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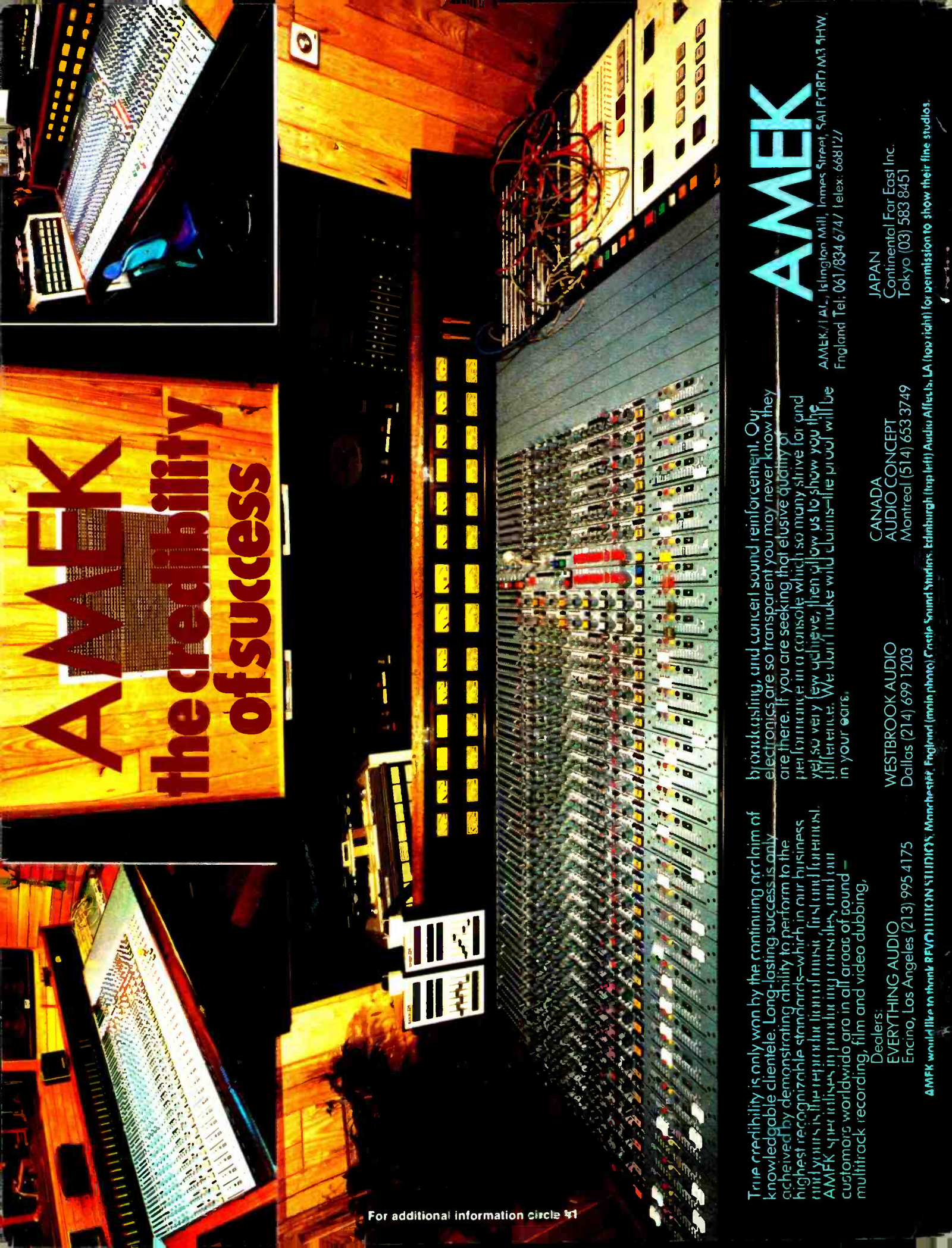
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August 1982
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MODULAR STUDIO
DESIGN — page 38

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— the magazine to exclusively serve the **RECORDING STUDIO** and **CONCERT SOUND** industries . . . those whose work involves the **engineering and production** of commercially marketable product for:

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- Film
- Live Performance
- Video and Broadcast

— the magazine produced to relate recording **ART** . . . to recording **SCIENCE** . . . to recording **EQUIPMENT**.



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The MCI-equipped control room at db Recording Studios, Florida. An article describing the studio's adaptable modular acoustic treatment, which can be setup and removed in just a few days, begins on page 38.





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August 1982 □ R e / p 5

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views letters news

WHITHER GOEST US?

from: John Mosely
Hollywood, CA

The AES recently held a symposium on digital audio sound in Rye, New York, which I attended. It was an interesting collection of specialists from the US, Europe and Japan, with a preponderant number of theoreticians.

The main purpose of the conference was to educate those of us schooled in other disciplines concerning the advantages of the use of digital recording techniques. Although there was considerable controversy amongst the experts as to precisely which format presented the ideal approach to sound recording of the Eighties, they were all agreed that the digits alone could profer a permanent and exact record of the original sound.

There were, however, two fundamental problems. Amongst the participants there were a few of us, myself included, whose principal interest is recording and listening to music, as opposed to looking at numbers displayed on test equipment and computer readouts. Of that small group, disdainfully referred to as the "golden-eared crowd," nobody felt that digital recording sounded as

"musical" as the best analog recording — a matter of some importance when music is the end product! Secondly, the cost of a true and complete digital recording system is approximately four times as expensive compared to its conventional analog counterpart.

These factors aside, it troubled me that the latest vacillating digital technology was compared against its analog counterpart that has been in daily use worldwide for about the last 25 years. A few serious workers have demonstrated meaningful improvements which give excellent musical recordings for a fraction of the cost of the current digital systems.

Unfortunately, the marketing arm of our industry has been sold a "bill of goods." Shortly, Philips, Sony and CBS will profer the compact digital disk for sale at about \$18 per piece, with the conviction that it will replace existing records and tapes over the next decade. Whilst not wishing in any way to oppose the progress of technology, it does seem that common sense and economics should be considered before blindly blundering into an unknown morass that clearly represents an enormous extravagance that probably cannot be afforded, and cannot be justified.

AUDIO/VIDEO RECORDING

THE DIGITAL AUDIO DISK — A PROGRESS REPORT

by Martin Polon

The story of the digital audio disk is becoming somewhat uncomfortably like an audio version of the successful CBS soap opera "The Young and The Restless." Will Compact Audio Disk (CAD) be released to the marketplace in 1982, or for that matter in 1983? Does N.V. Philips' Gloeilampenfabrieken talk to their Japanese partner Sony Corporation about release dates for the CAD system? Is there a royalty for software producers in the CAD system? Will the rest of the audio world accept the Sony standard for mastering of compact audio disks using 1/4-inch U-Matic video cassettes?

For answers to these and other questions, don't read on; tune your television set to . . .

A great deal has happened since the AES Digital Audio Committee last met in Montreux, Switzerland, during March of this year. After that relatively harmonious meeting's agreement towards professional digital protocols for inter-

connect of digital recorders, and the relative endorsement of only two sampling standards of 48 kHz for professional audio usage, and 44.1 kHz for CAD (32 kHz remains a European-use-only CCIR standard for broadcast and satellite transmission of audio), the digital audio "dilemma" has resurfaced.

The first arena for discussion came at the end of May during the SPARS digital audio meeting in New York City; then, the next day at the AES "New World of Digital Audio" conference in Rye, New York, and finally during the June Consumer Electronics Show in Chicago.

The first issue, and foremost to many in and out of professional audio, is the acceptance of a relative dual standard. There has been much comment at the professional level about the problems raised by the 44.1 kHz sampling standard for the much expected Sony-Philips Compact Audio Disk. The essence of the

... continued on page 13 —

New England Digital's Synclavier® II

Two years ago, when the Synclavier® II was first introduced, we announced the end of synthesizers as you once knew them. One year ago, with the addition of the Terminal Support Option for the Synclavier® II, our synthesizer continued as the world's most advanced and best selling digital system. This year, with the release of two new options, Sample-to-Disk™ and Music Printing, New England Digital continues to pioneer the computer music revolution with products destined permanently to change the world of music. . .

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The Synclavier® II has earned its reputation as the number one digital system worldwide because New England Digital delivers features, not excuses. In order to accomplish this, the basic Synclavier® II is designed around one of the most powerful and upgradeable 16-bit minicomputers in the industry. Complementing the computer is a flexible and efficient high-level structured software language, XPL. This powerful, unbeatable combination provided the vehicle for the rapid addition of new features to the Synclavier® II. Best of all, these new features were simply mailed to our customers on a floppy diskette.

To insure that these features produced outstanding musical results, New England Digital designed the simplest, most intelligent musical interfaces available, which provided the synthesis of sounds never before possible from any system. Sounds so realistic that after hearing the Synclavier® II demo record, people called to say they could not believe one instrument could produce sounds so lifelike. This same method of control can be mastered by anyone. By simply pressing a button and turning the master control knob, the user can adjust the parameters of the Synclavier® II instantly. For example, you can have up to 32 separately controlled channels or "voices" which consist of (1) 24 harmonics, (2) six-stage volume envelope generator, (3) six-stage harmonic envelope generator, (4) digital FM control, (5) extensive vibrato control, (6) portamento control that can be logarithmic or linear, and (7) decay adjust, permitting longer decays on lower notes. You can quickly recal from 64 to 256 preset sounds available on the Synclavier® II at any one time. Also, the possibility for creating your own sounds from scratch is limited only by your own skill and imagination. To add more realism to timbres, the Synclavier® II gives you extraordinary capability to change sounds as you play them, accurately recreating many of the

subtle changes real instruments make during a live performance. To top it off, the Synclavier® II comes with a 16-track digital memory recorder which is more sophisticated than any other system recorder or sequencer on the market today. The enormous power of the Synclavier® II's hardware and software allows the user to record and mix complete multi-track recordings within the Synclavier® II, set independent loop points for each of its 16 tracks, transpose and bounce tracks, and edit or change the scale of a prerecorded piece of music from the key of C to B minor. The compositional aspects are staggering.

Terminal Support Option . . .

The Musician's New Instrument

In addition, New England Digital integrated a high-resolution graphics computer terminal for use in conjunction with the Synclavier® II's keyboard (at left). This *Terminal Support Option* has opened up new horizons previously unavailable from any system. This option provides a *Graphics Package* which allows the user access to a detailed graphic or numerical display of the timbre being programmed. A sophisticated music language titled *SCRIPT*™ permits the user to take a performance played on the keyboard or typed in on the terminal and edit or synchronize it to a film or video production. Plus, precise polyrhythmic melodies can be developed which would be difficult or even impossible to play on a keyboard.

For those interested, a more complex language, *MAX*™, a superset of XPL, allows the user to write his own software programs to control New England Digital's special purpose hardware.

Even with these extensive features, New England Digital has only just begun to utilize the capability of the Synclavier® II. We invite you to turn the page and examine another product of the future, available today from New England Digital.



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Synclavier® II's Sample-To-Disk™ Option

The Most Important Technological Advance for Commercial Synthesis Since the Synthesizer Itself.

Using the Synclavier® II's new Sample-to-Disk™ Option, you can now digitally record **real instruments or whole sections of instruments** into the Synclavier® II using a microphone or any line-level source, and then perform them on the Synclavier® II's keyboard. But, that's only the beginning. Using sophisticated software techniques which are simple to operate, you can then analyze the recorded instrument(s), and, if you wish, completely reconstruct and alter the sound before performing it on the Synclavier® II's keyboard.

The Synclavier® II's Sample-to-Disk™ Option is *the* superior approach to music sampling. Its audio fidelity and length of sample time far surpass anything on the market today.

The Sample-to-Disk™ Option can be added to any Synclavier® II music system. Analog signals can be recorded at a sample rate up to 50KHz, onto a Winchester Disk (shown below). You may select a wide range of sampling times from a minimum of **100 seconds** to a maximum of **54 minutes**, depending on the size and number of disks your Synclavier® II has. Also, to insure precise conversion of the recorded signal, 16-bit state-of-the-art, digital-to-analog and analog-to-digital converters are included.

Leading Edge Technology Made Useful to the Musician

The technological wizardry of New England Digital now makes available a powerful performance and research instrument to help you understand and use creatively one of *the* most important components of music . . . *sound*. Though extremely advanced, this system is simple to learn and easy to operate. For example, to begin sampling any sound, all you do is type a simple command on Synclavier® II's terminal. While you are recording, the terminal draws a real-time *Envelope Display* allowing you to see how many seconds of sound you are recording. By typing another command, the display on the terminal changes to a *Signal Display*, which plots the recorded waveform of a violin, sax, human voice or whatever you have recorded in the time domain. It graphs the amplitude of the signal as it changed over time. At this point, using the cursor on the display, you can label the beginning and ending points of the signal, enabling you to play just that small segment of the

recording, again and again, on the Synclavier® II's keyboard or extract that segment for a more detailed analysis.

If you are interested in the harmonic content of a sampled timbre, typing another command draws a three dimensional *Spectral Display* on the terminal. This display automatically plots the strengths of individual harmonics present in the timbre, and displays how they differ over time. You can also examine non-harmonic sounds such as a cymbal crash (below). This is an extremely useful feature in learning the timbral characteristics of any musical instrument and will act as a guide to synthesizing future timbres.

