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Technology Update: API Discrete Series Console Can a small company build two consoles a year and compete in the upper end of the market?



Purchasing Consoles: New or Used? Under the right business and technical conditions, refurbishing a used or existing console may be a cost-effective alternative to buying new.

Five Questions: Purchasing a Console Answers to common questions on new vs. refurbished boards, financing, replacement parts, shipping and average prices. By the RE/P staff42



Sound Reinforcement

Sound System Performance Optimization

Whether designing, updating or shaking down your sound system, it takes more than ears to do the tweak. Here's one approach that gets results. First of a 2-part series.

Live & Direct

A monthly department that highlights, corresponds or relates to the Sound Reinforcement feature. This month: How Loud is Too Loud?

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Neutrality as a Design Concept

A recording environment where a 1dB EQ boost may be too much, and there is no room saturation and pinpoint accuracy? It can be a reality, using studio and component designs that result in no sonic character.

On the Cover

Today's console market offers more choices and options than ever before, including top-of-the-line dream machines, refurbished classics and mid-priced workhorses. (Photo by Steve Donisch. Studio: Chicago Trax. Technical assistance: Bill Mullin, Pyramid Audio, Chicago.)

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FROM THE TOP

Copyrights and wrongs

Home taping and copyright aren't issues that directly affect this industry, but a recently released government report on the issues has some interesting comments pertaining to audio professionals.

The Office of Technology Assessment, which advises Congress on technical issues, released "Copyright and Home Copying: Technology Challenges the Law" this past fall. The office conducted a national survey to gauge home taping practices and attitudes; conducted an economic analysis to determine what home taping's effects are; and listed possible actions that Congress could take.

The government, not exactly known for its forward thinking, has done a very good job in trying to come to grips with the most visible copyright controversy, home taping. The report is objective, gives a dispassionate airing of both sides of the issue and makes an honest effort to determine future considerations.

Briefly, here's what the report said. About 40% of people over the age of 10 surveyed had taped recorded music in the past year. The overwhelming majority taped music they owned so they could listen to it outside of the home. Few people said they borrowed recordings from other people, and very few people reported belonging to a "music swap club."

Is home taping harmful? What would be the effects of a ban on home taping? Longterm, the effects could either be positive or negative, according to the report. But in the short term, the ban could be negative, due to the loss of billions of dollars in blank tape revenues.

But where the report really gets interesting is outside the report's main body, in the footnotes and side tables. Three items are of interest:

1. DAT and its role in the home taping debate. The gray market is substantial. According to the report, one New Jersey importer expected to import more than 5 million machines the middle of last year. A single affiliate sold more than 600 in 1988, mostly to recording studios but also to government agencies, including the Department of Defense.

The report also cited an obscure report

by the Munich-based Radio Technical Institute that said DAT tapes made on professional and consumer model machines were unsatisfactory in terms of machineto-machine playback compatibility, recording quality and sound storage. The institute concluded that significant changes in the format, including increasing tape width and size of the recording tracks. were necessary to make DAT satisfactory for pro use. Just what this industry needs, right? Another fragmented format.

2. The erosion of niche boundaries. This section was impressive, in that the report acknowledged that recognizable, separate categories, such as "audio," "video," "audiotape" and "computer media," will break down. This will make a blank-tape levy, a commonly cited solution to the home taping issue, problematic. It won't just be tape that records sound. It will also be computers and optical disks.

3. Sampling. The report didn't mention sampling directly. But it mentioned a concept called contributory infringement, brought up during the Universal City Studios vs. Sony case, which dealt with home VCR recording. Simply speaking, the concept argues that a manufacturer should be held liable for infringement if it can be demonstrated that the product can be used to copy copyrighted works.

In ruling on the case, the Supreme Court rejected the argument, saying that there is no infringement if the product is capable of other uses that are non-infringing.

Applied to sampling, it would seem that manufacturers are off the hook as far as producing the devices. But it still leaves possible liability against individual users.

Does copyright affect this industry as a technical issue only? Not anymore. As we expand our businesses, adding such complementary ventures as production companies and record companies, copyright is going to be an increasingly important issue to us. We're not going to be just copyright creators anymore, we're going to be copyright holders, with a financial stake in the matter. That's a big difference.

How the government deals with these complex technical and social issues will determine not only how we create audio. but how, and even if, we stay in business. Stay tuned.

an Toulia

Dan Torchia Editor

AES: Unresponsive?

Editor's note: The following letter was sent to Don Plunkett, executive director of the Audio Engineering Society, by the Pro Audio Exhibitors' Group and given to RE/P to print as an open letter to the industry.

From: Ken Walker, MBE, secretary, Pro Audio Exhibitors' Group.

Dear Mr. Plunkett,

The theme of the Professional Audio Exhibitors' Group's constitution, and particularly the message, conveyed to the Audio Engineering Society during both the PAEG meeting and the AES Exhibitor's Breakfast in New York in October is one of collaboration and harmony. PAEG seeks to work together.

The AES' dismissive response to PAEG advice on the clash of the proposed dates for AES Los Angeles 1990, with the already announced dates for the International Broadcast Convention in Brighton, and its unilateral action in total disregard of any concern for European exhibitors and PAEG's membership, can only be considered as contemptuous. It is a view PAEG feels will be supported by other international and U.S. exhibitors.

Such disregard is to the detriment of the commercial needs of the exhibitors, who, after all, fund the convention, the convention staff and the social functions at the convention. It is regrettable that these actions proliferate a view, held my many, that the AES is run by a haughty committee.

The current arrogance visibly demonstrates the urgent necessity for the exhibition administration to be replaced with commercially minded personnel. Since PAEG's desire to collaborate has been ignored, the only recourse is to seek support among the AES membership for changes to obtain a more responsive attitude.

Surviving outside the mainstream

From: Daoud A. Balewa, president, The Creative InterFace Studios, Lancaster, PA.

With respect to your November guest editorial by Daryl Dragon: The salient points made by Mr. Dragon were eloquent, intelligent, informative and practical.

We at Damon Records, an independent artist-owned record label specializing in

New Age/jazz fusion artists and products, have remained an active alternative record label documenting our 10th year in existence. The application of many of Mr. Dragon's theorems have allowed us to continue to provide quality and intelligent alternative music to an audience constantly deluged with infantile/juvenile/socially amoral and generally deplorable music provided by the major record labels in the ceaseless quest for quantum record sales and gross profits.

The increased availability of affordable, advanced technology and the emerging home studio recording industry, coupled with the numerous alternative avenues available for airplay, have indeed placed the major record labels on notice that their antiquated and demeaning treatment of undiscovered new talent has reached its point of saturation and diminishing returns.

I commend RE/P for having the commitment to excellence in music that it could permit a guest editorial of such potency to appear between its covers.

Acquiring business saavy

From Darla L. Reddick, proprietor and engineer/producer, Oriana Enterprises, Denver.

As our overall economy becomes tighter, our business in the audio/video industry will have to be run more efficiently. Certain skills and the right equipment are vital. However, close ties with a good accountant and attorney are also necessary for survival.

In addition, information on how to start, incorporate and run a business is necessary to keep oneself in the black. The Small Business Administration offers classes at regular intervals on these subjects at little or no cost. Also, community colleges, extensions of universities and other institutions offer classes.

It is *not* a waste of your precious time to attend a few of these classes. It is like obtaining the nuts and bolts to hold your business together. If you are well-informed about business matters, finding competent help to assist you in running your business will be much easier if you don't have the time and energy to do it yourself.

l have watched a business go into receivership and have its equipment impounded by the IRS because the own-

er/engineer was a terrible businessman. That in itself would have been all right *if* he had sought out and entrusted his business management to competent people. As it was, he trusted no one. Being uninformed about good business management did not help him in seeking out competent help.

It was a very painful experience to see a talented and gifted engineer lose everything, including his home.

Century III Clarifications

From: Ross M. Cibella, president, Century III Teleproductions, Orlando, FL.

I very much enjoyed "Florida's Sunny Future" by Greg DeTogne in the November issue. I did, however, want to call to your attention to inaccuracies that were present in the section of the article labeled "Century's Mark." This section of the article was written about our new postproduction facility on the Universal Studios lot in Orlando. The article mentioned the entrepreneurial owner of our company as Ted Kaye. Mr. Kaye is currently the head of production at the Disney/MGM Studios and has no relation to Century III.

Additionally, it was mentioned that our Boston-based company was sold and moved to Orlando. Even though we sold the Boston facility to ScanLine, we still retain our corporate headquarters there, and the sale of that facility came long after we began construction on our new facility on the Universal Studios lot.

Greg DeTogne replies:

The reference to Ted Kaye was used to illustrate an earlier statement in the Disney/MGM section, and was not meant to associate him with Century III. Concerning the second point, the article is guilty of omission only in the fact that it does not mention that Century's headquarters is still in Boston. This is something that didn't come out in my interviews.



Send letters to RE/P, 9221 Quivira Road, Overland Park, KS 66215. Letters may be edited for length and clarity.

Because compromise is out of the question

Wheever said, "compromise is the oil that lubricates the business process" apparently wasn't in the studio business. To the contrary, in this unique world where art and business meet, and clients expect the best, compromise may be the fastest way *not* to stay in business.

That's why Otari tape recorders come with something behind the meters.



Otari isn't in the toy business. The MX-80 and MTR-90 sport 2" thick cast alloy deck plates, heavy duty swing arms, and motor shafts designed to handle the exceptional acceleration characteristics of these machines.

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For example, if you're involved in audio post, you'll appreciate a capstan motor that is *designed* to be speed-slewed, plus external control connectors for easy interface to any SMPTE/EBU time-code based synchronizer, editor or machine controller.

For whatever you do in audio. both machines share constant tension transport technology for high performance, yet gentle tape handling. You'll also get digitally timed, gapless, seamless, punch-in, punchout. On the "80," an autolocator with search zero and three cue memories comes built-in. And if you're a purist looking for the highest quality sound



Otari's proprietary integrated circuitry provides superior reliability and reduces service time

possible, you'll appreciate the transformerless balanced inputs and outputs. The MX-80 and MTR-90 were designed from the beginning to lock to external controllers, and therefore provide exceptional performance under these conditions. Pictured is the MTR-90's advanced EC-01 chase synchronizer.



And to keep everything where it belongs as you move from one studio to another, something else you have to look beneath the surface to see—a 2" thick, cast alloy deck plate.

It's not that we don't have our imitators. We do. But to coin an old phrase, beauty is more than skin deep. And someday when you're under pressure to get that track out, and you lock a "90" to your video machine and things happen exactly the way they should... Or some early morning after the talent has gone, you sit back and listen to what you've put together, you'll be glad you decided that "compromise is out of the question."

Call Otari. (415) 341-5900.





NEWS

TLS identification approved for United States

Four tape manufacturers have adopted the British Tape Label System (TLS) as a standard in the United States. TLS is comprised of eight color-coded self-adhesive labels for tape boxes to identify production masters at a glance. Initially, this was seen as a potentially dangerous source of confusion for personnel at studios. However, the Association of Professional Recording Studios/British Record Producers Guild have published definitions and directions for users' guidance. Agfa, Ampex, BASF and 3M have agreed to produce and provide the labels free of charge to tape users.

Pioneer direct-to-CD recording completed

Reference Recordings, in association with Kimball International and Disctronics Manufacturing, is said to have completed the first direct-to-CD recording. Music waveforms were converted to a digital bitstream and broadcast via microwave transmission directly to the compact disc master.

Music was performed by Dick Hyman on the Bosendorfer SE computerized reproducing piano and recorded on floppy disk. The floppy disk was then used to play another Bosendorfer SE instrument in the recording studio. As the instrument was played, microphones picked up the sound waves, which were converted to a digital bitstream and broadcast by microwave transmission to the CD mastering facility. The direct-to-CD recording is titled "Dick Hyman Plays Fats Waller." Suggested list price is \$30.

News notes

Dolby Laboratories has announced that approximately 32,000 professional audio tracks are equipped with Dolby SR noise reduction. The Spectral Recording process was introduced in 1986.

Gotham Audio Corporation, in an agreement with Datalink, is delivering CDR 90 optical recording systems to studios and record companies to make CD reference disks.

New England Digital has reported that by the end of the third quarter more digital audio workstations were sold than in the entire year of 1988. **Digidesign** has opened its first satellite sales office outside of the Menlo Park headquarters. The new sales office is at 35 E. Huron Suite 3804, Chicago, IL 60611; 312-943-0727. Digidesign has also reported that over 700 of its Sound Tools digital recording and editing system have been sold since its release in March.

Sam Ash Professional has named its new management team. Paul Rice is general manager of the five Sam Ash locations on Manhattan's West 48th Street and is supervising operations. Don Peebles is the director. There is a sales staff of four, as well as technical and office support.

Offbeat Systems was awarded "Outstanding Achievement in Engineering Development" at the 41st annual Emmy Awards. The company's Streamline Scoring System has received recognition from the television/film industry twice this year.

Full Sail Center for the Recording Arts has purchased the MSL-3/650 R2 main system from Meyer Sound. The system will be used in teaching sound reinforcement and concert lighting courses.

Sunkyong Magnetic/America has broken ground for a new headquarters in Long Beach, CA. The 50,000-square-foot facility is scheduled for completion in June.

The music engineering program at the **University of Miami** has announced that 100% of its 1989 graduating class has been placed in the audio industry.

People

Colin Stewart has been appointed vice president, Western division, of New England Digital.

Coda Music Software has appointed **Gary Brunotte** as general manager.

John Emmas, Ian Dodd and Rupert Ford have joined Digital Audio Research as recruits to its SoundStation II sales and customer support team.

Anne Baker and Lauraine Bacon have been named assistants to President Ken Bacon at KABA Research & Development. They are responsible for all domestic and international inquiries on the KABA 4track real-time and $2 \times$ Audiophile cassette duplication system and associated equipment for professional duplicators.

Karl Seglins has been appointed international director of sales and marketing for Electric Sound and Picture.

HM Electronics has appointed **Eunice Davis** marketing manager. **Bruce Slemmer** has been appointed general sales manager and **William Kranzush** has been appointed customer service manager.

Jan Hebel has joined Studer Revox America as its New York regional sales manager, and **Jim Philips** has joined as sales representative in the Nashville North region.

Panasonic/Ramsa Professional Audio has promoted **Carla Campbell** to Eastern regional sales manager.

Patricia Kiernan has been appointed general manager of Trident's U.S. operation.

Dr. Jean-Pierre Isbouts has been named director of the worldwide development of CD-I production tools for Philips Consumer Electronics.

Audio-Technica U.S. has named **Garry Elliott** national sales manager for the professional products division.

James Goodman has been named national sales manager for Otari.

Audio Services Corporation has named **Richard Topham Jr.** president. **David Panfili** has been named general manager; **Matthew Brown**, controller; and **Michael Riner**, sales manager.

Denny Bergstrom has joined AudioLine's Kansas City branch; **Barbara Gutknecht**, **Shannon Novack** and **Paul Schaleger** have joined its home office in Milwaukee.

Keith Clark has been named public relations director for Electro-Voice.





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FRESH TRACKS

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By the RE/P Staff

Editor's Note: We are pleased to present the first edition of Fresh Tracks. a monthly review of albums from a technical and production viewpoint. Each month we will critique examples of music production that we feel are valuable additions to any library, both for quality referencing and listening enjoyment.



Gipsy Kings: "Mosaique"

Label: Elektra Producer: Claude Martinez Recorded by: Francois Delabriere, Daniel Michel, Roland Guillotel Mixed by: Francois Delabriere, Daniel Michel, Philippe Cusset Studios: Studio EMI-Pathe Marconi, Paris Studio Guillaume Tell, Suresnes, France

SPARS Codes*: AAD



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The album successfully blends and balances the large quantity of midrange rhythm instruments without losing clarity and ambiance. Solo instruments are out front where they should be, with the background soundstage never lost in a jumble. The crystal openness and separation of the individual instruments on this primarily studio work, as well as the overall reverb, imaging and timbre, is as natural as any acoustic recording could be.

Of special interest: The percussive guitar and handclaps on "Mosaique"; the ensemble and guitar balance on "Liberte" and "Trista"; the overall imaging, extended frequency response (especially from the acoustic percussion instruments) and superb separation on "Passion" and "Nina Morena" all contribute to making this album a wonderful example of modern tech production.



