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AUDIO

MASTERING

Cover: KAO Infosystems Company, Optical Products Group, opened two audio premastering suites at its Lancaster, Pa., manufacturing facility. The main room features a Sonic Solutions editing system with 8mm tape drive and Start Lab's CD printer. Both rooms include Sony PCM-1630/DMR-4000. Sony and Panasonic DAT recorders, and Meyer HD-1 monitors. The rooms were designed by Rick Lehman using treatment by RPG Diffusors and ASC Tube Traps. **Photo:** Brian Tolbert/brt.

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AT&T

FROM THE EDITOR

Hyperfidelity...The Future Is Now

Digital recording systems have been around for nearly two decades. And though the digital vs. analog debates continue, there's no denying that digital technology has come a long way, with improved anti-aliasing filters, superior analog-to-digital and digital-to-analog converter designs, oversampling and 1-bit encoding schemes, true 20-bit systems and higher-quality analog components following the DACs in playback circuits.

Unfortunately, during this same period, pro audio gear often took a backseat to what was available in consumer living rooms. While home DATs offered 48kHz recording, pro users were typically limited to working at 44.1 kHz, due to the limitations of the Red Book CD standard. About four years ago, I engineered some album tracks on Yamaha's DMR8 20-bit recorder/digital mixer and was thrilled with the clarity of the sessions—that is, until I truncated the 20-bit mixes to 16-bit DAT. The effect was dull and lifeless, similar to that of hanging wet towels over your studio monitors: disappointing, to say the least.

In the past year, the world of pro digital has changed dramatically. Workstations capable of 20-bit audio are becoming more common, and the population of Sony's 20-bit PCM-9000 optical recorder/editors is on the rise. Retrofit 20/24-bit encoding systems for DASH multitracks have been announced by Studer and third-party companies. At the lower end of the price scale, devices such as PrismSound's MR-2024T or the Rane Paqrat can turn modular digital multitracks—the Alesis ADAT, Fostex RD-8, Tascam DA-88 or Sony's new DA-88 format 8-track (announced at last month's AES)—into 20- or 24-bit recorders, fed from outboard converters. Besides their obvious use in recording/tracking applications, these turbo-charged MDM systems provide an affordable alternative as stereo or multichannel (LCRS) mixdown decks.

With all these advances, we're still stuck with 16-bit CDs. But there's hope. Several systems designed for retaining the sparkle and punch of 20-bit recordings on standard 16-bit CDs are now available. In this issue, Dan Daley reports on the use of Sony's Super Bit Mapping process in the re-release of the late-1950s Vanguard classical recordings, which were transferred from the original 35mm sprocketed mag masters to CD by the use of SBM technology. And noted mastering engineer Toby Mountain tests Apogee Electronics' UV-1000 system for encoding 20-bit performance onto CD releases.

So while the record industry is currently locked into 16-bit playback media (I won't even get into 8-bit multimedia, MiniDisc and DCC), it's nice to know that high-resolution options are available to all studios. As for the future of hyperfidelity, let's put that on hold. We're off to AES now, and we'll provide a detailed report next month.

Stay tuned,

George Pe

George Petersen,
Editor

More records go gold on Ampex than on all other tapes combined.

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POWER

CHANNEL B
CLIP

ALESIS

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Matica Power Output Rating   *Typical, 1kHz 1%THD, both channels driven.*

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Matica 500	162 Watts	250 Watts	350 Watts	500 Watts	650 Watts
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CHANNEL A
CLIP

POWER

CHANNEL B
CLIP

ALESIS

MATICA 500

HIGH SPEED · WIDE BANDWIDTH
DUAL CHANNEL POWER AMPLIFIER

CURRENT

AVID ACQUIRES DIGIDESIGN

Avid Technology Inc. (Tewksbury, Mass.) has acquired Digidesign Inc. (Menlo Park, Calif.) in an exchange of stock shares valued at $204 million. Completion of the agreement is expected by mid-January, subject to approval by shareholders.

Avid and Digidesign have been working together closely in recent years. Avid incorporates Digidesign software products and technology into many of its products and is currently Digidesign's largest customer.

Digidesign president and CEO Peter Gotcher says, "Digidesign has long shared with Avid the vision that digital solutions are changing the way that media professionals work. By combining our audio expertise with Avid's expertise in video, film and related technologies, we believe we can deliver greatly enhanced production tools to our customers."

Under the proposed terms, Digidesign shareholders will receive 0.79 shares of Avid common stock for each share of Digidesign.

WORLD MEDIA EXPO:
REPORT FROM THE FLOOR
by George Petersen

The concept seemed good, but the outcome remained unclear as the 1994 World Media Expo, held October 13-15, came to a close. The expo grew out of the idea of combining several smaller conventions, notably the Society of Motion Picture and Television Engineers (SMPTE) and the NAB Radio Show, with meetings of the Radio-Television News Directors Association (RTNDA) and the Society of Broadcast Engineers (SBE).

Nearly 500 exhibitors packed into the newly remodeled Los Angeles Convention Center for the event, but a low turnout of attendees left a sour taste in the mouths of many of the companies showing product. Conjecture concerning the low attendance seemed plentiful, ranging from the general state of the economy to competition from another California show, the AES Convention, held in San Francisco less than a month later. Last year's SMPTE show was held in Los Angeles, and holding the show at the same site two years in a row may be another factor contributing to lower attendance. Additionally, with this new combination show, there may have been some confusion and/or lack of awareness about the name World Media Expo.

On the plus side, the majority of those who did attend seemed to be qualified, serious professionals, and the companies who fared the best were those whose products appealed to both radio *and* production/post-production markets. From a technology standpoint, the hot topic of conversation at the show revolved around systems for sending digital audio over telephone lines; with the availability of low-cost ISDN lines, this is sure to become a key issue of discussion for studios, broadcasters and post-production facilities alike. Attendance aside, the event was well-planned and organized, and the refurbished Convention Center made for an excellent venue.

The next World Media Expo is slated for September 6-9, 1995, in New Orleans. We'll keep you posted on further developments. For more information about NAB events, call (202) 775-4971.

TWO KEY EXECS LEAVE HARMAN TO RUN SPECTRAL

Lance Korthals and Tom Jorgenson recently left senior executive positions at Harman International to become the largest shareholders and top management at Spectral Inc., the newly rechristened digital audio workstation manufacturer formerly known as Spectral Synthesis. The two share the title co-chairman, with Korthals serving as president and Jorgenson as CFO and COO.

Jorgenson, a ten-year Harman veteran who played an active role in that company's recent acquisitions of Studer and AKG, says that he was attracted to Spectral because of the growth potential of the company's existing products, and a loyal and committed staff. "Now we're creating the marketing, channel management, manufacturing and engineering infrastructure we'll need to produce and sustain our projected rate of growth," Jorgenson said. "We'll also be applying more sophisticated financial and operational strategies to ensure that Spectral is delivering the range and quality of products we feel pro customers should be demanding."

LIVE SOUND WORKSHOP SCHEDULED

The sixth Live Sound Reinforcement Workshop, sponsored by PSN Publications, will be held January 16-18, 1995, on the Chapman University campus in Orange, Calif. (preceding the Winter NAMM show in Anaheim). Afternoon sessions will include beginner and advanced tracks in loudspeaker design, signal processing and computer control interface. The workshop will be held "on location" with a live band so that all the principles being dis-

RIC BRADEN: 1960 -1994

On November 4, 1994, our staff was saddened by the news that *Mix* graphic artist Ric Braden passed away after a bout with cancer. A creative artist and designer, Ric was also a gifted composer/producer with a love of *musique concrete* and alternative production styles. He will be missed.

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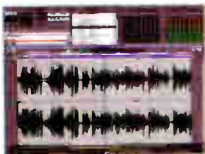
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A · V · I · D

INDUSTRY NOTES

Alesis Corp. (Los Angeles) created two new positions, hiring **David Oren** as professional products sales manager and **Jim Mack** as sound reinforcement marketing manager…**Stephen Rose** is the new director of sales and marketing at Chicago-based **Neotek**… **Apogee Electronics** of Santa Monica, CA, hired **Carol Craft** as digital media specialist and appointed **Michael Nicoletti** as technical support manager…**Korg U.S.A. Inc.** (Westbury, NY) promoted **Michael Kovins** to president and **Joseph Castronovo** to executive vice president…**Pinnacle Micro Inc.** of Irvine, CA, added a chief financial officer position to its executive management team, hiring **James W. Kerrigan**, formerly CFO for PDA Engineering…Several appointments at Rochester, NY-based **Applied Research & Technology Inc.** (A.R.T.): **Laurie Stewart** is the company's new direct marketing coordinator, and A.R.T. product specialist **Jeffery Cary** joined the marketing communications department. **Nancy Kimbel** was promoted to the sales force in the position of media placement…Little Ferry, NJ-based **Eventide** appointed **Nicholas Rose**, a founder of DAR, as director of audio engineering…**Dean Slagle** was promoted to the position of senior vice president, operations and human resources, at **Audio-Technica** (Stow, OH)…**Michael May**, formerly with Siemens, joined Los Angeles rental and remote company **Design FX Audio** as director of marketing and sales…**Bag End** rep **Michael Kropp and Associates** added upstate New York to its territories…**Joseph Kempler** recently retired from his position as technical director of **SKMA** (formerly Sunkyong Magnetic America). Kempler joined the company in 1988 and pioneered many technical innovations and improvements while there. Prior to that, he was with Capitol Magnetics. **Peter Pi-** otrowski has assumed responsibility for the Technical Services Division of SKMA…**IRP Professional Sound Products** of Bensenville, IL, added two reps: **Peregrine Southwest Reps Inc.** is handling Texas, Oklahoma, Louisiana and Arkansas, while **Bormann Marketing** will cover Illinois, Wisconsin, Minnesota, and North and South Dakota…**Polydax Speaker Corp.** (Wilmington, MA), a subsidiary of Audax Industries, France, appointed **Matt Daigler** to the newly established position of West Coast project manager…**Ensoniq** recently provided an entertainment and sound package for the Sixth Annual MicroGrafix Chili Cook-Off For Children, featuring Master of Ceremonies Pat O'Brien…**Lightwave Systems Inc.** (Dallas, TX) appointed **Michael C. Creamer** national sales manager…**Dave Burns** rejoined Quincy, IL-based **Harris Allied** as radio studio product manager. The company also promoted four employees to international regional sales director positions: **Warren Bottorff** will handle southern Asia and Pacific Rim countries; **Terry Bonkowski** is covering northern Asia and the Pacific Rim; **George Koumblis** is sales director for Middle Eastern countries and North Africa; and **Vic Reardon** is handling the rest of Africa…In a move to expand its presence in the West Coast market for CD-ROM publishing and software services, **Metatec** (Dublin, OH) recently acquired **Compact Disc Services Inc.** of Saratoga, CA…**UniDisc Inc.** moved to 260 Sheridan Ave., Ste. 410, Palo Alto, CA 94306. Phone (415) 328-7187, fax (415) 328-7188…The architecture department at the **University of California at Berkeley** named acoustical consultant **Charles M. Salter** adjunct professor…**The Recording Workshop** (Chillicothe, OH) has signed on as an official **Digidesign Pro School** educational affiliate. ∎

cussed can be demonstrated, including power, rigging, house speaker systems, monitors, house mixing and microphone techniques. For more information, call (812) 995-8212.

VERBATIM AND SANYO TO FORM JOINT CD VENTURE

Verbatim Corp. of Charlotte, N.C., and Sanyo Laser Products Inc. signed a letter of intent to form a joint venture that will be one of the largest independent CD-ROM and CD-Audio producers in North America.

The joint venture is being formed with contributions from both sides: Sanyo's Richmond, Ind., CD plant will be augmented with Verbatim's optical disc technology and sales and marketing expertise. In addition, Verbatim will contribute an undisclosed amount of cash for capacity expansion at the Sanyo-Verbatim facility.

"Our facility already has significant capacity to produce both CD-Audio and CD-ROM products," says Hidetaka Iijima, president of Sanyo Laser Products. "An immediate expansion will allow the joint venture to produce 50 million units of CD-Audio and CD-ROM discs annually. We expect to increase the annual capacity to 100 million units within two years."

Verbatim president Nicky Hartery says, "Almost half of Verbatim's current business is in the OEM market. Many of our customers have asked us about expanding our CD-ROM services, and now we can offer them the full range of CD-ROM services."

A joint venture sales force will handle the CD-Audio business as well as develop the new CD-ROM business among corporate and government clients, book and multimedia publishers, game and educational software developers and entertainment-based institutions. Verbatim's OEM group, as agent for the joint venture, will focus on CD-ROM sales to computer OEMs and software publishers and duplicators. ∎

ADAT Sy

The Latest Masterpiece

by Stephen St.Croix

MICRO-COLUMNETTE SIX-PACK

I know that I told you this would be the next in the mini-series on CD-R, but I still haven't received all the software or hardware that I want to include. Also, my real-world accelerated CD-R media wear/failure tests are not complete (somewhere out in the Arizona desert, a dark blue Porche Cabriolet sits with the top up and the windows closed, with one of the test CD-Rs in its CD player, and *it still plays*). So, a little more time is needed. While we wait, here are six points that are each too short for a column; so I packaged them up and turned out a six-pack.

1) FRY THE
FIENDLY SKIES

Well, all the airlines finally got together and solved the incredibly stupid anti-CD player ruling by also declaring *calculators* to be illegal. This is actually very clever, as it is so ludicrous that you almost *forget* that you wanted to use your CD player, because you are far too preoccupied with not being able to double-check the 2,716 miles that they claim frequent fliers will be granted for the Baltimore to Denver leg.

Meanwhile, several air-lines using new Airbuses have the new skyphone system, which not only lets everybody onboard saturate all surrounding space within a seven-mile sphere with high-powered RF, but also lets them hook up those illegal computers to standard phone jacks so that they may happily send and receive faxes all day at $2.50 a minute, while they watch one of 40 high-current, digital, TFT, LCD color televisions, which are

by Paul Stubblebine

FORMATS AND THE MASTERING ROOM

A little over ten years ago, when the CD format was introduced in this country, there was a lot of talk both inside and outside the mastering profession about how CDs would change the nature of mastering.

There seemed to be a supposition that most of the mastering engineer's efforts were directed at optimizing, or compensating for, the LP medium, and that without the limitations of that medium, there would be no more call for the engineer to treat the sound in any way. I recall one letter to the editor in a consumer audio magazine suggesting that "all those knob-twiddling mastering engineers" would soon enter forced retirement.

Looking at mastering now, with ten years of CD mastering under our belts, I don't perceive that the letter's prediction has come true, but I am intrigued by the way that a couple of other trends have quietly been expanding the way we think about our craft.

Fundamentally, I think I'm doing the same job I was doing ten years ago, and I think most other mastering engineers would agree. Although I spend a lot less time carving a groove in a piece of lacquer and a lot more time in front of a computer screen, the rest of my job can be described exactly the same way; I am taking the artist's stereo mixdown and trying to put its best foot forward, with an EQ nudge here, a level trim there, some help on a fade, a nip and a tuck, whatever the project needs to make it come across best. And of course, I am providing a master in the form that makes it easiest for the manufacturing plant.

I still do EQ touchups on a large percentage of the projects that come through. I don't feel that I'm EQing to compensate for the CD medium, but in retrospect, I'd have to say that very little of the EQing I did in LP mastering was to compensate for the medium. What for, then? The answer is always "to make the musical message come across better," and that involves what has, over the years, been one of the most consistent purposes of EQ: to get back to what the producer and artist thought they had in the control room.

There may be many contributing factors to people getting fooled by what they hear in the control room, including fatigue, mood-altering experiences and just being too close to a project to hear objectively. Still, I believe the biggest factor is that the sound in control rooms varies all over the map. After ten years of digital recording and/or recording for a digital end product, what has the digital revolution done for control room monitoring? As far as I can tell, it has increased most people's sensitivity to hiss, hum and buzz in the electronic system, but it hasn't revolutionized the control room monitoring situation in any way. Of course, any studio owner
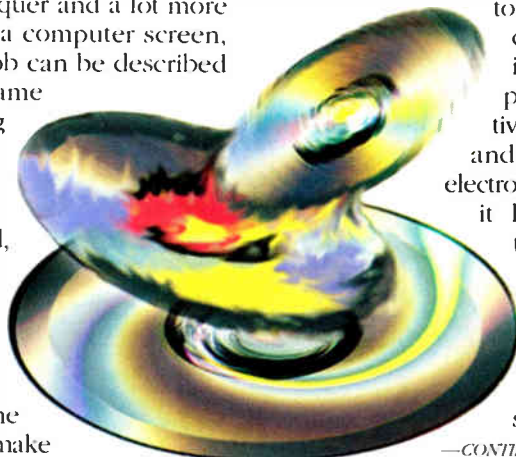
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RECORDING DRUMS

BY JOHN LA GROU

A look at stretched membranes and circular plates—recording the drums is this month's applications focus. We'll limit our field to drum set recording, while delaying until another time a discussion of "peripheral drums," such as vibes, tympani, gongs and assorted noise-making gizmos.

Capturing a great drum sound starts with a good set of well-maintained drums, with fresh and musically tuned skins, in an acoustically friendly room, beat upon by a player of talent and sensitivity. From there, the engineer shows his or her experience by finding the right position of drums in the room, choosing room treatments, selecting and placing the "correct" microphones and mic preamps, possibly applying artistic amounts of EQ, gating and compression, and getting it all on the recorder in a natural-sounding manner. No sweat!

As with most acoustic recording, drum sets require an especially compatible room in which to properly resonate and reflect. Each drummer, set, room and song provides the recording engineer with a new challenge, and this month's panel of engineers agree that last session's drum-tracking technique may not be appropriate for today's session. And, as we'll see, the variety of techniques available for drum recording are limited only to one's experience and imagination.

For those interested in the physics of drums, there are many fine books that discuss the topic. *Musical Acoustics*, by physicist Don Hall, is one of the best I've found, discussing pitch and tuning of drums, drum-striking methods vs. mode response, damping and an entire chapter's worth of real-world applications.

With the increasing abundance of sampling devices, live drum recording is becoming less common. And when a live drum session arrives, there's often little time or budget to experiment. Recording engineers are routinely given but a few minutes to develop a good drum sound. Beneficial are those rare opportunities where one can spend hours or more getting the right drum sound; fine-tuning every aspect of set, room and electronics.

There are engineers who have had decades of such opportunities. They are with us this month to share a bit of their drum-recording experience.

JIM ANDERSON

Frank Zappa once said, "Jazz is not

dead, it just smells funny." Accordingly, no discussion of drum recording would be complete without a look at jazz. Jim Anderson, who showers daily, has specialized in jazz recording for around 15 years, engineering for straight-ahead luminaries such as Branford Marsalis, McCoy Tyner, Gerry Mulligan, Phil Woods, James Moody, Joe Henderson and the Toshiko Akiyoshi Big Band. With multiple Grammy Awards and nominations gracing his resume, as well as two Best Engineering awards from Japan's jazz bible, *Swing Journal*, Anderson is one of the most respected names in the jazz world.

"The jazz drummer pulls together a rhythm section," Anderson states. "So if the drummer is weak or has problems, the entire band will suffer. I first try to understand what the drummer is after artistically. Then I attempt to record the drums in a way that fits holistically with the entire band.

"After so many years of recording jazz drums, I've seen three basic kinds of drummers," he explains. "The first drummer is younger, has an excellent set of drums, and plays very well but expects each drum to be miked. These players are well-schooled and skillful but a bit less refined; they're used to fixing balances in the mix. The second type of jazz drummer is more mature, has a road-worn set of drums, and plays with such grace and sensitivity that I usually need little more than a stereo pair of overhead microphones. These are the real jazz masters." When asked about the third drummer, Anderson replies, "They have no sound!" and left it at that.

"There are many ways to tune a jazz set," he continues. "Jack DeJohnette tunes in fifths and octaves. Others tune in thirds. Some drummers tap on the sides of the drum and listen for a fundamental pitch, then tune the skin to that pitch. Some say this technique optimizes sympathetic resonance. I tend to work with whatever the drummer is comfortable with. It's a feel thing—one of those areas where an engineer needs a strong musical sense.

"A kick drum and upright bass share much of the same acoustic space," Anderson adds. "Good jazz engineering keeps each instrument separate and distinct, without clouding the low end. Sometimes placing a second microphone on the beater side of the kick can help articulate drum from double bass. I've also doubled a kick-beater mic as a snare mic. I normally prefer a kick with the front

head removed."

Regarding rooms for drum tracking, Anderson says, "In the early '70s, recording rooms were built for isolation and lack of resonance. I like to record jazz in these older-style rooms. Brighter, livelier rooms tend to blur the drums in jazz music. Not always, but as a rule, this is true. Some of the better drum rooms—such as Clinton, Power Station and Sound-on-Sound—have lots of gobos and isolation goodies.

"Isolating a jazz group, such as a quartet, is always a challenge," Anderson notes. "Jazz cats need to be close, with good eye contact and the ability to hear every cue. The drummer and pianist are usually the triggers; they must be able to see and hear each other continually. In the old A&R Studio, you could literally stick every player out in the room without gobos or panels and still make recordings with wonderful isolation and separation. I recorded the NPR *All Things Considered* theme there in 1981 without isolation, and it still sounds as fresh as my best isolated recordings today.

"Microphone selection is really dependent upon the music, the room, the set and the player's technique," he adds. "Unfortunately, in the jazz world, budgets are minuscule and I rarely have time to experiment. For most sessions, I'll grab what works and go with it. For instance, the basic drum sound is captured on overheads, and most engineers I know use condenser mics. But I've found that ribbons are especially good for jazz overheads; a pair of Beyer 160s sound great. I keep them low and tight over the set.

"I've looked a long time for a good jazz snare mic," Anderson explains, "but keep coming back to the B&K 4007—it's remarkable with brushes. The 4007 works great on toms, as well. A Sanken CU-41 on kick doesn't lump up around 100 to 200 Hz but maintains a full, open quality, which is desired for jazz. It also gives me an honest timbre spectrum, which is easier to EQ later on. For ambience, I'll use the Sanken CMS-2 M/S pattern and move it around the room until it's right.

"When I'm under time constraints," he continues, "I take microphones directly to console; preferably an older Neve, such as an 8068. I'm not against printing EQ, and if a tom or kick is ringy, I'll run

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RIC WILSON

Ask leading audio post facilities why they chose Sonic and they'll tell you: "Only Sonic delivers the speed and precision required to meet our tight schedules and satisfy demanding clients."

Facility managers marvel how Sonic's MediaNet, a true high-speed network (not just a copying utility), increases productivity by delivering on-line, simultaneous access to any sound in the facility. MediaNet allows them to configure their facilities more economically, with inexpensive editing stations networked to larger mixing systems in a seamless token ring.

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SONIC SOLUTIONS

gates. A damping [product] can also be very helpful when placed on unruly drums. If I'm recording live-to-2-track, I may also compress the kick and snare with the 1176. For drums, I prefer analog recording running half-inch 2-track with [3M] 996 at 30 ips, or 15 ips with SR."

I asked Anderson to describe the ultimate drum recording. He admits that he's "still looking for the ultimate sound, though there's this Rykodisc recording I found called *Mouth Music*, which is some of the best drum and percussion engineering I've ever heard. I would like to achieve such quality on all my work."

JACK JOSEPH PUIG

"There are no rules, just guidelines," says Jack Joseph Puig, speaking from Compass Point Studios in the Bahamas during a session break with Boston alternative band Belly. Puig's resume lists a diverse group of artists, ranging from Barbra Streisand and Bette Midler, to Eric Clapton, Randy Newman, Robbie Robertson, Jellyfish and the Black Crowes. From behind the console he's observed that "different people can be quite opinionated about their own approach and emphatic that it is 'the only way.' But in the end, you go to Tower Records, buy the CD,

and music comes out. You can't fall into thinking there is only one magic system. You've got to pick and tailor your own recording approach to what is most suitable for the album you're making.

"One thing you must realize is that the sound starts at the instrument," Puig adds, "and where that instrument is in the room means everything. So you have to be aware of the room's acoustics and how to make its strengths and weaknesses work for you. Find the right spot for the instrument in the room. Part of that decision should be determined by what the band and the song dictate, but you should follow your instincts, allow yourself to experiment. Don't just put the drums somewhere because that's what everyone did before you. Moving a drum set only two feet can make a bigger difference in the overall sound than any one mic you might choose."

Puig has engineered six albums for Glyn Johns, who turned him on to what is now his favorite bass drum mic, the AKG D-30. "[Johns] calls it the 'Honky Tonk Woman' bass drum mic—it's amazing!" Puig says. "If you see one, try it." Along with the D-30, Puig has about 30 other rare mics that he says are great. "A no-name soundstage mic, designed in the MGM technical department by Mr. Bonanza, is incredible for snare drums. I've also used the Neumann KM-54, AKG C12A and D19C, Cole ribbon mics and, of course, the old standby SM57.

"For tom-toms, I have used the Telefunken ELAM 251, C12A, and KM-54," he continues. "For hat, two I like a lot are the Neumann U64 and Schoeps MD221B. My overheads are a pair of prototype Frank Church mics I love. But I've had equally good success with the Elam 251 and Neumann U47. For room mics, I like the Neumann KM-83 and Telefunken 201, also known as the Schoeps 58i. I have always primarily loved valve condenser mics on drums, solely because of the tone I have been able to get, although I have heard and done some great recordings with just dynamic and ribbon mics."

Puig's passionate interest in experimentation has led to some novel purchases. "I've bought various cheap, odd microphones in pawn shops that have been cool," he says. "I bought one recently that is very

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PROJECTS
Radio commercials for ABC Prime Time TV and ABC News, Disney's "A Fireside Chat with Donald Duck," Mrs. Bush's Storytime

LESLIE MONA MATHUS

SYSTEMS
48 track/16 channel system with NoNOISE

PROJECTS
Major radio (and TV) ad campaigns for 7-11, Oscar Meyer, Miller Brewing, Chuck E. Cheese, and Sherwin Williams

JOHN ZWIERZKO

SYSTEMS
2 systems with MediaNet

PROJECTS
Radio (and TV) commercials for Pizza Hut, Midas, McDonald's, Coors, BoKu, Pillsbury, Firestone, Ameritech, Kraft, Intel

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Ask any leading radio facility why they chose the Sonic System for production, and you'll hear the refrain, "It's fast; it's flexible; it's the best system available."

Radio spot producers boast how even the smallest Sonic System lets them manipulate 8 to 12 separate tracks in real time without bouncing. Their deadlines aren't as daunting with a system that provides background loading and tape layback while editing continues in the foreground.

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SONIC SOLUTIONS

odd-looking, with no markings at all. I spent $5 on it and then tried it on snare drum with Belly, and it just killed us! Don't hesitate to try anything."

Mic placement, says Puig, is so important he wishes there were room in this article to draw diagrams of concepts that have worked for him. His short advice is, "most of the time, moving the microphone one inch to four inches can make more difference than a dynamic vs. a condenser can. So experiment: If you don't like what you hear, get up and move the mic until you get what you like. Use your ears! It's also a good idea to look at the pattern sheets that come with the mics to get an idea of what you're working with."

Puig's racks are filled with Fairchild compressors, and Pultec, API, Langevin, Fairchild, United Audio and classic Neve mic preamps. Puig likes fusing recording styles ranging from the '60s to the '90s: "With the right combination of vintage and modern electronics," he explains, "I can achieve sounds that seem recognizable, yet are clearly new."

After choosing and mixing old valve preamps with more modern preamps, Puig says, "I'll do the same with various compressors. I love compression; it's our best friend. If I compress the kick and snare, I'll start with an SSL dynamics section rack module, which I had made for me. With room mics, tom-toms or cymbals, I'll use my old Presto, Altec, Electrodyne, UREI 1176LN or Fairchild 670 compressors. Mixing the grand old 670 Fairchild with the attacky SSL can lead to great results. But probably my favorite compression is my 10-channel EMI sidecar console. Its sound is a cross between an SSL and the Fairchild 670. It has tube and solid-state compressors used on many Beatles recordings." For gates, Puig recommends the BSS 502 or Kepex II on toms, snare, room mics or snare under. Of the 502, he says, "It is extremely flexible, and it does the least damage to the sound.

"As you can see," Puig continues, "I go through a lot of trouble to create the [sonic] picture at the time of birth. I have never understood the concept of recording a general, basic drum sound and then manipulating it at the mix. I start working to the finished mix the second I walk into the studio the first time. I like pulling up the faders to hear the full perspective of the recording. This also allows the drummer and me to react to each other, and it creates an inspiring environment for all of us working on the album."

Puig's favorite rooms for acoustic drum recordings include Ocean Way B and 2, Bill Schnee's studio, Electric Lady, Power Station and Sound City L.A., where he recorded the Black Crowes recent album, *Amorica*. "With the Black Crowes, I moved the drums and choice of microphones at least four times," he says. "The point is, don't look at any one approach as precious. Experiment, listen and follow your instinctive vision."

GEORGE MASSENBURG

George Massenburg requires no introduction. Having recorded drummers such as Phil Collins, Russ Kunkel, (the late) Jeff Porcaro, Jim Keltner, Carlos Vega and Richie Haywood, to name but a few, Massenburg's desire and ability to capture acoustic reality is rivaled by few engineers. He shared his drum-recording technique with us from GML in Van Nuys, Calif.

"The most important factor in recording drums, among many factors, is finding a room of sufficient size to work in," Massenburg says.

"On occasion, I've had to work in rooms with 10-foot ceilings but have never been able to ignore the effect of floor-to-ceiling resonance. The room shouldn't have too many odd characteristics—just enough so one is able to adjust the drum sound over a wide range to fit the music.

"For instance, I make extensive use of diffusion and ambience to craft a live drum sound," he adds. "Movable quadratic residue surfaces, flat wood or Plexiglas surfaces, sometimes curtains, even the appropriately placed road case; everything helps to shift the room sound around—the resonance of walls, the distances from the sources to the surfaces—everything."

Massenburg's favorite drum recording rooms include The Site in Marin County, Conway in Hollywood, Sony Tokyo and Townhouse's Studio Two in London. "The best drum sessions," Massenburg continues, "begin with a good song and a great drummer. Usually the musician or an assistant takes care of tuning the set, though I sometimes help fit their tone center into a mix. Once the drums sound correct, I se-

lect microphones that experience has shown provide transparency above all. I like the Sheffield custom 1-inch or B&K 4011 on overheads, C-414 or C-12 or C-37A—assuming they're available and working—on toms, C-12 on high-hat, U47-FET combined with C-112 on kick, and a stereo pair of B&K 4003s for room ambience. If I need a bigger, closer snare I'll always try the Coles."

Massenburg has "no doctrinaire answer on where to place mics. There are so many ways to approach it," he says, "though I have to give credit to Phil Collins—and, by association, Hugh Padgham—for opening my ears and mind to new drum-recording techniques beyond compressing the shit out of everything. I'm always open to adding samples, as well, but only if the drums retain the dynamics and humanity of the musician.

"I'll run the mics into my own gear, including mic pre's, EQs, limiters, mixers and converters," Massenburg adds. "On occasion, I'll use gates to tape, usually Drawmer. And I often spend considerable time EQing, compressing and gating the

room sound. I like the RMX-16 reverbs but have more recently been using the Eventide DSP-4000 to tape. Most of my drum tracking is direct to Sony 3348. In situations where I'm tracking from buses, I'll always use my mixer rather than take wide-range, dynamic material through any modern console."

Massenburg feels that drums should not be tracked separately from the rhythm section. He generally prefers to record a minimum of three or four pieces together. "Little Feat recordings work well," he says, "with a four- or five-piece section; that is, drums, bass, guitar, keyboard and percussion. I begrudgingly subject musicians to a click track, though PC-based drum machines are woefully inadequate in supplying any kind of groove. I prefer dedicated machines, such as the Linn 9000, or simply looping a sequenced groove out of samples.

"To me, the story comes through best when several great musicians are playing together and responding to one another in ways that cannot, and need not, be scrutinized too
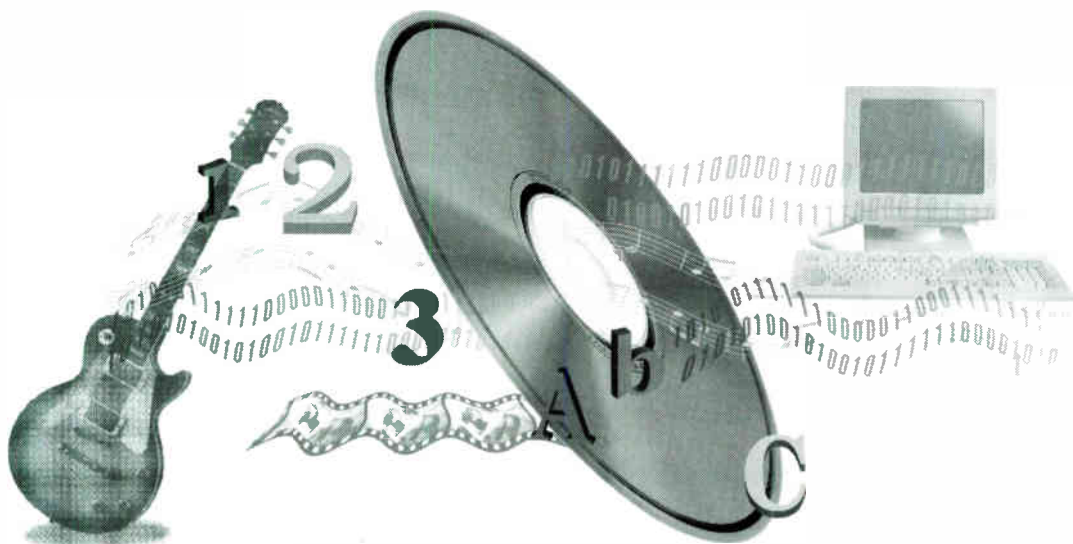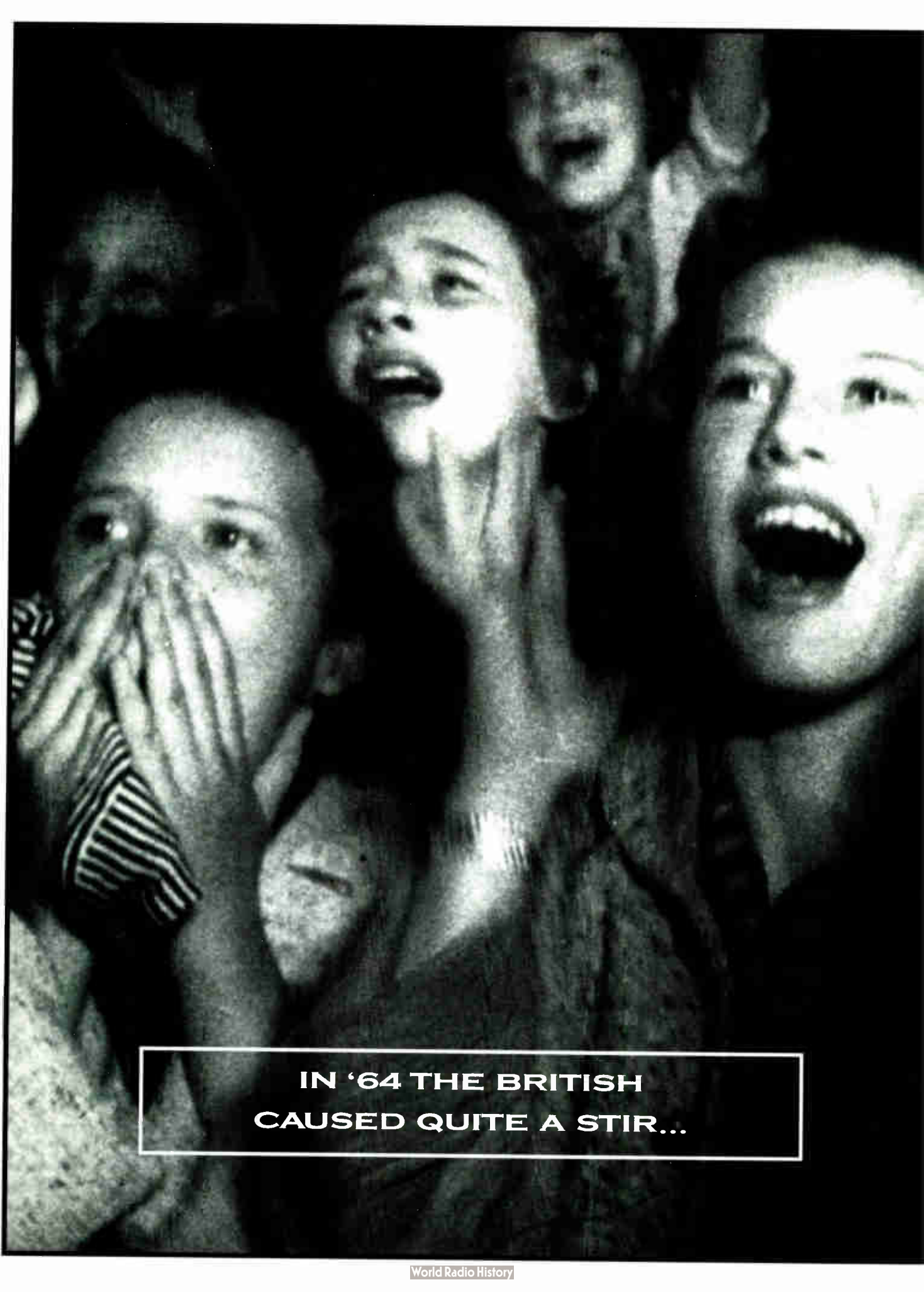
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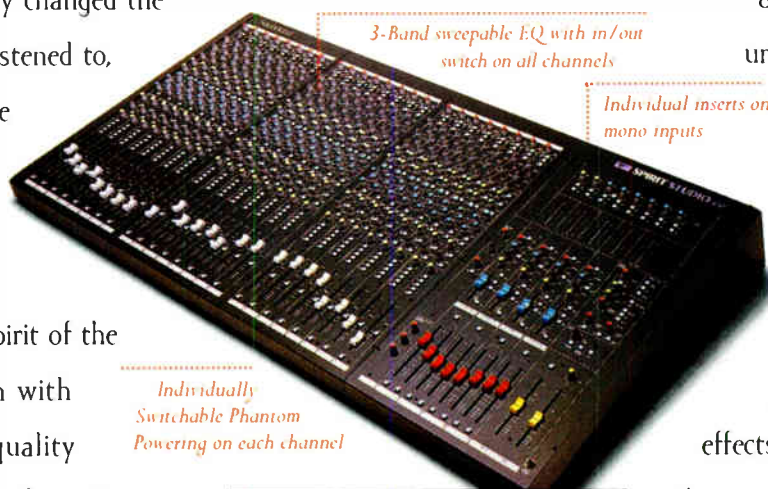
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SO YOU WANT TO

by James D'Angelo

Check it out. The year is 1971; your name is Johnny "The Swinger" Fantasia Jr.; you're 38 years old, you have spent your whole life in suburban Baltimore, and you sell aluminum siding for a living. And to top everything off, you're a nervous wreck. You've got the biggest decision of your life ahead of you...It's bigger than what football team to root for; it's bigger

Illustration by Halstead Hannah

■

A FEW HEAVY HITTERS DISCUSS THEIR RECENT CONSOLE PURCHASES

than what neighborhood to buy your house in...It's bigger than, well, life itself. You need to decide what car to buy.

If you buy a VW, the highbrows may not find you impressive enough to do business with. If you buy a Cadillac, you may not be able to afford the payments. If you buy a Citroen, you might not be able to carry your tools around, and if you get a Yugo pickup truck (do they exist?), you might not get any jobs at all, much less get to them. Every manufacturer out there is blasting you with hype...What to do? What to do?

Hello...It's 1994, and you're a studio owner, and you need to buy a console. Well grab a paddle, 'cause you're riding in the same boat as Johnny The Swinger. Your choice of a console is probably your most important decision, and at recent count, there are more than 30 manufacturers of studio consoles capable of at least 24-track production. Prices range from a few thousand to over half-a-million dollars, and it is not always clear whether the extra dollar is going to give you the extra oompf. Features cover the spectrum of total automation and recall in the digital domain, to traditional mixing in the analog world.

So before making the decision of a lifetime (or at least of the next several years), take a look at what

BUY A CONSOLE?

Mix found after talking with more than 20 console owners and to dozens of console manufacturers. We've broken down the main concerns in purchasing a console in the '90s.

PRICE

Lets face it: There are a lot of fans of API, Neve and SSL out there. Combined, these boards have tracked much of what has been considered music for the last few decades. They defined the sound and feel of traditional consoles while stepping into the modern age with complex computer control and automation. But these boards and others (like the Trident, the Focusrite or the Euphonix) come at a cost. Price tags can be well over $100,000, and even though financing is available through most companies, the monthly payments alone can cost more than the price of a small console.

For more than half of the console buyers, price was a major concern. "This board was under 50 grand, and the next board that compares is in the $200,000 range," says Bob Christianson (Manhattan Beach Recording in NYC) about Amek's BIG console by Langley. "I didn't have to sell my house to buy it." For many people who want an SSL, API or Neve, price dictates them right out of the market.

Frank Campbell (Bismeaux Studios, Austin, Texas) was considering one of the higher-priced boards but was charmed by D&R's Triton console. "It was either get a used SSL or a new Triton, and I felt more confident with a new board."

Craig Hazen (Zen Music, NYC) was towing the same line. "I compared the BIG, a DDA, and even a used Neve or SSL. When I heard the Jade [by Soundtracs] at AES, I was hooked. it was a full product [48 ins, automation, etc.] with a great sound. And because I bought it new, it was up to me to ruin it. I didn't want someone else to do it before me."

Richard Beggs, who has designed and mixed a number of film soundtracks at American Zoetrope, says of his personal studio in San Francisco. "I didn't think about automation originally; I was concerned with cost and size." He chose the Allen & Heath GS3V. "I was brought up on the look and feel of the SSLs with real sweet-feeling knobs and faders, and I tried to get that at a better price." He wasn't alone.

"I wanted a warm Neve sound with a lower noise floor and for less money," says John Lawry at Shakin Studios outside of Nashville. When he heard the Raindirk and talked price with the local rep, he was

Courtesy of Robert Irving Productions

Sounds Like Success!

When an audio console is so revolutionary in concept and design that it delivers virtually as much as boards costing 3 to 5 times as much, the word gets around fast.

Frankly, keeping up with demand has been our biggest problem. Professionals in post-production, project studios, music recording, and on-air, astounded at *Concept I's* speed and flexibility,

have realized its value and have ordered their own special configurations.

At just over $57,000* the *Concept I* gives you 48 inputs, digital control, automation, and sounds as good as any console, anywhere.

Call us for a demo in your own studio. We'll prove to you that for performance, flexibility and value, no other console even comes close.

*suggested U.S. pro-user price

sold. "The board is spec'd 14 dB quieter than the Neve. It sounded phenomenal."

Certainly at the bottom of the cost spectrum are Mackie's 8-bus consoles. With a starting price of $3,995, these models are virtually in a price range by themselves. "Everybody knows that they are inexpensive, but everyone also knows that they are clean," says Frank Serafine, who does sound for the *Star Trek* films and a number of current successful television programs. "When the Mackie console came out, I didn't even need to shop around. I'd been looking for years for something that clean at that price. I picked one up immediately. Now I own four."

All this is not to say that the market for the big companies has disappeared. Despite the whinings of labels, there is still serious money in big music production, and more often than not, the big studios are dipping their feet into lucrative post-production deals for video and film. Jimmy Rudenski, chief engineer at

Woodholly Productions in L.A., is a happy Otari customer. "Most of our work is involved in sitcoms and commercials...We do M&E [Music and Effects] so that shows like *Melrose Place* can get dubbed into Spanish and German. And the Otari Concept One gave us all the features we needed for the price."

Euphonix recently installed a CS2000M at the Record Plant in L.A. "Euphonix clearly represents a new generation of mixing systems," says Rick Stevens, "and offers an incredibly powerful combination of sonic performance and smart control."

Joel Levy of Criteria in Miami is a new owner of a G Series SSL. "We did not consider any other companies when buying the board. We've had great success on these boards in the past." Although Criteria is using new automation technologies such as Ultimation and Total Recall, Levy remains committed to the basic SSL console technology that has proven to be successful for his business.

Still, more and more "big time" production is being done in the

The Decision-Making Process

BREAKING DOWN
THE TOP 10 FACTORS

1. PRICE
Can you justify the new expense? Can you get an equivalent product for less? Do you need all the new features?

2. CUSTOMER SUPPORT
Does the company have a toll-free phone number? Is it relatively simple to get in touch with key people at the company?

3. PROXIMITY
Is the manufacturer/company in your time zone? Are they around the corner? Are they in the South Pole? This affects down time and customer support.

4. INTERFACE (AUTOMATION VS. TRADITIONAL)
Do you want automation? Do you want a computer interface? Do you want moving faders? Does it take too long to learn the system?

5. SOUND
Put everything else aside and listen

to the board. Does it sound good to you? Can you try it out before you buy?

6. BRAND NAME
Artists, A&R reps and others follow brand names of consoles. Will they work on a console they haven't heard of?

7. CLIENTS
Are the clients going to like the board? What are the needs of your clients? Do they need features/equipment that you haven't considered?

8. DIGITAL VS. ANALOG
An all-digital board has advantages and disadvantages. If the board is analog, are the parts discrete or IC? Does the automation system affect the sound?

9. LOOKS AND FEEL
Do the knobs feel cheap, or are they sturdy and confident? Can you stand looking at the board every day?

10. IN-LINE VS. SPLIT
In-line systems can save space and yield more inputs, but the EQ is often compromised. Is this okay? What are the space constraints of the board in your studio? ■

"small time" project studios for a fraction of the cost, and more and more "big time" studios are getting bigger and badder as well as diversifying. Digital boards are pushing the envelope of modern technology, and whenever this is done, there's a price tag attached. The good news is that, no matter what your needs and budget are, there is a manufacturer out there with a corresponding product.

WHAT DO CLIENTS WANT?

Just because you install an SSL doesn't mean Aerosmith or U2 is going to come pounding on the door, and it doesn't automatically ensure that your studio will rent for $1,000 a day. Every studio needs to develop its own customer base.

Many studios, especially in audio for post- or music-production applications, sell a product (a soundtrack, music, etc.), and the client never gets near the console. For these studio owners, console choice is personal: They select the features and company that fit their personal tastes. For other studio owners, the choice of console directly affects their clients. Often, it is the client who either runs the board or sits next to an engineer who is running the board. In these situations, the client needs to be able to run the new board fast. Sometimes the client is a fan of a particular console or is looking for a specific sound.

"Our clients are mostly doing demos. We'll turn a whole project around in ten to 15 hours, so the board has to be fast and durable," says Pat McMakin of Sony Music Publishing in Nashville, who is working with a Sony 3056. "We have to be able to set up and move fast."

"Our purchase of the [AMS Neve] Logic 2 is an investment for our clients," comments Lisa Bardack of Henninger Digital Audio (Arlington, Va.). "It represents a giant leap forward in the way audio post is currently being offered in this market." Adds Michael David, also of Henninger, "Clients are more sophisticated, and they are demanding more. We were looking for a second-generation digital audio board that was going to please both our customers and our mixers. After six months, we chose [the Logic 2]."

"A lot of guys come in, and they work on the board, so the console has to be easy to learn," says Mike

Fennel of MCA Music Publishing Studio in L.A. "Otherwise, I'm going to be on the phone all day explaining things. Other guys are gonna come in and beat the board up, so it had better be able to take it. The [API] Legacy stands up to that."

It's also important to remember that studios' customers are not always sound people or tech heads. "Clients want to see what's new, they want new technology," Glenn

> **Digital boards are pushing the envelope of modern technology, and whenever this is done, there's a price tag attached.**

Meadows says about the Harrison Series 12 installed in his Masterfonics facility in Nashville. Though a board with no bells and whistles might be able to do the job as well as, or better than some of the new boards, the industry is constantly looking to see what's new. Clients expect a lot from the technology.

For Roger Wiersema at Music Annex in Menlo Park, Calif., the key is to "diversify or die." This facility does post-production, music-recording, mixing, tape duplication—you name it. A prospective client for Music Annex is anyone in the audio

industry. And, to keep up with demand, Music Annex recently bought two Soundcraft DC2000 consoles. Wiersema says, "I saw it at last year's AES, found out how much it cost, and I said right then and there 'I want to buy one,' but I ended up buying two."

Sometimes, as in the case of Chris Bubacz of BearTracks (30 minutes north of NYC), it was a question of being able to stand out from the crowd. "We were looking for something different to distinguish us from all the SSLs in New York, and we found the right thing with the Focusrite," Bubacz explains.

Choosing a console is tough, the market and the customers are forever changing, and at the same time, looking for new bells and whistles in their studios. But a hip, fully loaded console today can be quickly outmoded by future technology. It is also impossible to play down the name recognition of certain companies, and the effect that is going to have on a customer. These companies have earned their name recognition over the long haul, but the dynasties are continually being challenged by the young, hungry upstarts.

INTERFACE
This is the era of the interface. Do you want knobs, or do you want a computer screen? Do you want lights or motorized faders? Do you have the time and the desire to learn a new interface? Are you big on automation? Do you need moving faders and knobs? The choices abound. If you are talking bells and whistles, you are most often talking interface.

"The great thing about Harrison is that they will configure the control interface any way you want," says Masterfonics' Meadows, "You want a touch screen? You got it. You want it to resemble traditional consoles but still be automated? You got it. The back end is exactly the same, but the control is any way you want it."