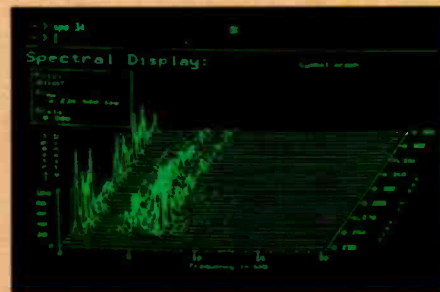
To modify or reconstruct a sound, two necessary software techniques are supplied. The first is *Digital Filtering* which permits you to reduce noise or individually filter out certain harmonics present in the sound, thereby changing the timbral characteristics of the sound.

The second technique, *Editing*, allows the user to examine two completely different waveforms graphically, on the terminal, and extract segments from each waveform to be spliced together for a totally *new* sound or sound effects. To illustrate, you could attach the attack of a snare drum to the sustain of a vibraphone.

Real Time Performance

Once satisfied with your timbre, you can transfer it to the Synclavier® II's keyboard for real time performance. Complete control over the decay and sustain of the timbre is possible, plus musical effects such as pitch bend are available.

These features, advanced as they are, are only the beginning. However, one thing is certain, the Synclavier® II's Sample-to-Disk™ Option is destined to change the world of music synthesis forever.



Synclavier® II's Music Printing Option

You Create! Let Synclavier® II Do the Work.

New England Digital's computer music revolution continues with Synclavier® II's sophisticated automatic Music Printing Option. With this option, you can play any combination of notes on Synclavier® II's keyboard and then easily transfer those



notes to Synclavier® II's terminal for editing. Once you have finished editing, a simple touch of a key on Synclavier® II's terminal gives you a high quality, hard copy printout.

This amazing new development eliminates the drudgery of translating your musical ideas to paper. Now you can concentrate on your creativity and let Synclavier® II

take care of the paperwork. Again, like all of New England Digital's products, it could not be easier to operate.

After playing a piece of music on Synclavier® II and storing it in its 16-track digital recorder, you may select which track or tracks you wish to print. To insure rhythmic resolution while playing, the system is adjustable to capture notes from 64th notes to any greater value.

Following a simple software menu provided by New England Digital, you can quickly edit the notes, change clefs, key signatures and keys of the instruments, and even change the resolution of the original rhythm.

Synclavier® II's Music Printing Option may be added to any Synclavier® II. It can be used to print out lead sheets (complete with lyrics), piano music (shown below), orchestral scores, and individual parts.

The Sample-to-Disk Option and the Music Printing Option are, again, examples of New England Digital's extraordinary ability to provide new enhancements and exciting options for the Synclavier® II system.

When you purchase a Synclavier® II, you'll never be stuck with today's technology tomorrow. Synclavier® II offers the ability to be upgraded and expanded year after year and to remain state-of-the-art indefinitely.

Synclavier® II digital music systems start at \$13,750.00.

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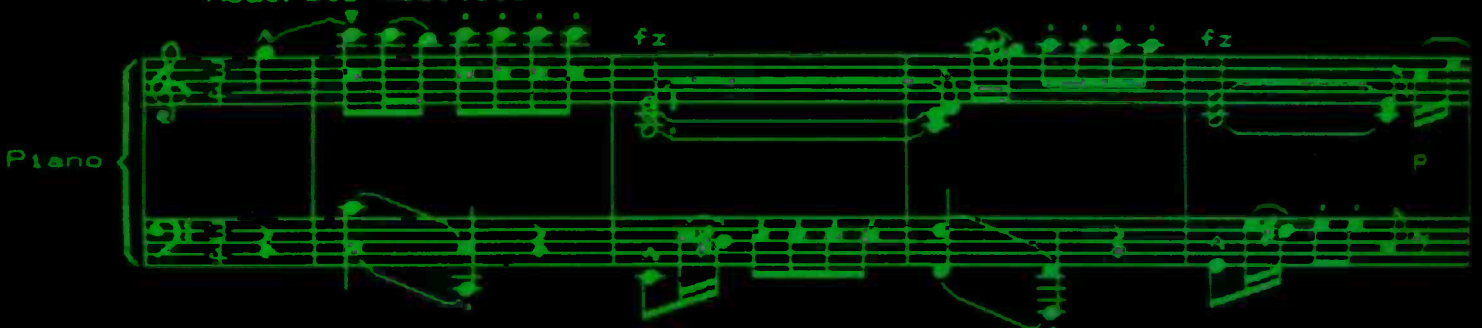
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Ochsenmenuett

Joseph Haydn

Moderato maestoso



**THE DIGITAL AUDIO DISK
— A Progress Report**
continued from page 6 . . .

complaints about CAD are that any application using 48 kHz will have to standards convert or transcode to playback, or deliver masters for the Compact Audio Disk. In the broadcasting environment, the audio equipment found in a digital state-of-the-art studio will be designed around the 48 kHz sampling rate. Playback of Compact Audio Disks will be accomplished only with a standards converter in each reproduce channel to accommodate the transition electronically from 44.1 to 48 kHz.

The same kind of situation occurs in the recording studio, where engineer and producers will be faced with mastering to the CAD at 44.1 kHz. If the entire recording chain is configured to 48 kHz, including a digital multitrack from 3M, Studer, Mitsubishi/Telefunken, Soundstream or Sony, the digital console from Neve, MCI (potentially with their Sony connection), or others yet to come, the entire process then has to be shifted down to 44.1 kHz to produce the two-track master suitable for CAD pressing. In all cases, the standards conversion

process accounts for approximately 6 dB of available signal to noise (the theoretical loss is 3 dB, but experts at Sony doubt that it can be done with less than 6 and perhaps 8 dB of loss).

Further complicating the issue of the CAD's sampling rate when used with professional audio equipment operating with a higher 16-bit rate at 48 kHz (44.1 kHz normally samples with 14 bits), Sony has issued a protocol for delivering master tapes for CAD mastering, which utilizes a specific encoder and 1/2-inch U-Matic video equipment. This virtually locks a studio into delivering a two-channel master videotape at the 44.1 kHz sampling rate. The Sony protocol (issued in conjunction with Philips), utilizes a PQ subcode providing cue information, additional tape code information with pauses and lead-ins/out, timecode, etc. on a 1/2-inch U-Matic

cassette

Potential users of digital studio equipment are very concerned about the dual digital audio standard. Many potential studio users are quick to equate the digital use of transcoding and standards conversion with the analog practice of impedance transformation. The reality of digital audio is that the signal is virtually unaffected by change, and with digital dynamics in excess of 90 dB, some moderate loss is relatively acceptable. The audio recording business, however, for better or worse, is a business of perceptions. Users worry that there could be signal-to-noise ratio loss approaching 8 dB in real terms for each standards change.

What many users are doing, at least in a reluctant way, is to assume a worst-case posture for studio digital environments. Since the various multitrack tape machines will operate at either of the two sampling standards, and the digital consoles could well offer similar flexibility, it seems likely that at least some of the users will operate at 44.1 kHz all the way through the process to the production of a two-track master.

Turning to the consumer arena, the presence of a viable digital audio system for disk playback is vital to continued growth of digital studio equipment. At the summer Consumer Electronics Show in Chicago last June, at least 10 of the 38 licensed manufacturers were showing Compact Disk players



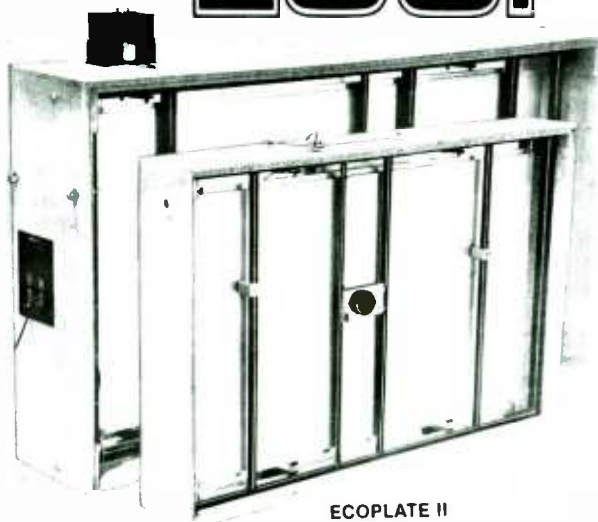
THE DIGITAL FUTURE
Views From The
Equipment Manufacturers

Many of the points raised in Martin Polon's analysis of the impact that the Digital Audio Disk will have on the professional audio industry are explored further in an article beginning on page 76 — Editor.



... continued overleaf

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views

THE DIGITAL AUDIO DISK — A Progress Report

Unfortunately, the software side of Compact Disk is just the reverse, with only the house labels of Sony and Philips, CBS/Sony and Polygram readying product for digital release. No pressing facilities are available in the United States at this time, although Sony (CBS/Sony) has a plant in Japan, and Philips (Polygram) is similarly configured in Germany.

The relative dearth of software providers after almost a year of exposure to the system prompted Sony to call a press conference at the June CES that caught some members of the staff of partner Philips by surprise. Sony decided to delay introduction of the digital Compact Disk system to the end of 1982 or into 1983. Although Sony commented publicly on the shortfall of available software, industry sources felt that the state of the American and world economic picture was at least as much a factor.

The question of royalties on digital players and software has appeared in and out of the media almost from the beginning of the Compact Disk. The system, which has borrowed some of the technologies inherent in the Philips Laser Disc videodisk system, was a Philips development first, with Sony

joining to perfect the audio design with its in-house chip manufacturing capability and other skills. There has been strong rumours amongst the audio and record industry that Philips, feeling stung by the lack of reward for developing the audio cassette and the videodisk, has taken a hard line on royalties. The figures of several cents per Compact Disk, and \$10.00 per CD player are the ones most often quoted, although the situation seems far from either official clarity or resolution.

The great danger is that the consuming public could find all of this another electronic exercise in futility. The Compact Disk is coming on the heels of the three-system videodisk battle, with the Matsushita VHD and companion AHD unclear as to whether it will even reach the marketplace. Similarly, the groups backing the two digital audio "standards" seem to have hardened to their present positions, as much by corporate marketing politics as by technological necessity.

The lesson of the interactions at the recent AES Digital Convergence in New York was that the positions taken and held had firm footing in the line of products made by the company that employed the individual. Not that this is hard to fathom, but the combination of marketplace pressures and a recent Supreme Court decision, involving standards activity by the ASME, may well leave the rest of the digital dilemma to be played out in the open marketplace.

So, if you want to know if a player, any player appears, stay tuned to this column, or at least the nearest soap opera. ■■■

STUDIO DESIGN & CONSTRUCTION

Transforming a Movie Theater into a Recording Facility — A Case Study at The Eddie Offord Studios, Atlanta

by Russell Shaw

This past January, for nearly one solid week, East Point, Georgia, lay cut off from the outside world. Main Street, the main artery linking the warehouse-pocked town of 39,000 with its much larger neighbor, Atlanta, seven miles to the north, was so icy it resembled a hockey rink. Off Main, on an incidental side street called Jefferson, it was even worse. Yet the denizens in the old movie theater were well-stocked for the enforced isolation. For this was the proverbial blessing in disguise, a chance to thrive off the sleet-dictated sequesterment. In the dead of the worst Georgia winter in 83 years, the Dregs were recording a new album, *Industry Standard*, at Eddie Offord Studios.

Who would record an album in a movie theater? Well, this isn't just any cinema house. Oh, sure, some of the trappings are the same. Pull up to the old East Point Theater, and a long-vacant box office greets you. It is actu-

ally not hard to visualize long lines of Clark Gable buffs waiting patiently on a Fifties Friday night for the place to open. Back then, this place was literally the only show in town, typical of the downtown, small-city edifice that introduced a whole generation to Hollywood flicks; that is before newer houses in snazzy suburban malls took customers away, and the old palaces were left to mildew and fire.

Of course, lots of sessions are recorded in theatres, but most often in a live setting with multiples of fans cheering every hot lick. Here, however, without the proud approval of producer Eddie Offord, engineer Chuck Allen, and a few roadies and friends, there is hardly an uttered accolade. This is a laboratory, albeit one in a rather deceptive setting. For one, most of the 600 or so theater seats are still in place. A balcony, decades ago the ugly signifier of segregation, still lurches forward from the

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Although the glamour and allure of the superstar recording session appeals to all of us, the reality of today's studio business is that the majority of work comes from commercial and industrial clients. One person who believes in this lucrative non-record aspect of the music business, and has turned this orientation into a successful reputation, is **Suzanne Ciani**, a New York City-based electronic music specialist, producer, composer, arranger, and president of Ciani/Music, Inc.

Her ideas and synthesized creations grace a diversity of outlets, including film scores (*The Incredible Shrinking Woman*, *The Steppford Wives*); records (*Meco's Star Wars*, *Afternoon Delight*, and *Fame*); TV/radio commercials (Elizabeth Arden, A&P, Atari, Avon, Black & Decker, Chevrolet, Clairol, Coca Cola, Columbia Pictures, Dupont, ESPN Sport Cable Network, Eveready, Excedrin, and that's only through the E's); and special projects such as the digital composition for "Xenon" pinball machine.

What follows is a brief glimpse of this multifaceted winner of several Clio awards, and which focuses on the innovative application of electronic music, advertising hype, and working with the unique talents of jingle singers.

The Commercials Production Arena —

Suzanne Ciani

Interviewed by Robert Carr

R-e/p (Robert Carr): It seems like you're doing most of the synthesizer work in town. Your name is always in the industry paper Backstage as having just completed one project or another. Why do you think you're getting most of the calls?

