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THE TECHNOLOGY THAT PERFORMS

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R•E•P: Recording•Engineering•Production (ISSN 1058-9678) is published monthly by Intertec Publishing Corporation, 9221 Quivira, Overland Park, KS 66215. Subscription rates are \$26 to qualified readers, \$30 to non-qualified readers per year in the United States, \$50 for qualified and \$60 for non-qualified per year outside the United States. Optional airmail for non-qualified readers outside the United States is also available for an additional \$55 per year. Foreign subscriptions are payable in U.S. funds only by bank check or money order. Adjustments necessitated by subscription termination at single copy rate. POSTMASTER: Send address changes to **R•E•P: Recording•Engineering•Production** P.O. Box 12960, Overland Park, KS 66282. Second-class postage paid at Shawnee Mission, KS 66202 and additional mailing offices.

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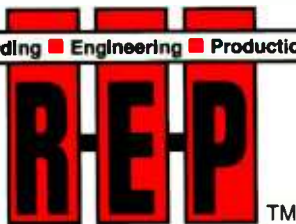
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From the Top

The Allure Of Older Gear

Today's professional audio equipment is cleaner, quieter, has lower distortion and performs more functions for the dollar than ever before. With all this in our hands today, why is there such a burning fascination for ancient audio gear? Of course, for many it's true that a good, solid, well-built and still performing piece of gear is literally money in the bank. It's a tool that still has lots of life left in it. If it works, keep on usin' it.

Yet there's another element, one most evident with certain notoriously popular items of antiquity, gear such as Pultecs, Teletronix, UREI, Fairchild, Neve, RCA, EMT, Neumann, or supply your own brand name. It seems that every studio owner or production facility manager we visit with, after they've pointed out the latest and shiniest thing the bank let them sign for, always takes the greatest pride in showing off the oldest and rarest goody in the place, working or not. It's not too dissimilar from the car collector/junky — here's the newest purchase, a 1992 'Vette with all the gee-gaws, but the *real* pride and joy is the '62 XKE, with both tops, sitting under the canvas out back.

It's really quite interesting, if you think about it. The phenomena transcends both logic and practicality, addressing pure emotion, as only the best musically related things seemingly can. In reality, your average piece of early tube or discrete transistor equipment hummed, buzzed, hissed and spit, in addition to its normal function of passing program material in a highly altered state. Tubes crackled and went microphonic, seriously altering performance with age. Transformers oozed goop when overheated, eventually crapping-out altogether. Diodes and caps died from pre-mature old age. Transistors cracked with a loud report whenever signal hit the voltage ceiling, and they notoriously took every nearby component with them when they shorted and let go.

Today, 20 to 30 years later, they still do all that, but with the added weight of several decades of component deterioration. Even worse, get two similar model numbers side-by-side and you'll hear a world of difference. This is a good thing? Where's the allure?

A clue resides in the nature of humans. Audio is more than a job for most of us, it's a prime love. For most, we were trying to get some guitar-thing brighter or bassier coming back off of tape well before we were trying to corner a pony-tailed cutie at a local dance. Many of the pieces of gear we now covet were items that we grew up on or had early memorable success with, as in: "I mixed my very first hit through that old tube compressor right there" or, "I cut (fill in player's name here) with this very mic back in 19XX" or, "I finally found an XYZ just like the one I learned on." Can you relate?

Even though there are many pieces of equipment today, courtesy of blown EPROM sub-codes and state-variable circuit parameters, that can clone an *element* of the sound made popular by a now antique piece of equipment, no contemporary electronic designer can (or would even want to) recapture *everything* that made the original piece of equipment perform the way it did, no matter how unique and desirable it may appear to us sound piggies. Older gear, with their manufacturer's propensity toward circuit simplicity and, with all due respect, oft-demonstrated ignorance of the currently accepted finer points of analog design, sounds the way it does precisely because of bad design and inferior components. What we hear is due to things such as huge iron coupling transformers, or 60Hz ac ripple on the B+, or non-complementary topologies creating serious second or third harmonic distortion elements. Cause and effect, now glamorized.

Are we guilty of glamorizing something we don't remember clearly? Absolutely. One has only to spend a little time with an old EMT 140, or a Pultec suffering from slipping component tolerances, or any one of a number of tube driven, transformer coupled, opto-element derived compressors from the '60s to remember why it was that we so anxiously embraced op-amps when they came along.

As the component parts and our means of manufacturing and measuring them got better, the quality of the gear *in toto* improved. But quality, whether measured by performance linearity or technical transparency, is often antithetic to musical character. Watch a musician: they'll choose the big, boxy-sounding, resonant acoustical instrument over the tight, flat one every time. They'll use words like warm, full, present and deep.

In comparison to new gear, does the older stuff sound good, musically pleasing, warm, blue with a touch of fire? Sure. Does it measure on par in the areas of dynamic range, noise floor, distortion component or TIM, spec-wise? Seldom, if ever. Could you find two pieces that worked or sounded exactly the same? Forget it. But maybe that's all part of the charm. Maybe it takes a better driver to get peak performance out of a flawed contender. Remember, each item from those early production lines was, in some small way, a "one-off". Each had a unique identity.

So, the allure exists. In this issue, we'll roll-out two new columns: R•E•P On-Line, promoting the advantages of electronic forums on modern communications networks, and R•E•P Handbook, the tear-and-save technical resource we promised to turn into a regular feature of the magazine.

And, oh, by the way, if you're interested in selling that old 15 pound audio thing with the big black knobs on it, give me a call. I've been looking for something that sounds blue, with a touch of fire ... ■

Mike Joseph
Editor

Letters

Kudos

From: Tony Madejczyk, WPTF-TV, Raleigh, NC.

In regards to your June 1991 "From the Top," I will be happy to take a few moments from writing and producing local spots to tell you what a great job R•E•P is doing. My favorite thing about R•E•P is that you do not have articles written by advertisers, or more specifically, ads written and laid out to look like editorial copy. The video trade journals are notorious for that! I have found the one audio/video piece per month to be *more* informative, *more* reality-based, *more* applicable to my professional needs, than many entire issues of *Millimeter* or *Post*. That's good for you, too bad for me.

The related articles on music production, live presentation, engineering, etc., are icing on the cake for me. I find it very entertaining to peek in on the world of hit record making or home studios for indy labels. Often, with appropriate compensation to BMI or ASCAP of course, some of this same music will end up on our air as a theme for a news piece. So it's all interconnected, really.

What can you do to improve? How to stretch a buck, obviously. The fat goose days of broadcasting are over. This puts more pressure on capital investment in equipment, we even get questioned about how much tape stock we buy. In stretching our buck, articles that help illustrate the economy or ease of use of a piece of gear can help us sell it to the owner(s).

The other thing I'd like to see more of, and not at the expense of what you're doing now, are tales from the front-line of video production sound — the techniques or recipes pros have used to enhance or "save" a production from collapsing into crap. Too many of today's college graduates (why you need a college education for this business is still a mystery to me) think we just get this equipment "out of the box" and plug it in and use it. Ha, Ha, Ha. That would not be creative, nor would we get the most use out of something if we did that.

From: Jake Brooks, Studio 80, Nashville, TN.

Reading each issue of R•E•P is like attending a good trade seminar; I find something I can use every time (which I highlight, cross reference in my database, and why I never, ever throw an issue away). Whether the subject is microphones, effects processors, or digital multi-track recorders, it's how that tool is used by humans that intrigues me. It's nice to be reminded that there's a human behind the wheel at R•E•P.

From: John Wiggins, HBO, New York

In response to your June '91 editorial I'd like to tell you that you're doing a great job! *dB Magazine* seems obsessed with sound reinforce-

ment in Indonesia and I only read *Mix* because of Steve St. Croix's column, so really — you're it! I have only one idea for you, maybe some kind of column, or article on cool analog mods, you know, those amazing capacitors you add to old Scully 2-tracks to increase erasure depth, and stuff like that. I think everyone has such a mod and everyone still owns an analog something. Anyway, carry on, I'm reading every page.

From: Andy Condon, Acoustical Symmetry, Thornhill, Ontario.

In response to your editorial published in the June 1991 issue of R•E•P magazine, I would like to mention that R•E•P is possibly the most useful of the trade magazines I get. My favorite articles are usually the more technical ones, and I find any competently written article about almost any aspect of electro-acoustics to be most interesting. I keep issues with such articles in my reference library for future referral. Keep up the good work.

From: Phil C. Mendelsohn, PCM Audio, Albuquerque, NM.

First, let me say that I find R•E•P to be one of most interesting and informative magazines that I have encountered, and certainly the magazine to trust and look to for pro-audio. It still stands head and shoulders above the noise floor of other publications. I would urge you to not succumb to the temptation to be like *MIX*, the *People* magazine of the recording world.

I prefer to see articles such as last year's "Where's the Zero?" and "Audio Noise," or articles such as "Headphone Distribution Systems," or "Interfacing Monitor Amplifiers" in the May '88 issue, rather than articles about why Studio X chose to move to a "smaller market" or why an industry trend will affect sales of International Widget's new gadget. I do realize that these latter are of some importance to all of us in the relatively small and absolutely quirky audio industry, but I would point to the slogan that is under the magazine's title ("The Pro-Audio Applications Magazine") and say that these issues are not *directly* related to *applications*. They should indeed be addressed, but not in a magazine with that particular epithet.

Now this is not to say that I am dissatisfied with the magazine's content, merely to say what concentration of material I would like to see. On several occasions an article in R•E•P has given me the background to go back and comprehend more fully an article in the *JAES*, which I greatly appreciate.

Audio certainly has some element of black magic, and R•E•P has always provided me with a solid understanding of some topics, and a bridge to other resources of information for some more esoteric topics (such as the basic principles and physics of analog magnetic re-

coding). I urge you to resist showing large percentages of big slick photos of the huge polished resort studios that I am beginning to suspect most of us spend very little time in, and stick to your guns by telling us about possible applications and how less well known applications of the past were accomplished.

In other words, try and keep the focus on tools we might use to solve problems, rather than looking at things that, while interesting, are not especially practical. While we all may not have to worry about whether it is more advantageous to buy or lease our new console, we do all have to obey the laws of physics, which are relatively few in our field.

R•E•P is a great resource. Keep up the good work!

Changing World

From: Don Geppert, Fanshawe College, Canada.

I read your editorial "From the Top" titled "Life After Sampling" in the July 1991 issue of R•E•P. As a professor of Recording Engineering at Fanshawe College (2-year program) and very long-time member of the "club" of professional recording engineers, I found your editorial to be a "brilliant breath of perception" at this point in time. When I started engineering, 8-track 1-inch was just being introduced, and I started recording on an old UA "tube" console bought from Wally Heider's famous Studio 3. No pan pots (ouch!), just a left-center-right switch to the 2-mix bus ... (double ouch!).

I recently visited many of the major recording Studios in Toronto, that hire our graduates, (also my old stomping ground for 20 years), and was shocked to find that they were slowly dying — engineers and assistants sitting around reading newspapers, large recording rooms sitting empty — scary stuff. One guy gave a serious demo of SSL's ScreenSound system, which by the way, obsoletes the synchronizer package that I purchased for my studio last year (but really, it's only money right?) .

I then visited some of my old production clients and hey, guess what, they're all compiling studio (or rather "production") packages right in their office, no glass, no booth, no mic, just racks of you know what, and of course "that computer thing" They just do the demo (or final) right in the office, call the client up and say, "Come on over and have a listen." Scary stuff, especially when you've come from a background like ours. One guy did convert a "closet" (really), into a "booth" with one, count em, one mic for the occasional acoustic requirement .

Your editorial hit me square in the head like the T1000's steel finger spike in "Terminator II". Our program must make some serious per-

Continued on page 8

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Letters

Continued from page 6

spective decisions on the direction of our education package if these young graduates are going to have success at employment. I mean really, where is the assistant engineer going to go nowadays?

Your last paragraph made my heart flutter. If you're crazy then maybe I must be crazy too, at least that's what my analyst keeps telling me when he makes another appointment! Maybe in 10 years people like you and me will make *big bucks* setting up mics and recording *real musicians* because by then, only a few of us "old guys" will know what a "mic" is. The entire industry may be so sick of the "canned stuff" that it will require some sort of "kinky" change — you know, like a bunch of musicians all playing some music together, at the same time. Hmmm, might work!

About R•E•P Magazine — still love it, have been a subscriber for years and my students all read it religiously. Thanks for a great publication.

SCMS Hell

From: Kenneth McGee, Lincroft, NJ

I am writing in reference to Ron Streicher's fine articles on "DAT in the Real World". I work in a facility which has two DAT's: a Panasonic SV-3500 and a Sony TCD-D10 Pro. These articles would have helped me immensely if I had been able to read them about two months prior! Here's the reason. Recently, I had done some freelance work at another studio that was using a Tascam DA-30. When I tried to make D-to-D transfers of my mixes at the other facility, I ran into Digital and SCMS Hell!

First, I attempted to copy from the Sony to the Panasonic, which only has S/PDIF I/O. To my horror, the tape was not even playing on the Sony! I then put the tape into the Panasonic, which played it with no problem. Whew! OK, I figure, I'll go from the Panasonic to the Sony. I put the Sony into Rec/Pause mode; I had signal! I've got you now, you little bugger! (So I thought.) I rolled the Panasonic, then the Sony. AAAAGGGGHHHH!!! No input on the Sony! Needless to say, I gave up!

Streicher's articles would have told me the following: 1) the Tascam DA-30 always writes an "11" status code on any recording it makes (Why?); 2) the Sony TCD-D10 will roll tape, but not play a tape with an "11" code (Why?); 3) the Sony TCD-D10 will monitor, but not record, an S/PDIF input with an "11" code (Why?).

He also detailed other shortcomings of "the scam of SCMS". But there is hope. Our Sony is being modified at the factory for "11" status playback. I found the "secret switch" inside the Panasonic that allows 44.1 dubbing. And we will also get the Bob Katz mods for the Sony.

By the way, Katz's company, Digital Domain, makes a digital format converter that allows you to go between and within AES/EBU and S/PDIF, along with control of the all-important Channel Status Bits, a 4-output DA, and other optional goodies. We have one on order. But so-called "professional" DAT machines should not put the professional through so much grief.

Wake up, manufacturers! The first company that makes a DAT where you can truly set your own level of protection (from the front panel, please!) is going to make a good deal of money.

Editor's Note: Contact The DAT Store in Santa Monica, CA; 213-828-6487 for more information on the Digital Domain FCN-I Format Converter.

Hot Juice

From: Robert Wilber, Electrical Contracting, Drexel Hill, PA.

In September 1991, an acquaintance inquired about my familiarity with balanced power. Admitting little exposure, he gave me your June 1991 R•E•P publication and pointed out the article by Martin Glasband, "Audio Noise and AC Systems". I found it very interesting. And more than a little frightening. Allow me to explain.

I am an electrical contractor and licensed electrical inspector. I can understand why Mr. Glasband might have encountered a certain level of disbelief and disapproval on the part of inspectors he dealt with. I'm also more than a little concerned at the apparent suggestion that the answer to this problem is a do-it-yourself project. And I will tell you why. It is certainly not unreasonable to pursue a course of action which diminishes the undesirable effects of "noise" in the recording process.

I understand what you proposed was balanced power, but I see one major shortcoming: By using any standard available electrically rated device (of a known NEMA configuration) you inherently include an extreme real hazard in the design. Any chassis grounded equipment that incorporated a standard connection device, like a male plug inserted into a center grounded 120V system, would, by nature of design, energize the shell of the equipment at 60V to true ground reference. Someone plugging a desk lamp into your "dedicated outlet" would effectively be laying an energized cattle prod on a table.

I understand your intent and heartily recommend that your industry association approach NEMA, and whatever suitable manufacturers exist, to develop and produce a suitable device classification and related equipment. This is how the industry grows. I recommend heartily that you submit a proposal to the NFPA, Battery March Park, Quincy, MA 02269, asking for information regarding the inclusion of the ap-

plication in forthcoming volumes of NFPA 70, otherwise referred to as the National Electric Code. (The code makers aren't there to rain on your parade. Their intention is the safe application of electrical power in all its uses and guidelines therefor.)

My congratulations to Mr. Glasband on his recognition of yet another situation which is not addressed by the electrical industry.

Editor's Note: We recently checked with The Zoo Studios at Music Animals in L.A. concerning their experiences with balanced power two years after install. To date, they have not had a single negative or electrically "exciting" experience with their isolated ground system. They report complete and total freedom from hums, buzzes and ground loops related to ac, especially referenced to devices notorious for such problems, eg: Fender amps and unbalanced audio equipment.

We agree with Mr. Wilber that anything having to do with system-wide power is serious business, and as such should have the early and complete involvement of a licensed electrical contractor to check for safety, code compliance and to "sign off" on the completed work.

A Sorry State of Affairs

From: Robin Whittle, Real World Interfaces, Melbourne Australia.

Recording engineers have had several decades to learn about the idiosyncrasies of analog tape — bias levels, bias intermodulation, erasure level, print-through, tape saturation, record and playback EQ, head alignment, head-tape contact anomalies, wow and flutter, etc. Now with digital audio they can forget about all of these and start worrying about a new set.

The technical information on ADCs and DACs which circulates in the other audio trade press is generally not very informative, so it is not surprising that many engineers are unaware of the finer points. The glossy brochures and gushing press releases try to convince them that they are hearing real 16-bit digital audio, but the reality is that the last one, two or three bits are usually noise or distortion. Phase response problems are hard to measure and are likely to be the cause of much of the criticism which has been directed at Digital Audio. Your magazine has an admirable record of trying to improve on this sorry state of affairs. ■

Send letters to R•E•P, Box 12901, Overland Park, KS 66282; or fax 913-541-6697. Letters must be signed and may be edited for length and clarity.

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CALL? Who you gonna

Recorded music's delivery system into radio broadcasting remains a highly controlled loop. Essentially, the music food chain snakes from recording studios, through record companies to radio stations and eventually to the record buying public.

And except for the influence of MTV, VH-1, TNN, BET, et. al., record sales are almost universally prescribed by those nefarious radio station playlists. As such, a powerful relationship exists between the music industry's "big picture" and the shadow business of measuring radio station listenership.

This arrangement lends intrigue to the murky profit and loss marriage of music/radio commerce. The net result is that those cold hard numbers used to define radio station superiority, indirectly determine who sells how many records and who gets paid.

With this in mind, we regretfully note that Birch/Scarborough research ceased operations of their Birch Radio division on December 31, 1991. The move leaves Arbitron as the solitary major player in the heavy business of measuring radio audiences.

Because potential abuse in any monopoly is a clear and present danger, advertisers and their agencies now face shaky ground when evaluating vehicles for their advertising. Complicating this event are radio industry doubts about Arbitron and the essential imbalance of any single source ratings system.

In quick response, a movement is afoot within the National Association of Broadcasters (NAB) to establish alternatives to the new ratings status quo. But, logic insists that the music trades, as the backbone of radio programming, will not remain unaffected. Specifically, the continued implosion of major radio business players forced by centralization of station rating shares will surely compress the already way-too-short radio playlists to wafer-thin proportions.

Time will probably deliver a competitor to challenge Arbitron's de-facto stranglehold on listener profile services. But, the wait may be painful. ■

They got coals in their

A new set of faces have joined the lines of autoworkers and investment bankers down at the unemployment office. It's you and me and us. As the recession grinds on, many record companies spent December passing out pink slips instead of bonus checks.

Among the hardest hit was Island Records with over half the staff shown the door. Nearly a third



Christmas stockings!

of the Thorn/EMI staff experienced layoffs at SBK, Crysalis and EMI. Last fall, Atlantic with the re-termination of the Atco label, sent over 70 people packing. Even mighty MCA has instituted staff cutbacks and tight-fingered spending controls to maintain stability during the weakest economic times the music business has seen since the early Reagan years.

The More Things Change:

From R•E•P (then-Recording Engineer and Producer) Jan.-Feb. 1971:

... Parasound, Inc. of San Francisco, CA., announces the availability of the new Orban/Parasound reverberation unit, engineered by Robert Orban of Menlo Park.

... George Martin concluded an R•E•P interview with William Wolf by saying, "The Beatles, four people together, did something nobody else had ever done before, and the fact that they're not together I think is a terribly sad thing."

The More They Stay the Same:

From R•E•P (then-Recording Engineer and Producer) Feb. 1981:

... from Robert Carr's article on Clair Brothers sound reinforcement of The Boss at the L.A. Sports Arena, "With inflation spiraling ever upwards, not many groups can afford to tour extensively, and fill the large arena so popular a few years back. Bruce Springsteen is one of those superstars who can sell out 16,000-plus seat venues for four nights in L.A. and still turn thousands of more away."

... Telefunken and Teldec recently demonstrated their "MD" (Mini-Disk) System before the Digital Audio Conference (DAC) in Tokyo. The joint proposed standard permitted one hour of stereo to be recorded on each side of a 5.3-inch disc turning 250rpm. Was Sony listening in? ■

PEOPLE

Rane Corporation recently promoted **Ray Bloom** to director of sales and marketing and named **Jeff Davies** and **Jon Ferren** as regional sales managers ... **Robin Yeager** has been appointed sales manager for Apogee Sound, Petaluma, CA ... WaveFrame Corporation has announced the promotion of **Jim Mercks** to vice president of engineering ... **Troy Jensen** was recently appointed general manager of RPG Diffusor Systems ... Symetrix, Inc. has appointed former Audio Control Industrial staff member **Rick Chinn** to the position of applications engineer ... I.E.D. has added two new staff engineers; **Tom Hayes** and **Patrick Mullaney** have joined the Louisville firm as software engineers while **Mark Young** has been named design engineer ... **Charlie Day** of The European Office has been appointed Apogee Electronics', Santa Monica, CA, exclusive European representative ... HHB Communications recently made two sales appointments; **Chas Rowden**, formerly with AMS, is HHB's new field sales manager; and **Tony Musgrove**, from Music Lab, has joined the company's pro audio sales department ... **Carl Reavy** has assumed the position of general manager of U.S. operations for Amek/TAC and **Lewis Frisch** has been named regional sales manager for Amek/TAC U.S. ... **William (Bill) MacKenzie**, formerly of Sharp Electronics, has been named full partner in RG International, an executive recruitment firm specializing in audio, video broadcast and electronics industries ... **Steve Metzger** has been appointed assistant sales manager of Audio Animation in Knoxville, TN ... Telex Communications has named **Tom Hansen** manager of sports electronics, pro audio ... **Dag Fellner**, managing director of Lyrec U.K. died suddenly during a family vacation to California in November 1991 ... ■

Trend Watch

The Cassette Lives On, and On, and On ...

The first recording made specifically for Digital Compact Cassette (DCC) technology was recently produced as a joint venture between Tandy Corp. and ProArte records. Featuring pianist Peter Nero, the recording includes Nero arrangements of standards from The Beatles, Stevie Wonder and Frank Sinatra. Apparently intended to demonstrate the sonic splendor of Tandys' new DCC product line, the Nero recordings also feature ProArte's All-Digital Surround Sound process.

Mistaken Masters

MCA records has admitted a mistake and has taken steps to remedy it. Investigative reports initiated by R•E•P's Dan Levitin discovered that inferior master tapes were erroneously used in the manufacturing of Steely Dan reissues on compact disc. Levitin confirmed his suspicion with original engineer Roger Nichols. MCA was already preparing to distribute the Steely Dan Gold-Expanded Edition (MCAD-10387), a compilation of Dan tracks taken from the proper masters. MCA plans to remanufacture the original Steely Dan releases also from proper masters and make these new versions available soon.

Send lawyers, guns and money ...

The sales potential of artists' names, pictures, and logos on caps, posters and T-shirts was once a bankable line item. As such, most modern artists established corporations to license and capitalize on this soft goods market.

But while the formerly robust touring business once delivered strong tour product sales, performance artists now frequently forgo tours or undersell arenas. And high ticket prices leave show goers with less disposable income for venue purchases. By contract, most merchandisers have long required artists to personally guarantee reimbursement of unrecouped advances made to them for failure to achieve sales performance minimums.

So often ignored in the boom days of arena rock, this potential payback liability is now a bonafide concern. The result is a growing list of merchandisers now seeking to enforce the personal payment provisions contained in merchandising agreements with even those "A" level acts.

Translation: The cash flow changes direction, as bands begin to write checks to cover merchandising shortfalls. As usual the attorneys still get paid. ■

"Fat cats don't hunt."

What Hartley Peavey said to President Bush during the president's inspection of Peavey operations Dec. 3, 1991, and immediately prior to the "Making it in America" ceremony in which the President cited Peavey's aggressive export posture as a model for American manufacturing.

Random Access

STUDIO UPDATE

Facility/Location	Details
NORTHEAST	
Theocratic Records/New York City	Purchased Yamaha DMR8 digital workstation for live/studio recordings for planned direct-to-CD mixing at Jah Works Studios (O'Brien, OR).
Pomeroy Audio/Brooklyn, NY	Recently purchased a CEDAR noise reduction system to augment its audio restoration services.
D&D Recording/New York City	Installed a new Sony APR 24-track recorder for its MIDI room.
The Hit Factory/New York City	Has completed installation of SSL's Ultimatum console automation system.
SOUTHEAST	
Doppler Studios/Atlanta	Has taken delivery of a second WaveFrame 1000 system.
Oz Recording Studio/Baltimore	Received an Ampex ATR 102 1/2-inch 2-track completely rebuilt by John Klett of Singularity Enterprises.
SOUTHERN CALIFORNIA	
Andora Studios/Hollywood	Recently opened for business with a 45' x 40' main room boasting 23-foot high ceilings. A 72-channel GML moving fader system is linked to the Neve VR-72 console and monitored on a pair of Genelec 1035As. Dual Studer 827 24-tracks are used.
Jerry Goldsmith/Los Angeles	Installed a Peavey AMR production series 2400 LED console for his home studio.
Redwood Digital Recording Studios/Woodside	Added a custom monitoring system utilizing T.A.D. components, White Instruments passive EQ/crossovers, powered by Bryston amps.
Enterprise Studio/Burbank	Has installed an 80-channel SSL 4080 G Series Total Recall console with "Ultimatum".
NORTHERN CALIFORNIA	
Robert Berke Sound/San Francisco	Recently acquired a Sony DVR-20 D-2 digital video tape recorder.
GREAT BRITAIN	
Abbey Road and Decca Records/London	Awaiting delivery of PD5050 digital audio conversion packages for their Mitsubishi X8620 and Sony 1630 systems respectively.
FAR EAST	
Hiroshi Sato/Tokyo	MTC Japan announces installation of a Soundtrax Quartz 48 console in Sato's home studio.
DESIGNERS	
Walters-Storyk Design Group/New Paltz, NY	Completed three NED Post Pro/Synclavier digital audio workstation suites and two central machine rooms at Electric Melody Studios in west L.A.
Russ Berger Design Group/Dallas	Expansion of Dallas-based James Neel Productions' 3,000-square-foot new headquarters, featuring three WaveFrame 1000 systems.

NEWS NOTES

In mid-1992, **R•E•P** magazine, along with its parent company, Intertec Publishing Corporation, is moving to new corporate headquarters, located at 9800 Metcalf, Overland Park, KS, 66212. Founded in 1886, Intertec is a wholly owned subsidiary of K-III Holdings, New York, NY which publishes 24 magazines, five newsletters and more than 250 technical books and pricing guides and a number of related publications.

BBE of Huntington Beach, CA, has successfully completed a "friendly" takeover of G&L guitar from Phyllis Fender, the widow of electric guitar legend/pioneer Leo Fender.

Mercenary Audio has been named the Focusrite dealer for the Eastern U.S.

Systems Development Group, manufacturer of the Art Diffusor Model P, and Pan Technical Sales & Marketing have finalized a sales and distribution agreement where Pan Technical will establish and distribute to European and Pacific dealers SDG's diffusor products.

The 4th-annual international trade exhibition known as **Pro Audio & Light Asia '92** is scheduled for July 8-10, 1992 at the IMM Exhibition Center, Singapore.

Dr. T's music software has completed a software distribution agreement with Soft-Kat (Chatsworth, MA) for its line of MPC and music related titles for PC, Mac, and Amiga computers.

PRODUCTION '92 has launched its 2nd-annual International Competition for New Media technologies. Media professionals are invited to submit their entries by March 15, 1992. For further information contact Christine Davet, International Competition for New Media Technology, 1276 Amherst St., Montreal, Quebec H2L 3K8; 514-842-5333.

PUBLICATIONS

Shure Brothers has announced the availability of its new publication, "Microphone Selection and Application for Church Sound Systems." For information on obtaining a copy of this 40-page pamphlet call: 800-257-4873.

"The Best of Analog Dialogue" is a new 224-page collection of the most useful and requested material from **Analog Dialogue** (a company-published technical and applications journal). Fax requests to Analog Devices Literature Center: 617-821-4273.

The Winsted Corporation has developed a free Cabinet Design Kit to help customers in planning and ordering cabinets for electronics equipment. ■

The 4200 Series. Designed For The Control Room, Not The Living Room.

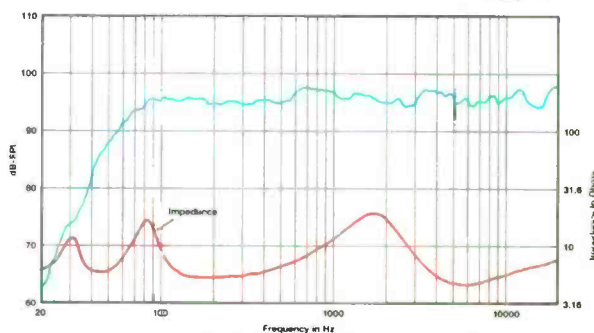
Today's recording studio has evolved into a multi-function facility which simultaneously addresses the specialized needs of music recording, film and video post, and radio production. In this environment, where the most critical listening often occurs in the final mix, close proximity monitors are often more important than the mains. The problem: most console top monitors, unfortunately, were designed for the living room not the control room. Until now.

