinking" is astonishing!

As a recording engineer, part of my job and what I have to offer my clients is a knowledge of the advantages and disadvantages of the microphones (and other equipment) at my disposal. This knowledge is *not* "beyond the normal recording business," but is the very heart of what all mixers do. One can make any number of objective measurements of a transducer such as a microphone or loudspeaker, but the last and best judge is the ear. If a particular mic doesn't sound attractive to me, I don't use it. Whether it is artistry, skill or just good sense doesn't matter; it is how most of us work to make successful recordings.

Sennheiser proposes to "provide transducers that will be very sophisticated." I suggest he take the sophisticated approach and start *listening* to microphones rather than *looking* at their specifications. With the kind of leadership that Jörg Sennheiser represents, I fear for the future of the Neumann line and the engineering support we have come to expect and appreciate through the years.

Roger C. Rhodes

Scoring mixer (*Dirty Dancing*, *White Men Can't Jump*, etc.)

New York, NY

THE NEWS FROM UPTOWN

Here at Uptown we were happy

to see a good article surveying the various options that the studio owner has today for console automation [May 1992]. I would, however, like to clarify two issues concerning our products.

There has been some confusion between the name of our product and the name of our distribution company. Our product name is Uptown Moving Fader Automation, System 2000 or System 990. We are distributed worldwide by Audiomation Systems Ltd., and we are represented in the U.S. by Group One Limited, as you reported.

Also, although at the time you were preparing your article our Uptown System 990 was actually an 8-bit system with 256 half-decibel steps, it has since been upgraded to a 10-bit system with 1,024 tenth-decibel steps. All installed systems are being file-upgraded at no cost to the customer.

Andrew Smith

Uptown Automation Systems
Boulder, CO

WEIGHING IN WITH HEAVY NAMES

I think your article regarding the most influential producers of our time [July 1992] refers more to quantity and not so much quality. Also, how can you be nominated the most influential producer of our time and not have been producing bands of merit for at least a decade? I think Michael Wagener (at least 37 million copies) and Mutt Lange (you tell me) have had a greater impact than some of your other fine selections.

Scott Burns

Morrisound Recording

Tampa, FL

DIGI HIST 101

I find it a little-known fact that "the emerging recording technology of the '90s" has now been

with us for over 20 years, having deep roots in pioneering efforts in the early and mid-'70s.

Your sidebar "In the Beginning," by Ron Ensminger [July 1992], is a commendable effort to provide *Mix* readers with a much-needed historical perspective. There is a real need to counter the prevailing mythology that Sony invented PCM recording in 1978. Certainly 3M's efforts from 1976-1981 mark one of the last great gasps of American recording technology. Their work with the BBC also brought digital recording to the fore in the UK.

However, to label [3M's] efforts, first demonstrated in 1977-78, as the "initial entry in the field" is both inaccurate and grossly unfair to those who were truly pioneering digital technology and recording years earlier. (Interestingly enough, *Mix* itself recognized one of the true pioneers in Peter Hammer's wonderful article, "50 Years of Magnetic Recording" [October 1985].

While many might date the Digital Audio Age as beginning with the 3M multitrack and Barry Blesser's landmark paper on "Digitization of Audio" (October 1978), the truth is that digital audio has been with us as long as our cherished 24-track analog machines and in-line consoles.

Lexicon can rightly claim the honor of developing the world's first commercially viable digital audio product—the Delta T delay—in 1971. A year later, Nippon Columbia (Denon) developed a crude but operational PCM digital recording system. The original machine and a subsequent portable were immediately put to work producing a series of acclaimed recordings for the Denon label. In fact, the first digitally recorded LP dates from 1972. By

1977, Denon had released well over 100 digitally recorded LPs.

Nippon Columbia's technology had progressed quite far by 1977. They completed development of an 8-channel PCM tape recording system (14-bit PCM, 47.25kHz sampling, on then-standard 2-inch VTRs) and inaugurated an impressive series of jazz records, recorded in America by the team of producers Yoshio Ozawa and Jim McCurdy in 1977 and 1978. All this activity predated by many months the delivery of the 3M recorders to Herb Alpert and Chris Stone in early 1979. Our industry has yet to properly recognize Denon's remarkable activities on behalf of digital recording technology.

Ignored in your sidebar, but far more widely recognized, were the efforts of Dr. Thomas Stockham, whose Soundstream digital tape recorders were the first commercial units developed in America. Stimulated by strong audiophile response to the first direct-to-disc

recording by Sheffield and Crystal Clear, Stockham and Malcolm Lowe founded Soundstream in 1975 with the aim of producing superior quality commercial recordings.

Stockham, who still serves as a consultant to Telarc, eventually built 17 16-bit digital recorders, which he rented to record companies. The list of remarkable recordings made on these machines is most impressive and serves as a strong argument for recognizing Stockham as the "father" of the digital recording industry. It was his success with renting that prompted 3M's decision to begin selling digital recorders to recording studios in 1979.

Food for thought: Are the efforts of Denon and Stockham often overlooked because they largely concentrated on recording classical music and jazz? Have some in our industry developed a sort of tunnel vision that doesn't recognize advanced recording

techniques until they are applied to mass market music (rock and pop) and big-budget films?

Lewis E. Frisch
Amek/TAC
Atlanta, GA

SORRY, OSCAR

I'm concerned about a piece of misinformation contained in the article "The Academy Awards Broadcast: A Peek Behind the Scenes" [June '92] concerning Academy Award nominations and honors credited to one of the subjects, Lee DeCarlo. The Academy's records of its nominees and winners do not show Mr. DeCarlo as ever having received a nomination or an Award. More specifically, the Oscars for Sound for *The Right Stuff* were awarded to Mark Berger, Tom Scott, Randy Thom and David MacMillan.

Kristine Krueger
Academy of Motion
Picture Arts & Sciences
Beverly Hills, CA

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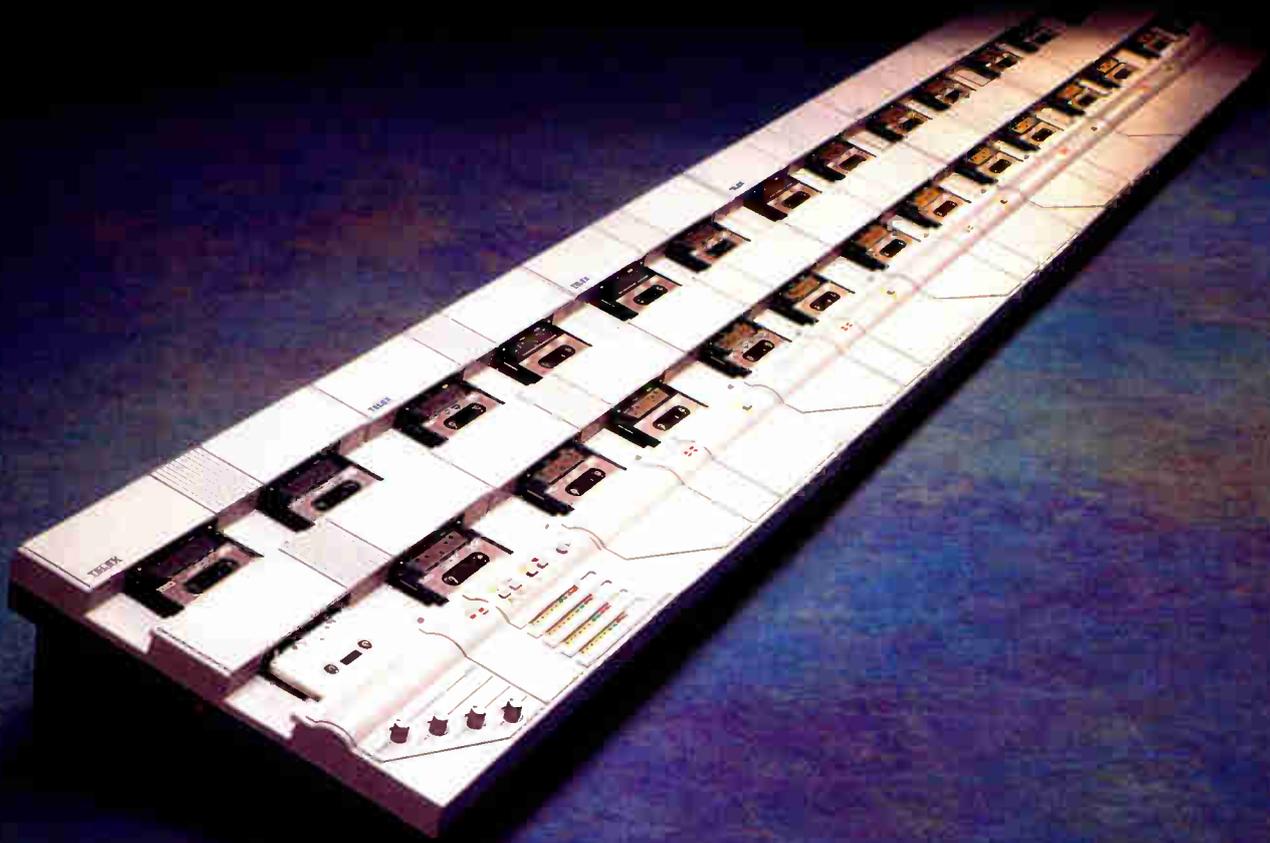
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TELEX

by Philip De Lancie

ITA "HOW AND WHY"

PART II

Last month's coverage of the ITA "How and Why" seminar on prerecorded audio and video focused on DCC, which held the spotlight in this year's proceedings. But presentations on a variety of other topics were offered as well. One of the most intriguing was a talk by Dolby's Dennis Staats on the company's AC-3 digital audio coding scheme and its potential applications in prerecorded music. The system (to be covered in detail in a future issue) will allow low bit-rate digital media to store coded audio for user playback in a variety of modes, including regular stereo and surround sound. Among other highlights from ITA:

COBALT TAPE

A year ago, a new generation of cobalt-modified ferric tapes were widely expected to play an important role in improving prerecorded cassette quality. But now that the new formulations are readily available from BASF, Sunkyong, Aurex/Auriga and others, demand appears to be far less than anticipated. The title of the panel on this topic said it all: "Who Is Using Cobalt Tape, and Why Not?"

The tape manufacturers represented on the panel were BASF, Sunkyong and TDK. Doug Booth of TDK pointed out that cobalt is well-established in the blank cassette market, where it accounts for 90% of the Type II tape sold. But in the duplication market, the response has been less than the manufacturers had hoped, though not due to any disappointment with the cobalt's performance. Duplicators were said to be quite pleased with the sound of the new formulations and reportedly interested in using them. And further technical development continues, as BASF's Terry O'Kelly con-

firmed with his announcement that the company will be introducing a chrome/cobalt combination delivering superior performance in the same price range as chrome (see Tape & Disc News, page 148).

Despite widespread acknowledgement of cobalt's attributes, however, the duplication arms of the major labels are apparently unable to convince the "bean counters" else-

Given all the variables like tape type and slave electronics that can affect the sound of a finished cassette, it is important that engineers in mastering houses and dupe plants can easily communicate about problems with a particular program.

where in their organizations to spend a few pennies more per unit for a higher-quality end product. That problem has been compounded by the fact that the new tapes were introduced during a recession, which has hit the music cassette market pretty hard.

Both O'Kelly and Booth argued

—CONTINUED ON PAGE 148

Tape & Disc News

BASF INTROS CHROME PLUS

BASF introduced a new high-bias audio duplication tape combining chromium dioxide and cobalt. According to BASF VP Daniel Malcorps, the new Chrome Plus formulation will entirely replace the company's current chrome high-bias tapes. The tape is said to combine the low noise floor of chrome with the low distortion and high output of cobalt.

MINI DISC MASTERING

Sony developed two new components for Mini Disc mastering. The devices are designed to work with existing premastering/mastering systems used for CDs. The K-1216 Format Converter takes 16-bit PCM audio from a CD master tape and encodes it into ATRAC, the MD data compression scheme. The converter also displays subcode and error-status information, and it allows input of non-audio information such as album titles or other text. For MD glass mastering, the K-1217 Address Generator is substituted into a CD mastering setup in place of the PQ generator.

The first mastering house to announce acquisition of the format converter, available on a limited basis, is Chop 'Em Out in London. That company was also one of the first to enter the market for premastering DCC.

SEMINAR SCHEDULES SET

The IFA announced dates and places for its upcoming events. The Super Seminar on Special Interest Video will be held October 15-16 in Santa Monica, Calif. MOMS (the Magnetic and Optical Media Seminar) will be offered November 5-6 in Atlanta. On November 24, the Annual Update Seminar will be held in New York. And the 23rd Annual Seminar will run March 10-14, 1993, in Phoenix. For further information, call (212) 643-0620.



Narada recording artist/composer Peter Buffett and Disc Mastering's owner Randy Kling take a break from the mastering session of Buffett's latest release, *Yonnondio*.

SPLICES

Billboard reports that PolyGram has purchased the PDO CD plant in Kings Mountain, NC, from its parent company, Philips. The plant, which has an annual capacity of 60 million discs, was reportedly sold for \$25 million...Media Technologies has relocated to Bohemia, NY. The move was spurred by Philips' recent appointment of the company as service agents for DCC duplication systems sold in North America. Media Technologies also chose Bryan Cammarata to head its North American service center...Electro Sound and Gauss appointed three organizations to market and service their duplicating equipment for the growing cassette market in India. Electro Sound also announced the sale of Series 9000 duplicating systems to two companies in Thailand, Krung Thai and Onpa Audio and Video...Versadyne (Campbell, CA) made Ermanno Parazzini of Professional Equipment in Milan its exclusive representative for high-speed duplication systems in Italy. The company also announced sales of Versadyne 1500 Series systems to Grabcassette in Mexico City and Recortec of Buenos Aires, Argentina...Northeastern Digital Recording (Southborough, MA) plans to market the Digital Companion Series from Troisi Inc. The line includes portable A/D and D/A converters as well as a digital preamplifier...Automatic Inspection Devices introduced the model CD-A optical disc analyzer for CDs. The device is designed for use in production-line QC or in-house certification of replicated discs...Big Oak Duplication in Hendersonville, TN, installed a Concept Design CD-

9000 loader...Tape Automation America of West Kennebunk, ME, changed its name to Applied Innovation America. The company markets the Program Evaluator automatic video-inspection device and will continue to sell spare parts and service Xenon loaders...Hot Fun in the Summertime...The first single from an upcoming Beach Boys album, was mastered at Fantasy Studios in Berkeley, CA...Digital House of NYC has recently completed work on a CD of remastered recordings by legendary opera and stage star Ezio Pinza...Hoyt Dooley III of Disc Mastering Inc. engineered mastering for *Yonnondio*, the latest offering from Narada Records artist Peter Buffett...The Looters mastered their latest, *Imago Mundi*, at the Rocket Lab in San Francisco. ■

—FROM PAGE 147, IFA "HOW AND WHY"

that in refusing to pay a little extra, the labels were shortsightedly undermining the continued success of their staple product, perhaps on the risky assumption that cassettes will soon be superseded by DCC. Booth questioned whether the "average" consumer would pass over cassettes for CD-priced DCC, and warned the labels against burning their bridges. Sunkyong's Mike Ingalls took a more optimistic tone, saying he expects demand for cobalt to pick up as DCC spurs improvements in analog cassette quality.

The idea that it is vital to continue improving cassettes even as DCC emerges seems to be shared by WEA, which has been promoting its DIGA logo for tapes made on digital bin systems as one way of letting con-

by Philip De Lancie

REPLITECH

CONFERENCE + EXPO

MAKES WINNING COMBINATION

After years of being lost in the crowd at shows catering to the recording and broadcast segments of the audio industry, the duplication and replication community finally has a show of its own. The first annual Replitech conference and exhibition, produced by Knowledge Industry Publications, was held in Santa Clara, Calif., June 16-18.

The show covered four main industry areas: audio cassette duplication (primarily DCC), video duplication, optical disc replication (including Mini Disc) and floppy disk duplication. On days two and three, the conference was broken down into four concurrent "tracks" (one for each area). Unfortunately, this approach forced attendees to make some tough choices if they had an interest in more than one track. Seminars were held in the mornings, with exhibition space open only in the afternoon.

Replitech is an attractive event for exhibitors and attendees because it is focused and because it combines conference and exhibition into one show—hear someone talk about a process and show slides in a conference, then actually touch the equipment and see it in action on the floor. Philips, for instance, had a working DCC premastering/mastering station set up where one could get a step-by-step walk-through of the procedure, first preparing the text and graphics for the DCC's text display, then recording a master DCC. The basic outlines of this setup have been known for quite a while (see "Tape & Disc," October 1991), but there's no substitute for being able to do it yourself.

Forty-four presentations were scheduled for the conference. The sheer volume of information, and the inability to be in four places at once, made it difficult to cover everything.

Some of the more notable points follow, with an emphasis on audio-related topics.

DCC UPDATES

DCC dominated the audio cassette duplication portion of the program, as it did at May's ITA "How and Why" seminar. Not surprisingly, many of the DCC people who spoke at Replitech had also spoken at ITA, and the information they presented was much the same at both events (see "Tape & Disc," August 1992).

Philips is holding to its schedule for worldwide launch in September, though the company now plans to retail the first DCC recorder/player (a home stereo component model) for \$799, up from the \$700 figure they announced previously. According to Philips' Koos Middeljans, annual worldwide duplication capacity within six months after launch is expected to reach 20 million.

Middeljans said DCC's ITTS (text display) capability, which can support up to seven languages on a given tape, is expected to contribute substantially to the format's appeal, not only to consumers but to artists as well. Once artists see that a few of their peers have nicely done graphics with follow-along lyrics, they are expected to want the same treatment. Middeljans also raised the alarming possibility of using the graphics for advertising.

Addressing the question of DCC's sound quality, Rudolf Mueller of BASF reported results of listening tests conducted by the company at AES Vienna. Participants listened to program on analog cassette, DCC and CD. Of 437 tested, 65% were able to correctly identify when they were listening to an analog cassette, while correct identification of DCC and CD were nearly the same, at 56% and 57% respectively. According

to Mueller, the tests showed that the sound of DCC and CD are virtually indistinguishable.

Mueller also talked about tape requirements for DCC. The DCC standard establishes minimum quality requirements, allowing only limited signal loss due to exposure to extreme environmental conditions. It also sets performance standards for the tape/shell combination tested together. DCC tape requires an extremely smooth surface (see Fig. 1) and needs to be backcoated for improved winding in consumer decks. Both these factors contribute to the higher cost of the stock.

PREPARATION FOR DCC DUPING

Many of the other DCC presentations were oriented toward the introduction of duplication products, either planned or already available. Gauss, for instance, has modified its Model 1850 semi-automatic loader for DCC capability. The new Model 1855 is intended primarily for low-volume start-up applications.

Product discussions from other vendors were much the same as at ITA. One refreshing exception was the talk by Duplitronics' Jeff Binder, who concentrated on the various phases a duplicator should go through in preparation for getting into DCC.

As defined by Binder, the first phase is education, which involves getting technical publications from Philips and keeping updated on the latest DCC information available in the press or through word of mouth. Next comes exploration. Binder suggested keeping in touch with the pilot plants to learn about the practical considerations of installing and operating. He also urged talking to vendors early to get specifications on equipment and tape, and to watch for improvements as they take actual experience into account.

Binder described the next phase, preparation, as taking the information gathered in earlier phases and beginning to plan to accommodate DCC in the plant. That means looking at layout for clean-area access, and planning for ventilation and static/temperature control needs.

Once the commitment is made to install DCC capacity, Binder said,

heavy emphasis on QC will keep throughput as high as possible. Noting that Philips currently quotes reject rates of "under ten percent," he said duplicators still have much to learn about getting higher yields. He suggested systems to track quality in response to changes in variables. He also encouraged service contracts to ensure good vendor support early on, and the purchase of training time and equipment for in-house diagnostics.

OPTICAL DISC

Over in the optical disc track, most of the presentations focused on specific aspects of the replication process, such as electroforming, mold upgrades and disc inspection systems. Mini

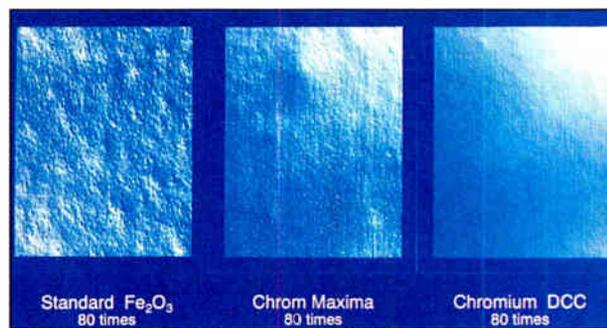


Figure 1: Comparative surface smoothness of three tape types.

Disc wasn't quite as prominent here as DCC was in the audio duplication track, but two presentations by Sony covered both commercial and manufacturing aspects of the new format. MD also came up in a talk by Art LeBlanc of First Light Technology, which makes the Uniline Series of integrated in-line CD replication systems. Because the First Light systems are modular in design, the company has been working on modules that can be swapped to convert between CD and MD production in half a day. LeBlanc pointed out some of the challenges that replicating MD and other new formats will pose to those already manufacturing CDs.

From the replicator's point of view, MD is really two formats: the prerecorded MD-ROM, and the magneto-optical MD-R for recording. The prerecorded disc is basically a smaller CD. No on-disc printing is involved, but automated systems are needed for insertion of the metal clamping ring at the center of the disc, as well as installation of the disc and shutter into the plastic cartridge.

According to LeBlanc, the mechanical accuracy of the cartridge is critical, particularly for the MD-R. He also pointed out that the experience so far in manufacturing magneto-optical discs for the computer market suggests that nobody really knows how to make MO discs at anywhere near as low a price point as Sony projects for MD-R.

Regarding other new formats for replicators, LeBlanc cited Kodak's Photo-CD as a potential growth application for CD-R. CD-Rs are more complicated to make than CDs because of the heat sensitivity of the dye polymer coating, the interaction of materials used in the various layers and the need to recover gold from the sputtering process.

Several of the optical disc speakers looked at mastering, with three alternative approaches examined: photo resist, direct read after write and the new Del Mar Firetrack. Unlike conventional glass mastering, the Firetrack uses a pregrooved plastic substrate coated with a photosensitive polymer layer. The substrate is attached to a saucer-shaped cover, with the photosensitive layer facing in. The cover shields against physical damage and protects the polymer from light and contamination. During recording, the diode write laser focuses through the substrate to the write layer, ablating the polymer.

The Firetrack approach is much cheaper to install than glass mastering capability: less than \$400,000, including DMR-4000 and PCM-1630, compared with about \$2 million for a photoresist setup in a clean room. It also appears designed for both economy and ease of operation. But the fact that the write beam travels through the substrate before writing limits the quality of the end result. Del Mar acknowledges that masters created on the system have higher block error rates than those created by conventional means.

According to Knowledge Industries, 1,600 people attended and 69 exhibitors showed. That was enough to make the show a success, though there was some grumbling among exhibitors about the cost of booth space. Next year's expo is already scheduled for June 15-17, again at the Santa Clara Convention Center. ■

C O A S T

L.A. GRAPEVINE

by Amy Ziffer

Things change fast. Only six months after I reported plans underway at B&B Studios in Burbank, the owner has passed away, the facility sustained damage in our spring "drought-buster" rains, and operations ceased. It was put up for sale, and Paul Ratajczak, owner of Ground Control in Santa Monica, decided to bite. The deal fell through, however, for reasons that are still not clear but may have involved counterbids from another company. "The B&B deal is totally off," says Ground Control management consultant Ron Lagerloff. "It's not even on the back burner." The B&B property will apparently languish unused a little longer.

The former Amigo facility in North Hollywood is more fortunate.

—CONTINUED ON PAGE 154

Tiny Lights Recording Studios recently opened in Hollywood, complete with a 40-input Amek Mozart mixing console, Sony 24-track recorder and Tannoy monitors.



PHOTO: MICHAEL MOMM

SESSIONS & STUDIO NEWS

by Jeff Forlenza

SOUTHERN CALIFORNIA

Ah, L.A. glamour: price-haggling from clients, vanishing record budgets, closing studios. Not to mention torrential rains (when it does), traffic and an occasional riot. But despite the general malaise, some L.A. studios are surviving and even thriving in troubled times. Oh, and, I love L.A.!

At **The Enterprise** (Burbank), CEO **Craig Huxley's** multiroom facility, recent music sessions of note included **Quincy Jones and the Hallelujah Choir** working with **Bruce Swedien** in Studio B (also known as "The Bridge"); and **Megadeth** camped out for five-and-a-half months as they tracked their new album with producer **Max Norman**.

At **Music Grinder Studios** (Hollywood), **Sony Music** act **Motorhead** came back to record the follow-up to their Grammy-nominated album, *1916*. **GNR** guitarist **Slash** provided a solo for "Ain't No Guy," which also features **Ozzy Osbourne** sharing the vocals with **Lemmy Kilmeister**. **Peter Solley** produced, with **Casey McMackin** engineering and **Lawrence Ethan** assisting. Also at **The Grinder**, folkie **Arlo Guthrie** recorded tracks for an animated feature that includes several **Woody Guthrie** songs. **Frank Fuchs** produced **Arlo**, with **Bob Kearney** engineering and **James Ross** assisting.

Current activity at **Larrabee West** (West Hollywood), which recently remodeled and added an **SSL 72-input G** console: Producers **L.A. Reid** and **Babyface** were in with engineers **Dave Way** and **Barnie Perkins** mixing **Bobby Brown's** new album. **Prince** mixed his new album for **Warner Bros.** with engineer **Keith Cohen**. **Bruce Swedien** mixed **Michael Jackson's** 12-inch of "Jam" with **Thom Russo** assisting.

At **Evergreen Recording** in Burbank,

classical guitarist **Christopher Parkening** was working on an album project with producers **Pat Russ** and **Dave Thomas**, engineered by **Steve Bartkovicz**. Also at **Evergreen**, composer **Harold Wheeler** came in with music director **Jackie Krost** and engineer **Gary Lux** to prerecord original **Jackson 5** songs for an ABC-TV mini-series, entitled *An American Dream*, based on the Indiana-based **Motown** act.

At **Chick Corea's Mad Hatter Studio** in Los Angeles, manager **Mark Francovich** reports the formation of **Corea's** new label, **Stretch**, under the auspices of **GRP/MCA**. Two releases from the new label are from **John Patitucci** and **Robben Ford**, both recorded at **Mad Hatter**. **Toto** came in to produce their new album with engineer **Greg Ladanyi**.

Venice Beach thrash punkers **Suicidal Tendencies** were back blasting L.A. studios. Led by vocalist/songwriter **Cyco Miko Muir**, the band recorded at **Ocean Way** and **Ground Control**, then it was on to **Skip Saylor** to mix. Producer **Peter Collins** (**Rush**, **Queensryche**) and engineer **Paul Northfield** captured the manic mosh-speed rockers on their Epic release, *The Art of Rebellion*.

Studio activity at **North Hollywood's Kingsound** included local country act **Boy Howdy** completing work for their upcoming **Curb Records** release: **Chris Farren** produced with **Eddie King** engineering. **IRS** act **dada** completed their self-produced debut album; **Steve Cormier** engineered and **Rob Ruscoe** assisted.

In **Venice**, **Mad Dog Studio** has been busy: **The Bonedaddys** completed *Jungle Jungle*, co-produced by **Kevin Williams** (of the band) and **Mad Dog** co-owners **Dusty Wakeman** and **Michael Dumas**. Famed producer **Ndugu Chancler** worked with all-female group **Mixed/Match** and engineers **Wakeman** and **Dumas**.

Alpha Studios (Burbank) added

C O A S T

William "Evil" Malouf to their staff. Hailing from the now-defunct Amigo Studios, Malouf will now be involved in rock-oriented projects at Alpha. Recent projects at Alpha saw Warrant tracking in Studio A with producer/engineer Michael Wagener and second engineer Russell Burt.

Take One Recording Studios in Burbank had The Ventures in to record their second album of 1992 with engineer Duncan Aldrich. Also at Take One, Gene Simmons and Paul Stanley of Kiss were producing Crown of Thorns with engineer Ricky Delena... In North Hollywood, Roger Waters finished mixing his solo album after a

The writing/producing team of Tom Mgrdichian(L) and Teddy Castellucci(R) worked on Olivia Newton John's "I Need Love" at Carla Ridge Camp (Beverly Hills).



six-month stint on the Neve VR72 in Devonshire's Studio 3. The album was produced by Patrick Leonard, recorded by Nick Griffiths and mixed by James Guthrie... Recently, producer Gerry Brown locked out three rooms at L.A.'s Westlake Audio. One of the projects was a remix of Vanessa Williams' "Work To Do," with assistance from engineers Bryan Carrigan and John "J.D." Dickinson...

SOUTHWEST

Country and western singer Trisha

Lynn and her band were busy at Planet Dallas laying tracks with producer Ray Ruff, former chief director of Paramount and MGM Records and Motown Recording Studios. Ruff helped launch the careers of the likes of George Strait, Reba McEntire and the Oak Ridge Boys. Rick Rooney engineered and mixed the Lynn sessions. From the "Texas ain't just country" dept.: L.A. rap group Killa Tribe flew into Dallas to begin laying tracks for their Money Mob Records project at Planet Dallas... Mantrasound, Michael Sena's facility on the lush island of Kauai, HI, had Taj Mahal in tracking and mixing music for *Follow the Drinking Gourd*, a storytelling album by Morgan Freeman for Rabbit Ears Productions. Taj Mahal also produced Cedella Booker Marley's (mother of Bob) children's album on Music For Little People...

NORTHEAST

Former Rolling Stone guitarist Mick Taylor took time out from the Empire Music Conference in Rochester, NY, to record with the Chesterfield Kings at GFI Studios in Ontario, NY... Suzanne Vega recorded her latest A&M release at Dreamland Recording Studio in Bearsville, NY, with producer Mitchell Froom, engineer Tchad Blake and assistant David Cook... Donald Fagen was at Clinton's (NYC) Studio B tracking guitarist George Wadenius with co-producer Tony Voante for Fagen's upcoming Warner Bros. release... In Philadelphia, Teddy Pendergrass was at Sigma Sound Studios with producers Reggie and Vince Calloway working on Teddy's new Elektra release with engineer Mike Tarsia and assistant Brian Wittmer... Producer Daniel Abraham was at Prime Cuts (NYC) working on a remix of CeCe Peniston's "Crazy Love" for A&M Records, with engineer Richard Van Benschoten and programmer Merv de Peyer... At Omega Recording in Rockville, MD, jazz guitarists Charlie

—CONTINUED ON PAGE 154

N.Y. METRO REPORT

by Dan Daley

NAMM Update: While the rumored Donald Trump vs. Merv Griffin rusty-razor/broken-bottle fight-to-the-death at Caesar's on the boardwalk never materialized, the Summer NAMM session—a somewhat tamer alternative—did take place in gambling mecca Atlantic City on June 20-21. The first midterm NAMM expo in two years, the show drew 240-plus exhibitors (about one-third the number exhibiting at the larger Anaheim show in January) and an estimated floor turnout of about 5,000.