Suzanne Ciani: I'm sensitive . . . I'm musical. [Laughter] I'd have to think about that — I don't have an answer off the top of my head.

I think the synthesizer field is expanding, though. With the general expansion, and the use of digital [technology] in all areas, not just sound design, there is a convergence going on. Everything in the world is being reduced to "ones" and "zeros." So, in recording studios the tape equipment, the processing equipment, the sound-generating equipment, and whatever else you find there, are all tending towards having something in common. For that reason, people are much more apt to work with equipment and machinery for controlling, or creating sounds.

R-e/p (Robert Carr): Is synthesis becoming easier or more complicated?

Suzanne Ciani: Actually, a little of both. It's important that we have the illusion that it's becoming easier. That's what moves us on; that's the great incentive in all this technology.

In the early days, when the musical technology was more complicated, you had to know what you were doing, because the equipment was very specialized, and not as consumer oriented. People entering the field now are dealing with off-the-shelf equipment, and have little or no history of synthesis. I find it narrows their concept of what the machines can do, or might do.

There's a whole, specialized type of thinking when working with electronics, in terms of how you take a sound apart; how you think of it in its component parts; and how you put it back together. People just coming into the field may or may not be aware of some of the basic concepts that are necessary for this kind of music.

On a sophisticated level, synthesis is a full-time job. It's like anything else; if you're willing to put in the time, energy and the research, you'll get that much more out of it. If you're only going to buy the keyboard instrument and come up with a few sounds, you're kidding yourself.

R-e/p (Robert Carr): How do you conceive of the sounds once you're asked to do a project?

Suzanne Ciani: The first point I focus



Photography by Alix Campbell

John Stronach started out as a classical pianist and a rock 'n roll drummer. Today, he's a producer/engineer. In fact, he's been a part of the record business since he was sixteen years old. His sixteen years of experience have included work with Diana Ross, The Supremes, the Jackson Five, Bobby Darin, Sammy Davis, Sarah Vaughn, Canned Heat, Alvin Lee, Three Dog Night, John Mayall, Rufus, Jo Jo Gunn, Dan Fogelberg, Joe Walsh, REO Speedwagon and more.

ON BREAKING IN

"As far as recording engineering schools, those things are great for teaching you fundamentals, but don't be spending a lot of money on that. There are people who spend thousands of dollars learning how to be a recording engineer, and they still start as a go-for, which is the same way everybody starts. It's nice to have that behind you, but I don't know. I don't know that it does all that much good. The best way to learn is by doing."

ON REPETITION OF STYLE

"I've seen it ruin people's careers. You can't use the same production style all the time. What works for one group of songs won't necessarily work for another. You have to remain flexible enough to change your production techniques as the music changes."

ON TECHNOLOGY

"A lot of producers and engineers are real spoiled with all this technical gadgetry and wizardry and all the things we can do now. They forget about the music, and the music is the thing we are here for. That's what you have to keep in mind all the time."

ON TAKING OVER

"The producer is there to help. It is not a dictatorial thing. A lot of producers get into a situation such as 'You are going to do it this way,' and it turns out to be the producer's album, not the band's. And I don't think that's fair to the band. It's their music. The act must be able to retain their identity and not just be a vehicle for the producer."

ON PLAYING AROUND

"In today's world, you have to be real businesslike. It's not like the early 70's, where everybody comes in and has a big party. You have to work within budgets, and you have to show up on time. I bring that consistency, and I try to bring a stability to the bands, so they know that they can be as creative as they want, but yet know that they can get a lot of work done and relate with the labels and management and just tie everything together."

ON TAPE

"I used another tape for a time and switched to 3M, because I would make twenty passes and all of a sudden, you would be able to see through the other stuff. They had a bad shedding problem. I just couldn't trust it any more."

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Suzanne Ciani

on is what the sound is *supposed* to do. The sound is there for a purpose — to elicit a response. So you want to be very clear about what kind of response you need.

R-e/p: You're talking about what kind of emotional response?

SC: It could be emotional. It could be subliminal, intellectual, symbolic; any number of levels.

R-e/p: Wouldn't that depend on the focus of the commercial — how they're trying to sell?

SC: If it's a commercial, but that line of thinking doesn't necessarily apply just to a commercial. It could be a sound for a video game; a sound for a movie; a logo for a company; a sound for an idea, like a snapping potato chip or a Coca Cola bubble. You want to know what the sound is supposed to do. Is it supposed to scare people? Make them feel good? Be larger than life to remind them of something else?

When you have those answers, you start narrowing in the area of the sound, and deciding where you're going to go to make it. That's the second question: what technology are you going to use to make the sound? Is it going to be a sound that's in a chip and, if so, what kind of chip? Is it going to be a sound that's stored on a hard disk, and called

up in a game situation? Is it going to be on television where it will have to fit into a context of other events or parts? The technology, how you produce it, and the overall context of where the sound is going to fit in, all have to be determined before taking another step.

R-e/p: Is most of the visually-related audio work you do keyed through SMPTE, or do you "hot rod" it?

SC: I don't hot rod it, but I don't use a lot of SMPTE yet, either. Primarily I use a click track from a UREI Digital Metronome. I take the timing for the picture, and lay out the score according to a particular click, and multiples of the click, which are on the tape. The click drives a number of different devices. Up until recently, that has been a big problem, because most electronic instruments couldn't be driven [triggered] that way. The Sequential Circuits sequencer can be now. Synclavier just developed software that gives me that capability. So does the new Roland Micro Composer MC-4.

R-e/p: Working with so many electronic instruments, do you ever have to worry about stereo panning and placement? How do you accomplish it?

SC: Spatial location is something you seldom find in a commercial, because they're usually monophonic. But, on a record, that space is very much a part of every sound — especially in electronics. The motion and placement of the sound is part of its personality and identity. It gives the sound "life."

The simplest case is panning left and right, or manually moving something. To record a part with the space already on it, you have to use up two channels. So sometimes I like to put the space on in the mix, but only if it's not the kind of space that's very integral to the composition part. For instance: the Buchla has an automatic voltage-controlled "space," which allows me to make a sound move in any way I want.

There's an improvisation performed by the Buchla in one of the pieces on my record [*Seven Waves*, currently only released in Japan]. I gave the synth a series of pitches to choose from, transposed those pitches harmonically on the keyboard, and hit the two chords that apply. In other words, every time the Buchla chose this note, the note was sent to the left speaker. Every time it chose this other note, it got sent to the right speaker. So while the synthesizer was playing, blipping the notes back and forth according to the melodic shape, it defined a certain form that was a result of the musical content. In that case, I was using up two tracks, because that kind of spatial distribution can be done only by the Buchla.

I like the spaces to go with the music. It's important that if something moves, it moves *musically*. In fact, you can add spatial rhythms to parts. Let's say you move a sustained tone left and right by switching it, not panning it. You've just



Leslie Mona has been an engineer for about eight years. Near the end of 1981, after four and a half years as a staff engineer at Automated Sound Studios, in New York City, Mona met Suzanne Ciani, and they have worked together ever since. Fully 25% of their projects entail extensive synthesizer recording. During that time frame, according to Mona, a standard *modus operandi* developed that generally runs as follows:

Click Tracks and Sync

"The first step is to lay down three tracks of clicks," she explains, "consisting of 1/4, 1/8, and 1/16 notes. To avoid crosstalk, we have to separate them. So three click tracks use up six tracks of tape. The open tracks are 17, 19, 21, 23; tracks 18, 20, 22 have clicks, and 24 is 60 Hz sync. From then on, I keep away from those tracks, until the very end when I can erase them.

"We don't suffer from print through, because I print the clicks at a low level. I usually put the signal on at about -20 dB on the meter, and never more than -15 dB. However, I have to make the console peak lights "read" in order for the level to be able to feed [trigger] the synthesizers. If the click isn't hot enough on tape, I run the signals through an amp rather than printing them over. That way I don't saturate the tape.

Synthetic Drums

"Tracks 1 through 6 are usually taken up with the Roland drum machine. The bass drum and snare are on separate tracks. The tom-toms are usually taken from a main output, and blended right away, unless we're doing it in stereo. Then I take two tracks out. In addition, there'll be a cymbal, and two high-hat tracks — open and closed — for a total of about six tracks.

"Suzanne sometimes gates white noise to

the snare sound. When we go into the studio, we'll overdub real drums. The result is a sort of 'New Wave,' snap snare with the white noise just underneath, and the live snare just over the top. Synthesis is so exact that if a beat is off just a hair, it shows up immediately. Live, or acoustic, music is more forgiving. Something a little off doesn't throw you as much.

Synthesizer Tracks

"After we've completed the drum machine, click tracks, and the sync, we add the other synthesizer work on tracks 7 through 16. synthesizer sounds are so clean, and distinct, that you really have to work with the 'textures' when doing a mix. If the textures and placement are not just right, the mix will be out of proportion. It's not like mixing a band.

"I have to be really frugal with jingle tracks. Suzanne usually ends up tripling the lead vocal, and any harmony parts. If there are vocal answer parts, and what not, you can see we end up doing a lot of bouncing. Most of the time, the pace is so quick that we don't really think about what we have until we're ready to mix.

"There's not a lot of equalization or processing after the fact, because the sound is already established by the musician while we're recording. You learn to communicate

Suzanne Ciani

given the note a rhythm. In those cases, that exaggerated motion has to rhythmically be a part of the sound. I do that while I'm making the sound. That's all programmed into the synthesizer.

Then there are some new spatial effects I'm looking into that are being developed by Harold Bode, who designed the Vocoder I use. I probably shouldn't talk much about them, but I will say they use phase. The spaces that we've dealt with up until now have been pretty primitive in terms of electronic sound. Really, it's been just amplitude . . . period. I like to deal with amplitude and, at least, reverb. I use the [URSA Major] Space Station.

What I'm working on now is the algorithm — the digital control of the actual placement of a sound. You have to use



headphones to make it work. With the current technology, you can put the sound between speakers. If it's a high sound, it may appear to be up in the air; a low sound may appear down. But the space options are pretty limited. If you deal with headphones, however, where you can make the field of placement

infinite, you can put the sound on your knee, left shoulder, on your lap, on the table, and so on.

R-e/p: When working with a mono mix, are there any tricks you use to achieve depth?

SC: A change in reverb can give you nice depth, as in the case where you very quickly go from a lot of reverb to none, the source appears to come forward. Reverb, in general, puts parts in layers, and gives the illusion of depth.

R-e/p: Would you constantly keep using more and more reverb to achieve degrees of depth in one mix, or would you resort to something else?

SC: I do use other effects, but reverb is a dynamic entity. To give a sound an illusion of space, it might come forward if you go "off" with the reverb. That's one use. Then, on another level, reverb in mono is very important for separating parts from each other in space. You might have a little "ticky, ticky" high-hat sound, without any reverb at all, positioned right up front and close. Then you might have another percussion sound that's also up front, which could get mixed up with the first sound. You can use reverb to separate them by putting the second instrument back.

The overall blend is definitely an aspect, but how parts blend depends on the individual frequency range, too. One sound could wash over something else. But generally, a sound that's very high, and has reverb on it, is not going to wash out your middle tracks. You adjust for the relative amounts overall. As you add in more reverb over here, yes, you're going to have to back off over there.

R-e/p: On the demo reel that you supplied to R-e/p there were a couple of music pieces with very low bass parts. It sounded like you didn't roll off any of the bottom at all. Is that something you generally do?

SC: This is a pretty tricky area, and one of the papers I listened to at the [SPARS] Digital Convention here in New York addressed the problem. They were talking about a way to compensate for variations between different speakers and room acoustics — how you can actually get a device that intervenes between you and the speakers that will correct the frequency response curve to flat no matter where you're sitting. Room acoustic variations is the biggest problem I have to deal with.

I try to do all the necessary equalization when I'm making a sound. Then the second phase, of course, comes when I'm mixing and fitting all the sounds together. I may have to brighten something, or "fatten" something, or whatever is needed on that level. There are no rules about that. It's done because the instrument tones are not set. They're not like violins, where I may usually boost them at 4 kHz, or for the drums and kick I need to do this and this. With electronics, the sounds are never the

A Conversation with ————— Leslie Mona . . . continued

with the player to develop the sound. For example: Suzanne may do a violin on her Synclavier, and add a cello that's been done on the Prophet. Those two synthesizers sound different. Plus, you don't want to make them sound like real strings, because they are synthesized. My goal is reaching a balance between the two instruments that keeps both distinct without too much echo, and blends them in without 'mushing' either of the sounds up with the other.

"On the average, Suzanne uses at least 11 tracks of synthesized parts. I try to collapse the synth tracks where I can. Luckily, all this can be done at Suzanne's studio, which is a less pressured situation. When we leave there, I'll generally still have two or three tracks open, so I can bounce to them. That's when I start getting rid of some of the clicks, and opening up those tracks to make room for the live parts.

Live Sounds

"If there's a live drum kit on a jingle, too, I usually use about eight more mikes, which I collapse to three tracks — bass drum and snare on separate tracks, and the rest of the kit on a third track. If stereo, I'll make the third track a stereo pair of drums 'left' and 'right,' which includes the high-hat and cymbals.