Many boards these days come fully loaded with automation and moving faders, and it has opened up a whole market niche for the manufacturers. For example, Amek's BIG by Langley, the Jade by Soundtracs, the Logic Series by AMS Neve and the Euphonix boards are all packaged with these major extras, and others like Mackie and Tascam are promising to come out with automa-

World Radio History

442 I/O AUDIO INTERFACE

SSD SYNC SMPTE SLAVE DRIVER

VSD SYNC VIDEO SLAVE DRIVER

888 I/O AUDIO INTERFACE

888 I/O AUDIO INTERFACE

888 I/O AUDIO INTERFACE

882 I/O

SYNC MODE
INTERNAL
SAMPLE RATE
44.1 kHz
1-2 FORMAT
AES/EBU

SYNC MODE
INTERNAL
SAMPLE RATE
44.1 kHz
1-2 FORMAT
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SYNC MODE
INTERNAL
SAMPLE RATE
44.1 kHz
1-2 FORMAT
AES/EBU

ANALOG ANALOG ANALOG ANALOG ANALOG

POWER

SYNC MODE
SMPTE Slave
Digital

MODE
Resolve
Generate from Slave
Generate from External #2

SYNC SOURCE
VIDEO
WORD CLOCK

VIDEO FORMAT
NTSC
PAL

CH 1

digi

OUTPUT

INPUT

drums-03

tion in the future.

"Clients really love it [automation and recall] because they can get back to a mix immediately," says Manhattan Beach's Christianson of the Amek. This is certainly the biggest advantage of automation: Your client is standing over you, and you need to tailor a mix you did the other day. Boom, it's done! Automation is your friend. But many modern engineers are not impressed.

Brad Wood, head engineer at Idful Music Corporation in Chicago, who chose the Neotek Elan, is one of them. "I don't like automation," he says. "I won't work with it. I'm from the Neve/API side of things. I use a razor blade and cut stuff together, mixing everything in sections of tape." John Lawry of Shakin Studios concurs. "I didn't care about recall; I was concerned with sound." He chose the Raindirk. And Jerry Goldsmith, a Peavey 2400 user in L.A., says, "I don't have any bells and whistles. I'm using it the way it came out of the box."

For Wiersema at Music Annex, it's nice to get away from the board's interface and turn it into a SMPTE or MIDI slave. "Because of the Soundcraft DC2000's ability to chase or generate time code, it's excellent for post-production. We even use one of the boards as an automated monitor mixer for an old Neve."

In general, the engineers who did most of their work alone and worked on projects for outside clients didn't care as much for automation. Those working with multiple artists and cranking out masters and demos with the artist riding shotgun were a little more hungry for moving faders and complete recall. Still others felt that you should buy the house before you get the furniture: spend the bucks on the sound and get the fringe later.

CUSTOMER SUPPORT/PROXIMITY
It's not surprising that almost all of the console buyers we interviewed mentioned the importance of customer support. Most of these veterans know that no matter how great a console you buy, there is going to be some down time. For most of the buyers, customer service was one of the top three concerns. For others, upgrading with the same company meant they would be dealing with a familiar console interface as well as interfacing with familiar console

faces.

Brad Wood says, "I have friends who worked at the console manufacturer, and they raved about the high standards and quality on the Neotek manufacturing line." Jerry Goldsmith, says that Peavey is a great company: "If something needs to be fixed or replaced, they do it overnight. It's awesome." For Derek Luff at Wildwood (Los Angeles) it was a simple decision: "I only buy Tascam equipment, and our customers love our sound."

For Frank Amato at KALA Recording, Atlanta, it was a matter of sticking with a company he was already happy with. "We upgraded [to the Trident 90] from the old Trident Series 65, and we were pleased with that. We loved the new EQs."

Proximity to a representative even in this day of FedEx'd modules is still a big concern. For Austin-based Bismeaux's Frank Campbell, "Even though D&R is out of Holland, they had local representation down the road in Houston. That was very important." And if you live in Nashville, Harrison is right there in town. "It's great that Harrison is local. We were able to speak to them a lot about the Series 12," says Masterfonics' Meadows. For Tom Keane, a busy singer/songwriter and MTA 980 owner, "It was great having [the representatives] right here in town— they helped out so much."

Before purchasing a Focusrite, Chris Bubacz had a rare opportunity to go visit the company in England. "Focusrite invited us to come to England, and we met the president and saw the boards being made. We met the people in charge of production. We saw their craftsmanship and their attention to detail. It was impressive."

SOUND: MIC PRES/EQS

Most console buyers, when discussing the sound of their particular boards, focused on the microphone preamps and the EQs. Indeed, these two sections are the most sensitive to problems like phase shift, noise, hum, feedback, etc. As a result, engineers tend to be a tad religious about their input sections, and more often than not, the mic pre's and EQs were big parts of the final buying decision.

According to Pat McMakin in Nashville, one of the most helpful features of the Sony console is that it can support third-party mic pre's and EQs. "If you like the way a certain mic pre works with a snare sound, for example, you pop that mic pre in on channel nine or wherever. You've got a mic pre you use with a particular mic, you drop that in as well."

"I go for EQ more than anything else," says John Lawry (a Raindirk owner). Ken Paul, a freelance music producer out of Chicago concurs: "The thing I love about the Studiomaster P7 is that it's got real English EQs. I've got a bunch of outboard EQs, but this board is a real good complement to them."

"We had been using Focusrite mic pre's and EQs for years, and we thought of them first when we were looking for a console," says Bubacz. The head engineer at MCA Music Publishing, Mike Fennel, had similar sentiment for his company: "We've been fans of API for a long time. We loved their preamps and the sound they would get. I get everything I want out of the onboard EQs."

While the basic design of preamps and EQs has remained the same over the years, MOSFET technology and other improvements have led to improved specs, and the return to vacuum tube-based systems has given purists and techno-wizards two strong camps to reside in.

The bulk of the decision for Stuart Steinhart, of the brand-new Lydian Sound studio in Toronto, had to do with EQ. "A big reason I chose the Profile by DDA is because it hasn't got the newfangled in-line setup," he says. "In-line consoles are a compromise, EQ-wise. I like having four bands of EQ on every channel. This alone ruled out most consoles right away."

You might even have a less definitive set of reasons; you might base your decision on something as simple as your ears. "It just sounds good. I mean really good," says Tom Keane, who recently purchased a 980 by Malcolm Toft Associates.

Once the signal has traveled past the mic pre's and EQs, the rest of the world of mixing seems pretty simple by comparison. The signals are fat and amped, the coloration is near complete, and the battles with noise become a contest that is winnable.

LOOKS/FEEL, THE INTANGIBLES

The ideal engineer would have no eyes or fingers—just grotesquely

Why do they call it Gefell?
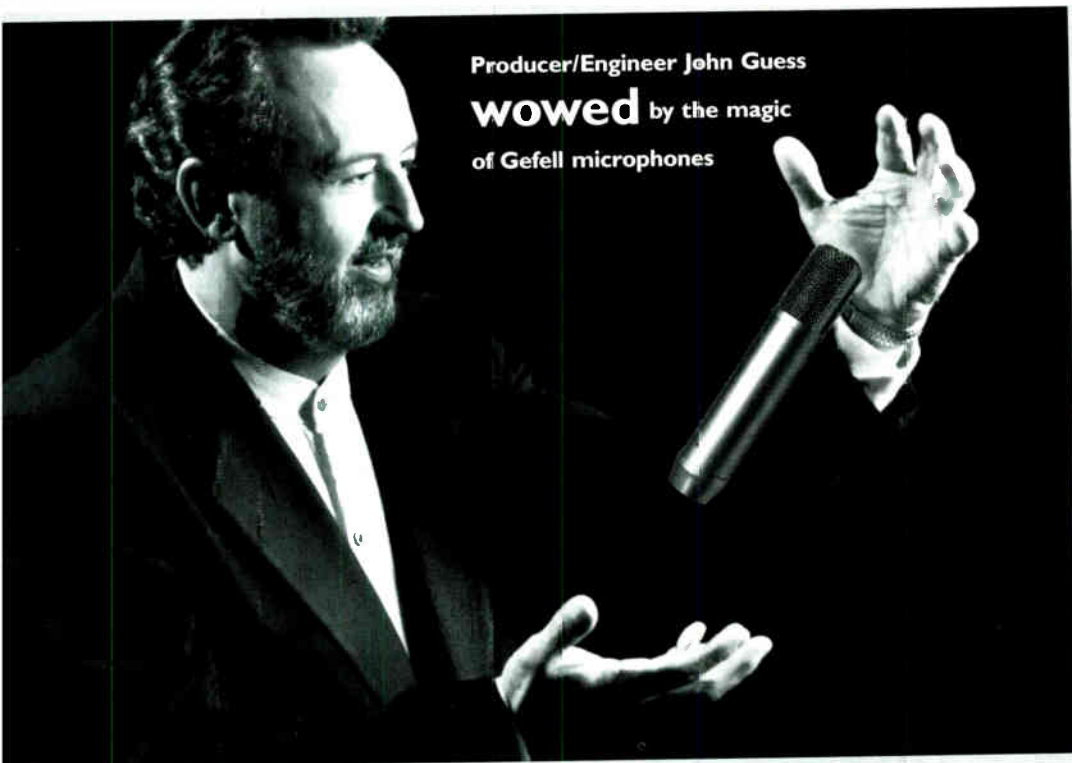
Producer/Engineer John Guess
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large ears. But since none of us is ideal, we trouble ourselves with the look and feel of a console. Most of the console buyers concerned themselves with feel. Often, they were hooked on an old product's familiarity and comfort. And almost all of the engineers had apprenticed and worked on an assortment of boards before purchasing one and can make informed comparisons.

Tom Keane talks about how his MTA is "very Trident"; Bob Christianson compares his Amek to his Otari Concept One and the old Harrison Raven; John Lawry was an old Neve fan (but bought the Raindirk); and almost everyone compares to SSLs.

On the Allen & Heath GS3V, Richard Beggs comments, "The strips are smaller than I'm used to, but I didn't feel like sacrificing inputs or getting a larger board. The other thing that struck me was that the GS3V didn't have the trashy look that other boards in this price range have." Jerry Goldsmith, who's been in the business for 40 years, says of his Peavey: "I like the fact that it's a good-looking board."

Among other things, buyers will want to consider board setup. Ken Paul likes the main control section in the middle of the board. Because most of the final mixing is done from the main controls, he wouldn't want to be sitting 15 feet from one monitor and two feet from the other. "When your control is in the middle, you hear your mix best," he says.

No one wants to spend ten or 15 hours a day with an ugly board, and no one wants the knobs to feel like the trigger on a Supersoaker. And, fortunately, most of the manufacturers have got this part down.

CONCLUSION

As long as you sell aluminum siding you're going to need a car, and as long as you make music you're going to need a console. Tossing all the issues up on a newfangled scale is a difficult process, so beware. If you choose the wrong console, next year you might be reading a similar article on buying a car so you can make your first delivery with your new partner, Johnny. ∎

James D'Angelo is Mix *technical editor, purveyor of style and a funky rhyme sayer.*

SOUND
FROM THE TRENCHES

FOX UPDATES NFL AUDIO

BY GARY ESKOW

Couch quarterbacks are no longer content with broadcasting that leaves them feeling that the action is going on in some faraway place. Short of suffering contusions that require a doctor's care, fans are coming to expect a greater sense of immediacy from broadcast sports. Jerry Gepner, vice president of field operations for the Fox Network, says that using audio to bring the view-
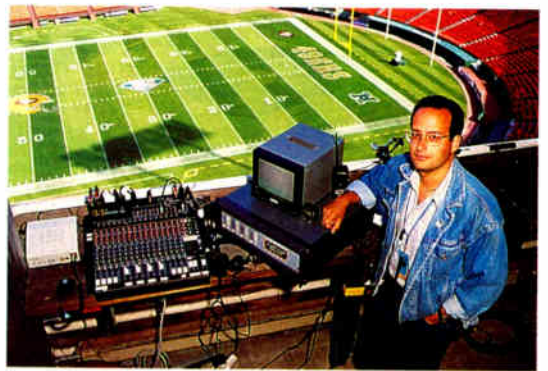
Top: Steve Young throws the pill; above: Phil Adler, parabolic submixer, at the Mackie CR-1604; left: the producer/director's view of Sunday afternoon at Candlestick Park.

ALL PHOTOS BY STEVE JENNINGS

er closer to the action has been a major challenge for him since the day he signed on to help Fox prepare for the '94/'95 season.

Gepner has worked his way up through the audio industry, starting out as a maintenance engineer in mobile sound trucks in the early 1970s. For nearly 15 years, he engineered and

designed audio unit setups. Eventually, CBS appointed Gepner as director of production for CBS Sports, and it was while covering the Winter Olympics for CBS in this capacity that he was approached by Fox. *Mix* recently spoke with Gepner as he was preparing for a trip to San Jose to scout its hockey arena, which will host the 1995 National Hockey League All-Star Game.

"We're moving aggressively to expand our participation in major sports broadcasting," says Gepner. "We announced in mid-September that a deal had been signed with the NHL. This agreement, a $155-million, five-year package, will begin with our televising the All-Star game in San Jose in 1995. One of the exciting parts of my job is that when we move into a new sport, I get to explore different ways of using audio to maximize the viewer's sense of

"Once I got over the panic that hits you when you undertake a major assignment, I set up a list of priorities. They were organizing the mobile units and choosing the basic hardware we would be utilizing; assembling a core group of freelance technicians who we could feel confident in; and securing a team of field managers—senior people on each crew who would act as my liaison at each stadium.

"Once this organizational work was complete, we moved into our design phase. David Hill, the president of Fox Sports; Ed Goren, the executive producer here, and I looked at what had come before. The audio work at CBS and NBC was excellent. Our premise was to look at audio and ask ourselves, where can we improve on what has gone before, make it shine more brightly?"

The Fox team concluded that camera technology had reached a point where all picture work was on a high level, since the majority of cameras covering football are fixed, reducing variables. "Audio is trickier—you can't have fixed mics on the field," Gepner says. "You're more dependent on the equipment, the people and the techniques you employ.

"For our football work, we decided to use parabolic reflector mics," he adds. "They allow you to pick out sounds with the greatest discrimination. It's very noisy down on the sidelines. The object is to hear what's going on at the line of scrimmage—you want to hear pads bang-

participation. The techniques you use to make football audio pop out of the screen won't necessarily be effective when you cover hockey.

"Were we prepared to deliver broadcasting equal or superior to any that had come before the day we landed the NFL contract? Sure!" (Cue laugh track.) Gepner says that when he arrived at Fox in April 1994, he found plenty of good ideas floating around on bits of paper. The trick was to lay out a plan that would have the network's audio flying on automatic pilot when the season began just four months later.

Above: one of the four parabolic mic operators, prior to game time; right: "Madden team" technical director Bob Muller; below: principal mixer Bob Seiderman at the Neve VR Legend in the Fox broadcast truck

ing against each other, not the sound of the crowd.

"We decided to use a company called Connectronics for our dishes," Gepner continues. "They manufacture 'The Big Ears' reflector dish. An outside consulting firm and our independent testing found that this reflector had the most selective sweet spot; at 100 feet, the area of greatest pick-up was an area 30 inches across. Outside this zone was an immediate fall off of about 3 dB, which gives us the selectivity we wanted."

The network then decided on the Sennheiser EM 1046 mic system, which is composed of the MKE2 miniature lavalier, SK250 transmitter, a 250mW RF transmitter and the EM 1046 receivers. Fox uses four parabolics per game, a pair on each sideline.

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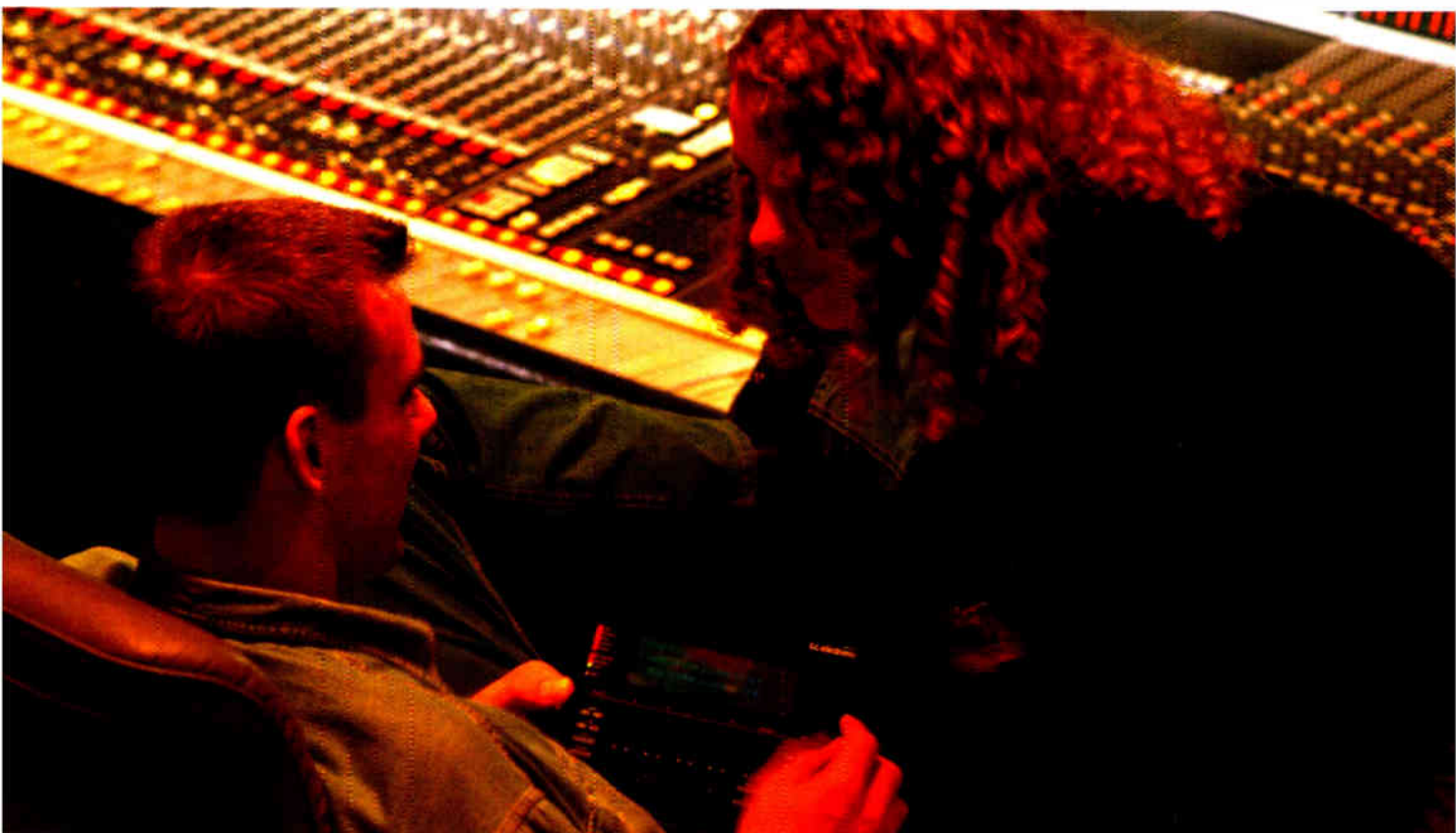
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The next decision that Gepner faced combined visual impact with audio considerations. "When you're picking out announcer headsets, you have to be mindful of their appearance on camera—this is a visual medium. We went with the Sennheiser HMD25; the quality of the mic is very high, the ear pieces are comfortable, and they look great. Noise isolation is important, but we don't want a headphone that's bigger than someone's head!"

When it came to picking hand-

48 Ins, What Do You Get?

For the "Madden" game each Sunday on Fox TV, the network sends out its premier broadcast truck, complete with a 48-input Neve VR Legend. When the crew was at Candlestick Park in San Francisco recently, we took the opportunity to sneak a peek at chief mixer Bob Seiderman's channel strip and ask for comments. And the inputs are:

1-6 Returns from limiters and effects devices.

7-8 Two interview mics on the field—for stand-up interviews with players after the game.

9-14 Left and right of three routers in the racks—for videotape playback. "I use the router; otherwise I'd be taking up 16 inputs just for machine playback."

15 Open. "For a wireless mic on the sideline if we have a sideline reporter." Usually appears at one Fox game each Sunday.

16-17 Two stick (handheld) mics in the announce booth for Pat Summerall and John Madden's on-camera opening.

18-20 Three headset mics up in the booth—Pat and John plus a spare or guest. "You never know if something's going to break or who is going to show up for a guest shot."

21 OBTW—"'Oh, By the Way,' for when they throw something at me too late to free up another input."

22 Feed from the house P.A.

23 Referee mic, feed from the stadium.

24-27 Shotgun mics on the sideline, handheld cameras.

28 Umpire's mic. New for this year. "It's used a lot. It's available for everything from the break of the huddle to just after the snap, so you get linebackers yelling out defensive signals, which is some-

thing we never had before."

29 Feed from the Mackie 1604 submix of the parabolic mics.

30-31 Left and right reaction crowd mix, coming off the Ryan Ashly submixer in the rack. "I have an X-Y pair of Sennheiser 416s set up at the high 50-yard line, outside the announce booth area. The other two are on the field, and their placement varies, depending on the stadium. For example, in Dallas, they have an abundance of cheerleaders, and they all stand at the 20-yard line, so that's a rough place to put a crowd mic.

32 Surround-channel crowd mics, located high in the stadium for a good, natural delay.

33-36 Submasters—LCRS sends to the Dolby encoder.

37 Announce submaster.

38 Send to the stereo synthesizer. The synthesizers are an Orban 275 and a Studio Technologies Generation II.

39-44 Music playback devices: the DigiCart, CD player and cassette player. "The DigiCart is great. It's not just instant access for playback, it gives you the ability to record something new on the spot—we might do a quick promo, a music transfer from CD or cassette that you can edit real fast. It has editing functions for fades and the like. I don't do it live, but before the game...and it's nonvolatile editing."

45-46 Incoming remotes, which could be feeds from the pregame show in L.A. or an onsite pregame show if it's Thanksgiving or the playoffs.

47-48 Return loops from Fox in L.A. "Basically for cueing announcers—for announcers to listen to when they do updates from the studio, or if our announcers are doing a two-way interview with the studio, pregame or postgame." ∎

held mics for field interviews, Gepner found "a lot of products that meet our criteria. We went with the Shure VP64, a standard handheld mic. It met all our performance criteria, and it looks great."

Fox also rethought the use of NAB carts, standard in the industry for many years as the medium for playback of music and sound effects—mainly stingers, promos and transitions into commercials. "We decided to use a product called the DigiCart, made by 360 Systems," Gepner says. "These devices are rapidly supplanting the NAB cart. In addition to having the advantages of digital sound, they have an internal hard drive which interfaces with a Bernoulli removable disk. Transferring audio between the two is quite simple." All of the mics, DigiCarts and various and sundry new equipment were purchased through Michael Descoteau, broadcast sales manager at Dale Electronics in New York City.

Gepner says that Hill's experience in European television affected the way that Fox delineates mixing responsibilities. "One of the biggest things that helped us provide consistent sound was relieving the engineer in the mobile unit from the responsibility of mixing all of the different mics. That's the way things are traditionally handled here in the States, but it is not the case in Europe."

Fox uses more of a recording studio model, in that they assign an assistant engineer to submix all four of the parabolics, sum them and send them single-channel into the mobile unit. The submix engineer sits in the press box with a Mackie 1604 console and the EM 1046 receivers, which are routed into the Mackie. "This person's sole responsibility is to mix these inputs. He can talk to the four people on the field via our one-way radio system; if they need to talk to him, they'll stick their face into the mic! This person has a bird's-eye view of the field, and he can move the others around the field, to wherever they'll get the best sound. We had our Mackies modified by a California-based company called Intercom Specialties. They put an RTS communication module in the board, which allows the assistant engineer to communicate with the mobile unit."

Down in the "Madden truck," principal mixer Bob Seiderman, who has more than a dozen years' experience in live sports mixing for

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One thing we're trying to do is give a perspective of suddenly walking out on the field, rather than being in that high seat at the 50-yard line. That's the idea behind the submix: to make the parabolic mics that much more effective.

—main mixer Bob Seiderman

CBS—including Super Bowls, World Series, horse racing, basketball, you name it—sits behind a 48-input Neve VR Legend. (Fox keeps core production crews intact, i.e., the crew for the games announced by Pat Summerall and John Madden follows the featured game of the week from city to city.) On a recent Sunday at Candlestick Park in San Francisco, *Mix* met with Technical Director Bob Muller, main mixer Bob Seiderman and Mackie submixer Phil Adler.

"The whole concept [behind the Mackie submix] is that a crowd in sports is one of the widest stereo im-

ages there is," Seiderman says. "So if you have any sources that are mono, like the parabs or the shotguns on the sideline cameras, if you don't do something to widen them out a bit, every time you go back and forth between crowd reaction and those mics, it just sucks into the center and will drive people crazy. The spread we're giving it is not to create a stereo effect, per se; it's just a light touch to make it a little easier to blend with the true stereo sources.

"My job is to substitute for the fact that the viewer is not at the game—not re-create being there, be-

cause that's impossible until we have true virtual reality. One thing we're trying to do is give a perspective of suddenly walking out on the field, rather than being in that high seat at the 50-yard line. That's the idea behind the submix: to make the parabs that much more effective. The use of Dolby Surround allows us to convey more of the stadium excitement.

The wireless mic on the umpire (i.e., not the referee, who calls the penalties), who starts each play in the defensive backfield, was experimented with at CBS last year and approved by the league this year. While the parabs are focused on the line of scrimmage and the quarterback, the umpire mic is useful for picking up defensive signals barked out by the linebacker. "That's become a pretty nice mic to have," Seiderman says. "It's available for use from the break of the huddle to the snap of the ball. The NFL has ground rules about when it can be used, and the ump has a switch so he can kill it if he goes into conference."

Seiderman, who might be considered the Bob Clearmountain of sports mixing, was in the truck for the 1987

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Balanced mic and unbalanced line inputs with phantom power and 20dB pad accommodate the widest range of input signals.

The only console in this price range with true Split EQ, each assignable to monitor or channel. High-frequency shelving control at 12 kHz, low frequency at 80 Hz for smoother, more musical EQ results.

Dual sweepable mids on each channel let you apply 16dB of boost or cut at critical frequencies.

Setting up two independent stereo cue mixes is no problem. Try this with other mixers in this price range, it just won't happen or you'll have to compromise something.

The most versatile AUX section in its class; rivaling expensive high-end consoles. 8 sends total, 2 in stereo. Send signal in stereo or mono, pre- or post-fader. Available all at once. Return signal through any of 6 stereo paths.

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Feel those 100mm faders! Turn those smooth and responsive knobs! They feel and work better than any other in its class. The M-2600's physical design takes the aggravation out of recording and lets you focus on the process of creating music. Everything is 'right where it ought to be'. Try it for yourself.

Each M-2600 channel features advanced-design mic pre-amps with incredibly low-distortion specs. Plus you get phantom power on each channel. Feed anything into the M-2600 from condenser microphones to line input from synths and sound modules.

For your personal or project studio, don't settle for anything less than a dedicated recording console. Some may try to convince you that a "multi-purpose mixer" works fine for multitrack recording. But don't take their word for it. The compromises, hassles and workarounds just aren't worth it.

Want proof? Ask your salesman how a multipurpose mixer handles these common recording situations. But listen carefully for workarounds, repatching schemes and other compromises. Then compare it to how easily the M-2600, a *true* recording console, sets up and does things.

SITUATION Separate headphone mixes for the talent and the producer. The talent wants a reverb-wet mix, but the producer wants it dry. Everyone wants it in stereo.

Compromise: Multi-purpose mixers require you to sacrifice 4 AUX sends and tape returns to get 2 stereo headphone mixes; but you need those sends/returns for outboard effects! What a dilemma.

M-2600 Solution: With a few buttons, assign up to two, independent stereo AUXs to be used as headphone mixes. Everyone hears the mix they want — and you've still got four AUX sends and returns free for signal processing gear.

SITUATION You're EQing tape tracks to get just the right sound. You're using the shelving EQ for the monitor mix, and the sweepable mids for the channel buss. Still, the drummer wants a certain frequency out of his mix — a job for the sweepable mids.

Compromise: Few multi-purpose mixers have EQ assignment. You're stuck with the shelving EQ on the monitor mix, and the sweepable mids on the channels (if they even have split EQ). You've got no choice. Good luck trying to explain this to the drummer.

Available with 16, 24 or 32 inputs, the M-2600 is optimized for digital recording. Don't wait till your first session to discover the compromises and hassles other boards will put you through.

M-2600 Solution: Assign the shelving EQ, the sweepable EQ, or both to either the monitor or channel buss as necessary. The entire EQ section is splittable and assignable and can work in tandem.

SITUATION Mixdown. You're sending tracks to effects units for added studio polish. You want to take advantage of true stereo effects. How do you do it?

Compromise: Most multi-purpose mixers have fewer AUX sends than the M-2600's eight. Usually only in mono. And, some sends are linked, so you can't send them to different signal paths. So you settle for only a few effects, or forego stereo effects altogether.

M-2600 Solution: Pick one: 8 mono sends or 1 stereo and 6 mono sends or 2 stereo and 4 mono sends. Each with its own level control and separate output jack. So you can use true stereo effects and still have sends left over for effects. Send the effects signals back via 6 stereo returns.

That's not all! The M-2600 doesn't compromise sound, either. You'll appreciate the new TASCAM sound — low-noise circuitry and Absolute Sound Transparency™. It all adds up to the perfect console for any personal or project studio — combining great sound with recording-specific features you'll need when recording, overdubbing and mixing down. Features you can get your hands on for as little as $2,999 (suggested retail price for the 16-input model).

So forget compromises. Invest in a true recording console. The TASCAM M-2600.

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Only the M-2600 provides two independent stereo cue systems. Demanding performers can hear the submix or scratch tracks the way they want, so they'll perform better. Meanwhile, the control room or producer's mix is unaffected. You can accommodate everyone involved in the production — without interrupting the creative flow. Best of all, using the cue mixes doesn't involve tying up your valuable AUX sends.

Use more effects/signal processing gear on more tracks with the M-2600. Use two (count 'em) true stereo send/returns to support stereo effects units. Plus, you still have 4 fully-assignable AUX sends left over for other gear. A total of 8 AUX sends — more than nearly any other console — anywhere. Better yet, you can use them all at once. No compromises. At mixdown, you can actually double your inputs so you can mix in all those virtual tracks. Just press the "Flip"* switch. No repatching. No need to buy expensive and space-eating expansion modules.
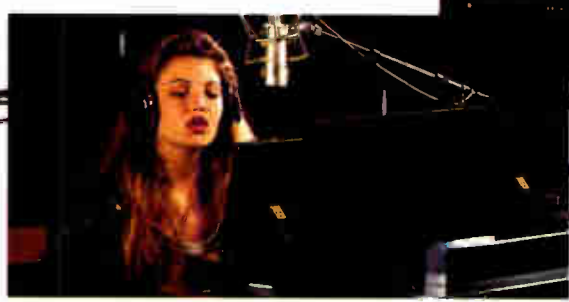
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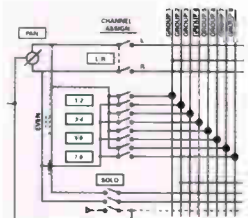
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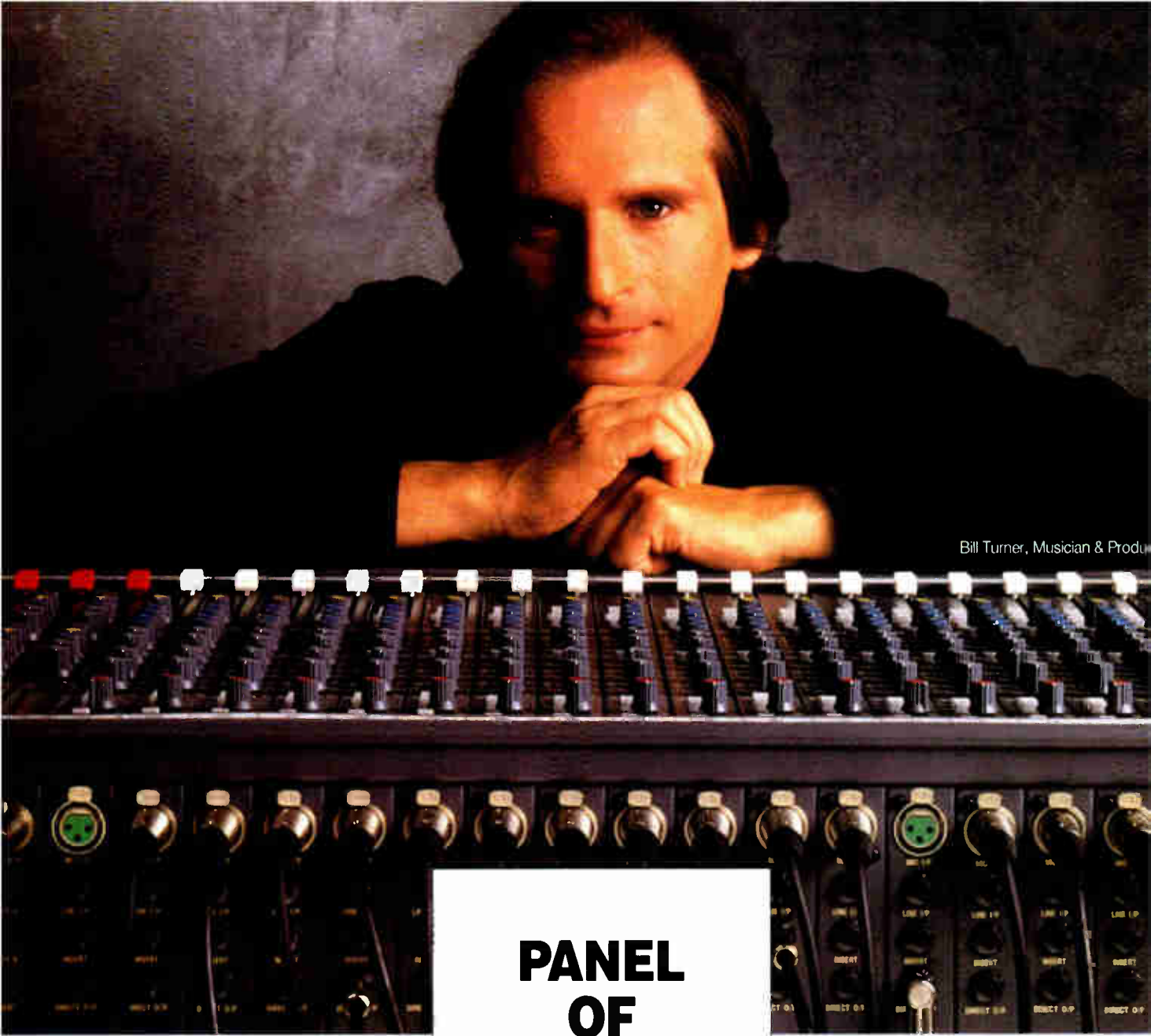
Bill Turner, Musician & Produ

PANEL
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EXPERTS.

Bill Turner is an expert on professional sound studios as well as being a renowned session musician. Among his noteworthy accomplishments, he played lead guitar with Bill Haley, and most recently toured Europe with a revival of the original 1954 Comets band. He currently performs and records with his own band, Blue Smoke.

Bill is equally talented as a producer in his Brooklyn, New York, studio, Bill Turner Productions (BTP). "Being an independent producer, we often have to create the product on location and many times outdoors. This is the trickiest... anything can happen outdoors. We eliminate a lot of the 'gremlins' by using only the parts and connectors we feel are the best...and that translates to Switchcraft. We never leave the studio without Switchcraft."

Switchcraft manufactures microphone connectors, plugs, adapters, cable assemblies, receptacles, patch cords, audio patch panels, and more. If you need something customized, we'll help you design and execute your concept. Wherever music is made, Switchcraft can supply the components and assemblies to make it sound better.

So why use ordinary components when you can work with a panel of audio experts? When you do, you'll know what Bill Turner has known for years. "Insist on Switchcraft...we do. It's the undisputed Standard of the Industry."

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Super Bowl in Pasadena, which was the first use of Dolby surround for live broadcast—sports or otherwise. Nothing, he says, compares to the sound of a crowd of 70,000 going crazy, and it's even more impressive in surround. Sennheiser 416s are set up in an X-Y pair below the press booth, at the 50-yard line, and sent through an Ashly submixer in the truck's rack. Two more crowd mics are placed on the sideline, for when it's a big game.

"The L, C, R and S from the Neve are sent to the Dolby SDU-4 encoder," he explains. "The output—the left-total and right-total output of the encoder—gets reinserted into the masters of the board, so that's the last thing you're looking at. Every place in the system that says 'program left' and 'program right' is actually encoded."

The encoded audio is then sent on its way to the Fox studios in Los Angeles via fiber-optic lines on the Vyvx network. There is no satellite. "We transmit four channels of audio per game, two of which make it into the home environment," Gepner explains. "We have Dolby equipment in each truck, which we use to surround-encode our mixes—Dolby presented us with encoders and decoders. Channels 1 and 2 go stereo left and right; these channels also carry the surround information. On channels 3 and 4 of the fiber, we ship a mono effects mix only, which includes crowd and field mics submixed, along with any other effects, but does not include announcer voice-overs or music. These two channels carry identical information. The reason for sending out this mix is that when they download the transmission in our main facility in Los Angeles, they'll take the mix without announcers and use it for highlight films. This mix is also made available for possible future uses, which may not want the original announcer VOs."

Gepner and his crew are betting that owners of sophisticated home theater systems will be brought closer to the action with the audio scheme that Fox has designed, and he's also convinced that average TV owners will notice the extra pop that the network has built into their audio pathway. ∎

Gary Eskow is a New Jersey-based musician and writer.

Long-Lost Classical Recordings Rejuvenated BY VANGUARD AND SONY

by Dan Daley

Sound engineers in 1958 would have looked upon our wide array of music reproduction formats with considerable confusion. They had vinyl— 33, 45 and the odd 78 rpm standards—and that was plenty. The audiophiles had tape; the more well-heeled ones had it in stereo. But Harry Belock and Bert Whyte had a vision of what the future could sound like.

Starting in that year, Belock and Whyte began a series of classical recordings whose clarity and accuracy exceeded the sound reproduction systems of the day. Being that far ahead of the curve meant that their labors languished in warehouses and cut-out record bins for 35 years, waiting for the future to arrive. This summer, it did. The dozens of original recordings, cut to 3-track on 35mm mag film stock, passed through the time warp in the form of digital editing, 24-bit resolution and Super Bit Mapping for re-release on CD. And a first

listening at Sony Classical—to Stravinsky's *Rite of Spring*, with Goossen conducting the London Symphony Orchestra—on a beautiful September afternoon in Manhattan made it abundantly clear that it was worth the wait. Early releases also include Bartok's *Dance Suite*, with Ferencsik conducting the London Philharmonic; and Aaron Copland's *Appalachian Spring*, with

Leopold Stokowski conducting the Stadium Symphony Orchestra of N.Y., at Manhattan Center, circa 1958; note the three-U47 stereo array and single U47 for mono.

Susskind conducting the London Symphony.

The original recordings were done between 1958 and 1961 by Belock and Whyte. Recognizing that the ¼-inch, 15 ips mono format was trun-
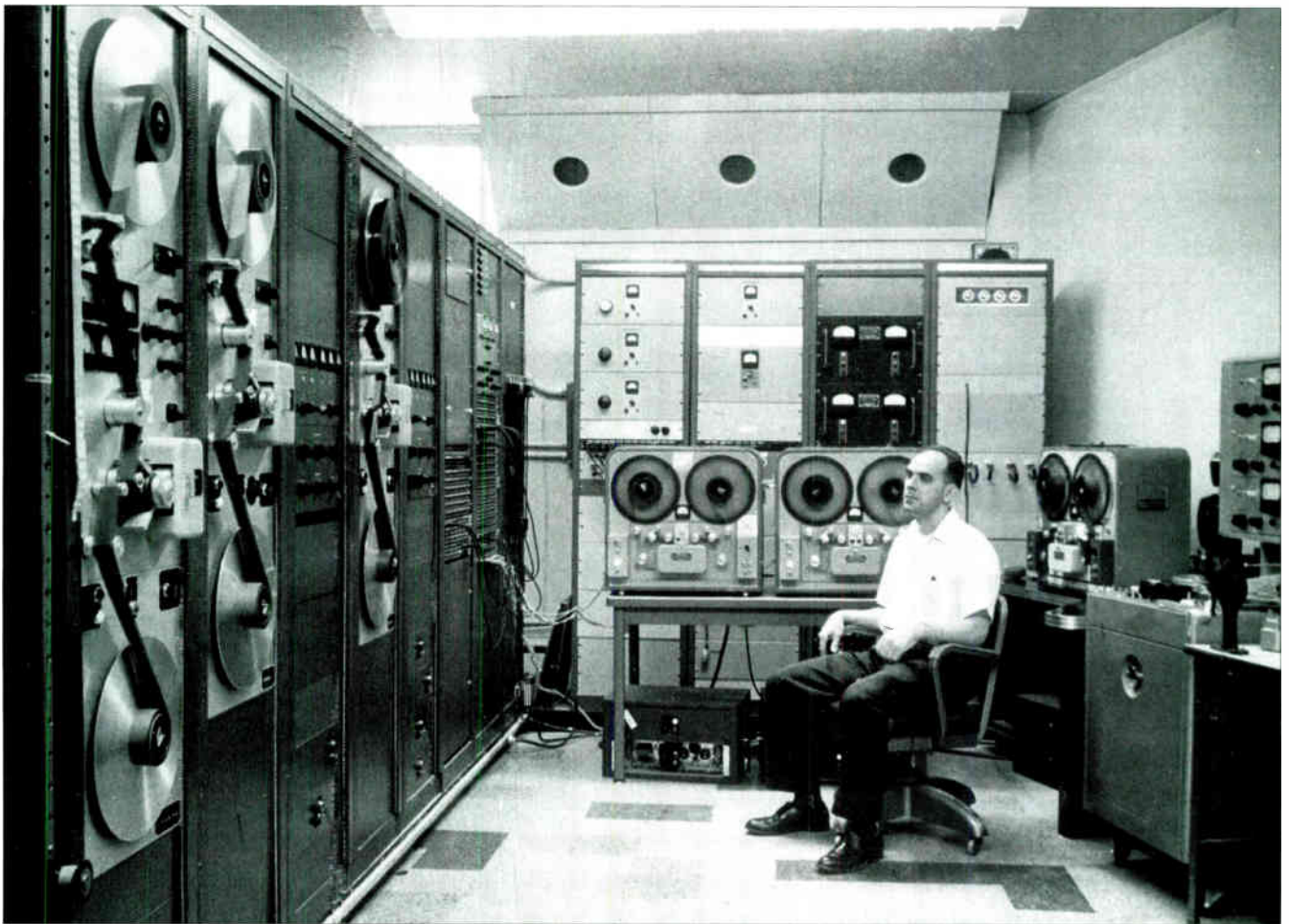
Above: 35mm magnetic film equipment at the Belock Recording Studio, Bayside, N.Y., circa 1960; below: During an Everest recording session in Pittsburgh, Penn., Bert Whyte at the board with conductor William Steinberg; Raoul Poliakin, of Everest, with back to camera, circa 1960.

cating the dynamic range of stereo, some engineers were experimenting with ½-inch tape and 30 ips speeds. Belock and Whyte went further, selecting 35mm magnetic film stock and a heavily modified mag film audio recorder, a vacuum tube model that Belock adapted by removing the input and output amplifiers, allowing audio signal to hit the tape directly.

The recordings were captured via three critically positioned and heavily modified Church/Neumann U47 microphones. The mic's tubes were changed from VF14s to 12AY7s, and the power supplies for driving the plate and capsule were adapted for 400-volt photoflash batteries,

which trickle-drained down to the 200 or so volts needed for optimum power. The console was a Western Electric board, also tube-powered and heavily customized, which allowed Belock and Whyte to ride the center channel and place as little processing in the signal path as possible. That, combined with the film audio recorder that minimized pre- and de-emphasis EQ curves and de-

layed the onset of tape loading for substantially increased frequency response and dynamic ranges, gave Belock and Whyte some of the most pristine classical recordings ever achieved. Signal-to-noise ratios and dynamic ranges were greatly increased, there was dramatically low print-through (heavy film stock is great for that), and virtually no wow or flutter was evident.

Unfortunately, their original release on Everest Records was a disappointment despite careful attention to pressing—the playback systems of the day simply couldn't do them the justice. Subsequent releases used ¼-inch dubs that eventually gave way to multiple-generation duplication masters, further diminishing the quality. The original 35mm masters eventually wound up in storage at Everest in Pismo Beach, Calif., in coffin-like tin film canisters.

Although their beauty was never fully realized, their

legend compensated, growing almost mythically among the technical and aesthetic cognoscenti. "People knew about these recordings," recalls Seymour Solomon, president of Omega Records and founder of the Vanguard Classics label, which is sponsoring the re-release. "It was a matter of doing something that did them justice." Everest owner Bernie Solomon (no relation) had resisted re-release offers over the years, but not the one that Vanguard/Omega tendered early in 1994. Transferring the material to 20-bit digital would be buttressed by application of editing and clean-up work on a Sonic Solutions system and storage to a Sony PCM-9000 hard disk mastering system.

When the film tins were opened for the first time in more than three decades, the stench was almost overpowering. "Some people actually got ill from the noxious fumes that came from those cans," Seymour Solomon recalls. However, once cleaned with water and paper towels, the tapes played back fine for the most part. There was some water damage to a few spots but otherwise, Solomon says, "They were essentially flawless."

Seymour Solomon and Frank Burton, operations manager for Vanguard Records, took the film masters to a warehouse in Queens, N.Y., where they set up a Belock-designed film dubber and a small console, and set about transferring the tapes to a Sony PCM-9000. The key here, according to David Smith, director of recording operations at Sony Classical and supervisor of the editing and assembly, was to make the transfers as clean and free of artifacts as possible. "They had to use the same dubbing machine," says Smith, whose own background in audio goes back to stints at Manhattan's legendary A&R Recording and Editel. "It was the only way to get the same EQ curves. We tried to keep the masters as the CDs would be: minimal dynamic changes, no EQ, no signal processing and, most of all, keeping acquired jitter to a minimum."

The 20-bit information was then transferred on removable hard disk to a Sonic Solutions system at Sony Classical and manipulated by staff editors Richard King and Shane Bryanton. The main goal was jitter suppression, Smith says, and while much of the process is being kept under wraps, he did say that the entire transfer process bypassed the conventional AES/EBU and S/PDIF ports and instead utilized an older, simpler Sony SDIF port. Once that was accomplished, the result was data with 24-bit words, a by-product of the editing process that enlarges the word size. The data would eventually be algorithmically transformed from the 24-bit structure to the CD-standard 16 bits via Sony's Super Bit Mapping process.

Within all the mathematics, though, was a distinctly human element, as well as a tolerance and appreciation for what the tapes contained and what they meant to their creators. After hearing a playback, one audiophile magazine editor mentioned that there was some audible high-frequency distortion. Smith replied that it was caused by the overloading of the film stock in recording, which manifested itself in clipped upper harmonics. "Back then, the way they dealt with signal-to-noise and dynamics was to hit the tape as hard as they could," he explains. "It can be removed, but it's time-consuming and involves signal processing and thus interpolation of data, which we wanted to avoid.

And it's part of the original recording, so a decision was made to leave it alone."

In the editing process, the human element came to light in problem solving. Issues such as head bumps, tracking errors, dropouts, reverb discrepancies and high-frequency damage were reconciled with a combination of cold, hard math and some very human sensitivity to the intent of the project's originators. In the process, King and Bryanton repeatedly referred to the original scores of the compositions, looking for exact duplications of damaged parts either from the master they were working

on or one of the two backups that had been made of each piece originally. They would then insert "gentle" fixes digitally.

Razor-blade edits on the film stock created some sonic problems, which were addressed by opening the edits up and inserting noise over the bumps or by very quickly dropping the level to mitigate the thump. Reconciling levels was tedious and required precision, with increments of half-decibels. Occasionally, the original recordings cut off the reverb tail of the hall. In a rare instance of a signal processing application, the reverb tails were restored digitally,

but only, Smith stresses, to provide continuity to the acoustical effect, which in no way affected the integrity of the music.

The toughest problem was dealing with torn sprocket holes in the original stock, which affected the speed of the dubber. "They were corrected one millisecond at a time using an algorithm in the Sonic Solutions system," says Smith. Both the reverb fixes and the speed correction were the only applications of signal processing used in the entire process. "What we wanted to do was to avoid extended signal processing—to correct the problems without resorting to pitch shifting or other digital fixes," Smith says. "It was inevitable that there had to be some processing."

After the editing process was completed, the output of the Sonic Solutions was dumped to DAT for approval by Burton and Solomon. They proved rather critical, indeed, sending back several edited versions. However, the two additional sets of ears proved to be very technically intuitive and aesthetically astute. Burton and Solomon were able to spot jitter problems and, in one instance, were even able to discern a clock board problem in one of the Sony 9000s, where an egregious error is measured in pico-seconds. "They certainly knew their stuff, to the point of being almost frightening," Smith says with admiration.