While decidedly an MI show, NAMM's summer session reflected the continuing blurring of the line with pro. For instance, Tech 21 owner Andrew Barta,

—CONTINUED ON PAGE 155

David Hewitt aboard Remote Recording Services' (Lahaska, PA) Silver Mobile capturing the Philadelphia Pops Orchestra for a live Fourth of July broadcast with a new Neve VR 48 console featuring the latest automation.



—FROM PAGE 152, L.A. GRAPEVINE

nate; it got a new resident a few months ago when IPN Recording moved in. IPN stands for International Primetime Network, which will soon incorporate the Asian News Entertainment Network. Owned by tennis player Vijay Amritraj and physicist Dr. Raj Dutt, ANEN has supplied programming for the Asian community on cable in many American and Canadian markets, but the new company will offer broader programming. IPN's first pay-per-view event was World Cup cricket, live via satellite from Australia.

Plans for the facility include construction of two video stages for shooting IPN's video productions; a small video editing suite is already operational. Despite the overall emphasis on television programming, the former music studios will still be turning out records, at least for the near future. After a March move-in, some remodeling and rewiring, one room opened for business June 15 with a Neve VR60 and Studer A800. Guy Snider, chief engineer and studio manager, says a string of Latin albums were the first projects to land.

Acme Soundworks, the five-year-old studio owned by sound supervisors George Berndt and Jerry Ross, has moved from Hollywood to a much larger facility on the West Side, near Skywalker South. Acme principally does film post-production, adding five film editorial suites with the move.

Acme already has one Sound Tools/analog 24-track-based sound design studio up and running (designed by Brett Theony of Boto Design), with plans to complete another, larger one by the end of August. They also have a sound transfer department that can accommodate temp dubs. Movies recently completed or on the board include the Super Mario Brothers live action film with Bob Hoskins, *Born Yesterday*, as well as *Cool World* and *Hero*.

It pleased me to see that the Academy of Television Arts & Sciences (ATAS) presented several special Emmys for technical achievement at the 44th Annual Primetime Emmy Awards. Unfortunately, because the creative arts are segregated from the "glamour" categories, these presentations were not televised. Of the four, the one of greatest interest to *Mix* readers went to Charlie Douglas, "for the invention and development of the post-production sweetener." It would be interesting to know what that first-

generation sweetener was like.

Equipment upgrades: Burbank's The Enterprise did one better than becoming the first studio in this country to install an SSL 8000 G Series multiformat production system...it installed two of them. One is a 96-channel and one is an 80-channel, both with Ultimotion automation. The Enterprise was the first studio anywhere to try Ultimotion when it was introduced. ■

—FROM PAGE 153, SESSIONS & STUDIO NEWS

Byrd and Carlos Barbosa-Lima recorded a guitar sextet for Concord Records with studio owner/engineer Bob Yesbek...Alternative rockers The Posies used a Walter Sear-reconditioned Theremin on their recent recording at Sear Sound in Manhattan...At The Looking Glass Studios (NYC): Hot Canadian songstress Sara McLachlan recorded vocals for an upcoming Philip Glass/Allen Ginsberg release for Nonesuch Records entitled *Hydrogen Jukebox*, produced by Kurt Munkacsi and engineered by Laura Fried...

SOUTHEAST

In Miami, Studio Center has been busy: Cameo mixed their latest Warner/Reprise release with producer Larry Blackmon and engineer Chris Rutherford; Todd Rundgren mixed tracks for his upcoming concert video; and Billy Preston recorded overdubs for an upcoming release with engineer Charles Barwick...Platinum producer/engineer Geoff Workman was at Triclops Sound Studio (Atlanta) recording Drivin' N Cryin's follow-up to their very successful Island release, *Fly Me Courageous*, which was also engineered and produced by Workman...Hot producer Dallas Austin was at Doppler Studios (Atlanta) juggling several R&B acts, including Another Bad Creation, The Highland Place Mobsters and Gerardo. Engineers on the projects included Darrin Prindle, Thom Kidd and Phil Tan...Eagles alum Joe Walsh completed work on his *Songs For a Dying Planet* at Reflection Sound Studios (Charlotte, NC) with longtime friend and current producer Bill Szymczyk. Reflection engineers Mark Williams and Tracey Shroeder assisted Szymczk during the three months of recording...

NORTHWEST

The Bay Area's ambassadors of world beat music, Kotoja, recorded their latest Mesa/Blue Moon release at the Music Annex in Menlo Park, CA. The

12-piece group led by Nigerian bassist (and former member of King Sunny Ade's band) Ken Okulolo was joined in the studio by Ghanaian master drummer C.K. Ladzekpo, Nigerian guitarist Danjuma Adamu and Sikiru Adepoku, whose talking drum was recently part of Mickey Hart's *Planet Drum*. Music Annex engineer Patrick Coughlin worked the vintage Neve 8036 console and co-produced with the band... Former Talking Head Jerry Harrison produced Vancouver rockers Pure for their debut Warner Bros. release. Harrison and the group recorded and mixed at The Plant in Sausalito, CA, and did some additional mixes at Little Mountain in Vancouver...Also in Vancouver, Randy Bachman (BTO) was at Mushroom Studios putting the final touches on his solo project for Sony Records. The album was produced by Toronto's Chris Wardman and engineered by Greg Reely...At Dance Home Sound (Emeryville, CA), Greg Douglass tracked a new acoustic CD with guest musician Norton Buffalo and engineer Lisa Richmond...

NORTH CENTRAL

M-Brace, an R&B band fronted by Atlanta Falcons wide receiver Andre Rison, cut tracks for their debut release at Studio A (Dearborn Heights, MI) with engineer Randy Poole...BLR Studios (LaPorte, IN) had heavy-rockers Storm Front in recording a four-song demo...

STUDIO NEWS

That Studio in North Hollywood, CA, received a new DDA Profile console with the Uptown 990 moving fader automation...River City Sound Productions (Memphis, TN) installed a new Tascam 3500 Series 24-input recording console...C&D Spot Studio Inc., a full-service audio facility, recently opened in Albuquerque, NM. The three-room, David Elledge-designed complex features a top-of-the-line D&R mixing console, Otari 24-track recorder and a 16-track studio for post work...Sound-track Recording purchased two Yamaha DMC1000 digital mixing consoles for its Boston and New York facilities...Down in Austin, TX, The Hit Shack remodeled its 2,100-sq.-ft. facility and added a Soundcraft TS-12 36-input console and Otari MX-80 24-track recorder...Capitol Records (Hollywood) added a Neve VR72 with Flying Faders automation...Technisonic (St. Louis) acquired a custom Neotek Elan 32-input console. ■

—FROM PAGE 153, NY METRO

developer of the SansAmp guitar direct recording system, said that most of the sales of his new rack-mounted units have been to professional and project studios—including recent purchases by Bruce Nazarian and Al Kooper—rather than individual musicians. “I realized that’s the way it was going after we took a booth at the last AES show,” he said. “What would have been only a musician’s product a couple of years ago has become a piece of professional audio equipment that studios need.”

Yorkville Sound, known for P.A. and guitar amps, announced a non-exclusive distribution deal with Audio-Technica to sell A-T’s professional microphones in the U.S. and Canada. Equipment that covers more than just MI bases: Yamaha’s MC Series mixers, designed for small-studio and SR applications, with four primary mix groups and stereo, as well as four aux sends, 48-volt phantom power and expanded stereo inputs for external gear. DigiTech showed off a new 16-bit digital harmony processor, the DHP-5000, which generates five-part diatonic harmonies, portamento-type vocal effects, doubling and shifting for vocals and other line-level instruments, and delay, chorus/flange, EQ and compression effects. Sampling rate is 42 kHz.

Atari showed off a slew of third-party software developers in its bid to get more of a music market share in the U.S., a market now dominated by the Apple Macintosh. Stefan Daystrom, a developer of Barefoot Software’s new SmpteTrack Gold and EditTrack Gold software for the Atari, said that the Atari has better resolution and timing accuracy than Macs. “I expect the Atari footprint to get bigger on this side of the Atlantic because the software base is improving and the basic computer is so inexpensive,” he said, adding that users should expect to see the best of European software for the Atari heading this way soon as Atari encourages continental software developers to test the U.S. market. The Atari is the leading European music computer platform.

Best new product: MIDIVOX, a throat-activated, Wheatstone-bridge-technology-based vocal transducer that takes vocal chord vibrations and converts them to MIDI information, allowing it to trigger and control any MIDI sound module. The unit, first introduced at the 1991 AES and 1992 Winter NAMM shows, has potential in the

project studio, where drum machines and sequencers have already made multi-instrumentalists out of single-instrument players. The brass and woodwind renderings it’s capable of are more sensitive than most similar keyboard-activated sounds. Next step? Probably plugging directly into the brain (not as far-out or far-off a concept as you might think).

The NAMM show pulled in a few pro manufacturers such as Tascam, which had a small contingent and demos of several consoles and personal multitracks; other manufacturers, such as Alesis and Fostex, were notable by their absence.

While a summer NAMM expo is at least marginally useful to professional recording people, a once-annual exposition of the kind of crossover gear described here would be a real hit. A more focused exhibition like the retail-sponsored and (unfortunately) under-advertised project studio show held in Los Angeles over the winter would be just the ticket for project and personal recording.

Back to the Streets: In other news, Effanel Music owner Randy Ezratty now has the first mobile installation of SSL’s Ultimatum in a new 52-input console. Ezratty said it will accommodate the dual 48-track Sony recorders. “It was a compromise to have a 40-channel console and 48 tracks of tape,” he said. First gigs are Harry Connick Jr., Ray Charles and Genesis.

In another road story, Remote Recording Service’s David Hewitt reports the installation of a new Neve VR48 with the latest automation package aboard his Silver Truck. First gig was the Philadelphia Orchestra Fourth of July telecast.

You Want Rumors? We Got Rumors Dept.: Howard Schwartz confirmed that he is actively looking for a new space to build a music recording facility outside of his present locations, which will remain in the Graybar Building. Schwartz said he wants a better acoustic and aesthetic environment for live music recording—20% of his overall revenues. The new facility will have two complete studios covering about 3,500 square feet, complete with a small driving range, showers and a gym. Schwartz will move some equipment, such as his EMT plates, 9-foot grand piano and a 48-track digital multitrack, to the new location. Construction is expected to be underway by September. ■

—FROM PAGE 34, L.A. RECORDING MARKET

you have to do a great job.”

Ron Lagerlof agrees that too few studios employ typical business practices. “My policies differ from those of a lot of owner-operated studios,” he says. “I’m used to corporate-owned facilities [Lagerlof has worked for Skywalker North] that have strict rules and policies. A lot of studios run on a shoestring budget. They don’t plan ahead, they don’t figure out budgets, and they don’t have any real idea what their return on investment should be.”

Some of the most prosperous studios are those that have a mix of music and other clients. Soundcastle, which used to do almost exclusively music, quietly set about attracting post-production work several years ago. “My six rooms are going around the clock,” says manager Dave Devore. “Days are all posting, and evenings and weekends are music. Even the three editing rooms with SSL ScreenSound can and do handle music. We’ve come up with a formula that works for us. We’re weathering the recession, but we’re doing it by working more hours and working harder.”

Soundcastle caught the wave at the right time, but their formula clearly can’t work for everyone. Not only is post-production a totally different field that requires a complete re-education of all staff and considerable equipment purchases, but a sudden influx into that field of a large number of post-capable studios would only serve to drag those rates down as well, as supply increased relative to demand. And post work isn’t recession-proof, either.

What would make this industry healthy again? No one I talked to has a solid, workable suggestion. “Somewhere along the line, the mystique was taken out of what we do,” says one studio owner. “Everybody thinks, ‘All you need is a console and a tape machine, and you’ve got a studio.’ I gave an architect \$175,000 just to do the inside of a building that was already standing. You cannot do that in a garage. There is something special about what we do.” If mystique is the answer, then the recording studio industry has to work to restore that mystique. Whatever happens, in Los Angeles there are still tough times ahead. ■

Amy Ziffer is Mix’s Los Angeles editor.

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Information in the following directory section is based on listing applications mailed earlier this year and was supplied by those facilities listed. *Mix* claims no responsibility for the accuracy of this information. Personnel, equipment, locations and rates may change, so please verify critical information with the companies directly.



The dub stage at Alan Howarth's new Electric Melody Studio, based in the Lantana Center in Santa Monica. It was designed by John Storyk and features a 60-channel Neve V3 console and a Mitsubishi 32-track digital recorder. Services in the five-room complex include Foley, ADR, sound design and all areas of post-production. Howarth's first feature film project at the new facility was *Fortress* from Hollywood Pictures. Photo: Ed Freeman.

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Upcoming Directory Deadlines:

Mastering, Pressing & Tape Duplication Facilities: **September 10, 1992**
 Remote/Location Recording & Sound Reinforcement: **October 9, 1992**
 Recording Schools & Programs: **November 10, 1992**

Mix listings procedure: Every month, *Mix* mails listing applications to recording studios and/or other vital facilities and services for the recording, sound and video production industries. There is a nominal charge to list a Boldface Listing (name, address, contact and descriptive icons) and an Extended Listing (equipment and services and photo or logo). If you would like to be listed in a *Mix* Directory, write or call the *Mix* Directories Department, 6400 Hollis St., #12, Emeryville, CA 94608; toll free (800) 344-LIST (344-5478).

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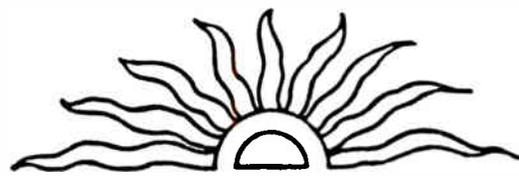


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Additional information available from:
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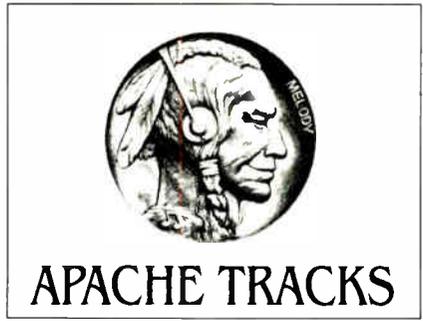
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AAZTEC RECORDING & TAPE DUPLICATING

1110 E. Missouri, Ste. 400, Phoenix, AZ 85014; (602) 279-0808;
 FAX: (602) 277-6552. Owner: Ron Briskman. Manager: Marc Bennett.



APACHE TRACKS STUDIO
 Tempe, AZ

APACHE TRACKS STUDIO

1006 E. Guadalupe Rd.; Tempe, AZ 85283; (602) 345-7557; FAX: (602) 345-9145. Owner: Michael Riddle, Jerry Davis. Manager: Jerry Davis. Engineers: Jerry Davis, Vaughn Smith, John Welch. Dimensions: Studio 16'x28', control room 18'x24', isolation booth 11'x16'. Mixing Consoles: Neve VRP-48 w/Recall & Flying Fader automation. Audio Recorders: Otari DTR-900II 32-track w/Apogee filters, Otari MX-70 16-track 1", Otari MX-5050B II 2-track 1/4", Akai A-DAM 12-track, (3) Panasonic SV-3700 DAT, Panasonic SV-250 portable DAT, Tascam 122 MkII cassette, Yamaha YPDR601 CD recorder. Digital Audio Workstations: Compaq 386/Turtle Beach Systems digital mastering system. Monitors: Genelec 1031A, Tannoy SRM-12B. JBL Control 5. Other Major Equipment: Adams-Smith Zeta-3 w/remote, dbx Type 1 18 ch., Lexicon Model 300, Lexicon Model 200, Lexicon Super Prime Time, (2) Yamaha SPX1000, Yamaha SPX90, GML dual mic. preamp, Studio Technologies dual mic. preamp, Apogee AD-500 converter, Apogee DA-1000E converter, Summit Audio DLC200 tube comp., (2) Valley People M610 2-ch. comp., (4) dbx 165 comp., BBE 802 processor, AEA MS-38 M-S Matrix, Mac II Quadra 950/Opcode Studio 5 w/Vision MIDI system, Intelix stereo headphone mix matrix, Intelix RM 8/2RQ remote headphone mixer, mics include: (2) AKG C-12 tube, AKG The Tube, AKG C-414B-UJS, (2) AKG C-460, AKG D-112, Beyer M500, Beyer M160, Beyer M130, (2) EV RE20, (3) Micro-Tech UM705, Neumann U49 tube, Neumann U67 tube, (3) Neumann USM69 stereo, (2) Neumann KM84, Neumann U87 (2) Neumann U89, (2) Sennheiser MD-441, (4) Sennheiser MD-421, Shure SM7, (2) Shure SM57, (2) Shure SM58.

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(2) Shure Beta 57; Yamaha S400B handmade studio grand piano, Yamaha DX7 II, Yamaha TX416, Roland D-50, Roland JD-800, Kurzweil 1000-PX, Kurzweil 250-RMX, E-mu Emulator II, E-mu SP 1200, E-mu Proteus 1, Alesis D-4, Waldorf Microwave, MiniMoog, Hohner D-6 clavinet, Hammond B-3 w/Leslie 122, (9) Martin 6 & 12-string acoustic guitar, Martin acoustic bass guitar. **Specialization & Credits:** Rugged, yet refined, Wild, yet one with the surroundings. That's the Native American spirit. And that's the spirit of Apache Tracks Studio. As the newest top-class studio in the desert Southwest, Apache Tracks blends the latest recording technologies into a warm, southwestern environment of muted earthtone colors, handcrafted oak woodwork and natural stone accents. It's an environment that stimulates the creative spirit. Acoustically diffuse recording spaces and the visual continuity provided between isolated rooms preserve a sense of musical ensemble that brings out the best in traditional live performance recording sessions. Each artist even has a remote mixer to independently control their headphone mix. For tracking, sweetening or mixdown of audio, for compact disc, video or film, look to us. Just an hour flight from the west coast puts you in Apache Tracks country, where technology and the creative spirit become one.

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AV **RV** **TR** **CD** **DA** **MA** **MS**
8088 N. 15th Ave.; Phoenix, AZ 85021; (602) 870-0351. Owner: Bruce P. Leland. Manager: Shirley Leland.

THE CAVERN RECORDING STUDIOS

AV **RV** **TR** **CD** **DA** **MA** **MS**
3305 N. Oodje Blvd.; Tucson, AZ 85712; (602) 881-1212; FAX: call first. Owner: Bill Cashman. Manager: Bill Cashman.



CHATON RECORDINGS
Scottsdale, AZ

CHATON RECORDINGS

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5625 E. Nauni Valley Dr.; Scottsdale, AZ 85254; (602) 991-2802; FAX: (602) 951-8167. Owner: Ed and Marie Ravenscroft. Manager: Lori R. Geare. Engineers: Steven Escallier, Rusty D'Agno. Dimensions: Room 1: studio 13'x24', control room 13'x24'. Room 2: studio 13'x15'. Room 3: studio 20'x20'. control room 15'x18'. Remote truck, control room 8'x15'. **Mixing Consoles:** Trident 80C w/32 ch. Diskmix Moving Faders, Trident 80B, Soundcraft 800. **Audio Recorders:** Otari MTR-90II 24-track, Otari MTR-90 16/24-track, (2) Otari MTR-10C 2-track w/center track SMPTE, Otari MX-80 24-track, (2) Otari MTR-12, (2) Otari JX-5050B, (2) Sony PCM-51 2-track digital, (4) Tascam DA-30 R-DAT, (2) Panasonic SV-3700 R-DAT, (10) Tascam 122MKII cassette. **Digital Audio Workstations:** Digidesign Pro Tools, Digidesign Sound Designer, Macintosh IIFX w/20" color monitor, Kurzweil 250RMX, (4) E-mu Emulator II, Emax, Proteus, SPX, (2) Roland D550, Super JX-S550 & HD, Kawai K1. **Monitors:** Tannoy FSM, (2) Tannoy LGM, (2) Tannoy PBM 6.5, (3) Yamaha NS-10M, (2) Auratone. **Other Major Equipment:** (54) Dolby SR noise reduction channels, (4) Adams-Smith Zeta-3, Lexicon 480L w/LARC, Lexicon 224X w/LARC, (3) Lexicon PCM42, (4) Lexicon PCM70, (2) BBE Sonic Maximizer, (4) Yamaha SPX90II, Even-

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tide H3000 SE, Lexicon PCM60, Eventide H910, Lexicon 200, (10) dbx various compressor, (6) UREI various compressor, Drawmer 1960 vacuum tube compressor, (2) Drawmer DS-201, Audio Design Research F769X-R vocal stessor, (4) TC Electronic TC2240 E.O., (2) Valley People assorted racks, (2) Baldwin grand piano, Yamaha KX88 MIDI driver w/weighted key. **Specialization & Credits:** 48-track capability, Diskmix 3 Automation, multitrack Dolby SR, Pro Tools (digital multitrack, hard disk recording, editing, sequencing, pre-mastering, automated mixing and processing workstation); complete SFX/music production libraries; phone patch; full audio/video/MIDI lock-up, audio post-production for video; A.D.R., 24-track mobile truck; dedicated and experienced staff. Credits include CeCe Peniston, Joey DeFrancesco, Glen Campbell, Paul McCartney, Lyle Lovett, Little Joe Hernandez, George Strait, Randy Travis, Phil Ramone, B.K. Jackson, Malalika Sallard, Alice Cooper, Judas Priest, Dan Fogelberg, The Phoenix Symphony, John Gary, Dick Van Dyke, Pat Metheny, West World, Icon, Gin Blossoms, Lynch Mob, Ray Herndon, Charlie Byrd, Louie Bellson, Johnny Rodriguez, Doc Severinson, Dave Brubeck, James Galway, Midori, Itzhak Perlman, Isaac Stern, Alicia De Larrocha, Don Bluth Prod., Fisher-Price, AG Communications, ABC Network.

MUDSHARK RECORDING STUDIO

RV
7055 N. Chambers Dr.; Flagstaff, AZ 86001; (602) 774-7533. Owner: Phil Gail. Manager: Phil Gail.

RAPA SOUND

AV **RV** **TR**
PO Box 1017; Jerome, AZ 86331; (602) 634-9607; FAX: (602) 634-2518. Owner: Walter Rapaport.



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Scottsdale, AZ

SCOTTSDALE CONFERENCE RESORT

AV **RV** **TR** **CD** **DA** **MA** **MS**
7700 E. McCormick Pkwy.; Scottsdale, AZ 85258; (602) 596-7690; FAX: (602) 596-7420. Owner: Scottsdale Conference Resort. Manager: Brian Court. Engineers: Brian Court, John Haro, Mike Floor, Martin Dempsey, Terry Baker. Dimensions: Studio 21'x26', control room 20'x18'. **Mixing Consoles:** TAC Scorpion 24x16, TAC Scorpion 16x8, Soundcraft 600 16x8, Tascam M4 8x4. **Audio Recorders:** Otari MX-70 16-track, Otari MTR-12 2-track w/center track time code, Otari 5050 MkII 2-track, Otari 5050B 4-track, (2) TEAC 3440 4-track, (2) Tascam 122, Nakamichi MR-1, Tascam 234 4-track, Tascam 133 3-track. **Monitors:** (2) JBL 4430, (2) Tannoy SRM-12B, (8) JBL 4401, (2) Auratone SC. **Other Major Equipment:** (8) dbx 150X Type I, (2) Adams-Smith 2600 synch, Adams-Smith LTC writer, Adams-Smith reader, Lexicon PCM42, Yamaha REV7, Eventide H949, (3) Yamaha SPX90, Lexicon 200, (3) Gatec noise gate, (3) dbx 166 comp/limiter, Symetrix 522, Scamp rack, Aphex II Aural Exciter, Studio Technologies AN-Z stereo simulator, (20) dbx 903 comp/limiter, (3) Klark-Teknik DN360 graphic EQ, (4) dbx 904 parametric EQ, dbx 902 de-esser, (3) Rane 10-band EQ, (6) Crest 3000, (2) Steinway 6'6" grand piano, Grass Valley 16001L switcher, Grass Valley DPM-100 digital effects processor, Grass Valley model 100 switcher, Convergence 204 editor, Sony BVU-950 recorder, Sony BVU-920 DT recorder, (3) JVC CR-850U recorder, (3) Sony 5850 recorder, Quantafont OC6-500 graphic, Ikegami HL 79 OAL camera, Ikegami ITC-730 camera, (3) Sony DXC-M7 camera, (30) multi-image projections, 7-watt Argon laser system, complete darkroom. **Specialization & Credits:** Specializing in original music composition, commercial production, audio/visual soundtracks, post-production audio-for-video and voice-over production. Also complete video production and industrial multi-image staging. Located in luxurious resort setting with golf, tennis, complete health spa and fitness center and easy access to Sunbelt activities.

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PO Box 1007; Tempe, AZ 85281; (602) 968-9506; FAX: (602) 443-0773. Owner: Clarke Rigby. Andy Baede. Manager: Andy.



VINTAGE RECORDERS
Phoenix, AZ

VINTAGE RECORDERS



4831 N. 11 St., Phoenix, AZ 85011; (602) 241-0667; FAX: (602) 241-0645. Owner: Billy Moss, Chuck Holder. Engineers: Paula Wolak, Clarke Rigby, Billy Moss, Chuck Holder. Dimensions: Room 1: studio 24'x14', control room 21'x17'. Room 2: studio 24'x22', control room 19'x14'. Room 3: studio 9'x10', control room 14'x10'. Mixing Consoles: SSL 4040 E/G 32-loaded "O" electronics & computer, automation; Trident "B" Range 28x16x24, Studer 189-080 16x8x16, Quad Eight Westar 36x24, Neve 6-ch. submixer, Mackie 1604. Audio Recorders: Sony 3324 24-track digital, Studer A-827 w/TLS 400 sync 24-track analog, Mitsubishi X-80, Ampex ATR-104 2-track 1/2" & 1/4": 1/2" 4-track, Studer A810 w/center time code, Panasonic SV-3700 DAT, Yamaha C-300 cassette, Tascam 85-16 1" 16-track w/dbx. Monitors: George Augspurger custom, twin TAD 15" JBL 240J, John Meyers 833, Klien/Hummel 096, Westlake BBSM-6, Yamaha NS-10, Electro-Voice Sentry 100A. Other Major Equipment: (2) Quantec QRS room simulator, (2) AMS DMX-15-80, AMS RMX-16, Yamaha REV-1 reverb, (3) Eventide H910 Harmonizer, EMT 240 & 140 plate reverb; Lexicon 200 reverb, Lexicon PCM70, Lexicon Prime Time DDL, (2) Pultec EPQ-1 tube EQ, (2) Pultec EQH-2 tube EQ, (2) ITI (Massenburg) ME-230 EQ, Trident (Cherokee) "A" Range discrete mic/EQ, Trident "B" Range discrete mic/EQ, (6) Calrec discrete mic/EQ, (2) Aengus EQ, Klien/Hummel UE-1000 tube EQ, (2) Teltronics LA-2A comp., (4) dbx 165 comp., (3) dbx 160/1, (4) Aphex CX-1, (2) API 525 discrete comp., (5) Neve stereo comp/limiter, (2) Valley People Dyna-mite, Drawmer DS-201 gate, (2) dbx 902 de-esser, (3) AKG C-12, (2) AKG 414, (4) AKG 451/2, Telefunken ELAM 250, Neumann U47 tube, Neumann U47 FET, (4) Neumann M49B, (2) Neumann U67, (6) Neumann KM64, (2) Neumann KM84, (3) Neumann U87, (2) Neumann U89, (6) RCA ribbon mic, (4) Sony C-37a, Yamaha C7 7'4" grand piano, Hammond B3 organ w/Leslie 122, Kurzweil K-2000, Gretsch drum kit dbi bass, 6 toms, assorted vintage guitars/basses and snare drums, Marshall Superhead 100W w/4x12, Ampeg B-15N, Roland S-550, JVC 6650-U 3/4" video deck. Specialization & Credits: Stevie Nicks, Fleetwood Mac, Mick Fleetwood, Bob Welch, Joey DeFrancesco, Lynch Mob, Scared Reich, Evening Shade, Al Jardine (Beach Boys), Grateful Dead, Bob Dylan.

Arkansas

ARCA



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100 N. Rodney Parham Rd., Stes. 1A & 1B; (PO Box 5686, AR 72215-5686); Little Rock, AR 72205; (501) 224-1111; FAX: (501) 224-3329. Owner: Dick Marendt, Clyde Snider.

CRYSTAL RECORDING STUDIOS



2307 Brandon Rd., Benton, AR 72015; (501) 847-8215. Owner: Ray and Karen Brooks. Manager: Ray Brooks.

MELODY RECORDING STUDIO



PO Box 57; Fayetteville, AR 72702; (501) 443-5948. Owner: John L. Johnston. Manager: Rose Marie Johnston.

WATERMELON WASTELAND STUDIO



PO Box 1535; Hope, AR 71801; (501) 777-8458; FAX: (501) 777-3311. Owner: Jim Perry.

California

A TO Z STUDIOS



680 Arrow Hwy., La Verne, CA 91750; (714) 599-1301; FAX: (714) 592-9888. Owner: R. A. Zahnsier. Manager: Ann Thomas.

ACROSS THE TRACKS PRODUCTIONS



PO Box 2612; Garden Grove, CA 92640; (714) 636-3780; FAX: (714) 636-3780. Owner: Brad & Jodi Clark. Manager: Jodi Clark.

ADAMO'S RECORDING



5811 Westminster Blvd., Westminster, CA 92683; (714) 897-8886. Owner: Jerry Adamowicz.

AFTERHOURS RECORDING CO.