Synthesized Versus Real String Sounds

"Because I do a lot of jingles, and the pacing is so fast, like most engineers I have a formula. By the time I get to the date, the assistant should have the room set up, and I should be able to go to the board, and start flipping in the general EQ that I usually use. I only have about three or four rundowns to get the sounds for a 30-second spot. So for strings miked with [AKG] C414s, I definitely roll off the bottom about 50 Hz for 6 to 8 dB, depending on the room and how high or low the mikes are. I roll out about 2 to 4 dB at 1 kHz to 1.6 kHz, to let the transients come through for an 'airy' sound around the strings.

"Above 1k, the settings depend on the scoring of the part. If it's a high part, I probably won't add high-end. But in the mix I might take out a little at 1 kHz, or maybe add a little at 3 kHz depending on how it's fitting in with everything else around it. On a very rich, fully-orchestrated arrangement, I might add a few highs just to make the part a little more distinct, if the strings are low in register, in order to separate the A and B string parts.

"In New York, there aren't too many studios that have the high ceilings. A&R's A1 is a beautiful room for strings. Usually, I try to mike the live strings as far away as I can. But if they're done at the same time as reeds or horns, I have to tight-mike them. Then sometimes the sound gets too stident, and blending with the synthesizer can be difficult. The real strings tend to mask the synthesized strings or make them sound muddy.

"To blend with a synthesizer, we wouldn't use any more than nine violin players, two violas, and two or three cellos on a date. After they're on tape, they should blend easily if they've been written and played correctly. But, occasionally, the players can be a little sloppy or too laid back. Because the synth will be more exact, and more in time with the rhythm, blending becomes a problem when you add echo and EQ. Generally, what goes on top in the mix depends on the overall desired effect. One is the sound, and the other provides the texture underneath for support.

Monitor Settings

"Before I start any mixing, I do my own analysis of the speakers with a reference tape I bring with me. The tape contains spots that I've done, and I know the quality that I had when I did them. I also equalized them to make some bright and some 'bottomy.' That way I know what I have to do in a room to compensate for any deficiencies or spikes in their speaker system. A lot of times it's a guessing game."



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Suzanne Ciani

same. All I can do is go by ear. There are no preset rules, and what I do is very much dependent on the monitoring system I use. That's why a lot of times I check sounds and mixes with headphones.

I'm a small-speaker person, and I mix at very low volumes, because that's how I like to hear the music. I mix for the volume that I expect it to be heard at. Sounds alter tremendously depending on how you turn them up.

R-e/p: Do you do most of your own engineering?

SC: No. I hate to engineer. I made a rule — that's another part of my philosophy — which is, if someone else can do it, let them. A few years ago, I committed very strongly to not do any engineering, although for many years I did.

R-e/p: So, even while working with synthesizers in your own studio, you would bring someone else in to engineer?

SC: Yes. It's a philosophy, basically. If someone else can do it, they should. And if I'm spending time on something other than what I should be spending time on, it's taking my concentration away from my work.

R-e/p: You don't feel you can be totally creative, then, if you have to worry about the technical aspect of recording?

SC: It's not really the technical aspect of it. It's just a matter of more buttons to push; the mechanics of it. I work very well with my engineers, and we communicate well. We've evolved a good understanding so I can get what I want. It's not as if I'm oblivious to what I can achieve with the equipment. I'm very specific as to what I want. But, in terms of actually having to mechanically reach down, patch over, push this, watch that meter, and watch this, I have enough to watch on my side.

R-e/p: Do you feel you're pretty tough on the people you work with in the studio? Are you kind of difficult to get along with, or demanding?

SC: I am demanding. And I work with the people I do, because they are "succeeders." They want the project to go well. They have a lot of integrity in terms of the end product, and don't let little things slip by. And those are the only people I can work with. Otherwise, it bothers me.

R-e/p: Do you let the engineer do your mixes, or do you mix yourself, or advise?

SC: I walk out of the room, and let the engineer get everything set up. That way, he or she is comfortable knowing where everything is, and can do the basic, first level of settings. Then we can start to interact.

I personally don't touch the console;

"I work very well with my engineers, and we communicate well . . . I'm very specific about what I want . . . they have a lot of integrity in terms of end product, and we don't let things slip by."

it's like doing union jobs. I work with engineers that I have a great deal of respect for. It really is teamwork on that point. There are so many important elements — settings and so on in a mix — that unless you can accomplish the first 80% of those without discussion, you'll be there forever.

I'm talking about speed in commercials. For a record, it's different. Recording artists can take a lot longer time to deliberate over every little sound. In a commercial, for the sake of speed and getting the project done, I let the engineer have the first 15 minutes. Then we finish.

R-e/p: You've been quoted as saying that you wanted to use faders on a console as sound-shaping devices. What did you have in mind?

SC: If a fader is moved automatically, it's really functioning like an envelope shaper on a synthesizer. An envelope is simply letting sound through a circuit in such a way that you're setting an

attack, decay, sustain, and release. Basically, what's happening is somewhere a knob is opening and closing. The console fader is, in a sense, doing the same thing. The only problem is that the fader is difficult to move manually with a great deal of shape and expression.

There are a lot of sounds that can be enhanced with a fast amplitude change. Maybe where you're doing a final mix-to-picture of a space-ship sound, and you find you really have room to give it a little bit more of a push or something. As you're watching the picture, you follow the action with the fader in order to give the ship another level of on-the-spot dynamic.

The fader makes it difficult to be fancy about shaping the sound, but I think in the future, when digital consoles are common, sound synthesis and recording equipment are all going to start blending together. People will be designing sound generators as part of the studio, or control room.

Some of us came to the control room from the sound generating side, and others will go from the control room to the sound side. As the commonality of the equipment grows, there'll be more people crossing over from one aspect of sound to the other. Eventually, I see all the techniques blending together — sort of a standardization in audio. It'll make everything a lot easier.

R-e/p: I assume that all the material you develop has to be unique to a particular project or product. Do you develop a sound library as you're experimenting, and pull sounds from there as they're needed? Or do you compose on a per-project basis?

SC: On a per-project basis. Everything I do is very, very specific. If I'm asked to compose a piece for television, I have to work closely with that image.

For example: there's a piece I'm doing now for Rockwell where the space ship becomes the logo. They want an image of corporate stability, power, and futuristic, frontier know-how. That automatically tells me that the sound should be in the "symphonic," electronic category. Keeping in mind the corporate situation with a corporate identity, you must think about what that company is doing, and how they want to be thought of. That's the first point we just talked about — what kind of response do they want to get from the sound? How should people react when they hear the sound?

Well, if you're trying to establish a corporate identity, and your corporation is Rockwell International, and you're sending satellites out into space to do research, you want people to feel that's a

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Monitoring: JBL 4313B speakers, plus Visonic Series 7000 "mini-speakers," powered by Crown DC-150 amplifier
Effects Units: Eventide Digital Signal Processor (prototype); URSA Major SST-282 Space Station; MICMIX Master-Room XL-305 reverb; two dbx Model 163 compressor-limiters; MXR Dual 15-band Graphic Equalizer; Dynex Model 241 Noise Suppression; Eventide Model H949 Harmonizer; Marshall Model 5002 Time Modulator; MXR special-effects board
Synthesizers: Buchla Series 200 with touch keyboard; New England Digital Synclavier with disk-drive and music printer options; Roland TR-808 CompuRhythm; Roland U-64 Micro-Composer with high-speed cassette storage; Sequential Circuits Prophet 5 Mark III, with Model 800 Sequencer; Polyfusion Model FF-1 Frequency Follower; Bode Model 7702 16-channel Vocoder; Sync-tone Generator; UREI Digital Metronome

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Suzanne Ciani

big task you're doing. You want people to feel your high tech-ness; your corporate big-ness; your emotional concern. I mean, you're going up into space, and doing things that are effecting all mankind. So you want to reach people, and make them feel good about what you're doing.

But you don't want to just bang them in the head with "Hey, we're big, and we're going into space." You want to *romance* the listeners; you want to warm up the message. This is cold space, and a cold corporate entity, but you want to make contact with people on an emotional level. In this case it's important to take the bigness and high tech-ness, and add to it an *emotional* quality. The bigness and the emotional quality gets into the area of symphonic sound design — the grandeur of rich, orchestrated textures.

On another level there's the sound design of the technical parts where you'll possibly be designing sounds for the opening of the space ship, and the ship taking off. You really do make these sounds up, because they don't exist in space. There's a whole vocabulary of sounds that are fantasized, yet talk to us about that other environment.

R-e/p: So, when you speak of a vocabulary, you really have something to draw on already. There are certain building blocks to work with that the viewing public knows as space sounds, for example, and you use them as starting points?

SC: Well, yes. Part of the building blocks are what the people already know. You're trying to communicate with people, and predict how people react. When people hear something classical, they think one way. When they hear rock and roll, they think another way. So that part of the vocabulary is stylistic, and has to do with the general response. After that, it becomes a personal, artistic style within that general style. In fact, a lot of styles in that area come in waves. For instance: there was the *2001 — a Space Odyssey* wave, because the film made such big impact; there was a genre of sounds that went with that film, which was grand and classically oriented.

R-e/p: And the sound effects that were defined in the movie locked the public into those small, discrete sounds of space.

SC: Yes, but more of those were a result of the *Star Wars* style, which came next. The effects there were little talking machines and characters — tiny sounds. Rockets and space ships.

Now we have a Vangelis-type of style, because of [his soundtrack for] *Chariots of Fire*. His music is very emotional, even though it's all electronically gener-

ated — it's colored electronically.

I was at Vangelis's studio last weekend [in London, England], and he's got his instruments stored on an [EMU Systems] Emulator. The bottom part of the keyboard is live tympani sounds; the top part is live cymbal sounds, and the middle is another percussive sound.

Electronic sounds can appear totally real with analog-to-digital devices, which is an interesting point. I've always had both sides, meaning that I've always worked with traditional [analog] instruments and electronics. Now, with the analysis systems like the [New England Digital] Synclavier, the Fairlight [CMI], and the Emulator

"When digital consoles are common, sound synthesis and recording equipment [will] start blending together"



becoming very popular and of better quality, the two aspects of live and electronic have come together.

I don't know if that answers your question. It's hard to describe the creative impulse. But thank God we have it, or else we'd be reading books and following rules all the time.

R-e/p: Speaking of live versus synthesized sounds, what are your criteria for making a determination between using synthesized strings and real strings?

SC: A lot of that has to do with the performance style, and the characteristics I want. If it's just a bed or a pad, obviously, an electronic part will work. But I may want that "photograph" of the real sound, because of some emotional focus. For that I may use a Fairlight or Synclavier, I might need a solo violin played like Issac Stern so, in that case, I'm looking for the quality of the soloist. Often, it's an articulation I need that I could spend all day trying to get synthetically. Time is a big factor. Can

real violins get a sound faster if I need something done stylistically, like disco violin cadenzas. All kinds of little articulations can be very time consuming to get on a synthesizer.

Occasionally, I just need one element from the real strings. I'll record just a couple of strings for the attack and some of the nuances, and build up the rest of my string parts with the electronic strings.

A synthesizer like the Synclavier will give me strings that sound totally *real* in terms of bowed articulations, provided it does what is appropriate for that particular application. With the [digital] sampling system you have control over the pitch of any timbre, and can alter the sounds any way you want. But there are many, many aspects of a sound in a performance, such as how the notes "move," and the incredible delicate changes in pressure and volume.

Basically, if I need the real sounds, I use them. There are effects that real string players can't do that the electronic ones can, such as incredibly slow and perfect swells, or crescendos, or certain kinds of filtering characteristics. Synthetic sounds are getting closer and closer to their related real sounds, but I would never use a synthesized tone if I wanted the real one. On a synthesizer, the string tone is just one more sound, and not necessarily interesting.

R-e/p: You often process your voice through a Vocoder, and then blend it in with almost everything you do.

SC: Yes, it's one of my favorite effects. I augment the vocal with the Bode Vocoder, and blend that sound in the overall track as part of the texture. In most of my mixes, there's a processed vocal part that's not really detectable as a vocal. I believe it gives a warmth — a human aspect — to the sound; it's a breath and a contact that people respond to, even without it literally being a vocal.

Through the technology I can transform myself. On one level I'm this angel, and my voice has this feminine aura. Then all I do is turn this one knob, and all of a sudden I'm gay [Suzanne has developed a gay character via the Vocoder, called Steve, which will be the subject of an upcoming singles release]. Who am I? Through this electronics, you can be so many different things. If anything, you're everything. It's hard to justify.

About four years ago, I was repping Sennheiser's Vocoder, and introducing it to some of my colleagues in advertising music. I did an entire introduction in a male voice to give myself more . . . presence [laughter]. Nobody got it. I don't know why. There was a block against it, even though they could see the equipment. Now we understand the new technology, but four years ago there was no response.

R-e/p: Had they heard your normal voice before?

SC: Yes, but there was a block — an

... continued on page 28 —

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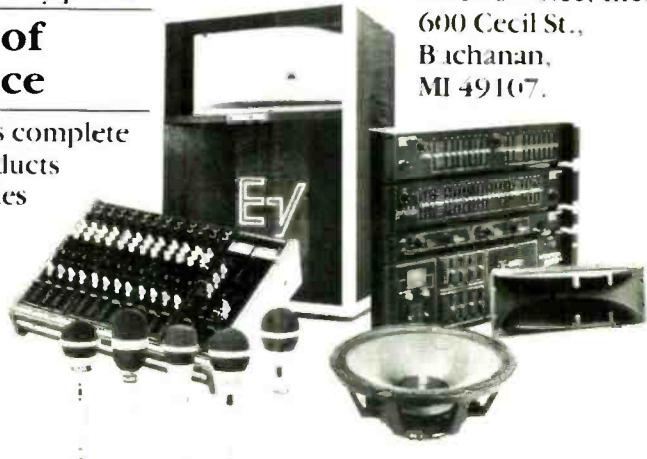
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The Commercials Production Arena —

Suzanne Ciani

inability to hear. I used to do concerts with the Buchla synthesizer, and the sound would be zipping around the room. Still, the people couldn't understand that the sound was being made with this machine. They knew it, but they couldn't make the connection. It's like if you go to a Broadway theater, where the PA speakers are on the side, and the woman is in the middle moving her mouth. Sometimes you're not sure — you disconnect the image with the sound.