With the 4200 Series we're taking our stand from where you sit: right where you work at the console. Designed, engineered and tested from this position, the 4200 Series is the first console mount monitor created specifically for the professional recording environment.

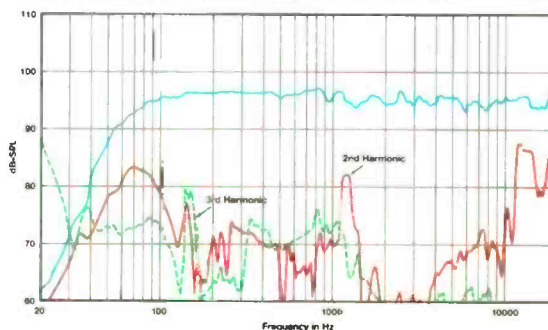
Both models give you pin-point imaging by delivering high and low frequency information to your ears at precisely the same instant. By virtue of their symmetrical design the 4200 Series monitors are mirror imaged.

And so nothing gets in the way of your music, the 4200 Series introduces our uniquely sculpted Multi-Radial™ baffles incorporating newly designed pure titanium tweeters and low frequency transducers. The combination of these technologies successfully corrects time arrival anomalies and eliminates baffle diffraction distortion.

4200 Series: console top monitors designed in the studio, for the studio, with sonic performance rivaling much more expensive monitors. 4200 Series: the shape, and sound, of things to come. Available at your local authorized JBL Professional dealer.



Frequency Response (Model 4206): 96 dB at 1 m, typical console listening levels



Distortion vs. Frequency (Model 4208): 96 dB at 1 m, typical console listening levels (distortion raised 20 dB)



JBL Professional
8500 Balboa Boulevard, Northridge, CA 91329

A Harman International Company

The Cleveland Quartet: "Dvořák Quartets Nos. 12 and 14"

Label: Telarc
 Produced by: Judith Sherman
 Engineered by: Jack Renner
 Editors: Henk Koistra, Judith Sherman
 Recorded at: Mechanic's Hall
 (Worcester, MA)
 SPARS Code: DDD

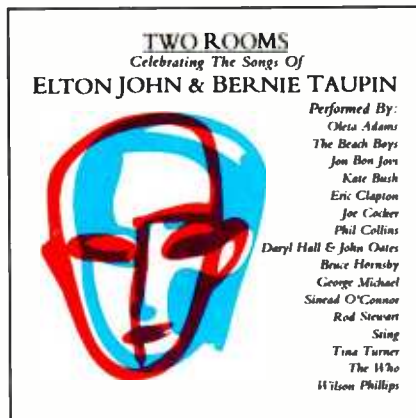


Comments: One of the finest natural ambiances we've ever heard in a recording. The mic placement perfectly balances the rich reverbs of Mechanic's Hall with a proximity to the instruments which brings out the nuances of each artist's performance. The ambience is rich and full without smearing or washing out any of the detail. The performances of these pieces are dynamic and inspired.

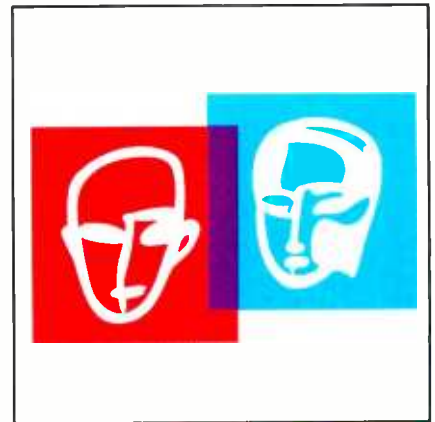
Telarc continues its laudable tradition of providing basic recording information to the purchaser. Mikes used were Scheops M-221Bs with MK-2L capsules. The console was a Studer 961, monitor speakers were B&W 801 Matrix, Series II, power amplifiers were Threshold S/1000 Stasis Class A/AB, etc. Digital editing was performed on the Sony DAE3000 and hard disc editing with Digidesign's Sound Designer II. The digital recording processor was an Ultra-Analog 20-bit, 128x oversampling A/D, custom engineered by Kenneth Hamann. All told, an excellent-sounding project completed on top-notch gear. ■

Various Artists: "Two Rooms" Celebrating the Music of Elton John and Bernie Taupin

Label: Polydor
 Coordinated by: Candace Strickland
 Produced by: John Astley, Glen Ballard, John Bon Jovi, Kate Bush, Eric Clapton, Phil Collins, Roger Davies, Gus Dudgeon, Daryl Hall, Trevor Horn, Bruce Hornsby, Chris Lord-Alge, Brian Malouf, George Michael, Billy Nichols, Aldo Nova, Obie O'Brien, Sinead O'Connor, John Oates, Roland Orzabel, Truman Stiles, David Tickle, Tina Turner, T-Bone Walker
 Engineered by: Richard Arnold, Francis Buckley, Chris Cameron, Steve Chase, Gus Dudgeon, Rob Eaton, Chris Lord-Alge, Ian Lynne, Andy Macpherson, Larry Millas, Peter Moshay, Phil Nicolo, Obie O'Brien, Dave O'Donnell, Hugh Padgham, Del Palmer, Jeff Peters, Chris Porter, John Reynolds, David Tickle
 SPARS Code: AAD



Comments: It's often hard to imagine how songs we've heard hundreds of times could have been done any other way. Even though those of us who have spent time in the studio have witnessed the many changes some songs go through in their creation, it's still hard to backtrack, to hear a completed song and tear it down mentally to its essence, to imagine some of the other musical areas it visited prior to arriving at its destination. Covers of well-known songs, especially when, as here, they are reinterpretations of the originals, hold a unique fascination.



Hearing the many different ways these 16 artists interpret the Elton John standards is fascinating. In some cases, parts of the songs which had seemed like mere icing — arrangement ideas and hooks, for example — reveal themselves to be inseparable from the song itself. The Beach Boys' version of "Crocodile Rock" retains the "lalalalalala" chorus; Wilson Phillips and Rod Stewart cop the acoustic piano obligatos during their verses of "Daniel" and "Your Song" respectively, and one realizes how integral these parts are to the song.

In contrast, other parts are easily separated from the song with no loss of song identity: the groove of "Border Song" for example, is entirely rewritten by Clapton adding a heavy Memphis blues groove with horns, while maintaining its songness. The Who give "Saturday Night's Alright" their full treatment: 16th-note-Townshend acoustic guitar strums straight out of "Pinball Wizard" and sequencer lines a la Baba O'Riley explode into the original's famous crashing guitar riffs.

Most of these artists retain their own individual identities through the tracks, which in and of itself is an interesting study in production and style. The sonics, engineered by a virtual Who's Who of top studio-meisters, are top notch, with the aforementioned Who cut and Kate Bush's "Rocket Man" among the high points. A must-have for everyone's library. ■

Dan Levitin is R•E•P's music production editor and a teacher in the music technology program at Stanford University.

NO AUDIO TAPE HAS EVER RATED SUCH INCREDIBLE RESPONSE.

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independent producer

"You can hit it 3 dB hotter without any distortion or bottom-end modulation. It's a mirror image of the source material." —Tom Tucker, Paisley Park Studios

"A lot of engineers and producers want to really be able to slam levels to achieve a certain sound. 3M 996 gives them more options and opens more doors, sonically speaking." —Barry Bongiovi, Power Station

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The Grateful Dead: "Infrared Roses"

Label: Grateful Dead Records
Produced by: Bob Bralove
Engineered by: John Cutler, Dan Healy,
Bob Bralove
Mixed by: Jeffrey Norman
Mastered by: Joe Gastwirt
SPARS Code: ADD



Comments: Someone once said it is the producer's job to make music out of the disorganized chaos on tape. This is certainly what Phil Spector did with The Beatles' "Let It Be", what Chris Thomas must have for "Dark Side of The Moon", and what Bralove has done here with "Infrared Roses." Bralove has taken sections of the "space" portion of different Grateful Dead live performances and weaved, crocheted and knitted them together to form a larger musical work, a work which forms a cohesive whole and comprises a focused musical concept. Bralove has done a first class job with this project.

Of special interest: The pieces cover a great deal of musical territory: percussion jams, introspective soloings and futuristic sound sculptures. The song "Sparrow Hawk Row" sounds like what you might expect to hear in Ten-Forward, the cocktail lounge on the starship Enterprise. "Magnesium Night Light" sounds like soundtrack music for "Terminator III." This is great stuff, on anyone's scale, and defies description or pigeonholing. It's worth the investment for a listen. ■

FOCUS:

JEFFREY NORMAN, Mixing Engineer, "Infrared Roses"

R•E•P: There's a lot of "active" panning and left-right stuff going on in the mixes. What did you use to get that?

JN: TCs — we had about six of the TC2290s at our disposal and there were a lot of in-time delays and panning with those. Bob (Bralove, the producer) had a real good idea of what he wanted with that.

R•E•P: The liner notes say that a lot of these tracks were combined from different performances ...

JN: We approached the overdubs in basically mix mode. Bob said things like "I want to take the basis of this tune from this show and overlay stuff from that show." Other times, we'd start with a general idea of where to begin, but we'd experiment by pulling things out — he'd have an idea of a certain color or image that he wanted to present in a segment.

We worked with safeties all the way through. We'd take out the stuff that wasn't working — by muting or erasing — then Bob knew where parts were that he wanted. If the part was on another 24-track, we'd just link two machines. Sometimes we'd spin something over to the 2-track and wild-sync it in. Sometimes he'd have something on DAT and we'd just play back the DAT against what we had, wild-syncing. If it was something where the timing was crucial, we'd dump the DAT over to an Otari 2-track with SR and SMPTE. With some things we got really precise on where the parts went; other times we were a little looser. We mixed directly to 1630.

R•E•P: How did the track "Parallelogram" come together?

JN: There's two segments in it. One segment lasts three minutes, where the drums start off and the two drummers are playing against each other, and that segues into Billy (Kreutzman) playing timbales and Mickey (Hart) playing "The Beast" — a huge set of big tom toms on a rack. Those had been performed as two separate sections and we combined them for this release.

The drums came from a 2-track DAT — left was Billy, right was Mickey. The album is mostly 60/40 real drums to sampled drums. Bob wanted the samples just to add some definition to what was already there. Because the source was only 2-track, if you wanted more kick or something, there wasn't a lot you could do. We did it by transferring the DAT to two tracks on the 24-track, Dolby SR at 15ips, so we could work on one drummer at a time. With EQ, we worked on each drum sound — we'd EQ to pull the kick out of the mix and then have that drive a new kick sound. Next we tried to do that with the snare and toms, but we couldn't EQ the individual toms well enough to pick them out individually. We had several Wendel Jr's and tom tom samplers set up, but we couldn't get an individual tom to trigger just the individual sound we wanted; the overtones were so rich that each tom was triggering everything. So Bob "played the board" by muting things at just the right spot. We only had the drum we were working on at the moment triggering the samples we wanted.

R•E•P: What reverb settings did you use on the drums?

JN: On the snare it's 480L on Large Wood Room, RTM 1.4, bass x6. We used 480 on as much as we could. If it needed another reverb, we used the PCM 70 a bit. The rest of the drums were 480 Jazz Hall, RTM 2.57, bass x3.0.

For the second segment, on "The Beast," we used a Quantec on program #24, "St. Peter's Cathedral Room," stock. We didn't have a computer so there was no way to adjust it. The timbale had 480L on the same Jazz Hall setting as before.

And here's an engineer screw-up for you: in the first part of "Parallelogram," remember that the two original drum tracks were on a DAT. At some point after we had all the samples together, I was putting something down on the 24-track. One of the original drum tracks was in *record* and I erased 10 seconds of drums that were an essential part of the kit.

R•E•P: So with that part gone off the multitrack, you had erased your triggers. You would've had to go back and start building everything up all over again.

JN: Exactly. After slamming my head into the console several times, I realized that wasn't going to bring the track back, so I calmly tried to figure out what to do. First, I took the DAT and transferred it to 2-track (Dolby SR with time code). I locked up the two machines — the 2-track and the 24-track, and started moving it (the offset) frame by frame until I got the part I hadn't erased to lock in. Then, once it was locked, I replaced the missing piece. ■



BIG EASY.

The M700 is a 32-buss production console series that combines sonic purity and a familiar, flexible architecture in standard configurations up to 128 input channels. Designed using a minimal number of active components, the M700's signal path is clean and efficient, which results in a natural sounding mix that's open, robust and transparent.

The ease and flexibility of the M700 Series can be extended by means of TASCAM's new Moving Fader Automation (MFA) package, a full-featured, stand-alone automation system which can be enhanced with a computer as a display terminal. The very responsive MFA package includes TASCAM-designed motorized faders with 12-bit resolution, along with capabilities for sub-grouping faders, mutes and solos.

If you haven't yet seen the remarkable M700/MFA production console in action, you can easily do so by calling (213) 726-0303. Or by writing TASCAM, 7733 Telegraph Road, Montebello, CA 90640.

TASCAM II.

Fresh Tracks

Michael Jackson: "Dangerous"

Label: Epic

Produced by: Michael Jackson, Teddy Riley, Bruce Swedien, Bill Bottrell

Engineered by: Bruce Swedien, Teddy Riley, Bill Bottrell, Bruce Forger, Jim Mitchell, Jean-Marie Horvat, Thom Russo, Dave Way, Richard Cottrell, Kevin Gilbert

Mixed by: Bruce Swedien, Teddy Riley, Bruce Forger, Bill Bottrell

Recorded at: Ocean Way, Record One, Larrabee, Westlake, Smoketree, Toad Hall, Record Plant (Los Angeles)

Mastered by: Bernie Grundman

SPARS Code: DAD/AAD



Comments: There aren't enough superlatives for this effort, technically speaking. The musical trend follows previous albums, meaning more groove, perhaps at the expense of melody. It is clear, however, that the members of the production team, notably Bill Bottrell, Bruce Swedien and Teddy Riley, have created a new standard, a "sound" that everyone will be trying to copy for some time to come. The bottom end is as good as we've ever heard; the machine tracks cook and move some serious air. In spots, Michael's vocals are a bit lower and more ambiently distant in the mix than has been the custom lately, but of course this will probably be the next trend in balancing.

Of special interest: Some of the 3-D and spatial effects are stunning. If you've seen the video or heard the track, there is a sequence at the beginning of "Black or White" where a kid is listening to music and his father comes pounding at the door, telling him to turn it down. The effects are so uncannily realistic, one finds oneself doing a double-take even after a dozen listenings.

Overall, the mixes are far from the sterile carefulness one might expect on such a high-profile, expensive project - they are occasionally loose and sometimes even a bit raw and gritty, all with great feel. Surprisingly, tape or preamp hiss (remember that?) shows up on several tracks, most noticeably on "Keep The Faith." One wonders whether it's there as art or artifact. ■

FOCUS:

BRUCE SWEDIEN, Producer/Engineer, "Dangerous"

REP: What are the sequenced sounds on Jam? There's one that sounds like a sleigh bell.

BS: Right, it is! It's a sleigh bell I've had in my barn. I brought it out from Minneapolis when I moved here. Rene Moore and I came up with the original concept for that piece and there's a bunch of really unique sounds in there — a drum loop that's an old groove thing and some new sounds that Rene and I played on drums.

R•E•P: What sequencer did you use for the album?

BS: For the techno-pop things that Teddy [Riley] was involved in, he did all the sequencing himself with Atari equipment. The stuff I did, like "Jam" and "Keep The Faith" is all Linn's MPC60. Rhett Lawrence did the sequencing on "Keep the Faith" directly on the MPCC60. I think feel-wise it's far superior to Macintosh-based stuff like Performer. I don't know what the difference is, but it seems like Linn's just wake up feeling good. The original samples were recorded at 96K on a Mitsubishi 86HS with B&K 4006s.

R•E•P: How did you get the vocal effects? A lot of it sounds like heavy compression and stereo phasing.

BS: I think it's SPX 1000 on a special chorus, with parameters I modified. My favorite compressor these days is the Neve 2254; it's a vintage, spectacular piece of equipment. I carry two racks of them with me.

R•E•P: What's that thing that sounds like a sequenced guitar on "Can't Let Her Get Away," playing the 1/8 note "chunk chunk" part?

BS: That was Teddy playing guitar — we sampled it on the Mits and then dumped it into a Roland stereo sampler.

R•E•P: The credits read "Recorded, mixed and mastered with the exclusive Quantum Range Recording Process." What's that all about?

BS: (Laughs) I'd rather not comment.

R•E•P: Hmm...(Long pause)

BS: Well, it's the space age accusonic. It's really a term to describe the way I multiplex multitrack tapes, whether they are analog or digital. I think the most dramatic sonic value it has is that it allows us to keep a lot more discrete stereo up until the final stage of the mix, which lets us keep the sound wider and fuller.

I have a penchant for recording true stereophonic images. By that I don't mean left-right-mono; to me that is about as interesting as yesterday's shirt. The most value there is that I'm able to keep a lot of truly discrete stereo images to the final mix, because the minute you bus a lot of those sounds down to mono you lose the polar pattern of the stereo and they become resultantly very very small. By keeping a lot of the sound of the original stereo miking, whether it's x-y or a-b or whatever, you can really improve the sound without any additional effort.

The problem with an x-y mic pickup is that the incoherent sound is very apparent, but it's not coherent, so it gives you a center-feeling image. It has a feeling of acoustics and all that, but if you really listen, the whole sound field seems to come from the middle. But it still has a big feeling of space.

With a traditional a-b mic pickup you get a great deal of left-right intensity. By combining those techniques you can come up with some incredible values. I never think about minimizing the number of tracks I use. I drive the studio people crazy. Kind of a "Tracks R Us" concept. It does burn up alot of tracks, but I don't care. With a-b the intensity difference between mics is vastly more apparent.

B&K went and made me a special calibrated stand for their omnis, which they offer for sale now. It's numbered and you can return the mikes to their original x-y position with great accuracy.

R•E•P: What's your favorite vocal mic these days?

BS: Last time you and I discussed mics we got into a lot of trouble. But I can tell you there's only one mic that's come out in the last decade which is truly remarkable, and that's the Milab VIP50. And the fact that I'm a Swede too has nothing to do with it. I used it on Ray Charles on "I'll Be Good to You" in "Back on The Block." He came into the studio right after the tracking and said, "What mic is that, I have to have one." ■



MORE POWER AND MORE PERFORMANCE

THE NEW DYAXIS. Now providing automated real-time EQ and Level Control for our 2 and 4 output virtual multitrack systems. Other advanced features include support of a 1 gigabyte hard drive for up to 10 hours of stereo recording, new full magneto optical capability and full sample frequency conversion.

SYNCHRONIZATION IS EASY. With the System Synchronizer and time code option, Dyaxis is a master of sample accurate time code based slave applications. Just a click of the mouse enables Dyaxis to lock to SMPTE, EBU, VITC, video, and film tach.

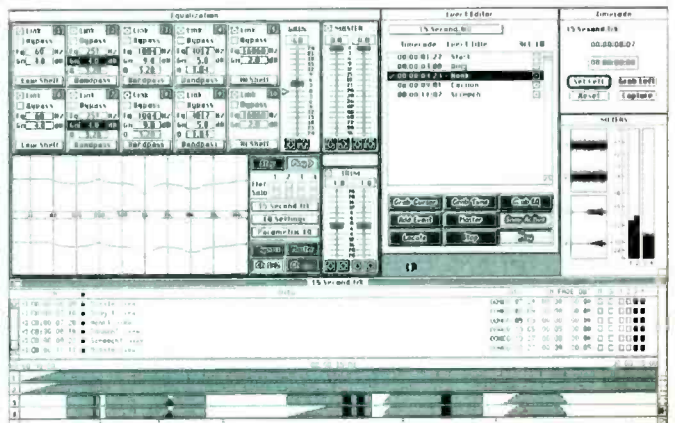
SUPERB AUDIO QUALITY. Through Studer Editech Corporation's own proprietary A-D/D-A converter implementation, anti-aliasing filter and analog

circuit designs, Dyaxis has achieved a worldwide reputation for outstanding sound quality.

RDAT. Dyaxis' integrated RDAT subsystem allows you to reliably back up 1.2 gigabytes of information on a DAT data cassette. Using our custom Studer-Backer II software, you can retrieve an entire job or a single sound effect quickly and easily.

DIGITAL COMPATIBILITY. Dyaxis communicates with and transcodes between all major digital formats such as DASH, AES-EBU, SPDIF, PD, SDIF, 601 and more.

STUDER DYAXIS — DESIGNED FOR YOU. With Dyaxis, you not only get the most up to date digital technology available you also get free on-line service and support from professionals who care. To find out more about the right Dyaxis system to fit your specific needs, call your Studer representative for complete details.



Obviously, our "smart" digital processors don't look like the old, traditional processors you're accustomed to. What may surprise you is that they don't process that way either!



Roland's custom VLSI chips give our Processors amazing power at a price that will astound you!

For example, here are some comments from Roger Nichols about his own Roland R-880 Digital Reverb.

"The detail with which you can construct a process is amazing! You can

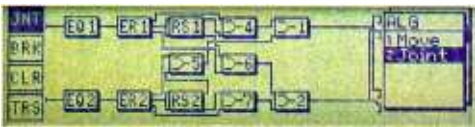
ROLAND'S "SMART" PROCESSORS. HOW DID YOU EVER GET ALONG WITHOUT THEM?

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

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



With 20Hz to 20kHz frequency response, greater than 90dB dynamic range, and less than 0.015% THD, the R-880's transparent performance provides natural ambience for acoustic instruments.



the chorus and go into the reverb,

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



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

Consider our E-660 Digital Parametric Equalizer. It's a new breed of studio tool operating entirely in the digital domain. Designed for the ultimate in sound quality and

ease of use, it offers eight bands of equalization in a variety of configurations. It even gives you 99 storage memories for individual curves,

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



It's a whole new way to look at reverbs. The R-880's effects exist totally in software, so you can create unique effects unattainable with other devices. Optional memory cards let you use Roland's pre-programmed effects, or you can use the same card and write your own. And after you've custom-programmed exactly what you need, these programs are stored into memory for future use!

each recallable at the touch of a button. And the "660" is MIDI compatible!

And while we're on the subject of doing things right, you should check out our SN-550 Noise Eliminator. First, it's affordable. But it's

Not only can you control analog and digital levels separately (screen 1), but the E-660 Parametric EQ lets you store and recall a precise EQ history, from microphone to master, either as an exact numerical setting, or as a representative curve (screens 2 & 3).



Laboratory-grade construction, components, and grounding techniques deliver a flat frequency response from 20Hz to 20 kHz, a dynamic range greater than 94dB, and 0.015 THD. (The screen shown lets you reverse the polarity of either or both channels from the front panel.)

also an extremely sophisticated, yet easy to operate, single pass unit that works in real-time.

And because all signal processing occurs in the digital domain, the integrity of the original signal is preserved at

every stage. We even put a hum canceler in the "550" that *really* works. As one of *R-E-P* magazine's testers put it, "Its hum cancellation capabilities are nothing short of amazing."



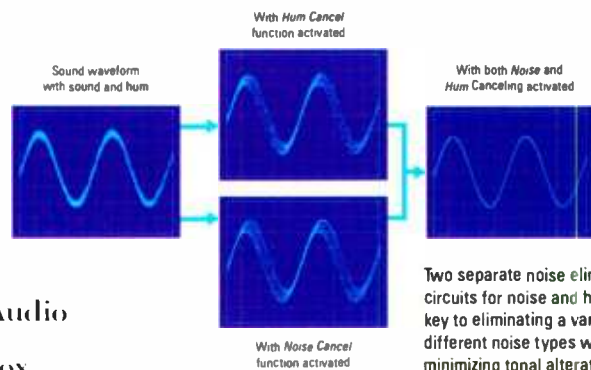
16-bit linear A/Ds and 18-bit D/As with 48kHz sampling frequency gives the SN-550 Noise Eliminator exceptional dynamic range and sound quality.

So before you buy *any* audio effects processor, you owe yourself a look at Roland's line of "smart" processors.

You really *will* wonder how you got along without them!

And don't forget to send for illustrated brochures on these, and other fine Roland Pro products, like the new DM-80 Digital Audio Workstation, the SBX-1000 MIDI Cueing Box and the Roland *Sound Space*™ Processor.

Call Roland at (213) 685-5141, ext. 337.



Two separate noise eliminating circuits for noise and hum is the key to eliminating a variety of different noise types while minimizing tonal alteration.



Use It or Lose It?

By Steve Lawson

Every organism has a life cycle. We learned that in 9th grade biology. You know — you're born; you live; you die. The same goes for equipment. Because our industry is ever-evolving, much of the equipment we purchase is as perishable as unpasteurized milk. It may become obsolete before it's even paid for. But there are some gems. Some gear was, and still is, built to last forever. But how do you know what will live on and what should be thrown away? It's not an easy question to answer.

It was more cost-effective to add the features we wanted rather than replace them with those that did more but didn't sound as "warm."

Some gear has a short life span. Mechanical pieces wear out or the manufacturer goes out of business. Other gear seems to be more in demand today than when new. If it's a piece that always sounded great it probably still sounds great, with proper maintenance and updating. The main reason for keeping a piece of gear is how it sounds. Maybe the piece in question "colored" the sound in a certain way that engineers and producers still love. Maybe the gear sounded bad when new and still sounds bad today — but producers who work in your facility will only work there if you have one. That's reason enough to hang on to otherwise oddball equipment. And maybe what sets you apart from your competition is the fact that

Steve Lawson is president of Lawson Productions, Inc. and general manager of Bad Animals, Seattle.

you've been around long enough to have some of the "classic" equipment that is now sought after.

At the moment, our company is undergoing major expansion. Our new room is large enough to handle a 50-piece orchestra. It boasts a brand spanning new 64-input console featuring VCA and moving fader automation at the touch of a button, at a cost more than many waterfront homes here in the Northwest. The new room has access to two new 24-track analog recorders, 24 channels of noise reduction and twin digital multitracks. But the room also has access to 12 old modules from vintage consoles offering that "other" flavor of equalization requested by so many producers. The room is complemented by numerous older EQ's and classic tube microphones in a wide assortment of models.

Our two other music rooms feature 20-year-old vintage consoles that have been totally rebuilt from the faders up. We considered selling off these boards a few years ago, but we kept them for a number of reasons.

The first reason was audio. People love the way some of the older consoles sound. They spend a lot annually just to buy the equalizers. We kept our full-blown 32-input consoles because they had such great history and had been used in making major hits for artists such as Heart, Steve Miller, Bachman Turner Overdrive, Elton John, The Spinners, Tower of Power and more. Pull out the old vinyl or the new CD's made from the old masters. They still sound great — the "classic" sound of those old consoles.

The second reason we kept the consoles was a financial one. It just made money-sense to update the consoles rather than to replace them. Because of the sound quality of the consoles when new, it was more cost-effective to add the features we wanted rather than replace them with those that did more but didn't sound as "warm." We added eight discrete sends because producers asked for that feature. We replaced all the relays and capacitors because they were tired and needed to be swapped out. We changed resistor values where necessary to increase bass response. And we added hard disk-based automation to both consoles, with moving faders in one room and VCAs in the other.

The response from engineers and producers alike has been most gratifying. They love the thought of tracking and mixing on the new board in our main studio and overdubbing on our old classic consoles. They savor using the older input modules along with some of the newer available outboard input modules. And those old equalizers share racks with the latest tube EQ's. The old tube limiters share space with the new tube limiters, but not everyone favors the new stereo compressors so they share rack space with the 20-year-old units. The latest digital reverbs are available, but many engineers and producers still prefer the sound of our old plates on vocals and drums. And one

producer even asks to use our old spring reverb — he just loves that spring sound.

One producer even asks to use our old spring reverb — he just loves that spring sound.

So how do you know when it's time to get rid of something? If it's broken, you can't get parts and it wasn't that great to start with — throw it away. If it's all mechanical, getting old and causing downtime — sell it. We just sold two very old 24-track recorders and one not so old, but out of production (in fact, the company no longer makes audio equipment). These three machines had mastered many hits and worked very hard for us for many years. They were still doing the job, but our facility runs 20 hours a day and any downtime causes us morale and customer goodwill problems, as well as billing nightmares. So, it was time for us to sell these working machines. The people who got them paid far less than the cost of new machines and they got some great gear. But it's older gear and will demand more maintenance than a piece of new equipment.

We've sold very few pieces of gear over the years, but have bought quite a bit of used equipment. Some of the equipment we purchased spoiled like old milk, but most of it is still in service today. We might not use all of it that often, but when it's called for we're heroes. It feels great to roll out our old organ once in a while, and our oldest drum kit is still used as often as our newest.

What and when to sell, or buy, is more of an artform than it is a science. Different authorities have widely divergent opinions on this subject and no one viewpoint is the final word. Being able to network and discuss topics such as these with your peers is a great reason for being a member of SPARS. You can get together with fellow members locally, and you can get on the phone and contact your colleagues from all over the country. Chances are good that you will sharpen your own views, and help to shape our industry by sharing with others. ■

The Society of Professional Audio Recording Services is the industry's best source of business information. For details on activities or membership, contact SPARS at 4300 10th Ave. N., Lake Worth, FL 33461; 407-641-6648; fax 407-642-8263.