1616 Victory Blvd., Ste. 104; Glendale, CA 91201; (818) 246-6583; FAX: (818) 240-1286. Owner: Bill Berkuta. Manager: Bill Berkuta. Engineers: Bill Berkuta, Scott Griffith. Dimensions: Room 1: studio 22'x14', control room 12'x13'. Room 2: studio 11.5'x11.5', control room 10'x11'. Mixing Consoles: Tascam M-520, (2) Tascam 3, Opamp Labs 14x4x2. Audio Recorders: Tascam 38, Tascam 80-8, TEAC A-3440, TEAC A-2340 SX, Olari MX-5050 BII 2-track. Digital Audio Workstations: Technics SV-DA10. Monitors: (2) Tannoy, (2) JBL 4310. Other Major Equipment: dbx 166, Lexicon PCM60, DeltaLab ADM1024, 12-band stereo EQ w/Expander, MXR 10-band stereo EQ, Aphex Aural Exciter Type C, Roland S-330 digital sampler, Yamaha SPX90, US Audio GateX 4-channel, (4) Sennheiser MD-421 U-5, (2) AKG D-1000E, (2) AKG D-190E, AKG C-414/48, (3) Neumann KM84, AKG D-112, Shure 300. Specialization & Credits: Music demo recording, theatrical sound design and consultation, commercial voice tape production, radio drama production, radio and film voice-over production, audio cassette mastering. Flexibility, effectiveness and cooperation are key elements at Afterhours, where resident producers are available to help you realize your project.

AIRE L.A. STUDIOS INC.



1019 S. Central; Glendale, CA 91204; (818) 500-0230; FAX: (818) 240-1463. Owner: Craig Burbidge, Raymond Shields. Manager: Eve R. Glabman.

AMERICAN RECORDING CO.



22301 Mulholland Hwy.; Calabasas, CA 91302; (818) 223-8030; FAX: (818) 223-8034. Owner: Richard Podolor. Manager: Bill Cooper.

ANDORA STUDIOS



3249 Cahuenga Blvd. W.; Hollywood, CA 90068-1301; (213) 851-1244; FAX: (213) 851-8604. Owner: Andora Corp. Manager: D. Parry. Engineers: Bino Espinoza, Elaine Anderson. Dimensions: Room 1: studio 40'x43', control room 24'x29'. Mixing Consoles: Neve VR-72 w/GML automation, Massenburg 72 channel w/fader automation. Audio Recorders: (2) Studer 827 24-track, Studer 820 2-track, (2) Ampex ATR-100 2-track. Monitors: Genelec 1035 (main), Genelec 1031 near-field, Yamaha NS-10M. Other Major Equipment: Dolby SR 24-channel, (4) TimeLine Lynx synchronizer, Lexicon 480L digital reverb, AMS 1580 digital delay, AMS RX-16 digital reverb, Eventide H3000 SE Ultra-Harmonizer, Eventide SP-2016, (2) TC 2290, (2) Lexicon PCM70, Yamaha SPX1000, (2) Teltronix LA-2A, (2) Tube-Tech CL-1A limiter, (2) Focusrite ISA-131 dynamic, Focusrite ISA-115 EQ, (2) API 560B graphic EQ, (2) API 560B EQ, Publison INF-90, (2) GML 8200 stereo EQ, GML limiter, Steinway BB grand piano, (24) Neve 1073 EQ, (2) Pultec EQP-1A, (2) Lang EQ, Pultec EQ H-Z, TC 1210, (2) UREI 1176LN. Summit Audio TLA-100, Neve 33609 stereo limiter, (2) AKG C12, (2) Telefunken ELAM 251, (8) Neumann U-67, (3) Neumann M-269, (2) Neumann M-49, (18) AKG 414EB, (8) Neumann U-87, (10) Neumann KM-84, (2) Drawmer DS-201 dual gate, (3) Aphex 612 dual gate, (2) UREI LA-3A, Yamaha REV-1 digital reverb, Hammond B-3 organ.

ATELIER X



34700 Pacific Coast Hwy., Ste. 307; Capistrano Beach, CA 92624; (714) 489-8656; FAX: (714) 489-8658. Owner: Robin Cox. Manager: Eric Gabriel.

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12426 1/2 Ventura Blvd.; Studio City, CA 91604; (818) 762-2232; FAX: (818) 762-8077. Owner: Steve Katz/Steve Mitchell.

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1110-A W. Glenoaks Blvd., Glendale, CA 91202; (818) 241-9090.
Owner: Eric Sclai. Manager: Kevin Lange.

BAZZBO PRODUCTIONS



680 Arrow Hwy., La Verne, CA 91750; (714) 592-6271; FAX: (714) 592-9888. Owner: Tim Jaquette. Bob Somma.

BLINDFOLD STUDIOS



P.O. Box 253; Poway, CA 92074; (619) 486-4734. Owner: Gregg Brandalise. Manager: Gregg Brandalise.

BLUE MOON STUDIO



28205 Agoura Rd., Agoura Hills, CA 91301; (818) 889-8920; FAX: (818) 889-1208. Owner: Joe Vannelli. Manager: Diane Ricci. Engineers: Joe Vannelli, other engineers available upon request. Dimensions: Room 1: Studio 20'x22', control room 20'x25'. Mixing Consoles: Amek G2520 56-channel. Audio Recorders: (2) Akai ADAM DR-1200 24-track, Panasonic SV-3500 DAT, Dtari MTR-12 2-track 1/2". Otari MX-5050BII 2-track 1/4", (2) Yamaha K-1020 cassette deck. Monitors: JBL 4435 studio, Tannoy PBM-6. Other Major Equipment: Dolby SR/A 363 2-channel noise reduction, Lexicon 480L digital, (2) Lexicon LXP-15 digital processor, Lexicon PCM-70 digital processor, (2) Yamaha SPX-90II digital effect unit, Yamaha REV-7 digital effects unit, (9) Kepex II noise gate, (8) dbx 904 noise gate, (3) dbx 902 de-esser, (2) Summit Audio TLA-100A tube limiter, Summit Audio EQ-200 stereo program EQ, (2) UREI 1176 limiter, (2) dbx 165 compressor, (2) dbx 166 stereo compressor/gate. Audio & Design F769X-R vocal stresser, Neumann U47 tube mic, (2) Milab DC-63 mics, (2) Neumann U89 mic, AKG 414 mic, (2) Shure SM81 and more: Yamaha, Roland, Kurzweil MIDI synths and more.



BROOKLYN RECORDING STUDIO
Los Angeles, CA

BROOKLYN RECORDING STUDIO



8000 Beverly Blvd., Los Angeles, CA 90048; (213) 655-9200; FAX: (213) 852-1505. Manager: Bill Dooley. Engineers: Bill Dooley, Scott Stillman, Scott Tobinsky. Dimensions: Studio: 30'x27', control room 27'x25'. Mixing Consoles: Neve 8078. Audio Recorders: Dtari MTR-90 MkIII, Ampex ATR-102 1/2" or 1/4", Ampex ATR-104 4-track 1/2". (2) Panasonic 3700 DAT, (2) Sony 850-ES. Monitors: (2) Control room mains custom enclosed w/TAD components, (2) Yamaha NS-10M, (2) KRK 7000. Other Major Equipment: (2) Teltronix LA-2A, (2) Fairchild 660, (2) Pultec EQP1A3, (4) Pultec EQH2, GML 8220 parametric EQ, Demeter VTMP 2A tube mic pre-amp, (2) UREI 1176, (4) dbx 160XT, (4) Drawmer DS-201 dual gate, Eventide H3000SE, Lexicon 300, EMT 140 tube reverb plate, AMS RMX-15, AMS DMX-16, Yamaha REV-1, Yamaha REV5, Yamaha REV7, Lexicon 224, Lexicon Prime Time, (2) Roland SDE-3000, (2) dbx 160, Sony VP-9800 3/4" video, Sony KXBR-32 video monitor, (2) Focusrite ISA110, (2) Neve 3226A limiter, (2) Telefunken 250, Neumann U67, Neumann U47, (2) Neumann U87, (4) AKG 414, (5) AKG 451, Neumann U47 FET, (2) Shure SM81, (8) Shure SM57, (8) Sennheiser 421, (4) Sennheiser 409, (2) AKG D-12, (2) Demeter VTDV2 tube DI. Specialization & Credits: Our goal is to provide the finest audio recordings possible. The equipment package consists of a rather unique mix of the finest vintage recording gear as well as many of the newer digital effects. Every effort has been made to insure the highest level of audio quality while maintaining a comfortable, efficient atmosphere, at an affordable price. Recent clients include producers Tom Werman, Hugh Padgham, Neil Dorfsman; artists John Wesley Harding, Alannah Myles, Los Lobos, Leo Kottke.

WALLY BURR RECORDING



1126 Hollywood Way, Ste. 203; Burbank, CA 91505; (818) 845-0500. Owner: Wally Burr. Manager: Ellen Burr.

CAL-MEX MUSIC



328 N. Newport Blvd., Ste. 479; Newport Beach, CA 92663; (714) 631-2067; FAX: (714) 631-2067. Owner: William & Paige Price. Manager: Tito.

CAPITOL RECORDING STUDIOS



1750 N. Vine St., Hollywood, CA 90028; (213) 871-5001; FAX: (213) 871-5008. Owner: Thorn-EMI. Manager: Paula Salvatore. Engineers: Peter Doell, Leslie Ann Jones, Charlie Paakkari. Dimensions: Room A: studio 47'x44', control room 25'x25'. Room B: stu-

—LISTING AND PHOTO/LOGO CONTINUED TOP OF NEXT COLUMN



CAPITOL RECORDING STUDIOS
Hollywood, CA

dio 33'x31', control room 22'x20'. Room C: studio 12'x10', control room 18'x22'. Mixing Consoles: Neve VR 60x48 w/Flying Fader automation & Film Mix module, Neve VR 72x48 w/Flying Fader automation & Film module (new as of Dec.92), Neve 8068 32x24 w/Necam automation, Studer 900 12x4, (2) Sony 1105-k 8x2 digital, (2) Sony MXP-2000. Audio Recorders: (4) Studer A827 24-track, Studer A800 24-track, Mitsubishi X880 32-track w/Apogee filters, (12) Ampex ATR 102 1/2" & 1/4", (2) Ampex ATR 104 4-track or 3-track playback 1/2", (9) Sony DMR-4000/1630 2-track, Panasonic SV-3500, Panasonic SV-3700, Yamaha C300 cassette, Aiwa 660, Aiwa 770 cassette. Digital Audio Workstations: (3) Sonic Solutions, Monitors: TAD designed by Vincent Van Haaf, Yamaha NS-10M, Auratone. Other Major Equipment: Dolby A, Dolby SR, TimeLine Lynx synchronizer modules/controller, house sync, (8) live echo chambers (world famous), (3) EMT 140, EMT 250, (2) Lexicon PCM60, (2) Lexicon Super Prime Time, (2) AMS RMX16, (2) AMS DMX15, (3) Yamaha SPX1200, (4) Yamaha SPX90II, (4) Yamaha REV7, (6) Roland SDE-3000, Roland SRV-2000, Roland R-880, TC 2290, Eventide 3000 SE Ultra-Harmonizer, Kepex II gate, Drawmer gate, dbx 902, 903, 904, (7) Pultec EQ, (4) LA-2A limiter, (8) UREI 1176 limiter, (4) UREI LA-3A limiter, Neve stereo compressor, SSL stereo compressor, (2) Neve mastering compressor pairs, over 200 microphones including classic Neumann & AKG, Yamaha 9' piano, Steinway 7' piano, Hammond 33 organ, Marshall 4x12, Fender Deluxe. Specialization & Credits: At approximately 1,400-sq-ft. Studio A features 2 isolation booths. Expansion of Studio A into Studio B is possible by opening isolation partitions. The control rooms of Studio A and C incorporate MIDI, video and computer distribution as well as ultra low capacitance audio wiring, high-power cue and 8-channel self mix cue. Record credits include Richard Marx, Dwight Yoakam, BeBe & CeCe Winans, Deniece Williams, Natalie Cole, Diane Schur, Dave Grusin, Alice in Chains. Film score credits include *Leaving Normal*, *For the Boys*; *Glenlyng*, *Glen Ross*, *White Men Can't Jump*, *Prince of Tides*, *Honeymoon in Vegas*. We are a full service facility, offering analog and digital mastering, CD prep, and a Sonic Solution hard disk editing, video layback-to-picture.

CARDINAL RECORDING



623 Calle Tulipan; Thousand Oaks, CA 91360; (805) 493-2718. Owner: Tom Boyce. Matt Schaffer. Manager: Tom Boyce, Matt Schaffer.

CHACE PRODUCTIONS INC.



201 S. Victory Blvd., Burbank, CA 91502; (818) 842-8346; FAX: (818) 842-8353. Owner: Rick Chace. Manager: Bob Heiber.

CLEAR LAKE AUDIO



10520 Burbank Blvd., N. Hollywood, CA 91601; (818) 762-0707; FAX: (818) 762-0256. Owner: Brian Levi. Manager: Brian Levi. Engineers: Brian Levi, Colin Mitchell, Bill Fate. Dimensions: Room 1: Studio 30'x35', control 25'x23". Room 2: Control 17'x13". Room 3: Control 17'x10". Room 4: Control 13'x10". Mixing Consoles: Trident 808 30 input w/Dtmix automation. Audio Recorders: Studer A827 24-track, Dtari MTR-12 MkII 2-track 1/2", Tascam DA 30 DAT w/411 & 48K, Aiwa M700B cassette, Panasonic SD-3700 W/441 & 48K, Pioneer RPD-1000 CD recorder. Monitors: UREI 813A custom time aligned w/JBL Super Tweeter and JBL 18" subwoofer, Yamaha NS-10M, Tannoy PBM-8. Other Major Equipment: BTX shadow synchronizer with SoFTouch controller, Lexicon 480L, Lexicon PCM-70, Eventide H3000, TC Electronic TC 2290 30 sec., (3) Pultec EQP-1A EQ, (2) Pultec MEQ-5 EQ, Tube-Tech PE-1B prog. EQ, Tube-Tech ME-1A midrange EQ, Tube-Tech MP-1 stereo pre-amp, Tube-Tech CL-1A compressor, (2) Neve 1073 mic. pre-amp/EQ, (2) UREI 1176 comp./limiter, (2) Drawmer DS-201 stereo gates, Neumann FET U47, Neumann U67 tube, Neumann U87, Yamaha C-7E 7'4" concert grand piano, Roland E660 digital EQ.

CONTROL CENTER



128 N. Western Ave., Los Angeles, CA 90004; (213) 462-4300. Owner: Aseley Otten, Rick Novak. Manager: Aseley Otten, Rick Novak, Dan Nebenzal. Engineers: Dan Nebenzal, Aseley Otten, Rick Novak, Frank Blue Sposato, Spike Marlin. Dimensions: Room 1: studio 18'x24', control room 12'x16". Room 2: studio 7'x12". Mix-

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CONTROL CENTER

CONTROL CENTER
Los Angeles, CA

ing Consoles: API custom 32x16x24 w/550A and 560 EO. **Audio Recorders:** Studer A80 MkIV 24-track, Ampex ATR-102 2-track, Sony DTC-75 ES DAT, Sony TC-K950 ES cassette. **Monitors:** Tannoy 15X, JBL 4312, Auratone 5C. **Other Major Equipment:** Lexicon 200, Roland SRV-2000, Roland SDE-3000, Lexicon PCM70, Yamaha REV7, Yamaha SPX90, Eventide H910, (2) UREI 1176LN, (2) dbx 161, (2) Valley People Dyna-Mite, (4) Valley People GateX, (2) dbx 166, MXR DDL, Hill DX 3000, BGW 750, BGW 250, Crown D-75, (2) Neumann U87, AKG The Tube, AKG 414. **Specialization & Credits:** Clients include Los Lobos, Earth, Wind & Fire, Louie Louie, John Mayall, Gene Clark, Long Ryders, Green on Red, Dream Syndicate, Textones, Rappin' Duke, Heavy Traffic, Malice, Pat Boone, King Solomon Burke, Holland-Dozier-Holland, John Adams, Heavy Traffic, Taxis, Jimmy Haskell, PolyGram, A&M, Warner Bros., MCA, Atlantic, Dunhill, Rhino, Slash, Enigma, Bug, Demon, Down There, etc. Martika, Animal Logic

CORNERSTONE RECORDERS

9626 Lurline Ave., Unit. K: Chatsworth, CA 91311; (818) 341-1358; FAX: (818) 341-1330. Owner: Preferred Sound Inc. **Manager:** Matthew Spindel. **Engineers:** Matthew Spindel, Richard Hasal, Scott Campbell, Greg Olson. **Dimensions:** Studio 30 x25, control room 25 x25. **Mixing Consoles:** Neve VR-60 w/Flying Fader automation. **Audio Recorders:** Studer 820 24-track, Otari MTR-9011 24-track, Studer A80 VO 2-track, Ampex ATR-104 4-track 1/2", Studer A810 2-track, Panasonic 3500 DAT. **Monitors:** TAD TSM-1B, Yamaha NS-10M, Smithline, Auratone. **Other Major Equipment:** AMS RMX-16 digital reverb, AMS 1580S DDL, Lexicon 480L digital reverb 3.0 software, EMT 140 plate, EMT 240 Gold Foil, Yamaha REV5, Yamaha REV7, (4) Yamaha SPX90, Roland SRV-2000, Roland SDE-3000, Eventide H3000, (2) TC Electronic 2290 32-sec sampling, (2) Lexicon PCM70, (3) dbx 165 comp/lim, (2) UREI 1176 comp/lim, (2) Summit Audio comp/lim, Summit Audio stereo EO, Summit Audio stereo mic pre, BBE 812 Aural Exciter, Dolby 301.

CREATIVE MEDIA

11105 Knott Ave., Ste. G: Cypress, CA 90630; (714) 892-9469. Owner: Tim Keenan. **Manager:** Linda Keenan. **Specialization & Credits:** Creative Media has been providing professional media recording for over 21 years. Our specialty is voice recording and the production involved in audio-for-video, AV soundtracks and spots. Our facility features two control rooms, audio sweetening for video and a comfortable environment. We provide production music and sound effects, assistance in casting voice talent, multilingual narrations, dialog replacement and the talent behind the board to bring your script to life. We serve as a sound-support service for independent producers and corporate staff producers throughout Southern California. Extras include FAX and photocopier, phone-patch capability and duplication in any analog tape format. Clients include TRW, Disneyland, Allergan, Pacificare Health Systems. **Engineers:** Ed Berger & Dan Pavelin.

DEVONSHIRE STUDIOS

10729 Magnolia Blvd., N. Hollywood, CA 91601; (818) 985-1945; FAX: (818) 985-9915. Owner: David and Delores Mancini. **Manager:** Kelle Creamer. **Engineers:** Mike Mancini, James Johnson. **Dimensions:** Room 1: studio 20'x30', control room 20'x26'. Room 2: studio 20'x20', control room 10'x15'. Room 3: studio 30'x45', control room 26'x20'. Room 4: studio 15'x24', control room 15'x24'. **Mixing Consoles:** Neve V-3 60 in w/GML automation, Neve VR 72 in w/GML automation, Neve V3 36-in w/Necam 96, Neve 8128 56-in w/Flying Faders, Neve 8232 32-in w/Necam 96. **Audio Recorders:** (3) Otari MTR-90 Mark 2 24-track, (5) Studer 827 24-track, (2) Otari MTR-20 4-track, Ampex ATR 100 2-track 1/2" or 1/4", Studer A820 2-track 1/2" or 1/4", Studer A80 2-track 1/2", (4) Panasonic SV-3500 DAT, (2) Nakamichi MR-1 cassette, (2) Sony TC-WR730 cassette, (2) Yamaha C300 cassette. **Digital Audio Workstations:** Pro Tools 4-track, Sound Tools, WaveFrame. **Monitors:** (2) Boulder 500, (4) Phase Linear 400, (2) Carver PM-1.5, (6) George Augspurger custom w/TAD TL1603/4001 White EQ & crossover, (8) Tannoy 10", 12" & 8". **Other Major Equipment:** (3) Lexicon 480L, (3) Eventide H3000 SE, (3) Eventide 2016, (3) AMS RMX, (4) Adams-Smith Z6000 w/controller synchronization, (5) Lynx synchronization, Pro Tools 4-track system, outboard gear & microphones too extensive to list, 4,000 cubic ft. echo chamber, (5) Dolby A, (2) Dolby SR, (45) BVU 800 3/4", Hammond B-3 w/Leslie, (3) Yamaha grand piano, Roland

JD 800 MIDI keyboard, Ensoniq SQ1 MIDI keyboard, Roland U-20 MIDI keyboard, MIDI Moog. **Specialization & Credits:** Roger Waters new album *Amused To Death*, Ozzy Osbourne *No More Tears*, Tom Petty *Full Moon Fever*, Cher *Heart of Stone* just to name a few albums of recent release. Whitney Houston, Lionel Richie, Infectious Grooves etc. Soundtracks include *Beaches*, *Torch Song Trilogy*, *Talk Radio*, *Out For Justice*, *The Marrying Man*, etc. Also extended post-production credits for TV animation such as *GI Joe*, *Bill & Ted's Excellent Adventure*, *Captain Planet*.

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DYNAMIC SOUND RECORDERS

5624 Vineland Ave., North Hollywood, CA 91601; (818) 753-7665; FAX: (818) 764-7752. Owner: Mike Milchner. **Manager:** Geoff Gibbs.



ECHO SOUND RECORDING
Los Angeles, CA

ECHO SOUND RECORDING

2900 Los Feliz Blvd., Los Angeles, CA 90039; (213) 662-5297. Manager: Mike Williamson. **Dimensions:** Room 1: studio 18'x18', control room 10'x18'. Room 2: studio 26'x27', control room 18'x16'. **Mixing Consoles:** Trident 80C w/Moving Faders 32x24x24. —LISTING CONTINUED ON NEXT PAGE

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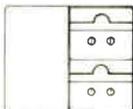
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California

—LISTING CONTINUED FROM PREVIOUS PAGE

Trident 80B 32x24x24, Yamaha DMP7 8x2 submixer, Otari/Diskmix ARMS III automation. **Audio Recorders:** Studer A827 24-track, Sony/MCI JH-24 24-track, Otari MTR-12 2-track 1/2", Sony APR-5003 2-track 1/4", Fostex B-16D 16-track, Sony PCM-2500 DAT, Panasonic SV-3500 DAT, (2) Nakamichi MR-1 cassette, TEAC A3440 4-track, **Monitors:** (2) Yamaha NS-10M, JBL 4330, Westlake BBSM-4, Westlake BBSM-15, JBL 4311. **Other Major Equipment:** Lexicon 480L, AMS 15-80S, Eventide H3000 S Ultra-Harmonizer, TC Electronic TC 2290, (2) Yamaha REV5 digital effects processor, Yamaha REV7, (2) Eventide H949 Harmonizer, (8) Yamaha SPX90, Yamaha SPX90 II, (2) Aphex Aural Exciter, (3) Orban 622B parametric EQ, Aphex Dominator limiter, (5) dbx 160X comp/limiter, Lexicon Super Prime Time, dbx 160, UREI/Teletronix LA-2A comp/limiter, API 3124 mic preamp 4-ch., API 5502 2-ch EQ, (4) Gate noise gate, Roland SDE-3000 DDL, dbx 906 flanger, SMPTE Time Window Eventide Omnipressor comp/limiter, Neumann U87, (2) Neumann TLM170, (2) AKG C-414 condenser mic, (3) AKG C-460 condenser mic, AKG The Tube, (8) Sennheiser MD-421, Linn 9000 digital drum/sequencer Emulator II digital keyboard/sampler, Roland D-50 Linear synthesizer keyboard, (2) Sennheiser MD-409, Crest 7001 power amp, Crest FA800, (2) Crest 4000, Mac Plus w/Mark of the Unicorn Performer, Yamaha TX816 8 MIDI modules, Schäfer & Son grand piano. **Specialization & Credits:** Echo Sound provides you with professional-quality, cost-efficient recording services. Studio B features the Trident 80C console with 32 channels of DiskMix Arms III moving fader console automation and Studer A827, 24-track recorder. We have provided recording services for Capitol Records, Warner Bros., Qwest, Soundlab, Atlantic Records, PolyGram, Mercury Records, Ice Cube, D.J. Pooh, YoYo, Charo, St. Ives commercials, College Boys, King T Force One, Street Knowledge Production, and many more various independents and commercial projects. Our services include 24- & 48-track production and automation mix-down facilities with a wide array of outboard and signal processing gear. Recording services include our professional, experienced staff of recording engineers, serious about customer satisfaction. The MIDI production facility offers the producer, arranger and songwriter Performer sequencing and a selection of MIDI sound sources complete with 16-track or 24-track recorder, console and outboard effects, in-house arranging and production services.

ELDORADO RECORDING STUDIO



6553 Sunset Blvd.; Hollywood, CA; (213) 467-6151; FAX: (213) 467-5780. Owner: Gary Gunton. Manager: Gary Gunton.



ELUMBA RECORDING STUDIO
Hollywood, CA

ELUMBA RECORDING STUDIO



1538 N. Cahuenga Blvd.; Hollywood, CA 90028; (213) 461-4515; FAX: (213) 461-4622. Owner: Marie Josephine Dabany. Manager: Jo Keita. Engineers: Lori Fumar. **Mixing Consoles:** Solid State Logic 6056 w/G Series computer. **Audio Recorders:** (2) Studer A800 MkIII 24-track, Studer A820 2-track, Ampex ATR-102 2-track, Panasonic 3700 DAT player, Mitsubishi X-850 32-track, (2) Studer 710 cassette deck. **Monitors:** (2) Yamaha NS-10M, (2) Augspurger custom design w/TAD, (2) Auratone 5C, JBL 4430. **Other Major Equipment:** (2) TimeLine Lynx, (3) Bryston 4B amp, (3) Bryston 3B amp, Crown D150A amp, Crown D150, Perreaux 6000B amp, AMS RMX, AMS DMX, Lexicon 480L, Lexicon PCM70, Lexicon Prime Time II, Publison Infernal machine 90, TC Electronic 1210, Eventide 2016, Eventide H3000 Ultra-Harmonizer, (2) Yamaha SPX90, (2) Yamaha REV7, Roland SDE-3000, EMT 162 plate, Eventide 910 Harmonizer, (6) API 550A EQ, (2) API 560B EQ, Sontec 250C dual parametric EQ, (2)

dbx 905 parametric EQ, Orban 622 dual parametric EQ, (2) dbx 165 compressor, (2) dbx 160X compressor/limiter, (2) Inovonics 201 compressor, (2) Summit Audio tube limiter, Teletronix LA-2A, Aphex Studio Dominator, Drawmer DS-201 dual gate, (2) Valley People Kepex II, Barcus-Berry 802, Dynatronics FS-1 cyclosonic panner, Aphex Exciter Type C.

ENCORE RECORDING STUDIOS INC.



721 S. Glenwood Pl.; Burbank, CA 91506; (818) 842-8300; FAX: (818) 842-6095. Manager: Darryl Caseine.

THE ENTERPRISE



4620 W. Magnolia Blvd.; Burbank, CA 91505; (818) 505-6000; FAX: (818) 505-6006. Owner: The Enterprise Inc. Manager: Thom Brown. Engineers: Brian Malouf, Joel Iwataki, Craig Huxley. **Mixing Consoles:** SSL Ultimition 8000/96 Plasma, SSL Ultimition 8000/80 Plasma, SSL Ultimition 4000/80 Plasma, Neve VR72 w/Flying Faders. **Audio Recorders:** (8) Sony 3348 upgrade, (4) Mitsubishi X800 w/Apogee, (8) Studer A820/24, (4) Studer A820/2, (4) Mitsubishi X-86 HS, (4) Sony 7050 SMPTE DAT. **Digital Audio Workstations:** (4) Synclavier full blown & Post Pro Direct-to-Disk, Pro Tools, (8) Korg 01R/W. **Monitors:** (12) George Augspurger TAD/Northwest, (8) Yamaha NS-10, (8) Tannoy Gold Foil, (8) Westlake BBS M6, (2) Meyer Sound Labs HD1. **Other Major Equipment:** Wide-screen hi-brite video projection 144"x108" (A & B), Sony XPR video monitor, Studer cassette, Panasonic SV-3700 Pro-DAT, Lexicon 480L, AMS RMX reverb, AMS stereo delay, (2) Eventide H3000 SE, (3) Yamaha SPX1000, TC 2290 64-second, (2) Lexicon PCM70, Focusrite 115 EQ, Massenberg 8200 EQ, (6) dbx 160X compressor, (4) dbx 900 rack w/902, LA-2A, UREI 1178, Neve 33609 stereo compressor, (4) Drawmer gate channel, (2) Pultec program EQ, Dolby SR 400-channel.

ENTOURAGE STUDIOS



11115 Magnolia Blvd.; N. Hollywood, CA 91601; (818) 505-0001; FAX: (818) 761-7956. Owner: Guy Paonessa. **Dimensions:** Room 1: studio 37'x25', control room 26'x25'. Room 2: studio 13'x28', control room 26'x25'. **Mixing Consoles:** (2) Harrison C Series 32x32. **Audio Recorders:** (2) Studer A80 MkIII 24-track, Studer A80 1/2" 4-track, (3) Studer A80 1/4" 2-track, Panasonic SV-3700, Panasonic SV-3900, (4) Yamaha C300 cassette. **Monitors:** (4) UREI 813, (6) Yamaha NS-10M, (6) Auratone 5C. **Other Major Equipment:** Dolby M16 24-ch. Type A rack, (2) Lynx synchronization modules, JVC CR-600U 3/4" video recorder, Lexicon 224XL digital reverb, (2) Lexicon PCM70 digital reverb, Eventide H3000 Ultra-Harmonizer, (4) EMT 140 plate reverb, Kepex II rack w/(4) gates, (2) Gain Brain, (2) Maxi-Q; (8) UREI 1176 compressor, (2) Teletronix LA-2A tube limiter, (4) UREI LA-4 peak limiter, Perreaux and Hafner monitor amp, microphones: (5) AKG 414, (4) AKG 451, (5) Neumann U87, (3) Neumann 47 FET, (2) Stephen Paul-modified U87, Stephen Paul-modified 47 FET, (2) Neumann KM84; (2) Yamaha pianos, 9' and 6'.