Tracy Chapman: "Crossroads"

Label: Elektra Producers: David Kershenbaum, Tracy Chapman Recorded by: Kevin W. Smith, John X. Volaitis Mixed by: Kevin W. Smith, John X. Volaitis Studio: Powertrax Studio, Los Angeles SPARS Codes: DDD

Comments: This is Chapman's second album and features more than the solo voice and guitar found on the first. It is as pure and clean a recording as you can find-every sound is in its place, with lots of clean, clear air and Chapman's powerful vocal straight up front.

An effective balance is achieved between the electric instruments, such as fretless and fretted electric bass, accordion, electric guitar and various electronic keyboards, and the acoustic section, whether massed voices, drums and perc, pianos, banjo, violin, trumpet or harmonica. This album has sonic depth and a natural clarity refreshing in a world of patches of copies of samples of processed sound bites. In other words, good mic technique.

Of special interest: Larry Klein's wonderful soaring bass lines, and the tasty instrumentation placed throughout the arrangements. The recorded vocal quality throughout is superb.

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* Three-letter designations on compact discs indicating whether analog or digital recording was used during multitrack recording, mixdown and mastering (in that order). First proposed by SPARS and adopted by many record labels for their CD releases.

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FRESH TRACKS

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Young M.C.: "Stone Cold Rhymin"

Label: Island

Producers: Matt Dike, Michael Ross, The Dust Brothers, Quincy Jones Jr.

Recorded by: Mario Caldato Jr., Brian Foxworthy Mixed by: Producers listed above Studio: Not listed SPARS Codes: AAD

Comments: Bust a move. This current album from the rap-master is fatter with melody than most of the competition. It could, as with most rap, be subtitled: Guess This Tune. There is much in the way of non-original material here, right down to the original ticks and pops off the vinyl source records. Credits are given for drum and bass players, but most else is, how do we say, borrowed. Sample city.

As expected, there's no shortage of subbasement sonics. WYW (watch your woofers). Although the fidelity is all over the road on the sampled stuff. the editing, intercutting of bites and arrangements of musical ideas from ancient recorded history is absolutely great. Many times the editing execution is so flawless that it's hard to tell what's sampled and what's new (even if your ears do hear the modulation noise under an old Motown or Atlantic kick or bass track).

Of special interest: There are several wonderful segues and sound bites between tracks. The innovative use of effects and imaging scattered throughout the scratch-and-sample editing magic make for zero dull moments. You'll find yourself saying "great idea" a lot.

Paula Abdul: "Forever Your Girl"

Label: Virgin

Producers: Oliver Leiber, LA & Babyface Glen Ballard, Jesse Johnson, Dave Cochrane. Elliott Wolff, Keith "KC" Cohen, Curtis Williams Recorded by: Steve Weise, John Gass, Pete Martinson, Russell Bracher, Jeff Lorber, Cliff Jones, Francis Buckley Wally Buck, Kendal Stubbs, Tim Jaquette Mixed by: Keith "KC" Cohen. John Gass. Francis Buckley Digital Compile: Dan Hersch, Digiprep Studios: Cochrane Recording, Los Angeles Fantasy Studios, Berkeley, CA JHL Studio, Palisades, CA Studio 55, Los Angeles Ceation Audio. Minneapolis Skip Saylor Recording, Los Angeles Studio Masters, Los Angeles Silverlake, Los Angeles Galaxy Sound, Los Angeles Kren Studio, Los Angeles Wildcat. Los Angeles Eldorado, Los Angeles Cherokee, Los Angeles Larrabee Studios, Los Angeles House of Music, West Orange, NJ SPARS Codes: Not listed

Comments: You know it's a major project when the credits read like a Speilberg movie. And the production? There is literally too much to mention here, in quantity and quality. This is a full-on danceoriented Top-40 mega-platinum monster which has been splattered over the airwaves since late last year. The production and music is synonymous with commercial success, and although not a breaking



album with a bullet, we include it here as a consummate statement on modern production. No collection should be without it. Need we say more?

The audio production is full and fat, a later-day update on the wall-of-sound. Fi-

delity is super-wide response, whether machine/sample generated or acoustically recorded. The sheer quantity of sound (instruments. FX. processing) sometimes obscures clarity and depth (e.g.: "The Way That You Love Me"), but the overall quality of the blend more than makes up for any deficiencies. The mixes are all tight and loud, no doubt a nod in the direction of radio airplay (or more correctly, radio frequency transmitter modulation limitations). This is another WYW album.

Of special interest: Imaging, the amazing use and placement of FX, extreme high and low end, and the artistic application of gated verb and spatial echo returns show that lots of thought from many people went into this project. This is a production that deserves special attention and a lot of good, close listening. And it moves.

RE/P

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MANAGING MIDI

By Paul D. Lehrman

Moving MIDI Into the '90s

In last month's column, I mentioned that a heated discussion about the future of MIDI is underway on PAN, an international conferencing and database service that almost anyone in North America with a computer and a modem can access by a local phone call. This month I want to talk about some of the ideas being presented in that discussion.

A lot of people have joined in the debate, but the most vocal has been Chris Meyer, a major MIDI proponent and theorist who was one of the principal architects of the Sample Dump Standard and MIDI Time Code. He has started the discussions on many of these topics. Other contributors of the ideas mentioned include Stanley Junglieb, Philippe Chatiliez, Jeff Niedermayer and Bruce Coughlin.

What people have been talking about more or less fits into two categories. One category consists of ways to utilize the current implementation of the MIDI specification to its fullest; the other concerns ways to add to the MIDI spec to take on new tasks. (There have also been a few ideas about the nature of "MIDI 2.0," but those will have to wait. MIDI 1.0 has a long time yet to run its course.)

How do we use the current spec to its best advantage? There are many paths open. First, the MIDI implementation of most equipment out there—synthesizers, processors, mixers, etc.—can stand significant improvement. High on a lot of folks' lists is the ability to remotely control over MIDI *any* aspect of a device's operation. That means being able to switch modes and channels, or being able to get and send bulk data dumps without pressing any buttons on the unit's front panel.

Setting up equipment before a session (or recapturing a setup from a previous session) is often the hardest part of running a MIDI studio. Being able to do that from a central computer, rather than having to run around to all your black boxes

Paul Lehrman is RE/P's electronic music consulting editor and is a Boston-based producer, electronic musician and free-lance writer. and go through an arcane series of buttonpushes to get them to request/accept/acknowledge bulk dumps, could save a lot of time and headaches.

Electronic musical instruments have many common parameters, such as attack time, stereo pan, modulation speed and effects depth, which can be (and in many cases have been) standardized as MIDI controller commands, either as part of the conventional controller set or as "registered parameters." Unfortunately, hardly any manufacturers recognize the majority of these commands, and if you want to control these parameters remotely, you have to use clumsy system-exclusive codes or bizarre patching schemes.

The spec is in place; the hardware lags behind.

One popular family of sound generators known for the completeness of its MIDI implementation doesn't simply let you use the MIDI Pan controller (number 10 decimal) to do a stereo pan, even though there is a parameter called "Pan" in each voice. Instead, you have to set up two identical sound layers, assigned far-left and far-right, with "opposite-sensing" balance parameters. You then have to designate a MIDI controller (which could be number 10, or something totally unrelated) to handle both balance settings.

Many samplers allow multiple loops in a sample. So does the MIDI Sample Dump Standard, thanks to a recent change in that spec. However, to my knowledge, no sampler can yet recognize multiple loops in a file sent using the Sample Dump Standard. It would save people a lot of time if it did.

The concept of a "star" network, in which different MIDI cables emanating from a central source are used for different purposes, has been around since the beginning of the spec, and is an excellent solution to many of the problems created by overcrowded MIDI lines. Unfortunately, very little progress has been made in implementing it.

Most Macintosh-based and some IBMbased sequencers now can address two MIDI lines, and a couple of Atari-based programs can play data over four. But except for isolating MIDI Time Code on its own cable (always a good idea), the main purpose of these schemes is not to split

up data, but to provide more MIDI channels.

More MIDI channels are nice, but they represent only part of what's needed. What's equally, if not more, important is the ability to split certain types and channels of data to different cables, so that timing errors from MIDI "choke" can be reduced, as can processing errors resulting from data going through multiple "Thru" jacks in a serial chain on the way to its destination. Today's computers are fast enough to handle a large number of MIDI lines, so that's no longer an excuse. I am looking forward to the introduction of a NuBus card for the Macintosh that features eight MIDI Ins and Outs, and uses the MIDI Manager software (or an extension to it) to configure them.

MIDI Time Code is establishing itself in many studios, but half of its usefulness its Cue List functions—is still almost totally unknown. Samplers, hard-disk recorders, CD players, even consoles that can read and execute MTC edit lists are needed to maximize MIDI's potential for automation control. The spec is in place; the hardware lags behind.

In the second category—expanding the MIDI spec to take on new chores—there is the obvious need for more registered controllers for use by instruments. This would allow "smart fader" boxes like the Lexicon MRC and the J.L. Cooper Fader-Master (or those graphic "faders" that are showing up in more and more sequencing programs) to be used for more musically interesting tasks than just mixing.

It would be nice if the Sample Dump Standard included a way to map samples across a keyboard. Creating good multisamples, so that a sound can be played over a wide note range, is probably the most tedious part of the sampling art. Streamlining that procedure with a computer (taking it away from the primitive user interface presented by most samplers), would go a long way to encourage users to move beyond "canned" sample libraries and to create their own sounds.

Transport control is a topic of hot discussion in MIDI circles, and it should be encouraged. Adopting a universal set of instructions that any manufacturer can use (not just one manufacturer's systemexclusive codes) to operate tape decks with record, play, locate, punch and trackenable commands, can do wonders to streamline the operation of the computeroriented post-production studio.

As it stands, MIDI-based music almost

exclusively uses the 12-note equaltempered scale, but it doesn't have to. Microtonality is useful for more than just "ethnic" music. It also allows the creation of music that is more pure to the ear than equal temperament allows. All of the instruments we use are capable of microtonal operation, and some of them even have scale tables built in. Why not standardize the ability to create scale tables and make it part of the MIDI spec? Making it universally available would encourage more experimentation in this area.

Several proposals for MIDI local area networks (LANs), which could multiplex a large number of MIDI lines (and possibly other types of signals as well) on a single cable, have arisen over the years. One proposal that is very promising was discussed in this column last October. Serious thought should be given by the MIDI community to, if not adopt it outright, at least provide it with some form of "official" support. It may well make the calls for "MIDI 2.0" obsolete.

There is one other category of discussion on the "Getting MIDI Moving Again" message thread on PAN. Although it is the most abstract, and perhaps the most difficult to get any results from, I think it's the most important. It's not practical or technical; it's perceptual. As one participant put it, if we want to ensure its future, we need to "upgrade MIDI's image."

Part of that can be accomplished by manufacturers who have already achieved "MIDI consciousness" developing products for the M.I. market, moving into more "serious" (and higher-ticketed) areas like pro-audio and post-production, and bringing their consciousness with them. What will do more, however, is for major companies with little or no M.I. identity to put MIDI into their products.

It's not too absurd any more to think of a MIDI jack (or two, or six) on a 64-input automated console, or a 3-machine synchronizer, or even a multitrack tape deck. If manufacturers would stop thinking of MIDI as "a tape recorder for poor people," and start looking into its potential as perhaps the only true automation control standard we have available to us today (considering the politics of standards creation, the only one we may have for some time), *that* would get MIDI moving again. And it would do a lot for the whole audio industry at the same time.

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SPARS ON-LINE

By John Fry

Relating To Consoles

While most console discussions tend to deal with the most recent changes and technological developments, I think it's also important to focus on the ways in which we relate to them. They have changed very little with the passing years.

I should preface this column by mentioning that my own professional career is about to enter its 24th year (not counting the five years of high school garage recording). I spent the early years operating consoles, the later years supervising others who operated them, and a good part of all those years trying to figure out how to pay for them.

Our present operations at Ardent include three recording studios and fullservice video/film production. We employ consoles that range from battery-operated portable mixers to large mixing desks with sophisticated automation. The greater part of our audio work is still music recording for record companies, and most of what I have to say flows from that perspective.

Soon after the advent of electrical recording, the mixing console assumed the primacy it enjoys today in the hierarchy of studio equipment. As the largest, most complex and costly weapon in the audio arsenal, it became the center of activity in the life of the studio. The size, configuration and brand name of the console rapidly came to constitute an expression not just of function, but of value and image. The central role of the console as a *symbol* came into play.

Today, the first words describing a particular studio are likely to include the type of console. It is likely that many instant judgments will be made regarding the purpose, size and substance of the studio. Show me your console and I can probably tell you what you do, for whom you do it and something about your finances.

John Fry is president of Ardent Recordings and Ardent Teleproductions. Memphis. TN. and a SPARS board member.

A major factor in many console purchase decisions is the symbolic statement made by the presence of a specific model. This is a legitimate consideration only when based on sound market research and marketing judgment. But when allowed to assume an overweening pre-eminence, console mythology can lead the unwary toward an ego-driven disaster.

One particularly virulent form of the disease begins with the age-old search for equipment that can guarantee successful results. This is based on the belief that machines, rather than people, make hit records (or jingles or film scores). The most dogmatic and stubborn positions regarding console performance frequently are taken not by those involved in the day-to-day engagement on the front lines but by those on the fringes of the studio industry. Often it is the A&R person who has never recorded or mixed any record, yet *knows* that a particular console must be employed to yield the desired results.

We may find cost relief through a radical departure from current console design.

Even so, many of our personal preferences and emotional attachments arise legitimately from the human interface role of the console as the point of contact between the craftsman and the sounds that he seeks to control. At its best, the relationship is as intimate as that of a sculptor or surgeon to the instruments of their craft. Indeed, all real advances in console flexibility or performance have been driven by the demands of dedicated and knowledgeable users who continue to strive for higher and higher standards of artistic and technical excellence.

Each escalation in a particular operational requirement places new demands on the corresponding type of technology. Demands for increasing numbers of inputs, outputs and routing paths keep the pressure on those responsible for control surface layout, component location and miniaturization, and console structure. Demands for increasingly sophisticated signal processing in each input channel have driven amplifier and circuit design, and have further aggravated the previously mentioned real estate problems.

Many advances could be made only by

waiting for the necessary technology to be developed for other applications before being adapted to professional audio use. We saw those VCAs in the primitive synthesizers of the mid-1960s and reasoned that there might just be some way to build automated consoles if only someone could build a small low-cost computer to tell them what to do.

And what about the cost of all this prestige and performance? Within the span of my memory, console costs have always been high, both in absolute terms and as a percentage of total studio investment. Whenever two or three studio owners are together, it seems the conversation frequently turns to the difficulty of amortizing the high cost of a first-class console over the fairly short period of time that it may appeal to top-level clients. It is difficult for professional studio operators to maintain a fee structure that is high enough to meet the actual cost of depreciation, while generating a reasonable return on investment in the face of a continuous excess of supply over demand.

In spite of a substantial body of informed advice to the contrary, there are always people building studios with no real market research, ascertainment of need or serious business plan. These operations invariably wind up selling their services at unrealistically low rates in order to meet short-term needs, thereby insuring their own demise, as well as making life hard for the other operators in the area until the inevitable collapse takes place.

As for manufacturing, any complex electronic or mechanical device that is made in small numbers is going to be expensive, whether the item is an airplane, automobile or recording console. There are simply not enough units over which to distribute the considerable expense of design and tooling. Anyone who has ever visited a console manufacturer's plant knows that these products owe more of their ancestry to the techniques of the custom builder than to those of mass production.

Paradoxically, in the coming decade we may find relief from the cost vs. obsolescence dilemma—not through the suppression of our appetite for innovation, but through the adoption of a radical departure from current console design. The functions of control, signal processing and storage/editing that are now shared among consoles, outboard equipment and tape recorders may be integrated in a single digital data manipulation and storage system.

Anyone who takes a thoughtful inventory of the control room contents during a typical remix session will quickly realize the redundancy of A/D and D/A converters, small computers, power supplies, connectors and other assorted hardware associated with various discrete items of equipment. An integrated system may eliminate these hardware duplications and their attendant costs. In addition, creation of new functions that today would be performed by outboard devices or a reconfiguration of the console architecture would in some cases require only new software; in other cases, a combination of software with standardized incremental units would provide additional processing, memory or archival storage. The potential for creating a system with a long useful life and almost infinite explosion possibilities would be obvious.