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The Global Network

By Rick Schwartz

Digital networks will change the way we work and live in the '90s. You may have already heard that the phone company will be expanding their service to include simultaneous voice and data capabilities. But did you know the FCC is also considering allowing them to carry cable television programs and other services over their wires? Things like 30 pay-per-view movie channels, picture-phone service, interactive television and a "video-on-demand" system that allows users to electronically select from a remote library and control the images with VCR-like fast-forward and rewind capabilities. Although this sounds like a scene from some science-fiction movie, all of the above services are already in use in special test markets. Imagine the digital networking potential once everyone has data lines installed in their homes and offices. If you think this has nothing to do with recording studios — you're wrong.

Most studios are already using digital networks, even though they don't realize it. Let's look at a few examples. If you own a personal computer, you use a digital network every time you print on a laser printer. If you've ever done a sample dump from one MIDI keyboard to another, you've sent a digital sound file over a very simple network. Although MIDI can be used to send packets of digital data, it is very slow. (In the future, make sure your samplers will support digital dumps over SCSI or RS-422 lines.)

Most studios are already using digital networks, even though they don't realize it.

For more complex setups, Passport's Alchemy allows users to send digital samples between a network of samplers. Once a sample is transferred into a computer it can be edited, mapped and sent to any sampler. So it doesn't matter whether your sounds are from an EIII, an Akai S-1000 or a Roland S-770. While you're at it, it's a good idea to store a copy onto your com-

Rick Schwartz is a contributing editor to R•E•P and director of post-production at Music Animals, Los Angeles.

puter's hard disk, so you can start building your own universal library of AIFF format sound files. There are several ways of expanding your MIDI digital network beyond 16 devices by using Opcode's OMS software or a Mark of the Unicorn MIDI Timepiece, which allows the Macintosh to talk to MIDI devices.

Every Macintosh computer has powerful networking functions built-in that allow its users to share resources such as printers and modems. All you need to connect computers is low-cost phone connectors and regular phone cables. By using the second pair off your phone wiring (yellow and black) you can link computers in every room.

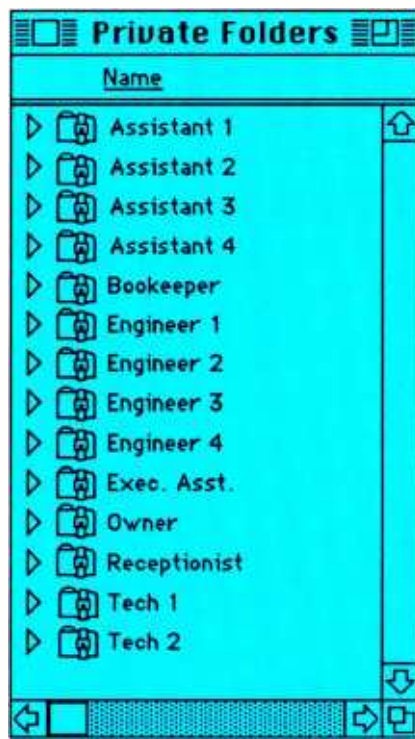


Figure 1. Private Folders.

THE PAPERLESS STUDIO

Apple has always promoted the concept of the paperless office. What about the paperless studio? Once you've connected all your computers to the network, you need to set up file sharing. File sharing tells the computer which folders will be shared, creates users and groups and setup access privileges. This is well documented in Apple System 7.0 documentation, so I won't waste time on it here.

There are three basic types of folders: private folders, public folders and drop boxes. Private folders are only available to a single user or a group and can not be accessed by anyone else. It's common to set up a private folder for every user or department (See Figure 1). A drop box is like a mail box — things can be put into

it, but not taken out, except by its owner. If an engineer wanted to submit an invoice to a studio's accounting office, he could simply leave it in their drop box (See Figure 2). Public folders have no security and are available to anyone who can access a server. Public folders are good for documents or applications that need to be made available to every user — things like stu-



Figure 2. Drop Boxes.

dio menus, killer drum samples or disk optimization software. I also recommend you have a studio Rolodex that is available to every room. TouchBase or Dynodex work well.

Digital workstation manufacturers are also getting into the networking act. Solid State Logic offers a system called Sound Net that allows multiple users of ScreenSound to access up to 16 SCSI devices. Editors can access hard disks by connecting various types of storage media to their workstation using an automated on-screen patchbay. The system also has a system-wide database that allows users to quickly search off-line optical disks for sounds.

Sonic Solutions is introducing a high-speed network using optical fiber to connect their workstations and peripheral devices, including DAT machines, CD printers and SCSI hard drives. This makes it possible to share all storage and I/O resources, which allows "network-wide" editing.

CHEAPERNET

There is another low-cost alternative for DAW users which works well in situations where several editors need to share a central sound effects library. By creating a file server for sounds instead of programs, several editors can share the same disk (although only one person can edit a single sound file at a time). Most of the time sound files are copied from the SFX server to an offline editing disk after they have been selected. For optimum performance, use a dedicated file server running AppleShare software. If you need to transfer large sound files, an Ethernet card would be a worthwhile addi-

Continued on page 64

In an age of disk and digital, why buy analog?

We know there are some applications where our 32-channel digital machine, the DTR-900, is the only answer. But if your business is such that you can do anything you want to do in the analog domain, and at the same time do less damage to your budget, then our brand new analog 24-channel MTR-100A may be the perfect machine for you.

When you consider that the MTR-100 will literally *change forever* the way engineers interface with audio machines, and

transport is pinchrollerless to give you the legendary tape handling ballistics of our MTR-90.

What's more, with its optional EC-103 chase synchronizer, the MTR-100 maintains frame-lock in forward and reverse from 0.2X to 2.5X play speed, and will typically park with zero frame error.

Then, there's the sound. New cylindrical-contour heads built by Otari especially for the MTR-100 result in remarkably low crosstalk and outstanding low-frequency performance. Pre-amps are located directly beneath the heads to further improve frequency response, and HX-Pro* is built-in for enhanced high frequency headroom. (An optional internal noise reduction package houses Dolby* SR/A.) Add all these features to gapless, seamless, punch-in, punch-out, which is also built-in, and your

MTR-100's sonic performance will rival, or beat any digital machine in the world.

So there you have it. With these powerful benefits available in analog, does it make sense to go digital? Sure, for some applications. But analyze your needs carefully before you buy. For many applications, a hot

analog tape machine like the MTR-100 is the right choice.

And because we can see both sides of the question, put us to work. We have information that can help you make the right decision. Call Otari at (415) 341-5900 for the "Technology You Can Trust".



Reel motors that approach one horsepower are driven by pulse width modulation amplifiers to tape speeds up to 474 ips.



The MTR-100's auto-alignment saves you hours of time by eliminating constant tweaking and re-tweaking between sessions.

that this new way will save you hours spent in non-productive time, the analog choice begins to make even more sense. You see, the MTR-100 features full Auto-Alignment that allows total recalibration of the record and reproduce electronics. This means you can compensate for different tapes in a *fraction* of the time that it previously took, and your studio is not bogged down with constant tweaking and re-tweaking between sessions.

And if you think digital machines have a corner on high performance transports, think again! The MTR-100's new transport incorporates reel motors that approach one horsepower—you'll get fast wind speeds of up to 474 inches per second! Of course, the

Trademark Dolby Laboratories Licensing Corporation

OTARI



Welcome to the Forum

By Tim Sadler

Before the end of the millennium all electronic communication will be digital. Bits will know no borders. Data will be ductile. You're not going to get a vote on virtual reality. It's going to bleed into your home and business through every electronic orifice in the room.

The broadcast/music/motion picture industries, publishing industry and computer and consumer electronics industries are experiencing a joint metamorphosis. If we are to believe the Toffler's, the coming powershift will place the purveyors of information at the top of the heap. Since both this magazine and you, its au-

dience, are in the communications business, it's time to start preparing for our positions of responsibility.

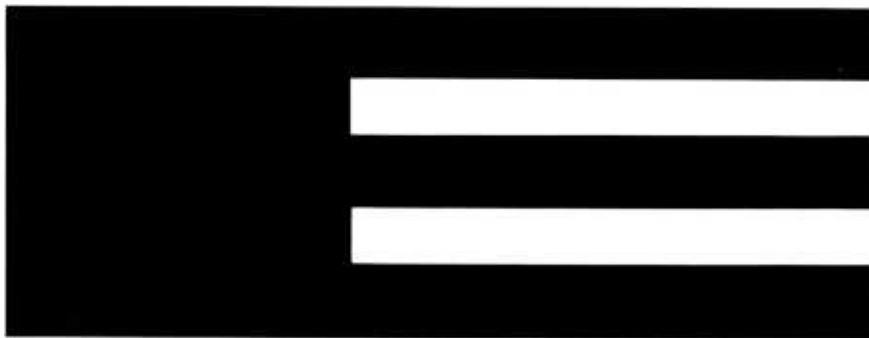
I'll be perfectly honest, I don't do much audio engineering these days. I spend 60-70 hours a week strapped to a computer keyboard, hacking out application code designed to make the work of those who are engineering (and those who support them) a little easier and maybe a little more fun. I don't manufacture a damn thing. I even deliver my product digitally via the telephone network. I don't remember which musician it was that, 20 years ago, wanted to phone-in his 'part', but today I do just that. Even these words were transmitted digitally from my electronic cottage overlooking Cape Cod Bay, to my editor at R•E•P. Its our own little virtual reality. I'm not really in the office next to Mike Joseph, but it is virtually the same thing.

I spend a lot of my time digitally connected to clients, colleagues, friends and family and I have a desktop full of digital tools to help me. If the desktop computer is the man-machine interface to the digital world then the modem is the machine-machine interface. I spent many years working with computers before I hooked

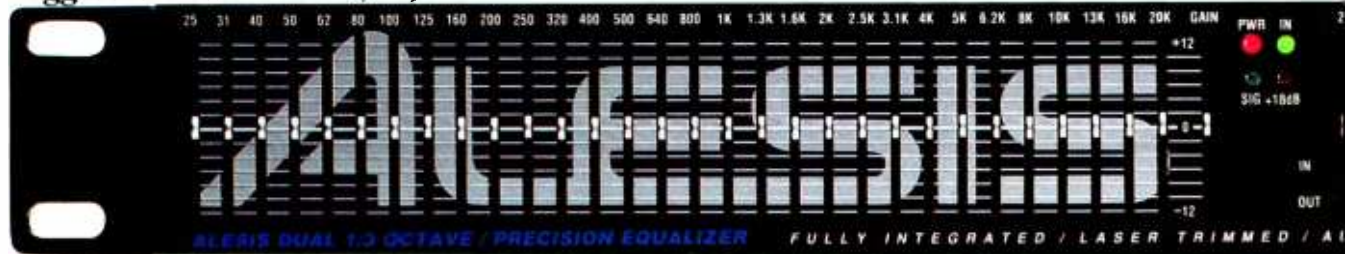
up my first modem. That day the world got smaller and faster and I have never looked back. The first time I tapped into the digital infoworld that lies at the other end of the phone line I was hooked, no pun intended.

Arguably, my most important digital connections are the E-Mail and professional message forums of the CompuServe Information Service. Through it I receive the support of hundreds, perhaps thousands, of nerds just like me here in the U.S. and in dozens of countries around the world. And that support is always at my finger tips, literally! I log on to the on-line service, ask a couple of questions, and within hours, I have multiple answers. No warranties, but no hype. Just a lot of cheap but professional advice, mostly from people I've never laid eyes on. And when I'm not asking questions or getting answers, I eavesdrop on some of the great minds of my chosen computer language. An on-line message forum is a running conversation, many running conversations really, open to all comers. Have you ever picked up a good engineering tip while swapping war stories with other engineers and producers. Well, I do it digitally every day and many of them don't even know they've helped

Tim Sadler is president of IntraMedia, a software consultancy. He can be reached through his CompuServe address: 72007.1113.



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1/3 octave ANSI/ISO centers, and features ± 12 dB of boost or cut so you can really dig in where you need to. Plus, to protect your speakers if power is interrupted, we've included Auto Power Muting.

And thanks to our exclusive Monolithic Surface Technology™ you get two channels instead of one in a one space 19" rack. For only \$249.

me. In fact, I log on for several minutes each day just to download the contents of selected message forums. Those of you more MIDI than not and connected to Compuserve's MIDI Forum, already know what I'm talking about.

This all-important digital connection is facilitated by other tools of the digital trade: the computer itself (mine are Macs, but operating systems are becoming increasingly interoperable and therefore irrelevant) and a modem, that technical marvel that modulates and then demodulates the digital data and software. Software is the key to making on-line information really accessible. I had a Compuserve address for two years before I really started to use it. The navigation of mature services, such as Compuserve, suffers from its command line heritage. Using Compuserve without specialized front-end software can be painful and expensive, but bring the power of a program like Navigator to bear and you begin to tap the real power of digital delivery.

That's where the idea for "R•E•P: On-Line" was born. If there is all this great digital communication going on right under our noses, why isn't R•E•P, whose readers' lives revolve around ever more digital communications, part

of that digital world? Why shouldn't our readers be able to tap the R•E•P archives for technical articles and references or instantly and directly address our editors to praise or pan their latest efforts? In fact, why should our readers have to wait, sometimes as long as a month, for breaking industry news and analysis? Why shouldn't manufacturer's provide product update and other technical information for our readers to access? And why not sponsor live, on-line (virtually real) conferences with the visionaries of our industry?

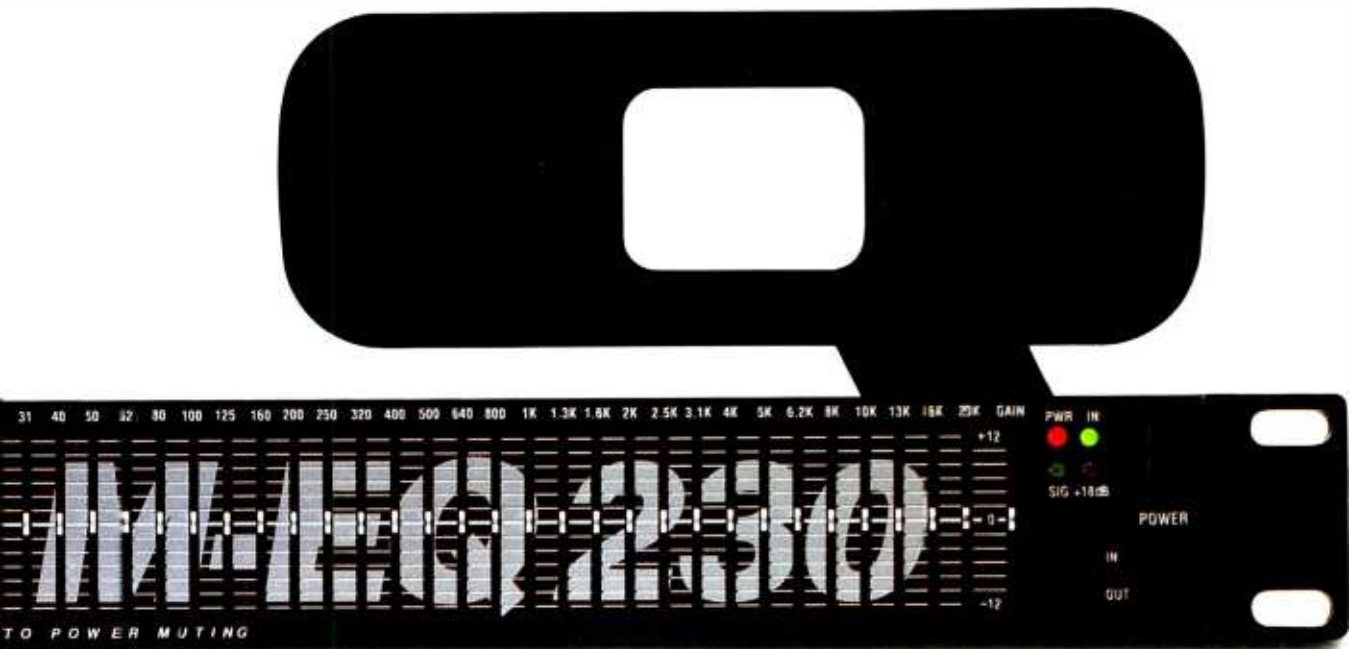
But most importantly, why not provide a forum for our readers to communicate with each other, a place where they can traffic in that storehouse of information that is the professional audio community. Believe it or not, studio time is not the most valuable commodity this industry has to offer. Two people can't use the same studio time simultaneously. A good production tip or technical tidbit is far more valuable. It can produce results for everyone who wants to make use of it.

Beginning this spring, R•E•P will instigate a professional audio forum on the Compuserve Information Service. "R•E•P: On-Line" will appear on their MIDI Forum, and although R•E•P's

focus extends well beyond the bounds of MIDI-related interests, we think the MIDI forum will provide a hospitable and established environment for launching "R•E•P: On-Line's" professional audio focus. When developed, "R•E•P: On-Line" will offer our readers who choose to join us on-line, an advance look at each month's important features, direct access to the magazine's editors, on-line conferences with audio industry insiders, a message forum for open discussion of pro-audio topics and libraries of R•E•P archives (both from the magazine and eventually of message threads), resource references and manufacturer's product releases and updates.

Each month in R•E•P, the magazine, I will report the highlights of the past 30 days of on-line activity in a continuing effort to light a fire under those who have not yet made the digital connection.

Next time in this spot, I'll give you the details on how to make the digital connection via Compuserve, our contact numbers and access protocol. I'll also tell you where to find good deals on modems and software, and what to look for when you visit us on-line. See you then!



With audio performance rivaling the very best, the M-EQ 230 is a great EQ that doesn't cost a lot of money. Now you can finally get excited about an equalizer.

When it's time for a little EQ, get a lot of EQ with the Alesis M-EQ 230 Precision Equalizer. For mixes, instruments and PA, there really isn't any other choice. Ask your Alesis dealer.



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Optimum Analog Performance

ANALOG?

Yes, despite the mounting digital wave there remain important roles that analog-recorders still play. For one, analog is a proven, stable format, while digital technology has yet to settle down. Re-writeable optical is virtually here, and even crystal-holographic recording is no longer science fiction!

For another, the cost and functional advantages of analog, considering editing, vari- and double-speed and portability from studio-to-studio or country-to-country remain substantial. By necessity or by design, many of us choose to retain significant investments in analog.

There is a price for analog's convenience in today's CD-spoiled marketplace: a requirement to squeeze out every last one of those analog dBs. Let's start by looking at bias. We'll briefly cover the basics, but hang in there. We may well cover some material you've never heard before. The emphasis on this will definitely be practical.

BIAS BASICS

Bias for magnetic recording is a stable, high-frequency electrical sine wave at a voltage amplitude 20dB-or-so above nominal signal level. Analog recorders always mix input with bias before sending it to the record head. What would happen without bias? The transduction of transient magnetic energy in the record head to permanent magnetization patterns on tape would be highly non-linear. Recorded sounds would be unrecognizably distorted and noisy.

Tape recorders employ a single bias oscillator, which feeds, via a separate amplifier for each, the head-windings of all record and erase channels assigned to record mode. If the oscillator is bad, no channels will record properly or erase. Separate amplifiers provide different amplitude ranges for bias and erase, and allow fine level adjustments.

If just one channel fails to record or erase properly, suspect the associated amplifier. The head itself, the cabling between amplifier and head and intervening connectors are also potential failure sites. Even a tiny chunk of grease-pencil over a head gap can block recording.

REAL VS. IDEAL

Ideal bias waveforms are sine waves. Real bias, however, includes distortion. Unlike other areas of audio, second and other even-order harmonics in bias are more damaging than odd-order harmonics. Even-order harmonics

impose a dc voltage on record head windings, directly distorting program signal.

Use a spectrum analyzer, or a voltmeter and filter-set to check the bias waveform at the output of the amplifiers. Second-harmonic distortion should be extremely low. If a spec for your recorder isn't available, you may get some idea of correct performance by checking several units of that model.

FINE-TUNING

The frequency accuracy of bias is critical, not so much for its impact on recording quality, but because bias-traps may not properly null out-of-frequency bias, and erase-peaking resonance-circuits may not properly boost it.

The absolute amount of bias applied to tape affects every sound-quality parameter, so include fine-tuning of bias level in every electronic alignment of an analog recorder. Tape data sheets, available from tape manufacturers or distributors, provide most of the relevant information (data may not be given for the speed you use; many sheets provide data for 15ips only). Bias levels greater or less than optimum, engender more harmonic distortion, more modulation noise, less medium and long wavelength headroom (1kHz and below) and problems with high frequency response of the tape.

All tape is formulated for optimum performance at just one speed, for which all parameters reach their optimum value at the same, or nearly the same, bias level. Most professional tape is designed for 15ips. Advantages of slower or faster speeds must be weighed against the performance penalty of "misusing" a tape by choosing a non-design speed.

OVERBIASING

The most common biasing technique, from which the term "overbiasing" arises, exploits the progressive decrease in short wavelength headroom with increasing bias. This effect emerges from spacing or thickness loss: For a given program signal amplitude, the shorter the wavelength (the higher the frequency), the less it penetrates the tape's oxide layer, so fewer magnetic domains are available for recording. A bias-level sufficient to excite tape down to its backing is optimum for long wavelengths, but too much for short wavelengths, which then decrease in recorded level.

To overbias you need the proper test-signal frequency for the speed you're using, and the proper input amplitude for that frequency/speed combination. The recommended overbiasing frequency for 15ips is 10kHz, equivalent to a 1.5mil wavelength on tape. To employ the same wavelength at other speeds, bias 7.5ips at 5kHz and 30ips at 20kHz, fed in all cases at nominal (0VU) level. If using a 10kHz signal at 7.5ips (0.75mil on-tape wavelength) reduce the input level by 10dB. Also critical is the gap width of your machine's record heads. The narrower the gap, the more bias needed.

Some tape data sheets provide a table relating overbias in dB to common gap widths;

others recommend that you derive proper overbias from the distortion nulling technique covered in a moment. The service manual for your recorder may provide a biasing recommendation for your tape type.

PEAK BIASING

Closely related to overbiasing is biasing for peak sensitivity at medium wavelengths. Most tape formulations provide maximum sensitivity for 1kHz signals (at 15ips) at a bias level at or near the optimum level for other parameters.

The downside of this very simple technique is two-fold: first, the 1kHz sensitivity-peak is rarely precisely at correct bias for nulling distortion or noise; second, this peak is broad, producing ambiguity in setting. I do not recommend peak biasing.

DISTORTION NULLING

The next two biasing techniques are more difficult, yet more precise than overbiasing. In the first, you bias for minimum harmonic distortion in the recorded signal. Optimum bias depends, as noted, on record-gap width, and on the geometry of the head/tape interface. These parameters change slightly from one head to another and even within a head as it wears. Tape formulations vary, as well, from batch to batch. Biasing for minimum distortion inherently takes all of these factors into account.

Proceed as follows: Record a stable, low-distortion 1kHz sine wave, at reference level, using the channel under adjustment. Read the THD-plus-Noise off tape using an auto-leveling distortion meter, such as contained in the Audio Precision System One. Carefully adjust the bias level to obtain the distortion null.

NOISE NULLING

Perhaps the least common technique is biasing for minimum modulation noise. Similar to distortion nulling, this technique automatically accounts for all relevant factors. The advantage of noise nulling is that you require only an oscillator and your ears. The catch? Proper application takes care and practice. Also, some tape formulations exhibit a sharp and deep distortion null but only a shallow noise null; for such tapes use distortion nulling as described above.

Record a low distortion 20Hz sine wave, at reference level, using the channel under adjustment. Get in the ballpark by adjusting bias for maximum recorded signal. Now fine-tune by carefully adjusting the bias level for minimum audible noise. Since absolute noise diminishes as bias is increased beyond optimum, even while relative noise continues to rise, this technique demands a light touch, a good ear and loud monitors (be careful!). Nevertheless, with care you can properly bias any analog recorder this way with no additional equipment or information.

Try all techniques to find which works best for your particular choice of tapes, operating levels and program material. ■

M. Raymond Jason is an electronic engineer at National Public Radio in Washington, DC.

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THE R•E•P INTERVIEW

The quiet man speaks on engineering, artists and avoiding pigeon-holes.

By Dan Levitin



In the span of just a few months, he went from engineering Def Leppard to Rosanne Cash; later from Edie Brickell to L.A. Guns. Stubbornly refusing to be typecast in an industry which often seems to thrive on such pigeon-holing of its producer/engineers, David Thoener's ears have been in demand for over 15 years, and he has added his touch to scores of records spanning many musical genres.

A partial list of artists whose records bear the Thoener touch includes Bruce Springsteen, John Lennon, AC/DC, Triumph, Dolly Parton, Stanley Clark, Carly Simon, Nelson, The Hooters and Lita Ford. Soft-spoken and intelligent, Thoener (pronounced "Tho-ner") talks about Def Leppard's mega-platinum "Hysteria," how he approaches a mixing day, how he got his start (would you believe cleaning ashtrays for Shelly Yakus?), and why he never wanted to do an interview before.

R•E•P: How did you get involved with Def Leppard's "Hysteria"?

DT: I was one of a few different guys who ended up recording it. Neil Dorfman worked on it for the first three months, but had to leave because of other commitments. I worked on it for three months and then left, and Nigel Green took over. Nigel had been my assistant many years ago on AC/DC's "For Those About to Rock," which Mutt Lange produced. Then Mike Shipley mixed it.

R•E•P: When did Mutt get involved?

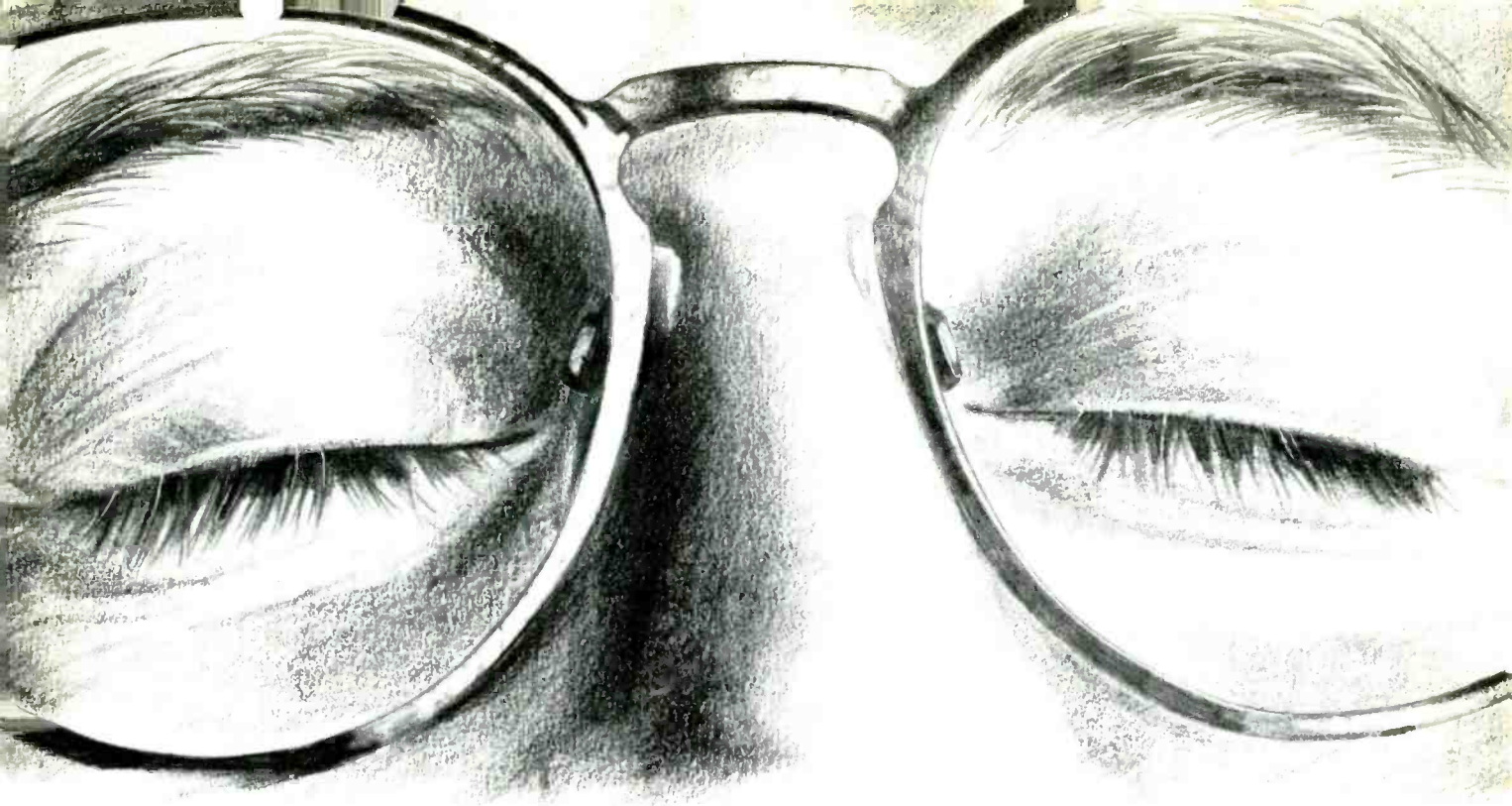
DT: Well, he had done all the demos before anything was recorded. He had all the parts down on this cassette that I think he made on a Portastudio in Ireland. It was a great-sounding demo — it had all the guitar layering, the 30 voices in harmony and everything. We spoke on the phone while I was doing it, and he told me, "Just stay faithful to the demo. Just re-record everything professionally, and you'll be okay."