EVERGREEN RECORDING STUDIOS



4403 W. Magnolia Blvd.; Burbank, CA 91505; (818) 841-6800; FAX: (818) 841-8931. Engineers: John Richards, Steve Bartkovic. **Dimensions:** Studio A: 46'x70', control room 20'x26'. Studio B: 35'x36', control room 20'x20'. **Mixing Consoles:** Harrison MR2 customized 6 mix, Harrison 4032 customized 6 mix. **Audio Recorders:** (2) Studer A-827, (5) Ampex ATR-104, (7) Ampex ATR-102, (2) Otari MX-5050, (2) Magna-Tech 35MM recorders single, 3, 4, & 6 stripe, (6) Hitachi D-2200 M cassette, (2) Panasonic SV-3700 DAT, Panasonic SV-3500 DAT, (2) Sony 650 ES cassette. **Monitors:** TAD, L, C, R custom system, UREI 813A L, C, R system, Yamaha NS-10. **Other Major Equipment:** (12) Dolby A 36, (2) Adams-Smith 2600 w/compact controller, (2) Dolby A M-Series 32 ch. and 24 ch., Dolby SR XP 24 ch., (6) UREI 1176 limiter, (8) dbx 165A limiter, (4) Inovonics limiter, (6) Yamaha D1500 DDL, (2) Yamaha SPX900, Lexicon 200, (2) Eventide H949 harmonizers, (4) EMT 140 plate, (2) live echo chamber, (2) Yamaha C7-D 7'4" grand piano, Sony BVU-800 video recorder, JVC 6690 video recorder, (2) Magna-Tech PR-635B 35MM projector, microphones: all standard makes & model (Neumann, AKG, Sennheiser, Shure).

FANFARE STUDIOS



120 E. Main St.; El Cajon, CA 92020; (619) 447-2555; FAX: (619) 447-5571. Owner: Ron Compton. Manager: Carol Compton. **Dimensions:** Studio 25'x30', control room 17'x20', iso room 10'x12'. **Mixing Consoles:** MCI 636 36x36 full mixing automation. **Audio Recorders:** MCI JH-24 24-track, MCI JH-16 16-track, MCI JH-100 2-track, Ampex 440B full track, Ampex 440B 2/4-track, (2) Tascam DA30 DAT, (2) Sony DAT, (2) Aiwa ADF810 cassette, (3) Revox A77 2 & 1/4-track. **Digital Audio Workstations:** Digidesign Sound Tools & Sound Designer II. **Monitors:** (4) JBL 4330, (2) Yamaha NS-10M studio near-field, (4) Auratone near-field. **Other Major Equipment:** Adams-Smith Zeta-3, Macintosh IIfx, Digidesign Sample Cell, Mark of the Unicorn MIDI Time Piece, Mark of the Unicorn Video Time Piece, EMT SJ-140 stereo plate, Lexicon 224 digital reverb, Aleiss Quadraverb, (2) Yamaha SPX90, Yamaha REV7, (2) DigiTech DSP-128, (2) Dolby A-361 noise reduction, (4) Furman noise gate, (2) dbx 165 compressor, (2) dbx 166 compressor, (4) UREI LA-3A, (2) E-mu Emax & Emax II, (2) E-mu Proteus 1 & 2, (12) Neumann U47, U87, KM86, KM84, (2) Sony VO-5600 3/4" U-matic video recorder.

52NO STREET STUDIO



1741 N. Ivar Ave. #204; Hollywood, CA 90028; (213) 463-5252; FAX: (213) 465-2079. Owner: Neil Posner. Manager: Michael Abraham.

4TH STREET RECORDING



1211 4th St.; Santa Monica, CA 90401; (310) 395-9114; FAX: (310) 394-7772. Owner: Jim Wirt. Manager: Kathleen Wirt.

FOXFIRE RECORDING



16760 Stagg St. #210; Van Nuys, CA 91406; (818) 787-4843. Owner: Rudi Ekstein.

GILLETTE RECORDING SERVICES



255 N. El Cielo Rd., Ste. 466; Palm Springs, CA 92262; (619) 323-6073. Owner: Richard Brown Jr. Manager: Deb Barnes.

GOLDEN GOOSE PRODUCTIONS



2074 Pomona Ave.; Costa Mesa, CA 92627; (714) 548-3694. Owner: D. & E. Rose. Manager: D.P. Rose.

GOLOMINE RECORDING STUDIO



1393 Callens Rd.; Ventura, CA 93003; (805) 644-8341; FAX: (805) 644-1821. Owner: Goldmine Productions. Manager: Jeff Cowan. Engineers: Jeff Cowan, John Morris, Mike Taylor. Dimensions: Studio 66'x26', control room 18'x16'. Mixing Consoles: Neotek Series II w/Jensen 990. Audio Recorders: Otari MTR-90, Tascam TSR-8, Otari 5050-B, Technics 1506, Panasonic SV-3500, Yamaha YPDR601. Monitors: (2) UREI 813, (2) Westlake BSM-6, (2) Yamaha NS-10. Other Major Equipment: Yamaha REV7, Yamaha REV5, Yamaha SPX90II, TC Electronic 1280, Korg DRV-3000, Roland SRV-2000, (2) UREI LA-2A, UREI 175, (2) dbx 161, (4) Omni Craft gate, (9) Neumann various, (6) AKG various, (4) Sennheiser various, (2) RCA various, (4) Shure SM57, Hafler DH-500, Phase Linear 700 B, Yamaha C7.

HALLMARK PRODUCTIONS



31320 Via Colinas, Ste. 118; Westlake Village, CA 91362; (818) 991-4857; FAX: (818) 707-2693. Owner: Steve Hallmark. Manager: Steve Hallmark. Engineers: Steve Hallmark, various independents. Dimensions: Room 1: studio 10'x11', control room 14'x17'. Room 2: studio 10'x14'. Video/editing suite: 10'x12'. Mixing Consoles: Soundcraft 2400 28x24x24. Audio Recorders: Otari MX-80 24-track, Otari 5050 BII 2-track, MCI/Sony JH-110 1/2" 2-track/4-track 1/4" 2-track, (2) Panasonic SV-3500 DAT, Yamaha C300 cassette, Yamaha C200 cassette. Digital Audio Workstations: Apple Mac IIci w/Sound Accel., Digidesign Sound Tools II, Micropolis ext. 650 meg, hard drive/int. 105 meg., Pacific CD ROM/ 88 meg. removable hard drive, Digidesign Sample Cell w/8 meg. ROM, Digidesign DAT I/O, Mark of the Unicorn Digital Performer, (2) Mark of the Unicorn MIDI Time Piece. Monitors: JBL 4411, Yamaha NS-10M, Tannoy NFM-8, Auratone 5C. Other Major Equipment: Adams-Smith Zeta-3B w/ remote, Lexicon PCM70, Yamaha REV7, (2) Yamaha SPX90II, (2) Alesis Quadraverb, (2) Roland SDE-3000 DDL, Roland R-880 RVB, (2) Barcus-Berry BBE 202R, JL Cooper Fader-master/Mixmaster automation, (2) dbx 166 comp/lim/gate, (2) dbx 160X comp., (2) dbx 563 noise reduction, (2) Neve 31106 mic pre/EQ, Summit Audio stereo tube compressor, (2) Symetrix 155 comp/lim/gate, (2) Symetrix quad noise gate, mics: AKG, Neumann, Shure, EV, Sennheiser, Sony; amps: Hafler, Crown; Time Commander Garfield, J.L. Cooper MSB 16/20 MIDI patch-bay, Korg M1R, Korg Wavestation A/D, Yamaha TX816, Yamaha TX802, Roland MKS-20 Pro module, (2) Roland D-550 module, Roland MKS-80 w/programmer, Roland A-80 keyboard controller, Oberheim DPX-1 sample player, Oberheim Matrix 1000, Roland Octapad MIDI controller, E-mu Proussion, E-mu Proteus I, (3) E-mu Proteus II, Kurzweil PX1000, Sequential Circuits VS rackmount, Panasonic AG6300 1/2" VCR, Sony 25" video monitor, Sony VO-5800 3/4" VCR.

HAMMERSOUND RECORDERS

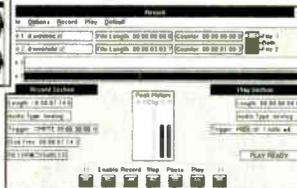


9612 Lurline Ave., Unit N; Chatsworth, CA 91311; (818) 998-9990; FAX: (818) 341-1330. Owner: Chris Apithorp. Specialization & Credits: After 17 years in Chatsworth, we have completely remodeled and tuned our control room and upgraded our equipment. The facelift has left the ambience of our studio and iso booths unchanged. Our clients loved them then and still love them today, so will you. Our equipment includes an Amek/TAG Matchless console, Otari MTR-90 24-track, gobs of outboard gear and a full complement of microphones. While we are equally adept at all types of projects, the acoustical environment at HammerSound was originally conceived as a studio for music that needs air to breathe. All types of acoustic music—bluegrass, country, roots-based rock bands, traditional jazz—will find magic in the sound of this room. HammerSound is part of a trio of studios including Cornerstone Recorders and its Neve VR w/Flying Faders, so whatever your project, we are ready to serve.



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5250 Vineland Ave., N. Hollywood, CA 91601; (818) 763-7110; FAX: (818) 763-6140. Owner: Soundland Inc. Engineers: Bryan Stott, John Gughenheim, John Lowson. Dimensions: Room 1: studio 45'x48', control room 26'x25'. Mixing Consoles: Trident 80B, DDA S-500. Audio Recorders: Studer A-827, Ampex ATR-100, Ditar 100, Sony DMR-400, Sony BVU-800, Sony PCM2500 DAT, Sony 75S DAT. Digital Audio Workstations: Sonic Solutions System. Monitors: UREI 813 time-align ML x-overs, Tannoy 15" MGB, Tannoy 6.5 Phase 2, Yamaha NS-10, NHT near-field S-1000. Other Major Equipment: Sony 1630 processor, (2) Dolby 361-A NR, (2) UREI 1176B limiter, (4) dbx 160XT limiter, dbx 163X limiter, dual strate-gate, Aphex T20 Dominator 2-ch., API 5502 4 band EQ 2-ch., Rocktron Aural Exciter, Lexicon PCM70, (2) Yamaha REV7, (2) Yamaha SPX90, (3) Korg DRV-3000, Roland SDE-3000, (30) assorted mics: Neumann, AKG, Sony, Shure, EV; (3) Aiwa 3-head synchronizer cassette recorder. Specialization & Credits: Multitrack recording—CD prep and sub mastering with Sonic Solutions hard disk editor. CD pressing and cassette manufacturing referrals. Studio credits include tracking for Judson Spence and Raindogs for Atco/Atlantic, produced by Don Gehman. Recording Japanese female group "Reg Wink" for Sony Japan through Blue Jay West Productions. Tracking for Dread Zeppelin album for IRS. Dn-dub and mixing of Argentina's new teen idol Diego Sabattini. Dn-dub and mixing of former "Flans" now Solo, Mimi for Capitol-Mexico. Tracking for Johnny Diesel, The Divinyls and Boom Crash Opera produced by Don Gehman. Recording Pandora, Juan Gabriel, Gloria Trevi, Gary Wright, Willy Deville, Sahara, Paz Martinez, Napoleon.

INTERSOUND INC.



8746 Sunset Blvd., Los Angeles, CA 90069; (310) 652-3741; FAX: (310) 854-7290. Owner: Ahmed Agrama. Manager: Kent Harrison Hayes, exec. VP.

JAMLAND STUDIOS



10988 Noble Ave., Mission Hills, CA 91345; (818) 361-2224.

KINGSOUND STUDIOS



7635 Fulton Ave., N. Hollywood, CA 91605; (818) 764-4580. Owner: Eddie King. Manager: Steve Cormier. Engineers: Eddie King, Steve Cormier, Rob Ruscoe. Dimensions: Room 1: studio 40'x24', control room 27'x19'. Room 2: control room 13'x11'. Mixing Consoles: Neve V3-48 w/Flying Fader. Audio Recorders: Studer A827 24-track 2", Ampex ATR-102 1/2" & 1/4", Ditar MTR-10, Ditar MX-5050B, (2) Panasonic SV-3500 DAT, (2) Nakamichi MR-1, (2) Akai GX-8. Digital Audio Workstations: Studer Dyaxis. Monitors: Kingsound custom 3-way/Tri-amp main, Yamaha NS-10M, Yamaha NS-10M studio, Auratone 5C. Other Major Equipment: Lexicon 480L, Lexicon PCM70, Lexicon PCM41, Lexicon LXP5, Yamaha SPX900, Yamaha SPX90, Roland SDE-3000, Summit TLA-100, (2) dbx 165, GML 8200 EQ, (4) API 550A EQ, (4) API 550B EQ, (2) Valley People Gain Brain, Valley People Kepex II, Drawmer DS-201, Aphex Aural Exciter Type III, Brooke-Siren DPR-402, Yamaha C5 piano, Bryston 4B, 3B & 2B.

LARRABEE SOUND



8811 Santa Monica Blvd., W. Hollywood, CA 90069; (310) 657-6750; FAX: (310) 659-1717. Owner: Kevin Mills. Manager: Kevin Mills. Mixing Consoles: SSL G 80 input, (2) SSL G 72 input, SSL E 56 input w/G computer. Audio Recorders: (6) Studer A800 24-track, (4) Studer A827 2-track, Mitsubishi X-850, (2) Sony 3324.

MAD DOG STUDIOS INC.



1717 Lincoln Blvd., Venice, CA 90291; (310) 306-0950; FAX: (310) 578-1190. Owner: Dusty Wakeman, Michael Dumas. Manager: Connie Hill. Engineers: Michael Dumas, Dusty Wakeman, Don Title, Connie Hill. Dimensions: Studio 25'x20', control room 18'x15'. Mixing Consoles: Neve 8108 w/Necam 1 automation 28x32. Audio Recorders: Studer A800 24-track, Ampex ATR-102 2-track 1/2" & 1/4", Tascam DA-30 DAT, Ditar MX-5050B II 2-track, Nakamichi MR-1 cassette. Monitors: Westlake BBSM-12, Yamaha NS-10M, Auratone 5C. Other Major Equipment: EMT 140 tube stereo plate, (2) Hardy M-1 mic. preamp, (2) Demeter VTMP tube mic preamp; microphones: Neumann U47 tube, (2) Neumann U67 tube, (2) AKG C-12A tube, (2) AKG C-28 tube, (3) Neumann U87, (4) AKG C-414, (2) AKG C-451 EB, AKG D-12E, Shure SM7, Lexicon PCM70, Lexicon PCM60, (2) Yamaha REV7, (2) Roland SDE-3000, Roland SRV-2000, (3) Yamaha SPX90, Alesis Quadraverb Plus, (2) Lang PEQ-2 program EQ, (4) Drawmer DS-201 noise gate, (4) Gatex gate, (2) dbx 263 de-esser, BBE 802 Aural processor, Demeter Bass Tube preamp, (2) UREI 1176LN, (2) UREI LA-4, (2) dbx 165A, (2) dbx 166, (4) dbx 160X, (2) Alesis 3630, Yamaha C7 grand piano, Yamaha DX-11 digital synth, Alesis HR-16, Emulator E11 8 meg w/4 meg hard drive, Emax, (2) Wendel drum replacement, Alesis D-4 drum module, EV RE-20 mic., (4) Sennheiser 421 mic., (2) Crown PZM mic.



MAD HATTER STUDIOS
Los Angeles, CA

MAD HATTER STUDIOS



2635 Griffith Park Blvd., Los Angeles, CA 90039; (213) 664-5766; FAX: (213) 660-9967. Owner: Chick Corea. Manager: Mark Francovich. Engineers: Bernie Kirsh, Larry Mah, Darren Mora, Robert Read, Mick Stern. Dimensions: Studio 38'x26', control room 18'x22'. Mixing Consoles: Neve 8078 40 mic input, 72 line input w/GML moving fader automation. Audio Recorders: Studer A800 MkIII 24-track, Studer A80 24-track (optional 16-track headstack), (2) Studer A80 2-track 1/2" & 1/4", Ditar MTR-12HII 4-track, Panasonic SV-3500 DAT, (2) Aiwa ADF-810 cassette. Monitors: Vincent Van Haaff system w/TAD components, (2) Tannoy SRM-10B, (2) Yamaha NS-10M, (2) Auratone 5C. Other Major Equipment: (2) EMT 140 reverb plate, EMT 240 Gold Foil reverb plate, Lexicon 480L digital reverb, Lexicon 224XL digital reverb, Lexicon Super Prime Time digital delay, Lexicon Prime Time digital delay, AMS DMX 15-80S digital delay, Evenlode 949 Harmonizer, Roland SRV-2000 digital reverb, (2) dbx 160X comp/limiter, (2) Teletronix LA-2A comp/limiter, (2) UREI 1176 comp/limiter, Sontec stereo parametric equalizer, (3) Klark-Teknik 31-band graphic equalizer, (4) API 550A equalizer, (2) Drawmer dual noise gate, (4) Valley People Kepex II noise gate, Electraspace dual noise gate, (4) Yamaha SPX9011 multi-effects processor, Valley People DSP de-esser, BBE Sonic Maximizer 822, Aphex Expressor comp/limiter, JVC CR-6000 3/4" video deck, (2) TimeLine Lynx synth, NEC 26" video monitor, Toshiba 19" video monitor, Steinway 9" Hamburg concert grand piano, Bosendorfer 9" concert grand w/Forte MIDI mod., (2) Neumann U67, Neumann M45, (4) Neumann U87, Neumann KM84, (2) AKG C-12A, (2) AKG C-12, (5) AKG 414, AKG D-12E, (8) Schoeps MK5, (6) Sennheiser MD-421, (5) Shure SM57, (2) Sanken SV-32. Specialization & Credits: "The building of Mad Hatter Studios is the realization of a place where musicians could make music in a free, easy atmosphere. Our technical concept is clarity of sound. Our musical concept is the artist's vision realized."—Chick Corea. Our clients include: Paul McCartney, Prince, Toto, Chick Corea, Jennifer Warnes, Chaka Khan, Robert Palmer, Clare Fischer, Mark Isham, Paula Abdul, Natalie Cole, Wayne Shorter, Yellow Jackets, Pebbles, Le Vert, Vanilla Ice, Los Lobos, Tara Kemp, and many more. Major motion picture soundtracks *Batman*, *Teenage Mutant Ninja Turtles*, *Little Man Tate*, *Surrender*, *The Principal*, *Nightmare on Elm Street*, *School Daze*, *Jacknife* and more. Television and our commercials: *thirtysomething*, *Quantum Leap*, *Shannon's Deal*, *Civil Wars*, *Home Improvement*, *Anything for Laughs*, *Miami Vice*, *Budweiser*, *Lexus*, *Coors*, *Colgate*, *McDonalds*, *Gatorade*, *Stridex*, *Nissan*, etc.

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—LISTING CONTINUED FROM PREVIOUS PAGE

1/4") 4-track (1/2"). Panasonic SV-3500 R-DAT, Panasonic SV-3700 R-DAT, Studer A710 cassette. **Monitors:** JBL 4311, Tannoy 5RM-12B, Yamaha NS-10M, Yamaha NS-10M w/McNair crossover, Auratone 5C, Westlake BBSM-4, George Augspurger custom w/TAD components. **Other Major Equipment:** Lexicon 224XL, Lexicon 200, Lexicon PCM70, (10) Pultec EQ and mic pre, AMS RMX-16, AMS DMX-15-80, (2) Yamaha REV7, (2) Eventide 949, (2) Eventide H3000, Neve 1063 12x4 console, (2) Roland SDE-3000, (8) Trident A Range EQ, Dolby 363 SR or A2-ch. noise reduction, (2) TimeLine Lynx, UREI LA-2A, (2) UREI 1176, (2) dbx 160X, (2) dbx 160, (4) API 550 & 560, (2) CBS Audimax limiter. **Specialization & Credits:** Credits include: Madonna, Loverboy, Cock Robin, R.E.M., Bernie Taupin, Crystal Gayle, Stryper, Eddie Rabbitt, Kenny Rogers, Poison, Juice Newton, Sergio Mendes, Dream Syndicate, Hunters & Collectors, Devo, Eurythmics, John Mayall, Herbie Hancock, Bus Boys, Cheech Marin, Alice Cooper, Webb Wilder, The Chills, Toad The Wet Sprocket, Dionne Warwick, Brenda Russell, Mary's Danish, Warren Zevon.

THE MIXING LAB



11542 Knott Ave.; Garden Grove, CA 92641; (714) 373-0141; FAX: (714) 660-3899. **Owner:** Frontline Music Gp. **Manager:** Thom Roy. **Dimensions:** Room 1: studio 20'x30', control room 20'x26'. Room 2: studio 15'x20', control room 15'x22'. **Mixing Consoles:** Trident Vector 48 input w/Moving Fader automation, Matchless 36x24. **Audio Recorders:** Otari MX-80 24, MCI/Sony JH-24, Otari MTR-12, (6) Panasonic 3500 DAT. **Monitors:** (4) Westlake BBSM-15, (2) Westlake BBSM-6, (6) Yamaha NS-10. **Other Major Equipment:** AMS reverb, AMS delay, Lexicon 480L, Lexicon PCM70, Lexicon 200, TC 2290, Eventide H3000 SE, (2) Yamaha SPX90 II, (2) Lexicon PCM42, (6) Aphex gate, (6) Kexp II, (3) UREI LA-3A, (2) UREI 1176, (2) dbx 165A, (2) Demeter mic preamp, Summit Audio tube limiter, dbx subharmonic generator, Adams-Smith Zeta-3 sync, Yamaha C7 piano, Hafler Pro 5000 monitor amp.

MUSIC GRINDER STUDIOS



5540 Hollywood Blvd.; Los Angeles, CA 90028; (213) 957-2996; FAX: (213) 464-8770. **Owner:** Ron Filecia, Gary Skardina. **Manager:** Ron Filecia.

NAKED GOOSE PRODUCTIONS



1310 N. Stanley Ave.; Hollywood, CA 90046; (213) 969-9685. **Owner:** Ben Decter. **Manager:** Jackie Sloan.

NRG RECORDING SERVICES



11128 Weddington St.; N. Hollywood, CA 91601; (818) 760-7841; FAX: (818) 760-7930. **Owner:** Jay Baumgardner. **Manager:** Philip Reynolds.

PACIFIQUE RECORDING STUDIOS



10616 Magnolia Blvd.; N. Hollywood, CA 91601; (818) 761-8042; FAX: (818) 761-9277. **Owner:** Vasken Inc. **Manager:** Joe Deranteriasian. **Engineers:** Ken Deranteriasian, Randy Long, Gary Dobbens, Jeff "Woody" Woodruff. **Dimensions:** Room 1: studio 35'x30', control room 25'x25'. Room 2: studio 21'x20', control room 25'x25'. **Mixing Consoles:** Neve VR72 72-input w/Flying Fader automation, Trident 80B 32-input. **Audio Recorders:** (2) Studer A820 24-track, Studer A827 24-track, Studer A820 2-track 1/2", Otari MTR-12 2-track 1/2", Otari MTR-12 2-track 1/4", (2) Nakamichi MR-1 cassette, (3) Studer/Revox A721 cassette, (2) Panasonic SV-3500 DAT, Panasonic SV-3700 DAT. **Monitors:** JBL 4435, custom TAD, Tannoy SGM-10B, Yamaha NS-10. **Other Major Equipment:** (7) API preamp/EQ, (4) Neve 1073 preamp/EQ, (2) Focusrite preamp/EQ, (8) Drawmer 201 noise gate, Neve compressor, Summit Audio program EQ, Teletronix LA-2A, Lexicon 480L, Lexicon 224XL, AMS RMX-16, AMS DMX-1580, (3) Eventide H3000, Eventide 2016, (3) TC Electronic 2290, (3) Lexicon PCM70, (2) Lexicon PCM42, (4) Roland SRV-2000, (2) Roland SDE-3000, (2) Yamaha SPX900, (2) Yamaha SPX90 II, Yamaha REV7, Lexicon Prime Time, GML 8200 EQ, GML 8900 comp., (6) 902 de-esser, (4) UREI 1176, (10) dbx 160X.

PARAMOUNT RECORDING STUDIOS



6245 Santa Monica Blvd.; Los Angeles, CA 90038; (213) 465-

4000; FAX: (213) 469-1905. **Owner:** Michael Kerns, Adam Beilenson. **Manager:** Michael Kerns, Adam Beilenson. **Engineers:** Mike Melnick, Stoker, Gezax, Barry Connelly, Voytek Kochanek, Danny Williams. **Dimensions:** Room 1: studio 45'x45', control room 27'x25'. Room 2: studio 15'x15', control room 26'x15'. Room 3: studio 10'x10', control room 20'x25'. Room 4: studio 12'x15', control room 20'x12'. **Mixing Consoles:** (2) SSL 4040E E Series automation, Neve 8068 Class A discrete 34x24x24, MCI 528 28x24x24. **Audio Recorders:** (3) Studer A-800 MkIII 24-track, Ampex MM1200 24-track, (3) Ampex ATR-100 2-track, Ampex ATR-100 4-track, (2) MCI JH-110 2-track, (4) Panasonic 3700 DAT. **Monitors:** (3) UREI 813, UREI 815, Tannoy S-10, (4) Yamaha NS-10. **Other Major Equipment:** (2) AMS RMX-16 reverb, Eventide HD-3000 Harmonizer, TC Electronic 2290, (7) Lexicon PCM70, PCM60, (4) Lexicon 200, (4) Lexicon Prime Time, (4) Lexicon PCM41, (4) Lexicon Super Prime Time, (10) Drawmer 501 gate, (4) Pultec PQEZ EQs, (3) Lang QZ EQ, (4) Tektronix LA-2A, (4) Neve 1073, (4) Neve 2254 compressor, (7) Yamaha REV, SPX90, (2) Akai S-900 sampler, (5) Yamaha DX7 & Roland S-50 keyboard, Yamaha C7 grand piano, (3) TimeLine Microlynx sync module, Sony 9600 3/4" video, (2) Mac Classic computer.



POWERHOUSE MULTIMEDIA STUDIO
Northridge, CA

POWERHOUSE MULTIMEDIA STUDIO



19347 Londelius St.; Northridge, CA 91324; (818) 993-4778; FAX: (818) 993-3575. **Owner:** Paul and Jeff Stillman. **Manager:** Paul and Jeff Stillman.

PUBLIC RECORDING



1220 Pioneer, Ste. I; Brea, CA 92621; (714) 526-0323.

RCM PRODUCTIONS



12478 Washington Blvd. #5503; Los Angeles, CA 90066; (310) 390-5573. **Owner:** Bob McNabb.



RECORD PLANT
Hollywood, CA

RECORD PLANT



1032 N. Sycamore Ave.; Hollywood, CA 90038; (213) 653-0240; FAX: (213) 466-8835. **Owner:** Rick Stevens. **Manager:** Deana J. Smart. **Engineers:** Bess, Kyle, Brock, Craig, Leonard, Bill. **Dimensions:** Room 1: studio 40'x25', control room 30'x23'. Room 2: studio 14'x22', control room 30'x23'. Room 3: studio 14'x22', control room 26'x23'. Room 4: studio 36'x25', control room 30'x21'. **Mixing Consoles:** SSL 8096 96-input G Series, SSL 4072 72-input G Series, Focusrite FR80 80-input w/GML automation, Neve VRP console w/GML automation. **Audio Recorders:** Studer A800 multitrack, Studer A820 2-track and multitrack, Ampex ATR 102 & 104, Sony PCM3348 digital multitrack, Mitsubishi X-880 digital multitrack. **Monitors:** Custom Hildley w/TAD component, various near-fields including Tannoy, KRK, Meyer, Auratone; custom Augspurger, all rooms include center speakers and surround speakers for film KCRS monitoring. **Other Major Equipment:** EMT 140 stereo plate reverb, AMS RMX16 digital reverb, AMS DMX15 digital delay, GML 8200 EQ, Roland Dimension D, Eventide H3000 SE Ultra-Harmo-

nizer w/stereo sampling & Steve Vai programs. Eventide 949 Harmonizer. Yamaha SPX90II. Yamaha REV7. Roland SDE-3000. Focusrite ISA 115 HD. dbx 160. dbx 165. Teletronix LA-2A. TC Electronic 2290. UREI 1176 comp.. Pultec EQP1A. Pultec EQP1. dbx 902/903. Pultec MEOS. Drawmer DS201 gate. Lexicon PCM70. Lexicon 480L. Ursa Major Space Station. **Specialization & Credits:** Hollywood's legendary Record Plant has been the recording site for some of the greatest hits and Grammy award winners of the rock era from the Eagles *Hotel California* to current hits by Guns 'N Roses, Michael Jackson, Red Hot Chili Peppers, Prince and Michael Bolton. Totally remodeled in the summer of '92, the Record Plant now features four studios. Two SSL mixing rooms (96 & 72 input "G" Series), one Focusrite and one Neve tracking room. Record Plant clients benefit from one of the industry's largest mic collections, including rare and tube mics. Facilities include an in-house atrium with health club and lap pool/jacuzzi, private client lounges and bathrooms for each studio, client service "conierge," full-time tech support.

RENT-A-RECORDER



1602 W. Olive, #222; Burbank, CA 91506; (818) 567-6194. Owner: Bill Young.

ROTUND RASCAL RECORDING



5654 Natick Ave.; Van Nuys, CA 91411; (818) 901-9636; FAX: (818) 787-0862. Owner: Dave Pearlman. Manager: Dave Pearlman

ROYAL SOUND STUDIOS



7120 W. Sunset Blvd.; Hollywood, CA 90046; (213) 851-2500; FAX: (213) 851-8162. Owner: Art Laboe. Manager: Terry Michael Scott.

RPD SOUND



1842 Burlleson Ave.; Thousand Oaks, CA 91360; (805) 496-2585. Owner: Randy Dew. Manager: Randy Dew.



RUMBO RECORDERS
Canoga Park, CA

RUMBO RECORDERS



20215 Saticoy St.; Canoga Park, CA 91306; (818) 709-8080; FAX: (818) 709-4072. Owner: Daryl Dragon, Toni Tennille. Manager: Vicky Cambin. Engineers: Cory Baker, Shawn Berman, Greg Cathcart, Dick Kaneshiro, Pat Rodman, Andy Udoff. Dimensions: Room 1: studio 58'x38'. control room 28'x25'. Room 2: studio 38'x33'. control room 26'x22'. Room 3: studio 25'x20'. control room 25'x20'. **Mixing Consoles:** Neve V-60 w/Flying Fader 60 input, Trident Series 80C 40 input, Trident Series 80 32 input. **Audio Recorders:** Studer A800 MkIII 24-track, Studer A827 24-track, (3) Otari MTR-90 24-track, Studer A820 2-track, (3) Ampex ATR 104 2/4-track, (3) Tascam DA-30 DAT, (2) Studer A721 cassette, (4) Tascam 122 MkII cassette. **Monitors:** (2) Custom box w/TAD components, Fostex box w/TAD components, (8) Yamaha NS-10. **Other Major Equipment:** (4) TimeLine Lynx. **Specialization & Credits:** Rumbo has always maintained a client base made up primarily of record companies working on album projects. With its huge main room and four oversized isolation booths, Studio A (Neve-Studer) is ideal for tracking. The Neve V-Series Console with Flying Faders Automation makes Studio A perfect for mixing as well. Studio B (Trident-Otari) remains a very popular recording room because of its great sound and reasonable lockout rate. With its history of hit rock albums, Studio B has become well known in the music industry. The latest addition to Rumbo, Studio C (Trident-Otari), offers a comfortable solution for long term overdub projects. Recent artists include: Mr. Big, Melissa Manchester, Tom Petty, Smitherens, Kiss, Damn Yankees, Lynch Mob, LA Guns, Spinal Tap, Guns 'N Roses, Megadeth, Barry Manilow, Toni Tennille, Bruce Hornsby, Belinda Carlisle, Suicidal Tendencies, Smokey Robinson and many others.