Perhaps the most significant advantage is that these systems offer the prospect of using many hardware components manufactured in fairly large numbers by the computer industry. Our best hope for reducing hardware acquisition costs is to move in the direction of reducing the number of custom-designed electronic and mechanical components in the system by increasing reliance on adaption of general application data processing hardware elements to audio applications. Such components have demonstrated a history of continuous improvement over time with respect to the performance obtained for each hardware dollar invested.

It is interesting to note that the principal obstacles to the design and implementation of integrated systems seem to be found in the area of control surface design. Manufacturers of early models of audio workstations and digital consoles have experienced considerable resistance to any control systems that are not easily understood by intuitive means or that fail to offer easy access for control changes along with positive monitoring of system status. Problems in this area will ultimately be solved by a combination of improved computer literacy on the part of operators and improved design of display graphics and control input devices.

In closing, I would like to point out that SPARS offers some exciting opportunities for participation in the planning and implementation of the console systems of the future. SPARS membership provides the opportunity for informative and thoughtprovoking discussion with colleagues from all parts of the country, covering a variety of technical and business issues. In addition, through the SPARS Interface Program, there is the opportunity for frank face-to-face exchanges of views and information with all of the major equipment manufacturers who participate as advisory members of SPARS. If you are seeking a more active role in building a brighter

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February 1990 Recording Engineer/Producer • 17



By Dan Torchia

The Grammy-nominated producer talks about Joe Jackson and Tracy Chapman, his role in the studio and the ownership of two Los Angeles facilities.



ver the years, David Kershenbaum's artistic and commercial successes have been so numerous that it's easy to forget his technical achievements.

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As the producer of the debut albums by Joe Jackson and Tracy Chapman, Kershenbaum went against the current production trends of the day. Both recordings were simple and emotionally direct, undoubtedly

accounting for their success.

Kershenbaum and Jackson went on to record "Body and Soul" in a Masonic hall direct to 3M digital multitrack, following it up with "Big World," a direct to 2-track digital project at New York's Roundabout Theater.

After "Big World," Kershenbaum became a studio owner with Powertrax, located in the old Wally Heider Hollywood studio. In addition to the studios, Powertrax has developed film music and music publishing divisions. Powertrax has also entered into an agreement to purchase Studio 55, Richard Perry's studio, with plans to develop it into a facility with complete audio and video postproduction capabilities.

Well-known for working with new artists, Kershenbaum will have three such projects on the streets early this year: Jimmy Ryser on Arista, The Origin on Virgin, and Loey Nelson on Warner Bros. In addition, he was the musical supervisor, with Bill Green, for "Sideout," a Columbia/Tristar movie scheduled for release this winter.

This month, he is scheduled to start on Kenny Loggins' new album. Kershenbaum says the album will be "from the heart, and back to basics."

In the interview, Kershenbaum talked about his role as a producer,

Dan Torchia is editor of RE/P.

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David Kershenbaum and Tracy Chapman during the recording of "Crossroads."

working with Chapman and Jackson, how he approaches technology, Powertrax and Studio 55, and the home studio controversy.

The producer's role

"I'm much more of an enhancement producer than a format producer. I think that's why I've been able to produce for as long as I have. I've tried to keep up with the current technology, but I try to take a guide from what the artist already is. In the case of Joe Jackson, it was Joe and a three-piece band. In the case of Tracy, it was her voice and guitar.

"What attracts me to new artists is their uniqueness. Unless they're trying to copy a trend, they've come up with something that's somewhat different than what's going on at the moment. We couldn't make either Tracy's or Joe's records the way that records were being made at the time. The idea was to make them simple and to make them direct. That dictated a certain stream of events.

"As time goes on, I find I have to do less coaching in the studio. With the advent of home studios, many musicians have already done a fair amount of recording. They're much more knowledgeable, whereas in the old days that wasn't the case. They know how to use the mic and they're not so uncomfortable with headphones. They understand bouncing tracks, multitrack recording, and the outboard equipment and what it does, because they have all those things."

Working with engineers

"For a long time, before I had Powertrax, we used different engineers who knew the rooms I was working in. When I started Powertrax, I started working with the same engineer. Now I'm bringing different people into the fold, and I'm using different engineers for different parts of the projects.

"One of the things about record companies is that they always like to remix things. They tend to go to a few certain remix engineers who specialize in remixing singles and tracks. Sandy Roberton, my manager, and I thought, 'It would be really interesting to have certain tracking people do the tracks, and then we'll hire our own remixing engineer. We'll do it ourselves before we turn it in.' We find that by the time we get to a certain stage it's great to have a fresh set of remix ears.

"I give engineers a lot of leeway during a project, although I've gone through a couple of different phases. Part of it is learning what your own strengths and weaknesses are. With Joe Jackson, through "Night and Day," I mixed them myself. I would have someone there to patch everything in, but I felt like I had to ride the faders. When I worked with Supertramp, they had their own engineer who was very good and very protective of that particular process. I became much more of a listener. It was a real interesting learning experience, because I realized that I could be much more objective by listening and not getting caught in the process.

"After that, I stopped riding the faders. Now that we have computers, I have the engineers set up the mix and take it to the point where they think it's up and rolling. Then I make certain comments. Often, it's just a case of rewriting a fader or two into the computer. I give them a lot of leeway as far as hearing their ideas and setting up the mixes and getting them to a certain point.

"Then, a matter of taste comes in. It's not a matter of balance, because the balances dictate themselves depending on the way the tracks were laid down. If a track is really well recorded, you can almost push the faders up and it will lay there the way it's supposed to. Most of my comments are about effects, delays and spatial characteristics."

Dealing with technology

"I've always been fascinated by technology. I started out when I was six or seven years old with a reel-to-reel tape recorder in my room, trying to figure out how to mix two tracks together. As I went on, every time something new came out I would have to hear it and see what it did.

"On one hand, I'm real instinctive, but on the other, I'm very technical and analytical. Usually, you're one way or the other. I tend to see sound more than I hear it. I see the mix in dimensions, in the form of a cube. I try to paint more of a picture of it rather than a technical balance of it.

"At the beginning of my career, I started with RCA, which required us to record in its own studios, and it was all unionized. You couldn't touch the board, so I really didn't learn the technical part.

"Then I went through a period where I learned what everything did, which is really helpful. I could not only ask for something and be understood, but I could also reach up and do it myself.

"When I started owning studios, I had more time where I could play with the equipment, and that's good and bad. It can be a little dangerous sometimes. I really New Beginning for digital multitrack recording. The Akai Digital Audio Multitrack format provides a unique blend of superb 16-bit digital audio performance, ease of operation, programmability, and system expansion. Akai has combined its engineering expertise in digital audio, video, and multitrack recording to produce A-DAM - the warmestsounding, and the most affordable, digital multitrack available. Whether used alone, or in sync with your other audio/video transports, the A-DAM system offers you fully professional specifications at a price point unapproached by any other manufacturer.

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Selected Discography

Joan Baez: "Diamonds and Rust." Laura Branigan, "Touch." Tracy Chapman: "Tracy Chap-

man," "Crossroads."

Marshall Crenshaw: "Good Evening."

Duran Duran: "Rio" (U.S. remake). Peter Frampton: "Breaking All The Rules."

Joe Jackson: "Look Sharp," "I'm the Man," "Night and Day," "Body and Soul," "Big World."

Graham Parker: "Graham Parker." Supertramp: "Brother Where You Bound?"

B.W. Stevenson: "My Maria."

think my strengths are as a producer and a creator, not as an engineer, but I know enough to get in trouble.

"I was taken by digital early in the game. All our rooms, both at Powertrax and at Studio 55, will be 32-track Mitsubishi digital. I think its the warmer of the formats.

"We've been collecting a lot of interesting old gear, which we use to create a contrast with digital. We try to use live rooms and as many old tube mics as we can. The combination of the room and tubes really makes it much more personal.

"With a lot of the acoustic things we've been using a lot of different kinds of mics—Scheops, Bruel & Kjaers and Milabs—to really warm up the digital medium. It creates more of an analog kind of sound.

"Powertrax has a very hybrid kind of board. It's a custom-made, 56-input desk with API 550As and Neve Flying Fader automation, and eight echo sends that tie it all together. It's an interesting sound with the newest automation system and a lot of flexibility. At the house, I've got a Neve 8048. At Studio 55, we're going to have an older Neve and a very large SSL."

Tracy Chapman

"With Tracy's first album, we didn't set out to try and make a 'commercial album." I had identified a window where I had felt that an artist could say something rather



One of the control rooms at Kershenbaum's Powertrax studio. Kershenbaum has also entered an agreement to purchase Studio 55, Richard Perry's studio.

acoustic and honest and that people might be willing to listen again. When Tracy came about as a prospect, I was very excited.

"We came up with a simple, direct approach, which went against the grain of what was out there at the time. In the initial stages it was just her and her acoustic guitar and vocals. We didn't want to come up with a lot of tricks and whistles on the record; we wanted something that would be natural and would accurately communicate her ideas. It would be supportive to her, but not intrusive.

"When it came time to make a second album, everyone said, 'Aren't you really scared and aren't you worried about how you're going to top the first one?' We talked about it, and all we could come up with was that we had faithfully communicated a set of ideas on the first album. If we could do that on the second album, we would have done our job."

"Big World" sessions

"Joe was always a pioneer; he always wanted to try different things. He also had a great dislike for the studio. It seemed to him that the correct way was to capture overall moments of musical ecstasy, and not get caught up in a long process of layering something into being that. He was always looking for ways to get himself out of the studio.

"Direct to 2-track was a dream that he had for a number of albums. During "Body and Soul," he had arranged the record and rehearsed the record so it could be done in that manner. He wanted a hall that had live ambience so we not would have to use any processing. We found this Masonic hall in New York, and with the help of the Record Plant, we built a control room in an adjoining office down the hall. We moved in one of the first 3M digital machines and off we went. However, the hall was so ambient that there was too much bleed. We ended up recording it live to multitrack and mixing it.

"We decided at the time that the next record would definitely be a direct to 2track and we'd figure out how to do it. "Big World" was probably one of the most difficult things that I ever tried to do, but the most fun.

"There were no rules on how to do it. We recorded at the Roundabout Theater with an audience because Joe said, "I'm going to perform better in front of people." So it was a show but it wasn't a show, and it was a recording session but it wasn't a recording session.

"The only thing that we could figure was to actually practice in a rehearsal with the truck. Michael Frondelli, who was the engineer, took one half of the board, and I took the other half of the board and we both made up these giant templates that would fit over the board for each song, so we could get back to our levels. We went around all over New York for nine or ten days practicing at various clubs.

"Then we got to the Roundabout, set up and we found that none of our levels made any sense at all. There also was a dome in this room that acted like a parabolic reflector and it was messing up everything. In the middle of the night we tacked up all this foam to deaden that.

"One of the things we had to do, which was fudging a bit, was that we had multitrack recordings of some of the shows, and they had the same performances on them. Just to get the levels absolutely right, once or twice we had Joe do an old song on stage, while we would leave the air, put the multitrack of the new song up, balance it and go back to him live. He would play the song and we would have the levels set up. A couple of songs were just too tricky to try and catch on the fly."

Powertrax and Studio 55

"Powertrax has grown in a number of different phases. We have a publishing company through Warner-Chappel headed by Bill Green. We have a soundtrack company that does original motion picture underscore, source music and record album packaging to movie companies, also under Bill's guidance. We have a production company that produces records and signs artists. And we have the facilities themselves.

"At Studio 55, there are plans to make it the first audio-video recording facility in Los Angeles with a complete off-line video post-production facility and a small shooting stage. This will be a merger with an existing music video company that's very successful and prominent in the industry.

"We feel that all of our artists are going to need videos, and when they turn to us for production, we develop a real close relationship. It's a natural progression to do videos.

"Secondly, there's a lot of artists who use Studio 55 who may like to use themselves for their own videos. Thirdly, in the case of mixing for videos, there are many times you want to remix the record as you're dubbing to video, and it's cost-prohibitive. In this case, particularly in the artists we're involved with, we can patch right into the video room. In an hour and a half, we can remix for the video at very minimal costs.

"We want to create exciting, creative environments. We use the facilities as a plant, put everybody under one room and let them go."

Home studio controversy "There are very good points on both sides. On one hand, it seems like people would have the right to record in their homes and do whatever they want to do as long as it's within the law. But then you get into such problems as zoning.

"Powertrax is a commercial studio, but mainly for our own projects. We don't have to worry about finding outside business. In addition to home studios, there's just too many commercial studios. The equipment changes too rapidly and you have to spend enormous amounts of money to stay current. "My feeling is that as long as things are done above-board and as long as no one's getting hurt, physically or legally, it should be allowed. It seems that in the spirit of free competition, which the country was founded on, that anything should be possible."



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Nomis Studios in London uses design neutrality for the acoustic design, construction, electrical, air conditioning, heating, humidity control, electronics interface, grounding scheme and wire. The desk and storage medium have not been modified.

have been a believer in sonic neutrality for a long time. Neutrality can be defined as the lack of sonic character, or sonic signature, a component system or environment places on the musical performance.

Although neutral sonic characteristics in sound equipment may seem difficult to achieve, the concept is easy to envi-

sion. The desk, recording storage medium, power amplifiers, crossovers, speakers and wire are neutral, having no sonic character.

Equalizers, limiters, compressors, gates or anything that may be considered outboard equipment are our palette of colors. If the desk and storage medium were neutral, this palette would be more vivid. The nuances of outboard equipment could then be heard as you used them to paint your sound.

In the 1970s, with the introduction of the 3M digital tape machine, I had a vision of the studio and mastering facilities of the future. However, it wasn't until the introduction of the CD and my subsequent research into the possibilities of this medium that I began to realize that neutrality may be possible.

In early 1985, Glenn Meadows, a mastering engineer and a part owner of Nashville's Masterfonics, reintroduced me to an old acquaintance, Tom Hidley. Over dinner we discussed the possibilities of building a room with no room equalization. This room of the future was to have an excellent acoustic phase character and an exceptional RT. Tom told us of a new monitoring system that had an exceptional frequency response and he told us of his new concepts in room design.

In July 1986, construction began on what was to become the

David LaBarre is a systems design consultant based in Brentwood, TN.

AS A DESIGN CONCEPT

By David LaBarre

A recording environment where a 1dB EQ boost may be too much, and there is no room saturation and pinpoint accuracy? It can be a reality, using studio and component designs that result in no sonic character.

first of two 20Hz rooms in the world: Studio Des Dames in Paris and Masterfonics. Construction went on simultaneously.

Through my consulting work for Masterfonics, Tom decided to involve me in other projects. In 1987 I spent seven months in Europe working on several projects. It was at the end of this tour that I found myself at Tom's home in Montreaux, reviewing the projects. It was during these discussions that Neutrality as a name for our ideas and concepts was born. But it wasn't until the recent design of Nomis in London that the neutrality idea began to gain publicity.

I have done many tests and demonstrations, through specially built or modified equipment, in order to prove that neutrality is within the realm of reality. However, the concept contradicts most manufacturers' design philosophies. For example, the majority of single amplifiers I have heard over the years have a sonic signature. If a single amplifier has a sonic signature, how can audio pass down a chain of some 50 amplifiers without changing the performance? Today's recording desk may have more than this in each signal chain.

When asked about their sonic signature,

many manufacturers will say, "People buy our products for their sound and features." They are proud of the fact that they have a sonic signature. This is synonymous with their name. "We have had thousands of hit records recorded on our desks. How can millions of people be wrong?"

That attitude holds us back from achieving neutrality. I have consulted with a number of manufacturers over the years, and each one has been reluctant to offer a system without a sonic signature. They want their signature, their names, to be heard. Examining some of their products revealed that everything played through these devices sounded the same. In order to hear subtle changes, large amounts of EQ or dynamics must be used.

Processing, processing...

The following example illustrates the point. In the beginning of recording history, we desired to faithfully re-create the musical experiences of live performances. In quest of the natural sound of the instrument, our talented young recording engineer struggles to learn all he can about microphone techniques by listening to the instruments he wishes to capture. He also learns how to begin to overcome the deficiencies of the recording equipment and storage medium with which he must work.