R-e/p: While we're on the subject of vocalists, have you encountered many difficulties while working with jingle singers as a result of the pressures of the commercial business? Do you take the pressure into account while you're writing the parts?

SC: In the jingle business, the singing starts when you hire the singer. You put together the group for the sound you want. At that point, you've already made a lot of decisions in terms of who you've picked to do the session, and what they can do. Then, it depends. There are times when singers will fall into patterns and, if you want those patterns, fine. Usually, what I want is not a pattern part. I need to break out into something else and, quite often, that's difficult for singers.

There are all kinds of singers, just as there are all kinds of guitar players. There are singers that are great at group singing; they can blend and read. There are singers who do great solo work, but who can't read or blend at all. And, of course, every combination in between. So, for me, if I want a very specific harmony and/or sound, I write it out, and tell them they have to sing what's written. If they don't, the music won't come out correctly in the end, because the pieces are built up in layers. That approach takes a little extra effort than just saying, "Sing," which is also a way to do jingles. And a lot of the work in town is done that way.

There are so many variables in singing, and I like a group sound that really is perfect. That can be tedious to get; you don't want to lose the emotional quality in going for the perfection.

R-e/p: Do you have a technique for pulling out that emotion?

SC: Of course. You've got to jump up and down, scream, tell them they're terrible [laughs]. A vocal session goes in noticeable curves. When singers first come into the studio, they're all excited and hot, and they deliver a lot. Then they go into a period where part of their attention is in their mind thinking, and working out their part. After that, they peak, where they know what they're going to do, and they sing the part like they know it. When they find out that what they sang was not great, and they thought it was, they fall down again.

It's the old production curve. They fall down and get lost, but you let them get down there for a minute or two, because it is a curve. What I have to do at that point is break that depression, and I use whatever it takes emotionally — anger, disgust, flattery. Then they go up to the mike and do it correctly.

Getting perfection is very tricky in commercial production, because you're dealing with a lot of people. One of them might have done their part perfectly every time, but so what? The group sound wasn't together. It's the same with playing. And you have to put up with some people saying, "Damn it. I did it that way already. She doesn't know what she's doing. Why doesn't she let us out of here?"

They play with anger, and that's why I think the curve goes down. It's the fact that there are many people [in the group], and some of them get angry, or frustrated. They tried, got it perfectly, and they weren't rewarded. Then the other guy, who wasn't as good, gets better and the better singer gets worse. A lot of times you get the take — and this happens with musicians, too — in the first try. But if you don't get it on the first one, it can take another hour.

R-e/p: From a musical standpoint, are commercials a reflection of the current Top 40: Is that a big influence over what you're doing?

SC: Yes. But as the record business goes down, it's becoming less and less of an influence. The record business is basically recycling material and ideas. Everything is quite eclectic out there in the record world now, whereas in the past there were much more narrow bands of style that one used for commercials. There was Disco, Reggae, Punk — Grover Washington even had a big influence for a while. Now, I can't say there are any obviously major influences that are more important than the rest.

R-e/p: Wouldn't that open up a whole world of sounds to you? Basically, whatever your imagination can come up with is what you can use.

SC: First of all, if I'm working with a picture, the music is very closely tied in. All records now are attached to images, because of video disks and tapes. The biggest limitation is the picture in terms of style. You can't put punk music to a girl who looks like she just came from Elizabeth Arden; it just doesn't work. I like working with really imaginative image people, like Mid-Ocean Motion, or Bob Abel, because they give me something to work with that's imaginative. If the picture is not imaginative, it kills the enthusiasm.

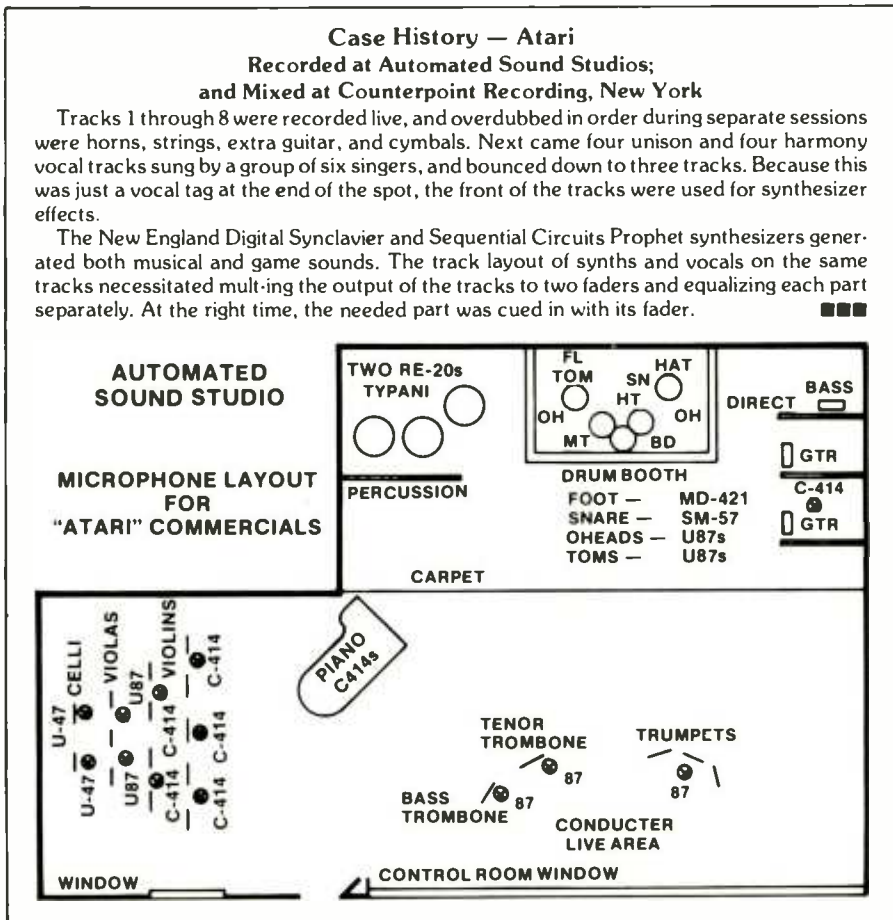
R-e/p: But there's always the inherent limitation of an image never being as vivid or as powerful as a person's own imagination. Won't working with a visual medium always be more restrictive than just doing an audio-only record, or

Case History — Atari

Recorded at Automated Sound Studios;
and Mixed at Counterpoint Recording, New York

Tracks 1 through 8 were recorded live, and overdubbed in order during separate sessions were horns, strings, extra guitar, and cymbals. Next came four unison and four harmony vocal tracks sung by a group of six singers, and bounced down to three tracks. Because this was just a vocal tag at the end of the spot, the front of the tracks were used for synthesizer effects.

The New England Digital Synclavier and Sequential Circuits Prophet synthesizers generated both musical and game sounds. The track layout of synths and vocals on the same tracks necessitated mult-ing the output of the tracks to two faders and equalizing each part separately. At the right time, the needed part was cued in with its fader. ■■■



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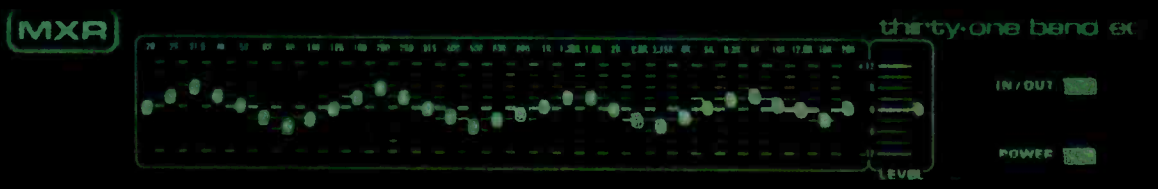
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Suzanne Ciani

a radio commercial?

SC: Not with images the way they are now. It actually parallels what's going on in audio. In sound, you have the whole world of acoustic instruments, electronic instruments, and all the combinations in between where you can analyze a sound of the real world, and then change it. You can do the same thing with images, too. Video people can start with live images, like the Levi [jeans] spot, and then process it any way they want.

R-e/p: What do you think of the theory that, because advertisements could be lengthier on cable TV, such a condition would open the door for commercial writers to make their pieces longer, and actually develop them into songs that may get into the Top 40? Do you ever find yourself writing with that concept in mind — having one of your songs crossover from commercial to Top 40?

SC: We're always struck by that possibility. But then it's a question of taking the time to follow the whole process through. I think we're more limited by time than anything else. There are any number of pieces I have the rights to that I could see developing into singles. But do I actually go through that process? Not very often.

R-e/p: Just because it's not a sure thing?
SC: Right. It's not a sure thing. The record business is not terrific, and just the marketing aspect is horrendous in this country — dealing with the record companies. But the same pit-falls happen in advertising music. The people like to pigeon-hole you. Fortunately, I got pigeon-holed in a hole that said, "She does anything." A very open pigeon-hole!

With records, there is always this label where, if you're successful with this type of music, they want you to do it again. It's very hard to be commercial. Most music people, in reality, have lots of identities, but they narrow them down for the market.

R-e/p: When they get successful, they're stuck with the classification that made them successful?

SC: Right. The same cubby-holing principle applies to movie actors, too. I don't know what it is.

It took Vangelis, for instance, 15 to 20 years to be a commercial success, and one of the reasons was that every album he came out with was completely different than every previous album. [His record label] RCA went crazy.

R-e/p: They had no idea how to market him.

SC: The marketing [of a record] is an element you have to deal with. You have to realize the repercussions of that, and

support it, unless you come out with a novelty single. A novelty single needs no follow-up. If it tweaks the mind, you can make one statement and that's it.

R-e/p: After writing so many short pieces for commercials, do you find it difficult to write longer pieces, such as for your Japanese album. Seven Waves?

SC: When I first started doing the album project, I was overwhelmed by the idea of making something last longer than 30 seconds. But a 30-second piece is just a condensation — the form is a large scale form that's compacted into 30 seconds. You have an introduction, you set it up, you have a development — a beginning, a middle and a close — [which is] the standard structure of a song. So, when you're working in a longer medium, all you do is, architecturally, stretch that out. The introduction is now 20 seconds, instead of a second. The "A" section that was seven seconds is now a minute and a half, and so on. The portions are different, but the structure is similar.

R-e/p: I'd like to refer to another article that appeared in Backstage, about making advertising more personal. "The traditional concept of the average American household . . . is becoming a myth," he says. "Instead we are seeking an increase in alternative lifestyles such as single or single parent homes, changing values, fragmented demographics, and so on. . . . Successful advertising must touch the viewer emotionally."

SC: [Reviewing the newspaper clipping] This is all typical advertising language. A perfect example here: "Advertising which reaches out to an individual's needs, and is also demanded by larger groups."

As soon as you make one statement in advertising, the opposite is also true, because what the advertisers want is *everything*. As soon as you divide a subject into two parts, you still have to try to get them both. I don't pay too much attention to these articles.

R-e/p: Do you feel you're really a part of the advertising community, or on the fringe?

SC: It's interesting that you ask that at this time. One of the strengths that I brought to advertising is that I came from an area where I spent seven or eight years doing lots of research and development, and performing with crazy machines. I think that, ultimately, the more you diversify, the more strength you bring to any particular area. Typically, I work in three or four areas — records; pure technology and sound design; TV commercials; and film — and I think that all those areas complement and enrich each other. So if I work outside of advertising, I'm actually working *inside* advertising — that's good advertising jargon for you — because I'm getting strength that I can then bring to advertising.

. . . continued overleaf —

Case History — Prince Tennis Racquets

Recorded at Ciani Studio; Piano and Trumpet Overdub at A&R Recording; and mixed at Counterpoint Recording

Tracks 1, 10, 18, and 19 are the only acoustic instruments. All other acoustic instrument names are merely descriptions of the synthesized sounds made by the Synclavier and Prophet.

Note that all the click tracks are still on the tape. These were used to drive the synthesizers for such parts as the bass sequence. The reference counts are there to guide Suzanne Ciani through the piece. ■■■

PRINCE TENNIS RACQUETS TRACK LAYOUT SHEET

TPT	BS SEQUENCE	MELODY	MELODY DBL	CHORD	HI STRINGS
1	2	3	4	5	6
HI STRINGS	HI STRINGS	BS @ FADE	PIANO CHD	HORN SWELL	WHITE NOISE
7	8	9	10	11	12
WHITE NOISE @ END	WHITE NOISE "SWOOSH"	BS ALT END	HORN ANSWER	HORN ANS DBL	LO PNO
13	14	15	16	17	18
HI PNO	SYNC @ 60 HZ	CLK 16ths	CLK 8ths	REFERENCE COUNTS	10.4 CLK ¼ NOTE
19	20	21	22	23	24

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For additional information circle #20

Suzanne Ciani

R-e/p: Why do advertising gigs then?