RUSK SOUND STUDIOS



1556 N. La Brea Ave.; Hollywood, CA 90028; (213) 462-6477. Manager: Elton Ahn.



SATURN SOUND
Burbank, CA

SATURN SOUND



2940 W. Burbank Blvd.; Burbank, CA 91505; (818) 841-2010; FAX: (818) 841-1965. Owner: Stephen Bray.



SKIP SAYLOR RECORDING
Los Angeles, CA

SKIP SAYLOR RECORDING



506 N. Larchmont Blvd.; Los Angeles, CA 90004; (213) 467-3515; FAX: (213) 467-4636. Owner: Skip Saylor. Manager: Skip Saylor. Engineers: Gregg Hinnen—chief technician; Chris Puram, Aaron Miller, Louie Teran, Mats Blomberg. Dimensions: Room 1: iso booth 10'x9', control room 22'x17'. Room 2: studio 21'x16', control room 19'x7'. **Mixing Consoles:** SSL 4080 G w/Total Recall 80 inputs w/E & G Series EQ, G Series computer. Real World Cue matrix system for a total of ten echo sends per channel (six w/Total Recall, four computer controlled), API 32x64 w/NeCam moving fader automation. **Audio Recorders:** (3) Studer A800 24-track, (4) Ampex ATR-102 2-track 1/4" or 1/2". (2) Ampex ATR 2/4-track 2", digital 32- or 48-track machines available on request. (4) Nakamichi MR-1, Studer A-721. (2) Panasonic SV-3700 DAT, Sony PCM2500 Pro DAT, Pygmy AD-1 A/D converter. **Monitors:** TAD, Yamaha NS-10, Auratone Sound Cube. **Other Major Equipment:** (3) TimeLine Lynx, Lexicon 480L, Lexicon 224XL, (4) Lexicon PCM70, AMS RMX-16, Eventide SP2016, Yamaha REV-1, (3) Yamaha REV5, (2) Yamaha REV7, Yamaha SPX1000. (2) EMT 140 plate, AMS DMX-15 80S 9.2 sec, (3) TC Electronic 2290 32 sec. stereo sampling, Lexicon Super Prime Time, (2) Lexicon Prime Time II, Forat F-16 8-ch. digital sampler w/hard disk, full library, (2) Eventide H3000 w/SE & VAI update and stereo sampling, Eventide 949, Eventide 910, GML 8200 parametric EQ, (2) Focusrite EQ, (2) Neve 1073, (10) Neve V-Series EQ, (11) API 550 EQ, (4) Pultec EQ, BSS DPR-901 dynamic EQ, Neve 33609 stereo limiter/compressor, (3) Teletronix LA-2A, (5) UREI 1176, (4) Drawmer 201, AKG C-12, (5) AKG 414, (2) AKG C-452, Neumann U87, Neumann TLM170, Yamaha grand piano. **Specialization & Credits:** Clients include Michael Jackson, Guns 'N Roses, Def Leppard, k.d. Lang, Paula Abdul, DJ Quick, Bell Biv DeVoe, 2nd II None, Penthouse Player, AMG, Go West, Suicidal Tendencies, Calloway, Eddie Money, The Whispers, En Vogue, Thomas Dolby, Isley Brothers, The Replacements, Pebbles, Donny Osmond, Jeffrey Osborne, New Edition, Manhattan Transfer, Julian Lennon, Soul II Soul, Vanessa Williams, Vesta Williams, Bobby Brown, Philip Bailey, Peter Cetera, Natalie Cole, Bernadette Cooper, Morris Day, Martika, The Pointer Sisters, Ralph Tresvant and many, many more.

SCORE ONE RECORDING INC.



5500 Cahuenga Blvd.; N. Hollywood, CA 91601; (818) 762-6902; FAX: (818) 762-2531.

SCREAM STUDIOS



11616 Ventura Blvd.; Studio City, CA 91604; (818) 505-0755; FAX: (818) 505-6405. Manager: Craig Doubet. **Mixing Consoles:** SSL 4056 G Series w/Total Recall and 4 stereo faders, control room designed by Vincent Van Haaff. **Audio Recorders:** Mitsubishi X-850 digital 32-track w/Apogee filters, Studer 827 analog 24-track, Mit-

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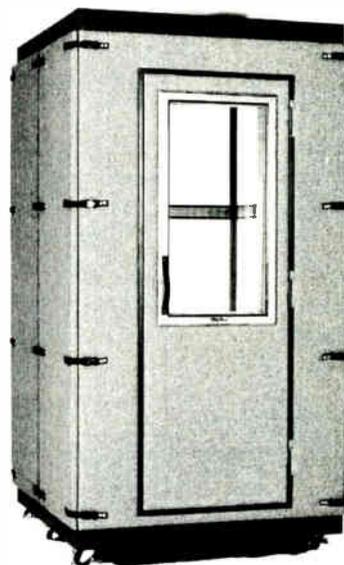
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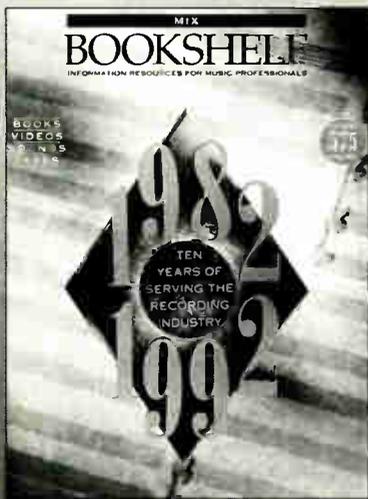
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subisbi digital 2-track w/Apogee filters, Studer analog 2-track, Yamaha cassette, Panasonic DAT. **Monitors:** Customized UREI 813B, Yamaha NS-10M, Tannoy NFM8. **Other Major Equipment:** Lexicon 480L digital reverb, AMS digital reverb, AMS 1580S digital delay, (2) Lexicon PCM70 digital EFX, Eventide H3000 SE w/sampling & mod factory, (2) Lexicon 910 Harmonizer, Lexicon Prime Time digital delay, (4) Roland SDE-3000 digital delay, (3) Yamaha REV7 EFX, (2) Yamaha SPX90, Roland SRV-2000 digital reverb, Klark-Teknik 3-channel analog delay, (2) Focusrite mic preamp & parametric EQ, (4) GML 8200 parametric EQ, (2) UREI 530 & 535 graphic EQ, (2) BBE 802 & 822 Sonic Maximizer, TC Electronic 1210 Spatial expander, Neve 33609 2-channel, (2) UREI 1176 limiter, (4) dbx 160X compressor, dbx 165A compressor, (2) Dyna-Mite 2-ch. compressor, (2) Inovonics 201 compressor, UREI LA-2A limiter, (2) UREI LA-3A limiter, (2) UREI LA-4A limiter, (2) Drawmer 2-channel gate, (4) Kepex II gate, (3) dbx 902 de-esser, Russian Dragon sample synchronizer, dbx 120SOX boom box, Marshall 5402 time modulator & flanger, Spanner stereo panner, (2) Wendell Drum Replacement system, Foral 16 bit 8-channel drum sampler & editor w/hard drive, Magnavox CD player. **Specialization & Credits:** Scream is extremely proud to have been involved with the following artists and records the past 2 years: Nirvana's #1 triple platinum *Nevermind* and the gold single, "Smells Like Teen Spirit" were mixed as well as Janet Jackson's #1 platinum single "Black Cat," Extreme's #1 gold single "More Than Words" & platinum album *Pornograffiti*, Faith No More's double platinum album *The Real Thing* and their new platinum album *Angel Dust*, Skid Row's #1 double platinum album *Slave to the Grind*, Ozzy Osbourne's platinum album *No More Tears*, Warrant's new platinum album *Dog Eat Dog*, The Indigo Girls platinum album *Rites of Passage*, Motley Crue's double platinum *Decade of Decadence*, Dwight Yoakam (Greatest Hits), Queen (Greatest Hits) and Kenny Loggins. We are most fortunate to have some of the world's greatest producers and mixers like Michael Wagener, Dave Leonard, Matt Wallace, Peter Collins and Andy Wallace. Scream is a small, cozy and private "state-of-the-art" recording studio located within a mile of 34 different restaurants—8 are within walking distance and there is a fabulous Thai restaurant directly next door. We have a patio with a gas barbecue, Nintendo, and a purple pool table. We are most definitely not a massive studio complex. Scream Studios is owned and operated by musicians for magicians.

SF AUDIO SOUND & RECORDING STUDIOS

RTB
5290 E. Hunter Ave., Anaheim, CA 92807; (714) 779-6677; FAX:
(714) 777-0894. Owner: Steven Forster. Manager: Steven Forster.

SHERWOOD STUDIOS

DS
2899 Agoura Rd. #299, Westlake Village, CA 91361; (805) 379-4477. Owner: Bill Cobb.



SIDWAYS RECORDING STUDIOS
Santa Ana, CA

SIDWAYS RECORDING STUDIOS

DS
2931 W. Central, Santa Ana, CA 92704; (714) 545-9849. Owner: Sideways Records. Manager: Jim Hahn. Engineers: Jim Hahn, Maurice Jackson, independents. Dimensions: Studio 23'x20', control room 20'x15'. **Mixing Consoles:** Amek custom w/Neve class A amps 72 input, Neve 12x2 w/(8) 31105 & (4) 1073 EQ & preamp. **Audio Recorders:** Otari MX-80 24-track, Tascam MS-16 16-track,

Panasonic SV-3900 DAT, Panasonic SV-3500 DAT, Tascam 32 1/4" 2-track, (3) Aiwa AD-F780 cassette, Yamaha C300 cassette, Tascam 112 cassette. **Digital Audio Workstations:** Digidesign Sound Tools II Macintosh Quadra 900. **Monitors:** Tannoy DMT 215, Tannoy PBM 6.5, Yamaha NS-10. **Other Major Equipment:** Adams-Smith Zeta-3B synchronizer, Roland R-880 w/Lexicon 480 card, (3) Lexicon PCM70, Lexicon PCM60, (4) Lexicon LXP1, (2) Lexicon LXP5, (2) Roland SDE-3000, Alesis MIDiverb II, Yamaha SPX50, DigiTech DSP-128L, Summit Audio TPA-200 tube preamp, (2) Neve 32264 compressor/limiter, (2) Aphex compellor, Aphex Expressor, UREI 1176LN compressor, UREI 7110 compressor, Orban de-esser, (6) Audio Logic quad gate, BBE 422, BBE 401, Eventide H949 Harmonizer, TC Electronic TC-2240 EQ, White 4400 1/3-octave EQ, (40) Neumann, AKG, Sennheiser microphones; Crest 8001 1150-watt stereo amp, Hafler P-505 250-watt stereo amp, Macintosh IIci, Macintosh Quadra 900, (3) Alesis drum machine, Kurzweil K-1000, Pearl MLX 9-piece drum set. **Specialization & Credits:** Since 1987, Sideways has been Orange County's premier recording facility. We cater to record companies, ad agencies, artists, producers, composers and musicians of all styles. Friendly and efficient engineers get the job done right at very reasonable rates. This year we've had the pleasure of working with CBS, Sony, WEA, Private Music and Louie Louie just to name a few. Call for rates and updated equipment list.



SIGNATURE SOUND
San Diego, CA

SIGNATURE SOUND



5042 Ruffner St., San Diego, CA 92111; (619) 268-0134; FAX: (619) 268-3137. Manager: Luis Artega.



SOUNABOUT STUDIOS
Van Nuys, CA

SOUNABOUT STUDIOS



15328 Oxnard St., Van Nuys, CA 91411; (818) 909-2287. Owner: Gus Farias. Manager: Rodolfo Cruz.

SOUND CHAMBERS RECORDERS



5264 Blakeslee Ave., N. Hollywood, CA 91601; (818) 752-8932; FAX: (818) 508-7987. Owner: Richard McIlvery. Manager: Mary McIlvery. Engineers: Steve Chase, James McIlvery, John Hanes. Dimensions: Room 1: studio 45'x40', control room 22'x27'. Room 2: studio 26'x24', control room 20'x24'. Room 3: control room 19'x24'. **Mixing Consoles:** Solid State Logic SL4056E/G w/Total Recall, Trident Series 80B 36-input, Soundcraft Sapphire 44-input. **Audio Recorders:** (2) Studer B27 24-track, (3) Panasonic 3700, Ampex ATR 102 w/1/4" and 1/2" heads. **Digital Audio Workstations:** Digidesign Pro Tools 4-track. **Monitors:** (6) UREI 813C, (4) Yamaha NS-10, (2) JBL 4206, (2) JBL 4208, (2) JBL 4401, (2) JBL 4311. **Other Major Equipment:** (3) Lexicon PCM70, (2) Lexicon 480L, (2) EMT plate reverb, AMS RMX16 reverb, (4) Yamaha SPX900, (4) Lexicon PCM42, (4) Roland SDE-3000, Eventide H3000SE, (2) Teletronix LA-2A limiter, (4) UREI 1176, (2) UREI LA-4, (4) dbx 160 limiter, (2) Drawmer DS-201, (2) JVC 850 3/4" video, JVC BR-7700 1/2" video, (4) TimeLine Lynx synchronizer, (2) Akai S-1000, Roland JD-800, Korg M1, Kurzweil K2000.



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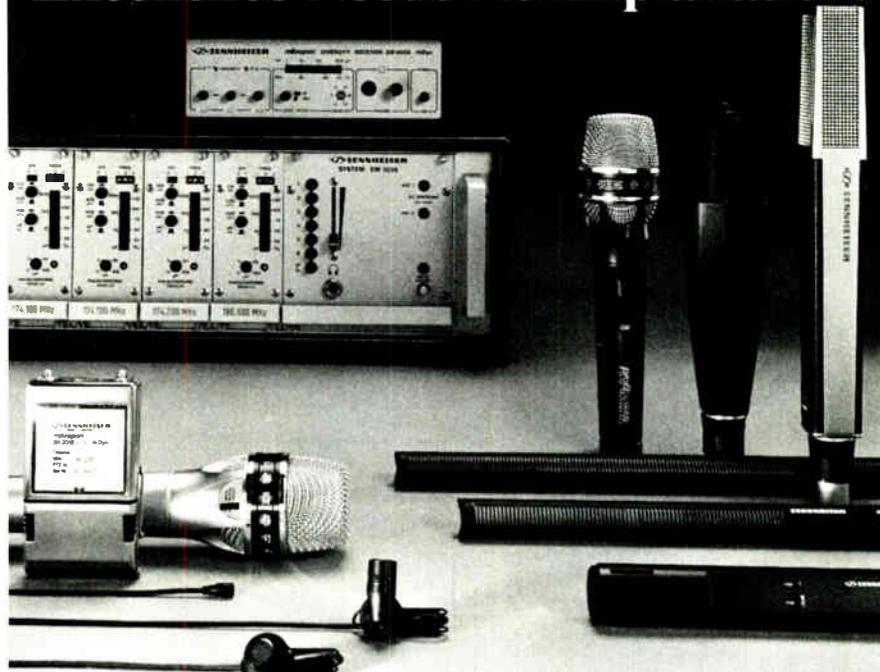
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SOUND CITY STUDIOS



15456 Cabrito Rd.; Van Nuys, CA 91406; (818) 787-3722; FAX: (818) 787-3981. Owner: Tom Skeeter. Manager: Shivaun O'Brian. Engineers: Joe Barresi, Jeff Sheehan. Dimensions: Room 1: studio 40'x50', control room 20'x20'. Room 2: studio 40'x30', control room 20'x20'. Mixing Consoles: Neve 8028, Neve 8068. Audio Recorders: (2) Studer A-800, (2) Studer A-80 2-track 1/2" & 1/4", Studer B-67 1/4". Monitors: JBL, Augspurger Design, Yamaha NS-10. Other Major Equipment: GML mic pre, Pultec, Yamaha SPX900, Lang EQ, EMT 140 tube reverb plate, Drawmer gate, AMS RMX digital reverb, Yamaha REV7 reverb, Lexicon PCM42, Dolby 361. Kepex gate, Teletronix LA-2A, Eventide H949, UREI 1176. Specialization & Credits: Clients include: Nirvana, L7, Masters of Reality, Elton John, MSG, Fleetwood Mac, Tom Petty, Pat Benatar, Tool, Foreigner, REO Speedwagon, The Scream, Racer X, Cheap Trick, Ratt, Rage Against the Machine, Dokken, Sammy Hagar, Kik Tracee, KYUSS, Bang Tango, Sugar Tooth, John McVie, Killer Power Trio From Hell, Poison, Redd Kross, Bob Dylan, Guns 'N Roses, Dio, George Harrison, Trixter, Peter Frampton, Santana, Robben Ford, Tom Scott, Joe Walsh, Allman Brothers, Jimmy Page. Large selection of microphones and vintage gear.

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SOUND MASTER AUDIO/VIDEO



10747 Magnolia Blvd.; N. Hollywood, CA 91601; (213) 650-8000; FAX: (818) 506-8926. Owner: Brian Ingoldsbys. Manager: Steve Coker. Engineers: Brian Ingoldsbys, Steve Coker, Ian Ingoldsbys. Dimensions: Room 1: studio 35'x40', control room 30'x30'. Room 2: control room 22'x21'. Room 3: control room 15'x15'. Mixing Consoles: Quad Eight Coronado 40x24 automated, TAC Scorpion 48x24 automated, Phonic PMX 1600A 16x6. Audio Recorders: (2) 3M 7924 24-track, (2) Sony/MCI JH-24 24-track, 3M 7916 16-track, Sony/MCI JH-110 4-track, (2) Sony/MCI JH-110 2-track, 3M 792 2-track, Ampex 2-track, Tascam DA-30 DAT, Sony DAT. Digital Audio Workstations: Digidesign MAC Sound Tools II. Monitors: (4) Sound Master custom HIEL/Goodman, (4) Yamaha NS-10M, (2) JBL 4411, (2) JBL Summit, (2) JBL 4323, (6) Auratone 5C, (2) dbx Sound Fields, (8) Radio Shack R51A. Other Major Equipment: (24) Dolby M Series, (6) Dolby 360, (56) dbx 411, (2) Lynx time code module, Adams-Smith Zeta-3, (8) dbx 165 limiter, (3) dbx 160X limiter, (8) dbx 904 limiter, ART MDC 2001 gate/limiter, Alesis 3630, (7) DBG 903, Orban 622B parametric EQ, CDD MC-8 comp/limiter, (4) Valley People Kepex/Gain Brain, (16) Allison Kepex, Lexicon 724 LARK IV, Ursa Major Space Station, (2) Yamaha SPX90, (2) Yamaha REV7, (4) Sphere graphic EQ, (8) Quad Eight noise gate, (2) Quad Eight compressor/expander, (2) Orban 516EC de-esser, EXR exciter, Eventide H910 Harmonizer, MXR pitch transposer, MXR Flanger doubler, (2) Advanced Audio Design D-250 delay, Lexicon Prime Time, Lexicon PCMA1 w/Apogee filters, MicMix dynamic flanger.

Alesis MIDverb II, (2) Boss SE-50, (2) Korg M-1, E-mu Proteus 1, Aphex Impulse, Pearl/Zildjian drumset, Fender Rhodes, Hammond B-3 (1943) w/Leslie, Steinway B 7'7" (1897). Specialization & Credits: Full production service including audio-for-video. We support 1"-C format and 3/4" U-matic video, and have both off-line and on-line editing facilities. Our mic stable includes a huge selection of rare vintage mics with many tube type. Our clients are mostly return customers who appreciate our courteous and prompt professional service.

Sound Writer Studio



SOUND WRITER STUDIO
Manhattan Beach, CA

SOUND WRITER STUDIO



1116-A 8th St., Ste. 160; Manhattan Beach, CA 90266; (310) 379-7426. Owner: Leigh Genniss, Patricia Yarborough. Manager: Leigh Genniss. Engineers: Leigh Genniss, Patrick Yarborough. Dimensions: Studio 8'x16', control room 1.9 & 1.4 room ratio. Mixing Consoles: Soundcraft 6000 52x24 w/auto and complete recall. Audio Recorders: Sony PCM3324 24-track digital w/Apogee filters, Sony PCM2500 2-track digital w/Apogee filters, Panasonic SV-250 digital 2-track, Nakamichi MR-1, TEAC CD 401 player w/edit for sound effects. Digital Audio Workstations: Korg T3 w/cards T1 update-10 disk, Akai Lynn MPC 60 drums, Dean Jammer guitar w/Humbuckers, Steinberger bass. Monitors: UREI time align (new revision), JBL 4412 alt., NS-10M, Auratone alt., Tannoy alt., Sony MDR V6 digital headphone. Other Major Equipment: IPS 33B GSP 21, Lexicon 480L, Eventide H3000, Roland 800, DSP 256, DSP 128, DigiTech 7.6 time machine, Lexicon LXP15, LA-4A, (2) UREI JBL 7110 comp/lim, dbx comp/lim., Simon system direct boxes, Innovalve auto tube direct box, Audio Logic stereo graphic, Audio Control SA 3050A, Atari 1040ST total MIDI w/printout, 2 systems, 4 meg.; Neumann microphones, AKG microphones, Shure microphones, Crate G120C guitar amp w/stereo line in/out, Trace Elliott bass amp 4/10 2/15, (2) Crate keyboard amps for stereo, JBL/UREI 6260, JBL/UREI 621 alternates. Specialization & Credits: Clients include: Danny Rocca, Madrock, Michael Taylor, The Ohio Players, Antron, Andrew Gordon, Kiet Bui, Rusty Vail, Juvenile Committee, H.W.A., Hami Dare, Soup, Lighter Shade of Brown, Latin Kings, Dangerous Gangsters, Supreme Love Gods, Stoker, Chris Charles, Jammin' James, William Handy Jr., Demetrius Shipp, Grand Jury Productions, Veragon Productions, DUO Esperanza, Quality Records, Virgin Records, Warner Bros. Records, Tommy Boy Records, Ruthless Records, DEF-American Records, AVC Records, Mountain Top Tapes, many, many more!!! Want digital at analog prices? Call us!!!

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THE STAGG STREET STUDIO



15147 Stagg St.; Van Nuys, CA 91405; (818) 989-0511. Owner: Gary Denton, Melody Carpenter. Manager: Melody Carpenter.

STUDIO DEE



3306 Glendale Blvd., Ste. #4; Los Angeles, CA 90039; (213) 662-9595. Owner: Huey Dee. Manager: Huey Dee.

STUDIO DEL MAESTRO



PO Box 996; Cardiff-by-the-Sea, CA 92007; (619) 944-3456. Owner: Richard Del Maestro. Manager: Richard Del Maestro.

STUDIO 56



7000 Santa Monica Blvd.; Hollywood, CA 90038; (213) 464-7747; FAX: (213) 467-8579. Owner: Paul Schwartz. Manager: Claud a Lagan. Engineers: Dennis Mackay, Doug Michael, Peggy McAfee. Dimensions: Room 1: studio 31'x24', control room 19'x20'. Room 2: studio 10'x15', control room 15'x14'. Room 3: studio 45'x60', control room 22'x15'. Mixing Consoles: Neve VR60 w/Flying Faders, Trident 80B, Neve 8028. Audio Recorders: (2) Studer 820 w/Dol-

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STUDIO 56
Hollywood, CA

by SR 24-track, (2) Otari MTR-90 24-track, (2) Studer 827 24-track, Studer 807 1/4" 2-track, (2) Studer 820 2-track, Studer 807 4-track, Otari 5050B 2-track, Mitsubishi X-86 digital 2-track, (5) Panasonic 3500 DAT. **Digital Audio Workstations:** Sound Tools, Pro Tools. **Monitors:** TAD, Tannoy SRM-12B, JBL, NS-10, (2) Mitsubishi 60" video monitor. **Other Major Equipment:** Lexicon 480L, Lexicon 300, (5) Drawmer D-S201 dual gate, (2) TC Electronic TC 2290, AMS RMX 16 reverb, Eventide H3000 Harmonizer, (2) UREI 537 graphic EQ, (4) Summit Audio TLA-100A tube leveling amp, (4) API Jensen pre amp, (2) dbx 166 dual compressor, Lexicon PCM41 digital delay, Yamaha SPX1000 effects processor, (2) Lexicon PCM70, Lexicon PCM42, Roland SDE-3000, Roland SDE-2500, Yamaha grand piano.

STUDIO M PRODUCTION UNLIMITED



1041 N. Orange Dr., Hollywood, CA 90038; (800) 453-3345; (213) 462-7372; FAX: (213) 462-8556. **Owner:** Mike Michaels C.A.S. **Manager:** Dean Gilmore.



STUDIO ON WHEELS
Glendale, CA

STUDIO ON WHEELS



339 W. Windsor Rd., Ste. 6, Glendale, CA 91204; (818) 243-6165. **Owner:** John Falzarano. **Manager:** John Falzarano.



STUDIO 101
Solana Beach, CA

STUDIO 101



159 S. Highway 101, Solana Beach, CA 92075; (619) 481-2274; FAX: (619) 481-9005. **Owner:** Marc Wintriss. **Manager:** Marc Wintriss. **Engineers:** Independents. **Dimensions:** Room 1: studio 15'x20', control room 10'x15'. Room 2: studio 25'x50', control room 10'x15'. Room 3: studio 8'x10', control room 10'x15'. **Mixing Consoles:** Trident Series 24 28x24x24 Neve modified & rehipped, custom 10x10 tracking console wall discrete Trident A-Range, Focusrite, Neve and API input modules. **Audio Recorders:** Studer A80 Mk IV 24-track w/Autolocator & Varispeed, Studer A80 Mk IV 2-track, Panasonic SV-3500 R-DAT, (3) Nakamichi MR-2B cassette. **Digital Audio Workstations:** Akai S1100 V.2 32 meg RAM w/1.2 gi-

gabyte hard drive and CD ROM drive, Macintosh Quadra 900 w/Opcode Studio 5 running Opcode Vision software. **Monitors:** Meyer HD-1, Tannoy PBM 6.5, Yamaha NS-10M. **Other Major Equipment:** Dolby SR 24-channel, Dolby 363 SR/A 2-channel, TimeLine MicroLynx 3 machine sync w/remote, Lexicon 480L w/SME, Lexicon PCM70, TC Electronic 2290, Eventide H3000 SE/B, Summit Audio EOP 200A dual tube program EQ, Summit Audio DCL 200 dual tube compressor/limiter, Summit Audio TPA 200 dual tube preamplifier, (4) Drawmer DS-201B dual gate, UREI 1178 dual limiter, (2) dbx 165A compressor/limiter, Aphex 250/Type III Aural Exciter, Zeta Music System VC220 MIDI violin controller, (4) Countryman Type 85 direct boxes, Telefunken Elam 250 (Klaus Heyne mod.), Neumann M49 (Klaus Heyne mod.), Neumann U47 (Klaus Heyne mod.), Neumann U67 (Klaus Heyne mod.), (2) Neumann U87a, (2) Neumann KM84 (Klaus Heyne mod.), (2) AKG 414EB/CK12 (Klaus Heyne mod.), (2) AKG 460B/ULS, (2) AKG C1000S, AKG D12/112, EV RE20, (2) Beyer Dynamic M88, (4) Shure SM57, (2) Shure SM58, (4) Sennheiser 421, (2) Crown PZM-30, Halfer Pro 2400, Yamaha P2150, Carver PM-100, Oberheim Matrix 12 analog synthesizer, Kawai KG Series 7' grand piano, Hammond B-3 w/Leslie 122, Martin D18 acoustic guitar, Faematronic 2-group fully automatic Espresso machine. **Specialization & Credits:** Studio 101 is an affordable, small, yet powerful audio production and post-production facility one block from the ocean in Solana Beach. Our comfortable location offers restaurants, motels and entertainment locales within walking distance. In an industry notoriously shrouded with hype, we take pride in delivering an honest service without hidden charges. We specializing in 24-track recording and mixing, audio post and video lockup, DAT editing, assembly and duplication and CD mastering. If we can be of any assistance or if you would like to schedule a tour of the facility, please do not hesitate to give us a call.

STUDIO ONE RECORDING



925 E. North St., Anaheim, CA 92805; (714) 491-0550 (Anaheim); (714) 538-3640 (Orange). **Owner:** WVLM Associates. **Engineers:** John Vestman, Ian Miller. **Dimensions:** Room 1: Studio 50'x30', control room 26'x22'. Control room: 15'x7'. **Mixing Consoles:** MCI 428 custom 32-input transformerless, TAC Matchless 32-input. **Audio Recorders:** Transformerless MCI JH-24 w/Autolocator, Fostex E-16 w/A050 Autolocator, Panasonic 3700 DAT, (3) additional DAT, vintage tube Ampex MR-70 1/4" 15-30 ips. **Digital Audio Workstations:** Studer/Dyaxis digital editor. **Monitors:** Dhalquist DO-10, Tannoy 6.5 w/subwoofer, Yamaha NS-10. **Other Major Equipment:** JL Cooper computer automation 32-channel, Threshold Class-A power amp, (2) Eventide 949 Harmonizer w/del-gitch, Lexicon 224 digital reverb, (2) Sontec mic pre amp, (2) tube mic pre amp, (2) 7-channel vintage tube program EQ, Lexicon LXP15 digital reverb, Roland SRV-200 digital reverb, (2) Yamaha REV7, (2) Yamaha SPX90, (2) parametric EQ, (2) Aphex compeller, (2) Aphex Exciter, Aphex stereo gates, (5) dbx limiter 160, 162, 166, dbx de-esser, (4) graphic EQ, (6) digital delay, Steinway 7' grand piano, (2) AKG C-12A vintage tube mic, (8) Schoeps Collette mic w/winterchangeable capsules, Neumann U87, (2) Neumann KM88, 84, Sony ECM-56, Speiden ribbon coincident stereo mic, Sennheiser Binaural (dummy head) stereo mic, (6) Sennheiser 421, (4) Sennheiser 441-U, (13) Shure SM57, Shure SM7, SM33 ribbon, (2) PZM mic, (2) Electro-Voice mic, (2) AKG 451, C501 E, (3) Audio-Technica mic, Emulator II-HD w/extensive sound library, extensive MIDI gear, Roland 770, D-50, Juno-106, R8, Korg, Mac sequencer software.