After a period of time, the engineer learns many techniques that please clients and that compensate for equipment deficiencies. He eventually learns how to convince clients to believe that the results are the best that can be obtained and are acceptable.

As the engineer becomes older and more established, he uses a second engineer to place and select the microphones. His memory of live performances still serves him well enough to please the clients.

The moment of truth always comes when the client proudly takes his product to the mastering engineer. Many times, I have seen the producer's face drop when he hears the product. The mastering engineer may suggest another studio in which the producer may be able to salvage his product. Thus, the phrase "We will fix it in the mix!" was born.

The problems the new engineer encounters are blamed on the original recording engineer and studic. But the new recording engineer never heard any of the original live instruments. He will work from memory and experience in order to provide the client a finished product that is musically acceptable. In doing so, he reprocesses what was originally processed.

After salvaging his product, the producer again will go to the mastering engineer for the transfer process. The mastering engineer has also never heard the live performance. They listen to the material and decide on a number of alterations. These may range from the sequence of the songs to level, equalization and dynamics. More processing! Thus, the phrase "We will save it in mastering!" was born.

The poor listener who purchased the record album says, "I like the music, but couldn't it sound better?" He may seek better equipment. This may make it sound nicer, but he never gets to the real musical experience. The musical experience was lost the instant the musicians finished playing the piece of music in the live performance.

Some people believe the biggest problem is the use of analog tape as a storage medium. These same people realized that if they recorded their basic tracks with one machine and mixed down to two tracks on another machine, and then continued their overdubs on this second machine, the original basic tracks didn't wear out. When the two machines were linked together for the final mix, the tracks sounded better.

This method allows us to get closer to what we remember of the original performance. Still, none of the problems encountered in mastering disappear.

A digital salvation?

Let's return to our young recording engineer. He isn't so young anymore. He's using his acquired talents as a purist, recording classical music for a well-known label. He has overcome many of his recording problems by constantly striving to make full use of his knowledge and equipment. Considering the number of awards hanging on his walls, he must be considered a truly dedicated professional.

In a recent discussion he told me, "I'm presently being forced to use a digital medium I don't like to fulfill my contractual agreements. A great deal of time is spent selecting the venues we will record in over the year. When I listen to the replay on digital gear, I can't hear the ambiance of the hall. Digital systems seem to lack the natural reverberation of the hall. I still drag along my analog tape machine and share my recordings with friends."

There are many professionals who feel this way. Some rely on "black boxes" to improve the dynamic range of analog tape machines so that it will be "comparable to digital." These black boxes are an encode and decode frequency-dependent device. Over a period of time they may make the end product sound worse than if they weren't used, because of the nonlinearities inherent in the analog storage medium.

Let's pursue this further. We are now into our second and third generation of digital tape machines, and our third and fourth generations of compact disc players. Each time we are told, "This is the one that will fulfill the promise!"

The promoters of digital audio promised us a storage medium that would sound exactly like the original. This medium was not to have a wear character and it was to last for posterity. We could make copies digitally, which would provide us with identical clones, and the clones could make clones. All of this could be accomplished and still retain the character and feeling of the live performance. Indeed, the digital manufacturers' early promises can come true with today's technology.

Still, there are two factors that no technology can overcome: first, the attempt to re-create a live performance that may be a distant memory; second, a general overreliance on signal processing, which may cause more problems than they solve.

Neutrality in theory

Neutrality addresses these factors. Let's look at an ideal (although imaginary) listening environment. We will need a plain piece of land, which should not exist in a valley. The land needs to be free of trees, houses or other obstructions. On the day we listen, the temperature needs to be between 65° and 68°. The relative humidity should be about 50% and it should be a still day. These parameters are suggested to avoid introducing natural reverberation, early high-frequency losses or a sonic character to the environment.

We can now place the recording desk and equipment into our ideal environment. Assuming the perfect power amplifiers, monitors and desk, frequency response is governed by the listening distance from the point source emission. This evaluation would allow us to realize we can move about the desk without losing our perspective of the left or right channel. We would also discover that even low frequencies have direction and balance. The notes are smooth and even without the normal buildup at one or more low frequencies that can only be associated with the acoustic problems of a room.

Because of the free-space environment, there would be no areas or corners we could move into to distort our view of



The 20Hz mix room at Masterfonics in Nashville, built in 1986. This was one of two facilities in the world that were built simultaneously using design neutrality, and the first to pursue full neutrality.



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Masterfonics' Studio 6, completed in the summer of 1989, is the facility's latest project using neutrality.

what we are creating. Placement of the instruments within the stereo spectrum would have pinpoint accuracy, and panning could be accomplished without a readjustment in level to retain the instruments placement in a mix. A solo or solos could be selected with the same sonic character and balance as the mix. If an equalizer were necessary for an instrument, you may find that even a decibel here or there would be too much.

The volume at which we monitor would

not play a part in our tonal judgment of the mix; no matter how loud we listened, we would never find a point where everything fell apart because of room compression or saturation. The image we are creating would have the 3-D quality of height, width and depth, which would appear to be outside the bounds of the monitors.

Unfortunately, the lack of isolation, temperature and humidity control makes it impossible to provide consistency to our ideal environment (to say nothing of keeping a piano in tune).

Today, these acoustic aspects can be gained within four walls, using modern design techniques. Isolation, temperature and humidity control provide a consistently neutral acoustic environment.

Additional factors

This is only a definition of a neutral reference. There are many other factors to be considered for those who are seriously committed to the quest for the real sounds of musical instruments, including:

1. The *electrical service* that powers all of our electronic systems. Unfortunately, you can't just plug equipment in the wall and expect that it will work consistently to its optimum.



2. External and internal ground structures. A proper ground structure will allow individual pieces of equipment to work together as one unit, without the normal hum, buzzes, clicks and pops associated with large systems, particularly when large numbers of outboard gear force extensive cross-patching during a mix.

3. The use of proper structural shielding and outboard equipment layouts. As we continue to ask for wider bandwidth equipment, we open the door to more of the possibility of RF interference and oscillations within the system. Unfortunately, this problem destroys our consistency and our neutrality.

4. The selection of *interface wire* and its associated layouts or routing. We have known about the resistance and capacitance of wire for some time and how it can deteriorate the sonic performance. There are methods by which this phenomenon can be optimized to reduce its effect and to provide consistency. There are also methods to eliminate this phenomenon.

These basic elements must be properly implemented in order to bring equipment into our neutral room. Please note that in order to bring complete neutrality to a neutral environment, our recording chain must also be neutral, such as the desk, storage medium, power amplifier and, of course, speakers.

In order to provide a foundation for complete neutrality, the speakers, speaker cabinets, speaker wire, crossovers and power amplifiers have become part of the acoustic design. Unfortunately, the desk and storage medium must be modified in order to finish the process. We are hoping that the cooperation of a number of major manufacturers will help eliminate this step.

The finished studio

We are no longer in our outdoor environment. We are now in a neutral control room. The carpenters, electricians and air conditioning people have gone home and the room has been tested, approved and released.

The desk we just put into the room affects its neutral acoustic aspects. We must account for this error acoustically and not electronically (via EQ) to maintain neutrality, or we can destroy it by adding unnatural phase shifts and phase relationships to the stereo image. Many anomalies can occur when building an electronics system from a large number of components. As stated earlier, the object is to make all of the individual pieces work together as one unit. A common anomaly of a digital multitrack interfaced to an analog desk is that the sampling frequency or switching power supply frequency of the digital multitrack becomes visible on all the outputs of the desk. These frequencies will have the same effect on the analog amplifiers as oscillations or RF, and will destroy the prospects of neutrality.

It is interesting to note that when the multitrack is unplugged from the desk, the problem cannot be seen in either piece of equipment. Both manufacturers will blame the other or they will collectively blame the interface, claiming to have never seen or heard about the problem before. They may recommend a change to the interface that irritated the problem or made it worse. Maybe with some luck, the problem can be made better, but it is never fully resolved.

From time to time, some people have said that human beings can't hear these frequencies, so this anomaly can't be a problem. Unfortunately, this is not the



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Neutrality from Concept to Completion

The so-called "Hidley" design concept has evolved considerably the past few years, and anyone who has heard one of my designs in Europe, Nashville or Montreal will agree that it is considerably advanced from the Los Angeles studios where my career began.

One of my latest projects, Kiva Studios in Memphis, TN, illustrates the concept of sonic neutrality, one of the most important developments in studio acoustic design. It is a 24Hz control room, featuring a Solid State Logic G Series console, a wide variety of outboard gear, and analog and digital tape machines integrated into a non-obstructive, acoustically coherent design.

To understand what is going on at Kiva, you have to understand what we as designers are

attempting. The first thing perceived in a sonically neutral sound space is not of the two speakers being played; it is a sensation of three dimensions. You suddenly realize that there is depth, width and height to the sound field—and that it's not coming from the speakers. You hear it in front of you, just above the console meter bridge. Because of the extreme acoustic cleanliness and the positioning and definition of the frequencies across the band, you will instantly perceive any motion in that sound field by adjusting the console.

Second, you notice that you don't have ear fatigue. The sound seems clean, the balance stays consistent, and the music retains the same tonality balance and mix conditions as you move around the room, regardless of the volume at which it is played.

If you are happy with the sound on the big monitors in the control room, and happy with the final mix, you will be happy with the product when it hits the street. The surprise is that you have no surprises.

Kiva's exceptional sound is an outgrowth of the quality and quantities of rooms we are doing. With each room, you simply get a little smarter. One thing is certain: No two rooms are the same. Everyone will have favorites. There is really no way to put our finger on any one; it is a combination of things, and studio aesthetic preferences are highly personal.

Perhaps it was our recent design at Nomis Studios in London that has



By Tom Hidley

gained much of the publicity for the sonic neutrality idea. At Kiva, the essential principles are the same only the studio sizing is different. Nomis is 1,000 square feet in the basic shell, and Kiva is 600 square feet. The basics of these facilities remain the same.

Planning the job

When we start a job, we hold an initial session with the client to rearrange some ideas that may have been detrimental in the past. A lot of things have to be worked out. We have to explain what makes a system sonically neutral. Often, the source itself must be corrected. For example, the sonic wires that feed the power to the crossover and speakers must be able to handle power on high or low volume conditions. The speaker and crossover systems must have integrity in terms of phase consistency.

Once you have established what you are putting into the room and how it should be configured, it should be as correct as physics allows it to be with today's technology. Then the room has to be designed to accept our monitoring and to address it correctly with consistent reverberation time across the bandwidth of the monitors.

At Kiva, we've been able to move reverberation control of the control room down to 24Hz. This has been accomplished by considering the details of room design—how you are going to trap and control the sound from the monitor to the ear. In a sense, the room is the ultimate link between the monitor and the ear. The series of events starts from the mains plug in the wall. No detail is too small.

It is a cleanroom for sound. It is colorless.

An important consideration is the console design. We always try to find out what type of console is going to be employed in the facility, although the selection of any studio equipment is left up to the owners and engineers. Frankly, as we all know, console selection is a highly debated topic-one I try to avoid. Still, I do have basic criteria to work around. The console is the studio centerpiece; we have to know the size, and we prefer a console that has an open bottom. This is extremely important. Remember, low end is being generated at the front of the room, and it needs to pass freely from the front to the back of

the room with minimal physical interruption.

If you introduce the steel back and bottom of a console, you have essentially erected a solid wall in the acoustic low frequency path. The inevitable result will be sonic low-end variations. Everything matters, from the console to the placement and housing of the outboard gear. The SSL console at Nomis Studio has an acoustically transparent profile with flared-out wings for the outboard machinery—details that make a critical difference.

Unwanted reflections

At Kiva, the same concept is applied in a different way. We have designed outboard racks that can be rolled to the client on wheels and that can be placed so you won't hear unwanted reflections. Again, they have open bottoms and open sides. The angle on the mounting surface assures that frequencies will not splash back to the engineer's ears.

This takes a little explaining. If, for example, an outboard rack is on your right-hand side and you are sitting in the middle of the desk, the left-front monitor is going to shoot midrange down in that direction. If this signal is reflected back at the engineer, you are introducing acoustic phase distortion to the listener's ear. This distortion will dry up the studio's 3-D sound field.

To avoid this problem, you need to have the rack designed at such an angle that the reflections will be directed upward and away, instead of putting them in the engineer's face.

Kiva is a very European studio, with Swedish hardwood floor and paneling, amps and grille cloth from Switzerland—tightly specified in acoustical transparency and our Hidley monitoring system from Japan (Kinoshita).

Acoustic design is fascinating because each product is as individual as it is the product of a formula. Ultimately, the room itself should be a creative extension of the artists themselves, be it the musician or the engineer. It should offer transparency, dimension and ambience. I believe that Kiva clients will find it to their liking. And I believe that Kiva is a valuable addition to the continued development of studio acoustic design. reality or we would have never created bias traps for analog tape machines. This story can repeat itself again and again until you are completely frustrated, bankrupt or give up the notion of neutrality.

At this juncture, we need to finish the structure for neutrality. We must consider the inner workings of the desk and the storage medium. To date, there are no major manufacturers of desk or storage media that could be considered neutral. I am hoping that soon these concepts will generate enough interest and discussion to generate change.

Neutrality in reality

And how does neutrality work in the real world? Glenn Meadows, who was at that dinner in 1985, has added a mixing facility and completely refurbished the two existing mastering rooms in the past three years. His clientele are so impressed with this facility that they have added a completely new studio. He is using the techniques of neutrality, acoustically, electrically and electronically. He is moving his business more toward neutrality every day.

Tom Hidley, who also was at that dinner, shares my belief in neutrality. Together, we are creating a new generation of audio and visual recording environments that are conducive toward complete neutrality. [For detail's on Hidley's latest project, see "Neutrality as a Design Concept," page 24—Ed.]

More than 70 studios have been built around the world that use many of these concepts. The response from both studio owners and their clients is exceptional. The most frequent comments from clients: "This is the first time I have taken a project to mastering flat and there are no surprises on the street. The response I am getting on this project is the best I have ever had."

Too expensive, you say? Not all of the 70 studios have been built from the ground up. Many have been refits. For those of you who may be considering new studios, there are a number of designs from which to choose, and all of the designs have sonic compatibility. The total costs are comparable to conventional designs.

I believe that a hit record can be cut in a garage and that it's the song that sells the record. However, if you are tired of the sound you get from a garage environment, neutrality may be an alternative for you.



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technology Update:

THE API DISCRETE SERIES CONSOLE

By Michael Fay

Can a small company build two consoles a year and compete in the upper end of the market? magine the differences in resolution that your eyes perceive when comparing film and video, or the differences that your tongue detects when tasting butter and margarine. Your body's senses are able to distinguish and appreciate qualitative differences on a remarkably refined level—so much so that significant differences become immediately obvious. Your sense of hearing is just as acute.

For the past 10 years or so, one of the raging debates in pro audio has been the issue of analog vs. digital resolution. But there is an even older, more subtle debate to consider: discrete analog circuitry vs. the more modern and commonly implemented monolithic integrated circuit approach to audio signal path design. Is there a perceptible difference in the sound? With the introduction of the Discrete Series console, API Audio Products is staking its future on the belief that there is. The new board also signals API's intention to be a serious player in the \$200,000-plus console range. With mainstays such as equalizers and pre-amps paying the bills, the pressure to build as many consoles as possible is off.

API was originally formed in 1967. After building Consoles and other products for about 10 years, the company hit some rough financial times that brought Its operations to a screeching halt. Following the original API's demise, and at the request of Sunset Sound in Los Angeles, a Virginia company secured a licensing agreement to continue making API's mainstay 550A equalizer. After an initial

busy period, the Virginia company also found itself in trouble. Everything came to a sudden stop when the company's management realized that while everyone was building products, no one was out selling. Customer relations were all but non-existent.

The API Discrete Series Console at its debut at the October AES

Michael Fay is the former editor of RE/P and a San Diego-based engineer/producer and freelance writer. One of the older debates in pro audio is whether a perceptible sonic difference exists between analog circuitry and integrated circuits.

In 1985, Paul Wolff, who was then working with the company as an engineering liaison to customers, bought the audio part of the company. The new group began by concentrating on selling the 550A, 560A, the 550A-1 modules and some older API products.