Once approvals were all in, the edited material was dumped to a Sony PCM-1630 using the Sony Super Bit Mapping technology. There was no real mastering stage, per se. From there, the recordings were replicated to compact disc.

"What was amazing about this process was how it showed that the future keeps pointing to the past," Smith says in retrospect. "It helps us develop an abiding and healthy respect for what they did back then, because if you look at the studio of today, you can see where we're going because of where we come from. What Bert Whyte and people like the late Bob Fine did in the '50s and '60s—using three to five microphones to record orchestras instead of the mega-miking so common today—shows us how the art of mic placement and on-site mixing has become not so much a lost art as a displaced one. It's one that we're increasingly coming back to as we move into the future." ∎

TEC Awards Winners

The winners of the Tenth Annual Technical Excellence & Creativity Awards were announced Friday, November 11, at a sold-out ceremony at the Westin St. Francis in San Francisco. More than 650 audio industry professionals looked on as 24 awards were handed out, along with the Les Paul Award to Herbie Hancock and the Hall of Fame Award to the late Frank Zappa.

Outstanding Institutional Achievement

- **Acoustics/Facility Design Company**
  studio bau:ton, Los Angeles, CA

- **Sound Reinforcement Company**
  Clair Brothers Audio, Lititz, PA

- **Mastering Facility**
  Bob Ludwig's Gateway Mastering, Portland, ME

- **Audio Post-Production Facility**
  Skywalker Sound North, San Rafael, CA

- **Remote Recording Facility**
  Le Mobile, Los Angeles, CA

- **Recording Studio**
  Record Plant, Hollywood, CA

For the complete TEC Awards wrap-up, please check the January issue of Mix magazine.

Outstanding Creative Achievement

- **Audio Post-Production Engineer**
  Gary Rydstrom

- **Remote/Broadcast Recording Engineer**
  David Hewitt

- **Sound Reinforcement Engineer**
  Robert Scovill

- **Mastering Engineer**
  Bob Ludwig

- **Record Producer**
  Don Was

- **Recording Engineer**
  Bob Clearmountain

Outstanding Technical Achievement

- **Ancillary Equipment**
  Apogee Electronics UV 1000 Super CD Encoding System

- **Amplifier Technology**
  Stewart PA-1400

- **Computer Software/ Peripherals**
  Digidesign SampleCell II

- **Microphone Technology**
  AKG C414B/TLII

- **Sound Reinforcement Loudspeaker Technology**
  Apogee Sound AE-9

- **Studio Monitor Technology**
  Alesis Monitor One

- **Musical Instrument Technology**
  Alesis QuadraSynth

- **Signal Processing Technology**
  Eventide DSP4000 UltraHarmonizer

- **Recording Devices/Storage Technology**
  Tascam DA-88 Digital 8-Track

- **Sound Reinforcement Console Technology**
  Soundcraft Vienna II

- **Small Format Console Technology**
  Mackie 8-Bus Series

- **Large Format Console Technology**
  Euphonix CS2000

by Paul Potyen

ENHANCED CDs
MAJOR RECORD LABELS
CONSIDER A STANDARD

I n our efforts to satiate your ravenous appetites for multimedia stories, this month we're offering one on a new kind of music CD-ROM—one that the major record labels are propagating. It's a new generation of interactive CD, and a different beast from what we've experienced to date.

Peter Gabriel's *Xplora*, His Purpleness' *Interactive*, Todd Rundgren's *No World Order* and other music-oriented interactive titles have captured the attention of a small, albeit eager group of knowledgeable, early adopters of the new technolo-

gy. But the fact remains that their numbers are still minuscule compared to those of the general record-buying public. However, a committee of representatives from the major record labels has formed under the auspices of the RIAA for the purpose of developing a new generation of "enhanced CDs," which just might bring about a significant change in the way interactive titles are marketed, perceived and ultimately embraced by consumers. The theory is that the record-buying public could buy such discs via the normal channels and

*Track 1 of Jason Miles' **World Tour** includes an interactive catalog of other Lipstick Records releases.*

play them as they would any normal audio CD. But there's extra stuff on it, which might entice at least some of them to buy the equipment (a computer and a CD-ROM drive) necessary to check it out.

The idea of an "enhanced CD"—a classical and pop titles, most of which are still available today in record stores. The discs play in any CD unit but offer additional information—photos, illustrations, text, etc.—on a separate graphics channel when used with a CD+G player connected
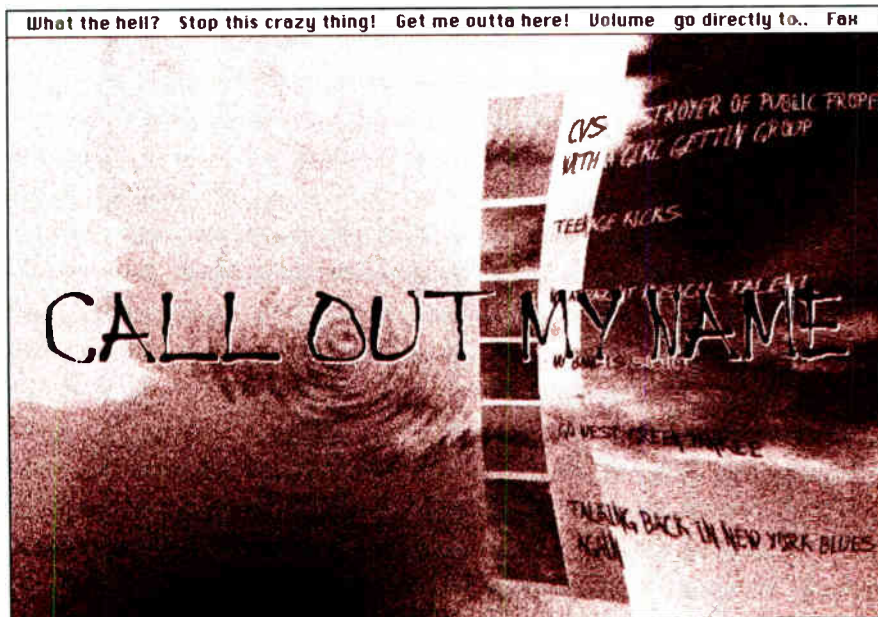
Chris von Sneidern's Big White Lies *includes an interactive track with stories, videos and other multimedia goodies.*

disc containing several music tracks, playable on a conventional audio CD player, along with extra digital content such as lyrics, photos and other information—is not a new one. For example Warner New Media experimented with the format in 1990 with its Beethoven String Quartet #14 mixed-mode CD-ROM, which could be interactively played from a CD-ROM drive and a Macintosh using a HyperCard stack. While the music could be played on a normal CD player, the disc was plagued by the "track 1 problem." By definition, track 1 of any mixed-mode CD-ROM *must* be the data track; only *subsequent* tracks can be Red Book audio. And what happens when you try to play track 1 on your audio CD player? If you're lucky, your player will be smart enough to mute the track, and you'll get several minutes of silence, depending on how many megabytes of data are on that track. If you're not so lucky, you'll hear the electronic equivalent of a set of fingernails on a chalkboard. And if you're *really* unlucky, you'll tear up your speakers, and maybe even your ears.

In 1991, Warner New Media used the CD+G format (the G stands for Graphics) to release a number of

to a television. Graphics mode is actually part of the original CD specification, but JVC was the only company to release a CD player in this country that took advantage of graphics mode, and it no longer sells that model. However, the CD+G standard has evolved into a standard that is currently used for playing Karaoke CDs. Those discs—as well as the original Warner New Media titles—are playable on a variety of multimedia platforms, including CD-I, 3DO, SegaCD and (with additional shareware) a Macintosh.

Despite the track 1 problem inherent in mixed-mode CDs, a few adventurous independent record labels have felt that there was enough incentive to release mixed-mode CDs. Jason Miles' Lipstick Records release, *World Tour*, is that label's first mixed-mode CD containing "interactive liner notes." *World Tour* was released in April '94 in Europe and Japan, and May '94 in the U.S. The interactive material—a catalog of currently available titles from Lipstick with audio samples, photos and graphics—is readable only from Macintosh computers. It was created using Macromedia Director. According to Miles, "The response [from the

public] has been mixed. When I was in L.A. last June I gave the CD to several friends, and I got phone calls at my hotel for two days saying, 'What's going on, it wouldn't play in my car,' or 'What was the weird stuff on the first part of it?'"

The record company placed a notice in two spots on the CD, warning customers not to play track 1 on a CD player "because it will be silent for 16 minutes or will make a noise which can be dangerous [sic] to your loudspeakers at high volume!" But let's face it, who has time to read anything these days? And who wants to read something that's "dangerous"?

Heyday Records president Ron Gompertz explains that his company's first enhanced release—*Big White Lies*, featuring singer/songwriter Chris von Sneidern—was developed in collaboration with V2 Productions, a San Francisco-based company that specializes in music-based multimedia. "We're pushing envelopes in more directions than an envelope can normally be pushed," he claims. "We're one of the few companies to attempt a mixed-mode, cross-platform CD-ROM. This makes it exponentially more complex." Gompertz was originally told that there was a way to skip the track 1 data when using an audio CD player. "That's not the case," he says, "so now we have to very carefully design our packaging to inform the consumer to skip that track."

Despite the technical issues, Gompertz felt it was worth trying. "It's difficult to sell a large number of units on a CD-ROM title, as opposed to an audio CD," he explains. "There are five-to-eight-million CD-ROM drives in the U.S., while there is more than 70% saturation of CD-Audio players in the American home. And on a practical level, a full-blown interactive CD-ROM is going to take a lot more time and money to do well, and then we'll sell maybe 10,000 of them if we're lucky. It didn't completely add up when we thought about whether we would break even on this thing.

"We're guessing that we'll get 5,000 units through the normal distribution channels based on the existing customer base for audio CDs," Gompertz adds. "And then the novelty factor should add another 5,000 units. There's not a lot out there in terms of music, other than the big

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"IT'S RIDICULOUS! Excellent bass control, great harmonic detail, the 9505 Trans·nova is another level up in overall performance."

Tom Jung
DMP Records

"The new Hafler Trans·nova sounds great here at Capitol's Tower Mastering. Dependable as always - clear and detailed with wonderful bass response."

Wally Traugott
Tower Mastering
Capitol Records

"The first 20 Trans·nova 9505's ever produced are now in use at Warner Bros. Studios Facilities in Burbank, CA."

Claus Wiedemann
Chief Engineer

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superstars. I think there are people who are interested in more obscure things. I intuitively felt that the cutting-edge consumer will check it out."

Big White Lies was scheduled for release in October. The interactive portion of the disc—as with *World Tour*, it was created using Director—is more developed than that for the Lipstick release. The main menu con-

sists of three windows: Clicking on the first gives you a previously unreleased (QuickTime) music video, whose audio track isn't included in the audio CD. The second window, called "About the Songs," contains 12 QuickTime Movie interviews with Chris, where he talks about each of the songs on the CD. And the third is "What's the Story?" Here you can select from eight 1½- to 2-minute audio/slide show stories that Chris tells about growing up and playing music around Syracuse, N.Y. The audio is 16-bit 22kHz for compatibility with the PC.

Dave Curtis, of V2 Productions, adds, "We've seen a lot of music CD-ROMs that we thought were missing the point. We don't think fans want to pay $49.95 to go through 3-D walkthroughs over and over again. We think we can present a ton of content in an attractive manner for no extra charge to the consumer. If a record company is paying $50,000 to $500,000 to record an album, our budget here is $10,000 to $60,000, so we're talking about one-tenth of the total budget to add an interactive track to the CD."

What the hell? Stop this crazy thing! Get me outta here! Volume go directly to.. Fax
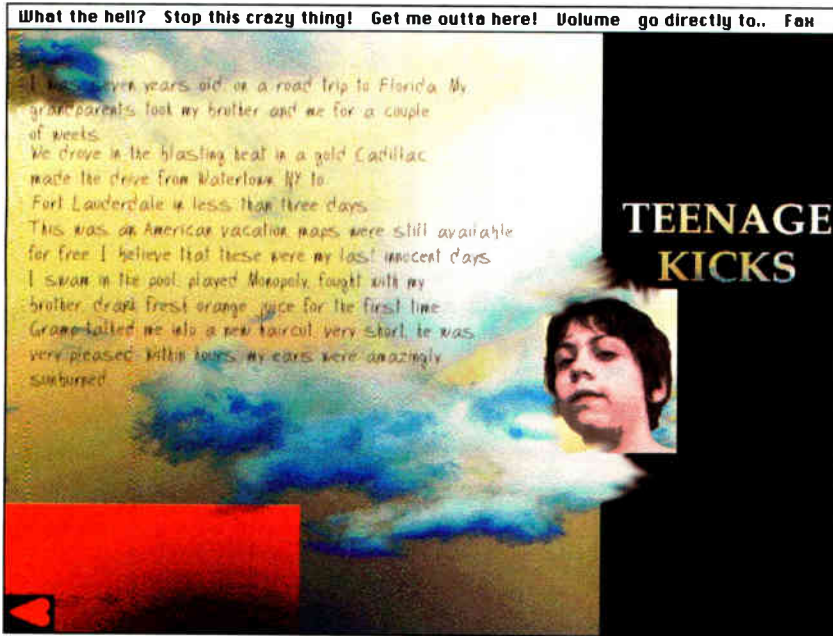
TEENAGE KICKS

"Teenage Kicks," from the "What's the Story" section of Big White Lies, *is one of 12 vignettes about von Sneidern.*

Alex Melnyk, VP of interactive media at MCA Music Entertainment Group, is one of those who feel that there needs to be a standard in order to successfully market this new generation of enhanced CDs. Her primary role is to publish interactive software, including CD-ROM software for the consumer market. She is looking to the RIAA New Technology Committee, which has representatives from all the major labels, as the group that will ultimately come up with the solution.

"One of the reasons I want to do this," she explains, "is that a lot of people are still intimidated by the technology. This is a great way to bring it into the homes of every audio listener. If someone goes out and buys the record (which is the way the product will be marketed initially), they'll discover that there is some extra stuff included, and many will want to figure out a way to see it. In that way, they'll be exposed to what the medium is about. That's important because people still need to be educated. I also think that this will be the record of the future. In five years, all [music] CDs will have a lot more than audio on them."

The track 1 problem inherent in mixed-mode discs is considered by many to be a serious one. Melnyk explains, "Even if you automatically skip over track 1—and as far as I know, nobody has succeeded in doing that—the first audio track will be track 2, which is still confusing to the consumer who is buying it as a record." The issue has led some to consider other alternatives. And it appears that the technology is finally in place to support another approach: multisession discs.

Albhy Galuten is a Grammy Award-winning producer and veteran of the recording industry, having collaborated on numerous Bee Gees albums, as well as releases by Barbra Streisand, Eric Clapton, Jellyfish and others. He's currently working with ION (the company that brought us David Bowie's *Jump* CD-ROM, and now a joint venture with BMG), developing interactive audio CDs, and he has been instrumental in bringing this technology to the major record labels.

According to Galuten, "A playable data track 1 [in a mixed-mode disc] creates an indemnity issue for the

record companies. People can say, 'You ruined my hearing,' or 'You broke my speakers.'" Galuten feels that multisession discs offer a better solution. Multisession has been effectively used in Kodak's PhotoCD process, whereby people can digitize a set of photos onto a PhotoCD, and subsequently add more photos onto the unused portions of that disc in subsequent sessions. One issue that engineers have been working on for more than a year is how to mass-produce multisession discs, which are essentially one-offs. [See "CD-Rs Burning Up The Tracks," *Mix*, November '94.]

In a multisession disc, the first session could conceivably consist of Red Book audio, followed by the lead-out and a second session containing CD-ROM data. The beauty of multisession disc is that all audio CD players are too dumb to look for a second session. "Basically in order to mass-produce such discs," Melnyk explains, "you need to change the firmware and software at the CD-manufacturing plants." And in September, those mass-production issues were solved. Most of the plants in the world use software and firmware created by Doug Carson Associates (Cushing, Okla.) [See "Using CD-R in the Studio," *Mix*, Jan. '94]. The company has been modifying its Disc Description Protocol (DDP), which it created back in the early '80s, to allow a multisession one-off to get translated onto a conventional silver disc. So, with one of the biggest roadblocks seemingly overcome, much of the discussion within the committee is focused on multisession as the ultimate solution. (See sidebar.)

Norman Beil, head of business affairs at Geffen Records, is one of those who is putting a lot of energy into the RIAA committee effort. "We [at Geffen] decided not to set up an interactive division, like some other labels," he says. "But we have a lot of people who are involved in their spare time. I head up that endeavor. And the project that's nearest and dearest to my heart is what I call enhanced CDs. There's so much more you can do with them than just liner notes. Sony wants to call it CD Plus. No one has come up with a name or even a standard on what it should do and look like." Beil feels his efforts, together with the input of others on

the committee, will soon bear fruit: "A lot of progress has been made, and we'll start seeing products coming out shortly."

Beil's goals are ambitious. He wants to see a standard computer application that resides on operating systems—Windows and Macintosh. And the audio CDs would have only the data on the second session, which would be read by the standard application, rather than requiring every new release to have developers and computer programmers who come up with a new concept, a new design and new code.

"From the consumer's point of view it would be much better," Beil says. "Once you've navigated through one CD, you know how to navigate through all of them. You know how to look up lyrics; how to control the music by clicking on a certain lyric; how to change the order of the sequence of tracks; how to delete tracks you don't want to listen to. All the labels have to do is have a database with tracks, lyrics, bios, liner notes, animations, touring maps, timelines of the band's history, the discography and so on. They could throw that on easily and inexpensively into standard file formats. The cool thing is that there would be this wonderful application that resides in everybody's computer that does all kinds of great things—whether it's controlling the audio, or just browsing through other information that has links to other information, including music—while you're listening to the audio."

Beil is hoping that the member companies will get together and fund an independent multimedia developer to come up with the application, and then coordinate with the various operating system developers to make that application available free of charge to the consumer. It could be distributed to the consumer at no cost by including it in the operating system (for example, the new Windows 4.0 or Macintosh operating system), or it could be made available through various online services. "And, of course," Beil says, "we could add it to the audio CDs. The first iteration of the CDs could all include the application."

Efforts are continuing in parallel with the RIAA discussions. "I know that Sony is rushing to release an Alice in Chains EP with a CD-ROM track on it before the end of the

year," Beil adds. "I applaud their endeavors, but I don't think it's what the industry wants. They are packaging a floppy disk with their CD, because that's the only way they can ensure that the CD-ROM drives will be able to read the material. That seems awfully inelegant. It means there's separate packaging and a separate price point."

Beil believes that the right approach is to enhance the existing audio CD format, rather than to try to create a whole new one. "If you did it as a separate SKU (Stocking Unit), where you might charge an extra $5 or $6, the incremental sales would be minuscule," he explains. "However, if you just add it to every CD, most people who get it wouldn't really care about it. But the kid who goes out and buys the latest Pearl Jam album with this additional material on it is the best salesman in his household for a multimedia system. He's got something he can't get at. If we make it part of what a record company does, then people will be encouraged to buy the equipment required to use it."

Beil is also looking at this as the next evolution of audio CDs. "As

Replicating Multisession Discs
THE DWEEBY DETAILS

As of this writing, three replicating plants are capable of mass-producing multisession discs. When you do a multisession one-off disc, it is "pre-striped." There's already a track on a blank CD-R that tells the laser beam recorder the location of the second session. When you mass-produce a glass master there is no equivalent address. You have to write the disc at once; you can't write it and subsequently go back and fix the first session and then write the second session because there are no addresses written yet. That, combined with the way you modulate the laser beam recorder, turns out to create a complex scenario. ∎

soon as you start putting it in computer stores," he says, "it misses the whole point. Then you're competing with multimedia titles that cost a million dollars."

Many issues remain before we start to see multisession discs in record stores. For one thing, it appears that at least some of the other record companies are less than enthusiastic about Beil's suggestions regarding a standardized application at this point.

One advantage to Beil's approach is that costs can be amortized and schedules can escalate. Record company artists would have a simple choice to include certain multimedia elements, which would be accessible from a standard application whose design and limitations have been predefined, or to simply have no interactive functionality at all. But the scenario is somewhat limited in that there would be no video, for example. Other companies are more interested in letting a user click on an icon to have an experience. And some record companies feel their artists should have the opportunity to be more involved in the interactive design and graphical elements. In any event, it remains to be seen how the economic model will shake down.

Galuten, who has been looking at the technical issues with multisession discs, talks about some of them. "One is the ability of CD-ROM players to read the discs," he says. "Many drivers and players can't. Even some multisession-compatible CD-ROM drives can't read the second session of a disc such as this, because once they see Red Book in the first session they don't expect a second session, so they don't read it. The problems live in the firmware—the driver software from the drive manufacturer—and with the layer of upper-level system software that communicates with the drivers." Those upper-level system problems are reportedly being worked on at Apple and Microsoft.

There are also legal issues: who gets the royalties, who pays whom how much for the various pieces of content, and other contractual issues with a recording artist. And there are publishing issues: For example, if you click on an icon on the lyric a chord chart might appear; will publishers want to get paid for that? You might also want to be able to print out a manuscript. There are all sorts of profitability and marketing issues. Are they going to be the same price as a regular CD or higher? Will they be at two different places in the store? The list goes on and on.

Even with the mass-production issues resolved, it's pretty clear that, between the RIAA and the complexity of authoring to make a good product, no standard will be in place in time for a Christmas release. But there is plenty of interest and momentum on the part of record companies to make this happen soon.

Galuten is optimistic. He feels that, ultimately, it will open the door for artists who come to a record label with demos that have graphical elements. But he adds, "It won't really be dramatic until the computer screen has connected with the living room, because the resolution of your TV begins to approach that of your computer and these interfaces can migrate to the family room." ∎

Paul Potyen is, among other things, a Mix *associate editor.*

MULTIMEDIA CHIP SHOTS

OPCODE AUDIOSHOP 2.0

The newest version of Audioshop, from Opcode Systems (Palo Alto, CA), records, edits and plays back AIFF, SND, QuickTime, Director 3.0 and Sound Designer II files in 8- or 16-bit resolution at sample rates from 5 kHz to 44.1 kHz. Additional hardware is not required as long as the Macintosh front end can run System 7 and Sound Manager 3.0. Other features include control of audio CD playback using a CD-ROM drive, mixing of two files, and transfer of CD audio tracks into QuickTime. Price is $149.95.
Circle #201 on Reader Service Card

CRYSTAL RIVER PROTRON

Crystal River Engineering (Palo Alto, CA) and Zola Technologies (Atlanta, GA) have collaborated on the development of ProTron, a TDM plug-in for Digidesign's Pro Tools platform. ProTron offers studio professionals 3-D spatialization on multiple sound sources using a palette of acoustic environments and controls to place the listener in a custom three-dimensional space. ProTron is expected to ship in November at a suggested price of $995.
Circle #202 on Reader Service Card

DATA TRANSLATION MEDIA 100 COMPONENT OPTION

Now shipping is a Component Option for Data Translations' (Marlboro, MA) Media 100 nonlinear digital video system for the Macintosh. Priced at $3,995, the Component Option hardware allows users to connect component video decks to the inputs/outputs of the system. Also shipping is Media 100 1.3, a software upgrade that offers higher-quality compression settings and the ability to export QuickTime movies with audio. Previous versions of Media 100 saved Quick-Time without audio.
Circle #203 on Reader Service Card

TURTLE BEACH MONTE CARLO

Turtle Beach Systems (York, PA) has introduced Monte Carlo, its first low-cost, game-compatible sound card for MPCs. Features include 16-bit stereo record/playback, wavetable synthesis and a selection of CD-ROM interfaces. Expected street price is $99.
Circle #204 on Reader Service Card

GALLERY CDSTUDIO

Now available from Gallery Software (London) is CDStudio, a Macintosh application that allows full control of Red Book audio on Apple CD300, CD300I or e/plus CD-ROM players. In/out points can be marked on the fly, and marked sections can be auditioned and trimmed. The Grab option allows the transfer of the marked audio to Sound Designer II format to hard disk at nearly double-speed via SCSI. U.S. retail is $119.
Circle #205 on Reader Service Card

PLEXTOR 4PLEX QUAD-SPEED CD-ROM DRIVE

Plextor (Santa Clara, CA), formerly Texel, is now shipping the world's first quad-speed CD-ROM drive. The 4PLEX offers a 600kb/sec data transfer rate, 220ms random-access speed and a 1MB buffer in both an external and internal configuration for use on a Macintosh or PC. The units fit the industry-standard half-height drive size and are designed with the high throughput demands of audio- and video-oriented CD-ROMs in mind. The internal model is priced at $549; the external version is $649. An optional 16-bit SCSI interface board is available for an additional $50.
Circle #206 on Reader Service Card

ATTO SILICONEXPRESS 4D ACCELERATOR

Targeted toward high-end applications such as digital video and multitrack audio, the SiliconExpress 4D SCSI-2 accelerator card can sustain data transfer rates of up to 20 MB/sec on all NuBus Quadra, Performa, Centris and PowerPC Macintoshes. The card, developed by ATTO Technology (Amherst, NY), bypasses the Mac CPU and the built-in SCSI port, transferring data between system RAM and the SCSI bus. It also allows the user to place SCSI devices up to 81 feet from the Mac's CPU—far beyond the 18-foot SCSI limitation. Up to 15 SCSI bus IDs can be used with the card without disabling the built-in SCSI port. Suggested retail price of $1,495.
Circle #207 on Reader Service Card

OPTICAL MEDIA INTERNATIONAL DISC-TO-DISK 1.1

Now shipping is Version 1.1 of Disc-to-Disk audio CD capture software from Optical Media International (Los Gatos, CA). Disc-to-Disk captures audio CD data from a supported CD-ROM reader via the SCSI bus and stores it on a Macintosh hard disk in AIFF, SND, Sound Designer II, QuickTime or .WAV formats. The new version of the software adds support for the Apple CD300Plus, NEC 3X family and Plextor 4PLEX family of CD-ROM drives. Suggested retail price is $199. Current Disc-to-Disk customers can upgrade to 1.1 for $15 by calling OMI.
Circle #208 on Reader Service Card

DB TECHNOLOGIES DB3000 DIGITAL OPTIMIZER

New from dB Technologies (dist. by Audio Intervisual Design of Hollywood, CA) is the dB3000, a multifunction digital audio processor for sample rate/data format conversion, monitoring and measurement. Features include sample rate conversion from 44.1 kHz to 22.050 kHz, word widths of 8, 12 and 16 bits, and special dither and noise-shaping curves. The standard rack-mount dB3000 connects to external digital devices —such as DAT recorders, DAWs and computers—via AES/EBU and S/PDIF, and is priced at $4,350.
Circle #209 on Reader Service Card

by Barbara Schultz

HILTON SOUND
BRITAIN'S ONE-STOP PRO AUDIO SHOP
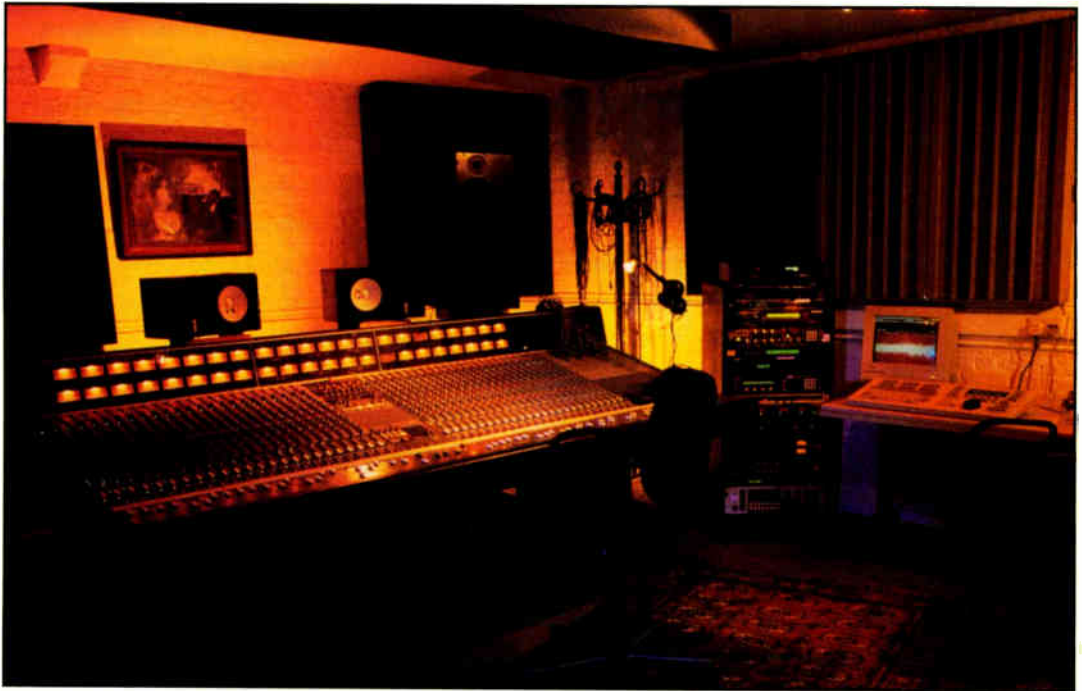
A ndy Hilton broke into the equipment rental business while working as a live sound engineer at London's The Venue club in the late '70s; he found a hole and filled it. The Venue, which was owned by Virgin Records founder Richard Branson, had its own sound system but offered no effects, and visiting artists were paying rental companies fees for use *and* transportation of effects equipment. Hilton, sensing an opportunity, borrowed £300 from his father and purchased a Roland Space Echo, making it available to artists for £15 a night. Later, The Venue's manager, Barbara Jeffries, suggested that Hilton purchase a Lexicon

Facility Spotlight:
JACOBS STUDIOS

Ridgeway House

The Gatehouse

In the Surrey countryside, less than an hour from London, is Jacobs Studios, a three-studio residential recording complex that in the past 18 months has seen the likes of The Cure, Joe Jackson, Robert Plant, Primal Scream and others. The studio resides in Ridgeway House, a former Georgian country house, and takes its name from a breed of sheep that are still farmed in the area.

Studio One is called the Pool Studio because the 455-square-foot control room overlooks the swimming pool. The main recording area is housed in the estate's old stables, where cobblestone and oak floors, beamed ceilings and earthy decor retain the character of the room's original use. The stalls were kept to provide acoustical screening while leaving an open feel. The Pool Studio also includes a live room built into one of the house's former drawing rooms, measuring 540 square feet.

The Pool Studio is built around a Neve VR 60-frame/50-fitted with Flying Faders and Total Recall. Also featured are digital tape machines from Sony, Panasonic and Mitsubishi; analog recorders from Otari, Studer, Ampex and Denon; Quested, Yamaha and Auratone monitors; and a collection of Sanken, AKG,

Neumann and Shure mics.

Studio Two is the Court Studio, which offers an SSL 4000 E 48-input mixing console with G Series computer and Total Recall. The control room was once a cattle byre and has a large set of bay windows overlooking the tennis courts. The recording area is divided into two sections on split levels. The control room has digital tape machines from Mitsubishi and Panasonic, and analog machines from Studer, Ampex and Otari. Monitoring is through Quested Q215s, Yamaha NS10s and AR 18s, and Auratones powered by Yamaha amps. The Court Studio also features mics from Beyer, Shure, Sanken, AKG and Neumann.

The newest room at Jacobs Studios is the Gatehouse Studio, which opened in June. Situated in a detached cottage on the same site as Ridgeway House, it comprises a control room (325 square feet) and an overdub booth (100 square feet). Featured equipment in the Gatehouse includes a Neve VR 72-frame/60 mixing console with Flying Faders and Total Recall; Mitsubishi and Panasonic digital tape machines; Studer and Ampex analog tape machines, a full complement of MIDI gear, and Pro Tools.

Monitors are Dynaudio M4s.

As a result of the Gatehouse expansion, the facility's staff has grown, too. Phil Buckley, formerly of Olympic Studios and The Mill, was hired as technical manager, and Stuart Eels is Jacobs' newest maintenance engineer.

Andy Fernbach, who owns and manages Jacobs Studios with his wife, Fran, says that "having the three facilities gives us a lot of flexibility in accommodating different types of productions and differing budgets. Nearly half of our clients are overseas, and we like to be able to offer clients a complete service from airport collection to rehearsal/pre-production, recording and mixing. In line with this, we are currently offering to fly over a band free of charge for a project of one month minimum."

The Pool and Court studios offer on-site accommodations that include use of the facility's recreational opportunities and around-the-clock catering. Fernbach says this allows the facility to "bring in a production a lot cheaper than if London hotel accommodations are used." There is no dedicated residence at the new Gatehouse, but the Fernbachs have a country hotel nearby that can be made available to clients. ■

UK Bits and Pieces

Ann Needham of Ridge Farm Studio Unlimited (Capel, Surrey) reports that "following a French year in 1993, when British producer/engineer Mark Wallis spent nine months here with three different acts from Paris [FFF, William Sheller and Les Objets], we have had an international year in 1994." The most recent international sessions include Dutch rappers Urban Dance Squad, produced by Phil Nicolo and Dave Johnson (Virgin, Holland); Scottish rock band Gun, produced by Chris Sheldon for A&M; Irish singer/songwriter Christie Hennessy with ten British, Irish and German session musicians, produced by Paul Samwell-Smith (Warner Music Ireland); and German rockers The Land with Australian producer Mark Opitz. Ridge Farm is equipped with a Neve VR60 with Flying Faders and Total Recall, Studer, Mitsubishi and Ampex tape machines, and monitors from Quested, Dynaudio and Genelec...Angel Recording Studios hosted orchestral sessions for the soundtrack to Bernardo Bertolucci's *Little Buddha*. The recordings were engineered and mixed by in-house engineer Steve Price and produced by the film score's composer, Ryuichi Sakamoto...Stiltskin's song "Inside," was recorded at **Water Music** (London) on a Digital Audio Research 8-channel Sigma DAW. The song is featured in a pan-European Levi's commercial..The **Frame Store** (London) recently acquired two D/ESAM digital edit suite audio mixers for use on their TV commercial and series projects... **Abbey Road** and **Virgin** Studios each acquired a Sony PCM-3348 48-channel DASH recorder this year...Songwriter/producer **Mike Stock** (Rick Astley, Kylie Minogue, Jason Donovan) opened his own London studio. The facility was designed by Andy

PHOTO ANTONY OLIVER

Strongroom's (London) Studio Two, with SSL G Plus console. Studio One was to receive a Neve VR60 Legend at press time. Recent sessions at Strongroom include the Manic Street Preachers, Duran Duran and Aswad.
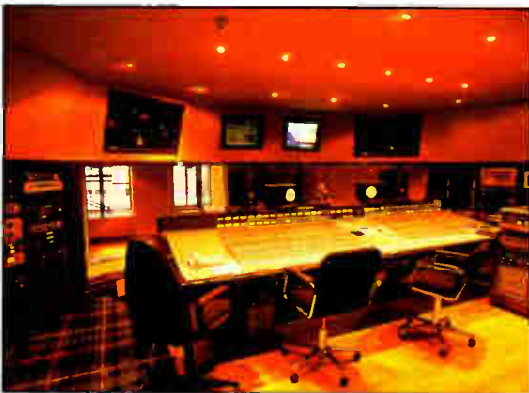
Studio A at The Church. Nick Price, manager of this London facility (profiled in September 1993 Mix) reports that Studio B's main monitoring system was recently updated with a Quested H210 system, powered by Chameleon amplifiers. Recent clients at The Church have included Living Colour, Bootsy Collins with Dave Stewart, TerrorVision and Erasure.

PHOTO RICHARD DAVIES

Townhouse Recording Studios (London) underwent major upgrades this year. Studio One (shown here) has a new 72-channel SSL G Plus desk with Ultimation and a second Sony PCM-3348 digital multitrack, and Sony time code-capable DAT machines are now available in all of the rooms. This winter, two new programming/preproduction studios are being built. Recent clients include The Pretenders, Eric Clapton and Diana Ross.

digital reverb, which Hilton was unfamiliar with. Jeffries was also managing two of Branson's studios, The Manor and The Townhouse, and promised Hilton eight weeks' rental if he bought the reverb. Slowly, Hilton amassed an impressive collection of equipment for-hire, and Hilton Sound began.

In the mid-'80s, Andy Hilton took on a partner: his wife, Robin Crookshank Hilton, another former engineer, who laughingly tells the story of their first meeting. "I had rented equipment from Hilton Sound before at the studio I was working in, but we'd never actually met. Then I'd read about him in a magazine—he had the first 32-track Mitsubishi digital recorder in Europe, and I was really interested in that. But we finally met on an Ampex boat trip. It was love at first sight, that kind of thing. We flirted shamelessly for the rest of the night." The artist that Robin Hilton was working with at the time—Nik Kershaw, for his album *Radio Musicola*—was interested in the Mitsubishi, too. After the Ampex trip, Robin told him that she thought she could probably get them an excellent deal on it. She called Andy, rented the recorder, and by the time the record was finished, the Hiltons were married.

At first, the couple continued in their separate careers, with Andy working at his for-hire business and Robin going into the studio with bands. But after a while, Robin felt, "If we're never going to see each other, I might just as well have left things as they were." She quit working as an engineer and decided to stay home and write for a while. "But soon I was bored out of my mind," she remembers. "And, of course, we knew all of the same people, and Andy would say to me, 'Well, would you give so and so a call.' about a project. I just fell into it naturally."

In the years that followed, the company's staff and inventory continued to grow, and in the late '80s, the Hiltons purchased one of their major competitors, London Sound Center. But, as Robin tells it, "This turned out to be very unfortunate timing. We had just taken this quantum leap into becoming a really big company when we ran right into the recession. The next couple of years were pretty hairy. With the Persian Gulf war, a lot of our clients weren't

traveling, and projects got canceled. And we had just reinvested in lots of new equipment. Fortunately, our inventory was so big that we were able to survive by selling off our equipment bit by bit, at a profit, and we still had enough to hire out. It was scary for a while, but everything turned out okay." The plus side of this harrowing experience was that it initiated Hilton Sound's professional sales division. The Hiltons are now the exclusive European distributors of GML products and, naturally, continue to sell a wide range of used gear.

In the past couple of years, Hilton Sound has begun dealing in more than pro audio equipment. The Music Bank division offers artists a large selection of musical instruments, which have been hired by dozens of stars: Eric Clapton, BB King, Black Crowes and Madness, to name a few. And then there's the aspect of the Hilton business that Robin finds most exciting: total project coordination.

After years of visiting studios and consulting with facility owners and artists, the Hiltons have developed a broad understanding not only of available equipment but of possible recording locations, modes of transport, accommodations, etc. Now they're capitalizing on that knowledge and consulting with artists to organize every aspect of a recording project—working out arrangements like the increasingly popular trend of installing studios in castles or chateaus or other remote locales. Services offered by this branch of the business could include anything from a bit of advice to a complete studio and a private plane to get there. These coordination services, principally provided by Robin, have been used by the likes of U2, Elton John, Depeche Mode and, most recently, Warner Bros. artists Blue Nile.

For the Blue Nile project, the band, or "the boys," as Robin calls them, asked Hilton Sound for a city location, not a studio, with unique character and lots of natural light. They had all their own equipment; they just needed the place. At first, she thought it would be easy, given her many contacts in London and other European cities. But she soon found that noise restrictions, either the band's or neighborhoods', ruled a lot of places out, and "the boys were very sensitive about where they wanted to work." She found herself sending them all over Europe, visit-

ing castles, chateaus, barns, churches and warehouses that were never right because they weren't urban enough or didn't have the right atmosphere, or something. At one point, she thought she'd found the perfect place: a 16th-century salt warehouse in Venice that was not being used. The building was right on St. Mark's Square, a beautiful structure with triple-paned windows. The bandmembers visited it and were thrilled.

Negotiations for the space proved troublesome, however. The Italian industrialist who owned the warehouse seemed to want more money every time they spoke and was evasive about his bottom line. Then Robin took a look at the front page of the newspaper one morning and read that the industrialist had been under investigation for consorting with the mafia, and had shot himself in the head. This bizarre occurrence exponentially increased Robin's feeling that her life would "never be normal again until I found a place for these boys to work. It became like the search for the Holy Grail. I told the boys to go to Paris, where I thought there might be a couple of other places they could look at. I found myself calling their hotel so often that the concierge probably thought I was somebody's girlfriend. And every time I called, it seemed I was asking for a different member of the band. They must have thought we were into something really weird. So, finally I felt compelled to explain to the concierge what we were trying to do. It turned out that he had a friend who owned a museum with a theater in it. The boys saw it and loved it. They worked there for six months."

After the six months, the band wanted a change of scene. This time, Robin placed them more quickly. She'd heard that the building housing the original Windmill Lane studios, just off St. Stephen's Green in Dublin, was going to be destroyed. She talked with the owners of the building, and as of the time of this writing, the Blue Nile are still there, recording. "Windmill Lane is where Van Morrison and The Chieftains used to record," Robin says. "The place didn't have much natural light, but I told the boys it has spiritual light—from Morrison and The Chieftains."

Throughout the Blue Nile project,

Hilton Sound has given the band technical support by phone and replacement equipment when they've needed it. "They wanted to do everything themselves," Robin says. "So it helps that they know they can sort of call me at 11 o'clock at night and I can help work something out, and we've ended up selling them some stuff and renting them some stuff." The Blue Nile's record is scheduled for spring release. Asked if there's a working title for the project, Robin tentatively answers: "Well, I'm calling it The Princess and the Pea."

HILTON SOUND AND THE EC
As the world becomes smaller, Hilton Sound gets bigger and bigger—the Hiltons say that the EC's relaxed transportation/border regulations have increased the company's ability to do business throughout Europe. And as the project coordination aspect of their

We got a call from Prince's management, asking if we could reproduce, to precise technical specifications, Paisley Park Studios, in France in about 24 hours. And we actually did it.

business grows, they have a greater need for an international presence. Now the company has representatives in Holland, Italy, Spain, Switzerland, Belgium and France.

The French office was the Hiltons' first commitment to international commerce and the only satellite office that they actually, until recently, owned. Robin Hilton explains that they purchased the French business in 1989 because "we were doing a lot of business in France, since at the time, everyone was sick of recording in London. And we'd promised each other that we'd only open offices in countries where we like the food!"

But, cuisine notwithstanding, the Hiltons found that they'd overextended themselves somewhat. "It just got bigger and bigger," Robin Hilton says,

"It really grew into a monster—doing something like a million pounds' business a year. And this was just at a time when Andy and I really wanted to get more into the the management and project coordination work. But the manager of the French office [Gabriel Nahas] wanted the hire business to go places. One day we just said to him, 'Do you want to buy it?' and he did." Now, Nahas owns the French equipment rental business and operates it independently under the name Mille Et Un Sons, but Hilton Sound continues to do large-scale rental and coordination projects in France.

One of the Hiltons' more memorable French projects was for the artist formerly known as Prince. "In August of '93, we got a call from Prince's management," Robin Hilton recalls, "asking if we could reproduce, to precise technical specifications, Prince's Paisley Park Studios, in France in about 24 hours. And we actually did it. We were tracking people down on their yachts and things, but we did it." The project began in Paris' Studio Guillaume Tell but, because of the facility's previous commitments, had to be moved to another studio, Davout, to be completed. "Later, Prince was very appreciative," Robin says. "He sent us port and cheese at Christmas."

To further its international scope, Hilton Sound recently joined worldwide studio referral/booking agency the World Studio Group. The Hiltons have been operating as the WSG's European appendage for some time—a relationship that brought them the Prince project; the new association means that the WSG will act as their representative in America. According to Robin Hilton, this liaison will only involve very large-scale equipment rental or project coordination work, because the cost of shipping equipment to the U.S. only becomes financially feasible if a studio's worth of gear is needed.

One of the first projects that the WSG is expected to help coordinate for Hilton Sound will involve George Martin's Air Montserrat studio in the Caribbean. The facility was severely damaged by Hurricane Hugo in 1989 and has been standing empty ever since. Martin recently decided to refurbish the building and asked the Hiltons if they would like to offer it to clients like the Blue Nile as a recording destination.

And lately, the Hiltons are getting back to their roots. They've formed a

The Gear, Piece by Piece

Mix asked Robin Hilton which pieces of equipment have been the most cutting-edge and most-rented in their inventory: "Aside from having the first Mitsubishi 850s and 880s and Sony 3348s for hire in Europe, we also had the first AMS AudioFile and the first, and only, Fairlight MFX2 hard disk recorders for dry hire (with or without operator). All of our multitrack recorders are our top earners.

"The big rage in Europe at the moment is MDMs, and there is huge demand for all three types: Alesis ADATs, Tascam DA-88s and Fostex RD-8s. We either do them singly or put together a small recording package with a Mackie mixer and the outboard gear; Focusrite, GML and Summit are hot here, and ATC are the most-requested monitors. This sort of thing is very popular at the moment because of the portability.

"We also rent Soundcraft, Trident and Allen & Heath boards, and we're the only hire company in Europe that rents out Neves and SSLs and Euphonixes. Or is that Euphoni? Our most-rented mic is the AKG 414. The Lexicon 480L and TC M5000 top the list of reverbs.

"We are also becoming involved in the demystification of ISDN technology, which is only just breaking into Europe. We rent out both Dolby codecs and apt converters, and we act as consultants to explain why ISDN exists and how to use it musically, liaise between the phone companies, and generally troubleshoot the installation or transfer, regardless of format. You would be amazed at the number of sites here that have ISDN lines installed and have never used them.

"And last but not least...our single most-rented item, by volume, is the microphone cable."

production company to record new artists. Andy Hilton has set up a home studio and is back mixing. "We're developing roughly four new acts so far, and at the moment, two have record company interest and might be signed by December. Our work is creative, and it's problem-solving," Robin Hilton says. "And the people we work with will always come to us; if it's anything weird, they'll say, 'Oh, get the Hiltons.'" ∎

Barbara Schultz is Mix's *editorial assistant.*

—FROM PAGE 86, BITS AND PIECES

Munro and features an SSL 4000 G Plus console...Post-production facility **Saunders & Gordon**, which specializes in audio for radio and TV commercials, opened a second Scenaria suite. The studio was used for recording and editing Jeremy Irons' and Rowan Atkinson's dialog for Disney's *The Lion King*... **Molinare Ltd.** (London) recently took delivery of a Pro-Bel MADI AES matrix...**Parr Studios** (Liverpool) recently hosted sessions with Jill Jones, produced by Jamie Mahoberec and engineered by Carmen Rizzo in the studio's Neve room...**The PA Company** (Kingston,

Surrey) provided sound reinforcement for this past summer's 30th Charles Wells Cambridge Folk Festival and the Greenwich Festival, featuring Jools Holland and his Big Band. The systems each featured a Soundtracs Sequel II SR console. A Sequel II was also used by **Precision PA** for the Avalon Stage at this year's Glastonbury festival. A Soundtracs Jade production console was installed at London's **Beethoven Street Studios** by Larking Audio. In addition to its recording setup, Beethoven Street manages artists such as Seal, Shape Navigator and Swiss guitarist/songwriter Mark Tschanz...Larking Audio also supplied Joe's **Garage Recording Studios** (London) with a 32-channel patch bay version Jade... Cadac J-Type live mixing consoles are being used for two West End shows: Fiddler on the Roof at the London Palladium and Barry Manilow's Copacabana at the Prince of Wales...UK sound and lighting firm **Eurohire** recently purchased a Crest Audio Century Series GT 40x8 FOH mixer. Lately, Eurohire has been used by oldies pop stars Frankie Valli and Neil Sedaka...**Richard Nowell Sound Services** also added a Crest Century to its inventory. The company recently provided sound for three shows at the Royal Albert Hall for the BBC Proms concerts. ∎

From *The Daily Mail*

(West Midlands, U.K.)—If the healing properties of music have been well documented, we now have evidence to the contrary from England. The hospital radio network at Dudley district hospital has censored Frank Sinatra's "My Way," editing out the line, "And now the end is near and so I face the final curtain," according to the London tabloid *The Daily Mail* (7/31/94), which reports on these sorts of things regularly. The censorship was implemented because the hospital deemed the sentiment "too depressing" for very ill patients. The network will still play the song, but a D.J. will mask the line when it comes along. I don't make this stuff up, folks, I just report it.
— *Dan Daley*

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- Francis Buckley, Independent Engineer: Album, Film and Television

"It's nice to see a company interested in the user's input before they release a product. They developed a reverb that really works. It's easy to make these kind of programs run if you've got tons of hardware. How they did it with such a small box at such an affordable cost is really impressive. It was worth the wait."
- Charlie Brewer, Chief Engineer, Village Recorders

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Q² *from to Born*

by Dan Daley

Our (Non-) American Cousins
PROJECT STUDIOS IN GREAT BRITAIN

The idea of parallel development has been a staple of science fiction and fantasy for as long as the genre has existed, from the 19th-century German literary fascination with the concept of doppelganger to Arthur C. Clarke's humanoid species developing millions of light years apart but in tandem.

All we have to do is look a few thousand miles to the east to see what has happened with the project studio outside the U.S. In fact, it might be the only other place to look, at least for the time being. The United Kingdom (along with some other parts of Europe) is the only other major market that has seen any significant project studio development.

The parallels to the American market are striking at first glance. The British market supports a broad range of sizes and configurations. There is, for example, the impressive two-room SSL facility built by Mike Stock (formerly one-third of the very successful and now defunct dance/pop production team of Stock, Aitken & Waterman); the more modest single-room, hard disk-based Candle Music; and it goes right on down to the garage (accent on the first syllable in Britspeak). Their raison d'etre has also been similar: to centralize creation and production and circumvent the traditional producer/artist/studio relationship.