STUDIO ULTIMO



1900 S. Sepulveda Blvd., Los Angeles, CA 90025; (310) 479-6010; FAX: (310) 479-7170. **Owner:** Private Music Studio Inc. **Manager:** Angele Hayashi. **Engineers:** Mitch Zeleny, Tom Biener. **Dimensions:** Studio 45'x35', control room 29'x30'. **Mixing Consoles:** Neve 8108 modified. **Audio Recorders:** (2) Ampex ATR-124 24-track modified, Ampex ATR-104 4-track 1/2", (2) Ampex ATR-102 2-track 1/4", Ampex ATR 1/2" head assembly, (4) Aiwa cassette. **Digital Audio Workstations:** Digidesign Pro Tools 4-track, 1 GB hard disk, optical drive. **Monitors:** Custom TAD 3X bi-amped by Bryston 4B, Meyer Sound Labs HD-1, (2) Yamaha NS-10M, Auratone. **Other Major Equipment:** Sony 5800 73/4 1/4 U-matic, Sony Trinitron 25 1/4 video monitor, RCA 31 1/4 video monitor, (2) TimeLine Lynx, AMS RMX-16, AMS DMX-15, EMT 251 w/250 program, (2) Eventide H3000SE, Lexicon 480L, Lexicon 200, Lexicon PCM70, Lexicon Prime Time II, TC Electronic TC 2290, (2) Summit Audio dual program EQ, Teletronix LA-2, Neve stereo compressor limiter, AKG C-12, Neumann U47 modified, Neumann M49, Neumann U67, and much more!!

SUMMIT RECORDING



32912 Brookseed; Trabuco Canyon, CA 92679; (714) 770-4528. **Owner:** Paul Bourassa. **Manager:** Paul Bourassa.

SUNBURST RECORDING



10313 W. Jefferson Blvd., Culver City, CA 90230; (213) 204-2222. **Owner:** Bob Wayne. **Manager:** Bob Wayne. **Engineers:** Bob Wayne, Jim Reeves. **Dimensions:** Room 1: Studio 22'x18', control room 18'x12'. **Mixing Consoles:** Trident Series 65 (1989) 48 in/16 out. **Audio Recorders:** Otari MX-80 (1990) 24-track 2", Mitsubishi X-80A 2-track digital, Otari 5050 Mk III 2-track analog 15 & 30 ips, Tascam 25-2 2-track analog 7.5 & 15 ips, Tascam 80-8 8-track ana-

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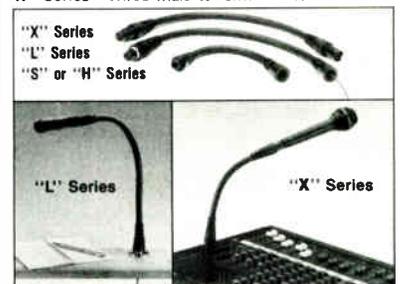
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log w/dbx I, Sony 55ES DAT, (2) TEAC C-3 cassette. **Monitors:** Tannoy PBM-8, Yamaha NS-10M, EV Sentry V, JBL L-26, Auratone cubes, Braun cubes. **Other Major Equipment:** (4) Neve 1073 Class A mic pre amp, Neumann U67 tube mic, Neumann U87 mic, (2) Neumann KM84 mic, (2) AKG 414 mic, (2) AKG 451, (2) EV RE20, (2) Demeter Tube Direct D.I., Lexicon 200 digital reverb, (2) Alesis MIDVerb II processor, (2) Yamaha SPX90 processor, (2) dbx 165 limiter/compressors, dbx 166 stereo limiter/compressor, (2) Audio Logic MT-44 quad gate, Furman QN-44 quad gate, (2) Orban 622B stereo para EQ, Orban 672A parametric EQ, Kawai KG-6C 7'4" grand piano, Hammond B-3 w/Leslie, Studio drum kit Tama/Pearl/Rogers, (2) vintage Fender guitar amp pro-reverb & Bassman.

SUNDIAL RECORDING



PO Box 5426; Santa Barbara, CA 93150; (805) 969-6926. Owner: Don Messick. Manager: Don Messick.

SUNSET SOUND RECORDERS INC.



6650 Sunset Blvd.; Hollywood, CA 90028; (213) 469-1186; FAX: (213) 465-5579. Owner: Paul Camarata. Manager: Craig Hubler.

SUNSET SOUND FACTORY



6357 Selma Ave.; Hollywood, CA 90028; (213) 467-2500; FAX: (213) 467-3103. Owner: Paul Camarata. Manager: Philip MacConnell.

SUTTON SOUND STUDIO



8390 Curbaril; Atascadero, CA 93422; (805) 466-1833. Owner: Rick Sutton.

TAKE ONE RECORDING STUDIOS



619B. S. Glenwood Pl.; Burbank, CA 91506; (818) 563-5323; FAX: (818) 563-5325. Owner: Frank Riesen. Manager: Laurel Stearns. Engineers: Jeff Shannon, Mike Bazzano. Dimensions: Room 1: studio 40'x25', control room 18'x18'. **Mixing Consoles:** Trident Series 80C 48 input. **Audio Recorders:** Otari MTR-90 III 24-track, Otari MTR-12 2/4-track 1/2" or 1/4", Panasonic SV-3700, (2) Akai GX-912 cassette. **Monitors:** Tannoy 215, Tannoy System 12, Tannoy PBM 6.5, Yamaha NS-10, Auratone Cube. **Other Major Equipment:** (2) dbx 160X limiter, (4) Drawmer stereo noise gate, Eventide H3000 SE, Lexicon 480-L, Lexicon 300, Lexicon PCM70, Lexicon LXP15, (4) Neve 1073 3-band pre amp/EQ, (2) Neve 31105 4-band pre amp/EQ, (2) Summit Audio TLA-100A tube limiter, (2) Summit Audio P100 tube EQ, TC Electronic 2290 delay/sampler, (2) UREI 1176 limiter, Yamaha SPX90, Sony CDP-670 CD player, (4) Crest 901 monitor amplifier, AKG The Tube mic, (4) AKG 414TL, AKG D-112, (2) AKG C-460, Electro-Voice RE20, (2) Neumann KM100, Neumann U67, (2) Neumann U87, (2) Neumann U89, (2) Neumann TLM170, (4) Shure SM57, (4) Sennheiser 421, (5) Sennheiser 441, Yamaha 6' grand piano, Crest 7001 monitor amplifier, Akai S-1000 stereo sampler, Korg M-1.

THAT STUDIO RECORDING SERVICES



PO Box 958; N. Hollywood, CA 91603; (818) 764-1421. Owner: That Studio Inc. Manager: Richard Holbrook, Maria Hostetter.

THETA SOUND STUDIO



Burbank, CA; (818) 955-5888; FAX: (818) 955-5867. Owner: Randy Tobin. Manager: Jim Latham. Engineers: Randy Tobin, Jim Latham. Dimensions: Studio 20'x20', control room 16'x16'. **Mixing Consoles:** Ramsa 80x16x2. **Audio Recorders:** Tascam MS-16 16-track w/Autolocator, Tascam TSR-8 8-track, Tascam 44 4-track, Technics 1520 2-track, (2) Aiwa DATs, (8) Aiwa 660, 770, 990 cassette, Sony PCM-501 ES digital processor, Sony SLHF-900 Beta Hi-fi video, JVC HD750 Hi-fi VHS video, (2) JVC 850, 600 3/4" video w/offline editor. **Monitors:** Yamaha NS-10M, Auratone 5C, Sennheiser HD414 headphone, JBL 4301B. **Other Major Equipment:** dbx 28 ch. noise reduction, Fostex 4030/4030 synth, (2) Lexicon PCM70, LXP5, Roland SRV-2000, (2) Yamaha RE7, SPX90, Alesis Quadverb, (2) Korg/MXP SDD-3000 DDLs, (8) dbx MXR, Symetrix, Valley Peo-

—LISTING AND PHOTO/LOGO CONTINUED TOP OF NEXT COLUMN



THETA SOUND STUDIO
Burbank, CA

ple Dyna-mite gate/limiter, Aural Exciter, Mesa/Boogie Studio pre-amp for gtr., AKG tube mic, AKG 414 mic, (30) Countryman Iso-max, Shure SM57/58, Electro-Voice RE-20, Yamaha C-5 grand piano w/MIDI, Roland R-8, S-50, S-550, Jupiter 8, D-50, MKS-20, (2) DX7, Ensoniq Mirage, Korg M-3, full drum kit, Atari Mega 2 w/Hybrid Arts SMPTE track II Gold Sequencer. **Specialization & Credits:** Services: 16/8/4/2-track recording; 2-track digital recording/mastering; MIDI sequencing/recording; SMPTE lock-to-video/audio; tape editing; reel-to-reel and cassette duplication; engineering; mixing/sweetening; vocal elimination; studio musicians; complete arrangement and production. Recent Clients: Viacom TV, Charles Fleischer, New Alliance Records, Capitol Records, Chameleon Records, ESPN, Playboy, Val Kilmer, Bill Watson, Dick Van Dyke, Ray Manzarek, Dan Bern, Charlie Jones. Motto: An environment where you can do your best.

38-FRESH RECORDING STUDIO



7940 W. 3rd St.; Los Angeles, CA 90048; (213) 383-7374. Owner: Mike Greene.



TOTAL ACCESS RECORDING
Redondo Beach, CA

TOTAL ACCESS RECORDING



612 Meyer Ln. #18; Redondo Beach, CA 90278; (310) 376-0404; FAX: (310) 379-3758. Owner: Allan W. Davis, Allan H. Juckes. Manager: Leslie Berman. **Mixing Consoles:** Amek G2520 52x48x104 w/MasterMix II automation. **Audio Recorders:** Mitsubishi X880-EX 32-track digital w/Apogee filter, (2) Ampex ATR 124 24-track, Ampex ATR 102 2/4-track 1/2" & 1/4", Sony 2500 R-DAT, Panasonic SV-3700 R-DAT, Nakamichi M-2 cassette, Forat F-16 8-channel 16-bit sampler w/hard disk and remote. **Digital Audio Workstations:** SoundStage 2-track digital hard disk audio editor w/full DSP & 80 min. capacity. **Monitors:** (2) Tannoy FSMU, (4) Canton Karat 100 near-field, (2) Yamaha NS-40M near-field, (2) Yamaha NS-10M near-field, (2) Tannoy PBM-8 near-field, (2) NHT large near-field, (2) Infinity 2001, (4) HorrorTones (Auratone). **Other Major Equipment:** Sony 1/2" & 3/4" video player, (2) Sony video monitor, Jensen/Boulder 12 ch. preamp, Jensen/Hardy 4 ch. preamp, (2) AKG C-12, (2) 414, (2) D-12E, (2) 452-EB, (2) Schoeps CM3-U w/omni and cardioid capsules and stereo mount, (4) Neumann U87, 67, (2) KM84, (2) KM86, (2) KM88; Shure 57, 58, Beta 57 & SM7; Electro-Voice RE-20; (2) Sennheiser 421, (2) 441; (2) Beyer 69, M-160; Fostex stereo mic; Drawmer DS-201 noise gate 8-ch., Aphex CX-1 noise gate 2-ch., Summit Audio TLA-100A tube limiter, (2) dbx 165A, (2) dbx 160, (2) Teletronix LA-2A, Lang PEO-2 program EQ, Orban 621B parametric EQ, UREI 530 graphic EQ, (2) UREI LA-3A, (3)1176; Sontec stereo parametric EQ, Lexicon 480L w/LARC and 3.0 software, Lexicon 224XL, Lexicon PCM70, Lexicon 95 Prime Time II, Klark-Teknik DN780 digital effect device, Eventide H3000 SE, Yamaha SPX90, REV7, Roland SDE-3000 delay, AKG spring reverb, (2) TimeLine Lynx modules lock-to-picture. **Specialization & Credits:** Total Access provides technically advanced recording systems coupled with a warm atmosphere and skilled staff. We can arrange for accommodations and anything else needed to accomplish any project. We are located one mile from the Pacific Ocean in beautiful Redondo Beach. Worldwide clientele includes Guns 'N' Roses, Ken Scott, Dokken, Gary Wright, Michael Wagener, Great White, Tears for Fears, White Lion, Alice Cooper, Will and the Kill, Terry Bozzio and many others. Labels include Capitol, Geffen, Enigma, Elektra, Cypress/A&M, Atlantic, MCA, IRS and Sony.

TRACK RECORD INC.



5102 Vineland Ave., N. Hollywood, CA 91601; (818) 761-0511; FAX: (818) 761-0539. Owner: Thomas M. Murphy. Manager: Alan Morphew. Engineers: Ken Paulakovich, Tom Murphy, John Carter, Pete Magdaleno, Darian Sananaja, Brian Virtue, Richard Presley, Greg Geitznauer, Freddy Rhodes, Mitch Rellas, Gene Robertson. Dimensions: Room 1: studio 40'x40', control room 20'x20'. Room 2: studio 30'x30', control room 20'x25'. Room 3: studio 8'x8', control room 15'x20'. Room 4: control room 12'x20'. Mixing Consoles: Neve V-III 60 channel, Neve 8232. Audio Recorders: Studer 820 24-track, Studer 827 24-track, Sony JH-24 24-track, (2) Ampex ATR 2/4-track, Panasonic SV-3500 DAT, Tascam DA-30 DAT. Monitors: (2) TAD monitor system. Other Major Equipment: TimeLine Micro Lynx, Audio Kinetics Q-Lock 3.10 synchronizer, (2) Lexicon 224XL, Yamaha SPX900, REV5, (3) Yamaha SPX90, (2) Roland SRV-2000, (2) Ecoplate I & II, (2) Roland SDE-3000, Bel BD-80 delay w/8 sec. sampling, (4) Teletronix LA-2A, (5) UREI 1176LN, (4) dbx 160X, Trident 2-ch. limiter, (3) RCA tube limiter, Valley People Dyna-Mite 430, Drawmer 6-ch. dual gate, Valley People Kepex II gate 6-ch., (2) Pultec EQ-H2, Pultec MEQ-5, (2) Trident CB9066 EQ, (3) AKG C-12, AKG The Tube, (5) AKG C-12 (1 has Klaus Heyne mod.), Telefunken U47, Neumann M49, (2) Neumann KM64, (5) AKG 414 EB, EB P48, & B-ULS TL, (9) AKG 451/452, (3) Electro-Voice RE-20, (5) Neumann U87 (1 w/Stephen Paul mod.), (2) Neumann U47 FET, (4) Neumann KM84, (13) Sennheiser 421, (2) Shure SM81, (12) Shure 56/57, Shure SM7, (2) RCA 77 ribbon, Kawai 7' grand piano, Yamaha C7, and much more.

TRS



12627 Hoover St., Garden Grove, CA 92641; (714) 897-6099; FAX: (714) 894-3926. Owner: John Tomlinson. Manager: Julie Tomlinson.

VALLEY CENTER STUDIOS



5928 Van Nuys Blvd., Van Nuys, CA 91401; (818) 989-0866; FAX: (818) 989-3818. Owner: Mark Antaky. Manager: Mark Antaky.



THE VILLAGE RECORDER
W. Los Angeles, CA

THE VILLAGE RECORDER



1616 Butler Ave., W. Los Angeles, CA 90025; (310) 478-8227; FAX: (310) 478-2414. Owner: Georgie Hormel. Manager: Kathy Konop. Engineers: Charlie Brewer, chief engineer; Charlie Brocco, Rob Hart, Marty Brumbach, Tom Winslow, Rick Ornstein, Van Coppock. Dimensions: Room A: studio 35'x17', control room 20'x14'. Room B: studio 16'x16', control room 18'x18'. Room D: studio 30'x50', control room 22'x25'. Room F: studio 13'x12', control room 12'x14'. Mixing Consoles: SSL 4056E w/48 mono & 8 stereo inputs w/SSL G, Neve VR-60 w/Flying Faders, Neve VR-72 Flying Faders, Trident T-24. Audio Recorders: (4) Studer A-800 24-track, (8) Ampex ATR-102 2-track, (3) Ampex ATR-104 4-track, (4) Technics SV-3500 DAT, (3) Technics SV-3700 DAT, Sony 2500 DAT, Otari MTR-90 24-track, (18) Aiwa AD-F780 cassette, Sony 1630 w/BVU-800. Monitors: (3) JBL TAD custom mains, (4) Yamaha NS-10M, (4) Auratone 5-C, (4) Tannoy Gold 12" coaxial. Other Major Equipment: UREI 1176LN, LA-4, LA-2A, Drawmer DS-201, Inovonics 201, dbx 160, 160X, Lang PEQ-2, Pultec EQP-1A, MEQ, Roland SDE-3000, TC Electronic TC 2290, Lexicon PCM70, 480L, AMS RMX-16, 1580-S, Summit Audio TPA-200, EQP-200, Yamaha SPX90, REV7, (4) Crystal stereo program EQ, (48) Dolby A, SR, (4) Sony BVU-800, (14) Lynx synchronizer, (50) miscellaneous outboard equipment.

VOLA STUDIOS



1717 N. Highland St. 620; Hollywood, CA 90028; (818) 509-1770; (213) 463-8652; FAX: (213) 463-5443. Owner: Evelyn Williams. Manager: Patrick Torres.

WEBSTER COMMUNICATIONS



607 N. Ave. 64; Los Angeles, CA 90042; (213) 258-6741; FAX: (213) 254-3756. Owner: Van Webster.

WEST L.A. SWEAT SHOP



PD Box 91392-2200; Sylmar, CA 91392; (818) 367-8642; FAX: (818) 367-8642. Owner: Bob Saldana. Manager: Bob Saldana.

WESTBEACH RECORDERS



6035 Hollywood Blvd.; Hollywood, CA 90028; (213) 461-6959; FAX: (213) 461-9690. Owner: Donnell Cameron, Brett Gurewitz. Manager: Donnell Cameron.



WESTLAKE AUDIO
Hollywood, CA

WESTLAKE AUDIO



7265 Santa Monica Blvd.; Hollywood, CA 90042; (213) 851-9800; FAX: (213) 851-0182. Owner: Glenn Phoenix. Manager: Steve Burdick. Engineers: Bill Malina, Steve Harrison, John Fundingstand, Chris Fogel, Brad Aldredge, Brian Kinkel, Shelly Stewart, John Dickinson, Cameron Cole, Doug Mountain. Dimensions: Room A: studio 25'x48', control room 25'x20'. Room B: studio 20'x35', control room 21'x19'. Room C: studio 27'x38', control room 23'x19'. Room D: studio 30'x50', control room 25'x25'. Mixing Consoles: (2) Neve V-Series 60x48, Neve VR-72, Harrison MR-2 56x48, Trident 80C 72x24. Audio Recorders: Sony 3348 48-track digital (rental), Sony 3324 24-track digital (rental), Mitsubishi X-850 32-track digital (rental), (8) Sony APR 24-track analog, Sony JH-16/24 16/24-track 2" analog, Studer A800 Mark III 24-track analog, Ampex ATR 2/4-track, Mitsubishi X-86hs 2-track digital (rental), Akai A-DAM 12-track digital (rental), (7) Panasonic 3700/3900 DAT. Digital Audio Workstations: New England Digital Synclavier 9600 w/16-track PostPro; Digidesign Pro Tools 8-track digital recording and editing. Monitors: Westlake SM-1, Westlake HR-1, full selection of near-fields. Other Major Equipment: All of the following items are available in quantity!!! Dolby SR, TimeLine Lynx, Sony 3/4" & 1" video, Adams-Smith AV 2600 audio/video editor, Quantec QRS-XL, AMS DMX, AMS RMX-16, Publison 90, TC Electronic 2290, Eventide H3000/2016, Lexicon 480L/300/224/PCM70/PCM42, Yamaha REV5/REV7/SPX1000/SPX90II, Roland SDE-3000B, EMT 250/251/252/240/150, dbx 165A/162/160/902, Drawmer gate, Valley Audio gate, Inovonics 201, UREI 1176/LA-3A/LA-4, Teletronix LA-2A, GML comp., GML EQ, Pultec EQP1A. Specialization & Credits: Westlake Audio and AMT Systems present a complete Macintosh IIx-based MIDI Production room. This room offers all the latest in MIDI equipment including the most popular sequencing software, Galaxy editor/librarians, Digidesign Sound Tools and (3) 8 meg Sample Cell cards with CD ROM libraries. The room houses a 36-input Sony MXP-3000 console and a Sony APR 24-track tape machine. Westlake Audio and Geot Benson Music of Chicago have joined forces to create an environment for Synclavier use. The 9600 system is extensive and includes a PostPro 16-track Direct-to-Disk digital recorder. The room is very professional and comfortable.

WESTWORLD RECORDERS



16760 Stagg St. #206; Van Nuys, CA 91406; (818) 782-8449. Owner: Robert Schreiner. Manager: Jerry Pearson.



WILD CHILD STUDIO
Long Beach, CA

—LISTING CONTINUED ON NEXT PAGE

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CONSOLE DESIGN

IN THE

NOVEMBER 1992 MIX

Custom Recording Consoles
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Canadian Audio

DIRECTORY:

North Central U.S. & Canada

In the November issue, *Mix* talks to console manufacturers about custom designs to fit users' particular needs; also, a look at versatile boards for ADR and Foley. Plus: articles on audio production in Canada, television sound production, and interviews with Willie Nelson and T-Bone Burnett.

Readex Advertising Effectiveness Study:
Free with 1/2-page or larger ads in the November *Mix*!

Ad Close: September 8, 1992
Materials Due: September 15, 1992



—SEE PHOTO/LOGO ON PREVIOUS PAGE

WILD CHILD STUDIO



6471 Wardlow; Long Beach, CA 90808; (310) 429-8669. Owner: Timothy Hunter. Manager: Timothy Hunter.

GREG YOUNGMAN MUSIC



PO Box 381; Santa Ynez, CA 93460; (805) 688-1136. Owner: Greg Youngman Communications. Manager: Greg Youngman.

Hawaii



AUDIO RESOURCE HONOLULU
Honolulu, HI

AUDIO RESOURCE HONOLULU



1084 Young St.; Honolulu, HI 96814; (808) 526-3733; FAX: (808) 734-1840. Owner: Tony Hugar, Milan Bertosa. Specialization & Credits: Hawaii's largest facility featuring 48-track digital recording with a Sony PCM-3348 and analog recording with MCI JH-24's. The studio includes Neve and DDA consoles, UREI, dbx, Drawmer, Summit Audio, Lexicon, Eventide outboard gear, Pultec EQ, EMT plates, Westlake, Tannoy, KRK monitors, Neumann and AKG tube microphones. Complete audio/video synchronization available for audio sweetening and ADR, including digital editing. Clients include George Winston, Don Bluth Animation, RED Speedwagon, Henry Kaiser, Anri, K.T. Sugiyama, PBS, TNT, McDonald's, JVC, Cadillac, ESPN.

FORTUNATE SUN STUDIO



720 Iwilei Rd., Ste. #416; Honolulu, HI 96817; (808) 531-5744; FAX: (808) 536-8983. Owner: David Tucciarone, Wei Chen, Bazio Chen. Manager: David Tucciarone. Engineers: David Tucciarone, Steve Kramer, Wei Chen. Dimensions: Studio: 20 x20. Mixing Consoles: Otari Series 54 46x24x44 w/moving fader automation. Audio Recorders: Otari MTR-90III, Tascam MS-16, Fostex E-2, Sony PCM-2500, Sony DT-55ES, Nakamichi MR-1. (2) Akai GX912. Digital Audio Workstations: Digidesign Sound Designer II, Digidesign Pro I/O Interface, Macintosh IIcx, Macintosh SE/30, Dpcode Studio Vision, Mark of the Unicorn Performer, (2) Mark of the Unicorn MIDI Time Piece. Monitors: (2) TAD TSM-1, (2) Meyer Sound Labs Sound HD-1, (2) Yamaha NS-10, (2) Auratone 5C. Other Major Equipment: Lexicon 300, Lexicon PCM70, Lexicon LXP15, (2) Lexicon LXP1, Eventide H3000 SE, TC Electronics TC2290, Drawmer 1960, Drawmer DS-201, Drawmer DS-401, UREI 1176N, (2) AKG The Tube, (2) AKG C-414EB, (2) AKG C-451E, Neumann KM84, Roland D-70, Korg Wavestation, (3) E-mu Proteus 1, (2) Roland R-8, Alexis D-4, TimeLine Micro Lynx.

JAGS ENTERTAINMENT



PO Box 935; Captain Cook, HI 96704; (808) 323-3315. Owner: Eric Jaeger. Manager: Eric Jaeger.

LAHAINA SOUND RECORDING STUDIO



840 Wainae St.; Lahaina, HI 96761; (808) 667-2587; FAX: (808) 667-2589. Owner: George Benson. Manager: Amos Daniels.

MANTRASOUND



4-1586 Kuhio Hwy.; Kapaa, Kauai, HI 96746; (808) 822-9466; FAX: (808) 822-0749. Owner: Michael Sena. Manager: Sherie Di-Salvo.

MELODY LINE PRODUCTIONS



2662 Kalia Circle; Pukalani, Maui, HI 96788; (808) 572-7152. Owner: Tom Hall. Manager: Tom Hall.

STUDIO M PRODUCTIONS



8715 Waikiki Station; Honolulu, HI 96830; (800) 453-3345; (808) 734-3345; FAX: (808) 734-3299. Owner: Mike Michaels C.A.S. Manager: Hugo Buehring.

Nevada

OAKDALE POST AUDIO INC.



3329 S. Eastern Ave.; Las Vegas, NV 89109; (702) 734-3900; FAX: (702) 734-4824. Owner: Oakdale Post Audio Inc. Manager: Bill Ebmeyer. Specialization & Credits: As our name implies, the focus of Oakdale Post Audio is audio post-production for video. Located close to major strip resorts, we overlook the 12th tee of the Sahara Country Club golf course providing a relaxing, peaceful environment in which to work. Our satisfied clients include IBM, FBI, Bally's Hotel & Casino, Caesar's Palace, The Nashville Network, National Republican Committee, Sunrider International, Las Vegas Convention and Visitors Authority, and many others. Over the past 5 years, our work for these and other clients has earned us 29 Addy and 2 Telly awards. We offer 5-machine lockup in addition to a Pro Tools digital audio workstation. Video streamers are available for ADR, and our numerous sound effect and music libraries may be uploaded digitally for sweetening. An elaborate Mac-based MIDI system featuring Sample Cell and over 3 gigabytes of CD-RDM based samples may be used for your custom music needs. Please call for more information and reasonable rates.



POWERHOUSE RECORDING
Las Vegas, NV

POWERHOUSE RECORDING



3111 S. Valley View Blvd.; Las Vegas, NV 89108; (702) 871-6200. Owner: Powerhouse Corp. Manager: Paul Badia. Engineers: Paul Badia, Tony Corporale, Scott Papich. Dimensions: Studio 35 x40', control room 18 x20'. Mixing Consoles: D&R Avalon 64x32x64. Audio Recorders: Stephens 821 24-track, Scully 280B 2-track, Ampex 700 2-track, (2) Panasonic 3700 DAT, (2) Nakamichi MR-1 cassette deck. Monitors: Fostex LS3-B, Yamaha NS-10M. Other Major Equipment: EMT 240 gold foil reverb, Yamaha REV5, Roland SDE-3000 delay, Korg SDD-2000 delay, Eventide 910, Eventide instant phaser, Lexicon prime time, Aphex Type C aural exciter, (2) Spectra Sonics 610 comp-limiters, (2) ADR S01 comp-limiter, (2) ADR S06 gates, ADR S23 autopanner, Orban 516-EC de-esser, dbx 500 sub-harmonic generator, Neumann microphone, AKG microphone, Sennheiser microphone, RCA microphone, Audio-Technica microphone, ZETA III synchronizer. Specialization & Credits: Powerhouse specializes in providing a comfortable and impeccably maintained environment for projects of all kinds. Our clients include Englebert Humperdinck, Dionne Warwick, The Four Tops, Steve Dorff, Rich Little, and all the major video, production and advertising agencies in our region.

New Mexico

MAX HIGHSTEIN RECORDING



5 Herrada Pl.; Santa Fe, NM 87505; (505) 986-1055. Owner: Max Highstein. Manager: Max Highstein. Specialization & Credits: Set in the high desert near Santa Fe, New Mexico, we're geared toward NAC, folk, jazz, and eclectic album projects. We understand your

need to produce great sounding, professional recordings on a reasonable budget—that's our specialty. The studio features beautiful, natural-sounding rooms designed to bring out the best in acoustic instruments and voice; a superb piano; a complement of synths; and a full array of gear to faithfully capture and mix your performances. World-class backing musicians can be readily drawn from Santa Fe's active cultural community. Low rates include engineering with optional producing services available to oversee your project from start to finish. Credits include the debut album by CHANCE, featured on the TV series *Northern Exposure*; and Max Highstein's *Touch the Sky*, one of NAC radio's most heavily played albums. Call for information on rates and accommodations.

MOONDANCE RECORDING STUDIOS



PO Box 3318; Taos, NM 87571; (505) 758-9113. Owner: Morten Nilssen. Manager: Morten Nilssen.

QUINCY STREET SOUND INC.



130 Quincy St. NE; Albuquerque, NM 87108; (505) 265-5689; FAX: (505) 256-9345. Owner: April L. La Monte. Manager: Daryl Piper.

SPOTS



PO Box 4872; Albuquerque, NM 87196; (505) 255-3225. Owner: Barzo Productions. Manager: Barbara Sue Rosen.

JOHN WAGNER RECORDING STUDIOS INC.



12000 Candelaria NE, Ste. E; Albuquerque, NM 87112; (505) 296-2766; FAX: (505) 296-9374. Owner: John Wagner, Laurie Zachery. Manager: John Wagner. Specialization & Credits: John Wagner Recording Studios is the only full-service 24-track recording studio in New Mexico capable of sophisticated SMPTE-interlocked audio-for-video. We use the Adams-Smith SMPTE synchronizing system with compact controller along with a 32-channel, 16-bit Yamaha digital automated mixing console, plus our new 2-channel digital master hard disk recording system. Dur 3,200-sq.-ft. facility has two control rooms, two large voice-over booths, and a large (30'x20') studio. We have over 25 years experience in all aspects of audio recording, including recording products for RCA, Capitol, MCA, Motown, CMH; creating numerous award-winning jingle campaigns; and recording two Grammy-nominated albums. Recent clients include Saatchi & Saatchi, Southwest Productions, American Laser Games, Storyville Productions.