After Nigel had been with them for nine months, he was exhausted, so Mutt stepped in and finished it. That record took about three years to make, you know. I should point out that, for all I know, Mutt may have redone everything we did — I don't really know.

R•E•P: Right after you left, you co-produced Rosanne Cash's "Rhythm and Romance," right?

DT: Yep. Quite a dramatic change.

Dan Levitin is R•E•P's music production editor and a teacher in the music technology program at Stanford University.



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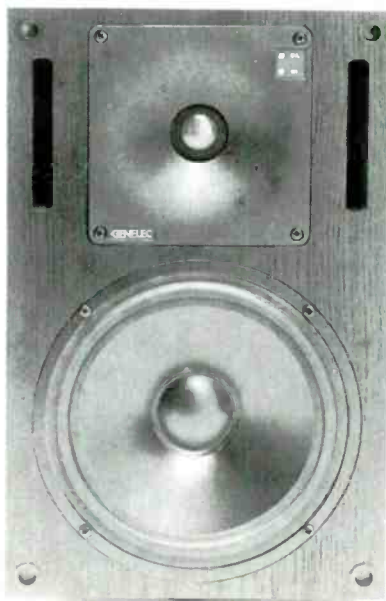
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R•E•P: Most engineers and producers usually stick to one style of music ...

DT: I know. I always tried to fight categorizing. I've made a constant effort over the past 17 years to switch genres whenever I saw myself doing too much of one thing.

R•E•P: So you're really the Neil Young of engineers ...

DT: Kind of ... my manager at the time was [recent RCA President] Bob Bouziak, and he told me "people want to see you as a rock guy, they want to be able to compartmentalize you." But my philosophy is that if you're really good at what you do, no matter what that is, you should be able to do that job in all kinds of areas. And what started out as a theory for me has actually worked well in practice. By doing a bunch of different things — my work in Nashville with Rosanne, Rodney [Crowley] and Dolly [Parton], or my CHR work with Dan Hill — it's enabled me to not get locked in to any one production concept or theory of how to do some thing.

R•E•P: What's Mutt Lange like?

DT: He's a brilliant, brilliant man. Of all the producers I've worked with, he's the one I admire the most. He's a really terrific person. His philosophy is to be very low key about the music business, not to do interviews, for example ... in fact, this is the first interview I've ever done, in 17 years. And one of the reasons is that I was impressed by his philosophy. He told me, "Don't let anyone know what you think." If you don't do interviews, there's kind of a mystery about you. No one really knows what you think or why you think it. So I've been low key.

But now at 36 years old I feel a little differently. I was thinking it might be good to do an article for a reputable magazine, and then you asked me.

R•E•P: How did you get started in the business?

DT: My whole family, my father, grandfather and great-grandfather were in the art conservation business; I kind of broke the mold. I still wanted to do something artistic, but I found that music was the way I wanted to go. And there were so many great things happening at that time — Hendrix, Cream, Woodstock. I graduated high school and decided to go to New York Tech because they had this program called Communications, which was the closest thing in 1972 that you could do to the record business.

I had gone to a recording studio, National Records, when I was still a senior in high school and I asked the recording engineer there what kind of courses I should take. He told me I should learn to become a doctor or a lawyer, anything but this. He said, "Spend your four years learning to do something else, and if you still want to do this when you're out of college, come back and see me, and we'll talk about it."

I went to school, and I realized I didn't want to do radio and television, and that's what they were teaching. So I went to a little underground recording studio at night and when my freshman year was over, I went back to the guy at National and he offered me a job as a messenger for \$80 a week. I did that for the summer of 1973 and in doing that, it got me around to all the different studios in New York. As I dropped off these packages of tape, I mentioned to the people at every studio that if anything ever opened up, I was looking for a job. In the fall, Dick Charles Studio on 7th Avenue in New York offered me a job to do tape copies.

R•E•P: They did publishing demos, right? Bill Szymczyk and Brooks Arthur worked there.

DT: Yes, it was essentially a demo studio. They advanced me to disc cutting, and at night the manager let me go into the control room and pull out multitrack tapes and start playing around with the console, learning what all the buttons did. A couple of times when an engineer didn't show up for an overdub session, the manager asked me if I knew how to do it, and I said yes, and I worked my way from there to full band demos. I was working with Carol Bayer Sager and Bruce Roberts. After a while I noticed that a lot of the people I was doing demos for were getting deals — Melissa Manchester, for example — but with Charles being a demo studio, I wasn't able to get the recognition I wanted. I wanted to be where they actually made records.

I got a job at Record Plant on April 4, 1974, and they made me Shelly Yakus' assistant. Shelly was and still is the hot guy, and Record Plant was the hot studio.

I always try to keep my career changing, I try not to do the same kind of records twice.

R•E•P: And that's where you assisted on Bowie's "Young Americans."

DT: Right, and I also worked with John Lennon there. I did the demos for "Walls and Bridges" which were later released as "Menlove Avenue." I also worked on Bruce Springsteen's "Born to Run;" lots of great projects. Shelly was my mentor, and I spent a year with him doing everything that he did. To this day, he is still a difficult person to work for because he's so demanding, but it was the greatest thing for me because it allowed me to be confident about what I was doing.

R•E•P: What did you do as his assistant?

DT: In those days we didn't have DDLs, instead we had a battery of tape machines running at all different speeds for tape effects. He said, "Keep all the tape machines running all the time, keep an eye on the console in case I accidentally hit a button I shouldn't have hit; keep all the coffee cups filled, the ashtrays empty, and make sure that no one hits any mics." We also didn't have counters in those days, so I had to mark the tape locations with grease pencil. Also at that time I worked for Martin Birch, do you know his work?

R•E•P: Of course — he did some albums for Fleetwood Mac, Blue Oyster Cult, Black Sabbath, Whitesnake. Another great engineer. What was your big break as a first engineer?

DT: Shelly gradually gave me some firsting to do. On Return to Forever's "Where Have I Known You" I recorded some of Chick Corea's piano while Shelly was downstairs recording Al Dimeola's guitar. Then when Jimmy Iovine was recording "Born To Run;" he let me record some of the vocals.

The big break came with Geils, though. I had worked with the J. Geils band seconding Bill Szymczyk, and the band and I got to know each other pretty well. We were in the studio every day for three months, and the sessions

would go from noon until three in the morning. When they were ready to do their next album, Szymczyk was busy recording The Eagles, so they asked the owner of the Record Plant, Roy Cicala, if he would engineer it for them. I was scheduled to second. So on the first day, I set up. The band knew me, I knew their whole set up, I set the console and the mics up, and everything was ready for Roy when he came in. He looked the console over and then we started recording.

It was the first day, the first song and the first take, we were about two minutes into it and Roy turned to me and said, "I'm going into my office. If you need me, call me, if you don't need me, don't call me." He got up out of his chair and walked out the door. Now the console had a high back, so from the band's vantage point, out in the studio, they couldn't really see into the control room. When the take was over, they said, "How was that," and I said, "Fine, let's do another, just to see if we can get a better one." After a few takes they came into the control room for playback. Roy had done this same thing to Jimmy Iovine, too, on John Lennon's album. Roy believed that you had to put someone into a sink-or-swim situation.

R•E•P: How did you move into production?

DT: John Kalodner, who is now at Geffen, was doing A&R at Atlantic, and he just called me up on the phone one day and asked me if I wanted to co-produce an album for the Henry Paul Band. Up to that point, I had only engineered. It was a big break, and John has continued to be a great supporter of my work.

R•E•P: Are there any engineers you have given breaks to?

DT: Steve Marcantonio was my assistant on Rodney Crowell's "Street Language." I was mixing one of the songs and then Rodney and Booker T., who were producing, decided they wanted to overdub some horns on one of the tunes.

R•E•P: You must be talking about "Let Freedom Ring" with that great "Lady Madonna" style horn riff.

DT: That's right! So I gave the tapes to Steve and let him record the horns, and he did a great job. Later, when Rosanne Cash was doing "King's Record Shop" and I was busy doing some rock 'n' roll stuff, she got Steve to engineer and mix the record. He also did Rodney's "Keys to the Highway" and "Diamonds and Dirt."

R•E•P: Those are great-sounding records. He's a great engineer.

DT: Yes, and he got some number one records out of those projects, too.

R•E•P: Is there a piece of equipment that you need to have at a mix?

DT: No. Because I've had to travel all over to mix, to foreign countries and weird places, I've learned you can't get locked in to one piece of gear.

R•E•P: What are your favorite pieces of mixing gear?

DT: The EMT 250 is one of my favorite toys and has been for 10 years. I love Pultec EQs, and tube gear in general. I like the Lexicon and Eventide stuff. I usually will walk through the presets with whatever instrument I'm sending to them, to find a sound that comes close to what I want, and then I'll tailor it more specifically to my needs.

R•E•P: When you're mixing, do you usually start out with the drums and build up the mix from there?

DT: No, not always. If it is a Dan Hill record, for instance, and the song is basically written around a vocal and a piano, I will work on the vocal sound first, and then the piano. Because that is the main focus of the music; there happens to be guitars, drums and bass, there might be strings, but the center of the song, the vocal and piano, need to happen first. After that I might go for the strings, so I'd have a vocal-piano-string mix before I even get to the rhythm instruments.

R•E•P: Once you have several things mixed in together, if you want to EQ something, do you solo it or EQ it in the mix?

DT: I tend to work within the mix. You can EQ something soloed, and it will sound great on its own, but it won't necessarily sound good in the mix. I EQ in the mix because that's how we hear it.

R•E•P: Do you mix to digital?

DT: Sometimes, but there are some labels and some A&R people, I won't mention names, who don't like digital. Even if they ask for a digital mix, I always mix analog too, so that if they change their minds and don't like the digital, I can just hand them the analog. Digital can be expensive, too. I wanted to mix Nelson digitally, and the rental took \$7,000 out of my budget. In the end, Geffen liked the sound of the analog mix better.

R•E•P: What about digital multitrack?

DT: I recorded Edie Brickell's "Ghost of A Dog" at Bearsville with the Sony 3324. I'm very hap-

py with the way that turned out. It was my first real experience recording multitrack digital.

R•E•P: You told me once that J. Geils' "Freeze Frame" was done 48-track, but it occurs to me that they didn't have automation back then ...

DT: That's right. We would have four or six hands on the console at once. We did a hundred mixes of that song.

R•E•P: You mean a hundred pieces of the song, for editing?

DT: No, I mean a hundred separate mixes. Seth Justman was producing at the time, and if we missed a move, he would have us do the entire mix again. At 15ips and six or seven takes per reel, we would sometimes end up with 15 reels of tape, just for the mixes of one song.

R•E•P: I'm not sure this is something you want to brag about in print.

DT: Well, we were after perfection, and if one thing wasn't right, Seth wanted to make it right. "Freeze Frame" is a very intricate album. We were manually doing stuff that automation makes easy. Seth might say, "I think the 'b' in 'because' on the first line of the second verse needs to be a bit louder" and we'd do a whole other take for that. I use computers now, and Massenberg's are my favorite.

R•E•P: How do you approach recording a band for the first time?

DT: If I'm working with a band that already has some records out, I do my homework. I bone up on what their other records sound like so I can find out what people are used to. What do people expect out of AC/DC? What kind of sound has Billy Squire had in the past? I study

the sound they've had in the past so that the band and I have a reference point when we start together. I want to take a band to a new level, without losing the integrity of what they've had going for the last year or the last 10 years, without losing that core sound that their fans have come to expect.

R•E•P: You worked on many of my favorite albums, including Was (Not Was) "Born to Laugh At Tornadoes." It has that great guest vocal by Mel Torme.

DT: Yeah. Don and David are great. I'm glad to see that they're getting more recognition these days, both for their own albums and for their production.

R•E•P: Is there anyone out there you want to produce or engineer, but haven't had the chance?

DT: A lot of people. Tears for Fears, Pink Floyd, ZZ Top or Don Henley would be great. I'd love to work with Springsteen again, but he has such a good thing going with Toby Scott and Bob Clearmountain. I don't blame him for not changing. I'd love to work with Mick Jones. I wanted to do Billy Joel's "Storm Front," but it just didn't work out. This might be a surprise, but I'd love to do some new age stuff. Paul Winter and I spoke last year, and something may come out of that. I always try to keep my career changing. I try not to do the same kind of records twice.

R•E•P: What's your secret of success?

DT: I've been very lucky to have the love and support of my wife Linda for 18 years. That's really meant a lot to me. ■

Hey Glenn, what do you do with your 56K?

Glenn Meadows is the president of Masterfonics Inc. in Nashville, Tennessee. His mastering credits, 350 of which have achieved Gold/Platinum status, include: Alabama, Hank Williams Jr., Dan Fogelberg, and Reba McEntire. Recent 56K projects include: Steely Dan Gold Extended/MCA, Reba McEntire/MCA, and Sawyer Brown Curb/Capitol. He has been mastering since 1973.

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A photograph of a recording studio. The room is filled with soundproofing materials, including a large grid of acoustic panels on the walls and ceiling. A grand piano is positioned in the center of the room. The floor is made of light-colored wood. The lighting is warm and focused on the piano.

A timely status report on the
Japanese recording industry.

TRACKING: THE RISING SUN

By Richard Buskin

Japan: A country where 125 million people are crammed into just over 145,000 square miles; where a staggering 3,500 nightclubs are to be found in Tokyo's 1-square-mile Ginza district; where well over 90% of the cars on the road are home-produced; where the average car has a built-in television set which, at the push of a button, conveniently doubles as a compass; and where Mitsubishi and Hitachi are well known for making elevators.

Trivia aside, Japan is also, of course, a country which has experienced phenomenal economic growth during the latter half of this century, and which has either re-invested much of its new-found wealth in its rapidly expanding industries, or utilized it to develop new ones by way of importing ideas and techniques from abroad. Indeed, copying something and then improving on it appears to be a favorite Japanese pastime.

Such is the case with its still-fledgling re-



recording industry, which, after several decades of slow progress, only really took off during the late-'70s. Today, of course, Japan produces much of the equipment used in major studios around the world, but this doesn't mean they're on top of it all. It is interesting, in fact, to note just how the Far Eastern entrepreneurs are successfully combining overseas innovation and ideology with local ingenuity.

Not too surprisingly, Neve and SSL are the market leaders here when it comes to recording/mixing consoles. There are close to 200 SSLs in Japan and 140 Neves, 61 of which are V-Series. It is also notable how much the Neves are now selling-in on a replacement basis. A growing number of studios are installing them as their main boards, preferring them for their alleged 'warmer' sound.

"In 20 years of trading, it has always been our policy to never offer a discount on Neve equipment," points out Takeo Ueshima, managing director of General Traders, the Japanese marketing representatives for the Neve

Electronic Group of Companies. "You see, we have a team of 25 first-class maintenance engineers to support any of the customers' [technical] problems, and so it isn't possible to cut prices. When either a major recording studio or a broadcast company buys from us, they know that the backup service is a condition of the contract. We communicate on a daily basis with the head offices of the companies whose products we market, and so any queries that we might have are always answered within a fairly short time."

In Japan, the importance of this kind of service cannot be overstated, for it is often the manufacturer's retailer's backup staff whom the studios liaise directly with whenever a technical problem arises, in contrast to the West, where the studios tend to make more use of the skills of their own in-house engineers. Good maintenance, it should be remembered, is a key feature of the Japanese recording scene, and so good lines of communication are of the utmost importance.

"We may, for example, turn around to Neve

Richard Buskin is a freelance music and film journalist based in London.



Control Room 1 at Toshiba-EMI's Studio Terra.

dios joining together, they can discuss and hopefully agree on reasonable levels for the rental fees, as well as exchanging notes on available equipment. About four years before JAPRS was formed, digital technology really took off in Japan. The specification for digital technology is changing all the time, and there are many levels of compatibility. So at present, about 80 studios and 40 manufacturers are members of JAPRS, and the main aim is to encourage dialogue between the two parties, in order to help establish guidelines that will benefit everybody, and in turn raise the general standard of recording studios in Japan.

"The hardware that you see in Japanese studios is very similar to that which you will find in Britain and America. Yet, in terms of the music, the market in Japan is much more limited. All of the music produced by Japanese studios is destined for the home market, none for export, and this is a problem, especially for our young recording engineers who would like to learn techniques from working abroad. So it is therefore important for there to be better communications with overseas engineers. In the meantime, through JAPRS, we hope to establish formal standards of workmanship among engineers, perhaps in the form of some sort of qualification."

In cities such as Los Angeles, New York and London, a plethora of mid-to-top-range studios provide the record companies with multiple options for their recording projects. Play one facility off of another, and, especially in the present economic climate, someone is inevitably tempted to seize the deal by dropping the price. The long-term consequences of this kind of short-term enterprise are all too well known; once a rate-cut has been made, this not only makes life difficult for rival establishments, but also for the discounter who, once the bargain-package project has been completed, subsequently finds it less than easy to reinstate the higher charge levels. The slide down the slippery slope has begun.

Such problems, however, have not yet affected the Japanese market to any great extent. "I can phone around the studios and some have different prices to others, but none of them are willing to negotiate," says Toshiba-EMI's head of domestic A&R, Sam Machida. "Only if a studio owner is a particular friend of mine can I maybe negotiate a special price."

Rates are still steadily rising, as studios continue to spring up around the country and there is investment in the new technology. This is still a young industry, enjoying a sort of halcyon period in which user demand easily outstrips the available hardware resources.

STABLE CONDITIONS

"In general, not just here but throughout Japan, it is typical for studios to be booked at least

six months in advance and to work to a yearly schedule," says Susumu Ohno, managing director of Studio Key Stone, a Polydor/Kitty Records-owned facility which derives about 30% of its business from outside artists. "This often means that if a remix has to be done on a record, it may have to take place at a different rental studio to where the project was originally carried out. Many new studios are being constructed all the time, however, and so this situation will not last forever. I am sure that eventually it will be the same as in the U.K. and the U.S., and this is quite worrying."

Also benefitting from the ongoing recording boom are some of Japan's well-equipped mobile facilities, such as Sound Creators, Inc., which during the past few years has recorded the live performances of overseas rock artists such as Phil Collins, Chicago, Hall & Oates, Cheap Trick, Blood, Sweat & Tears, Santana, Jeff Beck and Deep Purple.

"The concert business has changed for us during the past three years," says managing director, Fumiaki Saito. "Before that, it was sound and recording only, but now all of the concerts also involve shooting for video, and so this makes things more complicated."

To help cope with the workload, SCI owns three mobiles: a full-size Mercedes-Benz bus, ("Japan's number one deluxe mobile") housing a 48-channel Neve VR console and Genelec S-30 monitors, which is available at \$5,500 per day including 48-track digital and an engineer; a medium-sized truck, with a 48-channel Neve V-III board and JBL-4320 monitors, available at an all-inclusive price of \$2,200 per day; and a smaller truck, which houses a 32-channel Studer 089 desk together with Genelec S-30



The metal-lined machine room at Studio Terra containing digital Mitsubishi and Sony multitracks and a Studer analog desk.

monitors, also available at \$2,200 per day.

"There are five other major companies in Tokyo," says Saito, "and they own a total of eight mobiles equipped with good consoles, four of them Neves. That may sound like a lot, but on average there are now between 500-600 concerts a year in Japan, compared to only a few when we started 20 years ago, so the business is increasing steadily and there is enough for everyone. All of the companies get on very well with one another, we keep our rates fixed, and so we divide the work between us."

The mobile scene is, nevertheless, an exception to the rule in terms of its interrelation with foreign clients. There can be little doubt as to how outward-looking the Japanese continue to be in terms of adapting/copying techniques and ideas from abroad, in order to establish, and then boost the advancement of the home industries. Yet, conversely, with the current surplus of demand over supply, the vast majority of those in the recording business can afford, and, for the time being, are content to be far more isolationist when it comes to the utilization of their own facilities. After all, when they can fill the studios with domestic clients who are willing to pay considerably more than their Western counterparts, why shouldn't they be?

ON THE HOME FRONT

No one interviewed in Japan, be he a studio owner, producer, engineer or A&R man, was either able or particularly anxious to satisfactorily 'sell' his commodities/skills to potential overseas clients. Until a few years ago, it was a fairly regular occurrence for classical orchestras to record in a Japanese studio while undertaking their tours of the country; today it is not. The record companies in the West tend to shy away from the sort of expenditure incurred by such a move, and the Japanese themselves admit the main attraction for an overseas producer to work in their country is not really the studios, but perhaps some of the musicians who boast a unique style of playing.

What we are looking at, therefore, are world-class facilities supporting just the home market; a truly national recording industry, in effect, rather than an international one. "Only a very, very small percentage of the hit records in Japan are imported from abroad," says Toshiba-EMI's Sam Machida. "The same applies to cover versions by Japanese artists, and American TV and film soundtrack music. Artists such as Madonna or MC Hammer will have hits, but these are just a fashion and will not last for very long, whereas things like traditional Japanese music and 'enka' go on and on."

"So we do not import too many records, but what we often do is import the style. We may, for example, listen to the music of people such as the British producers, Stock, Aitken & Waterman, and then adapt their style to suit Japanese tastes. This, for example, means using the Fairlight to get the same sounds, but composing songs which are different in terms of the tone and the phrasing."

So, will the bubble eventually burst? Not according to those I talked with, at least in the short-to-medium term. Studio Key Stone's Susumu Ohno is typical in his view that most Japanese studio workloads are so diversified, with the production of video tapes and laser discs, in addition to rock, pop, karaoke and neo-traditional 'enka' records, that they will have more than enough to fall back on should a general economic slump take place in the near future. "There is currently more work than there are studios," says Ohno. "The people require more studios, and I am sure that what the people need is what they will get." ■

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The ins and outs of classic Neve modules.

NEVE RETRO

By John La Grou



These days, so many recording engineers are infatuated with old stuff: old mics; old compressors; old console modules. And like fine old musical instruments, there is good reason. It's not that old equipment grows better with age. Rather, certain of these inveterate audio devices give our recordings a sonic character that new stuff just doesn't provide.

A dominant player in this retro revival is Neve, specifically early mic/EQ input modules from the '60s and '70s. Many top professionals comment that they still use them regularly. More than a few smug studios are still in possession of original Neve consoles loaded with scores of these classic input modules. For the rest of us who want the "Neve sound" but can't easily access a vintage Neve console, we still have the options of renting or purchasing individual input modules.

With the way rental costs add up, and considering how frequently old Neve modules are used, this engineer opted for the latter; to install a "stereo pair" of old Neve console modules into a portable enclosure. This article is a summary of that project, and more.

GETTING STARTED

The first step in building a portable input rig is locating the modules, sans console. In my case, the folks at Audio Village found a studio in Canada that was "parting out" an older Neve console. This particular console housed 1063-type modules with very early 600-level serial numbers.

That same day, I called the domestic offices of Neve and asked if they had a copy of the 1063 schematic. Neither their East or West Coast offices could locate one. Nobody had ever heard of it. They even tried England. No luck.

Since that time (1989), I've become more aware of independent sources of parts and service for vintage Neve gear (see Re: Source sidebar). One of these sources identified my 1063s as being very similar to the more common 1079 module, including a unified mic and line input. Perhaps the 1063 is one of the many "custom-order" models that Neve built.

John La Grou is a principal of Millenia Media, an audio/video design, production and consulting team in Sacramento, CA.

When the modules arrived, the first thing I noticed was a large edge-card connector sticking out the back of each unit. Edge-card interfaces are especially common in older audio devices, and prone to abrasion and intermittency. My first thought was to remove the connectors and hard wire the interfaces. However, modifying such a wonderful piece of history just didn't feel right. I recalled how, in a burst of youthful folly, I stripped and repainted my 1958 gold hardware Stratocaster. Twenty years later, guitar collectors have said that I'm about \$15,000 poorer for that particular stunt.

True, Neves are not vintage Strats. Nevertheless, I decided to forego any permanent modification to the stock modules. Mating connectors or edge-card PC boards became essential, so I made my own, though a company called Wirepro manufactures mating devices for edge-card connectors common to older Neve modules.

CONNECTIONS

The internal design of a vintage Neve console module is a gem to behold; all discrete Class A circuitry and no ICs. Clearly, an artist designed this. Rupert Neve has commented that one of the most important factors leading to the "Neve sound" is his transformer design. He says the character of harmonic distortion produced by the transformers is key to his unique sonic signature. Judging from the looks of these things, I don't doubt it. The transformers seem as if they were built by NASA. Early module designs sported a large cylindrical plug-in can marked "Marinair Harlow Radar, Ltd." Later transformers were smaller, hard-wired and manufactured by companies such as "Saint Ives Windings, Ltd."

Most Neve input modules, including the 1063, provide linking connections to the original console channel fader. However, I've found that a fader is unnecessary when recording direct from the module outputs. Instead, I've simply hard wired Link Out to Link In (pins F and H). If necessary, a 5k Ω fader can be inserted here. On certain models, a 1/4-inch potentiometer shaft pokes out the back. This pot adjusts the return level of the linking input. For best performance in most applications, adjust this potentiometer for maximum gain.

It's no accident that Neve often assigned grounding to multiple connector pins. When

possible, gang similar grounds to achieve lowest impedance. The last (lowest letter) pin in any module connector is usually chassis ground. Experiment with chassis, power and audio ground interconnect schemes for lowest noise.

Most modules offer a balanced input and output. Line and mic inputs are sometimes combined, sometimes separated, depending on model. Input and output wiring should be soldered to the tail of each edge-card connector mate and brought out to your own XLR or multipin panel(s). Common lines can be daisy-chained along the backs of the connector mates, though individual ground feeds terminated at a star point on your XLR connector panel is ideal.

Table 1 shows the signal pinouts for the 1063, 1073, and 31102 modules. The 1073 pinouts are functionally similar to the 1064, 1066, 1081, 1084, 1085 and 1086 modules. I'm told that,

31102

A MIC IN (HI)
 B MIC IN (LO)
 D PRE-EQ OUT
 E POWER GROUND
 K LINK OUT
 L LINK IN
 M UNBAL LINE IN
 R BAL OUT(HI)
 T BAL OUT (LO)
 U +24Vdc
 V CHASSIS GROUND

1073

A MIC IN (HI)
 B MIC IN (LO)
 C GROUND
 D GROUND
 E POWER GROUND
 F LINE IN (HI)
 H LINE IN (LO)
 J GROUND
 K LINK OUT
 L LINK IN
 R LINE OUT (HI)
 T LINE OUT (LO)
 U +24Vdc
 V CHASSIS GROUND

1063

A +24Vdc
 B BAL IN (HI)
 C BAL IN (LO)
 F LINK OUT
 H LINK IN
 L POWER GROUND
 M POWER GROUND
 N UNBAL OUT
 P BAL OUT (HI)
 R BAL OUT (LO)
 S CHASSIS GROUND

Table 1. Connector pinout for modules 31102, 1073, 1063.

internally, the 1064 is identical to the 1073 except with separated switches and larger module packaging.

There are a number of circuit boards inside of a Neve input module (called B180-B184 in the 1063). Each PC board mates with an edge-card connector. When my shipment arrived, certain cards had worked loose and were rattling around. Tell your shipper to pack each module individually in layers of thick bubble wrap.

When you receive a shipment of modules, open the side panels and do a visual inspection. For good measure, clean all edge-card contacts with strong solvent and reseal the circuit cards snugly. Remember, these things were designed for fixed installation. If you transport your modules to sessions, be ready to reseal circuit cards on occasion.

ENCLOSURES

The short-style modules (1063, 1073, etc.) measure about 8.8 inches high. One's first inclination is to place two modules end-to-end and mount them inside a single-space rack cabinet. I tried various horizontal mounting methods but found the modules just a tad large to fit tandem into a 1U rack space.

After considering other options, I constructed a wooden enclosure about the size of a large lunch box. The box measures 8" x 10" x 12" and houses two modules plus an XLR panel. In hindsight, I think the box should have been large enough to allow for future expansion; perhaps four or eight modules wide (read: I want more!).

A remote power supply is recommended. However, with care, a well-shielded supply could probably be mounted near the modules with minimal hum. Use a toroidal wound power transformer with magnetic shielding to reduce radiated "hum" fields, especially when mic-level audio transformers are in close proximity.

Most modules should be powered with a well regulated +24Vdc linear supply. To avoid accidents, use something other than a 3-pin XLR as your remote power supply connector. For phantom requirements, I'm using a 2-channel Neumann supply that sits on the top/front of the module cabinet, attached by Velcro during sessions and easily removed for transport. Any quality phantom source should work.

Mounting a Neve module can be tricky. I've set aside in a safe place the original Flat-Allen/Wentworth faceplate mounting screws and replaced them with longer #4 fasteners, which now secure the module face against a wooden frame. A captive thumbscrew, integral to Neve modules, adds additional support when tapped into the mounting frame.

Some audio specialists are now building portable rack cages designed specifically for older Neve console modules. These racks can be customized to include a power supply, meters, faders, routing buses, and so forth. For those with reservations about doing-it-yourself, a call to one of these specialists can help (see Re: Source sidebar). And for those lucky folks with older Neve consoles, remote racks provide an excellent platform for off-site sessions — simply take your modules with you!