On the other hand, the development of project studios in the UK has been relatively recent and fast-moving. It's been recognized as a phenomenon only in the past five or six years, as opposed to the decade-plus we've seen here. That, in combination with a substantively different creative base, has quickly driven British project studios past the linear stage into more hard disk-based recording than is seen here in the U.S. And, even when they are linear, they are digital more often than not.

CANDLE MUSIC

A typical British project studio is Driftwood, an ad hoc name that reflects the proclivity of Charlie Spenser, one partner in jingle production company Candle Music, to collect such *objets trouvé* while on holiday. Taking a break from doing the music on *Lonely Planet*, a pilot for Discovery Channel, producer/composer Ian Ritchie noted the lack of sequential storage media in the studio. Current equipment includes an Akai S3200 sampler with its 520MB hard disk and 32 MB of RAM, augmented by the 12MB RAM S1000 and Cubase sequencing software. Ritchie, producer of Roger Waters' *Radio KAOS* and Laurie Anderson's *Strange Angels*, says, "It's rather ironic, since the project studio concept started here with things like the Fostex 8- and 16-track machines. They weren't nearly as sophisticated or as expensive as some of the other new multitracks that I saw being used in the States when I was there in the 1980s." Everything concerning the founding of project studios in the UK, Ritchie says, had more to do with price than anything else. While the much larger U.S. market was the prime target of new technology releases throughout the decade, Britain's budgets lagged behind, further delaying widespread implementation of downscaled recording technologies.

The technology appealed immediately to the house, techno, ambient and rave music producers, who saw little use for linear media in their repetitious genres. They embraced the less-expensive Atari platform—par-

ticularly the 1040s—coupled with a new generation of low-cost, powerful processors and sound modules. Those musical styles were becoming dominant in Britain in the mid- to late-'80s, crowding out the basic rock that British labels were no longer signing.

A STUDIO HAVING ONE MICROPHONE— THAT'S VERY MUCH A UK PHENOMENON.
—Ian Ritchie

"The project studio in the UK is largely a generation of people who were brought up on sound but aren't necessarily musicians and don't play instruments," explains Ritchie. "America is more music-orientated; the UK is more techno- and sound-orientated. [Here] you don't play the guitar part all the way through; you sample it and trigger it. The music side of Britain was floundering—fewer records were being sold. That's what led to the evolution of techno project studios—to produce that type of music less expensively. For instance, the music isn't really about vocals, so people weren't thinking about things like microphones. A studio having one microphone—that's very much a UK phenomenon."

MIKE STOCK
And that's precisely what one finds at a very different type of British project studio: Mike Stock's personal two-room facility on the South Bank of the Thames, not far from the remains of Shakespeare's Globe Theatre in the Borough section of London. It's a nice microphone—a Calrec Soundfield—but it's the sole transducer for an otherwise comprehensive facility, where the main room features an SSL 4000 G Plus console with Ultimation, Genelec monitoring, Sony digital 24- and 48-track decks and a broad collection of outboard gear, all backed up by a 15 kVA continuous loop emergency power supply. A second studio is designed as a conceptual workshop, with a Malcolm Toft (he of Trident fame) desk and Digidesign software.

Stock is the perfect upper-crust project studio candidate for the UK. He was nominally one third of Stock,

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Announcement: Beginning with the 1995 edition (available in January), Recording Industry Sourcebook has joined Mix, Electronic Musician, Mix Bookshelf and Mix Directories as part of the CBM Music and Entertainment Group. This massive industry guide is a top-quality, spiral-bound, tab-divided directory which has been critically acclaimed for its comprehensive scope of information and design characteristics. With over 10,000 updated listings in 75 categories, The Recording Industry Sourcebook offers comprehensive directories of record labels, producers, managers, distributors, attorneys, equipment suppliers, music video companies, media contacts and much more. Entries list contact names, titles, phone and fax numbers, styles of music preferred and information on whether or not they'll accept unsolicited demos. The entire Sourcebook database is also available on disk, packaged with contact management software; please call for details.

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MixBooks announces the updated and expanded edition of The Studio Business Book, by Jim Mandell. This informative, wide-ranging guide is a necessity for anyone running or owning a studio, whether it's a project setup in your basement, a midrange commercial studio or a world-class room hosting the stars! You'll get in-depth, detailed, specific information on all aspects of putting together and managing a recording studio, including writing a business plan; getting funding and finding partners; choosing and buying equipment; determining your monthly expenses; setting hourly rates and bidding on projects; developing new income sources and making contacts; doing advertising and PR; scheduling employee shifts and sessions; studio politics and psychology; managing, hiring and firing personnel; and more. The Studio Business Book also includes information on the legal debate over home studios and how to put together an employee handbook, plus a reference guide to studio terms and technology, a list of industry organizations and a recommended reading list.

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A GUIDE TO PROFESSIONAL RECORDING STUDIO BUSINESS AND MANAGEMENT

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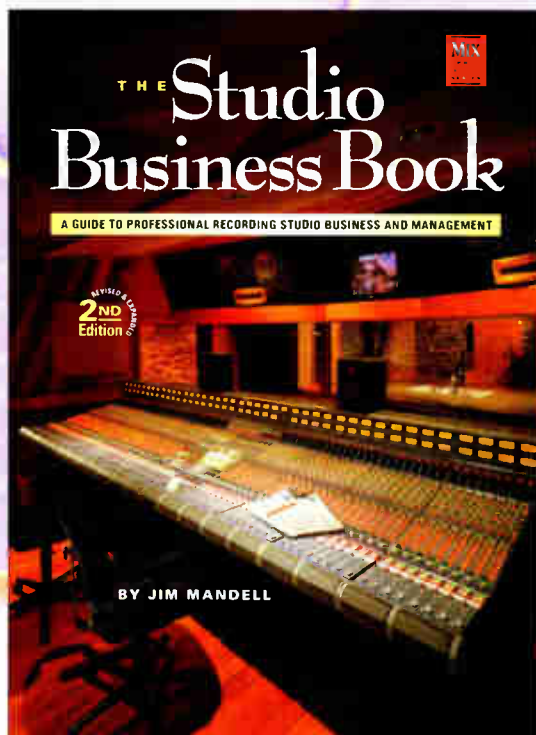
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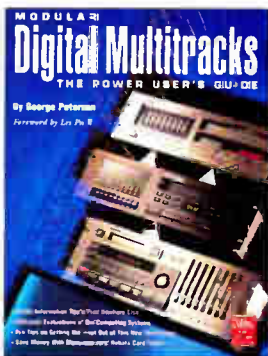
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Aitken & Waterman, perhaps the most successful composing/production team in European history, with more than 140 singles charting in the Top 75 between 1984 and 1993. By the mid-1980s, the team had become so busy that they offered to upgrade a room at Marquee, a studio they used regularly. The producers and the facility disagreed on just how to go about that, and as a result the producers installed their own newly purchased SSL console in Vineland Studios in Borough. Aitken retired in 1989, and Stock and Waterman's personal and business differences eventually led to a complete dissolution shortly thereafter. Stock had no intention of stopping, however, and he hired Andy Munro Associates to create his new facility in early 1994.

Personal studios on this level are not new to England—artists such as Sting and George Harrison have been recording in their homes for some time, and Peter Gabriel's Real World Studios has been a showcase for him and SSL. But Stock's studio fits the project rubric more precisely since it's both exclusive to his work (erstwhile partner Matt Aitken recently rejoined him for some productions), and it's run on a commercial sort of schedule. "I've always been a sort of nine-to-fiver," the boyish Stock remarks.

Stock believes that his scenario developed along the lines of the U.S. project studio experience. The differences, though, include the fact that zoning in London actually works to the advantage of project studios, with the individual borough councils often being willing landlords less concerned about the nature of an enterprise than its ability to meet the rent. London's mostly empty Canary Wharf development stands as a monument to government development planning. "You could probably get a space in there rent-free for five years," according to studio manager Mike Picking.

Picking, an engineer who has worked in London commercial studios before and in between his association with Stock, recalls the project studio controversy in the U.S., particularly the issues about it raised by HARP several years ago in Los Angeles. His overview, however, is fatalistic. "At least in the States you fellows have Chapter 11 to protect you," he says. "Here, there's less legal protection to keep a commercial facility going and less interest on the part of the councils to zone out non-commercial enter-

prises. [Indeed, on the way to a pub west of Kensington, a colleague pointed out a large brick edifice that housed both a large commercial studio and any number of project rooms and artists' studios. 'Dogs and cats living together,' he noted.] If this was a commercial facility we'd have to be going out for £2,000 [approximately $3,000, U.S.] per day, but actual rates in town are less than half that. Rates are very depressed here."

Another interesting difference is that record companies were integral to the development of project studios in the UK; they participated in the phenomenon earlier than U.S. labels, which essentially reacted rather than acted. Project studios were well-entrenched before American labels realized that they could begin acquiring masters for demo rates, and then mostly in the areas of dance and U/C; British labels, centered around techno and other similar genres as their mainstream music, had been dealing with mixers separately from artists and producers for far longer and thus saw project studios as crucial to their survival. "Another aspect of it is that British labels and production companies derive a lot of income from licensing throughout Europe," explains Picking. "PWL [Pete Waterman Ltd., the business side of Stock, Aitken & Waterman] income is derived almost wholly now from licensed product." That also encourages labels to create different versions of tracks for various Continental markets, yet another application suited to project studios.

To that extent then, the project studio is far more integral to the music industry in the UK than it is in the States. "I'm still driven by the same things artistically as I was before," Stock says. "And it's still the artist who is paying for the record, so you want to make it as cheaply as possible."

Ian Ritchie feels that the project studio will become more and more of a force in British commercial audio production. "With the economy fluxes and in a downright depression, I can't see how commercial producers can't turn more to facilities like this to make audio for video," he says. "It's inevitable." ∎

Dan Daley is a Mix *contributing editor with an emphasis on New York, Nashville and project studios.*

by Mr. Bonzai

GREG LADANYI
BUILDING THE PERFECT RECORD
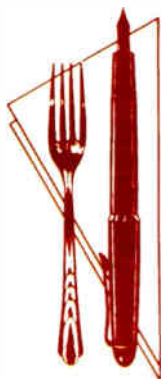
Greg Ladanyi's recording muscle has resulted in the sale of more than 27 million records from artists such as Toto, Clannad, Dolly Parton, Fleetwood Mac, Don Henley, Jackson Browne, The Church, Jeff Healey and, most recently, Caifanes, Mexico's biggest rock band.

Ladanyi began his career as an engineer while still in high school, recording local L.A. bands in his own 4-track studio. Soon, he stepped forward as assistant to the great David Hassinger at L.A.'s Sound Factory. At 23, he was given his first shot with a major artist, resulting in Jackson Browne's Platinum *The Pretender*. Next came the landmark *Running on Empty*, followed by long stints with some of the most successful acts of the '70s and '80s. He earned a Grammy with *Toto IV* for best engineer and a nomination as producer of the year with Don Henley on *Building the Perfect Beast*. His current passion is producing, engineering and directing the career of Australian Troy Newman.

Join us now at O'Henry Studios, Ladanyi's favorite L.A. recording spot...

Bonzai: What did you learn from David Hassinger?
Ladanyi: Versatility. The man would do things in front of me that I couldn't believe, in terms of adapting to what an artist was trying to achieve. For all of us who do this, we have to remember that we are *interpreting* people's music. You always have to be there for them, and that's sometimes a hard thing to remember. Maybe as you become successful, you think that your way is the only way it should be done, as opposed to what the artist is trying to do. Hassinger never stopped his concern for the artist, and anything can happen in the studio—good and bad.

PHOTO RICHARD ARMAS

Below: Ladanyi at the custom API console in O'Henry's Studio A

PHOTO MR BONZAI

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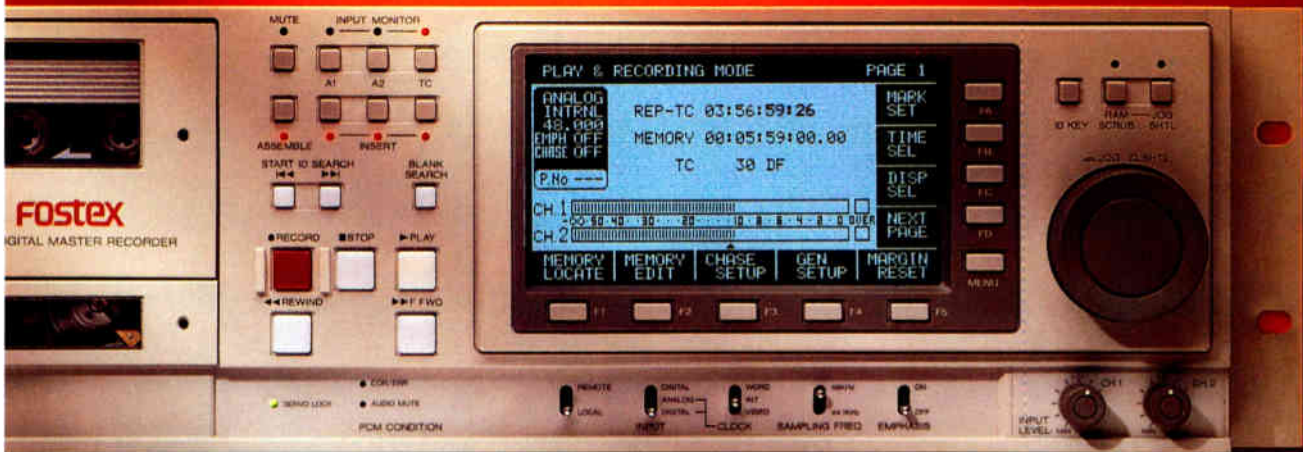
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Bonzai: Who was the first major artist that you were responsible for?

Ladanyi: I started with Jackson Browne on *The Pretender*. He was working with Val Garay, but Val had to leave for some reason and I was there. I said I would really like to have a shot, and Jackson let me do it. It was just being in the right place at the right time, and I was lucky. I mixed the record, and then we did *Running on Empty*, *Hold Out* and *Lawyers in Love*.

Bonzai: What a record *Running on Empty* was—lots of unusual location work.

Ladanyi: Everywhere. The record was about being on the road and what happens out there, how songs start and where they end up. Things would begin in hotel rooms and on buses, and I think it may be the only live record that was made with all new material. Wherever Jackson wanted to record or talk about his feelings, that's where we worked.

Bonzai: Was David Lindley in the band?

Ladanyi: Yes, along with Lee Sklar, Danny Kortchmar, Russ Kunkel, Craig Doerge, Rosemary Butler, Doug Haywood. They knew how to play quietly onstage for the making of the record, while the house P.A. could make them appear loud. Amplification onstage was similar to what we would use in the studio. I could control what I was putting on tape, because I knew we were getting the right sounds from the performers.

Bonzai: Did you take some of that road wisdom back into the studio?

Ladanyi: Well, being on the road, you have to respond to things on the spot and you must maintain a place for that in the studio. You get much better results if it isn't labored over. My goal with any artist is to work out what must be worked out before we go into the studio, so that when we come in it isn't "played" too much there. The minute that happens, it's not fresh and exciting. You work things out in rehearsal, and when you come into the studio it's like it's being played for the first time. There is a lot of energy in the studio when you know you are really *doing it*. If you can get that on tape, you'll enjoy

it when you listen back—and the artist will love it.

Bonzai: How did you get involved with Fleetwood Mac?

Ladanyi: I first did the two new songs for their *Greatest Hits*. They were looking for a producer because Lindsey Buckingham had just left the band, and they wanted somebody who was strong enough to stay with them and keep them together, so that the distractions wouldn't become too great. I got picked and we

> # If you have to use EQ, you use it, but if you talk to the players and ask them to help, you'll learn more about the way they are playing and the way they should be heard.

did the album *Behind the Mask*, which was a long and interesting project. A lot of my projects have taken awhile, with Jackson, with Henley, Toto.

Bonzai: How did you get Mick Fleetwood's drum sound?

Ladanyi: Mick is so great, because he has such an animal sound in the way he plays. For some reason I wasn't getting that, and I didn't know why. I went to Hawaii and I saw him play live onstage, and I got up there near him so I could hear what he was doing. In the studio, when I put monitors around him, he started really playing the drums, and I got the sound. He needed to feel the drum sound, the bottom end of his drum kit. His whole groove is about locking into it because he feels it.

Bonzai: Didn't the monitors cause any recording problems?

Ladanyi: Not really, because it was mainly for bottom end, for the bass drum. It wasn't for the high-hat and cymbals, because that came through the headphones. The bass anchored him, and it loosened everything up.

Bonzai: What mics did you use?

Ladanyi: On the kick I used a 421 inside, about two inches from the head, compressed. I used a FET 47 about a

foot away on the outside, not compressed at all. The reason I use compression is that in the studio, drummers will sometimes back off from hitting the pedal and the inside mic keeps the attack there. This way, the other mic gets all the air and depth. I also used overheads and room mics, and then 421s on the toms about an inch away from the skin. Once I've got all the top mics balanced, and I can hear the actual drum kit, then I bring up the tom mics to where you can hear the bottom end. I tuck it in there until you feel it.

Bonzai: What about guitars?

Ladanyi: I like to use anything from a Shure 57 to a Neumann 47 tube or an AKG C12. If it's real loud, like with a Marshall cabinet, I'll put one mic up on the top and take the bottom end out of it and use it just for the highs, and another mic on the bottom—I won't roll any high end off. I mix them up. It's hard when an amp is loud to get one microphone to capture what that speaker is doing, so I use two and just dial 'em in and then put another mic six, 12 feet away. The closer you get, the more bottom end you get, and farther away you get more high end from the room. On acoustic guitars, I use Neumann 54s. You just put the mic up and open it up and that's it, unless you want to get into some chorusing.

Bonzai: Do you vary your vocal mics a lot?

Ladanyi: Yeah, because singers have a lot of variance in their highs and midrange. I find that the 47 tube works on a lot of people, but lately I've been trying some different approaches. On Troy Newman and Caifanes, I have a windscreen with a 57 right up against the screen. I compress it a good deal and roll out almost all the bottom from 50 cycles down. This picks up all the breathing, the soft-spoken stuff, and then the 47 is about six inches away from the screen. The minute the singing gets loud, the compressor knocks it down in the 57, so you're not really hearing much of the 57. You just tuck it in, and the 47 takes over. If the singer has a lot of range, instead of trying to ride him you just set it up in a way that you let the singer sing the song, get a great mix in the headphones, and he sings the way he wants you to hear it.

Bonzai: When you're recording, do you use much EQ?

Ladanyi: I used to do more EQ than I am now. This is my seventeenth year of doing this, and I'm learning to stay away from it as much as possible. If I want something brighter, I'll go to the guitar player and ask him to either make his guitar or the amp brighter. There are ways to make things brighter or darker, by asking the musicians to help you, instead of sitting here and not saying anything and messing around with the EQ. The danger is that you might alter the way they play—if they hear more bottom, they might start laying off those bottom strings. If you have to use the EQ, you use it, but if you talk to the players and ask them to help, you'll learn more about the way they are playing and the way they should be heard.

Bonzai: What about the choices of analog vs. digital?

Ladanyi: Well, when I was working on the Henley and the Fleetwood Mac albums, which took a long time to make, you'd find a lot of slaves being made because I never liked playing the masters once we got a take. I used digital to enhance that process. But digital was expensive to use, and it became a cost factor and drove the budget sky high. That's changed and digital machines are affordable, but also with the new analog tape, the noise factor is so low. Now I just use two 24-track machines and that's all. I haven't had a reason to use a digital machine in the last four years, because with this new Scotch 996 and the Ampex 496 tape—you can't hear any noise, 30 ips, non-Dolby. Now for movies, digital is incredible because whatever they do in post, it stays in that domain and sounds good in the end.

Bonzai: How did you make the transition to producer?

Ladanyi: I was working during a time in the record industry where artists became more involved. Engineers became more and more valuable, and I was lucky to be around. We became valuable because we could sit with the artist and help them as co-producers. That led me into co-producing, and later to producing because I got better at it, better at listening and capturing performances. And I learned about arranging songs from people like Jackson Browne and Don Henley.

Bonzai: Are you a musician yourself?

Ladanyi: I used to play accordion, but not anymore. I can hear things, but I'm not a player.

Bonzai: What's the story with Troy Newman?

Ladanyi: I was introduced to him in Australia when I was with Fleetwood Mac. When I heard his demo tapes, his voice completely floored me. His songwriting and instincts were so natural. I made his first album, but I think it was a little too pop and a little too careful, too slick. For this new record I became more involved, in helping to create the image, working on his videos, everything.

I needed somebody to help me on this record, so I called Waddy Wachtel, and he went in there and sat with Troy and worked on the songs. We decided to make this

Bonzai: Did you do the whole record here at O'Henry?

Ladanyi: No, we did the tracks at Kiva-West up in Encino, with a small 40-input API console. We wanted a woodsy atmosphere, and it was a lot of fun. We got exactly what we wanted, uninhibited. Then we brought it in here for some vocals and guitar overdubs, and then the mix.

One of my favorite residential studios is Rockfield in England, where I recorded Clannad. It's the oldest residential studio in Europe; it's been there 35 years. You work for 12, 14 hours, you hang out, you wake up and the focus is totally on the making of the record.

Bonzai: What's your take on consoles?

Ladanyi: I used to be very concerned with the console. I think it was because I wanted to be com-

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For all of us who do this, we have to remember that we are *interpreting* people's music.

---

record with almost all guitars, hardly any keyboards. We were aiming at a raw sound, simple and right on the money. We did some demos and we had a clear picture of what the record was about. Then we put together the band—Waddy on guitar, Russ Kunkel on drums, Bob Glaub on bass and Troy on acoustic. A four-piece band for all the tracks, cut in two weeks. No song was played more than five or six times, and a couple were first takes. Minimal overdubs. And I mix as I go along, to a great extent, so it was painless in the finish: two or three hours to put the song up, maybe another two or three evaluating little things. About ten days mixing and we were done.

Bands like Nirvana and Black Crowes have brought back a focus to making records, music being music and not overlaboring it. Their records were inexpensive to make, avoiding the big debts of the past. You have to make a great product for a reasonable amount of money because there is so much that has to be done afterwards that costs so much more. Troy's record was very reasonable to make—no more than $150,000.

fortable. Now, the control rooms are a secondary factor. It's more important to me that the musicians are playing well. You can pretty much make any console work—I love the old API consoles that are really kept up, a big sound. Some of the Focusrites and the Neves are very good. But you often bring in your mic pre's and bypass the electronics. You can make any console work as long as it's not a piece of shit.

Bonzai: Do you have any favorite mic pre's?

Ladanyi: Doug Sax has some that I like a lot. [George] Massenburg has got some great mic pre's. George and I owned a studio together, The Complex, for about a year and a half.

Bonzai: What's your advice to studio owners?

Ladanyi: It's very stressful to own a studio and make money. You have a couple of bad weeks and you get in trouble. It's a nightmare, unless you're an Allen Sides with studios all over the city and the income is spread out. I would just say be careful.

Bonzai: In your credits, I notice you've worked with a number of Japanese artists. How did that happen?

Ladanyi: I think it was because of

Toto, who are huge in Japan. When I won the Grammy for *Toto IV*, one thing led to another. The Japanese artists were inspired by the people I had worked with, so the music was similar and I could react to it very easily. I would have the lyrics translated, and once I knew what the songs were about it wasn't difficult at all.

Bonzai: South of the border, you've got a big hit with Caifanes. How did you get involved with a band from Mexico?

Ladanyi: Working in other countries really opens your eyes, like my work with Clannad in Europe. Caifanes is just a great rock 'n' roll band, not a pop dance band. They liked my work, we had good meetings, and I went down to Mexico for a live show that was just incredible. The band went on, and the audience loved them so much.

So, I stayed with the band and really got to learn about them as people. We rehearsed, worked on the arrangements, listened to traditional Mexican music and we had a really good working relationship by the time we came here to record. After the first day, they were having a great time. Tracking took nine days, four to six weeks for vocals and overdubs, and about 15 days to mix. And it seems that people are enjoying the record because it comes across like their performances—fresh, with a lot of life. You hear the real guys, not a group that had to ponder what they were doing.

Bonzai: You admit that your success came from being in the right places at the right times. What advice would you give to the aspiring young engineer/producer who wants to make great records today?

Ladanyi: Be around music as much as you can. Understand it from the live aspect, as well as the studio. Live it; don't just dabble with it. If you're sincere about it and good at it, and somebody notices, you might get that shot. You can't go to school to learn all this stuff, although it can't hurt you. You'll get your shots; they'll come. It's just a matter of can you wait? Be persistent; don't give up, and knock on any door you want to. All they can do is say no. ∎

While hardly running on empty, roving editor Mr. Bonzai does admit to being down a quart from time to time.

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by Robin Tolleson

MARCUS MILLER
JACK OF ALL TRADES

H is training grounds were some of the hottest, funkiest sessions in New York throughout the 1980s, and his musical talent has translated cleanly into his new role as Grammy-winning producer. Marcus Miller doesn't have that many clients, but the ones he has are very loyal. Saxman David Sanborn has called upon Miller as producer, songwriter and multi-instrumentalist for more than a decade's worth of successful albums. Miller has co-produced Platinum efforts by soul giant Luther Vandross such as *The Night I Fell in Love* and *Give Me the Reason*, and co-wrote Aretha Franklin's hit "Jump to It" with Vandross. Miller

began playing bass with Miles Davis at the age of 22, and later produced some of the trumpeter's best later work on *Tutu*, *Amandla* and the *Siesta* soundtrack. He produced the Crusaders' *Healing the Wounds* and Chaka Khan's *The Woman I Am*. Al Jarreau's latest, *Tenderness*, features Miller's entire package as producer—arranger, composer, instrumentalist, bandleader.

A three-time NARAS MVP in New York, Miller has played bass on records with the likes of Frank Sinatra, Elton John, Sonny Rollins, Donald Fagen and Boz Scaggs. Producing duties keep him away from the

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type of schedule he kept in the '80s, yet Miller managed to fit in a bass date with Simple Minds the other day. And when George Duke calls him, it's hard to say no. And when he gets a chance to play on a real "blowin'" album like Kenwood Dennard's *Just Advance* (on Big World), it's just impossible to resist. Miller also released his most dynamic solo effort to date last year on PRA, *The Sun Don't Lie.*

Mix: There are some nice musical arrangements on the new Jarreau album. That's part of the package you bring as producer.

Miller: Yeah. Al is one of the greatest performers that I've seen. He hadn't done a live album in a long time, and to me he's a little different live than he is in the studio. Not even a little—he's a lot different. He really vibes off an audience, and he's a great improviser. When he gets the right feeling, the right vibes back, he comes up with some other stuff, and it's really exciting. As a producer, you bring whatever you've got. If you're an arranger or a musician or whatever it is, you've got to incorporate that into the gig. So most of the time when I'm producing, I end up being the arranger, sometimes the composer. It depends. I try to supply whatever the artist needs. I haven't done that many gigs where the artist has all the songs and all I have to do is make the thing come together.

On the Al Jarreau album, we decided to do some covers, songs that actually are standards but we don't recognize them as that. It wasn't as much a question of writing music as it was just finding good songs, sitting around, throwing songs at each other and seeing the reaction.

Mix: You took the songs some different places, like "Your Song."

Miller: A lot of that had to do just with the musicians, because I didn't walk into the session rehearsals with a lot of arrangements in mind. I just started making suggestions on the spot, based on the guys and what I realized we had available. So it was great. This project has taken on a whole new significance to me, because Eric Gale just passed away. This was one of, if not the, last things he did. Eric influenced me tremendously. Eric was there, so I'd look at

his face and say we need to open this up now for the guitar. Or for Joe Sample. The musicians really drove the arrangements, too.

Mix: Is the personnel usually the producer's responsibility?

Miller: Al and I had done some gigs with Joe Sample, so we knew that Joe was going to be there, and then it was how do we fill this thing out? I started throwing out names. I thought Steve Gadd would be great, and Eric Gale—it was easy. I was just trying to get the best guys that I knew. Steve's been on the road a lot, and people haven't heard from him as much lately, so that's one reason I wanted to get him on this gig. Eric, too. I played with those guys when we were doing sessions in the early '80s every single day, just turning out tracks for whomever the artist was. So I'm pretty close with both of them. In each situation, everything is an agreement between me and the artist. With Luther [Vandross] we co-produce, and he has a strong idea about what he wants—I just try to help him realize what it is he hears. But since I'm a musician and I'm hanging with musicians and playing with new musicians all the time, I can make suggestions that the artist might not get to immediately.

Mix: And you've got a pretty good list, I bet.

Miller: Well, musicians love playing, as long as they know the thing's going to be together, be good. The pain is when you get on dates and you're just throwing ideas at people to help them figure out what it is they want. It's not a big problem, because at least we're going to know what we want. And if we don't know what we want, if you play a couple of things we'll know what we like, which is important, too.

Mix: Whose idea was it to include Kathleen Battle on Al's record?

Miller: We booked SIR in Culver City for five days and did five concerts, with about 200 people there, and that comprised the bulk of the recording. Kathleen Battle came to one of the gigs because she's a friend of our road manager. She enjoyed it, and our manager asked if she'd be interested in doing a duet, and she said, "Yes, if you think we could pull it off." My job then was getting together an arrangement that would

work for both of them. Kathleen ended up being great, and it came out exactly as I had hoped. They really vibed off of each other. She did a little improvising, which no one expected. And Al didn't try to sing opera. When you have people from different styles, the danger is that each person tries to do what the other does. She kept in her space. She moved over a little bit but not enough to be uncomfortable, and Al did the same thing.

Mix: Do you arrange with certain people in mind?

Miller: Oh, yeah. It's like making a coat for somebody. Everything is tailored toward the artist and what I think they'd be comfortable with. When I was working with Miles, I tried to put him in a perfect setting, not an old setting or a conscientiously new setting, but just a good setting for today, so that he could still be himself. A lot of situations, the setting wasn't right for him, so he just blew over it. I tried to tailor everything for him.

Mix: Are you thinking about the sidemen as well as the main artists?

Miller: Yeah, but the side people not as much. I knew that I heard a tenor sax solo on "My Favorite Things," because you can't escape the John Coltrane connection, so we looked for somebody to fill that role. [They used Michael Brecker.] With the musicians, you can kind of change personnel to work for the arrangement.

Mix: "Summertime" is a great loping groove and great performance. Did you have to work hard to get takes from Al?

Miller: Not at all. Those are all live takes. We just did five gigs and picked the best performance of each song. Although the performance was great, there were a couple shaky lines, so we just went in on the soundstage and punched them in. But otherwise, it's just Al.

Mix: Did you record to a click track?

Miller: No, we recorded to Steve Gadd [Laughs]. That's all you need. We used to do sessions in New York with a click track, and I never heard the click because Steve was covering it up with drums. I think a lot of musicians who came up through the late '70s and '80s played with click

1994

Audio Production Facilities Survey Results

A Bright Forecast for the Audio Industry

By Elise Malmberg

In the two years since *Mix*'s last Audio Production Facilities Survey (*Mix*, Dec. 1992), both the industry and the readership of this magazine have gone through a few changes. During that time, we've seen the rapid and steady rise of project studios and the explosion of modular digital multitrack recorders, developments that have given access to high-quality recording to more people at lower prices than ever before. The line between "pro" and "semi-pro" continues to blur with each passing year. And increasingly, there is a large number of musicians (including a growing number of *Mix* readers) who have at least serviceable engineering chops—that's bound to be good news for many manufacturers of less expensive audio gear.

Just as the American economy in general has bounced back from its recessionary malaise the last couple of years, the recording industry seems to be back on track after an unsettled period. Our survey revealed a burst of optimism among facility owners and managers, with nearly two-thirds of the respondents saying they expect their revenues to increase over the next year and about 80% describing themselves as either "very" or "somewhat" optimistic about future growth in the industry.

Nearly 64% of the survey respondents (see "Methodology" sidebar) described their primary business environment as an audio production facility, and that group was about evenly split between commercial/public facilities and project/private studios. Video/film production and post-production facilities accounted for about 19% of the surveys; broadcast production studios made up 15%, and the rest were from a variety of business and educational situations.

Multiple job activities are nothing new for *Mix* readers. Most of the audio pros surveyed are involved in a variety of functions, from audio production to administrative duties. Facility owners/managers may also be active as producers, engineers, musicians, technicians or educators, along with other creative or business activities.

FACILITY CONFIGURATIONS

The average production facility in the survey has been in business for 10.5 years and includes more than three production-related rooms. Almost all facilities include control/music production rooms; 38% feature multimedia or MIDI production rooms; and close to one-third have mid-sized studios/stages (400 to 2,500 square feet).

In the past two years, there was a dramatic rise in digital audio editing suites; these rooms are currently found in 35% of the facilities surveyed, an increase of more than 60% in the last two years. Eight percent of businesses have dedicated mobile recording vehicles, an increase of 44% from two years ago.
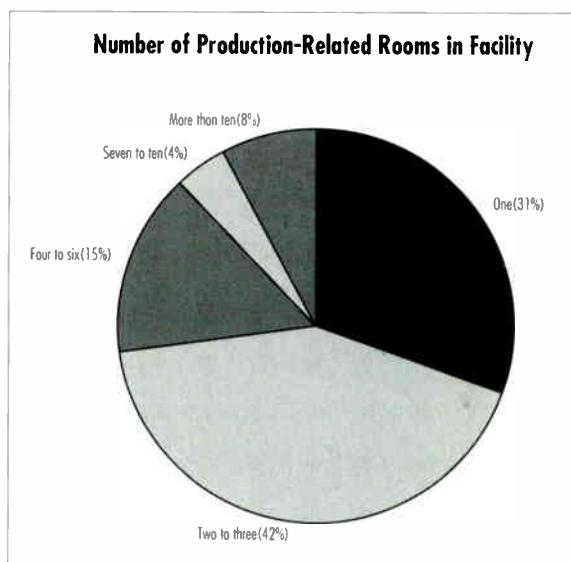
BUSINESS ACTIVITIES

As in the past, artists or artist management are the most common primary clients for production facilities. Many facilities also report significant numbers of audio producers/engineers, ad agencies and corporate clients as secondary clients.

Close to 80% of all facilities currently offer studio recording/production; 43% provide music composition or performance, and 40% offer broadcast production services. New areas of planned involvement include multimedia/computer graphics (14% plan to add), CD premaster-

Number of Production-Related Rooms in Facility

More than ten (8%)
Seven to ten (4%)
One (31%)
Four to six (15%)
Two to three (42%)

Primary Business Environment of Facility

Audio (commercial)	32
Audio (project/private)	32
Video (commercial)	12
Video (project/private)	7
Broadcast (radio)	8
Broadcast (TV)	7
Remote/variable	4
Corporate/educational/institutional	8
Other facility/location	10
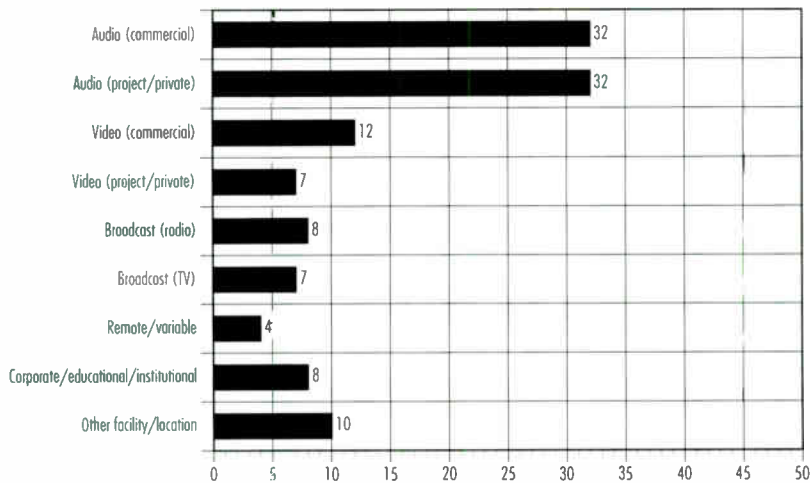
Gross Annual Salaries for Audio Production Facility Staff

Median Annual Salary
Mean Annual Salary

	Median	Mean
Staff producer/director	$33,000	$44,000
Recording engineer	$28,000	$36,000
Asst./second engineer	$19,000	$26,000
Tech/maintenance	$31,000	$38,000
Sales/marketing	$31,000	$39,000
Set-up staff/trainee	$14,000	$21,000
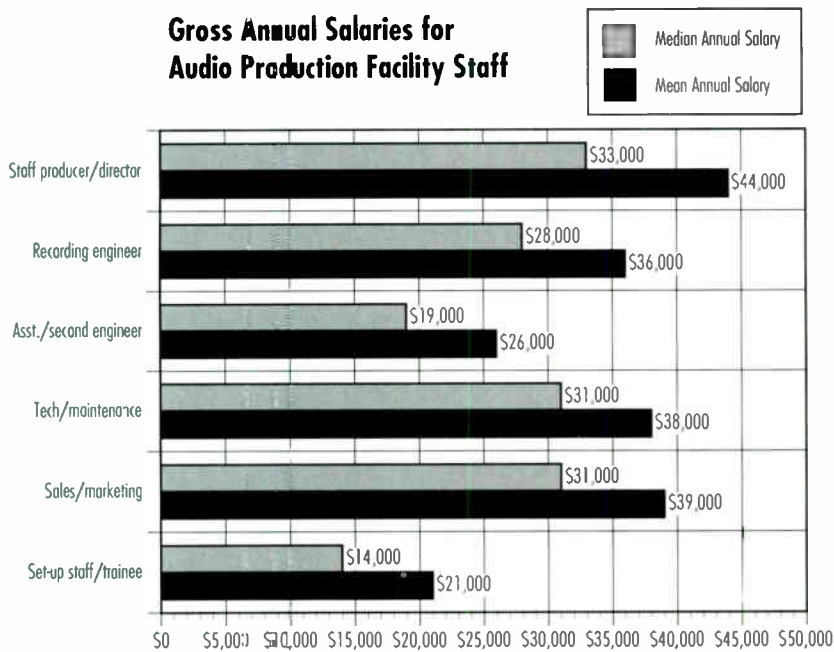
Current and Planned Annual Equipment Expenditures

Spent in Past 12 Months
Plan to Spend in Next 12 Months

	Past	Next
Under $10,000	38	34
$10,000 to $24,999	28	29
$25,000 to $99,999	22	22
$100,000 to $499,999	8	11
$500,000 or more	5	4
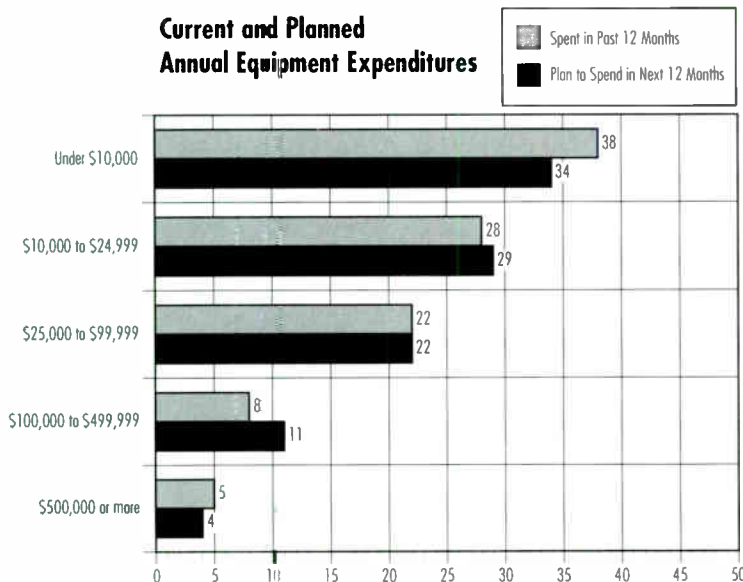
ing/digital editing (12% plan to add) and video/film post-production (10% plan to add). Twelve percent of facilities also plan to add record company functions—almost three times the number that planned to add this service in 1992. Almost no facilities report plans to discontinue currently offered audio services; the most significant number is the 2% of facilities that plan to discontinue equipment sales/rentals.

STAFFING & SALARIES

The average audio production facility employs ten full-time and six part-time staff members; however, more than one-third of all facilities have just one full-time employee. One-fifth of facilities employ two to three part-time staff members, while more than 43% of respondents report no part-time employees at all.

The average salaries for full-time employees have increased slightly for most staff positions in the last two years. Tech/maintenance staff have seen the greatest salary increases, from an average of $32,000 in 1992 to $38,000 this year. Recording engineers now receive an average of $4,000 more per year, while sales/marketing staff have increased their annual salaries by $2,000 since 1992. However, assistant/second engineers currently are making an average of just $1,000 more per year since 1992, and no salary increases whatsoever are reported for setup staff and trainees.

REVENUES & BUSINESS CLIMATE

Audio production facilities spent an average of $95,000 (median $16,000) on equipment, supplies and services in the past year, an average increase of $28,000 over expenditures reported in 1992. Thirty-eight percent of facilities spent $10,000 or less, and 79% spent under $50,000.

As smaller facilities become more prevalent, the extreme top end of the audio spectrum is also growing stronger. Two percent of all facilities currently report equipment expenditures over $1,500,000 during the past year, and 4.6% of facilities surveyed spent $500,000 or more in the past year, compared to just 2% in 1992.

Gross revenues follow a similar pattern from 1992 to the present. Although 34% of facilities have annual revenues under $25,000, and slightly over half made under $100,000 during the past year, a handful (8%) of

facilities report revenues in excess of $5,000,000. This top-bracket revenue group has almost doubled in size in the last two years. Overall, the average facility revenue is $736,000 (median $70,000).

EQUIPMENT TRENDS

Several equipment categories stand out as "hot" products for the coming year. According to the current survey, the top items for planned purchase include CD recorders (23%); multitrack digital audio workstations (20%); DAT recorders with time code (19%); and soundproofing/acoustical materials, modular digital multitracks, compressors/limiters, and other signal processors (all 18%).

Computers are used in almost all audio businesses today. Ninety-six percent of facilities use computers for both business and production activities; the predominant computer platform for business or administrative functions is *Windows* for IBM PC-compatibles (48%), while the top platform for production or creative work is the Apple Macintosh II or higher (45%). Atari computers are used by only 4% of facilities for business and by 7% for creative tasks, while the Commodore Amiga is used by just 1% for business applications and by 9% for production-related work.
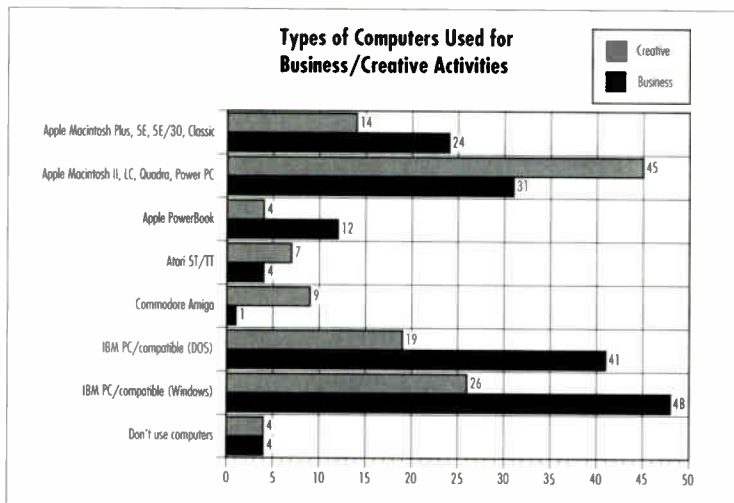
Of the facilities that plan to purchase business-related software, the most common planned expenditure is scheduling/studio management software (17% plan to buy). Digital audio processing/editing software is on the wish list of 29% of the facilities that use music or multimedia software. Many facilities also plan to purchase computer peripherals in the coming year, such as 200+ MB hard disks (23%), CD-ROM players (21%), and CD-ROM recorders (21%). ∎

Elise Malmberg is marketing manager of Mix *and* Electronic Musician.

Types of Computers Used for Business/Creative Activities

Legend: Creative, Business

- Apple Macintosh Plus, SE, SE/30, Classic: Creative 14, Business 24
- Apple Macintosh II, LC, Quadra, Power PC: Creative 45, Business 31
- Apple PowerBook: Creative 4, Business 12
- Atari ST/TT: Creative 7, Business 4
- Commodore Amiga: Creative 9, Business 1
- IBM PC/compatible (DOS): Creative 19, Business 41
- IBM PC/compatible (Windows): Creative 26, Business 48
- Don't use computers: Creative 4, Business 4

METHODOLOGY

The *Mix* 1994 Audio Production Facilities Report is based on the results of a survey mailed at the end of June 1994 to 1,000 randomly selected (*n*-th name) domestic *Mix* subscribers in the following circulation categories listed on *Mix*'s qualified subscription form, in quantities representative of the total number of subscribers in each category:

Facility Type
% of List

Total Names
by Category

Recording studios
private recording studios, project-oriented commercial studios, commercial studios offering full production services, facilities specializing in MIDI/computer-based recording services, remote truck/location recording, and corporate/institutional/government facilities
59.7%   597

Video/film facilities
production, post-production, remote truck, and multi-image production
18.3%   183

Mastering-only facilities
0.8%   8

Broadcast facilities
radio stations, TV stations,
other broadcast production facilities
11.3%   113

Music/recording school or program
9.9%   99

The questionnaire packages, which were mailed by an independent mailing service, each contained a four-page questionnaire, a cover letter, a $1 bill, and a stamped return envelope. A reminder postcard was sent to the list two weeks after the questionnaire mailing. All completed questionnaires were returned directly to The TabLab, an independent market research firm based in Portland, Ore., for processing and tabulation. 494 completed questionnaires and 12 undeliverable questionnaire packages were returned by the survey deadline of July 31, 1994, for a total response of **50%**.

Please note that not all respondents answered every question in the survey. The size of each question's response universe is indicated by the symbol Σ= (number). The exact wording of questions included in the original questionnaire has been retained in this report.

For a complete survey report, please send a check or money order for $15 (U.S. funds only) to: *Mix* magazine, 1994 APF Report, 6400 Hollis Street #12, Emeryville, CA 94608.

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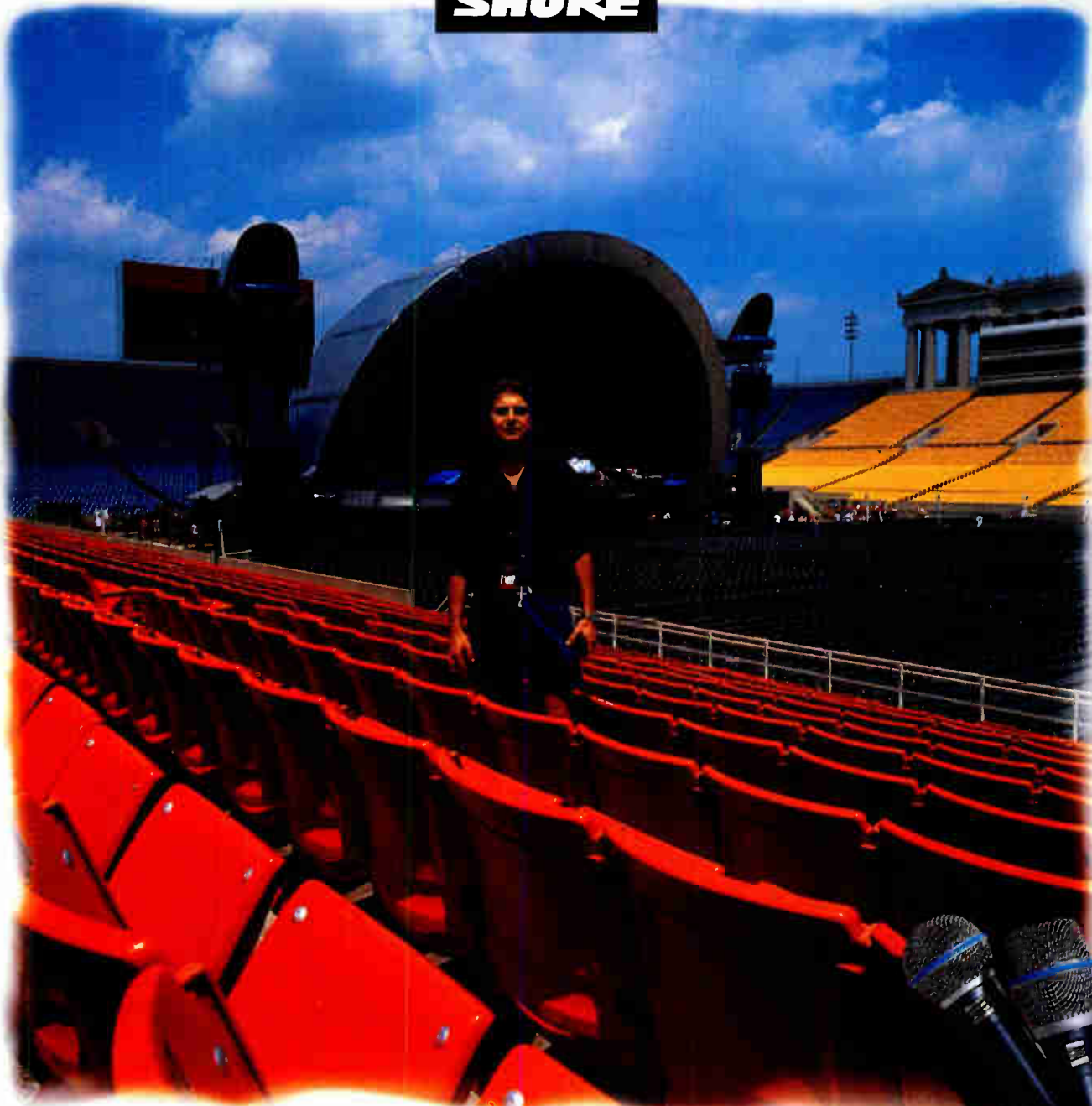
Seth Goldman, Pink Floyd Monitor Engineer, Soldier Field, Chicago.