SC: Everybody keeps asking me that [laughter]. It's actually a great exercise. Advertising is so concentrated, and all of the demands — in terms of production — are intense. It's like keeping fit; the whole process keeps me in incredible form.

When I work with record people, sometimes I'm amazed at the dissipation of focus and energy. In advertising, we really peak out. Everything is very organized, and that discipline is good to bring to other areas.

R-e/p: Which is your favorite area in which to work?

SC: I don't have a favorite. I love mixing them up. For instance: if I do something in sound design where I'm working with developing a sound to be stored in a chip for an Atari game, I like to incorporate that sound into the television logo or advertisement for Atari. The idea is to have the areas interrelate.

Another example is a recent film project I was asked to consult on. I ended up not doing the film, but I was called on to investigate the possibility of developing a robot sound effect that could be used in the movie, as well as accurately stored in a chip with the current technology. That way the sound in the movie would be identical to the chip sound used in the toy robot which would be merchandised with the film.

About five years ago, I went through a phase where I was doing "electronic clothing," which made me very aware that sensible marketing is absolutely essential for any idea to survive. Merely having an idea is trivial. Being able to bring it off is what's important. And any project like that is good even if you don't succeed. You gain a lot of experience, and research.

R-e/p: Is there any criteria for accepting a project other than money or time considerations.

SC: Yes. I have to *feel* something; I have to want to do the project. Money comes in to play there also, but first of all I want to feel that a project needs me. If they could use somebody else, then they should. If I'm not being called on for what I do, then it's not automatically as interesting to do it.

I have to want to do the project, or else I can't accept the work. Money can be an influence. In fact, that's how I got into advertising — I originally wanted to do a record. Advertising was a mixture of the money and all other kinds of won-



derful side benefits — creatively as well as in production.

I recently got a call from the [US Government] Defense Department, and they said they had a project for me. Now I may not have been interested in doing that work, except that the financial scale involved meant an important momentum for my business [Ciani-/Musica]. It also had a lot of interesting aspects in terms of research and technology. So even though the end product didn't necessarily interest me, the process is really the exciting part.

R-e/p: Suppose you were offered a great deal of money for a project, but it was something you didn't believe in. Would you turn it down?

SC: I've run into that. I've been turning down projects for a long time on the basis that they're not interesting to do creatively — they're just artistically bad. But in terms of "approving of something," that's a very vague area at this point. There was a time when I wouldn't do music for "GI Joe," because I thought it was a war toy, but that doesn't happen very often.

Certainly, there is a philosophical influence that enters into my decision-making process. I do things for the Boy Scouts for nothing. But I haven't turned down Procter and Gamble, because I think their soap isn't biodegradable [laughs].

R-e/p: Let's say you're offered a video project — one that you would accept. Do you normally enter the project at the very beginning, or do you get a video tape after it's been shot, and informed that, "We want this yesterday"?

SC: Let me say first that there are no rules. Everything is possible. For animated films, I usually come in at the same time as the picture, because of time requirements. Those people take weeks and months, and they're never in on schedule. The end is telephone calls

going back and forth with people saying, "Well, it looks like this," and "Just imagine this." Or video cassettes coming in the middle of the night. But, generally speaking, I come in after the picture.

R-e/p: Do you put your own style or stamp on a commercial? Or is each piece completely discrete, completely its own identity, and you try to remain separate from it?

SC: Both. In other words, the pieces might be very, very different styles. In one sense, it may be of a classical orientation, while another might be punk or jazz. On that level, any style could prevail, because they're little boxes that the composer works within. But everything I do has my stamp on it. What I do within a given box is my own personal use of that style. Many times, in my case, it has to do with some unusual sound, or way of dealing with sound. Basically, I like to keep my work simple. I like every part that's there to be there for a reason. My work is clean, and kind of minimal.

R-e/p: So there's a "signature" that you may consciously or subconsciously include in your work?

SC: Over different periods there are sounds that I pull in, because I'm interested in them at that time — sounds that I've just discovered. For a while, there were chime sounds in almost everything I did. I didn't realize it until I listened to a bunch of tapes one after the other. I had this one sound #24 that was in everything.

R-e/p: I was thinking in terms of a session player like, for example, guitarist Lee Ritenour, who would change styles in accordance with the type of date he does. Yet when you listen to a lead part that he's played, you can identify that lead part as his style within the context of the music style. Do you go for that kind of identity as a commercial producer?

SC: It's periodic. Last weekend, I went through Vangelis' entire life with him, and all his musical styles. I was absolutely shocked. There was the totally emotional, grandiose material that we're used to now. And also everything from bad rock and roll, to abstract academic, clanging, electronic weirdness, to Greek folk music, and on and on. But I could recognize it all as being his.

Now that's a very high-level question to figure out. I think it's not so much a "sound," as it is an *expressive* quality. If I had to make one comment about the work I do, I would say I try to give the electronics a life I call a "sensuality."

■■■

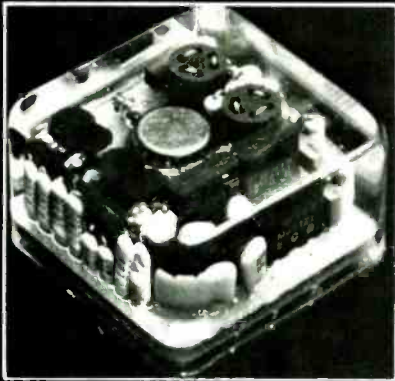
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THE OSCILLOSCOPE

... The Service Engineer's Friend

by Ethan Winer

Of the wide assortment of test instruments available to the audio engineer, the one most frequently taken for granted — yet least understood — has got to be the oscilloscope. Anybody can figure out how to use a voltmeter; and the oscillator and frequency counter are even more obvious still. There are many engineers, however, who wouldn't recognize slew rate limiting if it were staring them in the face. Therefore, in this installment of my series — in addition to the continuing saga of tips and troubleshooting — I will be attempting to demystify this most versatile of all audio tools.

Basic Principles

The main purpose of an oscilloscope, of course, is to display the level of a voltage or signal at a given point in time. A voltmeter might be fine for measuring steady levels, like test tones or for checking flashlight batteries, but it is impossible to observe the actual instantaneous value — or to determine whether you have a square wave or a sine for that matter — since the meter's pointer could never move that fast. Therefore, an oscilloscope uses an electron beam which has a very fast response, capable of "tracing" the input waveform. The actual dot of light is produced when this beam strikes the phosphor layer that coats the inside of the cathode ray tube (CRT).

Besides the CRT, all scopes must have a vertical and horizontal amplifier, as well as a variable frequency sawtooth oscillator connected to the latter. The purpose of this oscillator is to create the recurrent sweep that makes the whole thing possible. Since the CRT can only produce a single dot of light at a time,

this dot must be swept constantly from left to right in order to create the illusion of a continuous solid line. The signal to be observed is then applied to the vertical amp's input to shift the dot up or down, as shown in Figure 1.

Without the horizontal sweep then, there would only be a single dot in the center of the screen, and if you put a signal into just the vertical input, the dot would simply move up and down. Therefore, the signal's voltage can be determined by the amount of vertical deflection, and its frequency by the horizontal speed. Both can be read directly from the calibrated lines or graticule placed on the face of the CRT, an example of which is shown in Figure 2.

Switches are used to establish the gain of the vertical amp, which is calibrated in "volts per division." The frequency of the horizontal sweep oscillator is controlled in a similar fashion, and establishes the amount of time it takes for the dot to move one division to the right. When the dot has reached the edge of the screen the sawtooth is quickly reset and, in all but the least expensive models, the dot will be extinguished or blanked during this time. Otherwise, a confusing double trace would result, especially at the higher sweep speeds. (And believe me, I know — I used to have one of the cheap ones!) Okay, so that's the basic concept, now let's look at some of the refinements that go into making a commercial oscilloscope.

Additional Features

The most important provision is probably the inclusion of triggered sweep, which is to synchronize the

... continued overleaf —

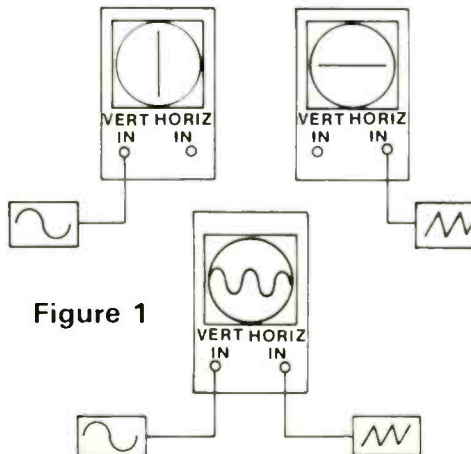


Figure 1

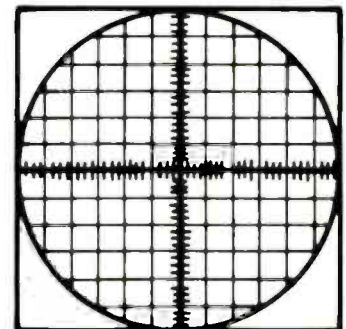


Figure 2

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sweep oscillator to the input waveform. Without this feature, the display would constantly flicker and wander about, since each time the sweep began, the input would be at a different part of its cycle. Instead of immediately beginning a new sweep as soon as the reset is finished, the trigger circuits delay the sweep until the input has a chance to return to the same point at which the last sweep began. (This should not be confused with delayed sweep, which is another thing altogether and generally found on only the most expensive models.) Triggering usually occurs on the rising edge of the input waveform, though again, the better scopes will have a switch to allow sensing in either direction (rising or falling edge).

Another standard feature is the inclusion of a variable-gain potentiometer on the vertical input for making relative, rather than absolute, voltage measurements. If you were measuring the response of a filter, for example, you would probably use this control to make the wave exactly fill the screen. Then, it would be easy to see when the signal was attenuated by a half, a quarter, or whatever. In fact, many scopes have a dB Scale printed on one side of the screen, to make such readings easier. Likewise, a vernier is provided for the horizontal sweep speed as well, to simplify relative frequency measurements. Also, every oscilloscope has an AC/DC switch — just like a voltmeter — to observe only the AC voltage, regardless of any DC offset present in the signal.

Most scopes allow you to turn off the horizontal sweep, and it is usually possible to feed a signal directly into the horizontal amplifier, which can come in handy when trying to measure the phase difference between two inputs. Used in the "X-Y" mode like this, it is simple to optimize the azimuth of a tape head, by comparing the relative phase between two tracks. As shown in Figure 3, when two identical signal sources are applied to each input, a diagonal line to the lower right results, in contrast to the other patterns that you get when varying degrees of phase shift are introduced. This method of checking azimuth, by feeding an upper track to the "X" input, and a lower to the "Y," is considered by many to be far more accurate than simply maximizing output amplitude while looking at the recorder's VU meters.

Another useful feature found on medium- and high-priced scopes is dual-channel capability, which is essential if you want to be able to view two different signals simultaneously. Most oscilloscopes have a switch to select between the two different two-channel modes — "alternate" or "chop." In the alternate mode, a sweep is performed first on one R-e/p 36 □ August 1982

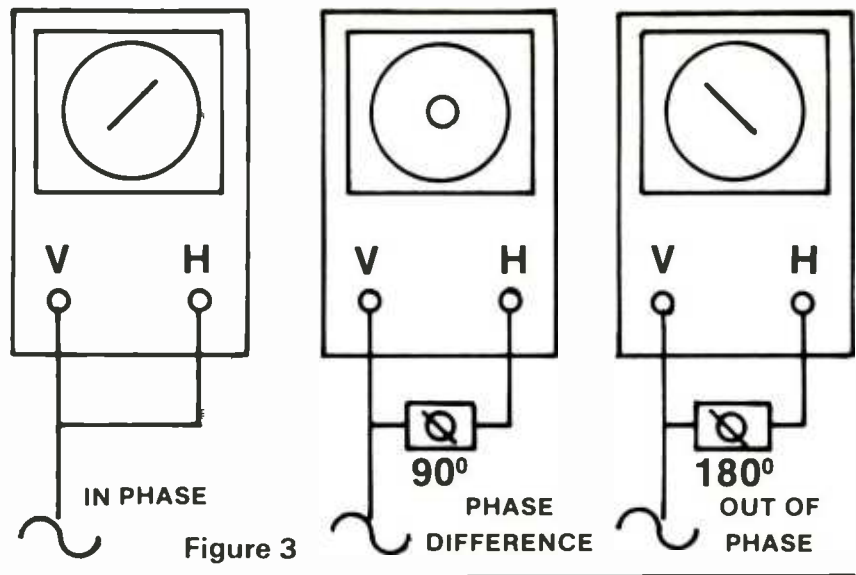


Figure 3

signal, then the other. The chop is created by a single sweep, with the channels switching back and forth very rapidly. (For a readable display, the chopping frequency must be at least several times that of either input.) Some models have four or eight inputs — the ultimate in digital circuit monitoring — and adaptors are available for regular scopes to accomplish the same purpose.

A built-in square wave calibrator is another common accessory, and can be used to calibrate the scope's Volts/Division trimmers, as well as provide a high-quality source for rise-time testing. Which brings us back to recognizing slew-rate limiting. First off, all audio equipment has some limitation to the highest frequency it will pass. Whether you're talking about a \$10.00 import or the latest state-of-the-art audio device, at some point as you go higher in frequency, the output will begin to fall.