Oklahoma

AMBIENT SOUND PRODUCTIONS

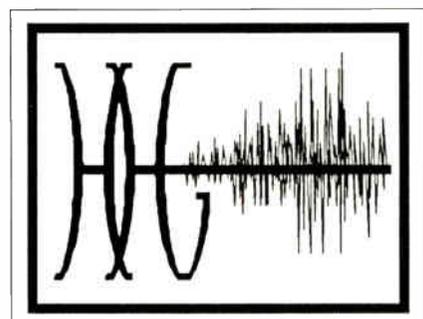


2733 NW 12th St.; Oklahoma City, OK 73107; (405) 949-1602. Owner: Doug Matthews. Manager: Doug Matthews.

CARUMBO RECORDING



519 N. Porter; Norman, OK 73069; (405) 329-6060. Owner: Michael McCarty. Manager: Michael McCarty.



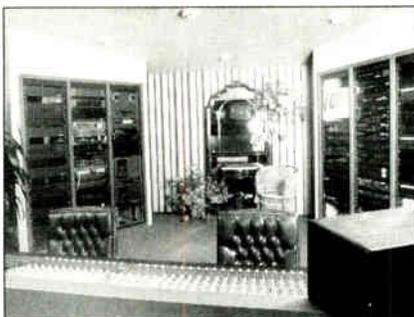
HAMILTON HOUSE ENTERTAINMENT GROUP
Ouncan, OK

HAMILTON HOUSE ENTERTAINMENT



1512 W. Plato Rd.; Ouncan, OK 73533; (405) 255-6431; FAX: (405) 255-6391. Owner: Sandi Hamilton. Manager: LG Brown. Engineers: LG Brown. Dimensions: Room 1: Studio 38'x38', control room 32'x38'. Room 2: Studio 12'x12', control room 12'x12'. Mixing Consoles: Ditar Series 54P 46/46, Amek Tac Magnum 36/32 LED, (6) Yamaha DMP 7 Total Recall, Flying Fader, automated sub-mixers. Audio Recorders: Ditar MX-80 24/32-track w/ Dolby SR, Akai A-DAM 24-track digital, Panasonic SV-3500 DAT, Panasonic SV-3700 DAT, Ditar MX-50/50 2-track w/Dolby SR, Marantz CPR 600 recordable CD. Digital Audio Workstations: Digidesign Pro

—LISTING AND PHOTOLOGO CONTINUED TOP OF NEXT COLUMN



HAMILTON HOUSE ENTERTAINMENT GROUP
Ouncan, OK

Tools 8-track, Digidesign Sound Tools 2-track, Apple Macintosh II FX w/8 MB RAM, 80 MB HD, 650 MB HD, Apple Macintosh SE/30 w/ 20 MB RAM, CD RDM drive, Digidesign Q Sheet AV, Mark of the Unicorn Composer, Mark of the Unicorn MIDI Time Piece, Dpcode Studio Vision. Monitors: (2) Tannoy SGM-15B, (2) Genelec, (2) Digital Design DD 161. Other Major Equipment: Lexicon 300, Roland R880, Eventide H3000 SE, Yamaha SPX-1000, Yamaha SPX-901I, Yamaha REV7, (2) Yamaha PCM 42, ART SGE, Alesis Quadraverb, (3) dbx 166, Eventide HC910, (2) JBL 5547 Ax, Audio Logic 440 quad noise gate, Rockman sustainer/chorus, Neumann microphone, AKG microphone, Sennheiser microphone, Beyer microphone, Shure microphone, Crown microphone, E-mu Emulator III 8 MB/300MB XHD, E-mu Emax II 8 MB, E-mu Proteus I XR, E-mu Proteus 2 XR, E-mu Proteus Master System, E-mu Proformance 1+, E-mu Percussion, Roland A-80, Roland JD-800, (2) Roland D-70, Roland D-550, Roland S-550 w/monitor, Roland P-330, Roland MKS-20, Roland MKS-70, (2) Roland R8M, Roland R-70, Roland Juno 106, Korg SGX-ID sampling grand, Korg M1R, Korg M3R, Kurzweil 1200 Pro III, Kurzweil GX-1000, Yamaha TX 816 (loaded 8 modules each), Yamaha TX 802, Alesis D4, Alesis SR-16, Alesis HR-16B, Kimball 60-year-old grand piano. Specialization & Credits: Offering privacy and seclusion in a totally creative environment...featuring full service, luxury guest accommodations...an enchanting guest house or magnificent guest rooms with color TVs, VCRs, and personal workstations, complete food service designed to satisfy your culinary preference and your budget, a swimming pool, spa, sauna, environmental booth, tanning bed, and exercise equipment are all part of the basic amenities...conveniently located between Dallas/Fort Worth and Oklahoma City, on five fenced, beautifully landscaped acres. A private country club, golf course and tennis courts as well as dog runs, child care and limousine services are also available. Complete package prices guarantee total cost control, convenience, and efficiency. You can pay more, but you can't get more. The LG BRDWN Sound is being acknowledged on an international level...beyond the cutting edge of the new music scene...focusing on "hit" music, film scores, and special audio projects. Come on over to our house.

THE 25TH TRACK



PO Box 1333; Broken Arrow, OK 74013; (918) 455-2459; FAX: (918) 455-2168. Owner: Walt Bowers. Manager: Walt Bowers.

Texas

BEE CREEK STUDIO



Spicewood, TX 78669; (512) 264-1379. Owner: Spencer Starnes. Manager: Spencer Starnes.

CEDAR CREEK RECORDING



5012 Brighton Rd.; Austin, TX 78745; (512) 444-0226. Owner: Fred Remmert. Manager: Fred Remmert.

CRYSTAL CLEAR SOUND



4902 Oon Or.; Dallas, TX 75247; (214) 630-2957; FAX: (214) 630-5936. Owner: Sam Paulos. Manager: Keith Rust. Engineers: Keith Rust (chief engineer), Sia Ahmadzadeh. Dimensions: Studio 35'x45', control room 23'x17'. Mixing Consoles: DDA 224V with Uptown moving fader automation. Audio Recorders: Studer A827 24-track, Studer A810 2-track, Sony 5002 1/4" & 1/2" heads, (3) Panasonic SV3700 RDAT, Panasonic SV3500 RDAT, (50) KABA real-time cassette. Monitors: (2) UREI 811, (2) KRK 703C, (2) Yamaha NS-10M, (2) JBL 4311. Other Major Equipment: TC Electronic M5000 EFX processor, AKG 68K EFX processor, Eventide H3000 EFX processor, Lexicon 200 reverb, Lexicon LXP-1 reverb, Lexicon LXP-5 EFX, Yamaha SPX900 EFX, Yamaha SPX90 EFX, Korg SDD-3000 delay, Akai S1000 sampler, (2) Tube-Tech PE-1B tube EQ, Summit Audio LA100 tube compressor, API 5502 EQ, (3) Aphex 612 gate, Aphex Compellor compressor, (4) JBL 7110 compressor/limiter, (2) dbx 165A compressor/limiter, Baldwin SD-10 concert grand piano, Hammond B3 Leslie cabinet, Dolby MT-24 SR&A.

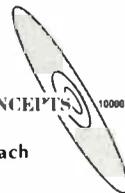
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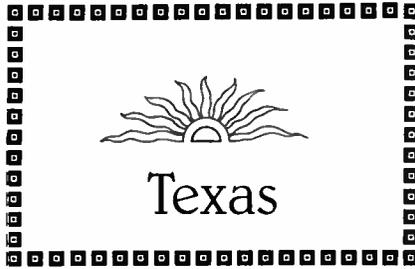


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DALLAS SOUND LAB
Irving, TX

DALLAS SOUND LAB



6305 N. O'Connor Blvd., Ste. 119; Irving, TX; (214) 869-1122; FAX: (214) 869-1135. Owner: Russell Whitaker. Manager: Johnny Marshall. Engineers: Thom Caccetta, Michael Vazquez, David Rosenblad, Tim Kimsey, Frank Salazar, Sterling Winfield. Dimensions: Room 1: Studio 46'x52', control room 24'x21'. Room 2: Studio 10'x8', control room 16'x14'. Room 3: Studio 24'x12', control room 28'x26'. Room 4: Studio 24'x18', control room 20'x16'. Mixing Consoles: SSL 6056, MCI JH-536, MCI JH-636, Tascam M-512. Audio Recorders: Sony PCM-3324 24-track digital, Otari MTR-90 24-track analog, Otari MTR-10 4-track analog, Otari MTR-10 2-track analog, MCI JH-24 24-track analog, MCI JH-110 2-track/4-track/center, MCI JH-110 video layback, Tascam ATR-60 24-track analog, Tascam ATR-80 center stripe, (4) Panasonic R-DAT. Digital Audio Workstations: New England Digital Pro 16-track, Digidesign Pro Tools 4-track. Monitors: (2) UREI 813B, (2) Westlake custom, (2) Tannoy SRM-12, (2) Meyer Sound Labs HD-1, (10) Yamaha NS-10, (2) JBL 4401, (6) JBL 4673, (8) Auratone 5-C. Other Major Equipment: New England Digital Synclavier 56 voice, Steinway 9' Concert Grand, Hammond B-3 w/Leslie, KABA 10-slave cassette, MTM 16/35mm recorder, MTM 16/35mm reproducer, BTX SoftTouch synchronizer, BTX maxi-pad synchronizer, Tascam ES-50/51 synchronizer, Lexicon 480L, Lexicon 224, Quantec room simulator, AMS RMX-16, AMS DMX 1580-S, (2) Yamaha SPX90 digital efx processor, Yamaha REV7 digital reverb, Lexicon PCM70 digital efx processor, (2) Lexicon PCM41 digital delay, (54) Oolby "A" noise reduction, (24) dbx noise reduction. Specialization & Credits: STUDIO A: up to 48-track digital/analog recording with interlock to video or film. Services include 40-piece capacity orchestra scoring to picture, video sweetening, and album/jingle production with audio and video timelines to three sound stages (15,000/6,000/3,000 sq.ft.) for live shows, concerts, etc. STUDIO B: 4-track digital audio workstation for voice-over and sfx production. STUDIO C: 16-track NED POST-PRO direct-to-disk digital audio workstation interlocked to 3/4" and 1" videotape with a large isolation booth for ADR(looping), SFX assembling and mixing to picture. STUDIO D: 24-track studio for album/jingle production. STUDIO F: film chain for 16/35mm transfers and cassette duplication. STUDIO G: SYNCLAVER 56-Voice Hard disk-based Digital Music Production Studio. Past clientele include: Phil Collins, ZZ Top, BB King, Grover Washington Jr., Stevie Ray Vaughan, Herbie Mann, Rod Stewart, Tri-Star Pictures, NBC, Universal Studios.



DIGITAL IMAGE RECORDING STUDIO
San Antonio, TX

DIGITAL IMAGE RECORDING STUDIO



555 Cicero; San Antonio, TX 78218; (512) 656-1382. Owner: Jim Waller. Manager: Suzell Waller.



DIGITAL SERVICES RECORDING STUDIO
Houston, TX

DIGITAL SERVICES RECORDING STUDIO



5805 Chimney Rock; Houston, TX 77081; (713) 664-5258; FAX: (713) 663-6518. Owner: John Moran. Manager: K.T. White. Engineers: Roger Tausz, James Hoover, John Moran. Dimensions: Room 1: Studio 35'x40', control room 30'x25'. Room 2: Control room 15'x13'. Room 3: Studio 45'x60'. Room 4: Control room 20'x12'. Mixing Consoles: SSL 6056EIG, Sony/MCI 636, Sony/MCI 628, Neve 5442, Tascam MM1. Audio Recorders: (2) Sony 3324 dig. multi., Otari MTR-90II analog multi., Sony 1610 CD master recorder, Otari MTR-12 4-track 1/2", Otari MTR-10 2-track 1/4", Otari MX-55 3-track 1/4", (3) Tascam DA-30 DAT, (3) Sony/RTW F-1 dig. processor, (10) Nakamichi MR-2B, (2) Sony BVU 800D. Digital Audio Workstations: SSL Screen Sound, Sony DAE 1100A, (3) Apple Macintosh. Monitors: (2) Meyer Sound Labs 833/834, (8) Yamaha NS-10M, (4) JBL 4411, (2) AMR ref. monitors, (2) CSI MDM-4, (2) Auratone 5C, (2) Klein & Hummel monitors, Sony PVM 1040. Other Major Equipment: (5) Adams-Smith 2600 synchronizer, Lexicon 224 XL, (6) Lexicon PCM 70, Lexicon Prime Time II, Eventide H3000, Eventide 969, Yamaha REV7, Yamaha SPX90, (2) Lexicon LXP-1, (2) Lexicon LXP-5, (8) dbx 160X, AMS DMX delay/sampler, (4) Tube-Tech mic preamp, (2) Tube-Tech CL1 compressor, (2) Tube-Tech EQ, (4) Summit Audio EDF-100 EQ, (2) Summit Audio EOP-200, Summit Audio mic preamp, (4) UREI 1176, (2) Audio & Design vocal stessor, Neumann TLM150, Neumann U89, Neumann U69 stereo mic, Sennheiser 421, Sennheiser 441, AKG 414, AKG C460, AKG D12, Schoeps CMC-5, Crown PZM, Crown GLM, Shure 57, Shure 58, Shure 89, Shure 81, RCA DX77, Countryman DI, TimeLine Lynx synchronizer, TimeLine keyboard controller, DSR V2-1 prototype steam-powered Hoo-Doo. Specialization & Credits: Digital Services produces audio for records, television and film. Our clients include Genesis, ZZ Top, Clint Black, The Young Riders/ABC-TV, Houston Grand Opera, Geto Boys, Choice, Bushwick Bill, Talking Heads, B.B. King, Neil Young, Willie Nelson, Herb Ellis, Hyundai, American Electric Power Co., Houston Astros, The Mariano Kid, Gunsmoke 3, JVC Jazz Festival, Placido Domingo, Little Joe y la Familia, Merle Haggard, Van Cliburn Inter'l Piano Competition, American Medical video, Houston Symphony Orchestra, Barbra Streisand, *Robin Cop 2*, Mazz, La Mafia, *That's Black Entertainment*, Burger King, Compaq Computer, Chrysler, Blue Bell Ice Cream, Oow, Culture Club, Frank Zappa, Timbuk 3, B-52's, 3 Times Dope, GTE, Coca-Cola, Coppertone Conspiracy, Carl Lewis, and at least two other clients we can't remember right now. World class studios, CD mastering lab, soundstage & remote truck make us Texas' most advanced studio facilities.

EDENWOOD RECORDING STUDIOS



7319-C Hines Pl.; Dallas, TX 75235; (214) 630-6196; FAX: (214) 637-1835. Owner: Jerry Swafford. Manager: Jerry Swafford.

ELK AUDIO



PO Box 142763; Austin, TX 78714; (512) 323-2016. Owner: Evr Kuniansky. Manager: Eve Kuniansky.

EMERALD STUDIOS INC.



2411 NE Loop 410, Ste. 132; San Antonio, TX 78217; (512) 656-2427; FAX: (512) 656-8024. Owner: Mitchell and Sunny Markham. Manager: Sunny Markham.

FAST FORWARD RECORDING STUDIOS



505 Apache Trail; Leander, TX 78641; (512) 259-3742. Owner: John S. Ward. Manager: John S. Ward.

FIRE STATION STUDIOS



224 N. Guadalupe; San Marcos, TX 78666; (512) 396-1144; FAX: (512) 396-2296. Owner: Lucky Tomblin. Manager: Becky Tomblin.

FOREST GLEN AUDIO



1014 Forest Glen; Oe Soto, TX 75115; (214) 223-6999. Owner: Dave Hughes. Manager: Dave Hughes.

GOODNIGHT DALLAS/REAL TO REEL



11260 Goodnight Ln.; Dallas, TX 75229; (214) 241-5182. Owner: Anvil Media Companies. Manager: Ron Morgan. Specialization & Credits: Specializing in the recording of music projects, radio commercials and audio-for-video. Two locations offer five studios for flexible scheduling. Digital music recording on Sony Digital 24 track with a Neve console. Commercial digital recording, editing and mixing on WaveFrame workstations and DAT. Analog recording 2- thru 24-track. Also offering music and SFX libraries, sound design and music production with Sound Tools/Sample Cell/Studio Vision, real-time dubbing of reel-to-reels and cassettes. Clients and projects we have been involved with include: Coca Cola Texas, Coors Light, Mason Dixon Band, McDonalds, Motel 6 (Clio Award winner), Stevie Ray Vaughn, Mercantile Momentum/MCorp (Clio Award winner), First Gibraltar, Colors movie soundtrack (RIAA Gold Record Award), Ron C, Nemesis, Stevie Nicks, (RIAA Gold/Platinum Record Award), Walmart, TGI Friday's, Whataburger, Wolf Brand Chili, Ponderosa Steakhouse, Long John Silver's Seafood, Buckwheat Zydeco and The Texas Tornados for El Chico.

BOB GREEN PRODUCTIONS INC.



7950 Westglan; Houston, TX 77063; (713) 977-1334; FAX: (713) 977-1305. Owner: Bob Green. Manager: Emily McGowan. Specialization & Credits: By the time this is printed, we'll be on our way to adding a digital room, but we concentrate more on selling our production expertise and people than on touting only equipment. Our producer/engineers bring special talents and judgment that our advertising and corporate clients rely on. We have a gigantic music and sfx library that we know and use well. We offer creative options and ideas, yet perform our work with extreme efficiency. As to follow through and getting those dubs out on time, we'll be glad to supply a client list, and you can ask them. Free brochure and various demos including great voice-over talent pool on request. With FAX, phone patch and Fed. Ex., consider us one of your local sources...or fly here for a Texas welcome!

KNIGHTLIGHT STUDIOS



1609 Tantor Rd.; Dallas, TX 75229; (214) 506-9162; FAX: (214) 506-9250. Owner: Tim Miner. Manager: Jeff Adams.

LOMA RANCH STUDIO



Rt. 1, Box 97A3; Fredericksburg, TX 78624; (512) 997-3521. Owner: John & Laurie Hill. Manager: John Hill.

MANNA PRODUCTIONS



397 Oal Rich Village #252; Richardson, TX 75080; (214) 239-9636; FAX: (214) 239-9636. Owner: Mike Taylor. Manager: Shaval Taylor. Engineers: Mike Taylor. Dimensions: Studio 26'x19', control room 26'x19'. Mixing Consoles: Soundtracs 72 channel MIDI automated. Audio Recorders: A-DAT 24-track digital, Panasonic 3700 RDAT, Alpine F-1 PCM digital processor, Tascam MS16 16-track 1". Fostex G-16 16-track 1/2", (2) Tascam 122 MKII cassette, Nakamichi MRI cassette, Fostex 4030-4035 syncro. Digital Audio Workstations: IBM 330 MB HD, Turtle Beach & Texture 24-track sequencing. Monitors: Tannoy SGM 15" gold series, Hafler power amplifier. Other Major Equipment: Eventide H3000 SE with Steve Vai preset, Lexicon 200 digital reverb, Lexicon Prime Time II delay, (2) Roland R880 digital reverb, Hughes Kettner tube guitar equipment, Symetrix 528 vocal processor, Klark-Teknik DN780 digital reverb, (2) Alesis 3630 comp limiter, (4) Symetrix comp limiter, ADR stereo comp limiter, Hammond B-3 organ, Roland GP16 guitar processor, E-mu ProCussion drum module, Double Kick Set drums digitally triggered sampler, E-mu SP12 sampling drum machine, E-mu Proteus I, E-mu Proteus II, E-mu E-max sampler rack, Korg M-1 rack, Yamaha TG77 rack mount keyboard.

PATRICK MCGUIRE RECORDING



1402 Rockdale; Arlington, TX 76018; (817) 467-1852. Owner: Patrick A. McGuire. Manager: Patrick A. McGuire. Engineers: Patrick A. McGuire, David Morgan. Dimensions: Studio 20'x22', control room 10'x12'. Mixing Consoles: D&R 4000 Series 24 channel in-line. Audio Recorders: Mitsubishi X-4000 16-track digital, Sony PCM-2500 Pro DAT, Otari 5050 B-II 1/4" 1/2-track, Yamaha C-300, Tascam 122. Digital Audio Workstations: Digidesign Sound Tools on Macintosh ILC w/1 Gigabyte HD. Monitors: Tannoy LGM, Tannoy PBM 6.5. Other Major Equipment: Opcode Studio 3 MIDI interface, Opcode Studio Vision sequencer, Eventide H-3000 Ultra-Harmonizer, Yamaha REV5 multi efx, Yamaha EMP700 multi efx.

Yamaha SPX90-II multi efx, ART 01A reverb, Alesis Quadraverb, Aphex 612 Gates, Aphex Dominator II, Aphex Compellor II, (2) Symetrix 528 voice processor, (2) Symetrix 501 comp./limiter, Barcus-Berry 822A sonic maximizer, Neumann U87A microphone, AKG D112 microphone, AKG D12E microphone, (2) Audio-Technica ATM63 microphone, (2) Crown PZM 30GP microphone, Sennheiser MD431 microphone, (2) Sony C535P microphone, Yamaha MZ 204, (4) Shure SM57, Shure Beta 57, Yamaha G3 6" grand, Yamaha DX7II FD, Yamaha FG335 acoustic/electric guitar, Yamaha BB3000 bass guitar, Fender thin line Telecaster, E-mu Proteus 1 sound module, Alesis D-4 percussion module, Peavey Special 130 guitar amp, Acoustic G60T tube guitar amp, (2) Sony headphones, (2) AKG headphones, (3) Fostex headphones, (2) Sennheiser headphones. Specialization & Credits: Patrick McGuire Recording was established in August of 1984 to give musical artists in the Dallas-Ft. Worth Metroplex a quality, relaxed and affordable place to record. Patrick, with 20+ years at that time as a working musician, saw a place in the market for a studio that catered to the special needs of the artist. Music recording is still our primary focus. At Patrick McGuire Recording, we treat you with the respect you deserve. We want you to leave our studio with your sound, not ours or anyone else's. If you're proud of your work you do here, you'll come back and you'll tell others. This service-oriented approach has made us one of the most successful studios in our class in the Southwest.



MIDCOM REMOTE SERVICES
Irving, TX

MIDCOM REMOTE SERVICES



6311 N. O'Connor Rd., Ste. 108; Irving, TX 75039; (214) 869-2144; FAX: (214) 869-0898. Owner: Mike Simpson. Manager: Jeff Jones. Engineers: Jeff Jones. Mixing Consoles: Soundcraft TS-24 32x24x16x2x1 w/custom stereo grouping, Amek/TAC Bullet 12x4x2 w/2 stereo input module. Audio Recorders: (2) Otari MTR-90II 24-track w/custom transport software, Studer A-810 T.C. 2-track w/center stripe time code, (2) Nakamichi MR-1B cassette recorder w/Dolby B&C, Panasonic SV-3500 R-DAT recorder, Nakamichi DMP-100 F-1 PCM encoder w/external sync. Monitors: UREI 811B Time Align, Westlake BBSM-6 nearfield, Digital Designs OD161A nearfield, Auratone 5C video nearfield. Other Major Equipment: (2) White Instruments 1/6 oct. EQ for mains, Hafler P-505 mains amplifier, Hafler P-230 near-field amp., TTM 24-ch frame accepting Dolby, dbx & Telcom, CIPHER Digital 4700 Shadowll synchronizer w/Shadowpad, CIPHER Digital Cypher reader/generator/ inserter, Lexicon 480L digital effects processor w/sampling, Lexicon 224XL digital reverb, Lexicon Prime Time II digital delay, Eventide H910 harmonizer, (8) dbx 903 compressor/limiter, (2) dbx 904 noise gate, MicMix Dynaflex noise reduction for dbx BBE 702 sonic maximizer for dbx 900, (2) dbx 160X compressor/limiter, Aphex Compellor stereo compressor/limiter, Sony CV-1900 19" color monitor/receiver, Sony VO-5800 3/4" U-Matic recorder, Panasonic AG-6800 VHS Hi-Fi recorder, RTS 2-channel intercom system, Clear-Com 2-channel intercom system, Jensen custom 40 channel transformer mic splitter, Neumann TLM170, Neumann U89, Neumann KM84, AKG C-414EB, AKG C460B/CK61-ULS, AKG D12E, Electro-Voice RE20, Sennheiser MD421, Sennheiser MD441, Beyer M69, Beyer M88, Beyer MC734, Beyer M201, Crown PZM, Shure SM57, Shure SM58, Shure SM81. Specialization & Credits: Eddie Money "Unplugged" tour, Z-Rock Radio Network 1990-1992 live broadcasts including "Metallica," Queensryche, Dio, King's X, Black Crowes, Vinnie Moore, Ugly Kid Joe, & Shotgun Messiah; Dallas Cowboys Radio Network 1991-1992; Mary Kay Cosmetics 1985-1992 seminars; 2 Live Crew live music video. Stevie Nicks benefit concert for Jane Goodall; Alan Jackson music video for Fox network; Marcus Roberts "Deep in the Shed" music video; Island Records "Deep Ellum" compilation project; The Cure "Prayer" tour; Mark Stetler 6th String debut album, "Aida," "Nixon in China," "The Aspern Papers," Great Performance series for PBS; "Dolly," ABC-TV prime time; 1989 Miss US Pageant for CBS TV; "The Vocal Majority" two live albums; "The Texas Debates" presidential debates for APR; Anthrax "I'm the Man" live album (gold); George Strait New Year's Eve Video for MCA; Bob Banner Productions "Face of the 80's" syndicated TV special; 7th Van Cliburn Piano Competition for APR.

NEW AGE RECORDING



8607 Wurzbach Rd.; San Antonio, TX 78240; (512) 641-9818; FAX: (512) 641-9908. Owner: Richard Vela/Keith Harter. Manager: David Garza. Mixing Consoles: TASC Scorpion 24/16/2, Yamaha DMP7 digital mixer, Soundtracs PC series. Audio Recorders: Sony APR-5003

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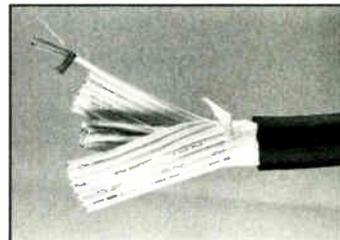
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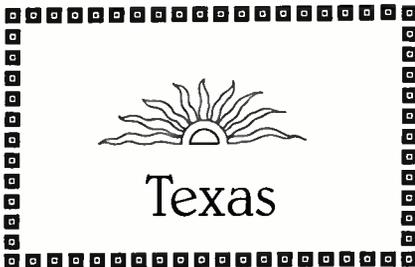
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2-track w/center channel T.C., (2) Panasonic SV-3700 RDAT, Sony PCM-7030 time code RDAT, Sony TCD-D10 PRD Portable RDAT, Otari MX-70 16-track, Tascam MS16 16-track, (5) Tascam 32 2-track dubbing, (3) Tascam 122 cassette dubbing, TEAC Z-7000 master cassette. **Digital Audio Workstations:** Digidesign Sound Tool, Digital Performer. **Monitors:** JBL 4430, Tannoy System 2 near-field, (2) Yamaha NS10 near-field, Auratone Cubes. **Other Major Equipment:** (2) Adams-Smith Zeta-3 synchronizers, (2) Zeta-remote, Eventide H3000S w/mod. factory upgrade, (3) Yamaha SPX90, Mark of the Unicorn wave board, Digidesign PRD I/O digital interface, Digidesign DAT I/O digital interface, (4) Mark of the Unicorn MIDI time piece, Mark of the Unicorn video time piece, Kurzweil 250 M1R rack mount w/soundblock A,B,C,D, (2) Korg M3r, (2) E-mu Proteus I & II, Korg Wavestation A/D, Roland D50, Roland U220, Roland R8-M, Roland D70, Yamaha TX 802.



OMEGA PRODUCTIONS/ENTERPRISES
Dallas, TX

OMEGA PRODUCTIONS/ENTERPRISES



7027 Twin Hills Ave., Ste. 5, Dallas, TX 75231; (214) 891-9585; FAX: (214) 891-9623. Owner: Paul Christensen, Chuck Billings. Manager: Steve Lowney. Engineers: Steve Lowney. Dimensions: Control room 30' x 8'. **Mixing Consoles:** API custom 32x32, Hill Multimix 16x16x8x4x2, Midas 40x24 (available on request). **Audio Recorders:** (2) Otari MTR-90 II 24-track analog, Otari MTR-10 2/4-track, (2) Sony 3324 24-track digital (available on request), (3) Technics cassette decks, (2) Mitsubishi X-850 32-track digital (available on request), Sony 3348 48-track digital (available on request). **Monitors:** (2) JBL 3340, (2) Yamaha NS-10, (2) Auratone. **Other Major Equipment:** Dolby SR noise reduction (available on request), (7) dbx 160 limiter, Teletronics LA-2A limiter, (2) UREI 1176LN limiter, ADR vocal stesser, dbx 162 limiter, dbx 165 limiter, Dyna-Mite Valley People limiter, BTX 4700 shadow sync unit, BTX 4500 time code reader/generator, Deneke time code reader/generator, Sony 14" video monitor, JVC 6600U 3/4 video recorder, (8) AKG 414 mics, (6) Beyer 201 mics, (2) Neumann U47 mics, (3) AKG 451 mics, (3) Shure SM81 mics, (6) Shure SM58 mics, (7) Sennheiser 421 mics, (5) Sennheiser 441 mics, (4) Shure SM53 mics, (7) Shure SM57 mics, (4) Crown P2M 31S mics, (3) Sony ECM 22P mics, (7) Countryman DI mics, (5) Heider DI mics, Audio-Technica ATM 5-R mic, AKG 10-12E mic, (2) Electro-Voice RE-20 mics. **Specialization & Credits:** Omega has been supplying remote audio recording services to the record, film and video industries since 1973. Their 40-foot Kenworth diesel remote facility is specially equipped to travel coast to coast. Partial credits/awards: two platinum records, five gold records, two Ampex Golden Reel awards, two RIAA gold video awards, three Grammy nominations, six Dove awards and one Silver Screen award. Artists: Lyle Lovett, Genesis, U2, REM, Lynyrd Skynyrd, B.B. King, Reba McEntire, Ricky Van Shelton, Little Feat, Neville Brothers, Joe Walsh, Prince, Art Garfunkel, David Byrne, Dizzy Gillespie, Roy Orbison, Fats Domino, Ray Charles, Clint Black, Neil Young, Fabulous Thunderbirds, Ramsey Lewis, Molly Hatchett, Texas Tornados, David Bowie and Jerry Lee Lewis.