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BY TOM KENNY

P O S T · S C R I P T

"I'm Still Here," Part IV: Post Post-Production

by Larry Blake

This is the fourth and final part of a series dealing with how all of us in film sound—that is, production mixers, sound editors, re-recording mixers and theater personnel—create more work for ourselves when it would be best to keep everything simple. As a result, things get screwed up. "I'm still here" is my catch phrase for the way we do things to let the director and the audience know that we are "still there."

In the first three installments of this series I was perhaps a little tough on my colleagues in film sound, criticizing them for going overboard in misguided attempts at doing their job. Certainly, the art and craft of creating film sound in all its forms has a large gray area between the obviously stupid (120 minutes of ear-bleeding loudness and unintelligible dialog) and the insanely great (*Apocalypse Now*). We're all working toward making the sounds that make the print master be all that they can be. That's our job.

By the same token, I can get really impatient when theaters try to make *more* out of the sound job than we put into it. I've pissed and moaned many times in these pages about how subwoofers and surrounds are too damn loud in most theaters...and I'm not about to stop complaining now. Rather, I'm going to try to act according to the gospel of Atticus Finch, the father in *To Kill a Mockingbird*: "You can't judge anyone's actions unless you walk in their shoes and understand things from their point of view." Okay: *Why* is this practice so widespread?

First, I think that because the great majority of theater service technicians

Pinewood Adds Avid

Leading British post house Pinewood Post-Production has added an 8-channel Avid Audio Vision system, in use currently for ADR and effects recording on the show *Space Precinct*. The company also was on schedule to add an Avid Film Composer suite and digital dubbing theater, based around an AMS Neve Logic 2 console and AudioFile Spectra hard disk system.

ILLUSTRATION: TIM GLEASON

Image Group Post Mixes the Music

There are advantages to operating an audio facility within a top-end video house. First, you can pretty much count on a steady stream of clients from the video edit bays, whether simply for transfer work or full-fledged mixes. And second, equipment for post work is available— not just the video decks that can be wheeled in, but also, as has been happening across the country, some pretty sophisticated audio gear. We've said it before in these pages: It's a hell of a lot less expensive for video houses to put in audio rooms than vice-versa.

MTI/The Image Group was established in Man-

hattan in 1977. In 1989, the company (with VP and chief operating officer Charles Pontillo leading the way), acquired VCA Teletronix, a video post-production house that had been involved in audio post since 1982, and added a second SSL ScreenSound. But the audio rooms were small, one housing the ScreenSound and the other holding the SSL 6000 and

Susan Pelino and Frank Lanzer at the SSL 6000 in Audio 1

PHOTOS JULIAN JAIME

The Scenaria in Audio 2

London's Tape Gallery
FROM DATABASE TO TALKING DOGS

by Dan Daley

Lloyd Billing sits at his desk at Tape Gallery, the SSL- and Avid-equipped audio post facility he owns in London's labyrinthine SoHo district. He is chain-smoking Benson & Hedges Specials and poring over a display generated by his Mac onto an old PostPro monitor. "We just had it laying around," he says of the monitor.

His casual attitude belies a level of excitement about what's on the screen, however. Just as music and sound effects libraries have proliferated and turned into multimil-

lion-dollar businesses, spawning their own data-base-management softwares, Billing is looking at an idea he came up with that could do the same for the voice-over industry. At this moment, on an uncharacteristically hot and sticky day in London, his database contains files on 127 voice talents, with a total of 920 voice clips. That database is increasing at a rate of two clips per day. It's outgrowing File-maker Pro and is about to be transferred to the more sophisticated animation and graphics program MacroMind Director. As easily as one now calls up library music and sound effects, Billing's system will let post houses do the

Lloyd Billing

PHOTO DAN DALEY

same with voice talent.

Billing, a 20-year audio engineering veteran who just last year gave up hands-on work to better manage a growing post house, came up with the voice-database idea in 1987. "I'd gotten tired of having to flip through hundreds of reels looking

for the right voice talent for different commercials and projects," he explains. "At the time, the Mac didn't have enough memory to be able to load a sufficient amount of sampled information on voices. Once that became available [he now has a 2-
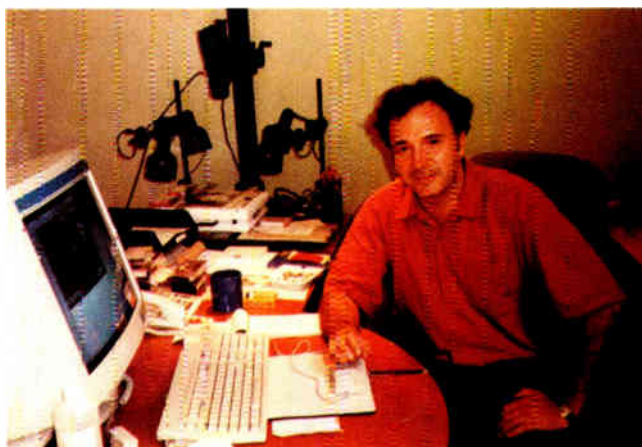
and projectionists never get a chance to talk to those of us who create film soundtracks (much less hear tracks the way the directors approve them on the dub stage) they are reliant upon conjecture and (often erroneous) assumptions. For example, I can't count the number of times I've heard theater people (projectionists, service technicians and managers) tell me that loud surrounds make a movie more involving; bringing the sound out into the audience, right? What they need to realize is that the important energy of a film—the dialog and the main left/center/right music and effects mixes—is up front. That's just the facts, ma'am, and when surrounds are goosed up, they pull the room's sound energy, and as a result the focus of the audience, back from the screen: You know, the perforated sheet where the actors and the story reside.

This situation is exacerbated because filmgoers have heard mistuned surrounds so frequently that they *expect* all films to be this way. Some theaters that have been too cheap to install a full-fledged left/center/right/surround system will install a center/surround theater decoder and then crank the surrounds, which are competing with only one speaker up front.

The rationalization for such systems is this: These little piece-of-shit shoebox theaters are so long and thin that there is no way to get a proper stereo image from the rear. Fine, then save some money and buy one good speaker/amp and play everything in wide-range mono; a center/surround mix bears even less of a relationship to what we hear on the dubbing stage than mono does because it is so unnatural. And mono doesn't mislead the audience into thinking that they are hearing "stereo"—there are speakers on the auditorium wall, so it must be stereo—giving them an erroneous point of reference.

This grim tale becomes a self-fulfilling prophecy when filmgoers go to see a movie with surrounds played at the proper level: They storm up to the theater manager, complain that they can't hear the surrounds, and *voila*, the projectionist will crank them up because "that's what the public wants."

The situation is made even worse by the proliferation of Dolby Pro Logic decoders, which have created a "little knowledge is dangerous" situation. People are more aware of surrounds, and I'm particularly pissed at the laserdisc magazines and newsletters whose litmus test of sound quality is how much surround information is present. I'll never forget becoming aware just *how* grim the situation was when I heard a guy behind me in a theater in Metairie, La., joyously tell his friend to "listen to the DSP," referring to the (ridiculously) loud surrounds.

Although it's a free country and you're entitled to play a movie at *home* with only the surrounds on, if you're so inclined, it's another thing when the home theater equipment as purchased is "non-standard." The most obvious example I can think of is the design of center-channel speakers, and how companies will skew their frequency response toward dialog. "The center channel is the dialog channel" is their mantra. Well, yes, one of the main uses of a center speaker is to anchor the actors to the middle of the screen for people seated off-center.

However, this should not obscure the fact that music and sound effects also play through that channel, and that we take great pains to ensure that all three channels are matched

at the dub stage. I spoke with the president of one such company who told me that he had designed his special center-channel EQ curve by listening over and over to a laserdisc of a film that (unbeknownst to him) is renowned in the industry for having unintelligible dialog!

Back to theaters. Notice that I haven't complained about the generally sad state of theater projection and how the equipment is maintained. I don't blame the people in the trenches because I know how frustrated theater personnel are with the company bean-counters who won't let them spend money to keep everything up to spec. All the mucky-mucks appear to be concerned about is popcorn sales.

This is the end of my first year as columnnist at *Mix*, and I've been thrilled at the response that I've received. For a change, instead of telling me how great or stupid a column was, I'd like to get some feedback on subjects that you would like me to tackle in the next year. Please send along your ideas directly to PO Box 24609, New Orleans, LA 70184, fax (504) 488-5139; or now, finally, via the Internet: swelltone@aol.com. ∎

Larry Blake is a sound editor/re-recording mixer who lives in New Orleans for reasons too numerous to mention, although getting a lungful of fragrant City Park air from his porch would be a good start.

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multitracks that came over from VCA Teletronix, along with the second ScreenSound. As part of Image Group Post's March 1994 move to a 70,000-square-foot location in the Tiffany Building (401 Fifth Avenue), with the assistance of general manager Willie Sheehy, the audio division picked up a third room, along with a fully loaded SSL Scenaria to fill it up.

Chief audio engineer Frank Lanzer, who has been with VCA (and now Image Group) since 1982, says the original intention was to buy an SSL 8000 film mixing console, and they actually had one ordered as part of the move. But the company decided to maintain their commitment to video post, and SSL graciously swapped the 8000 for a Scenaria. (It arrived in mid-September, and *Mix* called during the four-day training period.)

The Scenaria resides in Audio 2, with the 6000 and a ScreenSound in Audio 1. An additional ScreenSound/Yamaha DMP1000 combination handling pre-production chores in Audio 3. Eleven 1.5-gigabyte hard drives, two magneto-optical drives and three Exabyte 8mm backups are located in a central audio machine room and shared by all three rooms via SoundNet.

All the rooms, including the video edit suites, were designed in-house, with acoustic design by Jimmy Maher of Soundhouse Design. The initial requirement seemed to be large control rooms and large vocal booths (that can hold up to five). "We have some trapping in the front walls and some above the console, along with diffusors along the entire rear wall," Lanzer says, "but since our primary business is not doing original music, we're not in a situation where we would be constantly generating very loud SPLs. We needed rooms that are acoustically correct as far as imaging and perception go. Another major concern was the ergonomics, from the clients' standpoint—large producer's desks, large comfortable couches. And because of the way things are laid out, the sound lock sort of doubles as a phone booth.

"We have Meyer HD-1s in all the audio rooms and the video edit suites," he continues. "The nice thing about the HD-1s is that they are very directional and controllable in the listening environment. In a multipurpose facility, when you finish rough-cutting a project in the video suite then come into audio, you don't want it to sound drastically different. The Meyers work well in both environments. We also have the KRK 13000s in the wall, and the Auratones."

Although Image Group Post works on some long-form television projects and even has a couple of feature films lined up for January, the majority of the audio post projects—TV and radio commercial spots, electronic press kits and half-hour shows—move through the facility in a couple of days or less. Consequently, the three rooms have to function together and separately. As an example of the interaction, senior audio mixer Susan Pelino walks us through the two-day schedule for *The State*, a half-hour comedy series on MTV that combines live comedy and pre-produced sketches.

"Audio 3 is used basically for prep [on the show], voice-overs and unsupervised work," Pelino says. "My assistant, Max Perez, takes an episode on the D-2 master, which will be four tracks checkerboarded that the video editor prepared, with most of the on-camera dialog and maybe a couple pieces of music for lining up cues. He makes a work print while loading the four channels into the ScreenSound. Plus, the client will give him a list of 20 to 30 sound hits for that episode. The original music comes in on DAT the day before, and if he has time and the producer's there, he'll start lining up a few cues. We do a lot of music editing to match the scenes. And each sketch has a transition period to link it to the next scene, so that gets heavy sound design. And the sketches themselves get a lot of textures, outside ambiences, comedy effects, light switches, door slams, winds, birds, etc. I like all that done the day before, so we can use the second day for mixing."

The mix has been taking place in Audio 1 on the SSL 6000. But the

Vidcentral, the duplication and standards and conversion room

Scenaria was delivered mid-September, and the season that begins in October will be mixed in Audio 2. "On the second day, I just pick up the drive where everything was loaded and lined up. I line up anything we didn't get to on the first day, then work on automation, EQ and mixing. It's a loaded show, but I keep an MO disc of all the effects so everything's available instantaneously. Plus, SSL has put out six, or maybe eight, MO discs of the Sound Ideas library to go with the Scenaria—all head-and-tailed for Scenaria.

"It's about a ten-hour job," Pelino adds, "from lining up through the mix. About three hours on the actual mix and layback. MTV gives me two clones of the D-2 master. On one I lay back the full stereo mix, and on the second I'll do checkerboarding of each sketch on channels 1 and 2, then use 3 and 4 for the second sketch, and so on. That way, when they do a 'Best Of' show at the end of the year, they can just grab certain sketches without the links and transitions."

Pelino, Lanzer and Perez are the audio team at Image Group Post, and *The State* represents just a small portion of what they do. If they have a niche within the wide range of product they turn out, it's probably in music-related spots and special music presentations. Pelino's first job on ScreenSound in 1989 (with one day of training!) was a Sony Records 30-second spot for "Black and White," off Michael Jackson's *Dangerous* album. She's gone on to mix spots for Mariah Carey, Gloria Estefan, Melissa Etheridge, U2, Midnight Oil and Luther Vandross.

Image Group Post handles all of Island Records' TV and radio spots, and also does work for Arista ("a lot of EPKs"—electronic press kits) and Atlantic Records. Pelino's designed and mixed video profiles for Aretha Franklin, Ace of Base and Toni Braxton recently, the latter a home video collection available in record stores.

She has also put together the musical montages to accompany Rock and Roll Hall of Fame inductions—

John Lennon, Rod Stewart and Cream, among them. "For Cream, the producer came in with CDs, DATs and some footage," Pelino explains, "and we put together a six-minute collage of all the music. I feel the music has to be done first in a case like this because it's heavy cutting, and transitions and crossfades, with a couple of bites included. Then I lay that back to a D-2 basic and make a ¾-inch [copy] with time code as well. The producer takes the ¾ home and does an offline, cutting picture to the finished audio track. Then they go into the video edit room and cut to our final track, onto the D-2. The video editor loves that because all the audio is done. For shows that are heavily music-related, I feel that the music should be cut first."

Absolutely. Pelino has been playing guitar since she was four and says "being a musician is 80% of being a good engineer." From looking at her track record, the other 20% ain't so bad either. The rock 'n' rollers keep coming back. ■

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gigabyte hard drive for the system], I was able to put the idea and the hardware and software together."

The database is divided by fields, as in a spreadsheet. Each, upon being recalled, provides a picture of the talent as well as name, contacts, agency, affiliations, credits and the voice specialties. A keystroke will call up and play back those characterizations. Alternately—and this is the driving force behind the idea—the fields can be selected and voice talent located according to what's desired. Accents, voice tonality, specialties, nationalities and other fields are selected, and the talents fitting the specifications are brought up on the screen. "They come up in the order we logged them onto the system rather than alphabetically," Billing says. "We figured it was the most fair way to do it."

The field titles seem comical, almost capricious, but that simply reflects the fact that there are no real clinical terms for the way in which we speak. "Mumsy"—the British maternal colloquialism—seems odd when viewed next to "Bimbo" and "Housewife." Fields include Voice Basics—narrator, cartoon, upper and lower class (this is England, after all),

As easily as one now calls up library music and sound effects, Billing's system will let post houses do the same with voice talent.

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hard sell, medium sell, etc. Artist-type lists male, female, doubles (a la Stiller & Meara), comedians and an obtuse sub-field called "Irish Equity." Other fields include style types (Aggressive, Fast Talker, Agony Aunt, Pathé News, Quiz Master); national and regional accents from Afrikaan to Australian and from Belfast to Gloucestershire; sub-accents within those fields; and sound-alikes. Conceivably, one could

locate an Aggressive Cockney Fast Talker with a Sexy Yet Stentorian delivery who could, in a pinch, do an imitation of a Cheeky Bimbo with a Tanzanian accent.

The impersonations range from marginal to spot on, from a passable Cliff Richard to a very good John Cleese. Maggie Thatcher is still the most popular characterization despite being out of office for almost three years. Jimmy Stewart, Joan Rivers, Marlon Brando and Mae West are all represented. Interestingly, there is no Winston Churchill.

Another application for the database is to allow commercial clients to search through the types that competitors have used. "Newspapers, cars, shampoos—we can search by type of spot and see what everyone else is doing," Billing explains. "If they want to do something different, they'll know where not to look."

Talent can list on Tape Gallery's database for an annual fee of £150, with a charge of £10 per audio clip. Billing explains the charges by noting that the sampling of talent reels from their analog tapes to the hard drive, scanning of pictures and their subsequent editing and posting to the file format requires at least a day

per performer. On the other hand, Tape Gallery gets no commission when talent is booked.

TAKING IT INTERNATIONAL

The diversity of the fields has a distinctly British bias to it (or at least a Commonwealth bias). Billing, however, wants to take it international. He's in the midst of looking for U.S. post facilities that have a grasp on the voice talent market here for exchange clips and files. ("We can tell a Borstal accent from a Bristol one, but not a Kentucky from a Texas one," he concedes.) That, he says, reflects the increasingly global nature of audio post-production.

"[The database is] very timely in that regard," he says. "We do a lot of stuff with Germany. I was just on the phone with them finding a deep, sexy male voice that could do a commercial for an agency over there." Those multinational auditions are carried out via ISDN links, which have become the rage in the UK. The ISDN links allow Billing to exchange voice-overs in various languages for advertisers who look to maximize their commercial spots throughout the multilingual continent.

With the U.S. and German markets as the first ones targeted for growth of the voice data network, Billing wants to develop a portable version that can be demonstrated on laptop computers, using that sales tool to eventually license and distribute the database to other facilities around the world. The parallel step will be to load the database onto CD-ROMs segmented by types and sell those in the same manner that music and effects libraries are now distributed.

That effort will have to remain based around English as the sole language. However, says Billing, he's fooled around a bit with computerized phonetics libraries. Their capabilities at the moment are still too rudimentary for commercial applications. "But they're getting better," he says. "They can adjust for gender and speed, but they're just not ready for something like this yet. I'd like to see more in this area, sort of like what Quantel did with the Harry. I'd like to be able to have anyone speak and have it come out in Richard Burton's voice. I think the processing power is now available. I don't know why anyone hasn't done it yet. You could have talking dogs. You could make a fortune." ∎

New Audio Products for Film/Video Production

FOSTEX FOUNDATION 2000LS

Fostex (Norwalk, CA) introduces a low-cost version of its Foundation 2000 digital audio production system. Like the 2000, the new 2000LS features real-time editing, touch-screen control, dedicated transport/editing buttons and a weighted jog/shuttle wheel. The main unit features up to 12 slots for DSP cards and various combinations of analog and digital I/O, such as ADAT "Light Pipe," SMPTE sync, computer interfacing and external machine control. Unlike the 2000, synchronization, machine control, digital mixing and digital signal processing are add-on options. The 8-track 2000LS system is priced at $14,995 and is upgradable.

Circle #190 on Reader Service Card

WOHLER AMP-SUR

Housed in a shielded chassis, AMP-SUR from Wohler Technologies (South San Francisco) is a rack-mount 2U monitor for surround sound audio applications. It contains four powered loudspeakers, LED level meters for left, right, center and surround, and a surround sound decoder. Combined, these features can reveal potential problems in surround-encoded programs because the AMP-SUR does not attempt to compensate for signal path problems. Auto-mutes and individual volume controls for each channel allow the monitoring of individual channels or combinations.

Circle #191 on Reader Service Card

OTARI MR-10 MINIDISC RECORDER AND PLAYER

The MR-10 from Otari (Foster City, CA) is a professional broadcast storage and playback system based on the MiniDisc (MD) random-access optical disc format and targeted at on-air and production studios. The recorder features a hard-wired remote, parallel and serial control, S/PDIF digital I/O, table-of-contents editing, a selectable EOM detector, balanced +4dBu XLR analog I/O and headphone output. Options include transformer I/O and RS-422 or RS-232C interfaces.

Circle #192 on Reader Service Card

SUMMERTONE TC/VITC MONITOR

Summertone Ltd.'s Timecode Monitor (distributed by A/Z Associates of Needham, MA), used for fault-finding, confidence reporting and unattended monitoring of SMPTE/EBU longitudinal time code, can now simultaneously monitor, analyze and report errors in vertical interval time code (VITC). This new version reports faults in English on its front panel, logs up to 750 errors, and outputs information to printer/computer. Available in both portable and rack versions, the Timecode Monitor functions in both NTSC and PAL environments.

Circle #193 on Reader Service Card

ZEPHYR DIGITAL NETWORK AUDIO TRANSCEIVER

Zephyr, distributed by Telos (Cleveland, OH), is capable of transmitting broadcast-quality audio (full-duplex 15kHz stereo) over a single ISDN line or two Switched 56 lines using ISO/MPEG Layer III coding. Mono 15kHZ operation can be accomplished on a single ISDN B channel or one Switched 56 line, and because it provides split-channel operation, individual mono signals can be transmitted to separate sites simultaneously. Also, the Zephyr is compatible with older 7kHz codecs (using G.722).

Circle #194 on Reader Service Card

3-D Audio

FOR IMAX THEATERS

BY HANK BORDOWITZ

For nearly two decades, the Imax corporation has moved 3-D movies out of the realm of novelty and into the arena of high-class attractions. Imax images, often projected on dome-shaped rooms or screens fully three stories high, have served as

spectacular centerpieces to many expositions and world's fairs over the past 20 years. And the sound, delivered via proprietary hardware and software, is nearly as awesome. Until now. Welcome to the realm of 3-D audio, the most realistic sound sys-

tem in existence, if you believe David Millard, director of marketing for Sonics Associates, the audio division of Imax.

"You can create an ambience, a feeling that changes the character or size of the environment you're in,"

Millard says. "However, placing sound at precise distances from a listener is very difficult with a loudspeaker-based system. On the other hand, switching over to headphones causes a number of technicalities that affect the ability to consistently

create the same effect. But more fundamentally, with headphones you immediately isolate the audience members from each other."

So, Sonics Associates, based in Birmingham, Ala., addressed this problem by creating a headphone that isn't a headphone. On the one hand, the monitor is actually attached to the head of the viewer, like headphones. On the other hand, nothing goes in or over the ear. The speakers still can be used to create the feeling of distance, but the nearfield effects are shattering. They call this development PSE, or Personal Sound Environment.

"It's an approach that gives you a real good mix," Millard maintains. "The headset does not encapsulate your ears, so you are able to talk to the person sitting next to you and fully appreciate the sound coming out of the main 6-channel sound system. So, you can still get rocket launches, explosions, symphony orchestras—the sorts of things that might rattle your pant-legs and give you a real powerful sense in the larger realm. And you can get all of the precise location of details that you can get with a head-worn device."

Imax pairs the PSE headset with the special glasses that are intrinsic

to the Imax 3-D visual experience. The audio portion of the headset handles two of the eight discrete digital channels. Patrons of the new Imax theater (opening this fall in New York's Lincoln Center) will get to experience the new headset as they see one of the two features to be shown there. But the way the sound is delivered is nearly as remarkable as the sound itself.

For example, each member of the audience experiences eight tracks of digital audio at any given time, but that doesn't mean that eight tracks are playing. Actually, there are 14. The PSE headsets receive eight FM-modulated IR signals, designated as four stereo pairs. Each of the eight channels is modulated on a discrete carrier. The stereo multiplexing technique used in conventional transmission schemes is not employed with PSE in order to maximize channel separation.

A selector button on the headset allows each audience member to choose which channel pair he or she would like to hear. Each stereo (binaural, to be precise) pair is a complete mix of the specific language

and the music and effects (M&E) tracks appropriate to the PSE. That way, the M&E can be appropriately dodged around each language.

"Each pair of PSE channels carries a specific language soundtrack," Millard says. "That 2-channel pair contains all those spatial cues for music and effects that you want to locate very precisely relative to the listener. It also contains all of the dialog that's on the film soundtrack. That way, each pair of channels can carry a separate language, and two people sitting next to each other can be listening in different languages without either getting a subordinate experience. So, you actually have a total of 14 channels running. Any one listener hears eight at a time."

How do you deliver a total of 14 channels of digital sound to a theater audience? Do you sync the film to a 16-track DASH machine? Sort of an expensive solution. The method Sonics came up with is considerably less costly and, actually, fairly elegant in its simplicity. At the heart of it, the Sonics system involves slaving seven separate compact discs to the special Imax projector and to each

other. Although pending patents make it less than political for Millard to go into details, he gives a rough sketch of how they accomplish their digital delivery.

"Essentially, we lock the players together, sample for sample, so there is no drift between the channels," he explains. "It's been attempted by others before, using something like a SMPTE subcode or converter. They would try to lock that code within the resolution of one frame, or maybe a fraction of a frame of picture. What ends up happening, though—particularly because the data coming off for subcode on a CD is not synchronized accurately with the audio data—is the channels go through separate error correction. Therefore, the left and right audio channels stay perfectly in sync, but the time code can wander back and forth a considerable amount. The effect sounds like somebody playing back a tape deck and constantly adjusting the azimuth. There's a lot of flanging. We avoid using the subcode and get directly at the audio data, locking it together sample for sample. That pro-

vides a very effective means of synching the CDs without using a lot of data compression and without all the flanging."

Like so many of the elements that go into the Imax experience, much of Sonics' technology is proprietary. They make their own cabinets, mold their own speakers and manufacture all the Imax theater sound systems. Technicians modify all of the off-the-rack equipment to work to their specs. They design the audio environment relative to the design of every Imax theater.

"That's our main business," Millard maintains. "We manufacture all the sound systems for Imax theaters. In some of our earlier theaters, we used a standard, off-the-shelf horn assembly and made an adjustable crossover. We could steer the loudspeaker a bit by adjusting the delay times. We ultimately came to the conclusion that there are enough rules imposed on the geometry of an Imax theater, based on the requirements of the viewing angles, that we could come up with a very effective solution with a custom horn modeled around that geometry.

"It's really been very successful," he adds, "much more successful than we were with the older approach. We can very effectively distribute the energy from the loudspeaker, so you can maintain a plus or minus 3 or 4 dB consistency from the seat closest to that individual speaker all the way to the back. No matter where you're sitting in that theater, you get a very good balance of all six channels. That's a by-product of the fact that we are able to control the geometry of the theaters."

More than just delivering the sound, Sonics created the system that records it. While they don't expect to record all the soundtracks, some of the company's proprietary systems certainly will be used in that process. Creating the 3-D audio effects for a theater audience involves careful placement and mixing of the tracks, and more than a modicum of technical expertise.

"In many cases," Millard says of their early demonstrations of 3-D audio, "the client took the original effect and processed it through the computer-based mixing system that we rent. The system allows you to program in the spatial cues. We call it a Binaural Mixing Console. The system allows you to take in a single mono or stereo source and localize it anywhere you want and put it back out onto two channels with the appropriate localization cues. We have the only one of these at the moment, and we rent it out. Actually, Sonics holds it because we have the expertise in using it. Imax rents it along with all the camera equipment. At this point, we felt that it worked best that way, rather than expecting studios to invest in buying that sort of hardware until we have more theaters and films out there."

As Sonics has created the Personal Sound Environment, it stands to reason that the company will have the most expertise in using it, for the time being. As Millard says, Sonics experts come along with the equipment they rent. This allows them to rein in some of the possible excesses the format could spawn.

"People recording with the Personal Sound Environment channels need to think of it more like a spice than a gravy," Millard says. "There's a temptation to want to put things very close to the viewer's head and produce a lot of powerful, astounding effects. What ends up happening is the system draws more attention to itself than it has a right to, and it distracts from the story. If it's used sparingly, the effects tend to be more powerful because people don't expect them. The system does what it's designed to do, which is add impact to the production. You want to use the ability to move things from the screen fluidly past the viewer so the soundtrack works as a unit, not as two separate soundtracks. That is definitely a danger when you first experiment with this product: It can do so many very powerful effects, especially where proximity is concerned, there's a temptation to get carried away with it."

Imax's stated purpose is to remove the theater from the theater experience. With 3-D visuals, animals seem to jump into your lap, universes explode around you and submarines zoom by under your seat. But there are more elements at play than just video. With the 3-D Personal Sound Environment, Imax brings the theater experience yet another step further from the theater and closer to the experience of being there. ∎

Hank Bordowitz is a freelance writer based in New York state.

New Products

MACKIE EXPANDER

Mackie Designs (Wood-inville, WA) announces the 24-E 24-channel expander console, allowing owners of Mackie's 32- and 24-channel mixing consoles to increase input channel capacity. Essentially the same as the console without the master section, the expander provides 24 full-featured input channels plus 24 tape returns. Up to seven 24-E expanders (168 inputs) can be daisychained without raising the noise floor. Retail is $2,995; optional meter bridge is $695.

Circle #226 on Reader Service Card

BAYWATCHER

New from BayWatcher Inc. (Canoga Park, CA) is the BayWatcher™ patch bay monitor and recall system. A stand-alone system for monitoring and recording patches, the product monitors each patch as the user makes it and automatically stores the patch information for later recall. A Re-Patch function recalls patch info and prompts the user through repatching, with LEDs at each jack.

Circle #227 on Reader Service Card

SYNCLAVIER EDITVIEW 4.0

Synclavier Company (Lebanon, NH) previews EditView 4.0 digital audio editing software. Slated for early 1995 release, EditView runs interchangeably across a variety of hard disk workstation platforms, including PostPro, Pro Tools, Sound Tools and AudioMedia. It can control sessions from PostPro and Pro Tools simultaneously, allowing the user to drag and exchange audio files between them.

Circle #228 on Reader Service Card

WHITE DA

White Instruments (Austin, TX) is now shipping the Model 4926 2x6 Distribution Amplifier, which includes calibrated rear-panel level adjust, +15dB input gain/-31dB output attenuation, servo-balancing and better than 110dB dynamic range.

Circle #229 on Reader Service Card

NEOTEK ELAN EXTRA

Neotek Corp. (Chicago) offers the Elan Extra, an update of its Elan multi-track recording console. Enhancements include electronically-balanced multitrack busing; improved rejection of external interference; improved crosstalk between mic and line inputs; precision DC servo circuits incorporated into the microphone preamps; and double the headroom.

Circle #230 on Reader Service Card

AKAI DD1500

First shown at AES, Akai's new DD1500 multitrack disk recording and editing system supports recording to both magneto-optical (MO) discs and standard hard disks. Supporting up to 16-track recording and editing, the system can contain up to two 1.3GB MO drives and up to eight XLR analog I/O pairs. Extra drives and converters can be added, and an SVGA monitor may be connected for providing a large display.

Circle #231 on Reader Service Card

DIGITECH STUDIO VOCALIST

The Studio Vocalist from DigiTech (Sandy, UT), is a vocal harmony processor for recording applications. It provides vocal thickening, doubling, harmonies (up to five-part from a single input) and pitch correction with flexibility in editing and patching. It also can produce scalic, chordal and chromatic harmonies and vocoder effects. Features include 18-bit converters, line and mic inputs (the latter with switchable phantom power), 99 user presets and 99 factory settings.

Circle #232 on Reader Service Card

RANE PAQRAT

The RC-24 PaqRat (Mukil-teo, WA) is a cost-effective solution for producing high-quality 20- to 24-bit masters. Using your outboard converters, the RC-24 allows recording and playback of 20- to 24-bit stereo tracks using four 16-bit tracks of a digital 8-track machine. Housed in a single 19-inch, rack-mount unit, the RC-24 is available in two models, the RC-24T (for the Tascam DA-88) and the RC-24A (for the Alesis ADAT and Fostex RD-8).

Circle #233 on Reader Service Card

ISLAND DIGITAL TOUCHPRO

From Island Digital Inc. (Chicago) comes Touch-Pro 16, a 16-track digital recording, playback, mixing, editing and mastering station. The stand-alone system features 16-bit ADCs and DACs, touch-screen control, 1GB hard drive (over three track-hours at 44.1 kHz), AES/EBU and S/PDIF digital I/O, full waveform editing, automated mixing, effects sends and multiple sample rates. Suggested retail: $8,995.

Circle #234 on Reader Service Card

E-MU ESI-32 SAMPLER

E-mu Systems' (Scotts Valley, CA) ESI-32 is a 32-voice stereo sampler featuring compatibility with Emulator IIIx, Emax II and Akai S1000/S1100 sound libraries. The ESI-32 can be expanded with up to 32 MB of RAM (SIMMs) and has two channels of 128x oversampling ADCs, discrete 18-bit DACs per channel, four polyphonic outputs, 32 4-pole digital resonant filters, time compression/expansion and internal floppy drive. Retail: $1,495.

Circle #235 on Reader Service Card

NEUMANN KM 184

New from Neumann (U.S. offices in Old Lyme, CT) is the KM 184, a small-diaphragm, cardioid condenser microphone designed for recording and sound reinforcement applications. The KM 184 combines the capsule of the KM 84 with the transformerless electronics of the TLM 170. Retail is $600.

Circle #236 on Reader Service Card

SPIRIT STUDIO LC

Spirit Corporation (Sandy, UT) introduces the Studio LC mixer. Delivering up to 82 inputs on mixdown and available in 16-, 24- and 32-channel versions, this in-line console has eight subgroups. Channel features include 3-band EQs, eight aux sends, 100mm long-throw faders and line and XLR mic inputs with switchable 48-volt phantom powering.

Circle #237 on Reader Service Card
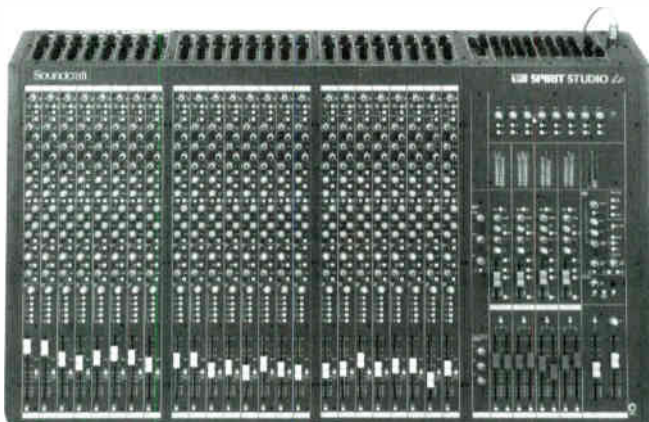
GENELEC SUBWOOFERS

Genelec (dist. by QMI, Hopkinton, MA) intros two powered subwoofers. Designed to provide additional low-frequency extension, improved dynamic capability and increased SPL when used with near-field speakers, these subs are supplied with a 3-channel crossover section with electronically balanced inputs and floating balanced outputs. The 1092A uses a 180W power amp and produces a usable frequency response of 32 to 80 Hz. The 1094A has a 400W amp with a response of 29 to 80 Hz.

Circle #238 on Reader Service Card

WEISS WORDMAPPER

Distributed by G Prime (New York City), the WordMapper 2016/2016A from Weiss Engineering offers a method of 20-bit recording on 16-bit DASH multitracks. This product enables the recording of up to 19 20-bit channels on a 24-track digital recorder, or up to 38 20-bit channels on a 48-track recorder (using two WordMappers). Housed in a single-rackspace chassis, it requires outboard ADCs and DACs. Suggested retail: $3,995.

Circle #239 on Reader Service Card

DBX 160A/166

dbx (Sandy, UT) adds two members to its compressor/limiter family. The single-channel 160A offers an improved signal path and stronger chassis design for a digital-ready, roadworthy unit. The 2-channel dbx 166A compressor/limiter/expander/gate is an upgrade of the dbx 166. Providing an all-new expander/gate design with continuously variable release and 75dB threshold range, the unit also provides PeakStop,™ a feature that protects against overloads to digital inputs and sound system amplifiers. The 160A retails at $459; the 166A is $549.

Circle #240 on Reader Service Card

B&K TUBE MIC

Brüel & Kjaer (dist. by TGI of Kitchener, Ontario) introduced its first tube microphone, the 4040. The 4040 is an omnidirectional design with a 1-inch diaphragm and two pre-amps: tube and FET. Both operate simultaneously and can be connected to different console channels, allowing easy A/B comparisons.

Circle #241 on Reader Service Card

PIETSCH ASP 100

The ASP 100 audio signal processor by Pietsch Electronics Ltd. (Greencastle, PA) is a series of notch filters combined with a harmonic enhancer designed to improve the sound of recordings. With notch filters at 60, 120 and 180 Hz, the ASP 100 attacks the 60-cycle hum and its harmonics that are present in many recordings. The enhancer is designed to restore punch and clarity without adding hiss.

Circle #242 on Reader Service Card

HOT OFF THE SHELF

Re-Amp allows professional recording equipment and tape tracks to be routed into musical instrument amps. Uses include experimenting with mic placement or adding wah-wah, distortion or other effects. Call (510) 530-2402...A new daughter-board option ($495) and software upgrade (Version 1.5) for the **Lexicon NuVerb** adds support for Digi-design's TDM system; the software upgrade is $10. (617) 736-0300...The **HDV-2 Vacuum Tube Reproduce Amplifier** is a high-definition playback electronics kit for the Ampex ATR-100 Series recorder; call ATR Service Company at (415) 574-1165...Version 1.1 of **Waves Q10** is a 10-band, 2-channel, parametric EQ software plug-in for Sound Designer II; call (615) 588-9307...Providing high-quality digital audio compression for mono and stereo signals, the **MPEG Digital Audio Processor** implements the ISO MPEG-1 Audio Compression Algorithm; call APSI at (404) 892-7265... Supporting two independent MIDI ins and outs, MIDIman's **WINMAN 2x2 PC MIDI Interface Card** is compatible with all Windows MIDI applications; call (818) 449-8838...DGS Pro Audio offers **Gotham GAC-3 digital audio cabling**, featuring a double "Reussen" shield to provide RF protection; call (800) 292-2834...**Crystal Semiconductor's CS5390** is a high-performance 20-bit, delta-sigma analog-to-digital converter chip with 110dB dynamic range; call (512) 442-7555...**Fireflex Acoustic Foam Panels** from NetWell Noise Control satisfy class A or class 1 building codes; call (612) 939-9836... **Neutrik's NP2RCS** is a two-conductor, ¼-inch, compact right-angle plug; at your dealer or call (908) 901-9488...**Lone Wolf's ML125K Chip Controller** for MediaLink offers general-purpose processing, A/D conversion, and digital I/O; call (206) 728-9600...**The Clamp** from Middle Atlantic Rackaccessories mounts non-rack-mount gear in standard rack enclosures; call (201) 839-1011...**Schtung Music** has released the world's first Asian music library on CD-ROM, entitled "Heart of Asia: Phrases, Instruments and Utterances from the Far East." Call Singapore 65-225-0781... **"Johnny C's Vintage & Custom Snare Drum Samples,"** a collection of classic snare samples, is now available on CD-ROM for use on Akai and Emulator III Series samplers. Suggested retail: $199. Call (505) 523-0337.■

You used to have excuses for using a consumer CD player. Perhaps you wanted audiophile sound quality, but then you had to put up with pre-historic user controls. Maybe you wanted an inexpensive player, but then you were saddled with awkward operation, marginal reliability and even worse sound.

YOU HAVE NO MORE EXCUSES.
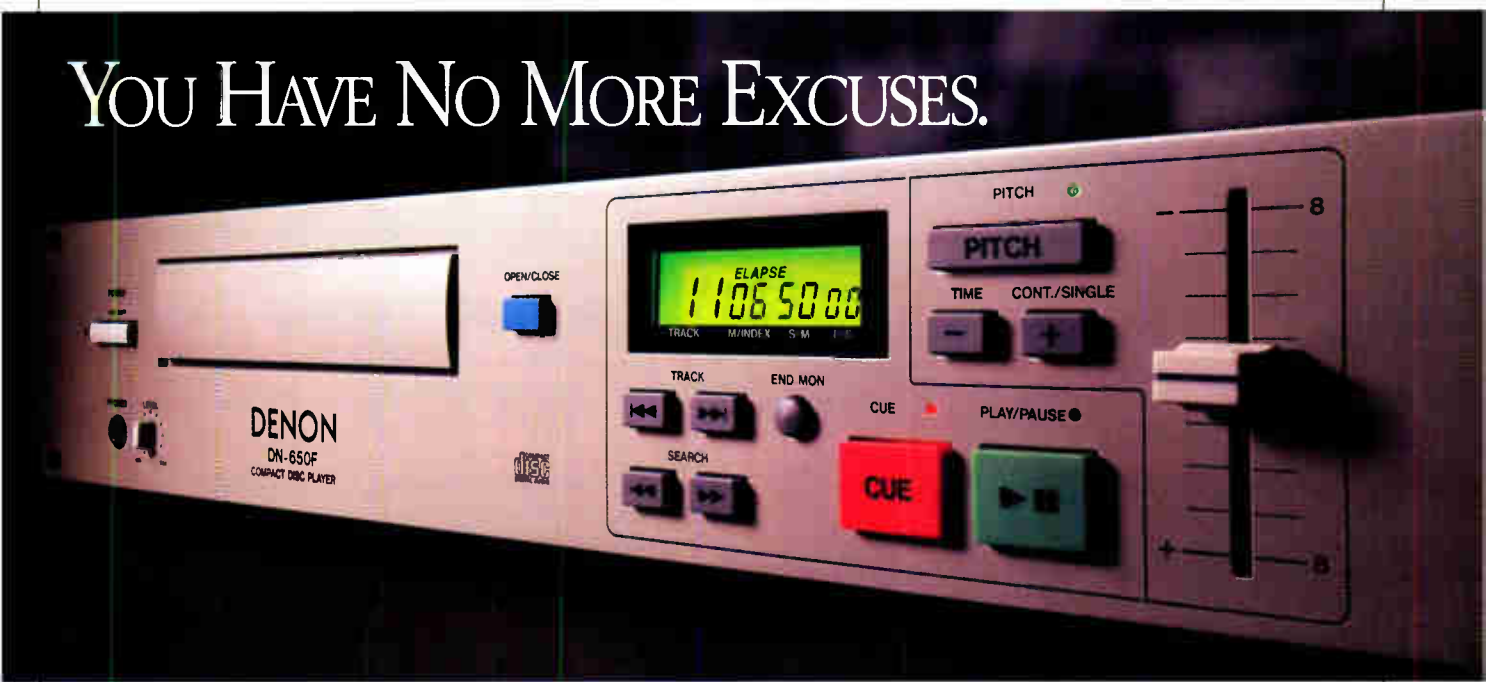
The DN-650F Professional CD Player changes everything. Denon has combined their legendary audiophile sound quality with powerful features developed specifically for studio and broadcast applications. Industry-proven professional controls include true instant start, auto cue-to-music, index search and a full complement of professional input/outputs, such as balanced and unbalanced audio, digital out, and a GPI interface. In addition, you can format these features for your specific applications.

The Denon DN-650F. Professional performance, economical price. And no excuses.

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by Mel Lambert

AMS NEVE LOGIC 2

DIGITAL RECORDING/PRODUCTION CONSOLE

Flexibility. It's essential in today's cost-conscious recording and post-production community. As an increasing number of facility owners are discovering, a console needs to handle a variety of tasks, from relatively simple stereo recording to sophisticated surround sound production. But that extended flexibility should not come at the expense of a baffling control surface.

The Logic 2 from AMS Neve is designed with the flexibility that allows for use in many applications. The model I reviewed at Pacific Ocean Post's Studio A (Santa Monica) has one of the new, two-person configurations that offers dual, identical assignment and automation control. All in all, I found that both the single-person and dual-operator Logic 2 configurations offer dramatic processing power in a remarkably small amount of space.

The key to a successful console design is that it does not force the user to adopt an entirely new mode of working. While progress is essential, each development must embrace the current paradigm, and then extend it just enough to remain within the user's comfort zone.

At first glance, the Logic 2's control surface seems pretty ordinary. It features a familiar array of button-laden control strips, a central assignment panel with upper and lower sections, a master/monitor control section, plus a central graphics display that also controls the optional AudioFile Spectra hard-disk editor. (The majority of Logic Series customers, I discovered, elect to install a combination mixer/editor configuration.) A separate processing rack holds the various DSP cards used in software-defined mixing functions, as well as the analog and digital input/output ports. Also provided is full transport control of audio and video decks, using conventional 9-pin serial or networked ES-Bus protocols.

A variety of mainframe sizes are available for Logic 2. They range from a standard configuration of 16 channel strips on the left and 12 on the right, to the 36-channel strip format I used at POP, to even larger configurations with up to 64 channel faders. (The standard configuration, with four totally independent signal paths per strip,

World Radio History

can handle 112 mono/stereo sources.)

Defining a Logic 2's I/O configuration is very much up to the customer. If the planned application is primarily remixing digital source tracks, then the configuration would require few analog-to-digital cards in the I/O rack. A music-recording or post facility, on the other hand, might specify a mixed collection of 16/20-bit A-to-D cards, plus AES/EBU-, SDIF- and MADI-format I/Os to accommodate a variety of possible sources and destinations. D-to-A cards in both 16/20-bit topologies are also available. The entire system can be referenced to a sampling rate of either 44.1 or 48 kHz. In varispeed mode, the entire Logic 2—including all EQ and dynamics processing—can be slewed by as much as ±10% to accommodate different multitrack playback rates.

The key to understanding the Logic 2 topology—and its resulting creative power—is that every I/O and crosspoint within the console is programmable. In essence, it is the electronic equivalent of a digital-mixer "erector set." It is possible to assign any of the multiple available analog and digital sources to the input of any channel. Insert points can then be generated to feed external hardware; bus assignments to feed multitrack recorders or subgroups; pan, EQ and dynamics inserted into the signal paths; servo-controlled faders assigned to the output of each functional segment; multiple film- and video-style surround sound mix matrices developed—the list continues. In every aspect, the Logic 2 can handle just about anything that is thrown at it.

Since the console is all-digital, the signal quality remains breathtakingly quiet and linear from input to output; the number-crunching power of the fully parametric EQ and multifunction dynamics section means that you can tailor the sounds to suit the needs at hand. Throw in subframe-accurate dynamic and snapshot automation of every control surface setting, and it becomes obvious that the Logic 2 is a dramatic advance in state-of-the-mixing-art.

SYSTEM SETUP

With so many possible system configurations and options, you might expect that setting up the Logic 2 is a potential logistical nightmare. Not so. A simple set of graphic displays leads the neophyte user through a series of easy-to-follow screens that are used to define various operational functions for each of the control-surface channel strips. You can define a mono or stereo signal path for each strip with or without EQ, dynamics, fader and designated output. Once a "typical" channel has been defined in this way, its parameters can be easily copied to additional channels to develop, say, a tracking layout, or a mix-to-surround-sound topology. The master processor also checks to see that sufficient DSP power is available in the master rack to provide the multichannel EQ, dynamics and mixing functions that have been specified by the operator. (So, it might be necessary, as I discovered, to call for an EQ section, for example, only on the channels, groups and/or aux sends that I *really* needed to modify, rather than asking for them as a matter of course. You can always come back and alter the console configuration, if necessary.)

In the same way, the Track sections can also be developed—24- or 48-bus outputs, for example—together with Groups, Auxiliaries and Outputs. The Logic 2 can be set up to handle a wide range of mixing formats, including LR, LCRS, 6-track DTS-style assignments (left, center, right, surround-left, surround-right and subwoofer; the family of "5.1" designations), plus 8-track IMAX and SDDS-format assignments. All of these formats are available at all channel output and group levels, allowing DME stems, for example, to be generated simultaneously with the master mixes. For conventional music-style mixing, the groups can be set up as additional subgroups and master outputs.

After designating the I/O, processing and mixing resources for the required Logic 2 console topology, the next step is to assign the functionality to a physical control on the control surface. Here, the AMS Neve Desk Designer software comes into its own, allowing functions to be mapped to the required channel strip. Each strip can control a total of four independent mono/stereo signal paths—a remarkable degree of flexibility. Of course, this process can be automated to a degree, either by calling up a complete console layout from a library of setups or copying settings across a section of the control surface.

The final stage is to call up the physical inputs and outputs to the

I/O of each signal path. Here, a set of buttons selects input or output and offers a full choice of the analog or digital I/O ports available from the companion processing rack. In this way, it is possible to lay out the control surface to mimic a conventional analog console, with input sources

fies its function or I/O designation. Channel strips can also be dynamically remapped to bring them into the central mix position, or cross-assigned during two-person operation.

CHANNEL STRIP
CONTROL ELEMENTS

Each channel strip packs an abundance of signal control into a small

left of the stereo pair shows overload or gain reduction. Meter ballistics can be set for PPM, VU or peak-reading. Below the meters are three control sections for equalization/dynamics; input/pan and aux sends; and layer selection, automation, mute/solo control. All switches are momentary action, with an LED to show what mode

called, as might be necessary while recording various multichannel stems from Logic 2. A companion Monitor Matrix Control Panel enables up to 104 monitor sources to be freely routed to one or more designated loudspeaker outputs; each configuration can be labeled and recalled later from memory.