POWER UP

Virtually all early Neve input modules feature a Class A mic amp with attenuator. The 1063 has a wide-range 20-step input attenuator marked -80 to +10, including an off position. Before you purchase any older Neve module, be certain the attenuator functions proper-

RUPERT NEVE SPEAKS

By Wynne Smith

It's always a pleasure to speak with Rupert Neve about the many aspects and philosophical questions surrounding the design of audio equipment. The conversation invariably covers opposing objective and subjective schools of thought. Rupert frames questions: What is excellence? Is it a subjective quality, an objective quality, or a combination of both? Can one measure excellence with test equipment, or should one simply listen, or should you do both?

"You could measure and analyze all the frequencies covered in a few bars played on a piano," Neve says. "Could you recognize from your computer printout what kind of piano it was? Or could you write a program that would produce the sound of a particular piano? Though perhaps possible, it would certainly take a long time. The human ear, however, is capable of doing that much more quickly by subjective means ... and much more accurately than can be done with test equipment.

"Someone once said that to be the inheritors of a great tradition makes men martyrs, but it blinds their souls. We can get so terribly caught up on a great tradition, and a great way of doing things, that we forget why we're doing it.

"When discussing the analog/digital question, I always like to make this analogy: A Rolls Royce and a coal delivery truck are both means of transportation; but you wouldn't deliver coal in a Rolls Royce, nor would you have dignitaries driven around in a coal truck. Both most definitely are required means of transportation, just as there is a requirement for analog and a need for digital. You must determine what delivery system is most appropriate for your task."

HISTORICAL BACKGROUND

Born in 1926 in Newton Abbott, Devonshire, England, Neve grew up in Argentina, where his father was agent for the British and Foreign Bible Society. From age 13 he designed and built analog audio amplifiers and radio receivers, purchasing kits in a shop close to his school, St. Albans College.

"Nearly every week I would stop by and place an order for the components I wanted to purchase and the following week they would arrive. I would take them home and explore all the possibilities with those components, then make out another list of parts for the following week, and so on. When I built a receiver that allowed me to bring in the BBC from London, I was terrifically pleased, as you can imagine."

During World War II, the young Neve volunteered to join the British Army straight from school. He returned to England and served in His Majesty's Royal Signals in a capacity that to this day remains classified. Although he was homesick for Argentina,

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Wynne Smith is an audio industry technical writer based in the U.K.

ly. Replacement attenuator assemblies are expensive.

Tone control on the 1063 is effected in three bands: A high frequency boost/cut control, a mid-range boost/cut control with switchable center frequency, a low frequency boost/cut control with switchable knee frequency, and a high pass rotary switch active at various frequencies. Most early 3-band modules follow the same EQ control layout, though frequencies vary per model.

The Neve Class A design is particularly sweet with vocals, strings, reeds, and bass, although just about anything sounds great through them. One personal favorite is a warm acoustic guitar in a good room mixed with an omni pair of B&Ks, gently compressed.

Bruce Swedien told me recently that he never goes to a session without his 3-band Neve console modules. His collection of some 40+ modules are used for "vocals, acoustic guitar, piano" and more. Most of Michael Jackson's vocals on his latest album (*Dangerous*) were tracked through Swedien's old Neves directly to tape.

Bill Bottrell, engineer to Tom Petty, Jeff Lynne, Michael Jackson, etc., is using 3-band Class A Neves on almost all tracking work. He likes them so much that he recently bought a Neve 8058 console filled entirely with the vintage modules. The 1990 *Toy Matinee* album, engineered by Bottrell, has been noted for its meticulous audio quality. Bottrell says that all of the tracking was done through Neve 1073 modules direct to tape.

As engineers and producers, we are recognized largely by the sonic quality of our work. Many successful audio professionals swear by 20-, 30-, even 40-year-old audio gear daily. If old stuff is what it takes for that occasional edge, then I say antiques aweigh! ■

RE: SOURCE PARTS AND SERVICE FOR CLASSIC NEVE MODULES

Brent Averill Enterprises:
818-784-2046

Audio Village:
619-320-0728

Valley Sound S&R:
818-842-6500

Mercenary Audio:
617-784-7610

Neve/Siemens:
203-744-6230

Wirepro:
609-935-7560

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peacetime found him running a public address and disc recording business before the days of tape.

"One of our first jobs was for a big Conservative Party rally. Winston Churchill was to make an important policy speech to be broadcast by the BBC, live, internationally. The day before it had rained buckets. The site was knee deep in mud. The organizers had alternative plans but weren't able to agree until just a few minutes before the broadcast. They told me that Mr. Churchill would speak under a large marquee that was in front of the main building. I'd already set equipment up at this location, just in case, and the BBC had set up a small tent nearby for their equipment."

Neve paused and chuckled. "When the crowd heard of the change in plans, they all went straight toward the new site and completely overran the BBC tent. The staff barely escaped with their lives. The equipment was ruined, buried in the mud."

"I still had my mic on the stage. Through a field telephone I arranged with my associate to give the BBC a feed, a balanced transformer feed of course. I was soaking wet, covered in mud, having been back and forth all day in these conditions. I verified that my mic was live. It was about two minutes before 5:00 and the 'Old Man' came on stage with his followers and security people and what not. I looked at him; I was all alone on stage, and I thought, 'What do I do now?' He came up to me and said: 'I take it you're in charge, my boy?' I said: 'Well, yes sir.' He said: 'Been some trouble, has there?,' I said: 'Trouble's all taken care of, sir; don't worry.' Churchill said: 'Very well, now, just tell me what to do.'" Neve smiled again before continuing, "For that one moment in history ... I told Winston Churchill what to do."

PRACTICAL CONSIDERATIONS

Rupert married his wife, Evelyn in 1951 and concluded that to provide for a wife and a family he would have to find a less variable career. He took jobs with Rediffusion Design Labs, then Ferguson Radio and later became chief (and only) engineer to a transformer manufacturer. It was while working for the small transformer manufacturer that he designed one of the first high quality "bookshelf" loudspeakers. Pleased with the outcome, he demonstrated it to his employer, who mumbled that it was "nice, but not quite anything they could use." Neve was, however, invited to lecture on the bookshelf loudspeakers at the Royal Society of Arts in London in 1958. For the next three years Neve designed and manufactured hi-fi

equipment with his wife for their own small company. From that time on, Mrs. Neve has been his faithful (if at times, reluctant) business partner, without whose help, according to Neve, there would have been no achievement.

His first step into the professional audio field came in 1961 when Leo Pollini of Recorded Sound Ltd. commissioned a mixer with EQ on every channel and with two group outputs. This was all valve (tube) equipment and was distinguished for its sound quality.

But the dreaded transistor was encroaching fast and a portable (it took four men to carry it) transistorized 16 in./three group mixer was built for Phillips Records, Ltd. in 1964. Surprisingly, the sound quality was actually better than with tubes!

Rupert Neve & Company opened in 1961. "I had so much to learn about the operation of a company," Neve reminisces. "Bookkeeping!" — he makes a mock shudder. "We had a splendid tax man come out at one time. Thank heavens he was as understanding as he was! I knew very little about keeping books, and evidently, had not done all that was necessary. He was quite understanding and most helpful, explaining what would be necessary, what we would have to do prior to his next visit, the penalties involved with respect to purchase tax, etc."

"Even years later, I found in running Rupert Neve & Company that I was so caught up in the day-to-day accounting and operation of the company that I rarely had time to walk through the engineering department. And when I did, I actually found I was craving to get my hands on the works in progress I found on the benches there."

WHY IT DOES

Neve recounts a story that gives some insight to the Neve console's "sound": "AIR studios commissioned a rather expensive, complex console. Geoff Emerick was the engineer, and I must say, he is one of those individuals who truly has 'golden ears'. He just isn't very specific about describing what he hears. Well, the console was delivered and installed and Emerick wasn't at all happy with it. We sent a team of engineers to check it out, and the team could find nothing wrong."

"Yet, he continued to protest and after some time, I decided to find out what all the trouble was, so I went out to AIR. We (Emerick and Neve) set up a test with a signal path through the console, and another directly from the source. Emerick brought



Rupert Neve and Bob Alach, president of Alacronics, Wellesley, MA, discussing a module being reworked by Alacronics.

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a tape and we played it through the test setup. Do you know, I could hear a difference but I couldn't define it. Emerick said after a bit that it seemed to sound 'brighter' through the console. Well, we continued our test and finally identified three channels that had this 'brighter' sound to them. On closer inspection, it turned out that these three channels had a 3dB resonance at 54kHz because their transformers had not been correctly terminated."

Neve paused for effect, giving it a moment for this to sink in. "Theoretically, that should be outside the range of human hearing, but we both perceived it in the same way, even if we didn't 'hear' it in the traditional sense. Did the brightness exist? Absolutely, although a team of engineers was unable to determine the cause for Emerick's displeasure and therefore said it didn't exist." Neve measured everything and then knew what had been causing Emerick's annoyance. As Lord Kelvin said: "To measure is to know."

COMPANY BUSINESS

From 1964 until 1969, Rupert Neve & Company operated out of the coach house of the Old Rectory in a village near Cambridge. The flow of custom equipment for the recording, television, film and broadcasting industries grew rapidly, and in 1969 the flourishing operation expanded to a new factory at Melbourn, Cambridgeshire, where the present Company still has its headquarters.

During the mid-'70s Neve found himself more and more tied to a desk in his office at a company that was growing rapidly, requiring both capital and professional management. "I would walk through the engineering lab and my hands would literally itch with the desire to begin work at one of the benches ... but, it was not to be." Neve sold the company to a public firm that sought to provide both capital and professional management and he entered into a lengthy agreement with them that terminated in 1985. That company, in turn sold the Neve Group of Companies to Siemens, the current owner.

Many of the original team are still with the Neve company and have continued to build on the tradition of excellence that Rupert Neve originally established. "A company and its achievements, reputation, etc., depend upon its people and I greatly admire the people I worked with at Neve. At trade shows I sometimes forget and I'll spot someone walking the floor with a Neve badge and will think: "That's funny, I don't recall seeing that chap before, I wonder in what department does he work?" Then I remember I haven't been there for 10 years. Of course there are new faces! Old habits die hard, I suppose."

During the past decade, a most amazing folklore has grown about the sound quality of the older "original" Neve console modules. Rupert Neve has often been approached by customers to refurbish or actually "remake" modules of a type which had ceased production 10 years or more before. Unwilling to turn the clock back, and yet intrigued by the supposed "magic quality" attached to the golden oldies, Neve designed a new range of modules embodying the qualities of the old with new technology

and enhanced facilities.

These were the Focusrite ISA modules which were introduced in short order. They were highly acclaimed and began selling well. "But," Neve says ruefully, "the pressure was on to build a new console. I was simply unable to resist such a challenge and within a 12-month period the first Focusrite console was designed and built." Failure to find a commercial partner led to the liquidation of Focusrite Ltd. and the emergence of Focusrite Audio Engineering Ltd., currently manufacturing and marketing Focusrite products.

PRESENT UPDATE

When asked about his current relation-

ship with Focusrite, Neve says, "You can imagine that it was a terrible blow to me personally and financially. We negotiated for some time, but were unable to reach an agreement that both parties were satisfied with. When Nick Franks (Chairman of Amek/TAC Ltd.) approached me with a most generous offer, one which gives me carte blanche to initiate and carry out engineering designs of my choice with the full support and backing of Amek/TAC's well established company, I said yes. During the first year of the new Focusrite Audio Engineering Company, and through Amek's agreement, I was able to provide technical

Continued on page 65



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Circle (22) on Rapid Facts Card

KEEP THE JEEPS ROLLING

By Anthony McLean

While more than 20 years have passed since the first JH16s arrived, a tight economy has combined with rugged durability to extend the life span of many MCI multitrack recorders. As these pre-Sony Jeeps change hands or just roll on, service and parts availability remains a major concern.

Blevins Audio Exchange in Nashville, TN, sells and services pre-owned JH-Series decks throughout North America. Randy Blevins recently spoke with R•E•P about MCI service, repair and modifications.

R•E•P: Which machines do you get called upon to service most frequently?

RB: We get the most calls about early MCI JH24s made up to about 1983. They seem to have the most instability problems, mainly because of the IC sockets that were used. From 1983-84 on, the overall stability seemed to be better.

R•E•P: So it's not the mileage factor, it's more the actual date of manufacture.

RB: Right. And they were corrected by installing better sockets. Also, early JH24s did not have sync transformers so it made them a little noisier in sync. It didn't affect what was recorded, but when you were doing overdubs you would notice a little bit more noise than normal. If you had an older machine such as a '77 J-16 and then switched to a JH24 the noise factor would be a little bit greater. Starting with 1983 they put sync transformers in and they became quieter, so when you switched between tape and sync there really wasn't much difference.

R•E•P: What about gradual performance failure? Do these machines "die a slow death"?

RB: On the JH24 Series there are a couple of output capacitors on the reproduce cards with problems. Specifically, C27 on a reproduce card for a JH24. That's like an output card — output capacitor. Those have a tendency to go bad. It is a slow death. You'll notice the bottom end becomes a little weird. For awhile we were getting calls from people saying they were hav-

ing low end problems. The capacitors were drying out and going bad, hence, the low end would become unreliable or disappear.

R•E•P: That symptom could probably be two or three things. You've got to isolate it.

RB: Right. So I recommend, when you have a chance, just do them all at one time. The capacitors are relatively cheap. You can do a 24-track machine in about two hours. It eliminates having that particular problem.

R•E•P: While we're speaking parts, whatever happened to the factory OEM parts inventory? How does parts availability work these days? Is it a walk through Hell?

RB: Not quite. Sony still has quite a few parts available if you're looking for spare replacement boards, which I highly recommend, especially if you're in an extremely busy 24-track situation and can't afford maintenance problems halfway through a session. Blevins Audio Exchange will be liquidating many of our MCI parts during February and March. We're overstocked on parts for MCI machines and consoles, and some Ampex machines that we rare-

ly use. We're going to keep some spares for our machines plus keep a spare of each of our boards and each of the power supplies for our own repair. But we've got too many parts for the older machines. Anybody who's got these machines can call us for the complete inventory of everything we have.

R•E•P: Are people satisfied with the new tape formulations?

RB: People have been very satisfied. I don't think it will take the place of Dolby SR, but it does give you substantial improvement. For people who are doing serious projects with a lot of quiet passages, and are concerned with noise, the Ampex 499 or Scotch 996 offer definite improvements.

R•E•P: Which modification gives the biggest bang for the buck?

RB: On JH24s, that are early 1980s or newer, there are not many modifications that I recommend. From '80 to '83 there's the socket problem. But the biggest thing, if you get a machine of that vintage, is to upgrade certain electrolytics. I mentioned the C27 that's on the re-



shares his insight on vintage MCI JH machines.



Randy Blevins at work surrounded by MCIs.

produce card and believe it's an 802 on the record cue card. On the JH16 machines from 1975 through '79 there are quite a few modifications you can do. The easiest modification is on those machines that had control cards with op-amps. The early ones came out with 741 op-amps for the reproduce and record cards. We recommend either doing one of several changeouts, changing to TL081s or TL071s. Some people have put 5534s in. Also, there are some hot-rodded new chip designs in the MA Series that are quieter and have got a little bit more headroom and higher slew rate.

"We get the most calls about early MCI JH24s that were made up to about '83."

R•E•P: How many of your clients are qualified to do this work themselves?

RB: Probably about one in 10.

R•E•P: If you don't have strong electronic chops you might be getting in over your head.

RB: Right. You can change the op-amps. If you change op-amps you have to cut out two capacitors and that's a pretty simple modification. Just about anybody can do that with a little instruction. They can remove an IC and clip out two capacitors per IC and that gives a faster slew rate. On the JH16 Series, from '75 to '79, many people jump the transformers out, which gives a little bit more bottom end and smoother response. The major problem when you do that, depending on which console, and who did the wiring, is to make sure that you have correct polarity. We've run into this problem several times. The best way to check it is with a scope. When people have jumped transformers out I always do a polarity check out of the console, through the machine again. The easiest way to do this is to record a signal on the tape, play it back and check a channel adjacent to it

in "input," identifying the problem.

R•E•P: What about tweaks or calibration tricks to enhance performance?

RB: We've found that original machine specifications were limited by the tape that was available back then, and that by using either Scotch 226 or Ampex 456, which is what we primarily use to set our machines up, we get better response than those original factory specs. MCI response has a lot to do with the bias and head-wrap plus several other alignment factors. The first thing that we do, and there are two methods of doing this, is check the wrap. When heads are out of alignment, you're forced to use more EQ to get the same amount of response. Before I even set up a machine I put a record pad on (even before I put a test tape on), put the machine in record, put 1,000 cycles on and make sure it's close to zero. If not, I adjust to make it zero, then I go to 10,000 and see approximately where 10,000 is. Then I move to a high frequency, 16,000 or 20,000 and see primarily if the meters are swinging much. MCIs have a tendency to swing a little bit more than some of the other machines. I put my

hand on the supply reel and add just a little bit of tension. If the needles move up in level, then the wrap is incorrect. If by applying more tension, the meters go down, then the wrap is correct.

R•E•P: That's a tasty tidbit.

RB: It's pretty important so I'll give you a couple of other hints on this. This is kind of backward to what many people think, but I find it works pretty well. There are two ways to adjust wrap. One is to go for the highest or optimum peak and the other is to rub a grease pencil over the head and see where the tape is rubbing the grease pencil off. You just cover the head a little bit, and then as the abrasiveness of the tape wears the grease pencil off, you can see where the wear pattern is. I've found that most machines have got so much wear pattern on them that to try to get them centered makes them very unstable and diminishes frequency response. I would rather go for the optimum wrap, the maximum output and then relap the heads in six months, if needed, to get started back on a fresh wear pattern.

R•E•P: So relapping is not too expensive?



Jeep Patrol: Blevins Audio Exchange staff leaning on the industry standards.

RB: Relapping is about \$500 for a 24-track using optical alignment, which I highly recommend doing.

R•E•P: What about synchro/mods/interface?

RB: Most of the MCI Sony Series, the JH24 Series, work well with almost all of the synchroizers. Just plug in the cables and go.

R•E•P: What about the 16s?

RB: The early JH16s, from 1971 to about 1974, had ac capstan motors and can't be synchroized. You're out of luck if you want to use it as a slave. You might use it as a master by just running SMPTE time code off the tape. But

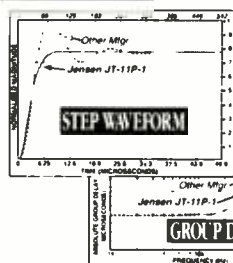
transformers it's important to either put a capacitor in the meter circuit or install a meter buffer. Otherwise when you turn the machine off and on, dc goes into the meters and pegs them. We've seen a capacitor network added to the VU meters, which made the meters offset quite severely. The response was a little bit shaky and the meters weren't representing what was going to the machine. A lot of people take the transformers out when jumping out the record and input amplifier. They are simply buffers and the signal degradation isn't that bad. I'm more concerned with having the machine perform to the best of its specifications as far as alignment. The JH16 Series from '77,

to synchronize it would be very costly and I just don't recommend it. Some of the late '74 and '75 machines, which had JH100 transports, ac reel motors and dc servo-capstan motors, worked relatively well being synchroized. The '76 to '79s pretty much take the same cables and have the same characteristics as the transports on the JH24s.

R•E•P: Tell us about common JH Series modification mistakes?

RB: When removing

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Circle (23) on Rapid Facts Card

Circle (24) on Rapid Facts Card

'78 and '79 had a little pot on the record amplifier that adjusted IM distortion. One of the biggest misconceptions is not aligning that periodically. I would like to see them aligned once a year. If you're using different formulations of tape the IM distortion is set by using that particular brand of tape.

R•E•P: From an owners point of view, what's a reasonable routine maintenance schedule that leaves you confident?

RB: At least once a year, if not every six months. I like to take the cards out of the machine and dip them in an ultrasonic bath. We do this to the audio cards and the transport cards when machines come in for repair or when we recondition machines for resale. An important tool for MCIs is Cramolin. It brings certain things back to life, but some people use too much. They spray it on like some of the other cleaners and it becomes goeey and actually gunks up some of the connections. We've experienced a lot of problems on MCI machines when people spray Cramolin on their transports. I've pulled transport boards off and the connections are actually green. It takes a considerable amount of time to get that stuff off. I've had to replace connectors because we could never get it to work again. The less Cramolin you use the better. Also every six months, depending on how much airborne dust is in the studios, the heatsink on the power supplies should be cleaned. We've seen several power supplies that are totally caked with dirt. A big failure problem on MCI machines seems to be from the power supplies running hotter due to dust and they can't breathe through the heatsink. Then the heatsinks overheat and start

burning wires. When hot, they run a lot of current through there and the solder cracks. We find that to be one of the biggest failure problems. So we remove the PC boards and resolder all the moxex connectors.

Another factor is to check the fans periodically to make sure they're running fast. If the fan is running slow when you turn the machine off and turn it back on, the fan might not start back up again next time. The fan becomes slow because the bearings get kind of gummed up. They need to be oiled or replaced.

R•E•P: Are they serviceable?

RB: Yes. But most of the time I recommend just replacing them. That's the biggest failure rate that we see on the machines periodically. The fans stop, power supplies get hot and components start dying.

R•E•P: What about cigarette smoke?

RB: I think most people have stopped allowing people to smoke in the control rooms and I think more people have become aware that smoke becomes a contaminant on-contact. I've seen less and less of some of the problems we used to see. Mainly, smoke causes contact problems. It's kind of hard to substantiate how much of that is specifically due to cigarette smoke. But I know that "no smoking" studios, ones that have the cleanest control rooms, seem to have the least problems.

R•E•P: How do you approach buzz, hum and grounding in general?

RB: Different people use different grounding schemes depending on which console they are using. The early MCI consoles had capacitors

in series with the ground wire. This made an ac connection but not a dc connection. In unbalanced situations I've had people use several different methods, everything from clipping shields to putting U-grounded adapters on the ac plugs.

R•E•P: We're at the end. Final words, warnings, comments or watch-out-for-this advice?

RB: I always advise people to have a set of spare cards on hand for JH24s. Mainly an output card, a bias card and a reproduce card. Actually, any of the cards would be a good spare. You don't really need a full set. You can always switch. You're not usually going to be recording on all 24 channels at once, so a bias card can be removed and switched to different channels. But you're going to be reproducing to an entire mix, so a spare reproduce card is advisable, as well as a record key card.

If you're buying a machine, get either maintenance records or talk to the technician who has serviced the machine. Get a history of any repeatable maintenance problems. We sell quite a few machines, and knowing who we buy the machines from always helps.

We still have parts from 1971s all the way up. As far as the circuit modifications, I'd like to say that we keep a book on transport modifications and some little tidbits of how to set the wrap and how to set certain electronics parameters. Feel free to either call or fax. ■

For MCI replacement parts contact, Blevins Audio Exchange 615-242-0596; fax 615-242-0599 or Sony 800-331-6679; in MO 800-654-0962.

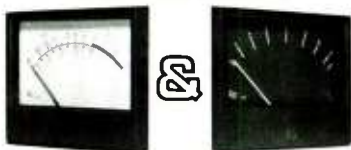
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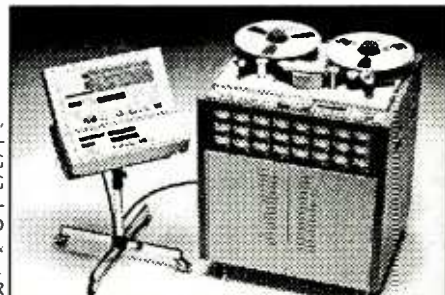
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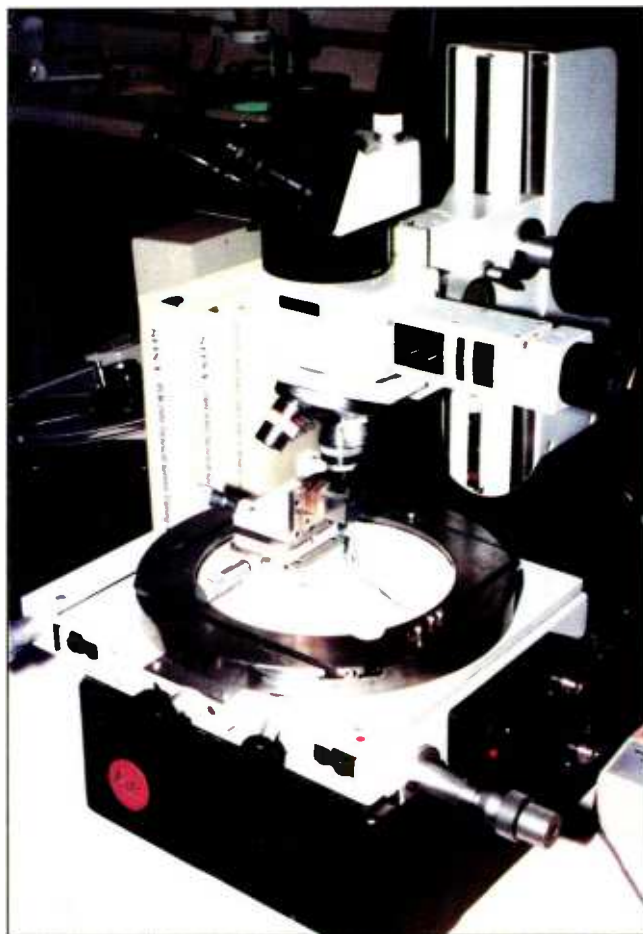
TAKING A HEAD TRIP

By John R. French

Because mixing to digital mercilessly reveals the slightest anomalies on a multitrack master, proper maintenance of analog multitrack heads is essential to ensure a flawless ADD recording. Why do tape heads require periodic maintenance and eventually wear out? Let's take a stroll and ponder the problem.

We'll start at what should be a familiar location: the New York Hilton. We'll walk down Sixth, past Rockefeller Center, cross 42nd Street with a wary glance towards Times Square, past Bryant Park, through Herald Square, angle off down Broadway at a brisk pace, take a short breather at Madison Square Park before puffing away down Fifth Avenue toward Greenwich Village, past 20th Street, and ... STOP! We've covered about 1.7 miles. That's how much tape passes over the heads of your multitrack in one hour of continuous operation at 30ips. Magnetic recording tape is mildly abrasive and eventually your heads will wear to the point where no amount of tweaking will keep your machine performing to full spec.

How long you can go until you reach that point, and what to do when you get there, will be discussed shortly. But first, let's take a look at those heads and see what they're made of. No matter what make or model multitrack recorder you have, your record and playback heads are virtually certain to be made of some



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type of laminated, high permeability metal. The most common metals used in head manufacturing are MuMetal, Permalloy and now amorphous metals (amorphous materials are actually more complex than "metal" implies, but for now we'll let it go at that). Some materials are softer and some harder, but they all will wear pretty much the same way, although not necessarily at the same rate!

The exception is your erase head, which is likely to be made of ferrite, so we will deal with it separately. For now, we will focus on progressive wear of metal heads.

HEAD WEAR: CONTRIBUTING FACTORS

The primary factors determining amount of head wear are, total hours in service and tape speed, which together give total tape passage over the heads. Tape tension also contributes, because higher tension will increase the rate

of wear. Tape path cleanliness can also be a factor, because grit and grunge caught between tape and heads will not only degrade immediate performance but also increase the rate of wear.

The abrasiveness of the tape is a factor, though there seems to be little significant difference between tape types. Finally, ambient temperature and humidity may also play a role; extremes of temperature and humidity do affect the tape, and there is some evidence, albeit inconclusive, that climate factors may influence head wear as well.

In most well-maintained studios, total hours in use will be the primary factor in determining the degree of head wear. The length of time heads can stay in service before reconditioning or replacement becomes necessary will vary, but our experience shows considerable degradation of performance on 16- or 24-track 2-inch heads at between 1,800 to 3,000 hours of use, or around 18 to 24 months of operation in a busy studio. Some of the newer amorphous metal heads introduced in the past few years exhibit longer wear characteristics, but not enough of them arrive for refurbishing at JRF for us to accurately predict the amount of increased longevity.

NORMAL WEAR PATTERN

Assuming the tape path and head assembly have been properly aligned, the wear pattern on the heads will resemble the left diagram on page 50. The pattern will be rectangular, and centered over

Despite the forecasts of all-digital proponents, analog multitrack recording is alive and well.

the gap. The flaring at the top and bottom of the head is common, and is usually present on all heads. This results from the curling effect of tape under tension, which tends to wear the heads slightly deeper at the edges.

Most newer heads have edge relief slots machined into the surface of the head at the edge of the tape path. These slots prevent the formation of a "lip," or abrupt surface anomaly, at the edge of the head wear pattern. When

John R. French is president and owner of JRF Magnetic Sciences, Greendell, NJ.

the edge of the tape bumps against this lip, due to slight variations in tape slitting or jitter in the tape path, severe edge track instability results. Edge relief slots solve this problem by preventing formation of an abrupt edge. Picture the surface of the heads as a bowling lane, with the edge relief slots as the gutters; the tape is just slightly wider than the lane, with the edges over the gutters. Edge relief slots help keep the normal wear pattern uniform, and considerably delay the onset of edge track instability.