Precursors to the new console

To gain the trust of the industry, API needed to do something with the 550A. The answer was the 5502, a rack-mount, dual 4-band version of the 550A.

"After using the 5502 for two years, people were finally accepting the new company and its products as being legitimate," Wolff says. Customers were convinced that the company could develop new products, without them sounding like the 550A-1.

The company then introduced the 3124 pre-amp, the 512 pre-amp and the 550B, a 4-band version of the 550A. At that point, API started thinking about building a console. Wolff went out and found two customers (David Hewitt and Geoff Daking) who were willing to work with API on building the first two production models.

"I started asking people around the country what they liked and didn't like about their existing consoles," says Wolff. "We tried to come up with an input module that incorporated the best parts of all those conversations and suggestions.

"Like I'm sure everyone else feels, we've developed an input module that does everything that everyone wanted. But with this design, both the large and small faders can receive input from any source and send to the multitrack buses. In addition, each fader has three stereo buses. A sweepable filter and the EQ can be assigned to either fader—as will future dynamics modules. If you want, you can have two equalizers per module, as the dynamics module will have the same pin-out as the EQ."

About the time the original designs for the console were coming together, Wolff started talking with George Massenberg about utilizing the GML moving fader automation system. In GML's basic software protocol, there are seven extra bits that are available that can be used for anything. API and GML agreed on and developed a data protocol to address console functions. This protocol will allow the development of a totally resettable console. When fully implemented, this automation protocol will allow the operator to put a disk in the control computer and completely reset the console within one SMPTE frame.

The audio path

Throughout the audio path, the clipping point is +30dB—with 0.05% distortion at +4dB out, and less than 0.1% at full output. The mic pre-amp has a gain range of greater than 60dB. The actual unweighted measured noise is -95dB. The equivalent input noise is -129dB. As Wolff puts it, "Those are the specs

As Wolff puts it, "Those are the specs that we offer. Anyone wanting any more than that is just going to have to listen to it."

The balanced summing amps are mounted directly on the back of the bus motherboard, so there is virtually no wire going between them. The basic card is designed with 24 track buses and three stereo buses. If you need more or less, all you have to do is ask. Expanding can be done at any time, without throwing away any of the console. If you want more than 48 buses, a second bus card can be added.

API has addressed some other chronic problems that computerized consoles occasionally face. For example, in the manual mode, the board is fully functional. If there is a loss of computer control, the input module defaults to whatever the customer has set as a default status. Also, there is battery backup for settings. When the power comes back up after a power outage, everything returns to its previous status. Another feature is that all the com-

Eliminating a lot of custom-made parts helps to minimize overhead. puter buses are dead when not in usethus eliminating noise.

API had to consider some minor compromises on things unique to a discrete console. For example, discrete circuits run a little hotter than IC-based circuits.

"That's where the saying 'it sounds warm' came from," says Wolff. "It sounds warm because it is warm."

To handle the extra heat, the console is vented under the faders and has four halfspeed "whisper" fans blowing out of the back. Wolff says these fans are guaranteed to be 100% noiseless.

Wolf expects a 48-input board with GML automation to cost \$350,000. API has signed an agreement with a New York area leasing company with experience in pro audio to help clients who need financing.

Is there a market?

In light of some recent failures in pro audio manufacturing, some questions must be raised as to whether the industry can support another line of \$200,000plus consoles.

"If I can build two consoles a year, I'll be happy, and I'm not going to build a console without having a customer," Wolff says. He claims that his company is profitable now and points to the fact that API is one of the very few making a discrete console, which sets it apart from the competition. (Many of the other companies making discrete consoles use API components in their designs.)

API is a small company that is experiencing controlled growth. There are only 10 employees and at that size it expects to be able to produce about four consoles a year.

Eliminating a lot of custom-made parts helps to minimize overhead. The company designs, tests and proves the circuits with standard, readily available components. Wolff uses a Lotus spreadsheet to add up the cost of all the elements involved in building a module, including the costs of inspection, labor, rework time, bad parts replacement time and even solder.

One of the concepts that Wolff is trying to maintain is that the Discrete Series is functionally very straightforward.

"I don't want anyone to be intimidated by the complexity of a console," says Wolff. "I want a guy to be able to walk into the control room and start working. Everything has a knob and is touch and turn. You won't need to know DOS commands to get the console to run. But, if you desire to go in deeper, you can."


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CT: (203) 744-6230 NY: (212) 956-6464 TN: (615) 329-9584 CA: (213) 461-6383 • TORONTO: (416) 365-3363 Circle (17) on Rapid Facts Card installation of a Neve 8068, another classic. For the price, this console best fit the requirements of his studio compared to a new console.

Depending on the disposition and direction of the studio, this route may be a costeffective alternative to buying new. In fact, with competent technical support, refurbishing your existing console may be the best solution when resources are limited. An old console can be given a reprieve with the replacement of key components and/or connectors.

Back to our first example: After installation, our friend Mills wisely elected to replace most of the switches on his old Harrison I/O modules for reliability. I know of one studio owner who, for the sake of sonic quality, replaced a significant number of electronic components in his brand new 6-figure console before putting it on-line. With available resources, refurbishment is limited only by your desires.

Why upgrade?

Your decision between the alternatives will most likely be founded in your reasons for upgrade. The most viable reason is to keep pace with the demands of your current or potential clientele. This likely means better sound, a more flexible system architecture and perhaps automation. Next, of course, is more inputs, which is like computer memory: you can't have too much or too many. Or, your studio could come into the money and be able to invest in a new console.

Before moving forward with such a project, you should decide to what extent you plan to improve the overall system. A system that hums and buzzes will not be improved significantly simply with a new console. Take this opportunity to make some changes for the better. Your renovated system is best presented as a balance between new equipment and system improvements. As always, time and money are the determining factors.

Perhaps the most significant improvement that can be made is in an overall grounding scheme (if that is lacking). This is accomplished more easily and effectively with balanced interfaces rather than unbalanced interfaces. When moving to +4dBu from -10dBu as a system operating level in your upgrade, consider balanced 1/O when purchasing your next board. [For more on grounding, see "A Practical Approach to Grounding" in the January 1988 RE/P—Ed.]

One question that always pops up in these projects is whether or not to adapt the incoming console to the crusty old wiring that inhabits the walls now or to replace it with the latest, greatest kryptonfree ultra-lustre audio cable designed with the demands of today's discriminating ears in mind.

Replacing the wiring provides the satisfaction that everything is the way you want it. This comes at a substantial increase in cost, of course (unless you are a do-it-yourselfer), but in some cases it is the best thing that could happen to a studio. There is something to be said for knowing where everything goes and how it is terminated.

Control room acoustics The factor requiring the most effort is



acoustic improvements. For the small operator this is generally too expensive a concern. With available budget, however, any attention given to control room design fundamentals such as bilateral symmetry, minimizing room modes, and controlling early reflections can enhance the monitoring environment, thereby complementing the console upgrade.

Tie lines are another perk worth adding to your system. Not just audio tie lines but video (with switcher), MIDI (with patcher) and speaker lines to accommodate today's many modes of operation. A studio-wide network adds flexibility to your system and allows you to accommodate any client. Designing with small, modular panels makes it easy to fulfill your current needs and provides for easy modification or expansion.

Think about future technology. Digital workstations and editing systems are already transforming the industry. Even if you don't have the means to obtain this capability now, its provision is worth incorporating into your upgrade plans. At the moment there is nothing particularly unusual about their interfacing requirements, though it may not be long before whole systems communicate via one network the way instruments and effects use MID1 now.

Appearance can provide clues as to the kind of treatment a prospective board has had in its previous homes. When pulling a module for inspection, be certain about hot seating, or having the board powered up while removing or installing a module. The older Harrisons and MCls, among others, do not take kindly to that sort of thing. Inspect the condition of the solder, the amount of ashes, lint, dust and corn chips inside. Old connectors can be a major source of buyer's remorse.

When checking out a console, whether it is a motherboard design or one with ribbon connectors, it is worth shaking things up a little around the module by passing signal to determine if you will be faced with such a problem. Buying from a studio owner who makes neatness a priority may indicate a bit less a risk of connector funk. As always, however, let the buyer beware—just because it looks great does not mean that it works great. Don't get snowed by a new paint job.

Prioritize your tasks

In refurbishing your own or a recently acquired used console, you first need to compile a list of tasks to validate the console's operation. Then prioritize the improvements and modifications your system requires. Outline your criteria in terms of satisfying your clientele, how you expect to improve your studio, and the satisfaction you expect to realize both personally and financially. Be clear about going through with it from the beginning.

This procedure begins with a performance test of the console. Compare audio performance with the manufacturer's specification, beginning with the monitor, mix and bus output sections. With nothing else connected to the console, these should be confirmed so that all ensuing measurements taken through these sections can be assessed with confidence (aurally as well as technically). Working back toward the front end, confirm performance and gain structure through each module.

Next, move all pots and switches to confirm that all routing is executed reliably and quietly, while faulty components can be noted for replacement. In some cases this may need to precede performance testing.

Older consoles can expect to see more frequent component failures once placed into service. Components are best replaced with parts originally specified or better. Availability is generally not a problem. Most parts requiring replacement are generic and are readily available from your favorite sources. Most manufacturers can readily provide unit specific parts unless it is a very old unit. Another common problem (and one that should be determined before purchasing a used console) is connector funk. Molex, ribbon cable and edge card connectors can potentially be a never-ending source of aggravation. Replacement is clearly the best solution and recommended for global problems. For isolated instances, a toothbrush and some good funk solvent can often provide adequate relief.

Improvements and modifications are creative opportunities limited only by imagination and the usual resource constraints. They can range in magnitude from a simple speaker switcher or producer's talkback button to replacing coupling capacitors and op-amps across the board. The usual criteria outside of necessities (e.g.: speaker switcher) are generally to provide convenience to the board's operation.

Some in-line boards, for example, can be modified so that the fader feeding the routing matrix can feed the mix bus, thus placing two inputs per module into the mix. In-board record/mix mode switching can be added to lower-end consoles fitted with a separate monitor section. There are several options available these days to retrofit automation to any console. Trick buttons that light things are where it's at in this business. Any modification that uses lamps or LEDs will increase the value of your equipment considerably upon resale.

One of the best retrofits I can recall involves some studio owners who began making plans for a new console nearly one year before the day the studio would be paid off. That's right, the day they were to own the joint lock, stock and barrel was the day they were going to tear the room apart, put it all back together with a nice new big dollar top-of-the-line console and "do it right."

All the financing was planned, as was a viable marketing plan where they would be able to keep most of their old clients and still attract higher-caliber session work. The day has come and gone, and the old, refurbished console remains.

With the studio paid off, and without the debt load of a new console, the owners were able to realize a substantial increase in profit. Whether or not plans for an upgrade are still in place is unknown. No one is speculating how long it will be before they grow tired of making the extra money.

Re/P





Answers to common questions on new vs. refurbished boards, financing, replacement parts, shipping and average prices.

> Our studio is in the process of upgrading. In our price range we can choose between a used, refurbished console or a new, mid-priced unit. What features should we expect (or avoid) on a new board in this price range?

A: Assuming mid-priced means \$20,000 to \$60,000 dollars, today's consoles offer features and performance comparable to, or better than, much more expensive boards of a decade ago. In light of the retro and factory automation packages available, real deals can happen. In many cases, features such as equalizer type and performance, routing and board function flexibility (VCAs, grouping, muting, MIDI interface, automation capability) are far advanced over consoles once considered stateof-the-art. Of course, this is not surprising, considering modern technology.

In equalizers alone, continuously sweepable bands, variable Q, multiple sections and selectable high-pass filters are the norm, not the option. Modern design emphasis has concentrated on low phase shift/group delay, linearity and lower noise. Usability has improved, as fully adjustable units emulate curves once the sole domain of external rack-mount devices.

Routing and busing flexibility, even on less expensive units, has doubled and doubled again in the past decade. It is now common to find eight pre/post aux sends, eight sub, stereo mix, 24 monitor and programmable mute functions on very affordable consoles. The number of inputs available for the price has grown accordingly. Digital interface and MIDI control is threatening to become common.

In balance, remember that older, once-expensive recording consoles, although in some cases shy of features compared to today's higher-tech speedsters, do have high-quality components and construction that guarantees the beasts will be functional virtually

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forever. And don't forget the magic thing which made them classics in the first place: their sound. Whether achieved by component choice, discrete and uniquely designed circuit topology or unusual operational features, classics have become so by being high-quality, reliable tools in the hands of competent and creative engineers.

Whether you decide to buy a new or used board, remember to consider what type of work you will be doing. If you do a lot of jingle work on tight deadlines, for example, automation probably isn't a necessary feature. So, a board's automation capability (or lack of it) wouldn't be a factor as would routing flexibility.

Q: Manufacturers, dealers and banks often provide financing on new console purchases. Where do I go to finance used or refurbished equipment?

A: It used to be that lending organizations wouldn't touch anything related to the music business because they thought it rhymed with bad business: unstable, chancy, dangerous. Those days are long over. Many lease and lending companies, as well as local banks, now regularly write large tickets for used equipment just as they would any loan-based on solvency, financial history and the lendee's experience in the business. A prominent individual in the trade informs us that studio industry-wide default is less than 1%, leagues better than automobiles, heavy equipment or the computer trade. And our equipment holds its value.

Although many companies exist which underwrite new or used sound equipment purchases, two well-known companies which specifically address studio equipment are:

• Century Financial Services Group,

15455 Conway Road, Chesterfield, MO 63017; 314-537-0330.

• Terminal Marketing Company, 5 Waverly Court, New City, NY 10956; 914-634-7601.

Q: What sources provide special or replacement parts for older boa ds?

A: It should come as no surprise that virtually every console manufacturer works hard to stock the major components, and certainly the unique ones, which make up their products. When looking for stock parts, a best bet is to contact the manufacturer first. It will be able to ship direct or identify local dealers or service support that provide speedy delivery (or, in the case of overseas products, provide the parts at better-than-current fluctuating exchange rates).

Virtually all generic parts (such as chips, op-amps, common faders and power supply components) may be available from discount electronics houses. A call to customer service at an OEM parts manufacturer (such as Motorola or Penny & Giles) may indicate who the large regional distributors are or if there is a current replacement upgrade available. Contacting a large pro audio dealer in an urban area will indicate who the hot techs are, or where secret stashes of once-common, now-rare components may be hiding. Finally, the used trade dealers/resellers are often a good bet for sourcing components, and they'd love to talk to you-they are always looking for customers on the next upgrade.

Q: What's the best way to ship a console long distance? Locally? A: As in any trade, there are specialists that have expertise in moving large, unwieldy, heavy objects, fully insured. Yes, you will save some money by renting a truck, buying a case of beer, and gathering all the seconds on staff to hump and drag. But what if something happens? How often do you insure your own move, especially in light of how relatively inexpensive it is to avoid a hernia?

Most moving companies, either local or long distance, will be happy to bid on the job. Note, however, that a large console is not a sleeper couch. It wasn't designed to be picked up by four corners and twisted or jostled about. Look for companies that move pianos, mainframe computers or convention displays. Familiarity with the creatures and patience are more important than brawn. Remember that every board is different: some will flex safely with the input modules removed, thanks to ribbon interconnects. Conversely, a rigid motherboard may threaten to crack, necessitating the modules remain installed for added rigidity, hang the weight. Many boards are delivered new only on a palette, as flex is absolutely verboten.

A safe first step is to call the manufacturer with the model, serial number and size configuration. Ask for a recommendation. Sticking the console on a palette is always a safe bet. And call your insurance agent or use the mover's coverage. It's cheap.

Q: Is there a source to find out average or standard prices on used consoles?

A: Yes and no. Books such as the professional sound edition of the Orion Research Blue Book (1315 Main Ave., Suite 230, Durango, CO 81301; 303-247-8855) serve this industry, much as an automobile blue book does. However, remember that pricing is highly variable.

Some used boards are hot for a while, then not. Condition, installed location, size, appearance, wear and tear, quantity of owners, number of times moved, popularity, total units produced, special options, standard model features and whose album it cut all affect the value of the console. Ultimately, after a thorough technical checkout, the purchase price is as much a factor of its value to you as its supposed op**en-market val**ue.