And for the theater-sound market, an optional software module lets you sequence a predetermined list of console configuration snapshots in real time via single presses of a front-panel button. Snapshots can also include a preset crossfade to provide time-dependent transitions from one layout to another during scene changes, for example.

THE BOTTOM LINE

For me, digital technology offers the best and the worst of possibilities. Without a doubt, 20-bit recording and processing provides an enormous opportunity for clean, linear mixes and creative sound design. My only reservation is that assignable control designs often leave a lot to be desired. Our industry is remarkably conservative; it embraces changes gradually and often reluctantly. All-digital console designs, like the remarkable Logic 2, need to walk before they run. Assignability should assist us to be more creative, not force us to work in unfamiliar ways as we page though layers of controls to recall the one we need.

For me, the Logic 2 is a transitional product. But, given its high degree of creature comforts and the ability to dynamically recall *every* system function, it is a very powerful, extremely easy-to-use system.

ACKNOWLEDGMENT

My sincere thanks to a Tim McColm, POP's chief engineer, and his technical staff, for their patience and understanding during various evaluation sessions with the facility's new dual-operator Logic 2 in Studio A. (Studio B and C house identical 28-module Logic 2s, fitted with 24-track AudioFiles; Studios D is equipped with a 48-path/12-fader AMS Logic 1 linked to a 24-track AudioFile.) ■

Former editor of Recording Engineer-Producer *magazine, Mel Lambert currently heads up Media&Marketing, a consulting service for pro audio firms and facilities.*

by George Petersen

HAFLER 9505
POWER AMPLIFIER

Hafler power amplifiers are no strangers to pro audio users. Offering a combination of reliability, quality sound and an impressive price/performance ratio, it's no surprise that Hafler amps have been accepted in fixed installation, touring sound and studio monitoring situations throughout the world.

Several years ago, the company began developing a radically different design approach. Known as trans•nova (TRANSconductance NOdal Voltage Amplifier), this patented principle was first made available in Hafler models for the audiophile consumer market. It is now marketed as the 9505, a professional model intended for critical listening applications.

Hafler's patent describes the advantages of an audio amplifier design whereby a MOSFET output stage is connected via an approach similar to the grounded cathode method used in vacuum tube amps. This yields an output stage with a typical voltage boost of 20 dB, as opposed to the 1dB loss of voltage-follower designs. With such gain available at the output, the driver stage can be a low-voltage circuit, yielding a shorter signal path with just three serial stages. The output stage becomes a current-to-voltage converter with minimal (fast) negative feedback, driven by a transconductance (voltage-to-current) stage. Eight lateral MOSFETs are used in the output stage of each channel.

Rather than taking the common route of combining an unbalanced power amplifier with an op amp-based balancing circuit, the 9505 is a true differential-input power amplifier. The plus and minus legs of the input differential stage are buffered with a high-impedance JFET buffer pair for direct signal access to the amplifier without conversion to an unbalanced signal. Four more JFETs in the input stage are used in a fully complementary, symmetrical configuration that connects directly to the cascoded transconductance stage.

In keeping with its minimalist circuit topology, the 9505's front panel is equally spartan, with only an illu-
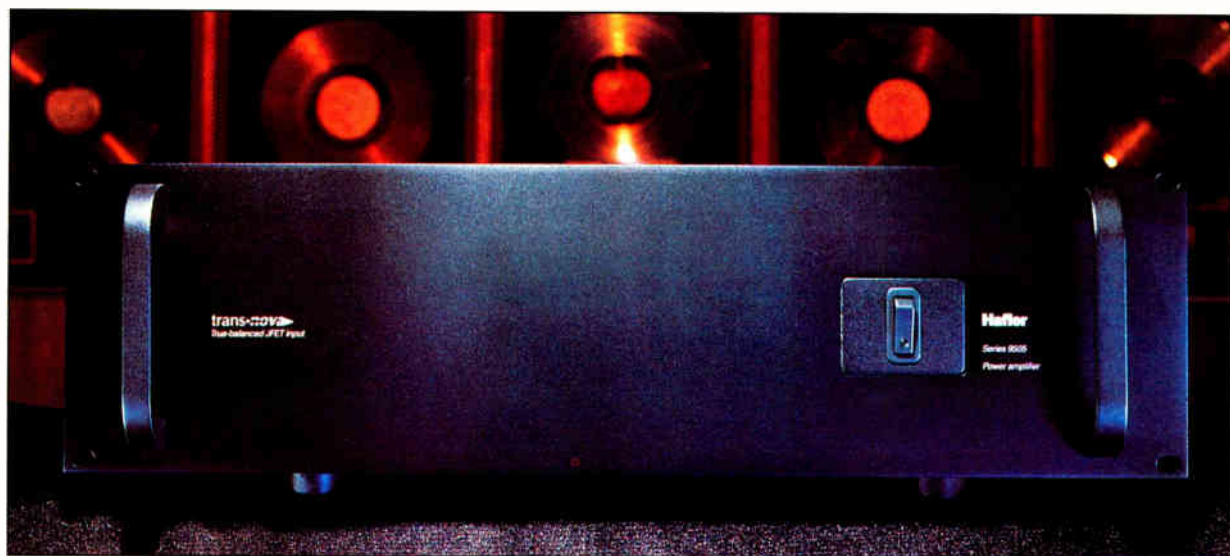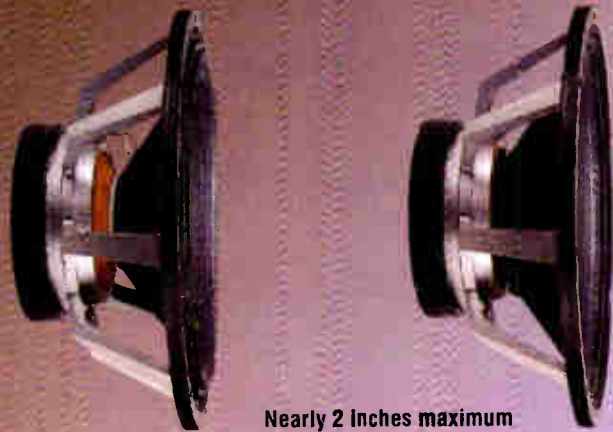
Nearly 2 inches maximum excursion without mechanical failure.

What a difference an "A" makes...

A few years ago, designers of professional high-output woofers fought to keep voice coils cool–and in one piece–with high power inputs. Today, there is a new battleground–maintaining mechanical stability over months and even years of actual use. Only Electro-Voice has engaged this battle–and won.

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New spider lasts 10 times longer.

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minated AC switch gracing the three-rackspace front panel. Don't expect to find clip LEDs, meters or gain pots on this model.

The back panel has a removable AC cord, gold-plated, five-way binding post outputs, unbalanced RCA inputs and balanced inputs on Neutrik combo connectors that accept either ¼-inch or XLR plugs. These combo connectors are great for anyone who has to deal with a variety of inputs.

I was less impressed with the back panel's balanced/unbalanced and mono bridging selectors: these push-switches are easy to accidentally change while reaching into the back of a crowded rack. Recessed screwdriver-type switches would have been preferable. Actually, the only real function of the balanced/unbalanced switch is to re-route the inputs from the Neutrik combo connectors to the RCAs, because any two-conductor jack inserted into the ¼-inch TRS connection grounds the minus (ring), automatically changing the amp to unbalanced operation. As an old proponent of the "less is bet-

ter" school, I say dump the switch *and* the RCAs.

The 9505 has a minimalist design, but that approach wasn't carried over into the amp's construction. The unit tips the scales at 50 pounds, most of which stems from the sizable power transformer and massive heat sinks that surround the back and sides of the amp. The heat sinks really do work without requiring noisy fans. Inside, the 9505 is neatly laid out in a logical fashion, with quality parts throughout. Everything about the construction is first-rate, even down to the chassis itself, which is bolted together with large, no-nonsense Allen head bolts—no sheet metal screws here!

My listening tests on the 9505 began with monitoring on a variety of studio speakers, including KRK, JBL, Tannoy, Yamaha, Altec and DynAudio models. The 9505 outputs 250 watts/channel into 8 ohms, 375 watts per side into 4 ohms, or 750 watts in bridged mono. While the amp tested out to meet its power claims, it seemed to have more punch than its mid-sized 250-watt rating would indicate.

But what surprised me more was

the depth of detail, spaciousness and precise imaging, which provided sparkling clarity, especially in high-frequency transients. This difference was noticeable in higher-end monitors and on NS-10s and other near-field speakers. Lower bass tones were solid and accurate, and at the other end, frequency response extends to 300 kHz (-3 dB at full power). Sonically, transparency is the name of the game with the 9505, and the amp offers uncolored reproduction without imparting a sound of its own. Just the sort of thing one wants in a reference amplifier.

Overall, the Hafler trans-nova 9505 breaks Hafler out of the "good for the money," Chevrolet image and takes the company to the next step, with a high-performance model that stands up to esoteric units costing two and three times as much. At $2,200, the 9505 is a far cry from the "dollar-per-watt" mindset, but who ever said that going first class was an inexpensive proposition?

Hafler Professional, a division of Rockford Corp., 546 South Rockford Drive, Tempe, AZ 85281; (602) 967-3565. ■
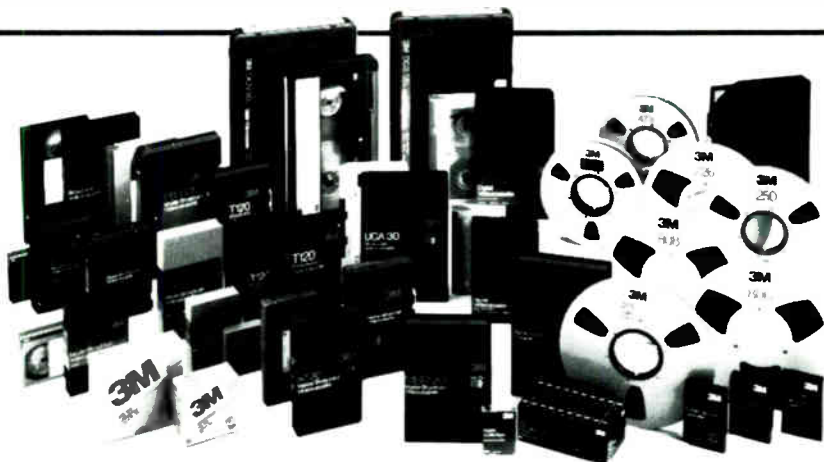
by Dr. Toby Mountain

APOGEE
UV-1000

SUPER CD ENCODING SYSTEM

With its unbashful purple trim and large square buttons, the Apogee UV-1000 Super CD Encoder is not going to win any beauty contests. But it has managed to garner lavish praise from all corners of the audio industry for its excellent sound. Several reputable mastering engineers have endorsed the UV-1000, and a host of CD projects, from the Rolling Stones' boxed set to Telarc's latest classical releases, have been processed with this product.

The unit I received is far more comprehensive than the UV-22 prototype unit that I received one year ago. The product has now evolved into more than just a 20-bit encoding box. Included are other features valuable to the mastering engineer:

- a 1kHz digital oscillator with outputs at 12 different volume levels;
- DC removal;
- automatic level reduction for those overs (called NOVA "No Over");
- channel reversal switch; and
- S/PDIF Output Status Controller for removing copy-prohibit status.

With its myriad of AES, S/PDIF, SDIF and optical connectors, the UV-1000 can even act as a digital patch bay because it can accommodate up to eight different digital inputs.

All of these features work reliably, and I suppose the UV-1000 could be considered a comprehensive DSP box—*a la* the Lexicon 300—if it weren't for obvious omissions such as sampling rate conversion or pre-emphasis removal. A cynic might suspect that the extra features have been hastily added as compensation for the high price tag. But hard-working mastering engineers will welcome them.

SUPER CD ENCODING, NOT NOISE SHAPING

Now to the meat: bit condensation or, as Apogee insists, Super CD Encoding. Regardless of what you call it, the goal is to preserve as much of a 20-bit (or higher) digital audio signal as possible onto a 16-bit medium, i.e., the compact disc. Sony's Super Bit-Mapping, a complex noise shap-

The UV-1000 uses Apogee's proprietary UV-22 Super CD Encoding system.

Apogee UV-22 "Super CD Encoding"

1. Apogee carrier signal is added to original 20-bit signal:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Apogee UV-22
signal

+ ↑
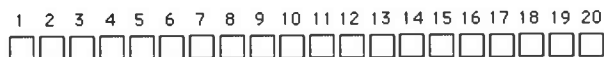
2. A 21-bit signal now holds "new" information in last 8 LSBs:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

3. Last five LSBs are dropped
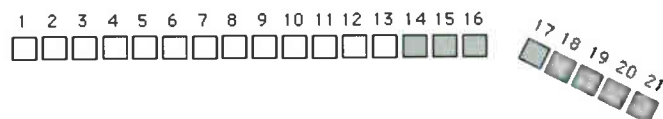
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

17 18 19 20 21

4. LSBs of 16-bit signal now carry information from discarded bits:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
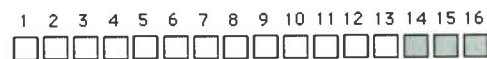
Generic Noise Shaping

1. A "difference" or "error" signal is fed back or added to the 20-bit signal with a specified delay

17 18 19 20

+

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
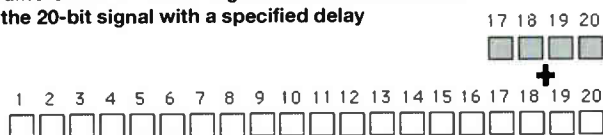
2. This produces a new 20-bit sample with a different noise spectrum and some signal content from the "error" signal

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

3. Last 4 LSBs are dropped and the remainder (last LSB) is rounded off:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

17 18 19 20

$\updownarrow \begin{smallmatrix} 1 \\ 0 \end{smallmatrix}$

4. LSBs of 16-bit signal now carry information from discarded bits:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
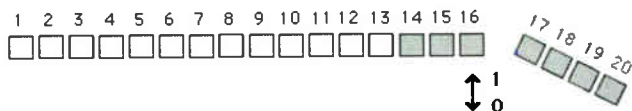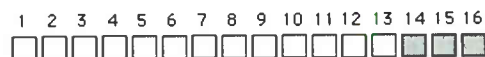
ing process developed from years of R&D for the MiniDisc, captured a great deal of attention early on. But now Apogee has challenged Sony with a different approach—one that Apogee claims is superior, with fewer sonic artifacts than classic noise-shaping designs.

Classic noise shaping (see Fig. 2) is a recursive process in which an error signal (the difference between the 20-bit signal and the truncated 16-bit signal) is added back to the 20-bit signal with varying degrees of filtering to remove noise out of the audible range. Apogee's approach (see Fig. 1) is simpler and more analogous to dithering. An independently synthesized high-frequency carrier signal with energy around 22 kHz is added to the 20-bit signal before truncation. This "magic elixir" of energy, developed after years of research and testing, states Apogee CEO Bruce Jackson, "makes the LSBs dance." The aim of the digital dance is to inject important information from the discarded four bits into the last two or three LSBs of the resultant 16-bit signal.

Very poetic and perhaps convincing in theory, but does it work, and is it worth the price?

ON THE BENCH

I set out to do two sorts of tests. First, get out the audio microscope and listen to 20-bit material that was either recorded at or gain-reduced to a *very* low level (-60 to -80 dB). Comparisons could then be made between the Apogee Super CD Encoding and the following variations: 1) original 20-bit signal, 2) truncated 16-bit with no processing, and 3) noise-shaped 16-bit with Sony's SBM system. This first test would allow me to hear more clearly things that were happening down at the LSB level.

The second test would be real-world comparisons of live music recorded at normal levels. Simple double-blind listening tests would indicate how the Super CD Encoding stands up to the original 20-bit material and other noise-shaping processes. Finally, I felt compelled to answer a question that has been nagging me ever since 20-bit came along: Can the average consumer hear and appreciate the difference?

For both recording tests, I used my favorite converters, the Troisi Digital Companion Series 20-bit A/D and D/A converters, along with pairs of

Schoeps and B&K omni microphones and custom-built mic preamps. For 20-bit storage, I used a Sonic Solutions Sonic System and a Sony PCM-9000. For final, in-depth analysis, the Sonic System was invaluable for quick and easy comparisons between the 20- and 16-bit samples.

LOW-LEVEL TESTS

I recorded a number of different instruments (pitched triangles, hand cymbals, guitar harmonics and hand bells) at very low levels (-60 to -80 dB from peak). Such delicate instruments, chosen for their fast attack times and varying spectral content, were recorded directly into the Sonic System at 20 bits.

Recording such quiet material in a low-noise environment convinces even the greatest skeptic that 20 bits are better than 16. In fact, my 20-bit tests let me hear for the first time the microphone and preamp noise that normally would be masked by hall ambience or the 16-bit noise floor. Most gratifying, however, was the clarity of the attacks along with the depth, richness and imaging of each note, which the 20-bit audio provided.

The next step was to run the 20-bit material through the Apogee UV-1000 and listen for sonic differences in the low-level noise floor by turning the monitors all the way up. Although it fell short of completely replicating the full 20-bit sound, the Apogee did a very good job of preserving the basic integrity of the original 20-bit signal in a 16-bit form. The immediate differences were slightly less energy on the attacks and a higher noise floor. The Apogee did, however, manage to preserve the body of the instrument tone all the way down to total decay, which the truncated 16-bit utterly failed to do. The Apogee signal had a smoothness and homogeneity, whereas the truncated 16-bit was edgy and hollow-sounding.

In comparing the Apogee's performance with Sony's K-1203 SBM box (Version 2.1), two things were clear: The SBM exhibited lower audible noise and did a slightly better job at holding the edge of the attacks. But, overall, I would characterize the Apogee as more coherent and pleasing. One final test, an artificial three-second fade to black of the above signals, revealed some unpleasant quantization noise on the

tail of the Apogee that was less severe using the SBM box (see graphic). I wonder if mastering engineers are cranking it up and listening to their fades to black...(According to Apogee, the release time on the processor has been increased in the newest software version.)

REAL-WORLD TESTS

Is it possible to hear some of these differences at normal levels? For my next test, I was fortunate enough to get permission from Boston audio engineer Joel Gordon to sit in on a live recording session of Ensemble PAN, a well-known and gifted Renaissance performance group that had charted an unbelievable #23 on the *Billboard* classical charts for their New Albion *Johannes Cicconia* release. We recorded a variety of short pieces in 20 bits: a cappella, solo voice with lute, and vocal ensemble (four singers) with several instruments (lute, viol and rebec).

Not surprisingly, the results seemed to reinforce the earlier low-level tests. The 20-bit versions were very impressive, with great depth, imaging and smoothness. The Apogee UV-1000 version was not quite as wide and three-dimensional, but it had a smoothness and homogeneity that was pleasing and clearly superior to the truncated 16-bit version, which sounded hollow and strident. The difference was also immediately apparent to my colleagues and even a few non-musicians who happened by for a casual listen. This re-established my hope that even consumers with average stereo systems might at least subliminally appreciate such endeavors to bring them 20-bit sound.

In comparisons with the SBM box, the Apogee seemed generally preferable—slightly more coherent and musical. The only negative was that the Apogee again seemed to smooth off vocal consonants and sibilance slightly. When I asked Bruce Jackson about this, his reply was that there would soon be a rev to the UV-1000 output clocking scheme that will improve this.

OTHER FEATURES

The four digital audio formats (AES, SDIF, S/PDIF and optical) that the UV-1000 accepts are very useful. When you connect a digital audio input to the back of the box, you then press the matching input button on the front panel, which lights

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Brian Christiansen, Engineer, Sun Studio, Copenhagen

Solid State Logic

SSL DIGITAL

when it receives clock. One of three sampling rates then lights in the middle of the front panel (48 kHz, 44, 32, and Hi-Res). Because some PCM-F1 recordings may still be processed, I feel that a 44.056 LED should have been included.

Once you lock to a specific input, you can then process your signal. The DC removal section is quite sophisticated with user control. Instead of employing a basic highpass digital filter, the UV-1000 calculates the polarity and Most Significant Bit of the DC signal and eradicates it. There are Average and Slew controls for adjusting the sampling and DC removal onset times. Even with these controls set at a minimum, I noticed that the DC removal still takes about a minute to fully kick in, which can be rather irritating. But it does work effectively once it finally locks in, and it's said to be fixed in software version G.

The Super CD Encoding is engaged with a simple On switch, with the choice of Normal or Low settings. Though Normal is the pre-ferred setting for CD encoding, yielding the greatest detail, Low may be used to lower the noise signal by 6 dB for multiple processing. An Auto Black button will turn off the Super CD Encoding as soon as no digital audio is present.

The L-R channel reversal feature is self-explanatory but can be modified to become a polarity reversal switch.

The S/PDIF output status control allows the user to change to 11 different SCMS status settings when sending digital audio to a particular device such as a DAT machine. This is very useful for overcoming interconnect and copy-prohibit problems with different consumer devices.

The NOVA feature is quite helpful, particularly for pop music engineers, where constant overs of inaudible clipping become bothersome and unacceptable at the CD plant. The UV-1000 has a remedy for this. By engaging the NOVA feature, all digital overs are stepped down one LSB to avoid the appearance of digital overs on the CD master. This does *not* smooth out any waveform clipping, but it does eliminate the appearance of overs on the master.

You can choose any or all of the digital output formats because they are all active at all times. This lets you record or monitor separate outputs (processed or unprocessed) at once.

CONCLUSION

The Apogee UV-1000 is a very impressive box that lets the audio engineer get a little bit closer to putting out true 20-bit sound. Retailing at $6,800—about half the price of competing product—the UV-1000 is sure to find a home in mastering suites and in other applications, especially with the increasing availability of 20-bit recording systems. My understanding is that Apogee will continue to tweak its encoding algorithm, so we can look forward to even greater levels of possible digital audio resolution for the 16-bit CD.

Apogee Electronics, 3145 Donald Douglas Loop South, Santa Monica, CA 90405; (310) 915-1000; Fax: (310) 391-6262. ■

Dr. Toby Mountain is the president and chief mastering engineer at Northeastern Digital Recording, Southboro, Mass.
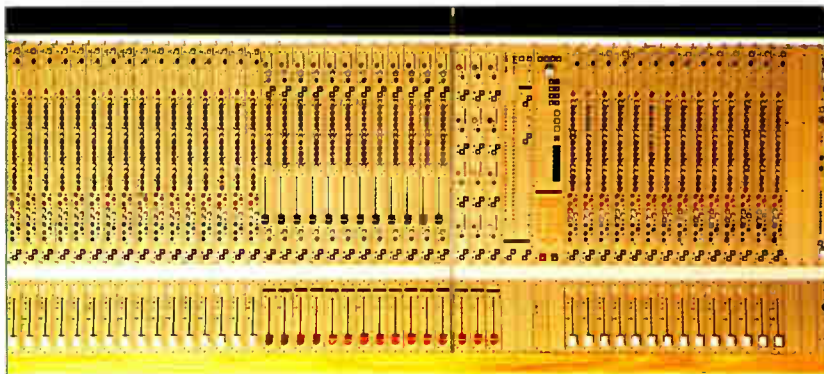
by Mark Frink

SoundCheck

NEWSFLASHES

Cadac Electronics launched its new Concert "live" board at the San Francisco AES show. Designed for sound reinforcement, Concert's key features include the ability to reset all switch facilities instantly, complete manual status recall of knob settings, and a sophisticated computer system with extensive control of MIDI. Standard specs include Cadac's own motor faders and a total of 40 group outputs: 12 subgroups, 12 matrix groups and 16 auxiliary groups. Each channel has direct outs as well as two inputs, both of which can be on at the same time. The console's design allows for modules to be freely removed or inserted without the need to power down. All switch functions are set from a Central Assignment Module and are stored, together with knob and fader settings, in the computer. All switch settings can be reset with a single button, while knob positions are recalled manually via an LED nulling system...Bag End's ELF System is being used by the Billy Dean Band to augment their Future Sonics in-the-ear monitors. Bass

player Kenny Lewis and drummer Tim Hedge had problems with hearing the lows, and engineer Craig Hoerig was pretty adamant about getting something to reinforce the low end because they roll off at 120 Hz. "We tried double-18 subwoofers and were not happy with the sound. We contacted Dave Shadoan of Sound Image in San Marcos, CA, and he recommended trying the ELF technology, which they've been using in their main P.A.," Hoering said. He's using one small BE-18-E enclosure right on the stage. "The punch is there, but not like you'd expect from a wedge; more like a good, home hi-fi."...Thirty-two engineers from 25 different companies, including Altec, Apogee, Crown, EV, JBL, Shure and Yamaha, met in Seattle for a three-day, intensive conference to learn about Lone Wolf Corporation's new MediaLink Development Tools. This software and hardware package allows each company's R&D department to work at its own pace on new product development. International attendees included Australian Monitor, Adamson, Lab.Gruppen of Sweden and TC Electronic of Denmark. The next MediaLink Development Tools conference is scheduled for mid-

February. Interested equipment manufacturers and third-party developers should contact product manager Mark Schulz at (206) 728-9600. ∎

QUICKTIPS

Foam windscreens used as "pop filters" can help the percussive breathing effects of close-miked vocals if condensers or especially dynamic microphones with heavy proximity effect are being used. These $3 accessories can reduce "P-popping," and they offer some other benefits. They are visually more acceptable for live work than the alternative: the nylon filters used in studios to relieve the mic's sensitivity to breath. Many engineers and singers already prefer to consistently use a foam windscreen in live performance. Traveling singers who don't carry their own mic should also consider that carrying a foam windscreen prevents lip contact with strange foreign matter in the microphone grilles found in some house sound systems' inventory. Singers can maintain a consistent distance from the capsule by resting their lips on the foam without having direct contact with the grille. It also can help the quality of vocals on live recordings. Colored windscreens are an additional advantage at festivals or with wireless mics to keep track of the different mic positions onstage. A further benefit is that they can offer some protection from electrical shocks when playing electric guitar and using wired mics. ∎

Thanks to Adam Blackburn of Blackburn Digital, NYC, for the tip!

Cadac Electronics Concert board

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by Paul Potyen

EMAGIC LOGIC AUDIO 2.0

MIDI RECORDING AND NOTATION SYSTEM
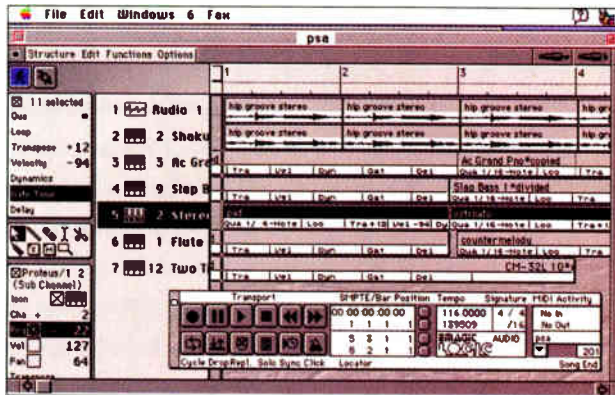
Figure 1: Logic Audio's Arrange window

Figure 2: the Event List window

Many years ago when I first came to *Mix*, esteemed products editor George Petersen told me that one of his most revered credos was, "Never review a MIDI sequencer. It's way too much work for a couple hundred bucks." Those words haunt me as I struggle through Logic Audio's four manuals, totaling more than 640 pages. So why am I putting myself through this ordeal? Two reasons: First, I have been extremely impressed with demonstrations I've seen of this powerful sequencer from EMAGIC; and second, I'm not nearly as smart as I thought I was. This software is far more daunting than that of any digital audio workstation I've ever worked on. So if you think you're going to get a comprehensive review here, you're mistaken. I've got a life, you know.

Logic Audio 2.0 is available for the Macintosh and requires at least a Mac IIx and System 7.0 or higher. If you want to work comfortably with four or more audio tracks, a Centris or Quadra is highly recommended. It also runs in emulation mode on a PowerPC. The usual caveats about digital audio on computers apply here as well: You need lots of fast hard disk space and lots of RAM. The software also requires not one, but *two* of those pesky copy protection boxes: one for Logic (the MIDI part of the program) and one for Logic Audio. They both connect to the computer's ADB port and are slightly smaller than a mouse.

Logic Audio offers unprecedented flexibility in working with MIDI and
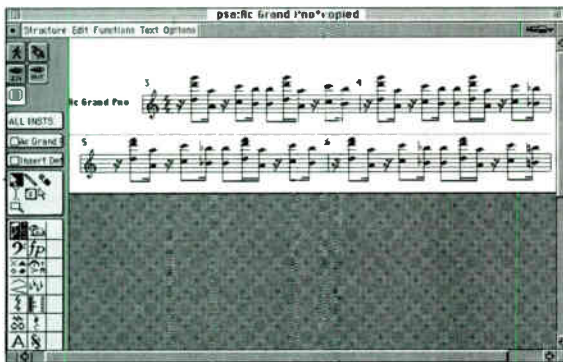
Figure 3: the Score window
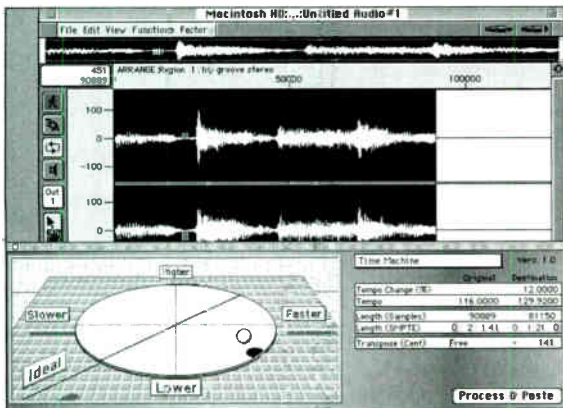
Figure 4: the Time Machine pitch shifter/
compressor/expander

audio, but it comes at a price: It was not fun wading through the four manuals (a manual and addendum for both Logic and Logic Audio), which contained minor, but frustrating, inconsistencies with the software version I installed. The three main menus—File, Edit and Windows (Fig. 1)—provide access to file management options, general edit commands and the various windows. The Arrange window is shown in Fig. 1, and it's just one of 11.

Each window has a set of local menus. I found this to be both a blessing and a curse. In theory, you are presented only with those functions that you actually need for what you intend to do in a given window. In practice, it was difficult for me to remember where those functions were located. For example, in Fig. 1, the upper left corner of the Arrange window shows a submenu consisting of Structure, Edit, Functions and Options. I counted a total of 72 possible selections under these four categories. And I'm still confused by the difference between Functions and Options. Add to this the often enigmatic set of icons at the left, and you have an entire *additional* set of options that pertain to a given selected

track (track 5 in Fig. 1).

One advantage of Logic Audio's structure is that users can customize their environment and call often-used combinations of windows to the foreground with keyboard commands. Here's a quick rundown of the other windows: Event List (Fig. 2, left) displays MIDI and audio events; Score (Fig. 3) shows the MIDI data in standard music notation, with editing tools on the left; Transform allows you to quickly change MIDI data in a variety of ways, such as limiting velocity or routing certain controller information to other controllers; Hyper Edit (Fig. 2, upper right) lets you edit MIDI controllers for a particular track or sequence; Matrix Edit (Fig. 2, lower right) displays MIDI events in graphic mode; Transport (Fig. 1, bottom) functions like a "tape" transport controller; Environment is used to configure your particular system; Key Commands lets you customize Logic Audio's operations with your own keyboard equivalents; Audio diplays the digital audio tracks; and Sample Edit offers sophisticated audio editing features for your audio tracks.

CONFIGURING YOUR SYSTEM

If your system is not complex, you can quickly configure it from the default setup before you start working on a file. However, if you have lots of MIDI modules, interfaces, and audio tracks and use OMS (Open MIDI System), you're better off using the "update OMS equivalents" option. In either case, this is done in the Environment window. You can create standard, mapped and multitimbral instruments as required in this window, then connect them to the appropriate serial port.

Alternately, if you use OMS, you can import your OMS configuration directly into the Environment window and name the patches for each instrument by either cutting and pasting the names from a patch library set, importing them from the appropriate template (provided on one of the

Logic Audio support disks) or by typing the names in manually. But the Environment window offers much more. You can create virtual instruments; sets of MIDI faders; and perform audio routing and grouping with EQ, pan and volume. There are even templates for the Alesis BRC front panel and the Mackie CD-1604 mixer, for use with Mackie's OTTOmix MIDI automation system. These templates allow you to control the third-party devices from within Logic Audio.

SETTING UP AND RECORDING

The Arrange window is Logic Audio's main work area. Tracks are displayed horizontally across a timeline; the bar numbers are shown at the top. The telescope icons located at the upper right allow you to independently resize the horizontal and vertical range of your tracks. Track numbers with the instruments in your setup are located to the left of the track display area. To prepare to record a MIDI sequence, you simply click and hold on a track; then select the instrument from the resulting pop-up menu. Fig. 1 shows that track 5 is selected. Added to the list of the track names are the parameters for the selected track, such as the device name (Proteus/1), MIDI channel (2), Program number (22), volume, pan, etc. You can change any of these parameters by clicking and holding on the corresponding number. For example, if you want to change the patch for this instrument, click/hold on 22; a pop-up menu appears, allowing you to select from one of the 127 program names for the Proteus on MIDI channel 2.

With the track selected, you can record from/to any point using either the Transport controls or keyboard equivalents. Nondestructive playback parameters for recorded MIDI data on a given track can be defined using the controls in the upper left portion of the Arrange window. Parameters include Quantize, Loop, Transpose, Velocity, Dynamics (which operates like a compressor/expander), Gate Time (which modifies the duration of the sequence's notes by a specific percent) and Delay.

Recording audio tracks involves a similar process. Select an audio "instrument" from the list of track names as determined by your Digidesign hardware setup and de-

fined from your Environment setup. (For example, Pro Tools users can have up to 16 record/playback tracks; Session-8 users can have up to eight. Quadra A/V and PowerPC A/V support is expected first quarter 1995.) Then, when you enter Record mode, an Audio Record/Returns window will automatically open, allowing you to select your audio inputs and levels.

Double-clicking on a recorded audio track in the Arrange window opens up the Sample Edit window for that audio file. Here is where you'll find some of Logic Audio's most powerful features. Aside from the functions you might expect in a sample editor, such as Normalize, Invert, Silence, Fade In/Out, Reverse, Trim and Sample Rate Convert, there are several other pleasant surprises.

If you want a MIDI/digital audio sequencer that takes full advantage of the Mac point-and-click style, and is loaded with every bell and whistle imaginable, you won't be disappointed by Logic Audio 2.0.

The first, Time and Pitch Machine, is an excellent time compression/expansion and/or pitch shifter, allowing you to independently select the desired amount of either. I imported a 60-second mono Sound Designer II file, and pitch-shifted it up by 12% without changing the duration. It took about 15 seconds on my Quadra 650, and it was *free* of artifacts.

The second function is called Groove Machine, and it is designed to create a swing feel from a selected region of audio—typically, one or two measures—based on either eighth notes or 16th notes. You can add up to 70% swing to a file (50% is equivalent to even eighths or 16ths). And it works great! The last two features—Audio to MIDI Groove Template and Audio to Score—create MIDI templates based on user-definable variables from rhythmic passages, and *create actual music nota-*

tion from audio files. This last feature is recommended for use only on clean mono files. I tried it on a file with four kids singing a nursery rhyme, and the result was acceptable with a little additional editing. With a well-played piano part, the results were still mixed. Without spending a lot of time tweaking the parameters, I'm guessing I could have made an accurate translation. By the way, Logic Audio lets you perform these, and all other sophisticated audio operations, *while the file is being played*. This interactive aspect of the program is a big plus and is implemented in the MIDI part of the program as well.

EDITING SEQUENCES

Back to the MIDI part of the program. Each track can contain one or more sequences (MIDI and/or digital audio). Logic Audio also lets you group sequences into folders (which is Logic's name for subsequences) within the program. Any combination of folders and sequences can be packed into another folder and placed on a track. There's no limit to the amount of such nesting. Double-clicking on any MIDI sequence opens up the corresponding Score window (Fig. 3). Option-double-clicking opens the Event List window, and option-shift-double-clicking opens the Hyper Edit window. If you want to group several sequences together into a folder, you use the Arrange window's "pack folder" command. If you double-click on a folder, you will then see an Arrange window with the sequences in that folder. EMAGIC advertises this architecture of nested sequences and folders as a flexible way of working with files, one that overcomes the "rigid" methods of other sequencers. My view is that it's a bit confusing, but perhaps the old saying, "You can't teach an old dog new tricks" applies here.

Meanwhile, in the Arrange window, the toolbox (Fig. 1, left) includes the normal pointer; the pencil tool, used to create empty sequences; the eraser tool, used for deleting objects; the text cursor tool for renaming objects; the scissors tool for cutting up sequences and folders; and the glue tool for merging same. Solo, mute and zoom tools round out the toolbox.

As previously mentioned, the program is easily customizable to the user's preferences, allowing for recallable window combinations (called

screen sets) that are interactively linked: edit a note in one and it changes in all the others. It's also possible to have multiple files open (a rare quality in a Mac sequencer), and the screen sets make it easy to copy and paste between them.

CONCLUSION

This professional package is loaded with features, and I'll just mention a few more examples: You can create transposable chord symbols and guitar tablature; you can automatically arpeggiate chords in real time; you can create delay line objects; you can import QuickTime movies and sync them to your sequence; you can simultaneously scrub audio and MIDI; you can mix down an unlimited number of "virtual" audio tracks; Logic Audio supports Lexicon's Nu-Verb; the list goes on and on. I didn't try printing out any notation parts, but I was impressed with Logic Audio's ability to accurately display music notation on screen. I know of several Hollywood composers using this feature to print out usable parts for session musicians.

The only feature I wanted and couldn't find was a "Record on Trigger" mode. Logic Audio supports only count-off mode (and, of course, auto punch-in). Aside from that, I can only fault Logic Audio for trying to do everything; the net effect for the new user is intimidating. And the manuals, aside from the occasional inaccuracies, are not designed to get a new user up and running quickly; I found I had to do a lot of jumping around just to get the answer to simple questions. EMAGIC also supplies an instructional videotape that deals only with the MIDI aspect of the program; it was somewhat helpful, if overly cute. Technical support is good, but you can count on having to wait for a call-back.

If you want a MIDI/digital audio sequencer that takes full advantage of the Mac point-and-click style, and is loaded with every bell and whistle imaginable, you won't be disappointed by Logic Audio 2.0, which, by the way, is priced at a very reasonable $699. But if you're like me, you won't find that learning this complex program is a trivial task. Prepare to spend some serious time getting up to speed before you try using it with a paying client.

EMAGIC, P.O. Box 771, Nevada City, CA 95959; (916) 477-1051. ■

Stocking Stuffers

TEN PRO AUDIO GIFT IDEAS FOR UNDER $50!

by George Petersen

If you're like me, you probably detest the holiday gift-shopping routine. The process becomes even worse if you procrastinate—something that I, of course, would *never* be guilty of—and rush around at the last minute, looking for something that's "just right." Well, if you have any audio engineers on your list, you're in luck: Here are ten affordable suggestions (listed in no particular order) that should please nearly any sound person.

DIGITAL CABLES

Many people unknowingly use everyday microphone or phono cables for digital audio transfers. The digital audio bitstream includes frequencies well into the megahertz range. Cables designed for analog audio can't handle these high frequencies, which can result in garbled data, dropouts and mysterious pops or clicks. High-quality digital transfer cables are a necessity; Apogee's Wyde Eye cables do the trick and are priced right, ranging from $19.95 (0.5-meter long) to $49.95 for a 10-meter model. All are available with your choice of XLR (110-ohm AES/EBU), 75-ohm RCA (S/PDIF coaxial), or BNC word clock connectors. Apogee Electronics: (310) 915-1000.
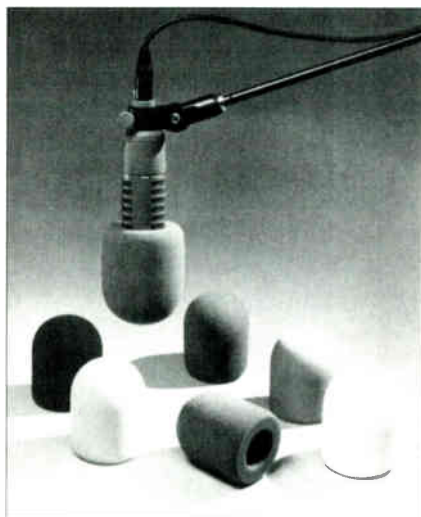
WINDSCREENS

WindTech has expanded its product line to include 11 series of screens in 19 colors. Made from hypoallergenic, open-cell foam, these -30dB LF-attenuating windscreens are available to cover virtually any pro microphone currently available, as well as many older models. The 20/421 model ($39.95 retail) fits the E-V RE20, Neumann U87, AKG C414, Audio-Technica 4050/4030, Sennheiser 421 and other large-diaphragm models. Just out is a line of shotgun mic screens and some way-cool $5.95 tie-dye models that fit Shure SM58s. Olsen Audio Group: (602) 998-7140.

VIDEO TIPS

Hosted by producer/engineer Tom Lubin, "Shaping Your Sound" is a five-tape, 6.5-hour video series covering the basics of recording and mixing, from a practical, hands-on approach. The tapes include "Reverb & Delay," "Equalizers, Compressors & Gates," "Mixers & Mixing," "Microphones" and "Multitrack Recording." Individual tapes are $29.95, or get all five for $99.95. Available through Mix Bookshelf, (800) 933-9604; or First Light Video, (310) 558-7880.

POP FILTERS

While we're on the subject of pop suppressors, I recommend the Poplesss VAC (Variable Acoustic Compression) system. It's a clever arrangement that allows the user to vary the distance between two microphone screen filters (from ⅛ to ¾ inch apart) to achieve the proper combination of pop protection and sonic transparency. The $32 system includes two screens (3.5- or 6-inch diameter) and a ball-socket swivel mount that attaches to any mic stand. A system with 15-inch black gooseneck and mic clamp is $54. Priced right, VAC is a simple, versatile and elegant solution to those pesky pops. Best of all, it works. Poplesss Voice Screens: (800) 252-1503 or (914) 255-3367.

CABLE SLINGSHOT

Sound installers need specialized tools. The Sling-a-Line™ wire puller ($39.95) combines a Baltic birch slingshot with a fishing reel and ⅜-ounce lead weight. To run cables over suspended ceilings or beams, forget ladders: just push the release button on the reel, shoot up to 125 feet of fishing line over the beam, attach your cable to the weight and reel it in. Not recommended for use with glass ceilings. Labor Saving Devices: (800) 648-4714 or (303) 232-6341.

STUDIO BUSINESS FORMS

This binder of slick-looking track sheets (four to 32 tracks), invoices, booking orders, cue/setup sheets, inventory logs, schedules, tape box labels and studio contracts will do more for your facility's image than a fancy leather couch in the upstairs lounge. Besides, at $39.95 (in paper or Macintosh PICT file formats), it's a lot cheaper. Just attach your logo to the forms, drop them off at your local PIP printer, and you'll have all the paperwork you need for that next Sting session. Available through Mix Bookshelf, (800) 233-9604; or Patten Sound, (818) 287-7424.

DATRAX

Storing all those DAT masters can be a problem, and Bryco's DATRAX offers a solution. The company has a line that includes sturdy, nylon DAT carry cases with capacities of 8, 16 or 40 tapes, priced from $13.95 to $39.95. A 40-tape wall-mount or table-top storage unit in industrial gray plastic is $21.95. If you have major storage needs, a 320-DAT, four-drawer storage chest is also available. Bryco: (310) 305-0317.

REFERENCE/TEST CDS

Bargain priced at $14.95, the *Mix Reference Disc* has recorder alignment tones, tuning notes, ⅓-octave bands, 20 minutes of 30 fps SMPTE time code, a speaker phase test, dry instrumental performances (for auditioning signal processors), sine and square waves, digital black and more. Mix Bookshelf: (800) 233-9604.

The *Studio Test Disc* CD from Masterfonics offers reference-level tones for A/D and D/A calibration, analog tape deck alignment tones, spot and sweep frequency response tones, positive polarity pulses compatible with popular phase-checking devices, pink and white noise, phase tests and signals for testing digital meter accuracy. Also included are 45 original Wendel Jr. drum samples (digitally transferred from Roger Nichols' masters) and 30 minutes of SMPTE time code at 29.97 and 30 NDF. Easily worth double its $25 price tag. Masterfonics: (615) 327-4533.

THE MIX COLLECTION

Need something that really impresses, but don't have the cash to lay matched pairs of U47s on your loved ones or associates? Then try *Mix*'s "Great Studios of the World" calendar, a steal at $9.95; a *Mix* T-shirt at $12.95; or the slammin' *Mix* hat, which looks stylish worn front-facing or backward. You can't lose. Mix Bookshelf: (800) 233-9604. ∎

by Mark Frink

SoundCheck

NEWSFLASHES

Cadac Electronics launched its new Concert "live" board at the San Francisco AES show. Designed for sound reinforcement, Concert's key features include the ability to reset all switch facilities instantly, complete manual status recall of knob settings, and a sophisticated computer system with extensive control of MIDI. Standard specs include Cadac's own motor faders and a total of 40 group outputs: 12 subgroups, 12 matrix groups and 16 auxiliary groups. Each channel has direct outs as well as two inputs, both of which can be on at the same time. The console's design allows for modules to be freely removed or inserted without the need to power down. All switch functions are set from a Central Assignment Module and are stored, together with knob and fader settings, in the computer. All switch settings can be reset with a single button, while knob positions are recalled manually via an LED nulling system...Bag End's ELF System is being used by the Billy Dean Band to augment their Future Sonics in-the-ear monitors. Bass

Cadac Electronics Concert board

player Kenny Lewis and drummer Tim Hedge had problems with hearing the lows, and engineer Craig Hoerig was pretty adamant about getting something to reinforce the low end because they roll off at 120 Hz. "We tried double-18 subwoofers and were not happy with the sound. We contacted Dave Shadoan of Sound Image in San Marcos, CA, and he recommended trying the ELF technology, which they've been using in their main P.A.," Hoering said. He's using one small BE-18-E enclosure right on the stage. "The punch is there, but not like you'd expect from a wedge; more like a good, home hi-fi."...Thirty-two engineers from 25 different companies, including Altec, Apogee, Crown, EV, JBL, Shure and Yamaha, met in Seattle for a three-day, intensive conference to learn about Lone Wolf Corporation's new MediaLink Development Tools. This software and hardware package allows each company's R&D department to work at its own pace on new product development. International attendees included Australian Monitor, Adamson, Lab.Gruppen of Sweden and TC Electronic of Denmark. The next MediaLink Development Tools conference is scheduled for mid-

February. Interested equipment manufacturers and third-party developers should contact product manager Mark Schulz at (206) 728-9600. ∎

QUICKTIPS

Foam windscreens used as "pop filters" can help the percussive breathing effects of close-miked vocals if condensers or especially dynamic microphones with heavy proximity effect are being used. These $3 accessories can reduce "P-popping," and they offer some other benefits. They are visually more acceptable for live work than the alternative: the nylon filters used in studios to relieve the mic's sensitivity to breath. Many engineers and singers already prefer to consistently use a foam windscreen in live performance. Traveling singers who don't carry their own mic should also consider that carrying a foam windscreen prevents lip contact with strange foreign matter in the microphone grilles found in some house sound systems' inventory. Singers can maintain a consistent distance from the capsule by resting their lips on the foam without having direct contact with the grille. It also can help the quality of vocals on live recordings. Colored windscreens are an additional advantage at festivals or with wireless mics to keep track of the different mic positions onstage. A further benefit is that they can offer some protection from electrical shocks when playing electric guitar and using wired mics. ∎

Thanks to Adam Blackburn of Blackburn Digital, NYC, for the tip!

by Mark Frink

BARBRA STREISAND LIVE

Clockwise from top: Barbra; Clair Bros. crew chief and monitor mixer Jim Devenney at the Harrison SM-5; tour sound designer Bruce Jackson at the custom Clair Bros. CBA 32 console, which he co-designed.

PHOTO KEVIN MAZUR

PHOTO COURTESY OF APOGEE ELECTRONICS

When Bette Midler returned to Las Vegas after an 18-year absence, she lost no time letting the barbs fly. Following a ballad, she told the audience, "I wish I'd brought my carpet like the other Jewish girl."

The now-infamous carpet gained notoriety in the press as a symbol of Barbra Streisand's extravagant touring production. Streisand's return to the concert stage was one of the landmark concert events of the past year. It began last New Year's Eve with two shows at the MGM Grand in Las Vegas, with tickets going for four figures, setting new marks for entertainment prices. Not only was there a 64-piece orchestra conducted by Marvin Hamlisch, there were as many as 20 copyists on hand, making changes to the scores as necessary. The show went on to tour London, New York, Washington, D.C., Detroit, San Jose and Los Angeles.

Contrary to the British tabloid assertion that Streisand demanded carpet because Wembley Arena was "draughty," the carpet was installed in all arenas on the tour on the recommendation of sound designer Bruce Jackson to calm the room reverberation (drapes were also hung to improve the sound). Called out of semi-retirement at Streisand's request, Jackson is the founder and head of Apogee Electronics, known for its reference digital converters and UV22 Super CD Encoding system. Jackson is also a veteran of many years of concert sound engineering, working with Elvis Presley and Bruce Springsteen, to name just two. Clair Brothers

of Lititz, Pa., won the bid to provide the system.

"One goal on this tour was to put together a team of highly skilled engineers to deal with the massive task at hand," Jackson explains. The combined experience of the crew reads like a who's who of sound engineers, and the complexity of the mix demanded a sophisticated division of labor to sort out the extraordinarily large input list.