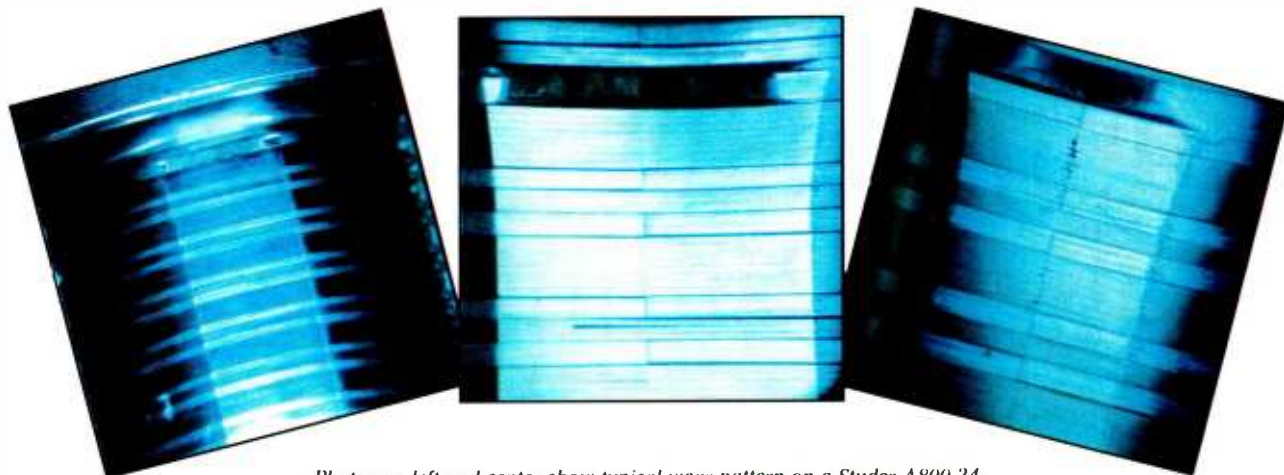
Nearly all new heads have edge relief slots, but many older heads being reconditioned do not have them. We usually recommend these slots be machined in as part of reconditioning (at a charge of \$30 to \$45), if there is sufficient gap depth remaining to warrant it.

studio owners who are convinced their heads are shot when really they have nothing more than a minor problem with their tape or tape path.

As a general rule of thumb, a tape head will not develop a major problem overnight. When somebody calls and says, "I came in this morning and suddenly my tracks are bouncing all over the place and I need to have somebody look at my heads," we generally try to steer them in another direction. If everything was fine yesterday, we try to find out what is different today? Different tape? Different use of the machine? Sometimes something as simple as flipping a tape over can eliminate heads as the source of trouble. If you have instability on track 1 and it moves to track 16 after flipping the tape, then your problem is likely with the

mal wear patterns, other problems may develop: dropouts, loss of high frequency response, midrange bump, increased distortion, increased noise, unstable tape path, tracking error, oxide buildup or shedding, or insufficient erasure.

The latter two problems are often associated with the erase head. Most erase heads are made of ferrite, and exhibit completely different wear characteristics. Unlike metal heads, worn ferrite heads will show no obvious wear pattern or change in contour. On close inspection, however, longitudinal scratching, pitting, and a general deterioration of the surface will show up as a matte or dull finish in the tape contact area. This surface breakdown results in pitting and microscopic chipping along the edges of the ferrite track, shields, ceramic fill-



Photos on left and center show typical wear pattern on a Studer A800 24-track playback head at 10x and 20x. Photo on right shows wear breaking through gap on tracks 1, 2 and 3 of a Studer A80 24-track head at 20x.

ABNORMAL WEAR PATTERNS

Tape recorders are complex mechanical systems, and often problems will arise which, if left uncorrected, cause abnormal head wear. Abnormal wear patterns (see figures) caused by tape path misalignment can prove costly, since correcting them usually requires removal of much more useable head material during reconditioning, thereby reducing the overall life of the head. Proper alignment of all tape path components on the headblock is an exacting procedure, and should be performed only by a qualified technician. Precision realignment is essential any time heads are reconditioned or replaced.

Assuming your tape path is properly aligned, there are several things you can do to extend the life of your heads and minimize reconditioning costs. First, keep your tape path as clean as possible. Second, keep your tape tension within recommended spec. Sometimes there is a temptation to cure immediate problems by increasing tape tension, but this will only delay the inevitable while increasing the rate of head wear.

During the course of normal wear, the performance of a head will vary as material is removed and the geometry of the contour changes. Up to a point, you can compensate for this change in your electronic alignment. But, when wear gets to a certain point, maintaining optimum performance on all tracks becomes impossible. What then?

ISOLATING THE PROBLEM

The first thing you want to do is make sure the problem really is caused by worn heads. All too often we get calls at JRF from panicked

tape and not with the heads.

On the other hand, if somebody calls and says, "This has slowly been getting worse for weeks, and today I decided I just couldn't stand it anymore," then I tell them to pull the headblock and send it in.

It is a good idea to regularly monitor the condition of your heads throughout the wear cycle, and the best way to do this is with a standard alignment tape. (This may seem ridiculously obvious, but you'd be surprised how many studios do not have alignment tapes for all speeds and formats.) If you don't have an alignment tape, and are dead set against buying at least one, then record tones at 10kHz and 16kHz when your heads are new or freshly reconditioned, and keep it as a continuing reference.

Every so often, put the tape on and check the stability of your levels. This is often the best way to monitor head condition, because many recorders do not have hour meters, and sometimes owners of machines with hour meters are lax in their record keeping.

FIRST SIGNS OF TROUBLE

On multitrack recorders, the first sign of trouble is usually edge track instability. Levels will start to bounce on the first and last tracks, gradually getting worse, and then moving in to the second and next-to-last tracks. At what point reconditioning becomes necessary is somewhat subjective, since some customers will tolerate much more instability than others. Most of our customers find something needs to be done when their heads have worn between 2.5 and 3 thousandths of an inch.

In the case of extreme wear, or with abnor-

mal wear patterns, other problems may develop: dropouts, loss of high frequency response, midrange bump, increased distortion, increased noise, unstable tape path, tracking error, oxide buildup or shedding, or insufficient erasure.

er, and the epoxy that holds the surface together. Because erase heads have long gap lengths (0.005" x 2 gaps minimum), an erase head will almost always continue to meet erase specifications despite serious gap deterioration. Although ferrite erase heads are often regarded as indestructible, erase heads suffering surface breakdown are often a major source of oxide shedding problems.

Does any of this sound familiar? If your multitrack has been in average to heavy use for more than two years, there is a good chance that worn heads are degrading your machine's performance. If you bought your machine new, you almost certainly do *not* need new heads, because unacceptable performance occurs well before 50% of total tip depth has been worn away. It may be time for reconditioning, which normally costs only a fraction of the price of a new head.

THE RECONDITIONING PROCESS

It's a good idea to call the head refurbishing company before you remove your heads from your recorder. The company's technician will take some time to discuss your specific problem, isolating the probable cause before you spend time and money sending in your head assembly. It is important, if at all possible, to send the entire headblock assembly to the refurbishing company, so that precise tape path alignment can be performed after the heads are reconditioned. The following description of our procedures at JRF Magnetic Sciences outlines services you should expect from any quality head reconditioning company.

Upon arrival, each headblock assembly un-

dergoes an initial inspection and testing procedure before the heads are removed. First, each head is visually inspected under a microscope (up to 600 power) to determine condition of the gap, core, laminations and ferrite material. Scratches, dents, voids, erosion, pitting, or unusual wear phenomena are noted. Visual inspection at this stage also helps establish a rough estimate of remaining head life.

The heads then receive thorough electrical testing. Inductance is measured at 1kHz, using a digital LCD bridge. Because the inductance of a magnetic head drops predictably as it wears, by comparing the head under test to wear-out specifications on file for the exact head type, it is possible to estimate remaining head life with fair accuracy, even when actual tip depth measurements are not possible. This test also reveals open or shorted coils, shallow tip depths, sprung gaps, and cracked or damaged cores prior to dismount from the head assembly. Readings are in millihenrys, and each track is measured and documented separately.

The LCD bridge is also used to perform the dc resistance test. This is simply a continuity reading, measured in Ohms, across each track. This test will detect poor solder connections, shorts, or internal wire breaks.

All of the above tests, along with an overall inspection of the head assembly, are performed before removal of the heads. At this point, the customer is often contacted to discuss options and anticipated costs. If the customer decides to go ahead with reconditioning, the heads are then removed from the headblock assembly. Many heads are manufactured with a machined-in reference mark for measuring tip depth; once these heads are out of the shield housings, the remaining tip depth can be measured with precision, allowing a reliable estimate of remaining life. Before relapping begins, precision contour tracings are established on optical measuring equipment.

The heads are then recontoured to exacting tolerances using lapping films appropriate for

In most well-maintained studios, total hours in use will be the primary factor in determining the degree of head wear.

the head material. Relapping is the precise and careful removal of material from the ramp (angled) area and radius area. The process continues down to, but does not exceed, the deepest point of head wear. At JRF, ferrite erase heads are then polished using a proprietary diamond vapor spray. Following this, the heads are again carefully inspected before remounting in the headblock assembly.

HEAD ASSEMBLY ALIGNMENT

The head assembly is set aside for at least an hour to allow stress relief of components before optical alignment. This is an extremely exacting visual and electrical/digital measurement process which references industry standard specifications for tape widths, track placement locations, and specific tolerances adhered to by the original manufacturers. At JRF, the procedure includes:

1. Cleaning of the entire head assembly.
2. Rotation of all fixed guides and posts.
3. Cleaning of flutter idlers and roller guides.
4. Cleaning and oiling of all lifters, gates and mechanisms.
5. Correcting and aligning tape height references.

6. Setting all tape path components for correct azimuth and zenith.
7. Aligning heads for track placement (within $\pm 0.0005"$)
8. Aligning head stacks for azimuth and zenith (within $\pm 0.0005"$).
9. Setting the wrap on each head stack for gap centering on tape contact area (within $\pm 0.002"$).
10. A complete quality control re-check of all above items.

FINAL INSPECTION AND QC

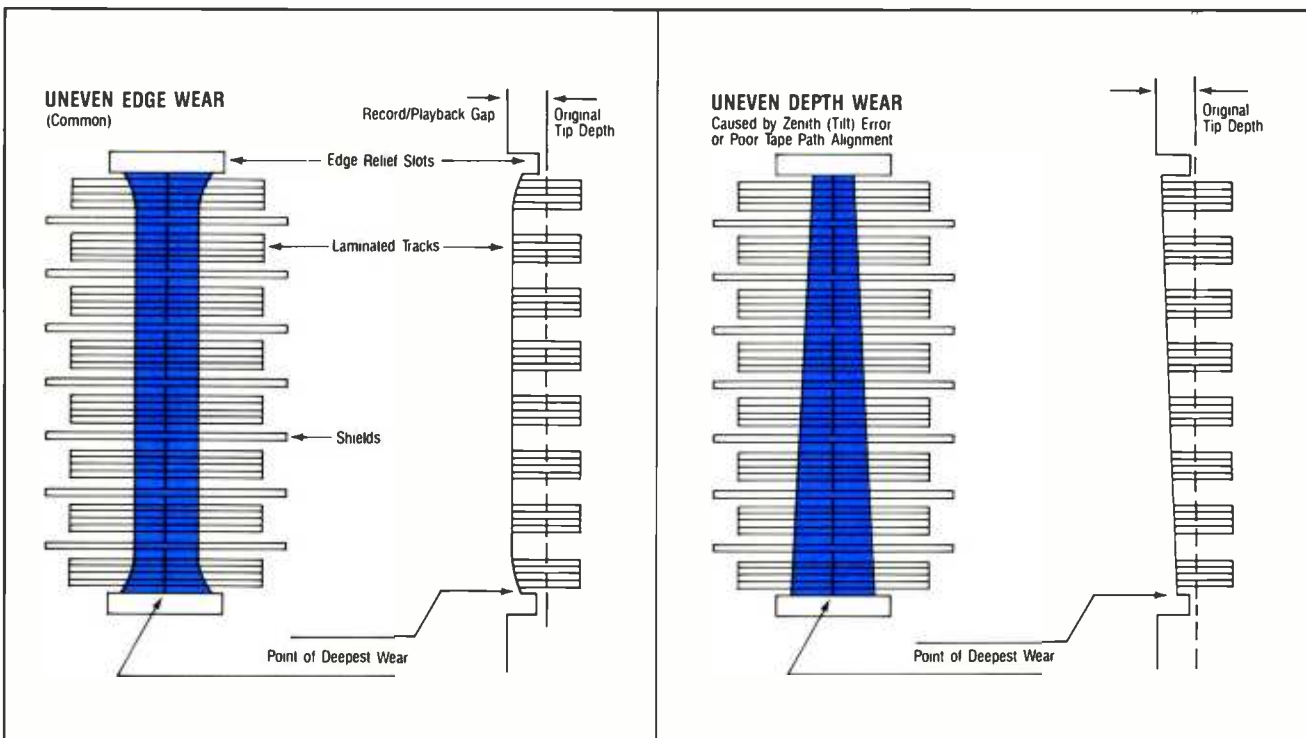
Final gap inspection places special emphasis on gap sharpness, laminations, polish consistency, contour consistency and overall surface conditions.

The final inductance test will show a slight drop from the initial test, reflecting the amount of material removed in the relapping process. After all tests are completed, the head assembly is given a final cleaning and a protective cover is applied. Complete documentation is shipped back to the customer with the assembly, and all data is kept on file at JRF for future reference.

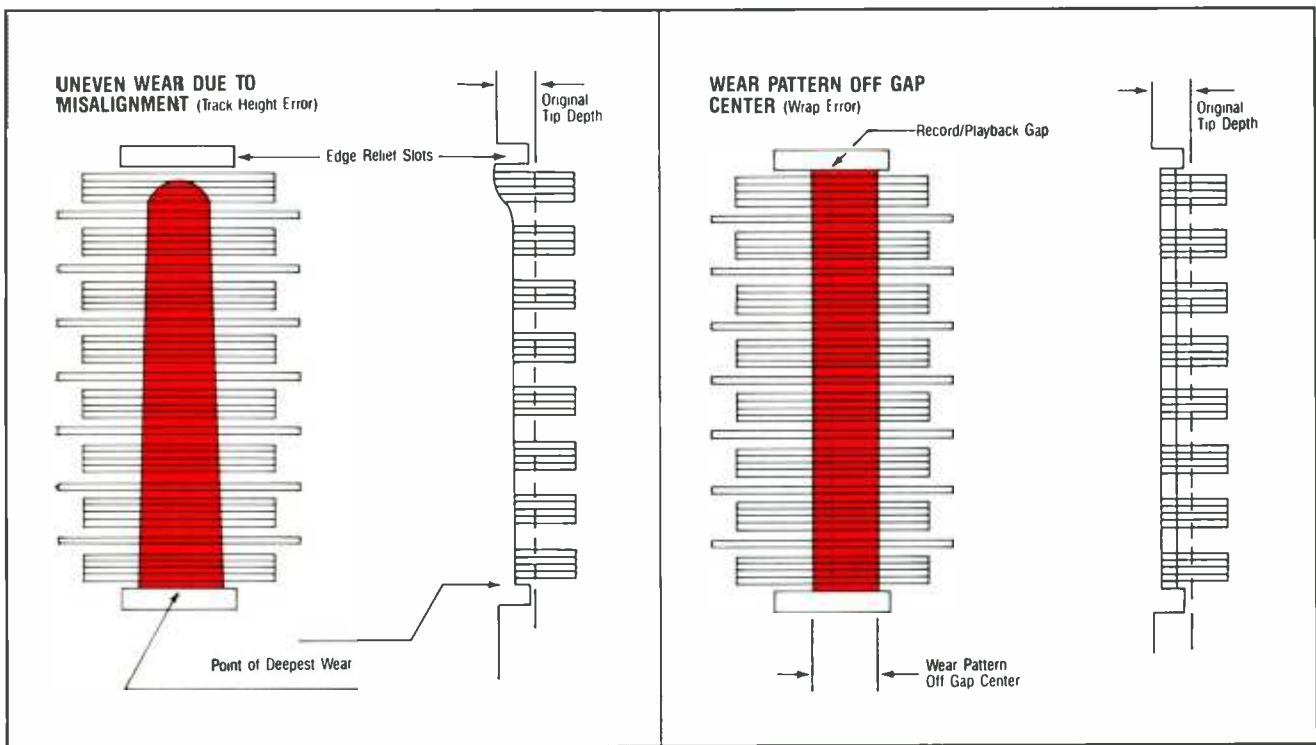
RECONDITIONING COSTS

As of this writing, the cost for the above services varies from about \$300 for a 1/2-inch 8-track assembly to about \$450 for a 2-inch 24-track assembly. When you consider that a new 24-track head can cost as much as \$6,000, the savings realized from refurbishing can be substantial.

When are heads too far gone for reconditioning? Again, the answer to this question depends to some extent on circumstances and the customer's particular financial situation. Almost all heads can benefit from reconditioning at least once, and most two or three times. But when tip depth gets down to what we term "marginal," we consult with the customer carefully before proceeding. If heads are on the "hairy edge" of wearing through, but the stu-



Graphic demonstration of multitrack head wear. Left: Normal wear on a properly centered head. Right: Wear pattern showing incorrect zenith alignment, where top of head is tilted away from tape.



Left: Incorrect tape head height and zenith alignment. Right: Incorrect head wrap alignment, causing increased sensitivity to dropouts.

dio simply cannot afford new heads, we may reluctantly go ahead and relap, though in such cases we cannot guarantee remaining head life. This scenario requires an unbelievable amount of added care (not to mention stress) because the parting words from the customer are usually, "Oh God, please don't let it go through!"

In most cases, however, the studio will not want to deal with the process again in the short term, and will elect to replace the heads. Also, in rare instances, a financially strapped customer will elect to live with the marginal head per-

formance a little bit longer, so we will return the assembly as-is.

Interestingly, the performance characteristics of a properly reconditioned playback head will actually improve as it wears. As the tip becomes shallower, the head becomes more efficient. The best performing playback head in the world is one that is just on the edge of going through the gap. So if your playback head has a good surface, it's okay to keep using it right until it wears through.

Record heads are a different case, since they

become very inefficient as they approach the end of their working life. The signal is applied and the flux is trying to bridge the gap, but with only a sliver of tip depth remaining, the pole tip can saturate very quickly. This leads to increased distortion, biasing problems, and, because you are driving the heads harder, increased adjacent channel crosstalk.

REINSTALLING YOUR HEADBLOCK

The reinstallation of a properly refurbished and optically aligned head assembly usually requires no more than minor tweaking of azimuth for optimum phase response, along with the standard electronic calibration procedure. Tape tension should be checked and reduced to the minimum acceptable OEM specified setting.

When you put in a new or relapped head, you can usually peak the output by playing with the tape wrap. This is a dangerous practice, and is not recommended. Making such adjustments will start developing an abnormal wear pattern based on the temporary peak, whereas after a few days, if you had left it alone, you would have had a nice, even pattern centered on the gap. Leave the wrap alone unless you are absolutely sure of what you are doing.

ADD: ALIVE AND WELL

Despite the forecasts of all-digital proponents, analog multitrack recording is alive and well. The combination of analog tracking and digital mastering, particularly at the project studio level, has kept business booming here at JRF. Because, when you end up on digital, you absolutely have to start out with analog heads that are "up to snuff." ■



Individual heads are inspected for gap, lamination and ferrite material condition, as well as surface finish, all fully documented.

The author would like to thank Bruce Borgerson of Tech/Write Communications for his assistance in preparing this article.

Computer Control of Sound Systems: Deus ex Machina?

By David Scheirman

In the Dark Ages, before the microchip, synchronous serial interface and data transfer protocol, sound systems were pretty straightforward. You had building-block parts (mixer, crossover, power amps and such), your cable harnesses with familiar connectors, and you had loudspeakers to present the results of your efforts to a listening audience. Not much got in your way, unless it was an equipment breakdown, a grouchy usher or a late soundcheck.

As shows became mega-events (did your kid ask you for \$75 bucks to go see Michael Jackson? Could you tell who was playing drums for Madonna from the last row of the football stadium?), it became more important to achieve a certain consistency to the sound of the show, because the program input was getting more complex (maybe four different mic positions for the lead vocalist, eight special effects returns on his voice, and some playback effects to boot), and because the sound reinforcement systems themselves were getting more complicated ... delay towers, rearfill, lower and upper deck systems ... the works. In short, there were more variables to deal with than ever before.

Manufacturers, take heed: If there's a computer involved, the software had better be right.

It had become not just a mono, then a stereo, but perhaps an 8- or 12-branch speaker system. Not just 24 or 32 inputs, but perhaps 120 with MIDI-linked reverbs, delays and noisegates.

A certain line has been reached, beyond which one sound system mixer/operator often cannot effectively handle the wide variety of audio hardware that may be "necessary" at his

or her mixing position. And, even with the assistance of a dedicated system technician manning the equalizers, speaker zone distribution matrix and crossovers, mixers may be hard-put to keep up with some of the changes in today's fast-paced live music shows ... and get it *right*.

ENTER THE COMPUTER

They always get it right, don't they? Since the late 1950's when the first data-processing card-sorters began to make noises in our culture (*clack, clack went the Univac*), we have grown accustomed to thinking of the computer as being the impartial, omnipotent, unerring silent partner. Throughout the 1970s and 1980s various software developers struggled to write code that would enable this silent partner to elbow its way onto the sound system mix riser.

First, it was personal computers for storing information, special effects cues. Then the computers were linked to an expensive console to make scene changes (just like the lighting guys were doing a couple of years earlier). Next, audio manufacturers started many ambitious research and development projects to work on the task of allowing simple sound system operations to be linked to the computer, changes such as program equalization, then power amplifier startup and diagnostics.

WHICH COMPUTER?

Well, the world seemed about evenly divided between Macintosh and IBM. Musicians, artists and writers liked the Mac's intuitive, graphics-based operating system. Engineers and scientists liked IBM's no-nonsense, familiar working environment. Which protocol or communications language to use between the audio component and the system computer? Well, MIDI was making strong inroads with electronic keyboards, drum sequencers and effects program changes in the studio ... but it certainly had its limitations. RS-432 and PA-422 ports started to sprout on the back of equalizers and reverb devices, and terms such as serial interface and digital I/O began to appear in product manuals.

Today, we have a problem, one not unique to sound reinforcement. It is the same problem that has been encountered by the automotive industry (your serviceman has computers to link into your auto's engine for diagnostics), the home entertainment industry (which remote control is supposed to start the damn VCR?), the printing industry (you need how many pages printed out from what word processing program?), the communications industry, and nearly every other field of endeavor where human beings have to interface with information and machines to conduct business.

Our problem is that the tools available to us to do our job are rapidly becoming more complex and doing more things for us, thereby performing more functions that we took for granted, so that the learning curve to use the tools is steeper than the time allowed. The new computerized equalizer came in today by Federal Express. The show is tomorrow night. They say they need it. Your wife notes that you haven't

been out to dinner with her in three months. They forgot to include the manual with the product in the box. What to do?

Today, we have a problem, one not unique to sound reinforcement.

There is a reason that the most well-established sound reinforcement firms, and the most successful live soundmixers, are conservatives when it comes to fancy new hardware (and in this industry, that invariably means "computerized" these days). Simply put, the ability to offer a good, consistent product (live sound to an audience) rests on the twin-pillared foundation of the right tools and the right skills to know how to use them. And much new technology claims to be "right" ... yet ...

Which direction do you lean? Which hardware do you put your money in? Which operating language do we learn this week? Who are you gonna trust ... the computer? Its operations manual? The software developer? The sales representative? Or just go by "feel"?

Products for live sound reinforcement today need simple controls, powerful data-crunching devices and absolutely correct software if they are going to effectively combine computers with audio. Whether mixing console, programmable EQ, or networked power amp racks, the push is on the product developers to smooth the user-hardware interface. Simply put, "Make it so I can understand what it is supposed to do, so I can make it do what I want it to, and so I don't have to spend every spare evening trying to figure it out".

In Latin, "Deus ex Machina" invokes the image of a "God/Ghost in the Machine," a benign but all-powerful entity that functions behind the scenes to (hopefully) influence a positive outcome to the endeavor that involves said machine. Perhaps computer science can offer the audio industry speed, logic and consistency. It can't offer subjectively better musical sound, and it can't provide a replacement for intelligent, savvy system operators and technicians who enjoy what they do for a living.

Manufacturers, take heed: If there's a computer involved, the software had better be right. The hardware had better be rock-solid. And the "user interface" had best be in touch with today's working system operators. There is no magical presence in any of your programs or hardware packages that can solve the looming problem of user apathy based on complicated, illogical control schemes. ■

David Scheirman is R•E•P's live sound consulting editor and president of Concert Sound Consultants, Julian, CA.

**RAT SOUND SYSTEMS,
SUN VALLEY, CA**

Headline Act:
**Red Hot Chili
Peppers**

Support Acts: Pearl Jam,
Smashing Pumpkins
Dates: Oct. 16 - Feb. 1992
Region North America

PERSONNEL

House Mixer: Dave Levine
Monitor Mixer: Karrie Keyes
Head System Engineer: Dave Levine
Technicians: Mark "Smitty" Smith
Rigger: Local riggers

CONSOLES

House: Ramsa WR-S840 40-channel
Monitor: Yamaha PM2800 40-channel
Support House: Soundcraft 500B 32-channel
Support Monitor: Yamaha PM2800 40-channel

MAIN LOUDSPEAKER CABINET

Manufacturer/Model: (16) Rat Trap 5-way (32 EVX150 15-inch, 32 JBL 2123 10-inch, 16 JBL 2440 2-inch, 16 TAD 2001 1-inch)

LOW END CABINET/SUBWOOFER

Manufacturer/Model: (16) 2" x 18" Rat Subs (EVX180 and TAD 1801)

ONSTAGE MONITOR WEDGES

Manufacturer/Model: (8) RAT 2x15"/10"/2"

Manufacturer/Model: (4) RAT 15"/2"/1"
Manufacturer/Model: (5) RAT 2x15"/2"/1"

ONSTAGE/DRUM SIDEFILLS

Manufacturer/Model: (5) RAT 2x15", 2x10"/2"

AMPLIFIERS

Main FOH: Crest 8001, 7001, 4801, 2501A
Lows/Subs: Crest 7001
Monitors: Crest 7001, 4801, PL400
Sidefills: Crest 7001, 4801, PL400

HOUSE SIGNAL PROCESSING

Equalizers: Klark-Teknik DN360, DN410, t.c. electronic 1128
Crossover: (2) BSS FDS 360, (1) BSS FDS 310
Reverb: Yamaha SPX90, Rev7, Lexicon LXP1, LXP5
Delay: Roland SDE3000, Yamaha D1500
Gates: Klark-Teknik DN514, Symetrix 501
Compressor/Limiters: dbx 160X, dbx 166, BSS DPR402, DPR404
Intercom System: Clear Com
Cassette Player: Nakamichi MR2
CD Player: Panasonic
MIDI Controller: Lexicon MRC
Headphones: Beyer DT109
Analyzer: t.c. electronic 1128
Power Conditioner/Light Module: Juice Goose PDI

ONSTAGE SIGNAL PROCESSING

Equalizers: (9) Klark-Teknik DN360, (2) Yamaha 2031A
Crossovers: TDM 24CX4 modified
Reverb: Yamaha SPX90
Gates: (4) BSS DPR 504
Compressor/Limiters: dbx 160XT
Analyzer: Gold Line RTA
Power Conditioner/Light Module: Juice Goose PDI

MICROPHONES

Vocals: Audix OM7
Kick: EV RE20
Rack Toms: Shure SM98
Floor Toms: Shure SM98



Natalie Cole house stacks onstage.

Overheads: AKG 460
Snare Top: Shure SM57
Snare Bottom: Shure SM57
Hi-Hat: AKG 451
Ride: AKG 451
Guitar Low: Shure SM57
Guitar High: Shure SM57
Bass DI: BSS
Bass: EV RE20

CABLING

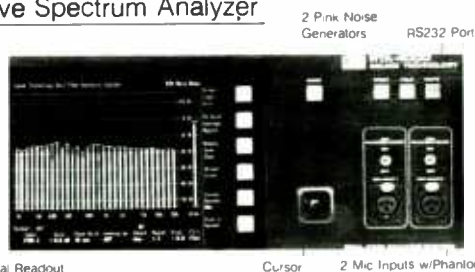
House snake: 52-pair Mass to Mass with TT patchbay, Whirlwind wiring standard.
Splitter: 52 hardwired 2-way
Stageboxes: 20-channel Whirlwind

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Natalie Cole

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Region: North America

PERSONNEL

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Monitor Mixer: Shorty Kades (independent)
Head System Engineer: Paul Sarault
Stage Technician: Bob Meyers
Production Manager/Lighting Director: Bud Horowitz

CONSOLES

House: (2) Yamaha PM3000-40C
Monitor: Midas XL340

MAIN LOUDSPEAKER CABINET

Manufacturer/Model: (12) Martin Audio F2
Manufacturer/Model: (12) Martin Audio F2L (Lows)
Crossover: Martin MX-4

FRONTFILL LOUDSPEAKER

Manufacturer/Model: (4) Martin Audio F1
Crossover: Martin MX-4

ONSTAGE MONITORS

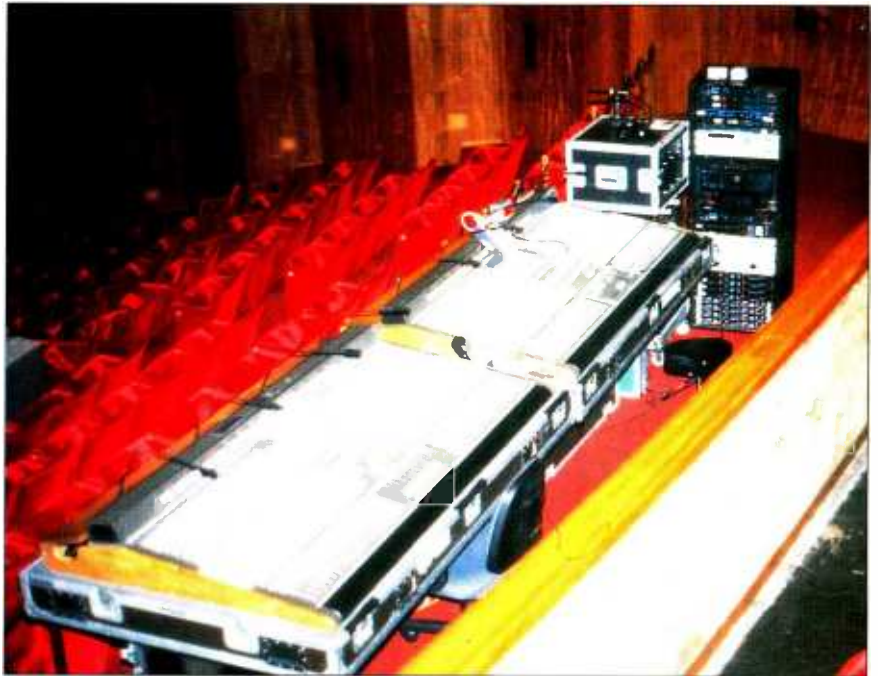
Manufacturer/Model: (10) Compact Monitor 112 TA loaded with 12-inch Gauss, 2-inch JBL 2482 on JBL 2311 horn, JBL 2402 Ring Radiator
Crossover: Built into compact monitor amp

ONSTAGE SIDEFILLS

Manufacturer/Model: (4) Compact Monitor 112SF loaded with 12-inch Gauss, 2-inch JBL 2482 on JBL 2311 horn, JBL 2402 Ring Radiator
Crossover: Built into compact monitor amp

AMPLIFIERS

Main FOH (F2): Carver PM1.5, Crest 6001
Main FOH Low (F2L): Crest 8001
Frontfill: Carver PM1.5
Monitors: Compact Monitor 1KTA mono 3-channel (650, 250 and 100W/8 Ω) built by BGW
Sidfills: Compact Monitor 1KTA mono 3-channel (650, 250 and 100W/8 Ω) built by BGW



Front and center at the house mix position.