When viewing a square wave, this limitation results in a "rounding" of the edges, as shown in Figure 4A. Assuming that this doesn't occur until 50 kHz or so, there should be no problem — unless you're convinced that you can hear that high. Problems do occur though, when an amplifier stage cannot supply the current required to charge up the various circuit capacitances. Then the picture looks like Figure 4B, which shows distortion as well as bandwidth

restriction. Again, if you aren't concerned about being able to pass a Megahertz, a simple RC filter can be added to an amplifier's input to prevent such transients from getting in to begin with.

Once you get into the high-rent scope models, you'll find storage capability, which is a method to freeze the display even after the input has been removed. Early storage scopes used a charged grid inside the CRT face, though most current units contain some type of digital memory that can be "looped," so to speak, much like the repeat-hold feature of a digital delay line. As can be seen, an oscilloscope is an absolute necessity if you plan on doing any serious repair work or experimentation.

TROUBLESHOOTING — RECENT CASE EXAMPLES

In the "embarrassing-but-true" category, one nasty item that took me over a year to solve involved the capstan motor in one of our Otari two-tracks. The darned thing would just coast to a stop in the middle of a crucial mix, or during the last few seconds of a 60-minute copy. You know, once a week or so. Of course, the moment you touched the machine, it would spring back to life, which made diagnosis pretty tough.

The first thing I checked was the power supply feed that went to the servo amplifier board. I tugged on every red wire I could find, and wiggled every possible PC connector, but that just wasn't it. So I wired an LED across the power feed to the board, and asked everyone who used it to check if the light stayed on when the motor stopped. If it did, the problem was on the circuit board — for which I had no schematic. If it went out, then the problem was an interruption in power. Well, the LED did go out, though with my voltmeter connected at the same time, the power was clearly there. I thought I must be in the Twilight Zone!

Of course, if I hadn't been so hasty in connecting my meter ground to the power supply common, rather than at the servo board where it should have been, I would have discovered that it

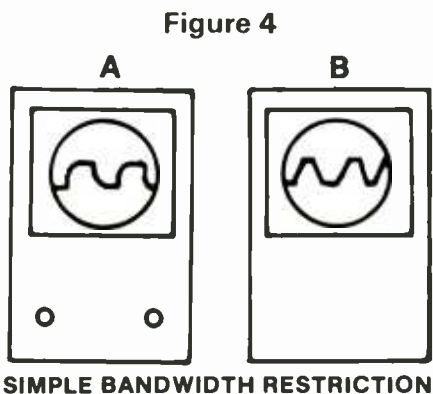


Figure 4

SIMPLE BANDWIDTH RESTRICTION

was the ground that was intermittent. And, of all things, it was caused by a bad solder connection of a PC jumper, far from where I had been looking all along.

And then there's the other kind of problem — where nothing's actually broken, but you still have to make it right. I've always been a ReVox fan — fine Studer-made equipment at about a third the price — but there is one glaring defect that has never been addressed: they just can't handle professional levels. On most tape machines, if you simply turn down the input gain you can hit it as hard as you like. Unfortunately, with a ReVox there is a pre-amp stage *before* this level control and, when overloaded, it makes a terrible "cracking" sound. Cheap solution really — just add an input attenuator (maybe 15 dB or so) and the problem will be gone for good. I've done that to all of our machines, in addition to several for other studios.

But what about that horrible sound you can get through your speakers every time the refrigerator or some other appliance switches on or off. I found that the best solution was to install a power line filter, either at the offending appliance, or in series with the feed to the audio equipment. I have always felt that our water cooler was one of the best pieces of "outboard gear" we ever bought. The only problem was the ticks and pops it caused in the monitors, which occasionally got on to the tape.

For less than \$20 each I bought some terrific line filters made by Cornell Dubilier. The APF1031L handles up to 10 amps, and will completely get rid of all kinds of junk riding on the power lines. Other filters in that series are available to economically handle a wide variety of load requirements, which brings us to yet another important use for these filters.

RF energy from nearby transmitters and other sources has an easy path to your AC outlets, because the wires out on those poles act as huge antennas. When we first set up our studio in its present location, nearly all of the equipment — console, limiters, delay lines, etc. — appeared to be oscillating at around 500 kHz or so. I immediately ruled out any kind of RF interference, because the recording complex is 15 feet under ground. And besides, I had done a thorough test before we signed the lease, since I know that a CB problem can be terminal.

Adding extra compensation capacitors to all of the console's summing amps seemed to help a little, but there was just no getting rid of it completely. Maybe it's a grounding problem, I thought. A friend came by and suggested that I get the heaviest welding wire I could find, and beef up all the ground connections between the console and the equipment racks. Twenty feet of #00 and \$60 later, the oscillation was still there, although that last little bit of hum (a different problem) was finally

gone. With console panels open, and scope probes connected everywhere, we began turning off the various pieces of equipment one by one.

Limiters off — still there; tape recorders off — same thing; equalizers and delays — still the same. Well, we finally hit upon the truth when the console was switched off and the "oscillation" not only remained, but got worse. Normally, it is not a good idea to stick your oscilloscope probes directly into an AC outlet, but with a 5 or 10 pF capacitor in series with the scope inputs, all that could get through would be RF — and it did. Again the power-line filters did an admirable job of cleaning up our act, and there was yet another benefit as well: the dbx noise reduction units were performing better than ever!

But if you really want a tough one, try finding the cause of dropouts on a high-speed in-cassette duplicator. I don't mean the electronics were switching on and off, but the volume would just sort of fade in and out at random. It doesn't take an Einstein to realize that the problem is most likely mechanical; but how the heck can you see what's going on within the cassette shell, and there's no easy way to slow the motors down. Our particular model — the Wollensak 2776AV — uses one master and can make two cassette copies at a time, but was it the master or the slave transport that was causing the problem?

All of the head assemblies appeared

secure, but it still seemed best to start at the beginning: I made a 5 kHz test tape on a recently aligned regular cassette deck, and played this in the master slot. The meters remained pretty steady, and I took the opportunity to align the heads while I had the chance. The real problem, of course, was checking the heads on the slave cassette transports — a tedious trial and error process at best. And that still wouldn't account for the level fading in and out.

I did finally notice that the pinch rollers were not exactly round anymore, but had become sort of cone shaped; apparently from heavy use. This must have caused the tape to ride up the capstan but, as I said, you can't really watch this happening. The following morning new rollers were on the way and, at last, I was able to put this one to rest.

As has been so wisely pointed out by the *R-e/p* staff, eventually I'm going to run out of these fabulously exciting troubleshooting stories to relate. It had been suggested that I begin looking for input elsewhere. Therefore, if anybody out there has some interesting or enlightening experiences to share, or even just some handy maintenance tips, you are cordially invited to drop me a line at *R-e/p* (address on the contents page). ■■■

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A Novel Modular Construction Technique For db Recording Studios, Florida

**An Easy-to-build and Removable
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by Tom Paine

When a well known studio designer and pro-equipment dealer decides to build his own studio, you can bet that it won't be just a "run of the mill" room. Case in point is South Florida's newest "World Class" studio, db Recording. Located in North Miami, db Recording Studio represents a good example of a knowledgeable but pragmatic approach to studio design for the Eighties, and incorporates many ideas soon to be seen elsewhere.

Seth Snyder, president of Florida's Recording Studio Equipment Company, has aided many of today's top artists in the design and construction of both "personal-use" and "commercial" studios, among them The Bee Gees' Middle Ear Studio, K.C. and the Sunshine Company, European notable James Last, and the late Bob Marley. When Snyder decided to build db Recording, he wanted it to be a showcase for the latest in studio hardware from MCI, and also a demonstration facility for a new concept in studio construction techniques, called "Modular Perfection." Equally important, Snyder wanted a comfortable, workable room that would pay for itself as a viable production facility, and his choice of equipment and studio design enables db to offer an unbeatable combination of features and value — a combination he intends to pass along to any clients.

Sharing the feelings expressed by many other Floridians that the State is destined to become a new center for productions of all types — music, teleproduction, and films — Seth Snyder has

built db Recording to cater to the needs of all those requiring high-quality audio recording facilities. Although he does not talk too much about the potential for video production in this studio, the extra large studio space, high ceilings, and a control room that can best be described as huge, make it obvious that db can handle very diverse requirements — to say nothing of the fact that there is enough power brought into the main studio to light a small town.

The Modular Design Approach



The db Recording Studio is one of several new rooms to take advantage of this unique concept in studio construction, and the idea is gaining popularity every year. It all started several years ago when Snyder was discussing with some friends the problems facing the "start up" studio, particularly regarding design and construction. At that time a studio owner had about three ways to go, all of them with some disadvantages. If you were on a tight budget, you could do the design yourself and then subcontract it; you could even try to

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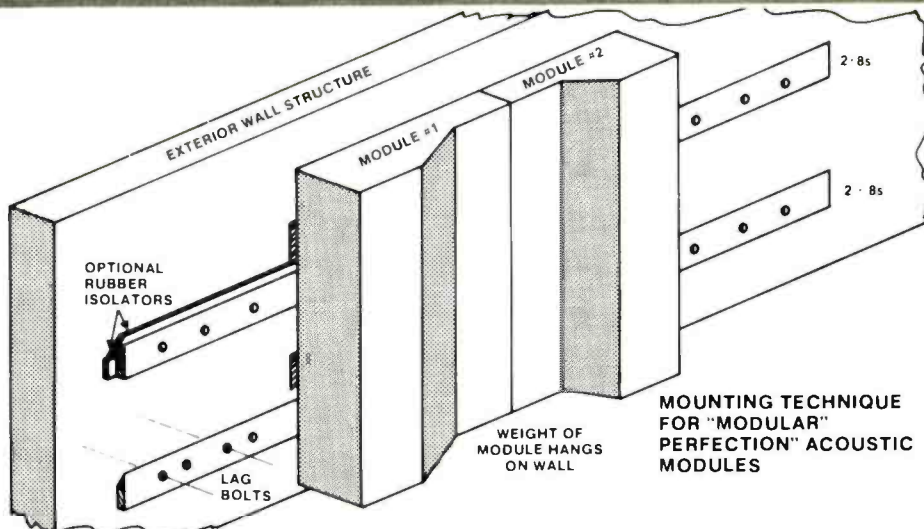
build it yourself if you dared. If you had a little more financing, you could turn to one of the well known studio design consultants and have him plan it out — but you were still faced with finding contractors who knew how to do the job right, the first time. Of course if funding was no problem, you could go to a “turn-key” outfit, who would then employ a consultant, subcontract the work, and give you a good or even great room. Then all you had to worry about was doing enough business to keep the banks off your back.

All of these approaches, save the last, are fraught with many dangers, not the least of which is the problem of finding local contractors who have the least bit of feeling for studio construction techniques. And all three approaches have two fundamental disadvantages: it takes a long time to build a studio this way; and when you are done you have an enormous amount of money sunk into a building somewhere — so much, in fact, that it has long been a wise move to “buy the building,” thus protecting yourself against the whims of landlords.

Even if you have the money this is not always possible, particularly if you wish to put your studio in a high density, high priced area — like almost any US city. And what if you want to move? Although multitrack recorders and automated mixing consoles are hardly what you would call “portable,” they can go with you (along with the piano and the Hammond B-3). Not easy, but do-able. But the walls, the windows and doors, several tons of soundproofing and numerous other interior decor items usually stay where they are, to be just another pain to the new owner or tenant.

In 1978 a company called Modular Perfection was formed to provide an alternative to the more traditional methods of studio design and construction. The concept was simple: design and construct individual modules that could be assembled in a variety of ways to create spaces that are acoustically correct and aesthetically pleasing. Build these modules in a factory environment and make them as complete as possible, including trapping, conduit for electrical lines, and separate PVC conduit for mike and signal lines. In short, create a system which would enable a studio to be built in record time within almost any space; a studio where you could take the walls with you should a move be necessary.

Since already Seth Snyder had built several of these modular studios for clients located all over the world, it was logical for him to use the system at db Recording. Early this year three tractor-trailer rigs pulled up their loads to a nondescript warehouse location in North



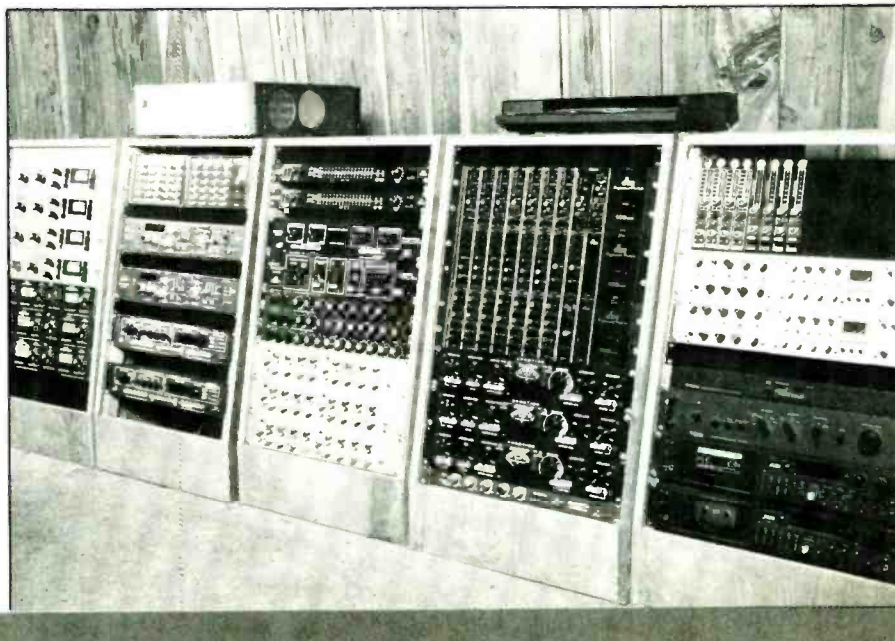
Miami, and within three weeks the basic studio “shell” was up, ready for delivery of console and multitracks. To construct the studio, 83 modules in all were used: 34 to form the main studio; 28 for the control room; and 21 for the large isolation room.