Check around, do your research, make an offer. The classified section in the back of this magazine has many good sources for reputable dealers who can assist you in locating the board of your dreams. Good luck.

RE/P

This issue marks the debut of Five Questions, a regular feature offering important information concerning the issue's main theme.



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approach

SOUND SYSTEM PERFORMANCE



By G.R. (Bob) Thurmond



any people still ask, "Why equalize a sound system?" Some claim that a properly designed system won't need to be equalized. Others say that EQ really doesn't make any difference or that it does more harm than good, so the less the better.

However, everyone overlooks one crucial fact: There is much more to a sound system's performance than frequency response. Although frequency response may be the most important factor, it is by no means the only one.

As much as we might like to believe, manipulating the controls of an equalizer until an RTA display looks flat is very unlikely to produce a flat system response. If you doubt this assertion, just follow a normal room EQ procedure and then move the measurement microphone to various locations throughout the audience area. Check the responses. Then, try to decide which is the true system response.

The fact that the system response varies from one listener location to another is only part of the problem of delivering good sound in an acoustic space. Overall level can vary, often in complex ways. Physics tells us that the level is expected to drop off from front to rear. But, people sitting in the rear expect to hear sound that is as good (in all the ways) as the sound in front. That means that they expect you to provide uniformly good sound all over. The typical sound reinforcement venue, such as a shed or an indoor sports arena, makes this task monumental.

The first logical step is to determine the actual coverage of your system. Then try to figure out exactly why the coverage pattern is the way it is. Do the loudspeaker dispersion patterns fit the seating areas? Are there troublesome reflections off hard surfaces? Are the coverage overlap areas particularly uneven? Are there shadows caused by obstructions? Do the levels match in the various coverage areas?

G.R. (Bob) Thurmond is the principal consultant for G.R. Ghurmond & Associates, Austin, TX.



Figure 1. Measured frequency responses of three high-frequency drivers of the same model. Driver A is new, B and C are well-used, and driver C is damaged. Note the differences in impedance curves.

Once a problem is properly defined, a solution is often obvious. Sometimes the solution can be implemented after the design or setup; often a solution must wait for the next design. In either case, there is valuable information that, unless acquired through organized measurement and evaluation, simply cannot be obtained in any other way.

Getting serious

Let's give some examples of things we often find wrong. The way in which loudspeakers (and microphones) are mounted will strongly affect their response, especially at lower frequencies. Level mismatches, through and at crossover frequencies, are often overlooked as sources of response problems. Of course, *acoustic levels* are considerably trickier to measure than electrical levels. Such level mismatches often cause other problems. Besides the need to set multi-amplifier gains for uniform audience coverage, other gain settings affect distortion, overload and noise.

Another common problem is the time mismatch, or distance offset, between multiple loudspeakers, either at crossover points or between drivers operating in the same bandwidth over the same coverage area. This manifests itself as response irregularities, which change with location. Try to correct that with equalization!

Sometimes the mismatch is one of polarity, which produces effects similar to those just described, only much worse. This occurs when one or more microphones or loudspeakers in a group do not have the same polarity as the rest. They are often *incorrectly* referred to as being out of phase. Usually this is caused by a wiring error, but occasionally the transducer itself is at fault.

A more ominous mismatch is that of impedance. An impedance mismatch anywhere in a system can degrade the response and S/N ratio, but when it comes to the power amplifier/loudspeaker interface, it can actually endanger the hardware involved. The problem is that loudspeakers often have an impedance at some frequency that is well below their rated impedance. This will cause the loudspeaker to draw considerably more power in that frequency region than you would expect from its specifications. If failure does not occur, the overload can cause very audible distortion.

All of these problems are common and of varying seriousness but typically widely ignored. They can be dealt with in the field, at least to some degree, and can significantly affect and often improve the performance of any sound system.

Because common equalization is of no value in dealing with most of these system performance problems, it is often not the best way to improve the frequency response.

Because this total process involves far more than just equalization, it should be known by a different name. I have always called it *sound system performance optimization.* [See the sidebar "Optimization Steps" for more information.—Ed.]

Performing the measurements

Sound reinforcement people are not known for their reliance on test equipment, but sound system performance optimization requires some measurement techniques to make it work. The equipment needed to make these measurements is readily available for less than \$4,000, less if purchased used. A good real-time analyzer costs as much and does less, in and of itself. The heart of the instrumentation-the chart recorder and related devices-is currently produced in a version ideally suited and priced for these applications by only one manufacturer (Neutrik), but GenRad used to build similar items that are still readily available on the used equipment market.

Before you make any measurements, however, you should make a visual inspection of the system for correct components and installation. This isn't a measurement, but it is always a good beginning. After that, it is best to start with the simple and proceed to the more complex, which means checking the individual system components first.

These days, most electronic components either work properly or have an obvious fault, which usually makes it unnecessary to check them carefully. Microphones and loudspeakers are not so easy, however. It may be safe to assume that high-quality microphones don't need to be checked individually, but I have found many cases where this was not true.

The story is much the same with loudspeakers. Often there are many more loudspeakers in a system, so it is possible for a faulty loudspeaker to actually damage parts of the system. However, they are easier to test.

Actual measurements

Figure 1 shows the response of three high-frequency drivers of the same model, all measured on the same horn. Driver A was brand new. Drivers B and C were well-used, having been on a rock tour. Driver B showed only a slight loss of high frequencies, but driver C was much worse. Inspection revealed that its diaphragm bore the imprint of the phasing plug, clear evidence of overexcursion. It was still working, but its future was highly uncertain.

It is interesting that the ac impedance curve for each driver mirrored its frequency response. Because the impedance is much easier to measure than the response, we have a powerful tool for checking driv-

There is much more to a sound system's performance than frequency response.

er quality. Even related faults, such as leaky enclosures and loose mountings, show up under this test. Figure 2 shows the simple apparatus needed for such measurements, along with the means for making a desirable permanent graph of impedance vs. frequency. Such measurements are informative and should be performed routinely, but seldom are.

Even if no faulty drivers are found, other problems may be. Figure 3 shows the



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Figure 2. Apparatus for measuring impedance of all frequencies, in both hand-operated and chart-recorder versions.

Table 1			
Measurement	Not Recommended	Recommended	Highly Recommended
Loudspeaker impedance frequencies	Calculated from published ratings	Measure at one or two frequencies	Plot at all frequencies
Coverage uniformity	Measure pink noise broadband	Measure pink noise in bands	Plot pink noise in bands noise in bands
Individual frequency response	Listen	Measure with 1/3-octave RTA	Plot continuous 1/3or 1/6 octave sweep
Overall frequency response	Visually average RTA	Use RTA internal averager	Draw average of individual plots
Feedback frequencies	Listen	Use frequency counter technique	Plot using in-phase

measurements on an assortment of drivers. Each had a rated impedance of 16Ω , but each measured much lower than that. Such an error causes a driver to draw considerably more power from an amplifier than you would allow, overtaxing both the amplifier and the driver. This problem, not as widespread as it once was, is still occasionally found. An impedance plot

will tell the story much better than a

single-frequency reading can.

Measuring after assembling components So far, we have talked about individual components or basic assemblies and how they can be tested before they go into a system. After you are sure they will meet your expectations, you can assemble them into a system.

But because combinations of components may interact in undesirable ways, be sure to test these combinations as you go.

Some component combination problems are the result of simple mistakes, which may go unnoticed, cause strange results, and evade all except a timeconsuming search. The care needed to avoid such mistakes is usually worth the trouble, especially if there are ways to help us find the needles in this haystack.

One such way is to check the polarity of all transducers and their connecting lines for consistency. Devices for doing this quickly and easily are inexpensive and readily available, and they catch many common mistakes. This should be routine practice, but experience has shown this simply not to be the case. Another easy check that is often neglected is for optimum signal level settings. An oscillator and an ac voltmeter are the bare essentials, with a decibel scale on the meter being highly desirable. An oscilloscope is also useful to check for overload, distortion and noise.

Actually, level checks should include the sound levels in the listening area, which are a bit more difficult to measure, but are very important. The minimum instrumentation here consists of a noise generator and a sound level meter (SLM) with A- and C-weighting characteristics.

Again, these are readily available at minimal cost, with an adequate SLM being available from a number of sources, and an FM radio tuned off-station serving as a noise generator in a pinch. Of course, a true pink-noise generator and good SLM with octave-band (or better) filters will give more accurate readings, but even the minimum devices will provide a good deal of very important information. Yet, many professionals lack even these units. That's like trying to inflate a tire properly without a pressure gauge!

Dealing with uniform coverage

Clearly, coverage uniformity must be dealt with first. If it is not good, then the frequency response will vary too much from place to place. Consequently, anything we do to improve the sound in one location may only make it worse somewhere else. This phenomenon explains many of the cases where the results of equalization are disappointing.

To deal with a problem effectively, we must learn about it by measuring it. Listening to speech or music over the system while you walk through the listening area is not a measurement; it is almost impossible to learn anything significant in this way. Listening to pink noise is better, but it is hard to tell exactly what is happening by using only our ears. Measuring levels with a broadband SLM. even one with A-weighting, is almost as crude. Octaveband filters, at least, are essential here.

Try observing the lower frequency bands first. There is probably little you can do, short of a system redesign or major acoustical treatment, to improve this region. Notice how the levels vary from front to rear of the listening area and from side to side along several paths. Note the general trend, as well as the magnitude, of the variations. At the very low frequencies, the variations are largely room-related, but in the region of a few hundred hertz. the loudspeaker directivity may be high enough to afford some directional control. Overall variations in this region of more than 5dB or 6dB may indicate a design or aiming problem.

Next, repeat the measurement traverses while observing the 2kHz to 4kHz region. This region is important because it contains most of the speech consonant sounds and much music information. Also, the ear is quite sensitive to abnormalities here. Consider these measurements carefully; variations should be even and no more than 4dB or 5dB overall. It may be impossible to achieve this degree of uniformity in some situations, but considerable effort should be made to do so and to understand exactly why if it cannot be done.

Take aim

If you have more than one highfrequency horn in your system, then the coverage area from each horn needs to be measured individually for extent and uniformity. After all of the cabinet aimings are correct, the relative sound levels of the various devices should be checked. There are two possible approaches: Either the

Because combinations of components may interact in undesirable ways, be sure to test these combinations as you go.

levels of the speakers can be compared to each other, so they can all be set the same, or compared to the level produced by the low-frequency loudspeakers in each area. so that the high- and low-frequency levels can be matched in each area.

The latter can be done by comparing the levels in bands about an octave above and below the crossover frequencies. One approach or the other may be more appropriate for a given situation, but one of them should always be used.



Figure 3. Measured impedance characteristics of three high-frequency drivers, each of which had a published rating of 16Ω .



Figure 4. Multiple frequency response plots of an actual sound system.

After all of these levels have been measured and adjusted, all of the equipment should be turned on at once and another set of traverses run to ensure consistency. Something probably will be out of order and some final corrections will be indicated. If the coverage suddenly becomes more uneven and seems especially ragged in the overlap between coverage areas, there is probably a time-alignment problem.

In response

Make sure you take a measurement that will tell you how the system sounds. The sound that reaches our ears is highly complex, and our hearing system processes these complex signals in ways we understand poorly and simulate even more poorly. Therefore, if you feed a constantlevel signal, which contains all of the frequencies within a fairly narrow range, over a system and measure the resulting level at a particular location, then repeat this for all of the frequency bands; a graph of the results will correspond closely to our subjective impression of the system tone balance at that location. This is fortunate, because it is rather easy to carry out. You have to decide exactly how to do it, yet this is where things get a bit sticky.

For example, just how narrow do the frequency bands need to be? Research has indicated that under certain conditions the bands need be no narrower than a set called *critical bands*, which are roughly 1/3 octave wide. This is the justification for measuring system frequency response in 1/3 octaves. But there are several problems here.

First, a number of the critical bands are significantly narrower than ½-octave. Second, it has been shown that under many circumstances, our hearing can discriminate in regions narrower than the critical bands. Third, our frequency discrimination is continuous, rather than occurring at fixed frequencies as the critical bands suggest. Fourth, to be really valid, any measurement must be capable of resolving details that are smaller than the least, which are judged to be significant.

All of this means that response measurements may need to be made in bandwidths narrower than ½-octave and by continuous sweep rather than at fixed intervals. Indeed, a response measured in continuously swept 1/6-octave bands will often reveal details that are audible, but that are shown poorly or not at all by conventional ½-octave fixed-frequency techniques.

Even a $\frac{1}{3}$ -octave continuous sweep is considerably more revealing than $\frac{1}{3}$ octave fixed-frequency measurements. A response peak that falls on the crack between two fixed bands, for example, will simply cause both of these bands to read the same level, which will be somewhat lower than the actual level of the peak. A continuous-sweep measurement, on the

Optimization steps

 Visual inspection of the entire system for correctness of components, installation and wiring.

 Impedance verification of all loudspeaker lines over the entire frequency range, plus a similar check of any other interfaces where custom fabrication was involved.

3. Electrical response sweep, at high level, of the entire system to check for response, distortion, gain settings, noise, overload, buzzes and rattles, etc.

 Coverage uniformity determination throughout entire audience area and in several frequency bands, establishing exact causes of problems.

5. Adjustment of loudspeaker mountings and aimings for best audience coverage.

6. Level setting between loudspeaker coverage areas, through crossovers, etc.

7. Delay minimizing between multiple sound sources.

8. Response determination in considerable detail and at many audience locations, with careful evaluation and averaging

9. Response improvement by acoustical and electrical means. 10. System feedback analysis and

suppression.

11. Documentation of all findings and actions.

other hand, will come much closer to showing the true location, level and shape of the peak.

How to?

The usual procedure is to break the system at a convenient line-level spot, such as where an equalizer would go, then inject the test signal into the resulting input and record the resulting signal from the output. The measurement microphone would be placed in the listening area at ear height and pointed toward the loudspeakers. All levels would be set for normal operation. The test signal is usually either filtered pink noise or a warbled sine wave, although other signals, such as a filtered repeating transient or a pulsed sine wave, are also possible.

Theoretically, it does not matter whether the filter is in the send or the receive side of the test setup. In practice, if the test signal is filtered first, this may make distortion or mechanical buzzes easier to hear. If the filter is used last, it can help reject interfering noises. Perhaps the ideal would be both together, but maintaining the proper slopes.

Checking and rechecking measurements

Whatever measurement technique is used, the system frequency response is plotted to make it as accurate and informative as possible. Then the microphone is moved to another location in the listening area and the response here is plotted in the same way. This is repeated for at least six, and preferably eight or 10, locations throughout the listening area. The graphs are examined and compared carefully for trends or anomalies. Figure 4 shows an example.

If all of the plots fall close together, this may indicate that the coverage is very uniform, or it may just be that the room is very reverberant. If there is considerable difference between the various plots, especially at higher frequencies, poor coverage uniformity is strongly indicated. Individual differences at lower frequencies are usually, but not always, caused by the room. Whatever the cause, they will still be audible. If one or two plots are noticeably different from the rest, this indicates a local problem, either with the coverage or the room. Such anomalies should be investigated and corrected, if possible.

Care and feedback

Attempts to deal with system feedback without adequate measurements lack effectiveness. However, the measurement of choice is closely linked to the corrective means to be used. If the one-at-a-time notch filter approach is taken, the best approach is to measure the feedback frequency with a frequency counter, then adjust an oscillator to the same frequency for tuning the filter. In fact, the original Boner technique involved tuning the oscillator to the feedback frequency without a counter, by the zero-beat method. This made it unnecessary to know the actual feedback frequency. However, if multiple notch filters were tuned, this information became important.

If you need to do some serious feedback control, you need to know the characteristics of a system. You can get an indication of some of these characteristics by running a system response measurement with the system microphones located where they normally will be used, then looking for peaks in the graph. The first few feedback points will usually occur near the highest peaks, but not always, because feedback depends on phase as well as amplitude characteristics. It sure would be nice if there were a way to measure all of these characteristics in advance.

Actually, there are two such ways available. One of them is comprehensive being able to determine the first several dozen feedback frequencies in a system, the order in which they will occur, and the gain benefit to be obtained from suppressing them. However, it is so tedious that it is impractical for most field situations. The other way is much simpler, yet it can yield similar information on the first dozen or

Before you make any measurements, you should make a visual inspection of the system for correct components and installation.

so feedback frequencies. It, however, is vague on the gain benefits possible.