PEDERNALES RECORDING STUDIO



897 Briarcliff, Spicewood, TX 78669; (512) 447-8558; FAX: (512) 447-0174. Owner: Freddy Fletcher. Manager: Robert Dodds. Engineers: Stuart Sullivan, Larry Greenhill, James Tuttle, Bobby Arnold, Spencer Starnes. Dimensions: Studio 2,000 sq. ft., control room 25' x 30'. **Mixing Consoles:** Tascam M700 40x32 w/Moving Fader Automation. **Audio Recorders:** Tascam ATR80 24-track 2" analog, Tascam DA-800 24-track DASH digital, Tascam ATR 2-track 1/2"

analog, Tascam ATR 2-track 1/4" time code, Tascam DA-30 DAT. **Monitors:** Custom Steve Durr 2-way passive crossover w/QSC & Belles amps, KRK 701 Reference, Yamaha NS-10, Auratone 5-C. **Other Major Equipment:** Acoustic Tile chamber, (2) EMT reverb/echo plates, Lexicon 480L reverb, Lexicon 300 reverb, Eventide H3000 SE w/sampler, Yamaha REV5, (2) PCM42, (2) Yamaha SPX1000, (24) Neve 80 Series inputs, (6) Neve comp/limiter, (2) Tube-Tech CL-1B, Tube-Tech stereo mic preamp, Summit stereo mic preamp, (2) Summit tube compressor, (6) Summit tube EQ, (6) dbx 160X, (2) UREI 1176, (2) UREI LA-4A, (8) Drawmer gates, Bosendorfer 7A grand piano, large selection of mics. **Specialization & Credits:** Clients—Willie Nelson, Ray Charles, Neil Young, Merle Haggard, Les Paul, Kris Kristofferson, Julio Iglesias, Herb Ellis, Bruce Hornsby, Stephen Tyler, Dolly Parton, Leon Russell, Waylon Jennings, Keith Carradine.



PLANET DALLAS RECORDING STUDIOS
Dallas, TX



PLANET DALLAS RECORDING STUDIOS
Dallas, TX

PLANET DALLAS RECORDING STUDIOS



PO Box 191447, Dallas, TX 75219; (214) 521-2216; FAX: (214) 528-1299. Owner: Richard Rooney. Manager: Tammy Whitt. Engineers: Rick Rooney, Ben Yeager. Dimensions: Studio 50' x 50', control room 25' x 20'. **Mixing Consoles:** MCI 528B with Otari disk mix. **Audio Recorders:** MCI/Sony JH-24, Sony JH-110C, Tascam 42, (4) Tascam 122 MK, Panasonic SV-3500. **Monitors:** (2) Lakeside Custom/TAD, (4) Yamaha NS-10M, (2) Auratone Cube, (2) Tannoy PBM 8, (2) Quadralflex 204L. **Other Major Equipment:** (10) API 560-B EQ, (2) Summit Audio TLA 100A compressor, (2) Summit Audio EOP 200A EQ, (4) Drban 6-22 B parametric, (2) Dietz Q-Metric parametric, (2) BASE Bedini Audio Spatial Environment, (2) BBE 822 Sonic Maximizer, (4) Brooke-Siren DPR 402, (4) dbx 160 compressor, (2) dbx 166 compressor, (2) UREI 1176 LN, AKG ADR 68K, (2) Yamaha SPX 900, (2) Yamaha SPX 90-Z, (2) Yamaha REV7, (2) Lexicon PCM 60 with updates, DeltaLab DL-4 Time Line, Lexicon Prime Time, Master-Room XL-305, (2) Aphex 612 expander gate, (4) Valley People Dyna-Mite noise gates, (2) Dolby 363 SR, (2) Neumann U47, (2) Neumann U87, (4) AKG 414, (2) AKG D-12E, (4) AKG C460 B, (2) AKG C451 E, (9) Sennheiser 421, (2) Sennheiser 441, (8) Shure SM 57, (2) Electro-Voice EV DS35, Beyer M380, MIDIMAN Synctan Pro synchronizer, Yamaha Drum Kit 8-piece recording series. **Specialization & Credits:** 24-Track with Otari Disk Mix Automation; analog or digital mixdown; DAT-to-DAT editing; studio design by Lakeside Associates of Los Angeles. Clients include RCA, Capitol, SBK, EMI, Rykodisk, Warner Brothers, Nettwerk, IRS, Gelfin, Sub Pop, Island, Priority, Virgin, Profile, Ray Ruff, MC 900 FT Jesus, Nemesis, XTC, The Bodeans, Sara Hickman, Mojo Nixon, Michelle Shocked, The Smithereens, Evan Johns and His H-Bombs, Earthquake, The Moon Festival, Shock TV, The Spin, Uptown Girls, Winter Hours, The Daylights, The Trees, Shallow Reign, Lesson Seven, Royal Flush, Consolidated, Gregory "D" and DJ Mannie Fresh, Reverend Horton Heat, Clever Pennies, The Shagnastys, Cool Christine, Voodoo Zyn, The Nixons, and Trisha Lynn. Also ShowBiz Pizza, Pizza Hut Inc. and Mitchell Fox Agency.

THE PRODUCTION BLOCK



906 E. Fifth St., Austin, TX 78702; (512) 472-8975; FAX: (512) 476-5635. Owner: Production Block Studios, Inc. Manager: Delaine Frasier.

RS

RAMPART STUDIOS
Houston, TX

RAMPART STUDIOS



6105 Jessamine, Houston, TX 77081; (713) 772-6939. Owner: Steve Ames. Engineers: Steve Ames. Dimensions: Studio 40' x 25', control room 13' x 18'. **Mixing Consoles:** Soundcraft 1624 w/automation. **Audio Recorders:** Sony JH-24 24-track, Sony APR-5000 2-track 1/2" & 1/4", Panasonic 3500 DAT, (3) Nakamichi cassette decks. **Monitors:** (2) JBL 4330, (2) Yamaha NS-10M. **Other Major Equipment:** (24) dbx noise reduction, Lexicon 20 digital reverb, Lexicon PCM 41, Lexicon PCM 60, Lexicon 91, (2) Aphex 9000 Aural Exciter, (2) Aphex Expressors, (2) UREI 1178, (2) Orban para EQ, Orban de-esser, (2) Yamaha SPX-90, Sony CD player, tube microphones, Neumann microphones, Roland R-8M, Atari 1040st computer, Hybrid Arts software, Aphex Impulse, Aphex exp./gate. **Specialization & Credits:** Rampart is a creative environment for both artists and producers, with an experienced, professional staff. Specialists in record, jingle and demo projects. Clients include ZZ Top, Kings X, the Judy's, the LA's, the Hunger, Galactic Cowboys, Gelfin, Atlantic, SBK, Megaforce, EMI, Columbia, Metalblade, and Rap-a-Lot Records.

REELSOUND RECORDING CO.



2304 Sheri Oak Ln., Austin, TX 78748; (512) 472-3325; FAX: (512) 282-0713. Owner: Malcolm H. Harper Jr. Manager: Deborah Harper. **Specialization & Credits:** Forty-two foot Sierra/Hidey audio truck-trailer designed for 24, 32 and 48-track digital and analog recording. For over 23 years we have been serving the on-location audio market. Some recent projects are: "Alan Jackson in Concert" (Nashville Network), "Riverwalk Live from the Landing" (American Public Radio Network), "Arcangel" (ABC In Concert), "Farm Aid V" (Nashville Network), "Queensryche Live Mindcrime" video (EMI), and "Bronco Live from Monterey, Mexico" (Apodaca). Whether you're working on a video, live broadcast, or album project, give us a call for complete information, rates and credits on the truck. Thank you.

SATURN PRODUCTIONS



17703 Craft Ct., Crosby, TX 77532; (713) 328-6752. Owner: Richard Cagle. Manager: Richard Cagle.



SOUND ARTS RECORDING STUDIO
Houston, TX

SOUND ARTS RECORDING STUDIO



2036 Paskett Ln., Houston, TX 77092; (713) 688-8067; FAX: (713) 464-2622. Owner: Jeff Wells. Manager: Alicia Valdez. Engineers: Jeff Wells, Brian Baker. Dimensions: Room 1: Studio 24' x 32', control room 20' x 16'. Room 2: Studio 10' x 10', control room 24' x 16'. Room 3: Control room 12' x 10'. **Mixing Consoles:** Trident Series 80B 30x24 for 54 channels in remix, Neve 8014 modified for 24-track w/1073 EQ, Neve BCM 10 w/1066 EQ. **Audio Recorders:** Tascam ATR 80 24-track 2" w/20 point auto locator, Otari MX80 24-track 2" w/remote, Tascam DA-30 DAT, Sony ES-75 DAT, Sony DAT-MAN DAT, 3M 2-track analog, Yamaha C300 cassette deck, Nakamichi MR-2 cassette deck. **Digital Audio Workstations:** Sonic Solutions digital time code editor w/graphics programs (Quark, Photoshop, Pagemaker 5) and w/Macintosh IIIx. **Monitors:** (2) Altec

—FROM PAGE 149, T&D "HOW AND WHY"

604 8G system w/stereo 31 band White EQ. (2) Yamaha NS-10, (2) JBL 4312, (2) TAC Studio 1 system w/offset correction, (2) Auratone. **Other Major Equipment:** Eventide H3000S Ultraharmonizer, Lexicon PCM 70 digital reverb, Yamaha REV7 digital reverb, Lexicon Prime Time II digital delay, (8) Alesis MIDIVerb II/III/Quadraverb, (2) Yamaha SPX90, (2) Neve 2254E compressor/limiter, Teletronix LA-2A tube comp./limiter, (2) UREI LA-4 tube comp./limiter, (2) dbx 160 comp./limiter, (2) UREI 1176LN black comp./limiter, (10) Neve 1066/1073 mic pres w/EQ, (9) Neumann U47/U67/M49/KM54 tube microphone, (50) AKG/Sennheiser/Neumann/EV/Beyer/Shure microphones, (6) Crown/Bryston power amps, Yamaha 6' Grand Piano, (8) Roland/EPYamaha/Korg MIDI keyboards, Roland MC500 Mark II sequencer, LinnDrum w/JL Cooper MIDI. **Much more.** **Specialization & Credits:** Sound Arts Recording Studio is conveniently located three blocks from the northwest corner of Houston's 610 Loop. We have a newly remodeled facility with a Trident 808 54-channel console complete with an arsenal of outboard equipment, including desirable vintage pieces, synthesizers and a Yamaha 6' grand piano. Also, a fully equipped MIDI pre-production room and a relaxed, creative, professional atmosphere. In the midst of Houston's city life, we have created a beautiful outdoor garden setting with waterfall, pond and barbecue pit. Experienced engineers and producers to help you complete your project, on time and within budget. Composers, arrangers and studio musicians available. Other services include BMI music publishing and recording engineering classes. We personally invite you to come visit us and listen to our quality productions. Recent projects include the platinum album Geto Boys, gold album Scarface, Gansta Nip, Too Much Trouble and OG-Style. Call for brochure and affordable rates. Thanks!

SOUND FACTORY

1807 Post Oak Ln., Carrollton, TX 75007; (214) 394-4515. Owner: Steve Garrett.

SOUTHWEST RECORDINGS

2031 Libbey; Houston, TX 77018; (713) 681-7565. Owner: Jeff Smith. Manager: Jeff Smith.

STUDIO WEST

15523 Barbarossa; Houston, TX 77083; (713) 530-1179; FAX: (713) 530-1705. Owner: Tom Tena, J.R. Kuznia. Manager: J.R. Kuznia.

SUMET SOUND STUDIOS

7027 Twin Hills Ave.; Dallas, TX 75231; (214) 691-1740; FAX: (214) 691-6616. Owner: Ed Bernet. Manager: Bobby Dennis.

UNREEL SOUND

PO Box 426, Rt. 1 Box 156; Decatur, TX 76234; (817) 62-SOUND; FAX: (817) 627-1004. Owner: Barry Eaton, Kenneth Wilson. Manager: Barry Eaton.

 **Mexico**
PROMICAST

Minatitan No. 8-1; Col. San Jeronimo Lidice; 10200 Mexico D.F., Mexico; (011) 525/65205 93; FAX: (011) 525/65224 08. Owner: Eugenio Castillo. Manager: Rossana Fernandez.

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mastering engineers Randy Kling (Disc Mastering Inc.) and Denny Purcell (Georgetown Masters) noted that when they had been given the opportunity to work with duplicators in optimizing program for cassette, the results were very positive. Purcell said that in some cases he had gone so far as to prepare his own Dolby B-encoded DATs for use at the plant. Kling told of the improved quality he had been able to achieve by communicating with dupe plants regarding how his cassette masters could best meet their needs.

Part of the process of communicating, of course, is the use of a common language. Given all the variables like tape type and slave electronics that can affect the sound of a finished cassette, it is important that engineers in mastering houses and dupe plants can easily communicate about problems with a particular program and how to deal with those problems. One step toward improving this communication has been the efforts of Sony Music Technology, working through the RIAA engineering committee, to adopt a Maximum Duplication Level standard as a point of reference in discussing cassette master signal content.

Tom Rucktenwald of Sony was on hand as part of the panel to describe the MDL proposal. His presentation covered much the same ground as the interview with him that ran in this space in May 1992, but he was more specific about Sony's ideas for implementation of the standard in various meters. The core of the design is a set of circuits that will be part of the MDL specification, available to any equipment supplier who wants to make MDL meters. The circuits provide a frequency response characteristic that is the inverse of the signal-handling capacity of the tape (defined as less than 3% THD below 5 kHz, and MOL above 5 kHz). Selectable curves for average Type I and Type II tape will be provided, as well as an adjustable setting for tailoring to the capacity of a specific tape.

Once pre-emphasized by the circuits, the signal is sent to a metering device. Sony envisions different types of metering for different applications, ranging from a simple LED-overload indicator to PPM meters or a full spectrum analyzer. PC-based systems

that could be optimized for this function are in development. The simple indicators would let engineers, producers and clients know when they are up against the limitations of the tape type they plan to duplicate on. The more sophisticated implementations would yield the kind of information that could help in deciding whether to handle a problem by upgrading tape type, reducing level, using EQ and/or compression, etc.

REUSABLE/RECYCLABLE PACKAGING

In a forward-looking move from one of the duplication industry's main suppliers, BASF has developed a system for the collection and reuse or recycling of packaging materials from its bulk tape products. Explaining the need for such a system, BASF's Werner Singhoff told the seminar that the cartons, cores and related packaging used by the company each year could fill a 25-mile-long line of 40-foot semis.

As an alternative to simply disposing of this waste, BASF came up with the Eco-Shuttle system: Tape is supplied in reusable plastic boxes, double-molded for stability and insulation, that may also serve as pancake trays. Once all the pancakes are removed, the boxes may be flattened and returned to the outer carton in which they arrived at the plant, along with spacers, hub supports and cores. When the cartons are full, they are returned to the regional BASF distributor, who ships them back to BASF factories in Europe. When the materials become too worn for further use, they are recycled into new packaging.

Singhoff said the system has been field-tested over the last year, and user suggestions have been incorporated. He emphasized that its ultimate success will depend on a cooperative partnership between BASF and duplicators. BASF won't charge for the packaging, but the company will ask that the materials are returned within three months. While freight charges between the regional distributors and BASF's factories in Europe will be paid by BASF, it has yet to be decided who will pay freight from the duplicators to the distributors. ■

Philip De Lancie is a mastering engineer at Fantasy Studios, Berkeley, Calif.

in and out can block your view of the players. You can reduce the traffic by using the kind of low, soft, bean-bag couch that's hard to climb out of. Better still, take the legs off. That'll *really* anchor 'em.

Two small problems remain. One is that a couch only holds a few people, and we occasionally get mobbed with visitors. The other is that ordinary carpet has virtually no low-end absorption because it's so thin. In a larger area, thin carpet can unbalance the room with its top-only effect.

Both these difficulties yield to a single solution. Cut off the platform floor at the console to make a 3-inch pit up front, and fill the pit with padding and shag carpet. The bass absorption will be greatly improved, the carpet will be soft enough to accommodate surplus visitors, and if you cut it out around the couch you will effectively lower it even further. They'll never get out of it.

Cable runs to the studio for microphones, tielines, cue circuits and the like are most practically carried in standard electrical trough. It's not pretty, but it gives great shield, it's easy to seal at the walls (wet newspaper), and you can't beat it for running new cable. It'd be a damn shame to turn down film work because you'd run everything in the walls and couldn't drop in co-ax for video monitors in the studio.

Walls and Materials

The job of control room walls is to keep outside sounds out and inside sounds in: i.e., soundproofing.

Actually, a *reasonable* degree of soundproofing. Nothing on earth will make a single room genuinely proof against all sound. Worse, perfect soundproofing is expensive beyond belief, so let's define the degree of isolation needed for recording work. The idea is to avoid feedback from the monitors to the studio mics, not to preserve the silence of death in the studio.

It's easy to figure. Worst case: You'll have a mixer listening at full thunder to a quiet singer six inches off a mic. That's 120dB SPL for the mixer, 84dB SPL for the mic. The difference is 36 dB. Sounds wrong? It is. So add 12 dB for vocal limiting, yielding 48 dB, and then subtract 20 for the studio absorption. Final *necessary* isolation for the control room

walls is 28 dB, which suggests that we overbuild control rooms something terrible. We do and we don't.

As anybody with a little studio experience knows, the usual control room walls shut out the top-end sound from the studio very well indeed, but if you sky a condenser mic, the 30-50Hz feedback will send the woofer cones across the room.

Fact is, most control rooms have marginal isolation at low frequencies as a result of wall construction, very big windows and/or sound transmission through the floors and ceilings.

Let's begin with the control room walls. To avoid transmitting sound, a wall must be rigid enough not to drumhead section by section, heavy enough not to move as a whole, and air-tight. The only ordinary construction that meets all those specifications is masonry. Not a popular idea, this answer is usually met with disbelief, followed by sputterings about weight, costs, and problems with the landlord.

Most of the objections are based on misinformation, although the weight problem can be real. Even with the lightweight cinder block currently available, masonry walls come in at about three times the mass of the more conventional double-wall with an inch of gypsum board on each side. So if the foundation slab won't take the weight, forget it. On the other hand, it's smart to look into the possibility of using masonry, as there are a number of advantages to the stuff. Among these are speed of construction, which makes the total costs *very* competitive, the cleanliness of the process of building a wall and tearing it down, and the fact that cinder block is a good acoustical material. Block is *rigid*, so its inherent low-frequency rejection is much better than that of flexible materials.

The rigidity bit is what separates silk sows from standard oinkers. Building a rigid wall with flexible materials is obviously absurd and even becomes embarrassing if you look at the published data on gypsum-paneled walls. Not the Sound Transmission Class figures, which are a form of average loss intended for rough comparisons rather than design purposes, but the more complex charts that list losses at various frequencies. These charts show that the 125Hz loss of walls is commonly 20 dB or so *less* than the published

STC loss. Why? Because the STC contour has a built-in 20dB slope from 1,250 Hz to 125 Hz, but even allowing for that, STC is an unreliable figure for music isolation, where the bass is likely to be as loud as anything else, if not louder.

For example, an STC 35 2x4 wall with 1/2-inch gypsum board on each side loses 47 dB at 2 kHz, but only 15 dB at 125 Hz. Double the board thickness and the STC is 39 and the 2kHz figure rises to 53, but at 125 Hz it's *still* 15. That's a difference of 24 dB between STC and low-end performance. Build for 39, get 15. We need a minimum of 28, remember? So if you sky a drum mic...

While a 2x4 frame is nearly as heavy as one layer of gypsum board, you'd expect that nearly doubling the mass of a wall would improve its isolation. In fact, nothing happens at 125 Hz, and the 15dB loss through the walls just detailed is 3 dB *worse* than for a single sheet on an open frame, which demonstrates that gypsum board is a strange material in terms of soundproofing.

Time for some hard data. The most common studio walls are 8x8x16-inch concrete block and double 2x4, 16-inch O.C. stud walls with 1/2-inch sheets of gypsum board outside and seven inches of Fiberglas between walls. A third, less common construction is double sheets of 1/2-inch gypsum board on either side of single 3-5/8 *metal* studs on 24-inch centers, again stuffed with Fiberglas. (See Fig. 1.)

All three work at 125 Hz, but the low-end loss curve for the double-wall construction is about 12 dB per octave, so 60 Hz should be 26 dB and 40 Hz, where the speakers pinch off, about 17.

The metal stud wall is better at about 8 dB/octave, and masonry shows the flattest response at 6. Unlike the others, masonry follows the mass laws, allowing it to be calculated at a firm 28 dB for 40 Hz. That'll work.

At this point we have two basic kinds of wall: masonry, which any apartment dweller will testify is soundproof, and lightweight, sophisticated wallboard construction that depends on design and fabrication to work properly. Leaving out the Fiberglas, for instance, will cost you about 10 dB of isolation.

There is nothing in the literature to suggest that using two sheets of

wallboard on each side of a double stud wall will improve low-end rejection, although two 1/2-inchers or one 5/8 on one side would probably be good for 2 to 3 dB. The problem lies in one side resonating the other across the gap between them, so dissimilarity helps.

For a real difference, use stiff panels on one side of the wall. Stiff translates to hard, rigid, makes no sound when you hit it. In short, particle board.

Particle board is not the name of a product, but of a process. Georgia-

inside a control room, if only on the speaker walls, makes sense from a monitoring standpoint.

One-inch board is easy to set in place and seal, as it has big, square edges. At 125 pounds a sheet, you need a little help, but it supplies some, and it's less than half the work of two individually caulked 1/2-inch sheets of wallboard.

A 3-5/8-inch metal stud wall is not only superior acoustically but does better on costs. For one thing, the number of studs is about 30% of the double-wall construction, with

| FREQUENCY (Hz) | STC | 125 | 250 | 500 | 1K | 2K | 4K |
|----------------|-----|-----|-----|-----|----|----|----|
| MASONRY | 50 | 38 | 44 | 49 | 54 | 58 | 62 |
| DOUBLE STUD | 59 | 36 | 48 | 59 | 64 | 66 | 63 |
| METAL STUD | 54 | 39 | 46 | 55 | 61 | 63 | 55 |

Figure 1: Sound Transmission Class ratings of wall materials at various frequencies.

Pacific lists 63 varieties of the stuff, ranging from thin, flexible, incredibly cheap chipboard to something called Lamiboard, at 200 pounds for a 1-inch sheet. The more ordinary products found in building supply houses come in 1/2- through 1-inch thicknesses. They're 17%-20% heavier than gypsum wallboard, but at 3/4- and 1-inch, they're *rigid*.

Also expensive. Don't panic, though. While a double stud wall control room *without* a back wall requires three gross of 2x4s, it needs only 80-odd sheets of paneling, so the panels are a fairly small proportion of the material costs.

Size for size, common particle board costs three to four times as much as wallboard, and the fireproof versions, which carry the same fire ratings as gypsum, are about 2-1/4 times the cost of the standard. But even if you used the fireproof stuff for both sides, the difference would be about half the cost of the 2x4s. Wallboard is dandy above 1 kHz, particle's good down low.

The resonance and drumming of wallboard has a nasty tendency to add harmonics to bass, giving the mixer a warm, smooth, *false* bass sound that leads to surprises when listening to the product in other rooms. One-inch particle board doesn't drum much, and 2-inch won't drum at all. So using the stuff

an equivalent reduction in labor. For another, the studs themselves are about the same price as standard 2x4s but half that of the fireproofed version. If you're building in an area with fire codes that specify *no* combustible materials in a compound wall, metal stud construction reduces the frame costs to 15% of a wooden double. Finally, metal studs can be bought at any length, which makes building 16- to 20-foot walls simple, and for high walls or a little better isolation, 2x6 metal studs are available at 50% over the cost of the 2x4s.

To summarize, if you can stand the weight and are willing to hire the work out, cinder block is probably the best choice for control room wall construction. If not, a single 2x4 or 2x6, Fiberglas-stuffed, metal stud wall with fireproof particle board inside and either that or two sheets of gypsum board outside will likely prove lighter, easier, better and cheaper than double wood stud construction.

This series concludes next month with Part 3, covering acoustical materials, windows, lighting, equipment locations, airflow and...a door. ■

Chicago-based Malcolm Chisholm has worked as an audio engineer, acoustician and consultant for the past 30 years.

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October 1992

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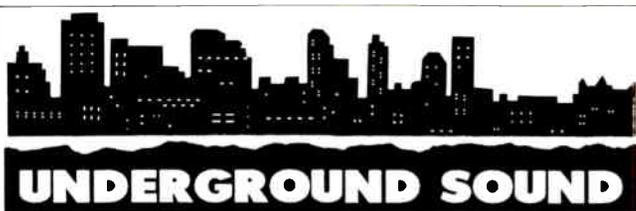
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—FROM PAGE 89. DIGITAL FILM SOUND

time, with its consequent smearing of one syllable into the next, with deleterious effects on intelligibility. The stereo era solved the problem of hearing monaural films in dead theaters, where the location of the loudspeaker became overly evident, for now we had a means to reproduce reverberation of any space, correctly balanced and spatialized. So low reverberation time is very useful for speech intelligibility and for stereophonic localization.

Low background noise is useful too, for obvious reasons. THX specifies a maximum background noise level of NC-30. As a design goal, NC-25 is highly desirable. The Stag theater at Lucasfilm has a background level of NC-15. Since it is that much quieter than typical theaters, it is also more revealing. This can be a problem because too much time may be spent in the mix on details that will be inaudible elsewhere. For this reason, we generate electronic noise that sounds like an air handler, operating at recommended background levels, so that the mixers can hear the effect that the noise has on their

program material.

The most interesting thing about film mixing is the degree to which the various producers and theaters are highly standardized. While not all theaters meet all of the standards, there is one common goal in mind, that of reproducing the dubbing stage sound in the theater. And while reproducing music is complicated by comparison to live situations, for film sound there never is a "live"; the only sound heard in a film mix is produced by loudspeakers. Now a great deal is known about this loudspeaker experience: the frequency range and room response, the stereo localization including envelopment and depth, the direct-to-reverberant ratio, and the like. And thanks to the development of new digital sound-for-film formats, reproducing sound the way the filmmaker intended is an available goal today. ■

Tomlinson Holman was instrumental in the development of the THX motion picture presentation environment. He now teaches at the USC School of Cinema-Television.

—FROM PAGE 80. WHERE ANALOG & DIGITAL?

the interest charges on the production loan to exceed the post-production budget on a weekly basis. So, lots of people are hired for a short period of time to get the job done fast, despite the fact that this makes post on film an extremely labor-intensive process when there are capital-intensive processes (the digital audio workstation) available as alternatives.

The peak-to-RMS problem has to do with use of digital audio workstations. If enough were purchased to handle the 50 sound editors working on the largest pictures (and even granting that it might take fewer people), what would this equipment do until the next time that many stations are needed? There simply isn't enough work to keep them all busy all of the time. Thus we have a post-production "peak headroom" problem that has nothing to do with audio! So analog techniques are used for these reasons today, but it is clear that the future lies with random access digital post systems because of their speed of access to the material. ■

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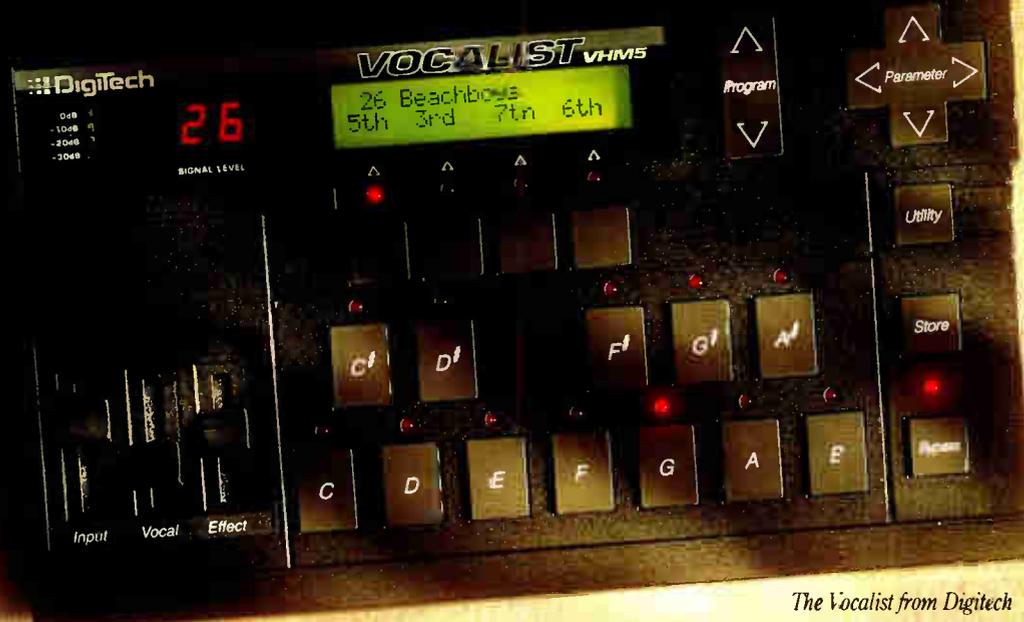
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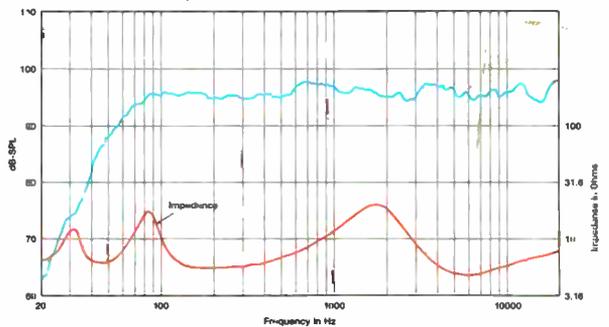
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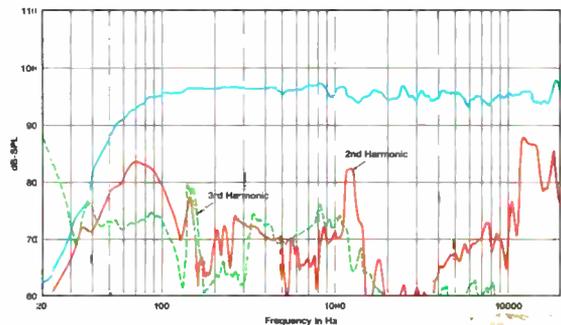


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