HOUSE SIGNAL PROCESSING

Equalizers: Klark-Teknik DN360, DN27
Crossover: Martin MX-4
Reverb: Lexicon 224, PCM 70 and (2) LXPI, Yamaha SPX900 and (2) Yamaha SPX90-II
Spatial Enhancer: BASE Bedini
Compressor/Limiters: (4) dbx 160X, (4) dbx 166, Summit Tube Limiter TLA100A
Intercom System: Chaos
DAT Player: Panasonic SV3700
Cassette Player: Nakamichi MR1
CD Player: dbx DX5
Headphones: Sony MDR V6, Sony MDR 7506
Analyzer: Goldline RTA

ONSTAGE SIGNAL PROCESSING

Equalizers: Klark-Teknik DN360
Headphone EQ: (4) dbx 905
Reverb: Yamaha SPX900, Lexicon PCM70, Korg DRV 2000
Delay: Lexicon Prime Time, Roland SDE 3000
Gates: (3) dbx 904
Compressor/Limiters: (4) dbx 160X, (2) Klark-Teknik Quad 504, (6) dbx 903, Audio Design Recording Complex limiter F760X-RS
Analyzer: Gold Line RTA
Light Module: Furman PL-Plus

MICROPHONES

Vocal: 4031 Sennheiser capsule with TV9H Series
Wireless: Sennheiser diversity wireless EM1036
Kick: EV RE20
Rack Toms: Ramsa SM7
Floor Toms: Ramsa SM7
Overhead: AKG 414 ED

Snare Top: Ramsa SM7

Snare Bottom: Shure 57

Hi-Hat: Sennheiser 441

Guitar: DI

6-string gut and 12-string Guitar: Sennheiser diversity wireless EM1036 with Ovation OP24 Electronics pickup

Piano: Yamaha Midi Grand with Helpinstiel pickup 5-piece, (2) AKG 414 ED

Bass: DI

Direct Boxes: Countryman

Sax-1st Chair: Ramsa SM7

Tenor Sax: EV MD408

Baritone Sax: EV RE20

Trumpets: Beyer M88

Trombones: Sennheiser 421

Flutes: EV MD408

Clarinets: EV MD408

Violins: Shure SM5

Cellos: Sennheiser 421

Violas: Shure SM5

CABLING

Snake: (5) Belden 23-pair

Multi-pair connector: AMP G3

Stageboxes: Whirlwind

Splitter: 3-way passive

Mark Herman is president of Hi-Tech Audio Systems, a sound reinforcement equipment rental company based in South San Francisco.

MIXING THE MONKS

By David Scheirman



Unique microphone technology and Meyer Sound Labs' SIM measurement system help bring a Tibetan Cultural Arts program to a nationwide audience.

In 1959, the People's Liberation Army of Communist China moved with tanks and armed troops to occupy Tibet, a little-known and hard-to-reach medieval kingdom high in the Himalayas of central Asia. Along with His Holiness, the Dalai Lama, the spiritual leader of the Tibetan people, a handful of Buddhist monks managed to flee the bombardment and invasion of Lhasa, the capital city. The Chinese occupation (still in effect) eventually managed to destroy nearly 90% of Tibet's 6,000 monasteries, and Amnesty International estimates that almost one million Tibetans have died due to warfare, hunger and imprisonment during more than 30 years of Chinese occupation. The Chinese outlawed all displays and practice of traditional Tibetan cultural and religious ceremonies.

The monks who escaped this cultural genocide brought with them secret, esoteric knowledge including styles of painting, sculpture, healing, dancing and vocal chanting that have been unknown to Westerners until recently. The Gyuto monks, now established in a monastery-in-exile in northern India, have worked some three decades to re-assemble their spiritual training center known as the Gyuto Tantric

University. Here, more than 300 monks now work on perfecting sacred rituals, passed down for many hundreds of years. From their practice of unexcelled yogas have emerged arts and sciences that are unique in the world. Their hallmark is an eerie, deeply moving style of multiphonic chanting wherein each individual monk, by training for years since early childhood, is able to "sing" a guttural chord that contains several harmonic tones simultaneously.

In the fall of 1991, the Gyuto monks completed their third visit to America since 1987 for the purposes of raising public awareness about Tibet's plight, and for fund-raising through live performances and the sales of their recordings. As their live soundmixer, it was my task to authentically replicate the intimate, indescribable sounds of their chanting to large audiences. This is the story of their tour, and the technology that made it possible.

TOUR SPONSORS

In these days of corporate sponsorship for rock concert tours, it should come as no surprise that even Tibetan monks can get by with a little help from their friends. Across the U.S., groups known as Friends of Tibet organized the local sponsorship of concert programs throughout September, October and November. Meyer Sound Laboratories of Berkeley, CA, offered to support the tour with equipment and the



With the mini-mic positioned in front of the face, the various tones of the multiphonic chanters could be accurately picked up and reinforced through the sound system.

company's precision audio measurement system.

Another primary supporter of this project since its beginning has been Mickey Hart, known as the lead drummer for The Grateful Dead. Through Mickey's involvement, the Gyuto Tantric Choir received benefit from that group's management office; in fact, the band's tour manager, Cameron Sears, ransomed portions of the tour himself. The band's soundmixer, Dan Healy, was instrumental in finding a

David Scheirman is R•E•P's live sound consulting editor and president of Concert Sound Consultants, Julian, CA

PHOTOS AND GRAPHICS BY DAVID SCHEIRMAN

SOUND REINFORCEMENT



One of the double-skinned drums, unique to Tibetan culture. AKG C414s were used to reproduce the sound of these drums.

technical solution to presenting the monks' sound, and with recordist Tom Flye worked to get their chanting onto tape and CD.

Hart has been a supporter of ethnic music from around the globe for many years. "This music represents life, and therefore is the sound that embodies the belief of impermanence," said Mickey Hart. "... listen to the full range of the chord. Breathe deeply and let the sound wash over you. Feel it in your bones!"

Interviews with the monks were taped for broadcast on National Public Radio. Record stores began to feature the unearthly, drone-like music of the Gyuto monks. And so, the audiences (typically 2,000-3,000 people in a concert hall or performing arts center) would arrive with high expectations. From the



A close-up view of the SIM measurement system's color monitor, which allows the user to select a variety of trace displays in the frequency/amplitude, time and phase domains.

beginning, Hart counted on support from Ultra-sound, the sound reinforcement company based in San Rafael, CA, that handles the Dead's concert sound needs. The company assembled a system to my specifications for shows in the western U.S.; all shows in the east and midwest were handled by Andrews Audio Tours of New York City.

What both companies have in common is a touring speaker system inventory based on

Meyer Sound products. Due to the complex but subtle nature of the monks' choral harmonics, sonic accuracy and consistency from show to show was seen as being the key to a successful nationwide tour. The tour received corporate support from Meyer, including the arrangement of air freight shipments, provision of speaker systems, and the loan of ATL mixing consoles and Meyer parametric EQs. The project also proved to be an ideal situation for beta-testing Meyer's new SIM computer-based measurement system.

"This program is really good for working out the intricacies of source-independent measurement," said John Meyer. "The sound of the performance offers a very narrow gain window ... perhaps ± 2 dB for the most part. It is a constant, but subtly variable, program input to the system. And, much of the sound of the monks' chanting occurs in the critical low-midrange frequencies, which is where so many of the acoustical problems in a given room space become noticeable."

MONK MICROPHONES

The first step in "wiring the monks for sound" involved the testing and selection of microphones for live performance. In the studio, a boom stand suspended a high-quality condenser microphone with pop filter (typically Neumann U87s and 67s). One microphone was dedicated to each monk, who sat in the traditional two lines, facing each other. For the live stage, this method would not be acceptable: the visual distraction of that many large-bodied microphones with booms, filters and shock mounts would spoil the ceremonial ambience. We attempted to preserve the simple, elegant and sacred aspects of the stage presentation, and this included "hiding" microphones from

the audience's view whenever possible (See Figure 1).

A hybrid miniature condenser headset microphone system was developed in conjunction with AKG, featuring a modified C410 omnidirectional element with foam windscreen. Compact and accurate, the system is able to pick up both the fundamental chant tone and the harmonic overtones produced by each monk.

The 48V mic systems were wired to an in-line pre-amp, and each monk (in a group numbering from 12 to 18, depending on the performance) was provided a system that was put on prior to each performance, once the group assembled at the stage area. Once the monks were "wired", a full sound check was undertaken each day, so that individual vocal harmonic overtones could be "dialed in". The ensemble blend was then used as system input to adjust the sound of the system in each different venue.

A look at a real-time audio frequency analyzer display showed that the monks were working with fundamental chest-tone and diaphragmatic low fundamentals that ranged from 75Hz-100Hz. Subharmonics, originating as a chest resonance, are audible and clearly measurable as low as 35Hz (!). Each man also produces, at the same time, a first harmonic in the throat/mouth region, typically around 350Hz-500Hz. The most accomplished vocalizers, including the 46-year-old chantmaster (who has practiced this craft since boyhood), then also produce, at the same time an upper-register, secondary harmonic in the 2.5k-4kHz region, developed in the throat/sinus cavities ... an eerie, bell-like tone likened by some listeners to "shimmering glass". Add to this multi-phonetic chorus the high-frequency sounds



Acting as their own road crew, the Gyuto monks learn about the stacking of Meyer MSL-3 loudspeaker system enclosures.

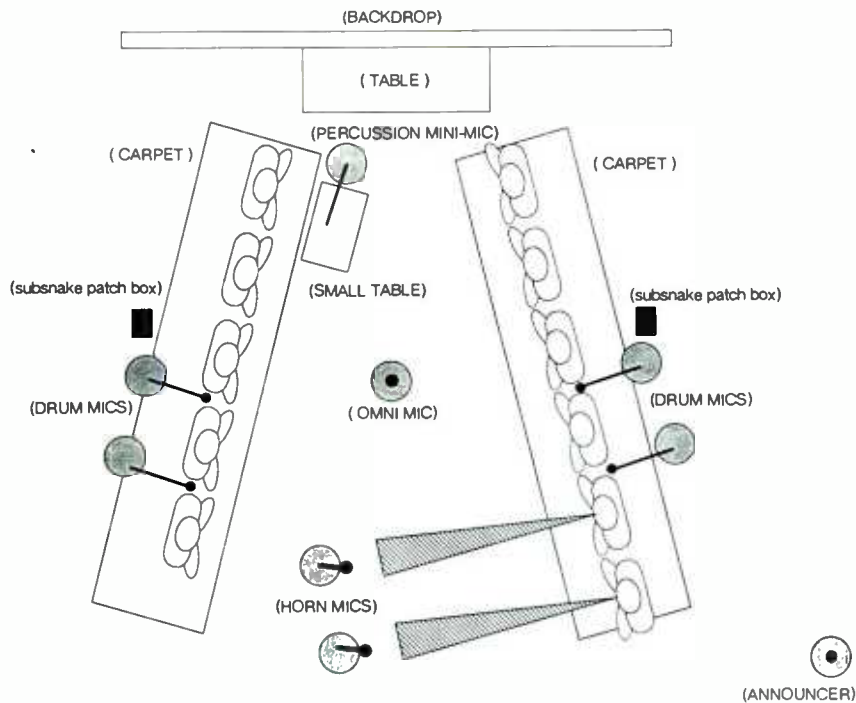


Figure 1. Overhead view of the Gyuto Tantric Choir's stage setup.

of the breath, and the Gyuto Tantric Choir is producing broad-band program input (35Hz-8kHz)...all from sounds originating with controlled breathing and the human voice.

CEREMONIAL INSTRUMENTS

The monks program, while based on vocal chanting, also includes the use of percussion and horn instruments. A round, tight-skinned drum unique to Tibet is often played by four to six monks, in unison. We used AKG C414 mics (-10dB pad, no filter, cardioid pattern) to pick up the slow, powerful, bass tones of these drums. A slender, curved wand-like stick is used to softly strike the front head of the double-skinned drum.

Other percussion instruments include traditional Tibetan bronze, high-crowned cymbals (clearly audible through an omni-pattern condenser mic shock-mounted in the center of the monks' ensemble on the floor) and small, hand-held finger cymbals. Other items such as the tiny, traditional finger drum were picked up by using Ramsa's miniature condenser mic series. The S2, for example, with Ramsa's unique adjustable mini-boom, enabled us to accurately reproduce delicate program information while causing minimal interference with the monks' stage presentation.

The monks also make use of unusual, 10-foot-long horns, designed for sending their loud, haunting sound echoing across the Himalayan mountain valleys. These did not need much reinforcement indoors, but a subtle taste was picked up by a pair of Sennheiser 421 microphones placed at floor level in front of the trumpet bells.

SPEAKER SYSTEM DESIGN

In planning the loudspeaker system layout for this tour project, I had to take into account that my stage crew would consist entirely of Tibetan monks and some helpful volunteers. This meant that the touring package had to be compact, easy to handle and simple to assemble. Most shows would be held at proscenium-stage theatre venues, so I anticipated that most

load-ins would be straightforward. We assembled a touring package consisting of (6) Meyer MSL-3 enclosures, (4) 650RS-2 subwoofers, (4) smaller UPA-1As with tripods, and (4) compact UPM loudspeaker enclosures that could be used wherever extra fill reinforcement was needed: under overhanging balconies, or on the front apron of extra-wide proscenium stages in rooms that required centerfill (See Figure 2).

The monks eagerly took to their new job as "roadies". Stacking speakers, unpacking the mix console, rolling amp racks and coiling snake cables became a part of their daily discipline. They often held contests (while eyeing their brand-new, bought on the street in New York wrist watches) to see which team (stage left or stage right) would complete their tasks first. This attitude was most helpful, because we often pulled into a venue at 3:00 pm for a 4:30 soundcheck and 7:30 show.

Signal distribution was laid out in the following manner. Left and right stage stacks received the full vocal/percussion mix with the exception of the large trumpet-like horns; smaller UPAs, depending on the room design, were used to reinforce the vocal chanting and delicate percussion (finger cymbals, etc.). Whenever possible, UPAs were used as a separate, left/right full-program source to present a rear-imagined "surround" soundfield, bringing a larger part of the listening audience into more of a nearfield environment. In some instances (such as exceptionally narrow, long rooms) the UPAs were used as delay reinforcement speakers, set back approximately 100 feet from the stage on the side walls.

SIGNAL PROCESSING

For the most part, no effects or special signal processing were used for the monks. A stereo digital reverb unit was available to add some ambience to the drum sound, but the sound of the show was generally carried by the monks' natural voices. Many audience members, never having heard the eerie, unusual multiphonic chanting, paused at the mix position to ask what "special tricks" were being used ... the

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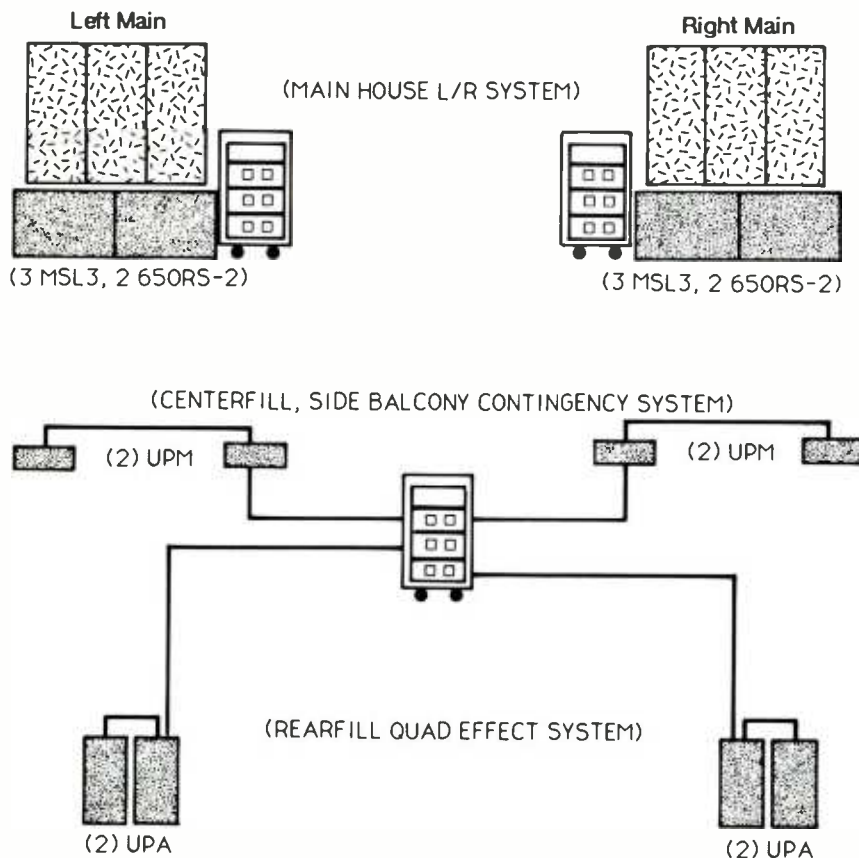


Figure 2. A general description of the compact touring system for the tour.

answer, of course, was none.

Meyer Sound Laboratories provided its CP-10 complementary-phase parametric equalizers (each filter notchable to 1/10dB). These were used on each "branch" (left main, right main, etc.) of the sound system. Also in use was the new ATL programmable digital signal delay unit (2-in, 4-out with 99 memory presets). A key component of the system, and something that should please any sound reinforcement user of Meyer Sound's loudspeaker systems, was the company's new VX-1. This 1-space rack-mountable program equalizer has been cleverly set up in three bands (low, mid, high) with the bandwidth of the filters being user-selectable. For instance, the low control can be set to adjust the tonal quality (cut/boost the selected low bandwidth) of only the subwoofers. The midrange control could be set to affect only the 12-inch low-mid section of the MSL-3s, and the high control could be set to enter into play at exactly the crossover point into the system's compression drivers.

Thus, the VX-1 functions as a "virtual crossover" that enables the system operator to gain a degree of control over the sound of a Meyer speaker system that has been previously unobtainable, due to the fact that the control electronics units for these systems (which include the electronic crossovers) have been traditionally located at the amp racks ... often 100 feet or more from the mix position. And, with few user-adjustable controls on Meyer's CEUs anyway, the VX-1 makes for a very handy operating tool at the mixer.

SIM ON THE ROAD

Sophisticated, computerized audio measurement systems are not typically found on the road with touring sound systems. There are several reasons for this. First, such systems are

not inexpensive. But perhaps most important, the time, special care and extra training that it takes to set up and operate such systems are usually considered to be extreme luxury items when it comes to sound on the road.

Why use such a system? Many Broadway show producers, corporate special event directors and major concert production managers feel that their production has a competitive "edge" and that they are truly offering state-of-the-art audio to their paying audiences when the sound has been "tweaked" to the Nth degree by the operators of such measurement systems.

To be very clear, let me state that SIM and any other such computer-based audio measurement systems (such as Apogee CORREQT) do not work any "magic" ... while the computer keyboard operator hovering over a dimly-light video screen next to the mixing console may add a sense of technical mystique to the production, the truth is simple: In the real world of live sound, a computerized measurement system is only as good as its operator. The operator's ability to perform meaningful work (or, add perceived value to the performance) is limited to the usability of the software program and computer system in question. And the results of his or her inquiries into the finer aspects of audio acoustics is based entirely on the mathematical assumptions that are made about the physical world around us (room spaces, sound energy and such) by the computer software programmers.

It is for all of these reasons that it has taken many years for even one or two readily accessible computerized audio measurement systems to become available to the concert sound industry. Meyer's SIM development program has been in process for nearly a decade. The development of a commercially built, road-

tested measurement system able to be used for critical live audio situations is a laudable effort.

For the Gyuto monks tour, a series of shows was selected to use as "test points" for the new SIM System II portable audio measurement system. The hardware included the SM-2201 Sound Analyzer, SIM-2403 Interface Network, and Bruel & Kjaer measurement mics. The SIM-2201 incorporates a signal generator (offering sine wave, pink noise and modulated impulse outputs), level inputs with meters for each measurement input, a removable hard disk, floppy drive for data storage and a VGA color monitor output.

With each show that took place using SIM in major cities such as New York, San Francisco and Los Angeles, we learned a bit more about the new instrumentation package, its software ... and about the monks' amazing vocal abilities.

MIXING THE MONKS

My initial reaction, upon meeting the monks and hearing their chanting during rehearsals at Mickey Hart's ranch in Northern California, was somewhat indescribable. I honestly was not sure that the rich, unusual sounds of the monks could really be presented to live audiences with accurate coverage and good fidelity. I wasn't *worried* ... let's just call it skeptical. As it turned out, the monks' awareness of the difficulties involved, and their willingness to work within the parameters that were given to them (including no foldback or stage monitor system of any sort) were a key part of the project's success.

The SIM measurement system turned out to be a rugged, roadworthy package. Interfacing it with the sound reinforcement system was painless; once patched in, I was able to look at the electrical output of the mix console bus (pre-equalizer), the post-equalizer electrical signal for each system "branch", and the acoustical response as measured at up to eight separate mic locations (more were used prior to audience entry to the room than during the show, due to cable/stand considerations). All in all, this method provided more frequency/response/phase data than most would have time to even think about during a live performance.

With a dedicated SIM technician manning the measurement computer and offering precise advice on room/system anomalies and the possible corrections that could be implemented (using the narrow-band parametric EQs), an interesting synergy can develop between board operator (music mixer) and measurement technician (SIM operator). This can allow for minimum-interference, precision adjustment of the system's performance in the room, as perceived by the average listener, in a way that it is hard to imagine being achieved without such a high-resolution measurement system.

The Gyuto monks' shows were invariably sold out (it was not uncommon to turn away several hundred people at the door of 1,500-2,000-seat venues), and the many positive comments about the sound undoubtedly reflected both the unique nature of the program, and the attention to detail that was taken on this project. A sophisticated computer measurement system is usually a luxury for most one-nighter touring sound projects, and would not have been possible on this one without the generous assistance offered by the manufacturer. Yes, it can make a positive difference ... if you have the money to get it, the time to set it up, the skill to make it work for you, and the common sense to know when to trust your ears and when to trust the video screen. ■

HANDS ON:

SYMETRIX 564E QUAD EXPANDER GATE



By Mike Joseph

It wasn't too many years ago that noise gates took the rudimentary form and function of electronic one-trick ponies: signal drops below threshold, device mutes. The earliest of Kepexes (probably still out there working in the field) had the barest of required necessities — threshold, range and a key input on the back. Later generations offered more advanced basic features, but still pretty much provided inverse-compressor type functions — attack, release, bypass, softer gating (expansion) with preset ratios, and an on/off switchable key input.

Only recently have manufacturers such as BSS, Drawmer, and now Symetrix, offered total manipulation of both program signal and

**It's a good device,
plain and simple.**

control input in a 1U rack-mount package. We recently had the opportunity to test-drive the latter, a Symetrix 564E, and came away quite enthused. The 4-channel gate/expander competently and effectively satisfies all its performance criteria. It's quiet, clean, intuitive to operate, well styled (read: easy to read), and suffers the nasty habit of quickly making itself invaluable in the analog recording and mixing environment. All for a list price of \$989, U.S.

DESCRIPTION

The 564E is the latest generation of products from Symetrix, and represents the first of a new high-end line. It is clearly targeted at professional users who operate fully balanced high level systems, as it provides electronically balanced XLR inputs and outputs for each of the four independent channels. A rear panel tip/ring/sleeve 1/4-inch jack for each channel allows a key input to control the VCA gain element externally, as well as provide loop-through capability for side-chain device insertion. Although it's not stated in the manual, this send/receive jack is presumably the way to tie two channels (or more) together for multi-channel VCA tracking, as no stereo strapping switch is provided. A patch bay mult would provide these strapping capabilities in lieu of a switch.

Mike Joseph is editor of R•E•P.



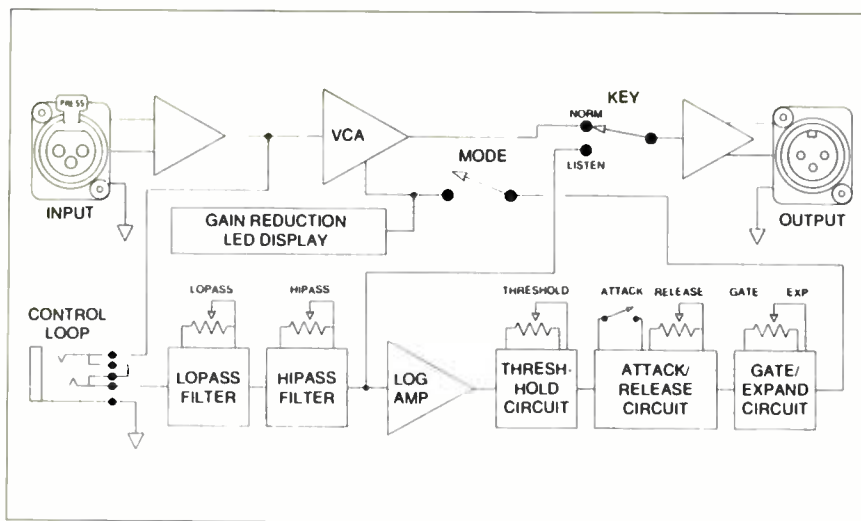


Figure 1. Signal flow block diagram of one of the four Symetrix 564E expander/gate channels.

The attractive front panel design is stylistically new for Symetrix — uniform blue, with round-domed knobs and switches and white legends. The pointers on the knobs stand out, so operation by touch in a dark corner is quite easy. The white highlighting on the pointers also makes settings very visible at a distance.

Although the 564E is designed for balanced operation, the unit is easily wired and operated in an unbalanced mode.

no power switch is provided; the unit is always on if plugged-in and powered-up.

BASIC SPECS

Although the 564E is designed for balanced operation, the unit is easily wired and operated in an unbalanced mode. All that is required is the jumper of pins 1 and 3 on the XLR interconnect, leaving pin 2 hot, and the unit works flawlessly. Although the device is unity gain throughout — there are no makeup level controls in-line — a large enough range is built into the threshold control (60dB) to satisfy both -10 and +4 applications.

The 564E specs out at greater than +18dBu maximum input and +24dBm (balanced) output levels, with a signal-to-noise ratio of approximately 92dB referenced to 0dBu, loaded into 600Ω balanced. Although there are devices on the market with slightly more headroom, the 564E will have no trouble interfacing with other pro or semi-pro equipment, both in level and terminations. The unbalanced control (key) input can handle upwards of +18dBu before saturation.

Crosstalk between next-door channels was

greater than 92dB at high frequencies, and rejection of a low frequency control signal applied to the key input and monitored at the channel output was 80dB or greater. In expander mode, the unit provided more than 50dB of attenuation, with gating action attenuating to greater than -60dB.

Load impedance for each input is indicated at more than 20kΩ, with the key input loading at 30kΩ input. The output source impedance is indicated as 200Ω when balanced, 100Ω when unbalanced. The control loop-through source impedance is spec'd at 300Ω.

OPERATION

Without sounding too enthusiastic, the 564E did exactly what one hopes it should do, quickly, quietly, smoothly and flawlessly. It's a good device, plain and simple. While we had it, we were able to use it for both drum recording dates (live session and Alesis HR-16B cue tracks) and mixdowns from analog multitrack to stereo DAT. In practical operation, we found the following: On recording drums, the sweep filters in the control leg proved to be invaluable. It was possible to remove all but the most forward cymbal and/or hi-hat leakage in the toms or snare by judicious use of the filtering, attack/release time and gate controls. As an experiment, we inserted a 564E channel into a group bus, feeding that sub both kick and crash cymbal, the latter several dBs hotter than the kick. By adjusting the filters, we were able to instigate gating with either the kick or the cymbal as a trigger, something impossible to do without filtering in the control leg. This trick alone for percussion or drum kit control is worth the price of admission. As a straight-ahead drum gate, it's as good as any we've used, both in attack/release flexibility, speed of gating action, smoothness of downward expansion, or speed with which the right setting could be derived.