The show's 111 inputs were distributed with four 40-channel snakes, using Clair Brothers iso-transformer splits and Audio Auto-Formers,™ which end up trading level for lower effective microphone output impedance (see sidebar). Two of the splits went to the two monitor consoles, one to the remote truck, and the directs went to the FOH mix console. Fred Vogler submixed the strings for the house and orchestra for the monitor positions in a separate acoustically treated and isolated room (sometimes the visiting team's locker room) on two consoles, using a pair of ATC monitors. Ed Greene engineered the TV sound in Vegas and Anaheim from his TV truck. Dave Hewitt and Randy Ezratty's trucks were used for the recording of the CD, with Hewitt engineering on the East Coast and Shawn Murphy engineering from Las Vegas. Dave Reitzas took the recordings through the post-production and mixing process, with Streisand and Jay Landers producing the resulting double-CD, which is now out.

All the close string mics were mixed on a Yamaha PM4000 to

Many Mics, Many Consoles

Microphones can see heavy impedance loading when simultaneously routed to many console inputs. Additionally, long snakes connecting the house console, two separate monitor consoles, orchestra and string mix consoles in an isolated room, added to TV audio and recording trucks, can cause excessive capacitive microphone loading (rolling off the highs). Many mics are sensitive to these loads, with the sound noticeably changing as the load drops under 1,000 ohms. Many mic manufacturers, meanwhile, have developed transformerless designs. This approach saves money and eliminates the restrictions that less expensive transformers (sitting behind the capsule in the mic) place on the frequency response and overall "sound" of the microphone. These transformerless designs are often much more load-dependent and have much less sonic stability as the load gets lower, such as when they're fed to this many consoles. Even a single console with an input impedance of 1,000 ohms will sound different from one with 3,000 ohms using the same mic.

As far as trading a few dB for a much better impedance level, we solved this in a number of ways. First, we lightened the load of each console by using build-out resistors on each split of the transformer splitter box. These are Clair Brothers three-way splitters with 1-to-1 turn ratios, causing the load of the individual consoles to load the mic as if they were all in parallel—something quite often misunderstood about splitters. The build-out resistors (small value resistors in each leg) trade a few dBs of level for a higher microphone load impedance from the console.

And for microphones that would have a problem driving this higher load impedance, we used a new invention from the Clair Brothers design department—the Audio Auto-Former.™ This device appears to lower the effective microphone output impedance by a factor of nine times. And, when looked at from the other direction, it appears to raise the console and wire load to the mic by the same factor. For example, a total console load of 500 ohms looks like a 4,500 load to the microphone. Or a 6000-ohm microphone output impedance looks like 67 ohms to the wire and consoles. The Audio AutoFormer is a passive impedance-matching device with a somewhat constant -7.5dB insertion loss. Most of the mics in question that need help are of a higher impedance as a result of attempting to get higher level from them, so the insertion loss does not present a problem. By the way, the device passes phantom power and line-level signals without problems. Using this method, any microphone can see a "happy" load of more than 1,000 ohms, while the console farm is driven with just a few hundred ohms or less.

Finally, in Madison Square Garden, the recording trucks are too big to bring up the ramp, so they had to park in the street. The multipair snake run is 750 feet. To remove this nasty capacitive load from each mic, Dave Hewitt put dozens of stereo mic pre's from GML, API and Millennia Media at the top of the ramp, behind the stage. That way we didn't have the capcitance of 750 feet of microphone cable hanging off each microphone. Instead it went into the preamps, which boosted it up to line level, and the internal line amps comfortably drove the signal all the way to the truck.

The result is clean, clear, undistorted mic inputs, making a noticeable improvement in sonic transparency.
—*Bruce Jackson*

send as sectional submixes to FOH as well as to the monitor consoles and the truck via a dedicated submix snake. The string section consisted of ten first and eight second violins, six violas, eight cellos and three basses, each using its own Sennheiser internal Soundlabs microphone. There were also 12 AKG 451s with "elbows" used as ambient string mics and sent to both the truck and to the FOH console. Vogler also mixed additional orchestra submixes on a Clair board for the two monitor positions and the remote truck. Six audience microphones were also going to the truck: two Sennheiser MK-416s at each side of the stage and two Countryman 101Hs at the front of the stage. In spite of the high number of condensers and interconnections, Jackson says, "Amazingly, there was not one hum or buzz during the whole tour and only one 'thumping' condenser during a rehearsal, which was quickly found."

Jim Devenney, Clair's crew chief and monitor mixer for Streisand, is also a Springsteen and Elvis veteran and has worked closely with Jackson over many years. He mixes on a Harrison SM-5, using a Lexicon 480 for the vocal and for the orchestra. The only dynamics he used were dbx 903 compressors for the orchestral submixes he received from Vogler. I caught up with Devenney just after he finished performing monitor chores for Bette Midler's tour. "[The Streisand tour] was a very educational experience," he says. "It expanded our knowledge of sound, and we all learned to listen in a different way than we would for other kinds of music."

During early meetings with Streisand's manager, Marty Erlichman, and agent, Rob Light, Jackson was told that Streisand hadn't liked the sound of monitors since the 1960s. Jackson quickly identified that the monitors of the '60s had essentially all cones, i.e., no compression drivers or tweeters. Jackson says, "I've learned to live with compression drivers as a necessary evil in my work on the road. I did get considerable experience with soft-dome recording studio monitors when Apogee imported Quested studio monitors about seven years ago. I loved the sound of those things—smooth and clean. So I talked to Roger [Quested] and came up with a design for an all-cone monitoring system for Barbra. The custom three-way wedges were finalized and built for Streisand by Clair Bros. for Las Vegas. Clair selected a TAD 15, an ATC soft-dome midrange and a Morrell tweeter in a custom low-profile package. These were powered by Crest 1004 on the lows and mids and a Crest 7001 on the highs."

"These wedges were power-hungry, and she used every bit of those amps at times," Devenney says. Jackson adds: "I'd be surprised if this soft-dome monitor approach doesn't catch on in a big way once people hear how good they sound. The down side is that they don't get as loud or cut through like horns."

The crossovers were Clair/EV XEQ3s with Clair Bros. custom band-correction filter shapes, and dbx 160s were used to "brickwall" the low- and mid-band outputs. The prototypes used in Vegas were built into CBA 115 enclosure shells, and the low-profile enclosures were built for the tour. A stereo mix of six alternating left-right wedges was used across the front of the stage with another mono mix behind Streisand, as well as a mix at each side stage and a mix at the entrance at the top of the set.

Live bit in New York City.

Don Garber was the system technician, hanging speakers, adjusting the delays and walking the room for Jackson. The main system comprised 56 speakers, hung in alternating left-right blocks on eight 8-foot bumper bars, using the X model S-4 speakers with the new low-Q, double-driver waveguide, except for the wider-dispersion F-1 version, which was used on the bottom row. HR 15s were hung from the downstage lighting truss, and eight R2 speakers

were built into the front of the stage for front-fill. The 16 S-4s used for delay speakers were hung on five bumpers, with the bottom row being six more F-1 versions. At the very rear of the room were the "afterburners," banks of 16 JBL delayed tweeters on Clair tweeter horns, as seen on Springsteen tours. "Some speaker manufacturers will tell you they have figured out how to get high frequencies to travel all the way from the front to the back of large rooms," Jackson comments, "but I'm not aware

Some speaker manufacturers will tell you they have figured out how to get high frequencies to travel all the way from the front to the back of large rooms, but I'm not aware that they've managed to change the laws of physics yet.

—*Bruce Jackson*

Streisand likes to hear herself as a balance of the direct stage sound and the more reverberant sound coming back from the house. Prior to soundcheck, Devenney and Jackson would sort out the blend and balance the monitors and house together at the stage.

A Cetec Vega Dynex II wireless with a Shure SM87 capsule was chosen for Streisand's vocal microphone after extensive listening and handling tests of many different makes and models for looks, feel and sound. "The pattern and response of the 87 worked much better than the Beta 87, and the Vega performed flawlessly, with the spare never being used other than to put in a fresh battery for each show," says Devenney. A wireless Sennheiser lavalier was available for Mike Myers' *Saturday Night*

that they've managed to change the laws of physics yet."

Stage technician Chris Bishop was responsible for all the inputs onstage. The rhythm section included drums, electric and upright bass, two guitarists, piano/synthesizer and Synclavier players. Kit microphones included AKG 460 condensers on the cymbals, Sennheiser 409s on the toms, an SM57 on the snare, and drummer John Robinson's personal AT STM 25 mic was used in the kick drum. "On the nights we had the remote truck, Shawn Murphy and Ed Greene suggested we use Schoeps mics for string overheads, and they were a big improvement," Jackson says. "If I were to do it again, I would use them for overheads all the time." Each guitar used a Countryman DI as well as a 441 and a 57 on the electrics.

The piano was miked with two Sony C-48 microphones and the Barcus-Berry piano transducer with the lid closed and blanketed. "The Barcus sounds so much better than I remember the early models and nicely fills in the middle of the stereo piano image," Jackson comments. In the percussion section, three AKG 414s were used for percussion "toys"—vibes and glock—and Sennheiser 441s, 421s and 409s were used on everything else, from timpani to bongos. In the winds section, Milab 96s were used for four French horns, AKG 460s for six reeds, Beyer 160s for four trumpets and tuba, and 421s on the four 'bones. The harp used both a Barcus-Berry pickup and an AKG 460.

Randy Weitzel mixed monitors for Marvin Hamlisch and the orchestra rhythm section on a PM4000 with Yamaha REV5s for reverb. Aphex Dominators and Crown D-75s provided hardwired, in-the-ear monitoring for the rhythm section, with some musicians using Future Sonics ear molds and others preferring Sony MDR-6 headphones. The only speaker in the entire orchestra was a small Fostex used for Randy Waldman at the piano. Mixes for the rest of the orchestra were provided from Devenney's console, with some of the orchestra musicians using Sony MDR-3 Walkman-style "ear bugs."

Chris Taylor, who has previously mixed Michael Jackson and Amy Grant, operated the FOH Yamaha PM4000, mixing drums, percussion, brass and reeds into submixes for Jackson's console, using a two-machine TC Electronic M5000, as well as Lexicon 480, 300 and PCM70 reverbs. Jackson's Clair board also took string submixes from Vogler's orchestra submix location.

Another innovation Jackson developed was an oversized Teleprompter positioned at the FOH mix that could be seen from stage. It used a high-power, liquid-crystal Barco TV projector reflected off a mirror and onto a large pane of glass. The audience looking through the glass saw only the stage, whereas Streisand looking back saw her lyrics superimposed over the audience. This technique was able to save hundreds of otherwise blocked sight-lines and millions of dollars in ticket revenues over the tour.

All the shows were recorded on Panasonic 3700 DAT machines using Apogee archive-quality DATs, of course, an Apogee AD 500 converter and an Apogee UV22 20-bit encoder. Jackson and Taylor took great care to make high-quality stereo mixes, which were synched to video for playback so that Streisand could review the show each night. These mixes included an AKG 460 coincident pair for audience ambience at the mix position, in addition to the stereo pairs on each side of the stage. Jackson adds that Streisand enjoyed hearing the life and ambience of the room on the DAT and video soundtracks, as it matched her experience onstage.

"Taking a break from Apogee and jumping back into the combat zone of live sound was quite a challenge and I had a lot of fun, but I'm glad I don't have to do this every night," Jackson says. ∎

Mark Frink is the Mix *sound reinforcement editor.*

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Al Di Meola: Painting Colors With Sound

by Blair Jackson

It's been 20 years since guitarist Al Di Meola burst onto the music scene—already a fully formed talent it seemed at the time—in the groundbreaking fusion outfit Return to Forever. Since those heady early days, he's recorded 14 albums as a leader, as well as two with John McLaughlin and Paco De Lucia, and carved out a reputation as one of the most versatile and imaginative players around. Along the way, he's touched on countless styles of music, from rock
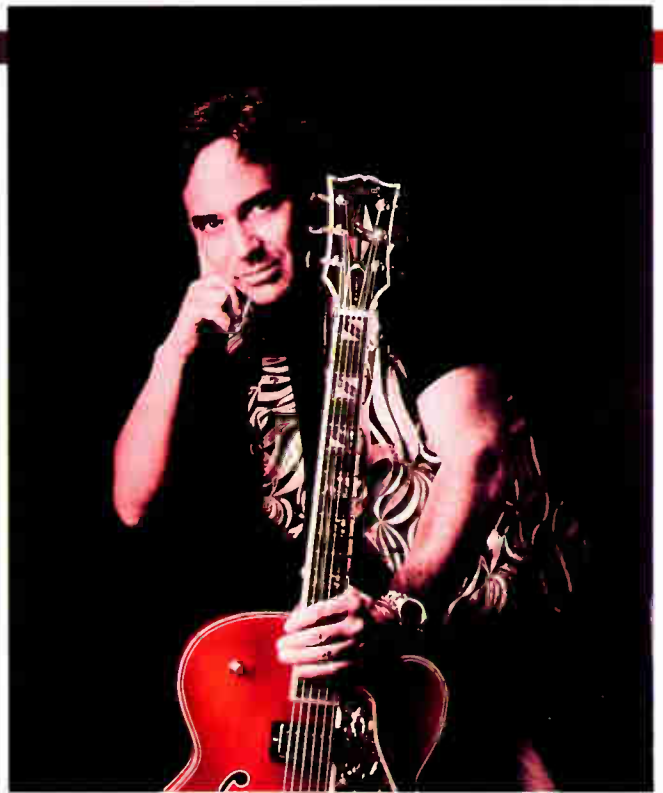
Matthew La Monica

to avant-garde to tango. No matter what he plays, though, Di Meola will pro-

bably always be labeled a "jazz guitarist" by most; certainly it's in his roots and his approach, and he's played with some of the heaviest jazz cats through the years. But since the mid-'80s, when he teamed up with Airto Moreira for the Brazilian-influenced *Soaring Through a Dream*, much of Di Meola's music has been an intriguing blend of different world music styles.

Three years ago, Di Meola put out the acoustic

World Sinfonia, which he described as a "very South American-European mix of classical jazz-tango improvisation with Middle Eastern overtones." That same year he released the very electric *Kiss My Axe*, and now his new record, *Orange and Blue*, fuses his electric and acoustic fretwork in a showcase of lyrical playing across many different genres. Once again, there is a heavy South American influence, this

"The Lion Sleeps Tonight"

by Blair Jackson

This month *Mix* inaugurates a new regular feature in our "Recording Notes" section—Classic Tracks—in which I'll look behind the scenes at the recording of famous songs from different eras.

Originally, I thought I might open Classic Tracks with some heavy Beatles

or Stones tune, but a funny thing happened on my way to doing #1: I saw the Disney film *The Lion King* (twice) and re-fell in love
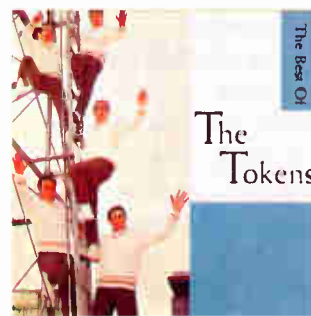
The Tokens

with "The Lion Sleeps Tonight," a mere snippet of which is sung by the gruff but lovable warthog Pumbaa and his wise-cracking meerkat buddy Timon in the film. When the original version by The Tokens was re-released this past summer, I bought a copy for my *Lion King*-obsessed 4-year-old son, cranked up the big speakers in my living room and was immediately blown away by how cool the arrangement and the recording of this 33-

John Oswald "Plunders" the Grateful Dead's Tape Vault

by Blair Jackson

Controversial Toronto-based producer/composer John Oswald has made a career of slicing up other people's music (sometimes without their permission) and reassembling it in unusual and inventive ways. He's an aural collagist, a musical Robert Rauschenberg, if you will, who creates bold, original compositions out of familiar elements.

Oswald calls his editing/processing/sound manipulation techniques Plunderphonics, and over the past decade he's tackled some of the biggest names in the business: the Beatles, Michael Jackson (the only one to threaten a lawsuit), The Doors, Metallica and Sonic Youth, to name several. (Actually, my favorite is his brilliant "re-creation" of the Fourth Movement of Beethoven's 7th Symphony on the original *Plunderphonics* disc.) Then there was 1993's *Plexure*, which contained fragments of 5,000 different pop songs. Oswald's art is radical and irreverent (and in many cases in clear violation of copyright laws), so it's not too surprising that he eventually caught the attention of rock's original sonic rebels, the Grateful Dead, who happily opened up their famed tape vault to this marauder.

Oswald's latest plundering is called *Grey Folded* (get the pun?), and it consists of parts of more than 50 different versions of the Dead's best-known improvisational vehicle, "Dark Star." Written as a three-minute song in late 1967, "Dark Star" evolved through the late '60s and early '70s into a mammoth piece that often stretched to over half an hour of
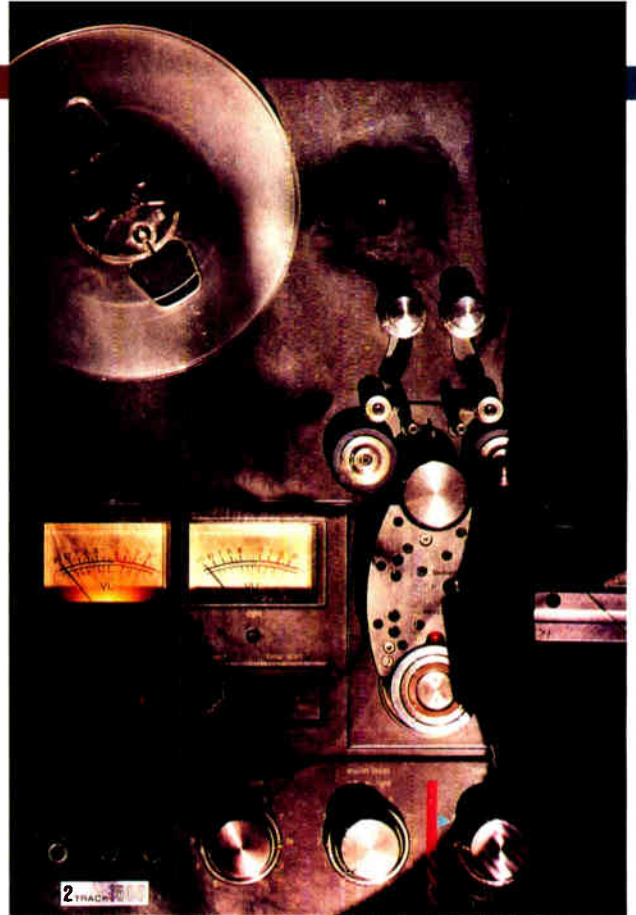
Quad Oddity
A HISTORY OF NEUMANN'S QM69

by Jeff Calder

The Neumann QM69 was developed in 1972 to accommodate the anticipated demand for quadraphonic recording. The QM69 was essentially a modification of the SM69, Neumann's classic stereo microphone. Although stereo recording methods had been developed in England as early as 1931, the first commercially available "coincidental" stereo mic was the Neumann SM2, introduced in 1957. A small capsule mic, the SM2 was replaced by the more flexible SM69 tube model, evolving into a solid-state instrument by the early '70s.

When Neumann leapt into the quad fray, designer Gerhardt Bore simply converted the SM69's two-times variable pattern to four cardioid capsules and created the four-in-one QM69. The QM69 is a four-times cardioid version of the SM69, with four sepa-

Neumann QM69

rate amplifiers. Its two 067 dual-membrane condenser capsules are arranged with a rotatable upper pair above a stationary lower pair. Each head-grille is color-coded (green/red/yellow/blue) and assigned the following directions: left back, right front, left front, right back. The QM69 has the same power supply (NQ69) as an SM69 with two additional outputs.

According to G Prime Ltd./Microtech-Geffel's Jerry Graham, an unofficial Neumann historian, the original QM69 had the SM69-like head-grille mounted on a bar from which two SM69-style bodies descended, forming a "pi" shape. Graham estimates that only 50 of these double-body mics were manufactured the first year. After that, the QM69 became the more conventional single-body mic pictured here.

Neumann literature described the QM69's directional diagram as "cloverleaf," though it's perhaps better described as four-times cardioid. It noted the

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RIK TINORY:

CARVING OUT A NICHE IN BOSTON

by Dan Daley

"Boston gets a trend going about once every five or ten years; in between, things can get pretty dead," says Rik Tinory as he handles the wheel of his Olds Calais through city traffic. "But in all the time I've been in Cohasset, I've never had a bad time of it."

Cohasset, Mass., is 35 minutes south of downtown Beantown and a million miles away in terms of ambience and pace. Pricey frame homes line the rocky seacoast, vulnerable to the fury of Nor'easters and a testament to the stark beauty of the

Rik Tinory

place that keeps residents there in spite of the elements. A few miles down one winding road is Tinory's house and its attached recording studio. The place gained notoriety in 1988 when local heroes Aerosmith chose it as a home base for production of their Grammy-winning, multi-Platinum album, *Pump*. Located within a few miles of their own homes, the band members commuted to Tinory's virtually every day for 15 months as they and producer Bruce Fairbairn, Geffen executive John Kolodner, and writer Desmond Childs plotted the band's return to the top of the charts. "I wasn't just the studio owner, I was also the security guard," Tinory explains. "I had a couple of girls from Canada actually walk right into the house looking

for autographs. But incidents [like that] are rare, and security is tight."

One might suggest that being the only studio in the immediate neighborhood has helped Rik Tinory Productions. But Tinory points out that his proximity to Boston puts him squarely in that market and that those studios' attrition rates have been high over the past several years. "It's a matter of being someone who has experience in the business and who can anticipate what a client wants," he explains. "It's not just who has this or that console or this or that outboard equipment."

Tinory's own experience is diverse and almost Zelig-like—he just seemed to be there when interesting stuff was going down. As a young bebop drummer, singer and gig musician from Boston's South End area, he was playing with a quartet in a club owned by some local hoods who one night decided that they only wanted to pay for a trio. "I learned very fast to sing that night," he recalls. That led to a career as a recording artist, with a few pop records in the 1950s and 1960s on the Venture label, supervised by a then-up-and-coming producer, Joe Smith, former head of Warner Bros. Records. Then Tinory went to Amy-Mala Records, owned by bandleader Sammy Kaye, and, finally, to United Artists Records working with Don Costa, head of A&R.

Rik Tinory Productions opened in the early 1960s when Tinory decided to settle down and raise a family. He chose Cohasset for its beauty and

solitude. "It doesn't matter where the studio is, as long as it's run right," he says. The studio relocated a few hundred yards to its present location in 1979.

Tinory has never been a slave to technological fashion. His main criteria for choosing equipment has been cost-effectiveness. The studio is a 30-by-60 room with a customized Soundcraft Series 1600 console with Penny & Giles faders and both ¼-inch and ½-inch Ampex 2-track decks, a more recent Sony APR-24 multitrack deck, two Panasonic 3700 DATs sandwiched in between, and a rather remarkable collection of older microphones and signal processors.

The one consistent aspect of his studio in both locations has been his use of 3M tape. Two temperature-controlled closets, next to the outboard rack, reveal old reels of Scotch 111, 201, 206, 207 and 209 formulations, holding recordings from as far back as 1955. "I still can put them on the deck and they sound as good as the day I recorded them," he says. "I was the first 3M user in New England." These days he favors 3M's 996, and it was that tape he used for pre-production on Aerosmith's *Get a Grip* LP.

The studio has carpeted walls and a sizable control room. The two isolation booths have inherent mid-range reflections that proved to be perfect for Aerosmith lead singer Steven Tyler's voice. The basement served as the guitar room for Joe Perry's Marshall amp stacks, with lines run from beneath the console to microphones scattered about the concrete-walled area.

Tinory's studio has hosted the gamut of musical genres, from recordings by the late Alex Taylor and Tom Jones, to musical numbers by comedian George Burns, to jams by Jimi Hendrix, who played there with fellow musicians in the late 1960s. It was also used to mix Tinory's recording of Pope John Paul's address at Boston Commons during a visit in October 1979. The session on the Boston Commons was one of the world's largest, with over 850,000 in attendance. Thirty reels of tape rolled continually and were drenched with rain when a canopy flew off: "I spent 11 hours carefully drying the tape with a hair dryer, but they all played perfectly." He proudly displays the Gold album he made of the event,

time thanks to the strong presence of guitarist/vocalist (and co-producer with Di Meola) Hernan Romero and keyboardist Mario Parmesano, both from Argentina. But there's also a touch of France (drummer Manu Katche), Israel (vocalist Noa), Greece (vocalist George Dalaras), Palestine (violinist Simon Shaheen) and Puerto Rico (percussionist Gumbi Ortiz). Other players include Marc Johnson on acoustic bass and drumming giants Steve Gadd and Peter Erskine. Quite a cast.

The album started with a series of fairly elaborate demos cut in Di Meola's home studio. "What I basically did was record everything from scratch at home," the guitarist says during a rehearsal break at S.I.R. in Manhattan. "I have an Akai [A-DAM] 12-track and a Soundtracs Series 2000 board, some Schoeps mics, though for most of what I do I go direct. I lay out the tune from beginning to end to get a sense of what it will sound like when I take it into the studio and start adding parts." Di Meola worked with Romero and Parmesano from the outset, and their textural additions to the album are almost as prominent as Di Meola's.

Matthew "Boomer" La Monica, whose engineering credits include LPs by George Benson, Lyle Mays and Miles Davis (*Doo-Bop*), among many others, recorded the *Orange and Blue* sessions over a three-month period, primarily at New York's Power Station, where he was a staff engineer before going independent. "We used three different rooms there," La Monica says. "A, B and C. They have identical dimensions but different consoles: Studio A has a Neve 8068, which is the most incredible, fat-sounding board you've ever heard; I want to hug that board! B has an SSL, and C has a Neve VR." Some of the overdubs were cut at the Hit Factory in New York, and La Monica mixed the record on Manhattan Center's Neve VR with Flying Faders.

"Al told me going in he wanted a real natural-sounding record—nothing too overprocessed," La Monica states, "and that was my guide. We kept it pretty simple. Most of it was recorded without any EQ, and there were very few external effects; Al has a couple of very warm-sounding Lexicon 200 digital reverbs we used, one set short and one set long. We used a

TC [Electronic] 1210 stereo chorus for a few of the guitars, a TC 2290 digital delay to fatten a few things up, and that was about it. Occasionally, we wanted a brighter reverb than the 200 on the piano, so we rented a Lexicon 480. But, in general, we tried to approach this multitrack record with a minimalist approach."

Di Meola plays a slew of different instruments on the album—for example, on the beautiful opening track, "Paradisio," he plays a Gibson Di Meola jazz electric guitar; Kotolin, Ovation and Guild acoustic guitars; a Roland GRI synthesizer; and drums, cymbals and other percussion. On other tracks, he tackles the violin, Hawaiian string harp, Kurzweil piccolo flute, tablas and a few others. "For me, part of the writing process is going through different sounds to see what works and what doesn't," Di Meola notes.

"This is definitely more of a production-type album for me," he continues. "Most of my previous records I've gone in with a specific group. The benefit of working this way is you can bring in guest artists who are right for the moods and feelings you're going for. But on a lot of this album, I had very specific ways I wanted to hear things—like the cymbals or percussion—so I put down guide parts. Then I ended up keeping some of them because they turned out so well. It's a different way of working for me."

Most of Di Meola's electric guitar parts were recorded DI, through a Demeter tube direct box/mic preamp, but "there was also a lot of acoustic stuff," La Monica says, "and what we did usually was bypass the console, using a couple of really good microphones through quality preamps straight into the [Sony] 3348s. I used a Neumann tube 47 on the low end, about six inches away from the bridge, and a Schoeps DM5 cardioid condenser mic about six inches toward the neck, away from the soundhole.

"The 3348 has the ability to give you digital outputs on two tracks," La Monica adds, "so what we did on certain things was take a digital output from the 3348 and put it through Cello Music & Film Systems' Series 8.1 digital-to-analog converters [designed by Mark Levinson], bypassing the Sony converters. It made those parts sound a little more sweet, and it took out some of the harshness as-

sociated with digital. Also, they took the two-dimensional sound and opened it up so it was more three-dimensional."

After years of recording in dozens of different studio environments, usually producing himself, Di Meola has a fairly good grasp of what he likes and dislikes on a technical level. "I guess you could say I'm somewhat technical," he says. "I have ideas about what sounds I like, and I usually know how to achieve what I want to hear. The one thing I hate is mixing. I like to keep my ears fresh. I'd rather walk in and out of the room and give my ideas like that. I think artists who are in the control room every second turning dials and lifting faders can get too close to it all, especially their own instruments. I like to try to keep some level of objectivity, and also I want to put my trust in my engineer to the point where I can let him go with it. In the end, I just go with my instincts. I go with my gut and what feels right to me."

This fall, Di Meola and his band—which includes Romero, Parmesano, Ortiz, bassist Mario Rodriguez and drummer David Siliman—began a tour that will take them across America, then to Europe and South America over the next year. "This time it really feels like it's fallen into place," Di Meola says. "This is a great band." ∎

Blair Jackson is executive editor of Mix.

recalling that it took a week for him to be cleared by the Secret Service. "The security was so tight, they welded the manhole covers shut along his route," Tinory says.

"I'm the only studio in the Boston area that's been in constant operation for the past 30 years," he states proudly. That longevity is attributable to conservative economics ("I never overextended myself financially or bought what I couldn't afford to pay for") and adroit use of a lifetime's worth of networking. His first encounter with Aerosmith, for instance, came on New Year's Eve 1972 when a mutual friend who was managing them asked Tinory for his opinion of the band. The band arrived at his studio 16 years later; that connection paid off with nearly two

year's worth of bookings. And he expects them back for pre-production for their next project.

While such long bookings are rewarding, Tinory says that at the same time he'll keep using the studio as a base for his forays into music, local commercial productions and music publishing. One of his most recent projects, a tribute to the late Alex Taylor that he's producing with Barry Beckett, is clearly more about love than money. But the secret to his success lies, he maintains, in getting as much mileage out of the studio as possible and using it as a core around which multiple businesses are built. "A studio is more than just a place to make music," he contends. "It's a business tool." ∎

year-old nugget is. (When I owned the original single at the age of 8, I undoubtedly played it on my little mono record player, and, of course, I knew nothing about either recording or arrangement.) Though it never quite cracked the Top 40 during its 1994 re-release, "The Lion Sleeps Tonight" stayed on the *Billboard* Hot Singles chart for more than five months, an incredible feat for a bona fide "oldie."

The tune was derived from a Zulu folk song called "Wimoweh," which was popularized in the early '50s by South African singer Miriam Makeba and then covered by The Weavers on their live *Carnegie Hall* album in 1960. The Brooklyn-based vocal/folk group The Tokens were coming off their first hit single, the million-selling "Tonight I Fell In Love," when the successful RCA staff producers Hugo & Luigi (Hugo Peretti and Luigi Creatore) wrote English lyrics for "Wimoweh" (along with George Weiss) and brought the song to The Tokens.

"Frankly, at first we were embarrassed by the lyric," remembers Tokens lead singer Jay Siegel. "We wanted to sing 'Wimoweh,' but Hugo & Luigi and George Weiss came up with 'The Lion Sleeps Tonight.' After the [recording] date, a couple of the guys in the group were adamant about not releasing it; they didn't like it at all. I thought we should give it a shot. I felt it was so strange

always intense, completely improvised jamming, sometimes centered around the original song's very simple chord structure and rhythm, but more often than not breaking down into dissonant free-form chaos that drifted in any number of strange directions. Oswald masterfully overlaps and segues multiple versions of that song—from performances throughout the Dead's history—into a whole that is suprisingly coherent and still true to the original spirit of the piece. Actually, the one-hour *Gray Folded* represents only the first half of Oswald's "Dark Star" deconstruction (this one is called *Transitive Axis*, after two random words in the first verse). A second disc due out early next year, called *Mirror Ashes*, will complete the mammoth undertaking.

Interestingly, Oswald is not a Deadhead. He says he bought and loved *Live Dead* (which contains a spectacular 21-minute version of "Dark Star") when it came out in late '69, but he has not kept up with the band through the years. Still, he was interested enough to approach the group about the project. It was the Dead's bassist, Phil Lesh, a longtime supporter (both financially and through his syndicated monthly radio program, *Eyes of Chaos/Veil of Order*) of avant-garde composers, who gave the go-ahead to Oswald.

The project posed a number of problems for Oswald, not the least of which was the fact that the Dead's archives exist in so many formats. "It ran the gamut from stereo Nagra recordings done in an almost offhand way by one of their roadies [Kidd Candelario] from the side of the stage while he was also doing his regular job, to really clean mutlitracks," Oswald says. "Some of the older tapes were recorded at a very low level, and so they were very hissy. I'm not always keen on restoration, but in this case, I wanted

mic's capability to capture "4-channel information without any arrival time differences." In other words, the QM69 could circumvent the phasing problems associated with multiple mics placed in close proximity. "It was perfectly mono-compatible," according to Graham.

The QM69 was discontinued in December 1982, a decade after quad went poof. Neumann didn't stockpile them—they were made to order—so few are around today. With the exception of the KU80 binaural head mic, the QM69 was the most expensive Neumann of the early '70s, listing for $1,350. (By comparison, the SM69 was $1,158, and a U87 just $495.) At the time of its demise, the QM69 listed for $3,147, and, of course, today the quad oddity can fetch a high price on the vintage mic market.

The QM69 can be found in a number of contemporary applications. Peter Hubner, chief engineer at the Ambassador Auditorium in Pasadena, Calif., uses the QM69 for live radio and television broadcasts of classical and jazz events. Hubner has the QM69 on a motorized pulley system, hanging dead-center above the sightlines of the balcony. One stereo pair is rotated to face the stage; the other faces the audience. Because Hubner can't place the QM69 exactly in "the sweet spot," he sums it with omnidirectional PZMs on the floor. And at Southern Tracks Recording in Atlanta, the QM69 has been used as a stereo mic for piano—an ambient and overhead

World Radio History

mic utilizing its 4-output capability—and at a recent session for Swimming Pool Q involving ten kilted Scottish bagpipers marching around the studio perimeter.

So quad may be a dead issue, but there's still life in this classic mic! ∎

that it was either going to be Number One or nothing. A month later, it hit Number One."

Siegel wrote the vocal parts for The Tokens (borrowing heavily from Pete Seeger's Weavers arrangement, he admits), and RCA staff arranger Sammy Lowe—who'd worked on smashes with the likes of Sam Cooke, Harry Belafonte and Elvis Presley—came up with the unusual musical arrangement, featuring guitar, banjo, stand-up bass, soprano saxophone, soprano voice (Metropolitan Opera singer Anita Darien) "and this great guy named Panama Francis on drums," Siegel recalls. "Although what he did on that date was take his drum kit box, put the

New York Times on top of it, and then played brushes on top of the newspaper—that's the drum sound you hear on the record."

The session took place in Studio A of RCA's old 23rd Street studio in Manhattan on August 27, 1961. "That was a great studio," Siegel says, "and we had the best engineer around, a man named Mickey Crawford. This was in the days of 3-track recording, but we always ran a simultaneous mono version, and the hit single was actually the mono version." (The re-release is Hugo & Luigi's stereo mixdown.) The Tokens had the studio booked for three hours, which was fairly typical for the day, and they managed to cut two songs in that time, "The Lion Sleeps Tonight" and the single's flip side, an old Portuguese folk tune called "Tina." Siegel notes, "It went quickly because we were cutting completely live, vocals and instruments together, which was not always the case." A more typical regimen for that era, Siegel says, was to record the instruments in the first hour, the vocals in the second hour,

and do "whatever sweetening was needed" in the third hour.

RCA was equipped with a custom-built Electrodyne console at that time, and the mics were all tube and ribbon models of the day. "The group had one mic," Siegel explains. "I had my own mic, which was probably one of those [RCA] 44s, and then there were a couple for the players. By today's standards it was pretty simple, but it sounded good."

The Tokens only cracked the Top 40 two more times before disbanding at the end of the '60s. However, Tokens first tenor Hank Medress produced a new version of "The Lion Sleeps Tonight" for Robert John, and it hit Number Three in 1972. Today, there are not one, but two versions of The Tokens to choose from: Siegel's East Coast-based band plays about 120 dates a year on the oldies circuit, and brothers Phil and Mitch Margo (the original bass and second tenor voices) head a West Coast Tokens. Needless to say, they are all reaping the rewards of the seemingly endless life of "The Lion Sleeps Tonight." ∎

to have a physical match between the later recordings and the early recordings. So I did a lot of hiss reduction," using Digidesign's DINR through Sound Designer.

Initially, Oswald spent about a month with the Dead's tape archivist, Dick Latvala, sorting through old tapes. "I gathered about 40 hours of material, most focused on 'Dark Star,'" Oswald says, "and then I brought it all back to Toronto and spent most of the next three months working on the first disc. I did a lot of experimentation, tried a lot of different ways of combining the material."

The primary tool of Oswald's trade is a multitrack Digidesign Pro Tools system, which allows him to seamlessly edit, layer and/or "fold" passages of music. Oswald says that there are several hours of musical information packed into his one-hour Dead disc, and he places the number of edits involving juxtaposed performances at "somewhere just under a thousand. Some of it is very hard to discern, but in parts it might be overlapping measure by measure from different performances."

At times, there are two or more Jerry Garcia or Bob Weir or Phil Lesh guitar parts wailing at once, and Os-

wald says that the first vocal fragment on the disc—the word "Dark" spread out over more than a minute, as various instrumental performances continue underneath—"is about a dozen different vocals from throughout the history of the song. There's a bunch of different things I used to stretch it, including this sample looping device called an Infinity; although I was using the software in a way that was different than sample looping. There's a thing in there, too, where you can do spectral smoothing from the beginning of the sound to the end of the sound, so it makes things more constant."

At one point, Oswald juxtaposes part of a 1971 version that clocks in at 61 beats per minute with a 1968 version at 93 bpm: "The fast one fits like a triplet over the slow one," Oswald notes. "It's a nice effect." Oswald says he eschewed adding reverb because he wanted to create a sense of immediacy and because "when you build up multiple layers of things, they sound more reverberant anyway."

The CD, which is on the Canadian Swell/Artifact label, has received a generally favorable response from Deadheads who have heard it since its release in early September. And what did Phil Lesh think? "Phil said, 'It's too long, there's not enough folding,'" Oswald says. "I can see his point. I think he was looking for something even stranger and quirkier than what I've done. But I wasn't trying to make something that was ostentatiously Plunderphonics or John Oswald or anything. I wanted it to sound like an idealized Grateful Dead project, and that might have been a surprise to him.

"What I did in response to his comment was a little experiment where I took the music on the first disc and started folding it over," Oswald adds. "First, I folded it in half so you could listen to it in 30 minutes; it was twice as dense. Then I folded it again, and I just kept folding it until I was up to 16,384 layers and the whole thing goes by in two seconds—it sounds like a rush of feedback or jet noise. That's probably a little more folding than even Phil had in mind. It's a useful, little-found object that may turn up on the second disc, but what I'd like to do is make a two-second CD for Phil." No doubt Lesh would dig it.

Gray Folded can most easily be obtained by calling (800) 263-4020. ■

by Philip De Lancie

MASTERING
WHAT IT IS AND HOW BEST TO PREPARE FOR IT

The rapid adoption over the past few years of low-cost digital audio tools such as DAT and hard disk recording systems has proven to be somewhat of a mixed blessing from the mastering point of view. In one sense, the new technologies have democratized the music-recording process, giving artists with limited financial resources access to fidelity that was previously only available in studios. In the right hands, low-cost digital recording gear can yield very good-sounding masters on a shoestring budget. And because more artists are able to make their music "sound like a record" without being beholden to a third party (the record company) to pay for studio time, independent releases are flourishing. That makes more business for mastering houses.

The downside is that saving the cost of going to a professional recording studio may also mean passing up the experience and professionalism that studio engineers can contribute to a project. Many "do it yourselfers" have little idea of how their master mixes become CDs, cassettes or vinyl ready for distribution and sale to the public. Without an experienced engineer's input, they may not know how to prepare their project for mastering and manufacturing, or even what mastering really is.

The savings realized by recording at home rather than in a studio can be eaten up in a hurry if the mastering house has to spend a lot of time whipping a project into professional shape before getting down to the business of enhancing its sound. So it is in everyone's interest to get up-to-speed on what's involved in master prep and mastering.

WHAT IS MASTERING?

Mastering is the link between production (the studio) and manufacturing (the plant). It begins with the master tape(s), normally stereo, that result from mixing and ends with the completion of a "production master" for each release format (cassette, CD or vinyl).

Mastering has two basic goals. One, simply put, is to make sure a given project sounds as "good" as