This second way involves setting up a system microphone as it will be used and running a frequency response, but using a pure tone signal swept very slowly. Next, the oscillator signal is mixed in with the signal from the microphone (making sure there is no polarity reversal), with the oscillator level set to produce the same reading on the chart as the highest peak on the response graph. Then, the response is run very slowly again, and any new peaks observed. If the oscillator signal and the microphone signal are in phase at a response peak, then the conditions for feedback are satisfied and the signals will add, producing a new peak on the graph up to 6dB higher than before. If the two signals are not in phase, feedback cannot occur and no peak will be produced.

The relative heights of these new peaks indicates the order in which the feedback frequencies will occur, and the spacing between the heights roughly suggests the relative gains involved. This information is usually all that is needed to provide effective feedback suppression.

After all of the corrective measures have been taken and everyone is delighted with the sound quality, a few more measurements will document the final system performance.

Part 2 of this article is scheduled to appear in March.

Re/p

How To Get The Perfect Mix.

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he mix down process isn't what it used to be. Recording engineers are finding it increasingly difficult to maintain calm, creative control over both the console and the battery of outboard gear. As these demands escalate, the need for console automation is further amplified by the need for perfection. The MAGI II and MAGI IIi Console Automation Series from J.L. Cooper Electronics are designed to save you time, money and give you the ability to achieve perfection!

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MAGI II External System

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LIVE & DIRECT

By David Scheirman

How Loud Is Too Loud?

Since full-bandwidth, music-quality sound reinforcement systems first became prevalent, there have always been some people who thought they were too loud. Most audience members didn't, and the music groups that were served by these systems didn't think so either. Neither did the soundmixers who operated them.

Fifteen or 20 years ago, "too loud" often meant that a systems distortion content was too high. Harmonic distortion, particularly in the upper frequency range, can make us think that what we are listening to is too loud, even if the sound level meter shows it to be a moderate level.

Within the past couple of years, however, sound systems have gotten cleaner. Both the pro audio manufacturing community and the major P.A. firms have begun to produce very powerful amplifiers and full-bandwidth speaker systems that combine both clean input and clean output with high-power capabilities. This means that for the first time most major sound reinforcement systems have more than enough electrical and acoustical headroom to not only provide ample audience-area coverage, but to fill the space with clean sound at very high sound pressure levels.

Since at least the early 1970s, there have been occasional nuisance lawsuits filed by audience members against rock performers and their sound companies. These were by far the odd exception 15 years ago. Today, they are much more frequent. Granted, litigation is more prevalent in all areas of our society than in years past. Yet, is there a pattern here to be discerned? Are more and more people who stand in front of our powerful sound systems actually beginning to notice temporary (or permanent) hearing loss because of exposure to amplified music that is too loud?

The ultimate operator, of course, is the system operator. He decides at what lev-

David Scheirman is RE/P's live performance consulting editor and president of Concert Sound Systems, Julian, CA. el the sound system will be operated for a particular musical group at the particular show. Because we all have different tastes, use our systems in different acoustical environments and work with different styles of music, it is rather difficult to say what level is the right one. Yet, we seem to know when it is "right," when the band, audience and sound system are all linked into a common experience that is satisfying and fulfilling to everyone involved.

So how do we begin to quantify this rightness, this perfect combination of frequency response and amplitude that signifies good sound without overloading the human hearing systems? How do we find what will work without harming our audiences, but still satisfying our musical clients and keeping the legislators and regulators off our backs?

It may become more difficult to find unregulated performance venues where volume can be the fifth member of the band.

It's a tough question. I know that no simple answers are yet evident. However, the questions must be addressed in today's concert sound industry, or the freedom to set up and operate these powerful, highfidelity sound reinforcement systems may soon be a thing of the past.

"No way!" you say? Well, take a look around as you are out on the road. Notice that many of the outdoor "shed" venues, often located near residential neighborhoods, are starting to set and enforce strict sound levels. Major venues like the Rose Bowl in Pasadena, CA, have had strict community noise ordinances in effect for more than a decade. Whenever a concert takes place, a civic official with a sound level meter is on site, ready to document transgressions and to alert police authorities of the breach of local law. Fines can be stiff.

Some facilities (such as the Great Woods Ampitheatre in Massachusetts) rely on automated noise-level monitoring systems that use a green/yellow/red light indicator to inform the sound system operators of acceptable sound levels. Others, like the Pacific Ampitheatre in Costa Mesa, CA, have been embroiled in local lawsuits related to sound levels and are finding it tough, indeed, to find the right policies and hardware to set and enforce sound levels for rock concerts.

While the general public used to take rock concerts with a grain of salt (particularly outdoor festivals), more and more community leaders and citizen groups are beginning to complain about the noise levels that have been creeping up over the past few years. At a recent Little Feat concert in an Idaho city, a local resident who couldn't sleep because of audible noise levels more than a mile away showed up at the outdoor concert venue one night dressed in a bathrobe and carrying an axe. The incident made the local newspaper with the headline "Rock Concert Too Loud."

Whether the sound of these events is really too loud or not is becoming less significant than the fact that the shows are disturbing a greater number of people who are not directly involved with the show. In other words, the sound of the events is spilling into the greater surrounding environment, thus creating opposition in the community.

This fact is not escaping the notice of different environmental health agencies and others concerned with the national cultural signal-to-noise ratio. While it is true that many forms of public entertainment (including ballgames, stock car races and carnivals) can break local noise ordinances, it seems that nothing will stir up a community legal hornet's nest like a good old outdoor rock concert in a community environment.

Shows are disturbing a greater number of people who are not directly involved with the show.

The recent 1989 International Conference on Noise Control Engineers (held in December in Newport Beach, CA) featured a special session to address this very issue. Titled "Community Impact of Outdoor Concert Sound," the session featured paper presentations and a panel discussion that took a close look at how the sound of outdoor concerts are affecting community environments. With titles like "Sound Control at British Open Air Pop Concerts" and "Residential Neighbors and Outdoor

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Concert Facilities: Are They Compatible?" the session featured parties on both sides of the fence. The noise control engineers are curious about the touring sound industry and its technologies. Likewise, the sound system community should be curious about how noise control engineers measure and report their activities to their clients.

Fifteen or 20 years ago, "too loud" often meant that a system's distortion content was too high.

This is a current issue, and it will probably become a significant one within the next year or two. More laws may be passed, both local and federal, related to permissible sound level limits at musical performances. How does a sound system operator begin to get a handle on how to approach this issue?

Perhaps the first advice for system operators is to learn more about how sound is measured and monitored. When an official begins to hit you with a "noise level limit" in decibels, is he talking A-weighted or C-weighted measurements? Does he know the difference? Do you? What are the consequences to you and your show if you exceed these limits? How is the monitoring agency documenting the alleged sound level of your performances? These and many more questions will start surfacing more frequently, as the public becomes more aware of the potential health hazards of listening to loud music.

For now, staying abreast of fast-paced developments in this field will be an important part of doing business in the professional sound reinforcement industry. Learning how to prevent volume levels from creeping up even higher than at present will offer some challenges to system designers and operators. And, for those groups and system operators who like it loud, it may become more difficult to find unregulated performance venues where the freedom still exists to have volume be the fifth member of the band.

Whether we're talking country or heavy metal, the time has probably come to start pulling in the reins on the excessive volume levels of some concert sound systems. If we don't learn how to do it ourselves, legislators and noise monitoring officials will do it for us.



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STUDIO UPDATE

Northeast

Giant Sound Recording (New York) has purchased a 56-input SSL console with a full G computer and total recall; an Otari MTR 90; a Lexicon 480; an AMS reverb; two LA3As, a Panasonic DAT machine and RCA 77 and 44 microphones. *1776 Broadway, New York, NY 10019; 212-247-1160.*

Multimedia Productions (Baltimore) has completed construction of its studio. Recently acquired equipment includes: an Apple Macintosh IIcx w/320MB hard disk and Digidesign's Sound Tools hard disk recording system; C-Lab's Notator sequencing/notation software for the Atari 1040 ST; a Nakamichi MR-2 cassette deck; a Sony PCM-2500 DAT recorder; two Yamaha DMP-11 automated mixers; an Opcode Studio 3 SMPTE/MIDI interface for the Mac; an AMR Sync Controller synchronizer; and an Alesis Midiverb II. *1201 W. Pratt St. Suite J, Baltimore, MD 21223; 301-752-0355.*

Baker Sound Studios (Philadelphia) has upgraded its studio A. The equipment includes a complete 24-track capability controlled from an 84-input DDA AMR-24 mixing console, Sony VO 9800 ³/₄" video deck and an Otari MX-55 TM center track time code recorder. All of the equipment will be keyed into the Time Line Lynx time code system. *1821 Ranstead St.*, *Philadelphia*, *PA 19103*; 215-567-0400.

Servisound (New York) has promoted Lisa Wytrval to studio manager. 35 W. 45th St., New York, NY 10036; 212-921-0555.

Southeast

Airwave Production Group (Birmingham, AL) has opened its new facility. It features a 24-track studio, a video post and voice over 16-track studio and a Synclavier/MIDI suite. Both studios employ Trident consoles and Otari multitrack tape machines. 1916 28th Ave. S., Birmingham, AL 35209; 205-870-3239.

Midwest

ICB Audio (Cincinnati) has moved to a larger facility that is closer to downtown and is more accessible to customers. 2036 *Reading Road, Cincinnati, OH 45202; 513-651-0800.*

Chicago Trax (Chicago) has upgraded its studio to include a Solid State Logic G Se-

ries console and a New England Digital Synclavier. 3347 N. Halsted, Chicago, IL 60657; 312-525-6565.

Instant Replay (Cincinnati) has added Charles Brown Music to its facility, bringing audio recording capabilities and original music composition to the studio. *1349 E. McMillan, Cincinnati, OH 45206; 513-861-7065.*

Southwest

Chaton Recordings (Scottsdale, AZ) has expanded its facilities in studio A to include a Lexicon 480L with full sampler card and dedicated LARC; additional Adam-Smith Zeta III units with remote allow 48 track lockup of the dual Otari MTR-90 multitrack; an EMU Proteus XR; a pair of Kawai K1 units; a Roland Super JX; and a Roland S-550 Sampler. *5625 E. Nauni Valley Drive, Scottsdale, AZ 85253; 602-991-2802.*

Sugar Hill (Houston) has revamped its studios A and B. Studio B now has a Neotek console and an Otari MT-90 24-track. Studio A has an Auditronix 26-channel console and an MCI 16-track tape machine. *5626 Brock St., Houston, TX 77023; 713-926-4431.*

Cereus Recording (Tempe, AZ) has opened a second studio. Studio B features a Kurzweil Midiboard in command of synthesizer/sampler modules, digital sequencing, digital mixdown and SMPTE management for video applications. Cereus has also added producer/composer Stephen Brown to its staff. *1733 E. McKellips Suite 7, Tempe, AZ 85281; 602-990-8163.*

Modern Music Ventures (Houston), which owns and operates historic Sugar Hill Recording Studios, is now representing the Southwest to acquire, develop, record and produce Latin music talent for PolyGram Records. Resulting records will be sold under the PolyGram label with the designation "Discos MM." *5626 Brock St., Houston, TX 77023; 713-926-4431; fax 713-926-2253.*

Southern California

Branam's Fox Run Studios (San Fernando) recently took delivery of a Neve VR console with Flying Faders automation. 216 Chatsworth Drive, San Fernando, CA 91340; 818-898-3830; fax 818-361-8439.

CMS Digital (Pasadena) has purchased a Sony PCM-3348 48-channel digital multitrack recorder. *182 S. Raymond Ave.*, *Pasadena, CA 91105; 818-405-8002.*

Buena Vista Sound (Burbank) has named Dave Campbell and Gregg Rudloff rerecording mixers. 500 S. Buena Vista St., Burbank, CA 91521; 818-560-0044.

Waves Sound Recorders (Hollywood) has ordered a second AMS AudioFile. The system will be directed toward radio post-production. 1956 N. Cahuenga Blvd., Hollywood, CA 90068; 213-466-6141.

Sunset Sound Recorders (Hollywood) has united the GML Moving Fader Automation System with its 56-input console in studio 1. An assortment of outboard signal processing gear has been rackmounted in the control room. Studio 2 has similar equipment that also features a 64-fader GML automation system integrated with its AMEK APC-1000 console. 6650 Sunset Blvd., Hollywood, CA 90028; 213-469-1186.

Northern California

Music Annex Audio Post Productions (San Francisco) has named Jon Grier sound designer/mixer. Grier formerly headed the audio and video department at Groupe Andre Perry. 69 Green St., San Francisco, CA 94111; 415-421-6622; fax 415-391-4995.

Davis Sound Studio (Davis) has added a Yamaha SPX900 digital effects processor with RCX-1 remote control unit, an EMU Systems Proteus XR with Opcode's E-MU Proteus editor/librarian software, and a J.L. Cooper FaderMaster MIDI command controller. The Macintosh computer also has been upgraded to 4MB of RAM running at 16MHz. *1205 Oak Ave., Davis, CA 95616; 916-758-6661.*

Manufacturer and dealer announcements

Neve has installed the following equipment: Soundworks West (West Hollywood), two VRP consoles, a Mitsubishi X-880 32-track digital tape recorder and an X-86HS 2-track recorder with three Prism racks; Digital Recorders (Nashville), a VR 48-input console and a Mitsubishi X-880 32-track recorder; and Streeterville Studios (Chicago), 48- and 60-input VR consoles

with Flying Faders automation.

NEP Productions has ordered a VR console for its Super Shooter 8 remote truck.

Sony has delivered the following: five PCM-3324A DASH multitrack recorders at EFX Systems (Burbank, CA): a 24-channel PCM-3324A digital multitrack recorder at the Musical Archives Musical Archives (Simi Valley, CA): and a 48-channel PCM-3348 digital multitrack recorder to Digital Recorders (Nashville).

Clarity recently installed a Clarity XLV at Gnome Productions (New York).

Tascam has installed the following equipment: an ATR 80/24 at Jim Morgan Sample (Omaha, NE); and an M-700 in-line mixing console in Soundtrek's Studio A (Kansas City, MO).

The following facilities have purchased **Soundmaster** Integrated Audio Editing Systems: Score One Recording (Hollywood); The Burbank Studios (Burbank, CA); Beckett Productions (Vancouver); and Belvue Pathe Quebec (Montreal).

Howard White Productions (Ann Arbor. MI) has added a **Trident** Series 24 console to its inventory.

TRC Studios. Indianapolis. and Blank Productions, Stamford, CT, have recently installed **Digital Dynamics** ProDisk-464 digital audio recording and editing systems.

Hip Pocket Recording Studios is said to be the largest assembly of **Synclavier** and Direct-To-Disk units available in the United States. It features seven NED systems. four Synclaviers and three Direct-to-Disk systems.

DDA has sold a DCM232 console to Score One Studios (Burbank, CA).

Martin Audio Video has sold one of its

Mozart consoles. manufactured by Amek. to Brielle Music (New York).

The following have purchased **Tascam** equipment: Omega Sound (Ft. Smith, AR), an M-700 console and an ATR 80/24 analog recorder; and The Tracking Station (Minneapolis), an ES-50/51 tape synchronizer.

Waveframe has delivered two AudioFrame digital audio production systems to Real to Reel Studios (Dallas).

Syncram, the new random-access digital audio system from **Soundmaster**, has been delivered to the following U.S. facilities: Woodholly Productions (Hollywood). Brigg's Bakery (New York) and Zenith/db (Chicago).

New England Digital has sold a Synclavier 9600 workstation to the Power Station and an 8-track PostPro workstation to East Side Film.



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February 1990 Recording Engineer/Producer • 57

THE CUTTING EDGE

By Laurel Cash-Jones

Seeing the light

OptoDigital Designs, a division of Monster Cable Products, has announced the first digital audio, multi-channel, multiphasing, high-resolution fiber-optic microphone cabling system: the OptoDigital LightSpeed 12.

The LightSpeed 12 (sounds like something a Trekie thought up, doesn't it?) claims to be a digital audio transmission and distribution system comprised of 12 channel modules, which may be configured to handle as many channels as desired. There are no limits to the number of channels used, and signals may be sent in both directions down the same fiber-optic link.