On a vocal track suffering from excessive headphone leakage and throat clearings between phrases, we were able to quickly arrive at multiple softer onset and release expansion settings, which left natural breaths in place, yet removed the offensive "in-between" noise druck. The presence of the continuous gate/expansion control allowed various levels of gain reduction to be introduced, providing as smooth a dynamic control as desired.

Each channel has front panel envelope controls for fast and slow attack (a switch) and fast to slow release (a rot pot), as well as a -40 through +20dB variable threshold control. Specific to other high quality modern gates, the 564E has high and low pass swept frequency shelving filter controls in the VCA control leg, covering 30Hz to 4kHz on the low end and 150Hz to 30kHz on the top. Symetrix calls the capability this adds Frequency Conscious Gating. The filters allow considerable flexibility in the operation of the gate, tailoring response to the signal much more closely than a traditional gating device can. Accompanying the filter section is a key listen switch, that directs the output of the filters to the channel output, where one can directly monitor the frequency-altering effect of the control loop circuit.

In addition to the ubiquitous Mode (bypass) switch, each channel also has a single variable pot that allows selectable amounts of gating or expansion to be dialed-in. Full counter-clockwise rotation provides -60dB of gating action, with center-up being VCA non-activity, and full clockwise providing downward expansion at a 1:3 ratio. Metering is supplied by six red-only LEDs, showing gain reduction to -40dB. There are no input/output meters, and

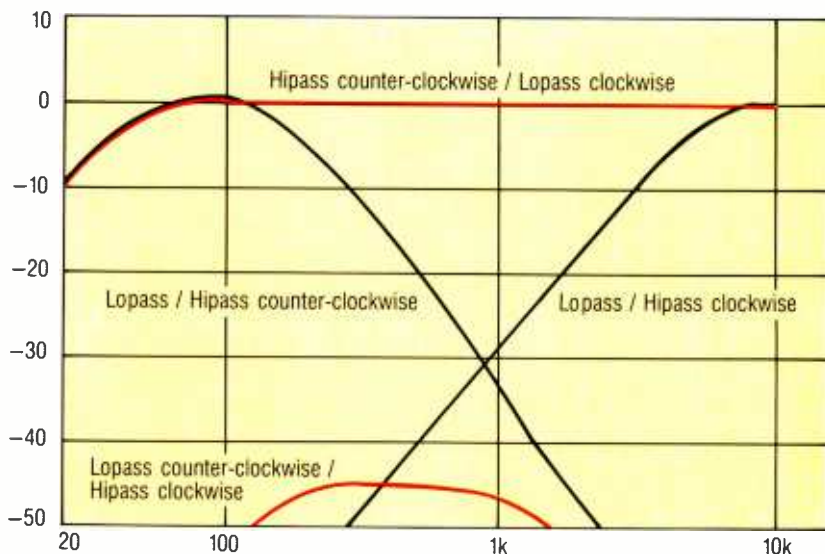


Figure 2. Combined bandpass effects of the VCA control filters.

SPECS AND DESCRIPTION

Manufacturer:	Symetrix 4211 24th Avenue West Seattle, WA 98199 206-282-2555 Fax: 206-283-5504
Model:	564E Quad Expander Gate
List Price:	\$989
Features:	Variable Threshold Variable Release 2 Level Attack Variable Gate/ Expansion Amount High Pass Control Filter Low Pass Control Filter Key Input Listen Switch Key Loop-Through Electronically Balanced I/O
THD:	.05% at 10dB of G/R
Max Input Level:	+18dBu
Max Output Level:	+24dBm
Size:	1.7" x 17.4" x 9.6"
Weight:	11 pounds

Using settings very similar to the vocal setup, we were able to remove some pedal squeaks and hammer lift-off noise from a track cut using a brand new grand piano, without any noticeable detrimental effects. Very nice!

A rather percussive acoustic guitar track had tape hiss from being cut too low, bass guitar/kick leakage from through the control room wall (we did say this was a real-world situation, didn't we?), and metal chair squeaks between lines. The 564E was able to remove all of the objectionable noises from between the phrases in both gate and expansion modes, without pumping, breathing or other deleterious effect.

THE KEY

During mixdown, the 564E was used to tighten up a rather sloppy electric guitar double (two guitars, hard left and right pan) by feeding a split of the rhythmically tighter guitar into the key control input of the second, being run through a gate channel. By adjusting the front panel controls for hard expand, fast attack and fast release, the primary guitar controlled the envelope of the second. The result? A tight pair of electrics whose envelopes hung together seamlessly. By playing with the sweep filters, it was possible to alter the nature of the envelope tracking. Total setup time for this effect was under two minutes.

By using the key input as a loop-through insert, it is possible to tie in an external equalizer, or even another channel of gate, to develop effects and/or applications beyond the built-in capabilities.

Unfortunately, the unit does not provide switching for the key input, potentially frustrating when the unit is rack-mounted and the in-

sert is not routed through a normalized patch bay. Any insertion of a plug into the 1/4-inch key input on the back breaks the normal input signal-to-VCA control connection.

Also, plugging in a regular 1/4-inch tip/sleeve, 2-conductor phone plug (although the factory frowns on it) works just like a normal, non-looping key control input, with hot signal going to the VCA filters as it should. But until it is unplugged, it precludes normal operation should you desire to return to non-external key control. Since the 564E's control jack is of the make/break 2-conductor-plus-shield stereo type, the input signal or loop-feeding side of the jack goes straight to ground with an unbalanced plug inserted.

A much appreciated addition for getting around the above would be the inclusion of a Key/Ignore Key (Bypass)/Stereo Strap switch, allowing much greater flexibility of the device without a hardwire to a normalized patch bay or crawling around to the back to remove a control jack. The folks at the factory tell us, however, that real estate on the front panel was at such a premium that said switch would have been virtually impossible to include.

CONCLUSION

We heartily recommend the Symetrix 564E Quad Expander Gate for professional audio applications. It is a superior product that performs just as one would expect, without negative side effects or requiring an extensive learning curve. It is well laid out, intuitive to operate, and transparent in sound and action. ■

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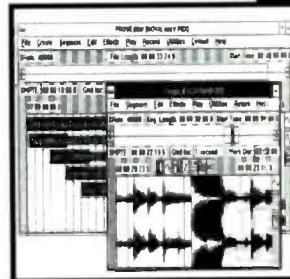
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FUNNY-LOOKING AUDIO EQUIPMENT

By Laurel Cash-Jones and Fred Jones

PREGNANT SPEAKERS?

The first strange-looking item is a radical (dude) new design in monitor speakers coming to a studio near you. It is the latest arrival from JBL, and although you may think that they look like they are about eight months pregnant, we can assure you that they will not deliver you a baby monitor in the near future (as opposed to the near-field).



The new 4200 series is designed as a console top monitor for use primarily in the (you guessed it) near-field. However, don't let the unique curved shape of the 4206 (with a 6.5-inch woofer) and 4208 (with an 8-inch woofer) fool you. The curved surface is said to direct possible reflections of shorter wavelengths (higher frequencies) away from the mixing position, thus eliminating baffle diffraction.

The multi-radial baffle also positions the transducers to achieve alignment of the acoustic centers so that the low-, mid- and high-frequency information arrives at your ears at exactly the same time, reducing phase distortion and improving imaging. Since the speaker components are mounted in the center of the baffle, they are automatically mirrored.

Another unique feature is that the port for low frequencies is mounted in the rear, to further reduce distortion. Both the 4206 and 4208 are magnetically shielded so they are ideally suited for use in video post applications where they need to be located close to a video monitor, or near tape recorders.

Circle (101) on Rapid Facts Card

DO YOU HAVE A LIGHT TOUCH?

If so you might be interested in the new touch-sensitive screen that is on the newest console from TOA. Originally designed for the Vienna State Opera House as a custom-designed, computer-controlled, all digital mixing console, it is now available to the recording and broadcast world.



We're also fairly certain that if you wanted one for a fixed installation in a theatre, auditorium or concert hall in your town they would build it for you.

The system processes all signals in the digital domain, and only resembles a conventional console so that engineers will feel at home using it. The TOA ix-9000 utilizes a 64x48 matrix mixing unit featuring 256-channel fully digital input/output patch system.

The reason we included it in this particular column about strange-looking audio devices is the human interface to the console. It is via two large amber interactive touch screen displays, as well as having some conventional knobs and faders.

With these displays, you can customize the 256 input and output console into whatever form you like. For instance, if you want to lay out the console in a style that might drive another mixer crazy, just store that particular preset, and every time you sit down the console will be just the way you want it.

Operating speed of the central processor is an astounding 2,500 mips (millions of instructions per second) and its computer assisted DSP unit utilizes 18-bit linear pulse code modulation, with a sampling rate of 48kHz.

Each of the 32 faders are motorized and are driven by the central processor using a high speed drive circuit for a moving fader system capable of 0.1dB resolution. All of the console settings (operator pre-set, EQ, pan, aux sends, etc.) are capable of being stored for future recall, or are recalled as part of the moving fader automation package. These parameters, including fader gain, are processed in a time-sharing method at an update/scan speed of 1/120 of a second.

In the system at the Vienna State Opera House, there are a maximum of 64 microphone inputs, 16 line inputs and tape inputs. These flexibly configure to feed the 48 group outputs and 16 aux sends.

All in all, it seems to be a very interesting (although expensive) system. And with its twin touch screens, it certainly qualifies as a funny-looking audio device.

Circle (102) on Rapid Facts Card

A NEW WAY TO HEAT YOUR STUDIO

Ok, ok so we might be exaggerating a little, but how often do you see a microphone with a radiator attached? Alright, the nice folks at Sony say it's not really a radiator. It's a "Thermo-Electric Cooling System." It still looks like a radiator.

Sony is introducing the latest in tube microphone technology with the C-800 and the C-800G. The G (the one with the radiator) vacuum tube microphone includes a Peltier device — a type of semi-conductor that controls cooling and/or heating by dc current. As current flows across a junction of dissimilar metals or semi-conductors (isn't that an oxymoron?), the Peltier device causes heat to be absorbed or liberated at the junction.



Both of these microphones benefit from a very unique two-piece anti-vibration body that virtually eliminates mechanical vibration. In the listening that we did on the show floor, these microphones were very quiet and open-sounding. They deserve a listen test under better conditions. Try them in your studio, especially the one with the radiator. Let us know if it makes a good heater.

Circle (103) on Rapid Facts Card

Laurel Cash-Jones is a writer. Fred Jones is a free-lance engineer, producer and writer, best known as the engineer/producer for the legendary comedy group, The Firesign Theatre. Among his many credits are an uncountable number of commercials and TV shows. Fred has won almost every advertising award, and several of his recordings have been nominated for Grammys.

Cutting Edge

TRIDENT CONSOLE

Trident's new Vector 432 is a highly flexible, multi-use audio mixing system combining superb specifications in a compact, ergonomically balanced frame. Offering an extensive range of options including integral machine and automation control each Vector incorporates four matrixed stereo buses, 32 group outputs and 16 externally and internally triggerable auto mute groups addressing channel, monitor and auxiliary mutes in any combination. Each I/O and bus is electronically balanced and there is a stereo bus compressor across the main output, a Broadcast mod (for simultaneous stereo and multi-track feeds), two dedicated foldback systems selectable from any combination of console sources and an auto talkback with two reverse talkbacks fitted to the Central Facilities section.

Frame sizes from 32 inputs up, are supplied with an on-board or remote 19-inch rack mount Mosses and Mitchell patchbay. Four-way Vector dynamics modules can be inserted in any module position and each sub section patched to any one of four selected channels simultaneously. The Vectors Studio Computer unifies machine control and automation in a single unit that locks to SMPTE time code, musical notation or optionally, feet and frames. Metering choices include moving coil VU or PPM as well as a bargraph VU/PPM combination which allows signal monitoring in both modes simultaneously or selectively on a single display. Transformer balancing on both inputs and outputs is also available, as are stereo input and echo return modules.

Circle (105) on Rapid Facts Card

NEVE LEGEND CONSOLE

The new Neve VR Legend console features 'oxygen free' copper wiring and enhanced signal path performance throughout the desk. Improvements in the main console bus have been achieved through introduction a new low-noise mix card, resulting a 6dB reduction of inherent noise levels.

VR legend mic gain is variable between -10 and +70dB when the -30dB pad is selected. The line input has a ± 1 dB trim control with center detent. Selection of any of the 1-24 or 25-48 bus switches provides routing, while instantaneous routing to the multitrack via the monitor signal path can be accessed by use of the Bounce button. A group button provides patch-free subgrouping. The Central Facilities Module creates control over Solo switching, mixed cue functions and master switching. Solo operation options include solo-in-place, multiple channel solos, latching choices, momentary switching and a master reset button. Master switching on the VR Legend allows immediate configuration for tracklaying, mixdown or broadcast modes. The dynamics module incorporates limiter/compressor and expander/gate functions. Eight Aux sends may be used either as mono or configured as stereo with level, pan and Pre/Post-fade controls. The VR legend is available with Flying faders automation.

Circle (106) on Rapid Facts Card

NAKAMICHI DIGITAL

Nakamichi America Corporation has announced two new high-performance digital audio products. The 1000mb is a digital-output CD transport featuring an "acoustic shield" wherein the chassis is hermetically sealed to prevent external airflow from reaching the pickup assembly. A heavy extruded aluminum main chassis is encapsulated by a thick external shell, and all joints are sealed by a special compound. The disc tray slides out through an opening in the front panel which features a gasket-lined 9mm-thick hinged aluminum door. Although the door opens automatically when a disc is ejected, it must be closed by hand to ensure an airtight seal prior to playback. The DA-111p is a plug-in D/A converter upgrade board for the 1000p Digital Audio Processor. The DA-111p D/A converter board is a direct plug-in replacement for the DA-101p board originally supplied with the Nakamichi 1000p Digital Audio Processor. It incorporates LSI (large scale integrated) digital signal processing circuit technology and advanced analog circuit topologies to enhance the 1000p's D/A conversion performance.

Circle (107) on Rapid Facts Card

SONY DASH UPDATES

Sony has expanded the versatility of the PCM-3348 48-channel DASH multitrack recorder with multiple new refinements. Available as a single update kit for existing owners and implemented in all new recorders from September 1991, the new features include an on-board time code chase synchronizer, advanced stereo sampling and a string of new refinements to speed operation.

The addition of a new 457.952kHz (48kHz drop frame)sampling mode now makes the PCM-3348 ideal for HDVS video production applications and the introduction of an on-board chase synchronizer is geared to support use of the PCM-3348 in high-end audio-for-video applications.

While providing offset with sub-frame accuracy, the new system allows the Sony machine to record even when in chase mode. Now capable of sampling in stereo for the first time, the sampling memory has been enhanced with the addition of three new operational modes. Sampling time has been increased to either 20 seconds in stereo, or 40 seconds when in mono mode. This allows entire vocal takes and musical passages to be stored for instant recall for 'spinning in' and the creation of other effects.

Circle (108) on Rapid Facts Card

RADIAN

The new Radian *Limited Edition* studio monitors feature full size "mains" monitor performance in a small format ideally suited for post production suites and small project studios, and function well for large studios as small monitors that "track the mains."

The MS8 *Limited Edition* is intended for mid-field or soffit-mount use, and offers excellent extended low frequency performance. The MM8 *Limited Edition* is designed for close field

monitoring, features a small enclosure size with higher bass rolloff and achieves its best performance when mounted on the meterbridge of a mixing console.

MM8 and MS8 models feature Radian design improvements including a new crossover network with front panel precision step attenuators for presence and brilliance, a new compression diaphragm with improved sensitivity above 12kHz and custom, mirror imaged enclosures with recessed drivers, rounded edges and full grain baffle.

Circle (109) on Rapid Facts Card

AUDIO LOGIC DIGITAL ROOM DELAYS

Audio Logic has introduced three new digital room delays, the D11, D22 and D24. The D11 is a one-in, one-out delay with a minimum 1.25 millisecond delay increment and maximum 1.28 second delay time. The D22 and D24 are 16-bit digital delays configured as two-in, two-out and two-in, four-out respectively. Both units have a 50kHz sample rate with monolithic oversample converters. The delay outputs display several configurations from stereo delays to mono delays. Minimum delay increments are 20 microseconds, and the maximum delay time is 655 milliseconds stereo and 1310 milliseconds maximum. Computer control of these units can be accessed through use of an optional PA-422 interface.

Circle (110) on Rapid Facts Card

ANALOG DEVICES LINE DRIVER SYSTEM

Analog Devices new SSM-2142 line driver system is a monolithic device capable of replacing complex transformer-based balanced line driver systems and their expensive external trim circuitry. Housed in a single 9-pin mini DIP, the SSM-2142 provides complimentary differential outputs from a single ended source, and can transmit 10Vrms signals into impedance loads as low as 600ohms(differential or single-ended) over cable lengths up to 500 feet.

Suited for such diverse applications as balancing studio mix consoles and industrial instrumentation, the SSM-2142 displays common mode rejection at 45dB and THDplus noise from 20HZ to 20kHz at just 0.0006%. Coupled with the companion SSM-2142 differential line receiver, the SSM-2142 creates an affordable high performance driver/receiver system.

Circle (111) on Rapid Facts Card

AD SYSTEMS OPTIFILE

Optifile 3D from AD Systems is a 3rd generation SMPTE-based automation system designed in a simple and legible format with Read, Write, and Update status visible at all times. Optifile's patented A/D converter provides full resolution throughout fader travel, eliminating "glitching" as you near the bottom of the fader. The system utilizes a dedicated qwerty keyboard and includes machine control. The 8-channel VCA boards offer individual channel relays to permit the insertion of a bypass switch and full compatibility with virtually any mixer.

Circle (112) on Rapid Facts Card

Continued on page 64

Cutting Edge

Continued from page 63

FOSTEX MULTI-TRACK AND MIDI

Fostex Corporation has introduced the X-18 Multi-tracker as the second generation of 4-input Multitrackers that operate from either batteries or ac. Instruments or mics can be connected directly to the X-18, and each input is assignable to any of four tracks. Each input channel features a long fader to set levels on the meters. A socket is also provided for punch in/out using an optional foot switch. The size and portability of the X-18 makes it an ideal recorder for location recording.

Fostex is also offering MIDI studio control packages comprised of a Fostex R8 8-channel multitrack and an MTC-1 MIDI control interface, and either a Fostex 812 12x8x2 mixer or a Fostex 454 8x4x2 mixer. Both packages work with either Atari or Macintosh computers. In addition, the standard software programs, C-Lab Notator and Steinberg/Jones Cubase package, have been pre-configured to empower the Fostex R8, G16S and G24S for MIDI controlled recorder functions such as play, record, rewind and fast forward.

Circle (113) on Rapid Facts Card

ROSS SYSTEMS CONSOLES

Ross Systems recently introduced the RCS Series Mixing Consoles. These consoles are available in 8-, 12-, 16-, and 24-channels, and are part of the new Ross Systems component product series. The new models RCS802, RCS1202, RCS1602, and RCS2402 each feature discrete studio grade mic preamps utilizing a 4-transistor quasi-Darlington topology to achieve an EIN specification of -130dB.

The EQ section features three bands with center frequencies at 80Hz, 1.8kHz, and 12kHz. The three Aux sends include monitor and two stereo Aux returns. The Aux 1 sends are selectable via internal jumper wires for post fade—post EQ, or pre fade—post EQ operation. The monitor send is selectable via internal jumper wire pre or post EQ operation.

Switchable 48V Phantom power circuit is included and each unit features a pre fade listen (PFL) circuit to allow independent monitoring of individual channel and master buses plus electronically balanced and unbalanced output circuitry.

Circle (114) on Rapid Facts Card

DIGITAL DOMAIN

Continued from page 24

tion to your system, provided you can spare a NuBus slot. (Ethernet is at least three times faster than using Apple's built-in networking capabilities.) By the way, if you purchase a card that is 10-base T complaint (this means it has a modular telephone jack on the back) you can use regular phone lines and do not need to run coax cable.

DIGITAL PATCHING

Although most studios have audio tie lines, very few have digital audio tie lines. Digital patching is far superior to analog patching when done right. Although a conventional TT patchbay could be used, I would strongly recommend not mixing analog and digital signals in the same bay (because of grounding and clock bleed reasons). Excellent results can be obtained by using professional video patchbays — with dual video jacks which terminate to a BNC connector. It's easy to adapt S/PDIF or SDIF signals to such a system.

There are three basic types of folders: private folders, public folders and drop boxes.

If you prefer using AES digital outputs, Canare makes an impedance transformer that converts balanced 2-channel AES format digital audio signals from a 3-pin XLR-style connector to a BNC receptacle, so that 75Ω coax cable can be used. Coax video cable will send digital signals hundreds of feet without any errors. Balanced video plugs are also available which work well for digital audio applications. While you're at it, consider putting in an RS-422 serial data patchbay as well.

Companies like ADC or Audio Accessories (Marlo, NH) make pre-wired serial patch bays that are perfect for routing synchronizer lines, transport control cables or just about anything else, including computer keyboard cables, which can be adapted to easy-to-wire Sub-D9 connectors.

DIGITAL MULTS

If you want to split a digital signal between several different machines for cloning purposes, Pro-Bel makes a digital distribution amplifier that will feed a single digital input (AES 3-1985) to 10 electrically independent transformer coupled outputs. Signals can be sent up to 300 meters. The same company also manufactures a digital audio router which will control 64 digital signals in a 6U package. If you want to automate your analog and digital audio and video signals you may want to consider the Akai digital patcher, which displays patch setups on a computer monitor.

As more audio devices incorporate digital I/Os, more people will be forced to think seriously about installing digital patch bays in their facilities.

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Circle (31) on Rapid Facts Card

Continued from page 43

support to Focusrite for the existing designs." Today, Neve is exclusive to Amek/TAC as a long-term design consultant whose expertise is in the audio sound control and manufacturing fields.

Already the fruits of this cooperation are visible. The Medici Equalizer embodies several features new to equalization. "The Medici Equalizer has two audio paths, plus a side chain path. The two audio paths use balanced inputs and outputs, however the side chain path uses transformer-like amplifiers (TLAs) instead. I designed these new circuit modules to behave like transformers, but without their disadvantages.

"The importance of the Medici Equalizer lies in the shape of the curves, which are slightly in excess of 6dB per octave. And in light of the story shared about Geoff Emerick and the 'brightness' due to an out-of-band resonance, the response is smooth and resonance-free to beyond 250kHz. Responding to the continuing search for the magic quality of older designs, I have introduced a 'Warmth' control that leaks a controlled amount of harmonic into the signal path, the sort of sound that fans of tubes appreciate so much. Another facility I've introduced is the 'Sheen' control. I've had so many requests from older engineers, so I've copied its gentle curve from older equipment. After setting the amount of EQ desired, you can adjust the tilt to obtain the sound you desire.

"Another feature is the ability to get identical outputs, including EQ, on each of the two channels. The disc and CD mastering labs asked for this capability. There are differences in component tolerances that make this diffi-

cult to do. But, we've come very close. You set the EQ to the way you want it on one channel, then, by using a pink noise generator that sends equal output to both channels, you invert the phase of the second channel and adjust its controls until you have maximum null. Typically you can get 30dB to 40dB of null which makes the two channels nearly identical in normal operation. The entire process takes only a few seconds."

The Medici EQs are similar to the modules in the Mozart RN console, but have slight differences in the curves. Amek opted for TLAs on the inputs because of space limitations. Distortion figures are less than .01 from 20Hz to 20kHz. Mr. Neve pointed out, "One would need quite a large transformer to do that at 20Hz." ■

RUPERT NEVE'S PHILOSOPHY

"So what is truth? I believe Archbishop William Temple's definition, 'Truth is to see things as they really are', is the best definition I've found. Is perfection creation in the light of truth? I think about these things, you see, because we become so caught up with specifications and jargon that we tend to overlook the underlying concept... what the designer had in mind," Neve grins mischievously, "assuming of course, the designer had something in mind. You see, the truth is not always easy to discover, and as with the situation with the console at AIR, we do not always have enough information, or we don't always perceive things as they totally are. I suppose the truth in design with respect to audio is liking what you hear. So the question then becomes, do you know what you like?"

Neve believes truth, "...is something which comes with experience, with training. It is subjective. But, when you consider

that the makers of musical instruments throughout history did so without the assistance of computers, then it begins to make sense. Nobody would deny the brilliance of Stradivarius' design, but how much of it was measurable? To me, the design is complete when I can truly say I like what I hear.

"An audio designer is a creative artist, or should be. So how can the hardware that is produced express the designer's personality? Probably from the way the designer does things. Most designers are perfectionists. Coming full circle, then, dare we say that we are looking for truth? Is there such a thing as truth in the design of a piece of hardware? How close are we going to get to it? Any piece of equipment can only represent the current state of the art. There's this constant urge for us to search for perfection and truth. It's that search that makes us keep trying." ■

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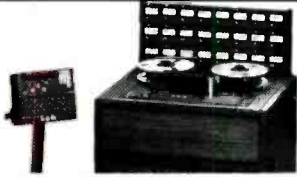
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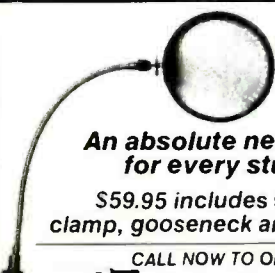
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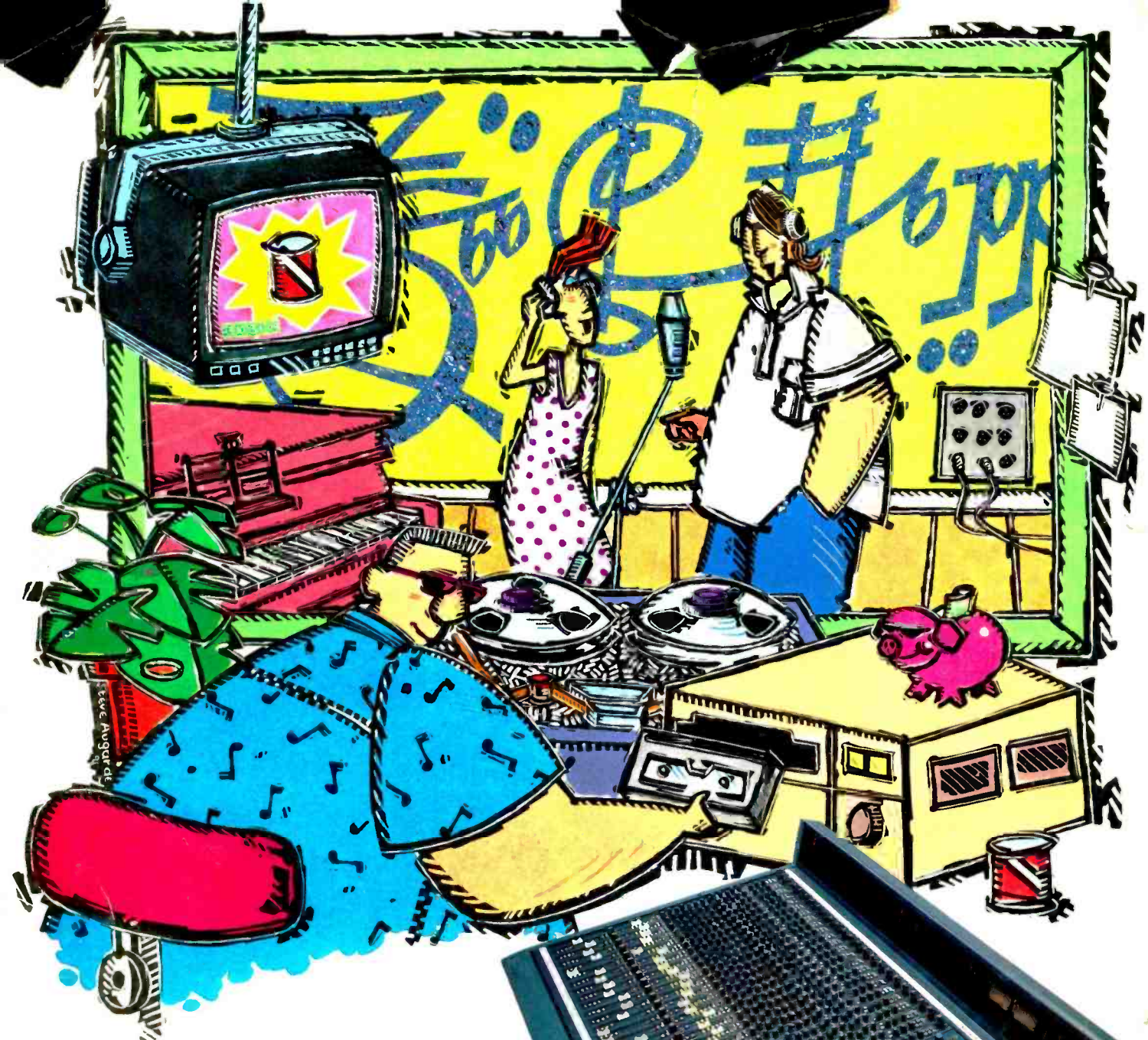
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