Making Prerecorded Music
A Production Flow Chart

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Pre-production → Recording/Mixing → Master Preparation → Rundown
                                    (Sequence/Assembly)   (Mastering)
                                                              │
                                                              ↓
        ┌── CD: PCM-1630, → Glass Master CD → Electroforming → Replication
        │      CD-R or DAT
Transfer ─┤── Cassette: → Loop Bin Master → Duplication
(Mastering)│    DAT or 1630   (for high-speed only)
        └── Vinyl: Lacquer → Processing/Plating → Pressing
               or DMM Master
```
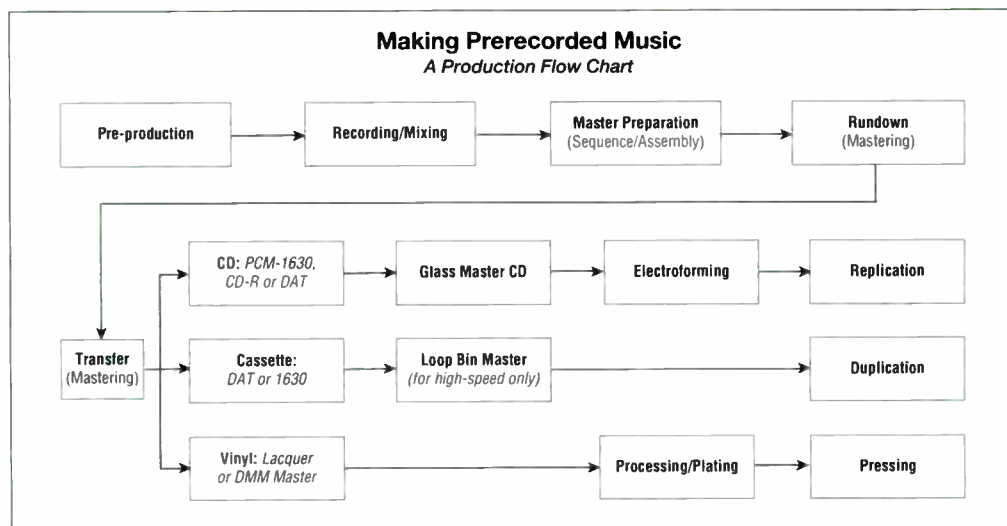
possible before it gets manufactured. Optimally, as part of this enhancement process, a collection of individual selections becomes a smoothly flowing whole, so the listener doesn't feel like readjusting the volume or tone controls for each successive piece.

The other goal is to put the program into the form needed by manufacturers (CD replicators, cassette duplicators and vinyl-pressing plants) to begin mass-producing prerecorded product. The standard production master sent to CD plants is a Sony PCM-1630 tape, though some plants can work directly from time code DAT or recordable CD (CD-R). Cassette duplicators generally work from DAT, although major labels often use 1630 cassette masters. Vinyl record-processing begins with a "master lacquer" cut on a lathe.

Though mastering may modify the apparent prominence of various elements in a mix, it isn't a remixing process, in which the level of instruments may be individually controlled.

WHAT STEPS ARE INVOLVED?
There are three basic areas to consider in the mastering process: master preparation, rundown and transfer. The steps don't always occur in the same order, and master preparation is not always even considered a mastering function. But each area has to be covered at some point in the chain linking mixing to manufacturing. For instance, you can assemble a group of mixes into a flat master and then EQ it, or you can EQ individual tracks and then assemble them into an EQ'd master. The end result is the same: a production master that runs from start to finish with the exact timing, fades, levels and EQ that you want the public to hear when they purchase the released product.

WHAT CAN BE DONE IN MIXING?
Consistency in mixing is one of the most important things a recording engineer can do. Some projects come in with wild variations from song to song in instrument EQ and balance. That might be fine if it's the intended effect. But if the intent is to end up with a project that flows well from one selection to the next, it will obviously take less time to work with tracks that have been mixed with an overall "sound" in mind.

It's especially important not to create a situation in which two problems cry out for opposite solutions in the same frequency range. For example, it's hard to deal with a dull snare mixed with harsh, sibilant vocals, because adding snap to the snare could make the vocals even harder to listen to.

Sibilance, which is merely unpleasant on CDs, creates a distortion problem on vinyl records (and sometimes cassettes) that can force a reduction in the overall level. There are

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The enduring importance of traditional mastering houses gets back to the core goal of mastering: making the music sound as good as possible.

• •

ways to cope with such problems in mastering. But it's preferable by far to work on individual problem tracks (de-essing vocals as needed, for instance) during recording or mixing.

Similarly, there isn't much that a mastering engineer can do to help with distortion other than pulling down the frequency in which it is most noticeable. If possible, it's better to deal with distorted tracks earlier in the production process rather than wait for mastering.

Because the mastering engineer will be setting the final program level, it is not necessary for the mixing engineer to try to mix for absolute maximum volume. The optimum level for analog mixes depends, of course, on the tape formulation and noise reduction system (if any) employed. For digital recording, shooting for peaks in the range of 3 dB or so below digital 0 (not to be confused with zero VU) is probably a good compromise between avoiding overloads and underutilizing the dynamic range.

Finally, if you are mixing to digital on a project that is going to be re-

leased on CD, there is little reason to record at a sample rate other than 44.1 kHz. But if you do already have some material recorded at 48 kHz, it is preferable to stick with 48 kHz rather than switching back and forth between sample rates on your master.

HOW IS A GROUP OF FINISHED MIXES PREPARED FOR MASTERING?
After getting a set of workable mixes, the next step usually is to create a master from the selected takes. This involves sequencing (putting the songs in the desired order) and assembling (creating the desired amount of silence between). The master may be put together at the studio where the tracks are mixed, at the mastering house or at another facility, perhaps one that specializes in hard disk editing.

The actual sequencing/assembly process varies a lot, depending on the format(s) of the master mixes. Traditionally, when working with analog tapes (except, perhaps, those recorded with an effective noise reduction system like Dolby SR), leader is used between the songs so that you don't bring up tape hiss when the fader is thrown open at the start of each tune during mastering. At the head of each piece, leader should be tight as practical to program. At the end, unless a "cold" ending is the desired effect, leave a second or so of tape after the music decays before the leader. That allows time to follow-fade the natural decay into silence, rather than going abruptly from tape noise to silent leader. This can definitely make a noticeable difference when listening to a CD, especially on headphones! If the spaces between tunes are tight, the leader may be as short as one-half second, just long enough to throw open the fader before the next song. The time between each selection should be just as it is supposed to be on the finished product.

WHAT ABOUT ASSEMBLING MIXES THAT ARE ON DAT?
With mixes on DAT, you obviously can't just cut together the takes you want into a master. The most straightforward way around this is often the least satisfactory: You get two DAT machines together and digitally transfer the desired takes one at a time from the original mixes to a new, assembled master.

This approach can work fine if you

are recording onto a high-end DAT machine, such as Sony's 7010, that is designed for both assemble-editing and (better still) insert-editing on the audio track of a tape that has been previously "striped" (recorded from start to finish in one continuous pass). On most popular DAT machines, however, you will end up with a tape that has a break in the control track at every point where the recording was stopped and started. On playback, these breaks will be interpreted by the machine as uncorrectable errors. They may either cause a noise where there should be silence or cause a mute. Different machines handle errors differently, so you can't necessarily predict how long the mute or how bad the noise will be. In other words, even if your assembled master sounds fine when played back on your machine, there may be problems when it is played on a different machine in mastering.

If you aren't too picky about the exact length of the "spread" (the amount of time between tunes), and you are careful at each assembly point to leave a couple of seconds after you put your machine into record before the music starts, you can probably get away with direct DAT-to-DAT assembly. Immediately after you finish assembling the master (while you still have the two DAT machines together), make a digital copy of the entire program in one continuous pass, listening carefully the whole time. Assuming there are no problems between (or during) the songs, save the original assembly as a backup and use the uninterrupted copy for mastering.

WHAT ABOUT USING A HARD DISK EDITOR TO ASSEMBLE A MASTER?
Hard disk-editing systems offer a more elegant solution to master assembly than the DAT-to-DAT approach, especially when you want tight spaces between selections. It takes time to transfer the material onto and off of the hard drive, but you gain exact control over the amount of time between tracks, and you can record your master off the system in one continuous pass. Some systems, such as Akai's dedicated DR-4 hardware, are limited strictly to editing functions. Others, such as the Digidesign and Sonic Solutions products for Macintosh, offer more sophisticated capabilities, including fades, crossfades, and DSP-based, sonic-enhancement tools like EQ and compression.

CAN YOU ASSEMBLE THE MASTER TAKES DIRECTLY ONTO A SONY PCM-1630 CD MASTER?
Yes. The 1630 format is excellent for insert-editing audio onto a striped tape, and so, technically, offers a good way around the problems of DAT-to-DAT assembly. But it may end up being more costly, because the assembly will probably take place at higher hourly rates than other types of transfer, editing and assembly work. Also, the 1630 format is not particularly robust, so you run a somewhat higher risk of investing time into assembling a master only to have it fail due to uncorrectable errors.

WHAT OTHER FACTORS SHOULD BE CONSIDERED?
Good documentation makes a big difference. A master tape will ideally be accompanied by a legend that shows the order of selections, their titles, and both individual and total times. If one selection segues into the next, an accurate time should be given for the exact point that will be considered the start of the incoming selection. If there are tones at the head of the master, they'll be easy enough to find, but it's still good to mark their location on the legend or box, along with the client name, artist name and catalog number.

DATs should be provided with numbered start IDs for every selection, preferably starting with the first piece of music (numbering tones as #1 may invite confusion). If extraneous IDs were written during recording, erase them and renumber the remaining IDs. And don't start the program right at the head of the DAT (where the tape is most likely to be damaged); leave at least 30 seconds or a minute before the music begins.

WHAT'S NEXT IN THE MASTERING PROCESS?
Working from a prepped master, the typical mastering session involves two phases. "Rundown" is the time spent by the client (if present) and the mastering engineer listening to the master and deciding what, if anything, can and should be done to improve the sound. Are there fades that could be a bit smoother? Is the bass too boomy, the cymbals lacking sparkle or the snare missing snap? It's common under the critical listening conditions of a mastering room for clients to notice things that they'd

by Philip De Lancie

TAPE & DISC NEWS

MI EXPANDS IN ANAHEIM

CD-replicator Disc Manufacturing Inc. acquired a 220,000-square-foot manufacturing site in Anaheim, Calif., that will allow the company to expand its West Coast presence. DMI currently operates a 30,000-square-foot replication facility in Anaheim that has a capacity of 44,000 CDs per day. The transition to the new plant was expected to begin in December and be completed by June of 1995, at which time capacity will be about 88,000 per day. By the time the $23 million expansion project concludes a year later, the facility's daily output is projected to have increased to 132,000.

DMI's Anaheim move is part of an overall company plan to double annual production at its two U.S. locations to 200 million discs by the end of 1997. To meet that goal, the company's Huntsville, Ala., plant will also be expanded. DMI says that Anaheim's West Coast location is an important element in servicing the CD-ROM segment of its business. The company's revenues from multimedia/CD-ROM accounts such as Apple, 3DO and Broderbund grew from 20% to 32% of total replication revenues over the last year.

SPLICES

Philips Key Modules (Eindhoven, The Netherlands) reports "keen interest" among manufacturers of personal computers and data storage devices in the use of DCC as a 350MB to 700MB data storage peripheral...**Saki Magnetics** (Calabasas, CA) introduced a line of hot-pressed, glass-bonded ferrite heads as replacements for metal heads in Telex, KABA, Otari and Wollensak in-cassette duplication systems...**Global Zero** (Westbrook, ME) announced the purchase of a new manufacturing facility in Sanford, ME, that will allow a doubling of production capacity by the end of 1994. The company makes the G-Zero videocassette, which uses re-cycled polypropylene and fewer parts for reduced environmental impact compared to conventional VHS shells... **Versadyne** (Campbell, CA) sold dual-slave units as expansions to existing 1500 Series high-speed duplication systems at both California Magnetics in San Diego and Star Products in Salt Lake City. The company also sold a 1000 Series system, along with an SR-150 duplication slave reader, to Music International of Innesdale, South Africa...**Griffin Mastering** is open for business in Atlanta, claiming to be the first full-service mastering facility in the area. The facility is operated by engineer Chris Griffin and offers digital mastering and editing using the Sonic System from Sonic Solutions... Springfield, Virginia's **Airshow Mastering** has been working on projects by Tom Paxton, Jerry Douglas and Mike Seeger, whose *Third Annual Farewell Reunion* features David Grisman, Maria Muldaur and Bob Dylan... Recent Mastering work at **Trutone** (Hackensack, NJ) includes sessions for Kool & the Gang, Smashing Pumpkins and Ruben Sierra...**HMG Digital Technologies** concluded an exclusive, long-term agreement to duplicate videocasettes for ABC Video, ESPN Home Video and Summa Video, all of which are owned by Capital Cities/ABC Video Publishing. ∎

COMPTON'S HEAD WALKS

The high-profile executive VP/general manager of Compton's NewMedia, Norm Bastin, resigned from his post. Company sources cite differences in management style, rather than overall company direction, as the reason for the move. Bastin's replacement is James Longson, who comes to Compton's from its parent, the Tribune Company, which acquired Compton's in September of 1993. According to *Billboard*, Longson has a background in programming and has been closely involved in the Tribune Company's expansion into multimedia and related fields.

Along with president/CEO Stanley Frank, who remains with the company, Bastin spearheaded Compton's seminal role in multimedia, becoming one of the industry's best-known figures. The company has been particularly successful in using its flagship *Interactive Encyclopedia* to help open up shelf space for CD-ROMs in new and existing software distribution channels. But Bastin is also associated with Compton's unpopular attempt to patent multimedia as largely its own invention, a claim hotly disputed by the rest of the industry and ultimately rejected by the U.S. Patent Office (appeals are ongoing).

NEW KODAK CD-R ENTRY

Kodak introduced a new hardware/software combination for recordable

Kodak PCD Writer 225

CD applications. The PCD Writer 225 features a RAM buffer that may be expanded from the standard two megabytes up to 32 MB to prevent "buffer under-runs," as well as a disc-at-once mode for writing an entire hard drive (or partition) onto a CD. The machine also features single- or double-speed writing and mixed-mode capability for putting CD-ROM and CD-Audio tracks on the same disc. Other supported formats include CD-I and Video CD.

The Multi-Write software allows multisession recording of CDs and recording of individually specified files organized by the user. A "virtual CD" function writes to a hard drive to allow testing before recording a disc. And a "safest speed" feature automatically adjusts recording speed to prevent buffer under-runs if the host computer isn't fast enough to support high-speed recording. Prices start at $1,995 for Macintosh or Windows/DOS software and $4,295 for the recorder. ∎

L.A. GRAPEVINE

by Maureen Droney

Village Recorders played host to the Eagles from April to September. The group spent breaks in the "Hell Freezes Over" tour there, working on both their MTV *Unplugged* special and their new CD. Produced by the Eagles, Elliot Scheiner and Rob Jacobs, the new CD contains 12 live tracks from the MTV show along with four new studio-recorded songs. Scheiner and Jacobs locked out Studios A and D and worked on different parts of the project at the same time.

When asked what it was like to have two producers on one project working in

Engineer David Reitzas at Hollywood's Record Plant. See page 182.

NASHVILLE SKYLINE

by Dan Daley

L.A. transplant and owner of Secret Sound on The Row, Chas Sandford, gave us a tour through St. Bernard's Academy, which he said will be the site of Nashville's largest studio complex. The 63,000-square-foot site, projected at $5 million-plus for equipment and design, is made up of two buildings, built in 1904 and 1924. Sandford showed three areas designated as studios—two in the older, main building, which will house the SSL from Secret and a recently ordered 104-channel Euphonix CS2000M board. An 8068 Neve is slated for the largest of the three rooms, a huge tracking and control room in the other building's chapel.

An overall design has been submitted by Neil Grant of Harris, Grant Associates. Construction was scheduled to begin in October, with the first studio ready by January, just after Sandford's lease on The Row

expires. He estimated that all three studios would be up and running before the end of 1995. Sandford said the lease on the new facility would be for 25 years, with an option to purchase.

Masterfonics continues with construction of its new tracking room down the block on Music Circle. *Mix* has learned that, as of early September, the studio was leaning toward a Neve VR console. However, said studio manager Lisa Roy, the studio would put a Harrison Series 12 into Studio 6 for evaluation, and it would remain in the running for the new studio. A Lorrie Morgan project will be the first on that board, with Barry Beckett producing. Masterfonics also installed a new Studer 48-track digital machine, the first of three D-827MCH decks on order.

In what could augur well for Nashville audio post, Tom Davis, noted mixer and former director of audio for 525 Post in Los Angeles, has set up shop in a leased space at Post Masters in Nashville. The self-designed suite features the town's first Euphonix console, a 48-channel CS2000, a Fairlight MFX-3 and a pair of Tascam DA-88s.

Davis cites a combination of reasons for coming here, from the oft-repeated and almost mantra-like observations on L.A.'s rapidly dissipating quality of life to the fact that High Five Productions, another L.A. transplant, is using Davis to post the audio for *The Road*, an ambitious and extensive live performance series backed by Tribune Broadcasting. "That alone is a whole year's worth of work," said Davis, whose first two projects since opening shop here in August were a Phyllis George TV special for TNN and a NASCAR production for The Family Channel.

Will post, which has lagged be-

Nashville's Masterfonics Recording Studios recently installed its first Studer D827 MCH digital multitrack recorder, which was immediately used on Willie Nelson's latest album, *Healing Hands of Time*. Shown from left are project engineer John Guess, Masterfonics owner Glenn Meadows and Liberty Records president/CEO Jimmy Bowen.

NY METRO REPORT

by Dan Daley

New York has been kind of getting a grandfather image in dance music lately. Once the epicenter of the genre, with four full-time dance-formatted stations, New York now has no full-time broadcast dance outlet. The attention of major labels has shifted to rap and R&B at the expense of dance, and remix budgets are feeling it. "They're down to between $10,000 and $12,000, down

Les Paul was recently at the Edison National Historical Site in Orange, N.J., to cut a "decidedly mono" track on a vintage Edison wax cylinder. Paul's session was one of a series, which has in the past included Wynton Marsalis, being conducted at the old Edison lab.

hind the growth of music recording in Nashville, begin to see a faster track develop? Davis, who posted two Garth Brooks specials but isn't a particular fan of country, hopes so, based on the dearth of audio post rooms here and the fact that once he announced that he was leaving L.A., "Everyone in the industry called me and said they were envious," he said.

Meatball Heroes: Ex-L.A. producers Dino and John Elefante opened Sound Kitchen in Franklin, Tenn. The two-room, 8,000-square-foot facility designed by Chris Huston will serve as a base for their mostly Christian/pop productions, but at least half the time will be available for hire. Recent outside projects for

the same building, Jacobs laughed and said, "It actually worked out really well. Elliot had recorded the MTV *Unplugged* show and because of the touring schedule, they were running behind. I'd worked with Don [Henley] over the last four or five years; he called me and asked me if I could help out. It kind of worked out that I did the studio tracks and Elliot did the live stuff, and then I ended up helping with some of the live stuff as well and Elliot helped with the studio stuff. It's funny because we got along so well that we actually are looking for pro-

jects to co-produce together. We really hit it off as a team. Toward the end of the record, when the band was always on the road, we had to sound things off of each other. It's also funny because one of the first sessions I ever worked on was for Elliot at Village Recorders. I was just a runner then, and one day his assistant didn't show up, and they threw me in the room...I could barely make a patch!"

For the Eagles project, all the live tracks were recorded on analog with Dolby SR and then transferred to 48-track digital for overdubs, with mixdown to a 1630 DMR. Continued Ja-

cobs, "We worked at studios all over the country. For a while, I went on the road with the band, and in between their insane schedule, we'd find a studio in any town where they had a day off—a vocal here, a guitar there, whatever we could get. It was pretty crazy getting people and instruments to the studio after playing a show. Toward the end, Elliot and I helped each other mix; it was really great because we were both a little beat-up at that point. But it was a lot of fun." Village studio manager Kathy Konop also enjoyed having the project in and said, "Everybody was in such a good frame of mind, it was really a pleasure to have them here. Now that they're done, I really miss them! Also, it's great music. Unlike with some bands, I'd keep my office door open to hear as much of the record as I could."

The Reitzas Stuff: I chatted with engineer David Reitzas (Whitney Houston's "I Will Always Love You," All-4-One's "I Swear" and Natalie Cole's "Unforgettable") about the Barbra Streisand live double-CD set that he recorded and mixed. Compiled from a total of four shows (three at Madison Square Garden and one at the MGM Grand in Las Vegas), the tracks were recorded by Dave Hewitt and Reitzas in Hewitt's Remote Recording Services truck. The truck's console is a 40-input Neve VR, and the tape machines were synched 48-track digital and 24-track analog recorders. Musicians included a six-piece rhythm section along with a 64-piece orchestra.

Streisand's vocal mics were wireless: at Madison Square Garden, the Vega System Dynex 2, and in Las Vegas, a Samson with a Shure 87 head. Mixing was done over a six-week period in Record Plant's Neve 1 room, with the various tracks submixed to 16 tracks of a digital 48-track and then final-mixed to DAT through an Apogee converter, along with 15 ips ½-inch with Dolby SR and a Marantz compact disc recorder. Reitzas told us he found it convenient to keep Barbra appraised of the mixes in progress via CDs rather than DAT or analog cassette. Streisand is famous for having a phenomenal memory for takes and meticulous attention to detail and Reitzas said, with a laugh, "It was a challenge, but with the help of producer Jay Landers, we kept up!"

Reitzas is probably best known

for his work with producer David Foster. They teamed up in 1987, and their projects together have included songs for Michael Bolton, Celine Dion and Frank Sinatra. In the works for the two is a remake of Carole King's "Natural Woman" by Celine Dion. And yes, it's really true that Whitney's worldwide smash "I Will Always Love You" was a two-hour rough mix by Reitzas!

Over at Paramount's Hal Wallis Building, we visited with film sound editors Gloria D'Alessandro, Carin Rogers and Kevin Hearst who were hard at work on *Star Trek: Generations* and *Losing Isaiah*. Dialog editor D'Alessandro took time out from *Star Trek* to give us the rundown on her technical setup and some insight into her job. Using a TimeLine (Waveframe) DAW with the Windows-based Studio Frame software, she cuts to visuals displayed on the ASC VR digital video recorder. She speaks highly about the VR.

"Digital video is just so much faster to work on," she says. "It chases time code almost instantaneously, and you can scrub in slow motion and stay in sync." She explained that the dialog editor begins by listening to the work dialog track to which picture was cut and then backtracks through the alternate takes searching for the cleanest performance. Then ambient sound is edited in where needed, with live sound effects (like wood chops and car startups) usually being moved to alternate tracks to give the mixers more options; they may choose to use the original live sound or to replace it with Foley or library sound effects.

The end result will usually be ten to 12 alternate dialog tracks for each scene that are then dumped to 24-track analog, so that in the final mixdown of music, dialog and effects, the mixers can choose which track suits each scene the best. Lots of tracks means lots of storage is required, so in addition to the TimeLine, hard drive information is saved to magneto-optical disks, 8mm cassettes and floppy discs. D'Alessandro, who started her career cutting mag tape, is now a big fan of the DAW.

Quick access to multiple takes, the ability to adjust fades in and out of sections, nondestructive editing—all of it makes her job, as she said, "Well, not easier but better. Basically, I'm a cleanup woman," she laughed. "No, really, what I do is

sort out the tracks so that there will be maximum flexibility when they get to the mix." Carin Rogers, working on *Losing Isaiah* in the next room, adds that she likes the time compression and expansion capabilities of her DAW.

"Of course, it's something you can overuse, but in certain situations, you may be able to lengthen or shorten a word up to 25 percent without changing pitch—that can really be a useful feature to match up an alternate track to picture!" Cecelia Hall, executive sound director for the facility, told us that Paramount originally purchased four TimeLine Studio Frames and two Avid Audio Vision systems. Recently, they've purchased some Tascam DA-88s, and plans are in the works to add more workstations next year. Other 1994 Paramount projects include *Clear and Present Danger*, *Wayne's World II*, *Addams Family Values* and *Naked Gun 33 1/3*. Look for an in-depth feature on the sound for *Star Trek: Generations* in January *Mix*.

Short takes: Westlake Audio on Santa Monica Boulevard has upgraded its Studio E mix and vocal overdub room with an SSL 4056 G Series console. Covering all bases, the 56-input board with G Series automation also has 16 E Series modules. ∎

Got L.A. news? Maureen Droney's new fax is (818) 346-3062.

from as much as $15,000 to $20,000 a few years ago," said Tommy Musto, one of New York's leading remixers, with above- and below-ground credits. One upshot of that is that Musto and others have diversified their careers; he has a production company that also holds his studio, based around an Otari MX-80 and a Soundtracs Megastudio console.

"New York was always the founding father of dance," said Musto, who began his career as a new-talent DJ at the now-defunct WKTU in the heady days when Frankie Crocker and his followers defined New York's dance programming and grooves. "But other countries and cities—L.A., London, Berlin—have taken a lead over New York. There are fewer clubs here, it's harder to get a liquor license." That combined with a market shift in radio and sales contributes to an impact on

the remixers of New York. "What happens is you get dance breaking up into smaller and smaller sub-genres," he noted, citing New York's soulful Garage (named after a former club on King Street), the mechanically Euro-house hybrid trance, and the totally Euro techno-rave. "And that makes it even harder to keep budgets up."

James "Bonzai" Caruso is another remixer who recently relocated his project studio when he moved to Forest Hills, Queens. He has a pair of Mackie 1604 boards to go along with his Akai S1000 and 950 samplers. The trend has caused him to involve the artists less in remixes. "They often don't really need to be here when I'm remixing their stuff," he said.

Still, the New York club scene, truncated as it may be, is *de riguer* for remixers. "That's how you stay on top," he said. "It's a sample-intensive town [heavy on the Roland 808 and 809 kick drums], and samples get played out fast. You always have to be listening for the record 'cause you don't get them on radio as much anymore." Bonzai also has a business relationship with Musto, reflecting the fact that the social network that is at the heart of New York's club and remix scene is rapidly evolving into a business one, as well. Part of the breakdown in sub-genres is causing a lot of influences to interact across genre lines—hip hop rhythms with house BPMs. "It's a big pot of influences," said Bonzai. "But you can't

beat the ones you get in New York. The network, whatever it becomes, is critical. I can do what I do technically anywhere. But it would be that much harder to stay on top of it."

Remix team Little Louie Vega and Kenny "Dope" Gonzalez agree that budgets have declined in the last couple of years. Vega, who said his Wednesday night DJ stints at Sound Factory are critical to staying on top of the genre despite the pair's lengthy successful remix discography (Madonna, Michael Jackson, Vanessa Williams, Neneh Cherry), attributes the drop to labels' letting as many as four or five remixers work a single track. "You're hearing one set of melody and lyrics on top of five different grooves," he commented. "It takes away from the song sometimes."

Vega and Gonzales work out of Manhattan's Bass Hit, which is owned by their management company, 23 West Entertainment. The SSL-equipped facility complements Vega's home DJ setup, on which he checks mixes, does radio sequencing and, most recently, has been sequencing a series of club CDs for dance labels. "There's a lot more mixers out there, young guys who will do it for a lot less, or for free, to get started, and a lot of them are really good," he said. "That affects the budgets, but mostly letting a lot of mixers on a single track can really hurt what an artist is trying to build." ∎

the room, which recently saw installation of a Neve V60 and Deja View's Studio Recall package, included Jeff Balding with Greg Nelson, and Neil Kernon producing heavy metallics Flotsam & Jetsam.

In terms of location, Dino Elefante said that as much as 90% of outside bookings are driven by the studio's suburban location. "You wouldn't believe how often, all other things being equal, people say that they want to work here because they live in Brentwood or Franklin," he says, adding that there is no need or perception of competition with Row facilities. "We're essentially taking their overflow business," he said. But, he added, the studio comes with a full kitchen and, occasionally, Mama and Papa Elefante to prepare some very authentic Italian cuisine that's rarely seen in these parts. "We'll put our

meatballs up against anything in town," Elefante said.

Recording Arts has undergone a combination technical and cosmetic renovation, according to studio manager Lou Johnson. A multicam Sony video system has been installed with remote pan and zoom functions. A completely new air-conditioning system was also installed. A new deck, new iso booth, and new cartage entrance and storage room round out the carpentry work. And the studio also has new hypo-allergenic and nontoxic carpeting. "There's a lot of new studios in town, and the cosmetic stuff is becoming as important as anything else," Johnson said. "These sorts of additions bring a studio up a notch. And it's a nice place to take a date." ∎

Fax Nashville items to Dan Daley at (615) 646-0102.

closely," Massenburg explains. "Philosophically, the recording of drums should be no different than the recording of other elements. I strive for transparency and avoid leaving fingerprints all over the track. In the end, the drums should tell the same story as the song does, or I've failed."

ELLIOT SCHEINER

Donald Fagen's *Nightfly* is the oldest recording in this writer's collection of "speaker evaluation and mix reference" CDs. Elliot Scheiner is the engineer behind the tracking and mixing of *Nightfly*, as well as hundreds of other recordings for Bruce Hornsby, Billy Joel, The Eagles, Van Morrison, Rickie Lee Jones and many others. A drummer himself, Scheiner shares his personal style of drum recording.

"I like to arrive earlier than expected to a new session, primarily to work with a drummer on set and room tuning," Scheiner says. "It helps me to record in a known room—that way I can predict problems and respond quickly. Some of the best rooms I've found for drums include Bill Schnee's personal-use studio, Ocean Way A and B, The Hit Factory, and Clinton Recording in New York City. I like the room to be live and bright, but not too live. In my opinion, dead rooms don't work well for pop drum recording.

"In the '60s and '70s," he adds, "we didn't think about drum tuning as much as today. Taking time to find the right tunings can really help the recording. Instead of tuning to the pitch of the song, I find tuning in thirds to be more effective. Even some of the more crackier snares have a kind of pitch, but I don't worry about snare tuning as much."

Scheiner says he's been "experimenting with drum mic technique since day one. It's a never-ending process, finding new mics and methods. Every new drummer, set, room and song is a new challenge. I can tell you, however, the microphone method I tend to start with. For starters, the SM57 just keeps working on snares, and I rarely use a bottom mic on snares. The snare mic sits just above the edge and points into the center of the head. Toms take experimentation. A few years back I liked 414s on toms, but these days I am leaning back towards 421s. I like to face the tom mics down onto the head. On kick, there are always a number of good choices: The older AKG D-12 seems to offer a little more depth than the newer D-112 version, though I like them both on kick; Sennheiser 421s and EV RE-20s are also good old standbys, which I use often. A kick with front skin removed is usually much better for recording. If a drummer insists on using a two-headed kick, I might end up miking the pedal side, as well.

"A stereo pair of Telefunken ELAM-251s or AKG C-12s in cardioid pattern is fantastic on overhead," Scheiner continues. "I space the overhead mics according to cymbal width. If there are one or two cymbals, the overheads will go directly over the cymbals. If there are three or more, I split the distance evenly. I like to get in close to the cymbals, usually around one foot above, but with an angle pointing away, towards the front of the kit. In a good room, an additional pair of 251s or Neumann M-49s work well for ambience. Ocean Way is a wonderful room for capturing drum ambience.

"I'll generally feed the mics into older Neve console modules and go directly to a recorder from there, unless I'm using Schnee's custom console," he adds. "Rarely will I use gating or compression during tracking, and any sample stacking is usually added later on in the mix, rather than during tracking."

When asked to comment about the engineer's role in coaxing artistry, Scheiner says that engineers are "hired guns. It's part of our role to make the producer and band happy and comfortable—especially the drummer. The first thing the band hears are the drums, so developing a tight mix quickly is good medicine for everyone. I'll give you an example: On a recent hip-hop session with a band called Repercussion, I fed the drummer a click track. After a while the drummer, who was used to thunderous amounts of kick drum energy in live monitors, asked if he could 'feel some bass drum.' So I fed his kick mic into big speakers in the studio and miked those speakers back to a separate track. Everybody was happy, and I found a new kick technique." ∎

John La Grou is an engineer, musician and inventor.

World Radio History

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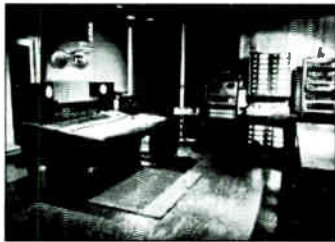
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TAPE & DISC

like to work on before releasing their
program to the public.

The mastering engineer has a vari-
ety of means available, including (but
not only) finely tunable EQ and dy-
namics processing. These tools can be
used to bring out a buried line, tone
down an overly prominent instrument
or just give a final sonic polish. Of
course, since EQ will affect all sound
in the frequency range at which it is
applied, enhancing one instrument
might have an undesired effect on
another. So there are compromises
to be made and limits to what may
be done. Mastering cannot be relied
upon to magically fix a bad mix.

As the rundown progresses, at-
tention will be paid not only to the
sound within each selection, but
from one selection to the next. Does
one song sound too quiet compared
to the one before, or not full enough
on the low end? Once all the run-

down decisions are made, the client
may ask the engineer to run a refer-
ence copy to play in more familiar
listening situations before giving final
approval to the sound.

WHAT'S INVOLVED IN ACTUALLY TRANSFERRING TO THE PRODUCTION MASTER(S)?

For each configuration in which a
project is to be released, a production
master must be made that includes all
changes to the sound that were de-
cided upon during the rundown. The
production master is made by trans-
ferring sound from the master through
an analog or digital console (where
EQ, level and signal processing are
set), to the 1630, DAT recorder or cut-
ting lathe. It's sometimes possible to
run the master for CD and cassette
simultaneously, if the program, se-
quence and treatment are the same.

When the master material comes
into mastering in pieces (which may
not all be the same format) rather than
on one assembled master, songs can

be run down and transferred individ-
ually to an "EQ master." Production
masters would then be run from this
tape, perhaps with further changes tai-
lored to the individual requirements of
the release format (cassettes, CDs or
vinyl). An EQ master optimized for
CD, for instance, might also be used
to cut LP masters. But the program
level and possibly the high-frequency
content would have to be reduced
during cutting because the mechanical
nature of phonograph records limits
the amount of level they can handle
without distortion.

Another consideration to keep in
mind if you are going to make vinyl
is the length of the material. Maxi-
mum length per side depends on the
volume and low-end content of the
music. There comes a point when
long sides have to be reduced in
level to fit on a side. For CDs, there's
no relationship between level and
program length, which (depending
on the replicator) may be as long as
77 to 79 minutes.

WHAT HAPPENS AFTER THE TRANSFER TO THE PRODUCTION MASTER IS COMPLETE?

CD masters are "timed," meaning that an exact time code address has to be specified for each place where there is to be a track start ID on the finished CD. Then the masters are shipped off to the plant, where the manufacturing process begins.

WHAT IS "PREMASTERING"?

"Mastering" is a term that developed when phonograph records were the only release configuration, because mastering sessions for vinyl end with the cutting of an actual "master record." "Premastering" has since come into use for CD preparation because CD-mastering sessions end one step short of the actual making of the master CD. A "glass master" isn't cut until the "premaster" gets to the manufacturing plant.

High-speed cassette duplication presents a still different case, in which there never is an actual "master cassette." Instead, the production master prepared in session is transferred at the dupe plant to either a "loop-bin master" or a "digital bin" from which cassettes are recorded. Despite these differences in final transfer procedures, "mastering" remains a viable general term for the preparation of production masters in all release configurations.

WHO OFFERS MASTERING SERVICES?

Mastering services are available from a variety of sources. Some CD plants offer in-house premastering, as do some brokers of replication and duplication services. You send them your master tape, and they take care of the rest, with the mastering costs built into the flat fee paid for a given number of copies. In most cases, this route does not allow for the client to be present during the mastering session.

Another approach is the emerging cottage industry of "project mastering," in which people with low-end audio workstations are assembling projects on their hard drives, adding EQ and dynamics processing, and shipping the masters directly to those plants that accept DATs or CD-Rs.

Despite the competition, tradi-tional independent mastering houses continue to thrive. Indeed, a growing number of mastering engineers now enjoy the kind of celebrity status in the music industry that was once reserved for those who tracked and mixed the superstars. This despite the drastic decline in what many had assumed was the core business of mastering: the cutting of masters for vinyl records.

The explanation for the enduring importance of mastering houses gets back to what the most important goal of mastering is: making the music sound as good as possible. To do that, you need a monitoring environment that lets you accurately hear what is really on the master tape and what you are doing to it in mastering. And you need an engineer whose decisions on enhancement are informed by daily experience with a wide variety of commercially released projects—who knows what will sound good and what won't when the music is released to the public. That's what mastering is all about. ∎

Philip De Lancie is a mastering engineer at Fantasy Studios, Berkeley, Calif.

strategically stuck to walls, seat backs and ceilings.

My personal goal is to use this impressive telecommunication ground-linked telemetry system to call another passenger on the same plane and play a networked tank game by phone. For *each player*, that's $2.50 a minute, new roamer connect charges of $5 or so every three or four minutes at 500 mph, an unknown digital data surcharge, and more sprayed digital artifacts than all the CD players in the world operating in one place with their covers off and all the grounds lifted. And as for those great metal birds? Pluck 'em if they can't data choke!

2) ASSAULT ON BATTERY

Speaking of portable killer gear, do you have any audio gear that uses batteries? Little portable cassette players that you use when you jog, CD players you use to down commercial aircraft, D.I. boxes, electret mics, portable DATs, cellular phones, hearing aids...anything at all? I thought so. If you have been reading me for a while, you might remember that I have talked about how important clean supplies are in both digital and analog gear, albeit for somewhat different reasons. I have also explained why clean contacts are so critical when using batteries.

Batteries are great because they provide real DC power, with no AC leakage and no ripple. Batteries are horrible because they *sort of* do this. The ideal DC power source is stable, won't droop and is noiseless. Although you might think otherwise, a battery ain't this ideal power source. Let's take that theoretical power source and put a resistor in series with it. Now you have a current limiter, a noise source and, well, other problems.

Good power sources must have a very low DC source impedance/resistance. This is why I have touted the wondrous advantages of keeping battery contact surfaces super-clean and oxygen-paranoid. I told you about my little Walkman gaining over 3dB dynamic range, along with a clearly audible reduction in wow and flutter, simply by painting the contacts with Tweak every time I put a new battery in. Lower contact resistance means higher current capabilities, which, in turn, means higher

peak currents on demand, for the drive motors, and a higher operating voltage in general, along with a lower impedance DC source and quieter B+ rail, thus, yielding quieter head amp operation.

Just a couple of ohms can pretty well trash the useful output of a little 1.5-volt AA cell. Just when you need peak current and peak voltage, you don't get either, because the voltage drops when the current demands increase. Batteries are ancient chemical devices, basically unchanged since the big old Evereadys used to power the stereo gear on Cleopatra's sleek little river boat. It is actually amazing that they have gotten the internal impedances of these things as low as they have, but it's not enough.

A few years ago, Eveready (the choice of the Nile crowd) introduced a battery line called the "Conductor." It was great. It was designed with all of this in mind and had a considerably lower internal impedance. They could deliver much higher peak currents, and so were much quieter. They worked! All kinds of gear worked better. CD players skipped less, located songs faster (this uses massive current) and sounded better. Nobody cared, Eveready gave up. Your fault.

Now it's up to you. If you find yourself facing a field trip with a portable DAT or some real recorder and you want the best possible recording, along with the obvious stuff, build a power adapter that uses two or more of the same batteries that are inside the unit, and wire them all in parallel. Make sure that the lead wires are short, make the terminal contacts smash up against the batteries real tight. Tweak them, shield them, put a ferrite bead on both leads right at the recorder end, pop a .01 monolithic cap across them and listen. You might be very surprised.

3) BIT BY BIT, THE TRUTH EMERGES

It has come to my attention that many of you did not know that George Massenburg has had a 6-kilobuck, 18.25-bit A/D on the street for about a year, and it has been carved and modified until even *he* says he likes it. So that's 18 and a quarter bits, the highest that I've known about until now.

By the time you read this, there will be a new A/D converter in this world. It will be a first, finally obsoleting my past comments on the absurdity of people running around claiming to have 19- or even 20-bit

> *Whoever it was that said you can't make a silk purse out of a sow's ear must have been trying to do it in the time domain.*

A/D converters. dB Technologies has a "near 20 bit" A/D, also for the standard official price for good converters: $6k. Their specs are a bit complicated, and the info that they faxed came with formulas for me to compute my own results (I guess they forgot I'm just a guitar player).

4) OVERFLOW, OVERFLOW, WHERE FOURIER ART THOU?

I have recently been playing with real-time digital signal processing in the frequency domain, as opposed to the normal time domain. Actually, I have been doing it the right way. I design the function and the interface, and someone else figures out how to make it work, writes the code, tests it, tweaks it—I just listen to it. Fascinating. Actually, then I have to make it into a product, package it, write the manual and sell it. This particular project is an intelligent adaptive noise and interference removal system for, uh, not for the private sector. I'll tell you this: You haven't heard what computers can do to audio until you have experienced true, real-time, frequency-domain DSP. To me, it falls well within the window of what may fairly be described as magic. Whoever it was that said you can't make a silk purse out of a sow's ear must have been trying to do it in the time domain.

5), 6) SOMETHING'S MISSING...

Oh come on. When was the last time someone brought a six pack into the studio and all six were still there? ∎

Stephen St.Croix has never wanted to live forever (who would want to, in a world where a pack of cigarettes costs over a buck and people still buy them). But recent developments in computer technology are making him rethink that stand.

Ad Index & Reader Service Page

In the day-to-day reality of mastering, we are trying to squeeze everything into the top two or three dB of the 90-plus dB we've already got.

will tell you that "the monitors in my studio really work, they tell you exactly what's on the tape, you'll have no surprises when you take it out of here, the monitors translate perfectly to every system on the planet, etc." In fact, I think every studio owner is required to memorize this before opening for business, just like Tim Robbins working on his cliches in the movie *Bull Durham.* I'll even tell you the same thing about the monitors I use. But here's a quick reality check: We can't all be right.

One of the most significant trends of the last ten years is that more and more of our recording and mixing is taking place outside of what we traditionally thought of as studios. That's right, I'm talking about the trend to home studios and (buzz word alert) project studios. I'm not arguing against this trend particularly (and I'm sure the trend is going to continue with complete indifference to whether I like it or not, anyway). I'm merely pointing out that it increases the vari-

Nowadays we have to assume that a home system could be anything from a boombox, to a rack system, to a high-end audiophile setup, to a surround sound home theater.

ability of the conditions under which the tapes were monitored before they got to the mastering room.

Parallel to this trend, we have seen an increase in the end-user listening environments that we have to consider. Back then, we concerned ourselves primarily with how the record would sound in the "average" living room and how it would sound on the radio. Now, a large part of the audience listens on Walkman-style headphones. And a substantial part of our audience is listening in their cars. We all hope that our song will eventually be part of a movie soundtrack and be heard in large theaters

on 6-track surround systems. For many musical genres, the way the video clip sounds coming out of a single television speaker has a big effect on its ultimate success. The "average" living room was probably always a myth, but nowadays we have to assume that a home system could be anything from a boombox, to a rack system, to a high-end audiophile setup, to a surround sound home theater. The audio processing used in radio is so extensive now that it's anybody's guess what a record will sound like on any particular station.

If we just look at the above wildly different listening situations and ignore for the moment the rest of the places our record might be heard (elevators, supermarkets, third-generation cassette in an aerobics studio, etc.), we are left with an important question: What makes a recording sound good under all those different conditions? I submit that it is still true that a good recording does sound good in all those places. Of course, it won't sound as good on a boombox as it does on a great pair of speakers, but it will sound noticeably better on that boombox than a mediocre recording will, and the essence of the track will come through.

So what gives a good recording that quality? Let's mention the nonengineering parts first: a good arrangement, where the parts are not fighting each other for space; a good song that lets a good arrangement fall into place easily; and great players who get great sounds out of their instruments. If you've got all that going for you, even a rudimentary engineering job is going to produce a decent recording. In fact, in such a case, a less-is-more approach might be best. However, there is still the question: What makes a great engineering job great, or a mix great?

You think I have an answer for that? I wish. I've been pondering that for years (on and off, not 24 hours a day), and I've only got a couple of insights worth sharing. One is that an engineer must have a feel for the music he or she is working on, because the feel of the music is what

the recording must convey. It's essential to be able to recognize which instruments are creating the groove and build the mix around them.

Additionally, I'd like to pass along an insight I gleaned from Tom Flye, an engineer with a lot of successful recordings to his credit. He said that when he's balancing a mix, he compares it to a standard he has in his mind, a symphony orchestra. He uses that standard in mixing many kinds of music that, on the surface, have no similarity to symphonic music: rock, country, R&B. I think he was referring to the balance of bass to midrange to treble instruments, the balance of main melody lines to secondary lines, and the scale or "bigness" of the overall presentation. The point is that, whether or not you use a symphony as a model, you have to have a mental image you're shooting for, or your result will never rise above the ordinary.

As long as *Mix* magazine has lent me a soapbox, I'd also like to point out one of the great paradoxes in mastering currently. Though, on the one hand, the technical folks are working hard on 20-bit converters, dither schemes and slicker bullbleep marketing in order to give us more dynamic range in the CD format, in the day-to-day reality of mastering, we are trying to squeeze everything into the top two or three dB of the 90-plus dB we've already got. Yes, friends, the level competition we remember so fondly from LP days is still with us.

There are producers who are obsessed with making their records louder than everybody else's. Since we all have the same absolute limits to work within, the inevitable result is compression, limiting, more compression and more limiting. I offer one bit of unsolicited advice: If you're that worried about whether your record is going to be a hit, go write a better song. ∎

Paul Stubblebine is a mastering engineer at Rocket Labs in San Francisco and president of the San Francisco chapter of NARAS.

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tracks so long that they don't need one anymore. The reason you had a click initially was for timing in commercials. They wanted to make sure the commercial came out to 30 seconds, and they'd keep that click on so you didn't mess up the timing. Then disco got happening, and 120 was the tempo you needed to get a hit, or everybody thought so. Then the reason for clicks was that if you were going to edit between takes, you'd want to make sure the tempos were the same. Then it was, "Well, we want to use some sequenced synthesizers and use a click track." But those reasons don't really mean anything to me anymore. I don't care about the timing, and if we cut between takes, the tempos are going to be close enough. If the tempos aren't the same, then we'll just find the best take. And synthesizers—we'll just play them by hand like we used to do. So there's not enough reasons to bother with a click.

Mix: And the time was so good that you could just punch in?
Miller: We punched in, and the times were good. And you want it to speed up a little bit to add to the excitement. It doesn't sound bad if it speeds up, unless the musicians aren't playing well. Sometimes things speed up and the groove gets messed up—and that's different. When you've got good musicians, if the thing gets a little hot and speeds up a little bit, that's great. For the kind of music we were doing with Al, I think it was real important.

Mix: You got Bill Schnee to mix the Jarreau album.
Miller: He was perfect for it, because he understands real instruments and understands singers. Bill is known for a pop sound, but I've given him some stuff that definitely wasn't pop. He's a real musical guy.

Guy Charbonneau did a great job recording with the Le Mobile truck outside the hall—15 ips Dolby SR—it sounded great, the tracks sounded nice. We had some problems recording with separation, because everything was leaking on everything else. So we couldn't do as much fixing as I'd hoped we'd do. But luckily, we didn't need as much as I thought we'd need. When we had to punch

in and out vocals on a couple of lines, we had to keep it to a minimum because his old lines were leaking into the drums.
Mix: Where did you work on the album after S.I.R.?
Miller: We went to a studio called Andora for some things. We had Al come and look at his performance to see if there were any lines that we wanted to try and get. And we did some synth overdubs at my studio at home. Philippe Saisse was playing the synth on two tracks stereo, so we separated them out so we had a little bit more control. Philippe put the strings and bells on their own stereo tracks to make it more interesting in the mix. I did that all with different engineers and brought the whole

> A lot of producers have their sound, and they become just as much of an artist as the artist.

thing finished to Bill, just to mix. I like bringing things to the engineers after all the recording is done. I get attached to things, maybe for the wrong reasons, maybe because it was so difficult to get. And an engineer brings a different perspective if he hasn't been hanging around for the whole thing. They hear what's important because they haven't lost their perspective yet.

Mix: What kinds of things do you look for in an engineer?
Miller: The best thing is if they're on the same page as you, going in the same direction anyway. It helps if they're musical because then you don't have to explain everything. You're playing soft, and guys will say, "Hey, I don't have enough level there." That's because this part is soft, give me a break. [Laughs] But with good engineers, you don't have to worry about that. Bruce Miller is very good that way. A problem is that a

lot of them don't have experience with live recording anymore, because of machines. A lot of young guys have some catching up to do as stuff goes back the other way, back to more live instruments: Live experience at miking and stuff.

Mix: Actually getting a groove.
Miller: Yeah, exactly. That's a unique concept.

Mix: When it gets there, there's nothing like it.
Miller: No, there's nothing like it. I remember sitting back listening to some of the tracks we cut with Ralph MacDonald, Steve Gadd, Eric Gale and Richard Tee. And it was such a good feeling when everybody in the room knew—"Hey that's it; check *that* out."

Mix: Where did you learn your studio chops?
Miller: In a studio called Minot in White Plains, New York, that Ray Bardani worked out of. Ray and I worked on David Sanborn's earlier records there, *Voyeur* and *Backstreet*, and I did two records of my own. We paid some fee to the owner, Tom Cimillo, and he just opened the studio to us. I spent all day, every day, there, trying different things. I got my studio chops up and learned how things work.

Mix: Are there any producers you look up to or have learned most from?
Miller: Not really. Recently I've begun to appreciate producers, but I was a musician and started writing and arranging songs. Producer was just the next step in songwriting. The people I admired were people who wrote good songs. But now that I know what it takes to be a good, consistent producer, I've begun to appreciate guys like Arif [Mardin] and Quincy [Jones] and Terry Lewis and Jimmy Jam for the consistency. It's difficult to maintain. I appreciate people who create different sounds for different artists. A lot of producers have their sound, and they become just as much of an artist as the artist. But at this point, I'm more interested in just creating a sound for the artist. I wouldn't want Luther's albums to sound like David Sanborn's or Miles Davis' records. Hopefully, if you listen closely you can hear that the same guy is behind all this, but I don't want it to be that obvious. Quincy does that, just creating a vehicle for the artist.

Mix: Is a musical background most important for a producer?

Miller: No, not necessarily. Tommy LiPuma is a great producer, and he's not a musician. He played tenor a long time ago I think. The most important thing is to be able to really hear music and love music. People who love music make the best producers. A lot of times musicians don't make good producers because they're too focused on the mechanics of playing their instruments, and sounds. Those things are important, but the most important thing is the overall music, and I think the best producers don't play any instrument.

I think I've gotten very good at listening like a regular person as opposed to listening like a musician. You need to take an overview. The first thing you should hear is the saxophone or the singer, whatever is out front, and how the music supports that. People who don't play instruments really have that naturally. Musicians have to come around full circle to come back to that. I just try to spend a lot of time listening to music, in non-musician situations—in the house, in the car—listening to see what grabs people. When somebody listens to a Luther Vandross record, they're not listening to the bass, at least not at first. They're listening to Luther. The same with David, although with instrumental records, the focus is more spread out. People who listen to instrumental music are more likely to listen to different instruments.

Mix: That bass may be what's moving them on that Luther record, but...

Miller: They just don't know it. Yeah. It's all important, I'm just talking about perspective. I have to find out what's important, and if it's a funky bass line that's important, then that's what you need. I'll ask each musician which take they like sometimes, and you have to make sure they're not picking a take because of their performance. Drummers, at least in my experience, are the ones that listen to everything. Steve Gadd will make me play a song four times before he even starts playing the drums. He really wants to hear the music. Yogi Horton was like that. Buddy Williams, they all learn the song. Maybe because they don't learn the music by reading so completely, they get more tuned into their

ears and to listening to everything and supporting. Paulinho da Costa is wonderful, but I've had to ask some percussionists, "Man are you playing the same song?" The best ones—Paulinho, Ralph MacDonald, Steve Thornton, Don Alias—they're musicians and they hear, but I've heard a lot of cats just wrapped up in their own thing. Guitar players can get like that, too. But I'll take a drummer's opinion first. If Buddy Williams or Steve Gadd likes a take, I know I should pay attention to that opinion.

Mix: Has it been a help to know how to play so many instruments?

Miller: Knowing the instrument definitely helps in arranging. It also helps being able to explain to somebody what you want them to do. If you do a demo where you play every instrument, you can just play it for the cat and don't have to do any explaining. You can just say, "I'd like it to sound like this, just better."

Mix: How has recording changed since you first started?

Miller: We'd get to a session and wait two hours for the engineer to get the great tom tom sound. The most important thing was the sound of the drums, and they spent a lot of time with miking. Then these machines took over. The drums were still the most important thing, but they just spent all their time with the machine. I'd do sessions with guys like Scritti Politti, and [producer] Dave Gamson would be sitting there with his head between the speakers, detailing every element. It was real interesting with guys like him and Donald Fagen—real perfection-oriented. That lasted most of the '80s. People I played and worked with were really into details, because you finally had control over them with synths and computers.

It was fun and interesting, but I see people getting away from that. People are more concerned about the feeling and not real concerned about the details. A lot of people just got messed up because they lost sight of the most important stuff. Now I see it coming back a little bit. Gamson is moving back the other direction with Me'shell Ndegeocello. It goes back and forth. Even in the techno period, most of the things that did well and people loved were still great songs. That's the most important thing: to start with that and then figure out

how to do it based on the times.

Mix: Having worked with Miles so much, what was your feeling about *Doo Bop* [a sketchy, posthumous hip hop album]?

Miller: I liked the idea. I didn't think it was finished. In fact, it wasn't finished. There's a trick with hip hop and improvisation. With hip hop, the whole point is that the bottom of the music stays the same. It doesn't move with the guy who's improvising, so sometimes it sounds like a cat playing along with a Music Minus One record. But Miles had such a cool sound and created so much stuff just by himself that *Doo Bop* worked for me. That's the trick. I've been trying to find a way to have the music breath but still be hip hop.

Mix: What do you look for in a studio?

Miller: As a musician, one important thing is just having a nice space, feeling comfortable walking around. I'm always walking around as a producer. Then I just look for efficiency. Not taking a long time to get things to work. When you have to stop for a few minutes to get something else working, that really kills a session. Especially when you're doing the kind of music I've been doing lately, which is trying to get a feeling. A good assistant engineer is a key. There's a guy at Schnee named John, plays trumpet, has perfect pitch, and he knows what you're going to ask for. That's important. He'll probably make a good engineer.

Mix: If you could go into the studio with one piece of gear, what would that be?

Miller: A piano. That's the most indispensable piece of gear. And after that, I'd choose a bass and all the other instruments. But if you're talking about in the studio, I don't know. I don't really think like that. I had an AMS DDL for a long time, the one that samples, and I really liked that, but if I didn't have it I wouldn't think twice about it. I'd figure something else out. All those things are tools, and I don't get too caught up in tools. I love them all and different things excite me for a while, but in general it's just music, and I'm really centered around the music. ∎

Robin Tolleson is a musician and freelance writer based in the Bay Area.

If you think only your eyes can play tricks on you...
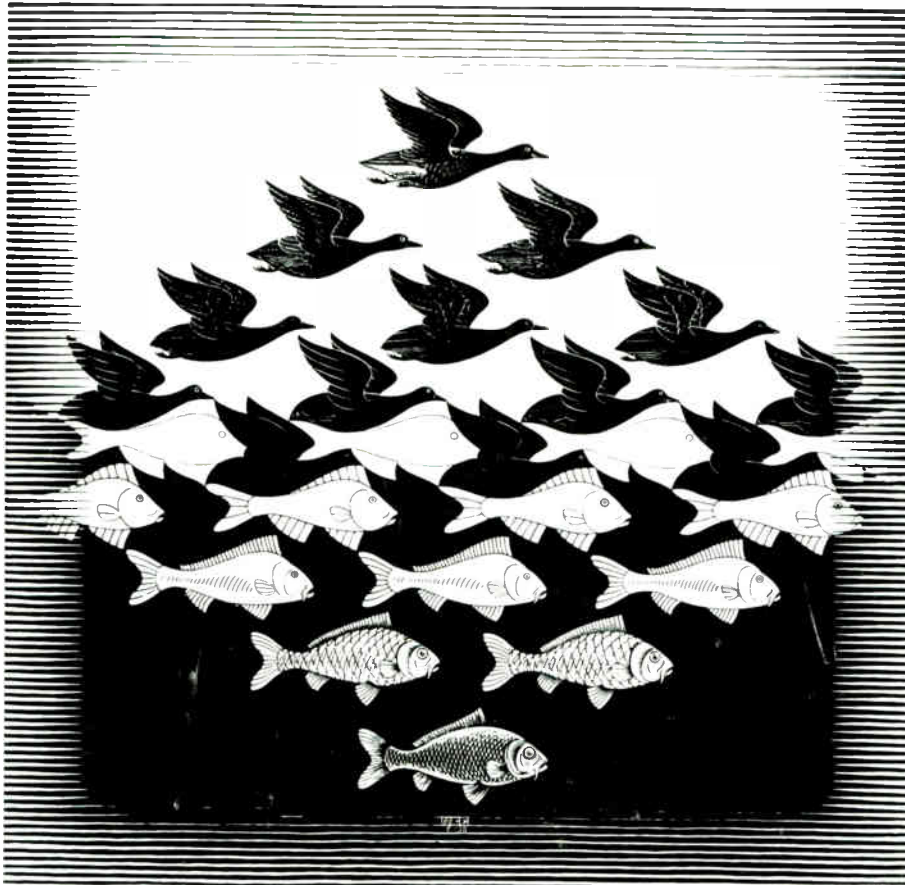
Study the illustration. Are the geese becoming fish, the fish becoming geese, or perhaps both? Seasoned recording engineers will agree that your eyes *and* your ears can play tricks on you. In the studio, sometimes what you think you hear isn't there. Other times, things you don't hear at all end up on tape. And the longer you spend listening, the more likely these aural illusions will occur.

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