The LightSpeed's extraordinary sonic quality and size is said to be of most benefit in live remote recording and sound reinforcement. The most obvious problem the LightSpeed 12 overcomes is that of transportation and setup. In order to run 24 channels, using regular cabling, from a remote location (for instance, the breakout boxes on stage to the breakout boxes at the mixing console or remote truck 500 feet away) the necessary cables would weigh approximately 1,000 pounds.

This problem has been eliminated, as the LightSpeed 12 is only 3/8-inch in diameter and is lightweight so that the same length could easily be carried under your arm. (However, this could cause a problem with unions. How many cable pullers would you need?)

This cable is so small that the major consideration of routing all but disappears. This will be a great relief to installers who must arrange cable lengths for tidiness and safety considerations when exposed to foot traffic. Wouldn't it be nice if this were to lower the astronomical insurance rates for this type of business?

The company says that the LightSpeed 12 totally isolates the audio processing system from grounding problems and RFI. Also, it will no longer be necessary to isolate via transformers to remote sends or spend hours in "lifting" grounds to stop hum.

Laurel Cash-Jones is RE/P's executive consultant and a Los Angeles-based free-lance writer.

Even with cable runs as short as eight feet, LightSpeed 12 keeps signal loss to a minimum. The other good news is that snakes will not act like one long antenna, picking up anything that's in the air (like police calls).

OptoDigital has also created the equivalent of a computer system's Local Area Network (LAN) for the audio world, called most appropriately an Audio Local Area Network (or ALAN, a term the company has trademarked). This ALAN is a path (cable, copper or fiber optic called the data bus) that connects the nodes. The ALAN system employs a DAT format to transfer data in digital form. Plus, each node can be used to input or output audio.

How does this affect your universe? It makes it bigger. It brings into the recording industry a word that the computer industry has been using for a long time: connectivity.

In order to explain what ALANs are and





can do for you, we must first describe the three basic types and configurations of ALANs (see Figure 1):

1. The bus configuration, in which nodes

can occur anywhere along the line, in any order, as they all access the bus in parallel and at the same time.

2. The daisy-chain configuration, in

which the data bus passes through each unit in line. This can be considered to be a passive mode, due to the fact that the signals are not modified or acted upon. However, a daisy-chain can also be much more complex. For example, the links may require commands in order to pass certain data. Or they can be used to slow down or, in some other way, alter the data. But perhaps the most important consideration is that the direction the data flow follows now becomes extremely important.

3. The star configuration is a hub-type arrangement with data flowing in and out of a central terminal. If the star or hub has intelligence, varying levels of access and control become possible in the system.

Remember, as I discussed in the January issue, this is your future. Totally digital optical.

Circle (125) on Rapid Facts Card

RE/P



Circle (24) on Rapid Facts Card



Circle (25) on Rapid Facts Card February 1990 Recording Engineer/Producer • 59

NEW PRODUCTS

J.L. Cooper Synapse

Synapse is a fully programmable 16-input 20-output MIDI switcher and processor. Features include three independently programmable MIDI processors, each with channel filtering, channel bumping, data filtering to selectively remote notes, controllers, pitch bend, program change, after touch, system exclusive and system common messages; velocity scaling; 4section overlapping zoning; MIDI Merge, which allows any three inputs to be merged to any outputs; and a panic button that sends an all-notes-off command. Synapse also includes a program mapping system that allows 16 program changes to be sent out on any MIDI port and MIDI channel to re-configure program numbers on slave devices.

Circle (126) on Rapid Facts Card

Ensoniq VFX^{SD}

Based on the 16-bit technology found in the VFX keyboard, the VFX^{SD} music production synthesizer fuses synthesis, effects processing, sequencing and disk storage into one keyboard for both composition and performance. The synthesizer features more than 200 programs from more than 1900 wave possibilities and a 24-track sequencer with standard memory of more than 25,000 notes. Suggested price is \$2.595.

Circle (128) on Rapid Facts Card

Winsted shelves

Two new types of rack-mount shelves are now available from the Winsted Corporation. The Universal shelves are designed to fit all 19-inch EIA racks, and provide secure support for equipment up to $173/s'' \times 14''$. Constructed of 14- and 16gauge steel, the shelves are available in four models from $3^{1}/_{2}$ inches to $10^{1}/_{2}$ inches high. The stationary Extra Deep/Heavy Duty shelf is designed for heavier, non-rack-mountable electronics.

Circle (129) on Rapid Facts Card

Dolby MT Series

Dolby's multitrack MT Series is available with 24 channels switchable between the Dolby SR process and Dolby A-type noise reduction. The series features softwarecontrolled automatic alignment and channel grouping to save time and boost enduser productivity. For installations with fewer than 24 channels, additional channels can be added at any time; for those requiring eight channels or less, the Model 400 Series, which incorporates the same features in a more compact format, is available.

Circle (131) on Rapid Facts Card

Jeanius Russian Dragon

The Russian Dragon measurement meter from Jeanius Electronics measures the timing accuracy of two sounds that were meant to happen at the same time, and then gives an instantaneous visual display of the results. The stand-alone unit has two inputs: One is the reference of click input; the other takes the signal or sound that is to be checked. The calibrated LED display detects timing error from 80ms to 0.5s. The table-top version is listed at \$395; the rack version is \$495.

Circle (127) on Rapid Facts Card



Cipher Digital Phantom II VTR Emulator

The 4815 Phantom II VTR Emulator is a protocol converter, synchronizer and time code reader that allows any video editing system, using an Ampex, Sony or CMX protocol, to control virtually any parallelinterface audio or video transport. The Phantom II communicates with the video editing system via an RS-422 serial port. It converts the editor's control information to a parallel format for tape transport, and passes status and time code information back to the video editor. The unit maintains synchronization accuracy to within ±50usec; it allows accurate split edits on video decks and is PAL/EBU and NTSC compatible with simple switch selection.

Circle (132) on Rapid Facts Card

Otari MTR-15

The MTR-15 tape machine provides 1/4and 1/2-inch tape formats in mono, stereo, 2-track and 2-track with center channel time code configurations. The unit features an automatic alignment system for fast calibration. It is designed for 19-inch rack cabinet or console mounting, and tape formats can be exchanged on a single machine.

Circle (133) on Rapid Facts Card

Waldorf MicroWave The MicroWave synthesizer from Waldorf

Electronics is now available from Steinberg/Jones. The synth provides the sound capabilities of the PPG Wave 2.2 and 2.3 synthesizers, and features two internal banks that hold 64 single sounds and 64 multi programs. An additional 64 sounds and 64 multis can be accessed via a RAM card. The MicroWave is MIDI compatible and includes the ability to send/receive system-exclusive information for interaction with editor/librarian software. List price is \$1,995.

Circle (134) on Rapid Facts Card

Editor/librarian for Kurzweil K250

The Sweetwater K250 Editor/Librarian from Sweetwater Sound permits Macintosh-based editing of keyboard setups and instruments with complete control of all parameters using mouse movements and visual editing of the digitizer's waveforms. Mac Plus (or greater), a MIDI interface and Version 6 or 7 software for the 250 are required. The unit is available for \$395 and includes user documentation.

Circle (135) on Rapid Facts Card

Singular Solutions A/D interface for NeXT

The A/D64x: analog/digital interface for NeXT computers features an analog frontend that supports balanced and unbalanced inputs at both line and microphone levels. The interface also accepts simultaneous direct digital (AES/EBU) input and direct digital output. The A/D64x is priced in the \$900-\$1,000 range. Educational pricing is available.

Circle (136) on Rapid Facts Card

Pro Co StageMaster

The StageMaster multipair audio snake is available in fan-to-box and fan-to-fan models with several connector configuration options. The fan end, which is split into fingers of four with colored tie wraps, features Neutrik NC3MX/FX connectors with channel identification numbers stamped onto the barrel of each connector. The enclosure features an extruded aluminum chassis with a steel top and steel end caps. The box end connectors are Neutrik NC3MPP/FPP panel-mount connectors.

Circle (137) on Rapid Facts Card

UltraAnalog ADC 20048

The ADC 20048 20-bit resolution A/D

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Circle (28) on Rapid Facts Card

NEW PRODUCTS

converter is based on dbx oversampling, noise-shaping architecture, which converts audio bandwidth signals at 128 the standard sampling rates of 44.1kHz or 48kHz, and also eliminates the need for anti-alias filters. The converter is comprised of the AFE 20048 analog front-end module and the D20C10 decimator IC. List price is \$275.

Circle (139) on Rapid Facts Card

AT833R studio condenser mic

Audio-Technica's AT833R studio condenser microphone features removable foam windscreen, internal shock-mounting, 9Vdc to 52Vdc powering flexibility, 30Hz to 20kHz frequency response, 150Ω balanced output, 141dB SPL handling capacity and -45dBm sensitivity. Optional accessories, including in-line attenuators, external shock mounts and 3-pin broadcast-type cables, are available.

Circle (138) on Rapid Facts Card

ADA T100S

ADA Signal Processors has introduced its T100S 50W/channel all-tube power amplifier. The amplifier is housed in a 2-space rack-mount package and includes 6CA7 (EL-34) and 12AX7A vacuum tubes. The T100S is recommended by ADA as a match for the MP-1 MIDI tube preamp for an all-tube signal path. A switch-selectable output impedance of 4Ω , 8Ω or 16Ω is featured.

Circle (140) on Rapid Facts Card

Toleeto Cord-Lox

Cord-Lox from Toleeto Fasteners International color-code cables, sort by size, length or type, and keep them coiled for protection and safety. Cord-Lox is available in several colors and in 19 sizes. A company logo can be printed on the material for a small fee; custom-designed Cord-Lox are also available.

Circle (141) on Rapid Facts Card

Crown US-1

The US-1 miniature microphone universal power supply is an interface for converting lavalier microphones to low-impedance, balanced-input operation. The unit transforms 12V to 48V of phantom power to 2.25V to 9V of unipolar or bipolar power. It is also equipped with an internal 1.5V AA cell. Accessories included are pairs of 4.7K, 10K and 0 Ω resistors. Suggested price is \$149.

Circle (142) on Rapid Facts Card

SOUND VALUE

H&S Industries catalog

This catalog features H&S Industries' complete line of products for use in the electronics industry to prevent Electrostatic Discharge damage. The 16-page catalog highlights products from wrist grounding devices to flooring systems and test equipment.

Circle (143) on Rapid Facts Card

Dynair Dyna Mite

Dynair Electronics has introduced Dyna Mite, a 40MHz broadcast-quality routing switcher that is designed to handle NTSC, PAL and SECAM, as well as all proposed ATV and DHTV signals and medium resolution graphics signals. The unit can be controlled from a built-in control panel or from up to 30 remote-control panels. A 10×10 video switcher version is available for \$4,495; a 10×10 audio switcher is listed at \$3,895; and a 10×10 audio/video switcher is listed at \$6,285.

Circle (144) on Rapid Facts Card

Rane FAC 28

Model FAC 28, part of the Flex Series modular signal processor line, is an 8thorder Linkwitz-Riley active crossover. The model uses binary code switching that allows selection of 24 discrete crossover points with plug-in card accuracy and selector switch convenience. The mono 2way module conforms to a half-rack standard and features both 3-pin and 1/4-inch TRS balanced inputs and outputs with patch points and mono low-frequency capability. Built-in variable constantdirectivity horn equalization and adjustable phase alignment capability are provided.

Circle (145) on Rapid Facts Card

Digital Designs studio monitors

Digital Designs' studio monitors are mirror-imaged, 2-way, acoustic-suspension driver systems that eliminate response dips that occur in the upper harmonic structure of the human voice range. The monitors feature point-source vocalization; minimum phase shift; minimized diffraction effects; fast transients; time-corrected driver placement; self-resetting, thermocontrolled fuse on the tweeter; gold-plated connections; and a wide frequency response.

Circle (146) on Rapid Facts Card

Focusrite 8924

The 8924 tracking console features an

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Circle (30) on Rapid Facts Card

NEW PRODUCTS

open style of architecture that provides the main benefits of both the split and inline configurations, but without the drawbacks, such as the complexity of in-line layouts. The 8924 has one type of channel that can be assigned to both the input and monitor paths by an in-line style routing matrix on every channel strip. All of these open channels are fitted with an ISA 110 equalizer module.

Circle (147) on Rapid Facts Card

Furman QN-44

The QN-44 is an updated version of the QN-4A quad noisegate. An attack control has been added to each channel, and an

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improved gain-control element provides a direct audio path that yields lower noise and distortion than gates using conventional VCA technology. Suggested list price is \$399.

Circle (148) on Rapid Facts Card

Vega R-42A

The R-42A wireless microphone receiver is the newest addition to Vega's line of Pro Plus wireless products. The true-diversity receiver features Dynex III audio processing, a third-generation design with improved transient response and a wider dynamic range. The R-42A also features silver-plated, 4-pole helical resonators for tighter RF selectivity and lower insertion loss; a GaAsFET RF amplifier; a high-level mixer; and a high-intercept point IF amplifier for high sensitivity and overload reiection.

Circle (151) on Rapid Facts Card



Momentum Data Systems' **MacFilter software**

MacFilter filter design and analysis software provides extensive error checking and detailed help screens. The program supports three types of filter design: Finite Impulse Response (FIR), Infinite Impulse Response (IIR), and Equi-ripple Finite Impulse Response (Parks McClellan). Mac-Filter also provides a system analysis feature that enables designers to determine the magnitude, phase, group delay, impulse response, pole/zero locations and step response of a given transfer function. The system is listed at \$995.

Circle (152) on Rapid Facts Card

Mark IV AcoustaCADD

The AcoustaCADD software program, introduced by Altec Lansing and Electro-Voice, provides optimum sound by shaping a concert hall's geometry and designing acoustically superior sound systems faster and more accurately. The program integrates calculation and computergenerated graphics of the sound paths and is run under the MOS-DOS operating system on IBM or IBM-compatible PCs.

Circle (154) on Rapid Facts Card

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DE Dolby SR

NEW PRODUCTS

Hardware and software updates

Myriad Facility Manager

Available from Xymox Systems, the Myriad Facility Manager provides management with the ability to realize quantifiable gains in overall operational efficiencies, productivity and bottom-line profitability. The program features Sales Bids and Bid Costing, Job Costing, Job and Work Order generation and processing, Scheduling, Invoicing, Management Reporting, Client Tape Library Management, Raw Stock Management, Office Automation, Lead Management and integrated accounting functions.

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Coda Finale 2.0

Coda Music Software has released the 2.0 version of its Finale music notation software for the Apple Macintosh. The upgrade eliminates numerous dialogue box-

es and replaces them with menu-driven options and commands. It also features a MIDI Tool for visual editing of raw MIDI data and improved multiple voice capability. Finale 2.0 includes new documentation in four volumes: the Finale Start-Up Guide, Learning Finale, the Finale Encyclopedia and the Finale Reference. Libraries, tutorial examples, templates, music samples and a revised version of Finale's Petrucci font are also provided. Suggested retail price is \$749.

Circle (156) on Rapid Facts Card

Ashly Audio amplifier update

Ashly Audio's FET-2000C and FET-2000M MOS-FET power amplifiers have met all Underwriters Laboratories' testing requirements and are now U.L. listed. Circle (157) on Rapid Facts Card

Circle (157) on Rapid Facts Card

Ensoniq Version 2.0

Ensoniq has announced an upgrade to its VFX dynamic component synthesizer.

www.americanradiohistory.com

Version 2.0 offers sonic enhancements, improved buttons and advanced software features. It also provides seven new effects algorithms including concert reverb, warm chamber, dynamic hall, and gated and room verbs. The upgrade is free of charge. Circle (158) on Rapid Facts Card

Alpha Audio software upgrade

The Boss/2 automated audio editor from Alpha Audio can now be interfaced with the Tascam ES-50 and Otari EC-101 synchronizers. Drivers have been added for these serial-controlled devices: the Studer A730 CD player; the Panasonic AU-660 MII VTR; the Hitachi HR-230 with Sony Emulation; and the Sony VO-9850 VTR and APR-5003V 2-track recorder. A TCGEN driver enables the Boss/2 to control codeonly chase machines. The drivers are available to current users at no cost.

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