Individual modules can be installed in a number of ways; db chose to use them free standing and locked together with panels nailed to the back. Other installation methods involve “hanging” the modules from the walls of an existing structure, using strips of 2 × 8s with angled bevel cuts on the long sides (one 2 × 8 on the wall and one nailed to the module). The modules are then lifted into place and hung on the walls. If additional isolation is required, rubber strips can be placed within the mating bevel joints, and the wall strips can be mounted on rubber as well. The free-standing approach used at db offers good isolation from outside noise, and could be taken one step further with little effort. This would be to construct a “floating” slab floor, and then free-

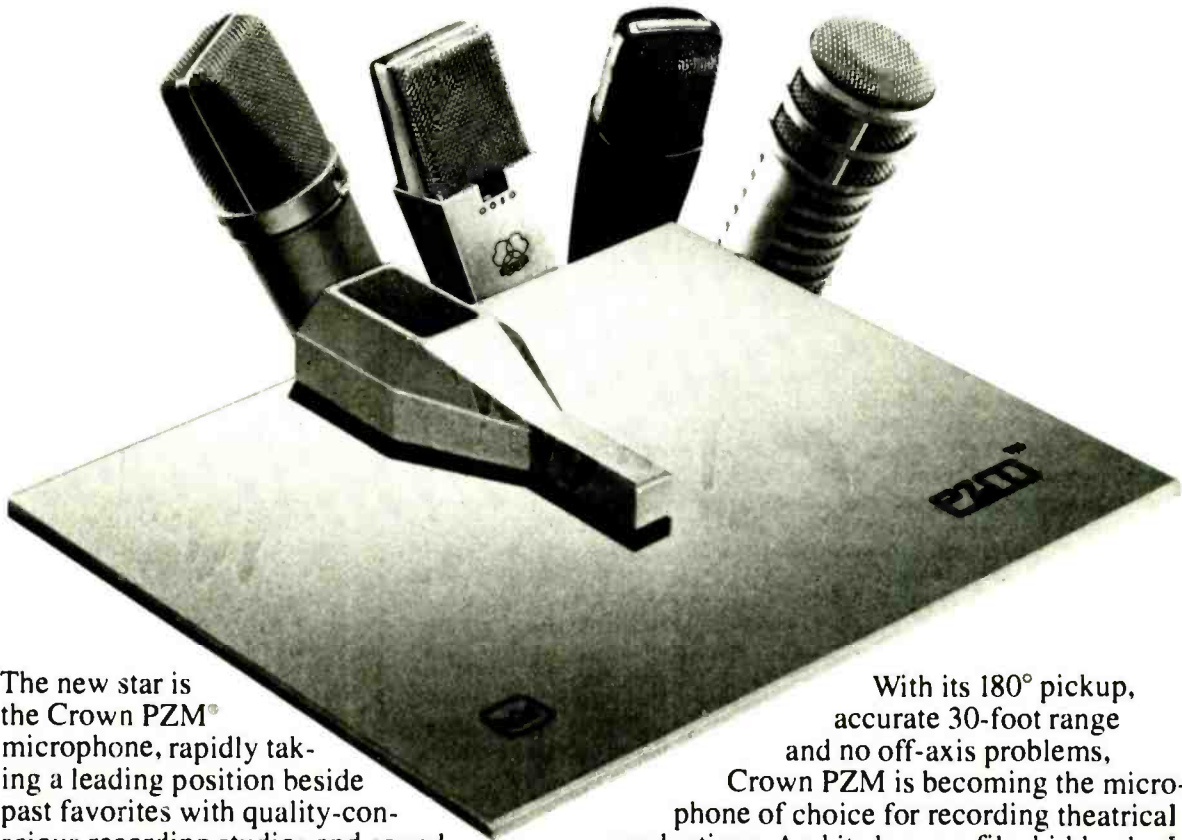
stand the modules around its perimeter. Although this approach has yet to be taken with Modular Perfection, it probably would offer the “ultimate” in acoustic isolation.

The modules weigh in at over 400 pounds each, and careful attention to detail in the construction phase is necessary to avoid compromising the acoustic and aesthetic integrity of this design approach. Special tools are also required to make possible fast installation. For all these reasons the makers of the Modular Perfection system include installation with every sale, and discourage “Do It Yourselfers.” A malleable Modular Perfection system has been developed to meet the needs of broadcasters, and these systems can be installed by the user. When a system is designed, every module is numbered and they come off the truck in plastic overwraps, ready for installation in order, thus eliminating the old “put Tab ‘A’ in Slot ‘B’” type confusion.

After the shell is up electrical contractors can come in and pull their wires



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CONSOLE SELECTION FOR db RECORDING STUDIO MCI's new JH-652 Console — Capable of Being Operated in Both Split and In-Line Formats

by Gregg Lamping, Technical Representative
MCI, A Division of the Sony Corporation of America

The console selected for the new db Recording Studio had to fulfill some very special requirements. Not only did it have to meet or exceed specifications considered "pro" — such as signal-to-noise ratio, crosstalk, etc — but it also had to offer great versatility in its mixing, routing, and cue functions, while still remaining sensible in controls and ergonomics. In addition, the console was to be used with a variety of production formats (everything from dual multitracks, to digital, to direct to half-inch two-track) and operated by a wide cross section of engineers and producers — each with their own preferred method of operation. Since db was to cater to the needs of many guest engineers and producers, the board had to be quickly understandable and easy to use as well.

It was exactly these goals that the MCI console designers had in mind during the conceptualization and realization of the new JH-652, making it an ideal choice for db Recording's new facility.

Inputs, Outputs, and Sends

The JH-652 uses the standard JH-600 Series input/output module which, coupled with considerable design innovations in the main frame and master/control modules, provides the console with unequalled performance and flexibility. With master control sections in the center of the desk, and 26 I/O modules on each side, the board may be configured to operate as a standard "American" style in-line console, or as a "Split" console with inputs and channel outputs on one side and monitoring on the other. Full effects sends, EQ, grouping, etc., are retained no matter what configuration is selected, and changing from one operational mode to another requires only the push of a button. The channel bussing output select buttons on the left side of the console feed the active combining networks on the right side. In this way, working with dual multitrack machines and performing complex submaster-to-master 24-track bounces required no patching. In addition the "-2" or stereo (combined two-track/monitor) mix bus output can be fed from the left, right, or both sides of the console. Control room monitoring also offers these selections, independent of the mix bus.

The six sends on each side of the console can be operated together for all 52 channels, or split in the same way as the mix bus. Four cue submaster modules allow for feed to cue from any of the six sends, or the "-2" mix from either or both sides, as well as an auxiliary input and studio monitor feed. Studio select routes whatever signal source is selected on the studio monitor module to the cue feeds, making playback to cue from any control room source as simple as pushing a button.

Console Automation and Grouping Functions

The console's automation (standard equipment on the JH-652) is configured in a way to complement the "-2" mix routing functions. Either side can be operated independently, or all 52 channels automated together. A mix made on one side can be moved to the other side while retaining its channel and effects integrity.

Master faders for the eight subgroups can be selected to be any of the 52 channel faders, enabling the mixing engineer to locate the group masters anywhere on the console. For example, an entire left side submix can be controlled from the left, the right, or anywhere the mixer finds most convenient — thereby putting the masters where they should be, in the area of the console where the operator is working. Should the operator's position change after group masters are selected, they can be deselected and moved to another location on the console without affecting the automation levels.

In addition to the 52 channel faders, six "wild faders" are provided in the center section of the board. These can be used as submasters, and are available at the patch bay for automated level and mute control of any audio in the studio facility. Overall VCA master control is accomplished by one VCA Grand Master fader that controls two more masters — one for the left side of the console and one for the right, controlling all VCAs and groups.

Metering Systems

The JH-652 metering system features MCI's newest generation Plasma Display 100-segment bar graphs on channel and mix outputs, and includes conventional VU metering on the mix bus as well. The Plasma Display system can be operated in the Peak Reading mode (DIN-standard ballistics), or used to read the DC levels controlling the automated faders. Metering of sends and "-2" mix is independently selectable for the left or right side or the entire console. A phase meter is also included as standard equipment.

through pre-installed conduit in the walls. Most wiring is then brought to the top of the module structure and tied together through more conduit. Signal lines can be treated in the same manner, and run through PVC conduit to the control and equipment rooms.

Main Studio and Isolation Rooms

The first thing that strikes a visitor to db Recording's main room is a feeling of spaciousness. A high ceiling with track lighting and extensive trapping is coupled with what seems like acres of floor space, yielding a room which could comfortably hold a big band, or even an orchestra. The modules that make up the walls of the studio are shaped to form low-frequency traps, and slotted wooden surfaces cover a proprietary damping material that fills the interior, thus providing uniform absorption. Vertical strips of wood cover the face of each module, and a variety of woods — fir, cypress, and cedar — give each module a different acoustical characteristic. The floor is half thick parquet tiles and half earth-toned carpeting, also providing two distinctly different acoustics. There is nothing to reveal that the walls are made of "building blocks," since once they have been installed with nailguns and glue all joint lines disappear.

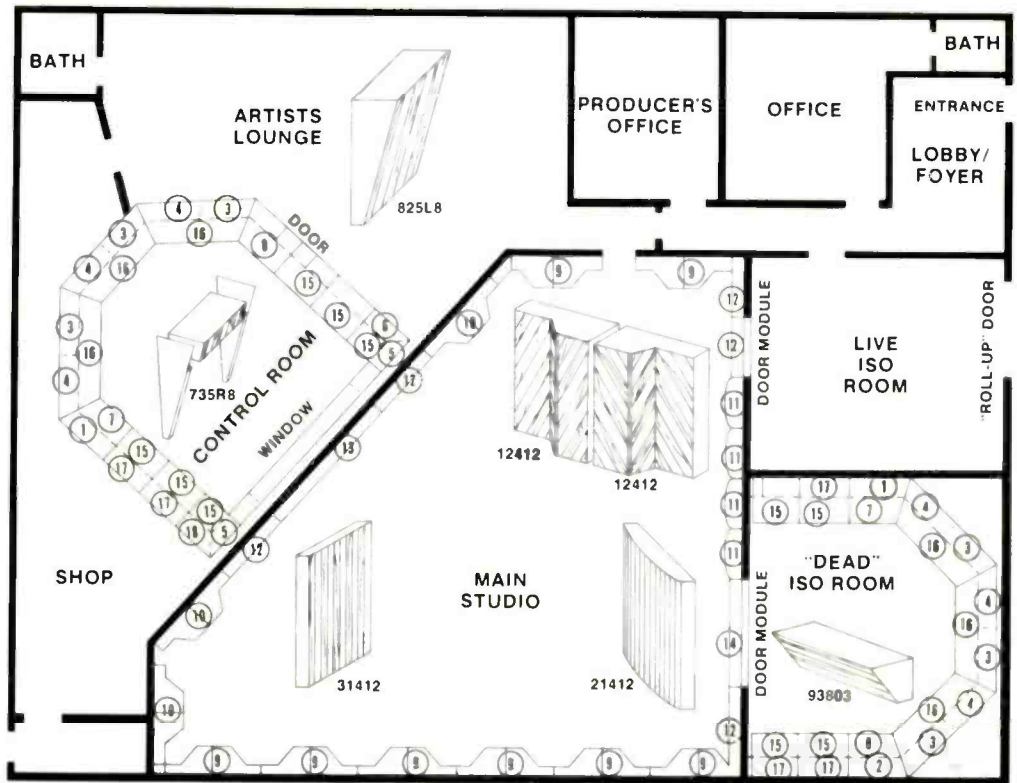
A walk through the main studio's warm comfortable atmosphere leads to the double glass doors of the first isolation room. A semi-hexagon measuring about 20 by 25 feet, the room is normally host to a Yamaha grand piano, and has a very dead acoustic. There is some wood in sight, and all microphone and cue lines available in the main studio are brought out at a connector panel here as well. More noticeable are the large acoustical "wedges" pointing down from the ceiling and in from the walls, providing a very high degree of broadband absorption. Average decay time of the room is on the order of 0.2 seconds, but this small a figure is hard to measure accurately. Another isolation room is to be found off the main studio. Ultra-live in characteristic, it is the only "standard" construction room in the complex. Measuring 20 by 12 feet, the live room has a cubic volume of 2,000 cubic feet, and non-parallel walls and ceiling. Its average decay time is 1.06 seconds; 1.75 seconds at 500 Hz.

Another interesting feature of the studio is its air-conditioning system, which does not use any ducts or fans. Instead, specially made refrigerant pipes line the ceiling, and air circulation is by convection only, thereby maintaining a comfortable temperature at all times without noise, and saving approximately 60% on the power bill compared to conventional systems. Various units are available to provide cooling capacities between 12,000 BTU (1-ton) and 37,500 BTU (3-ton).

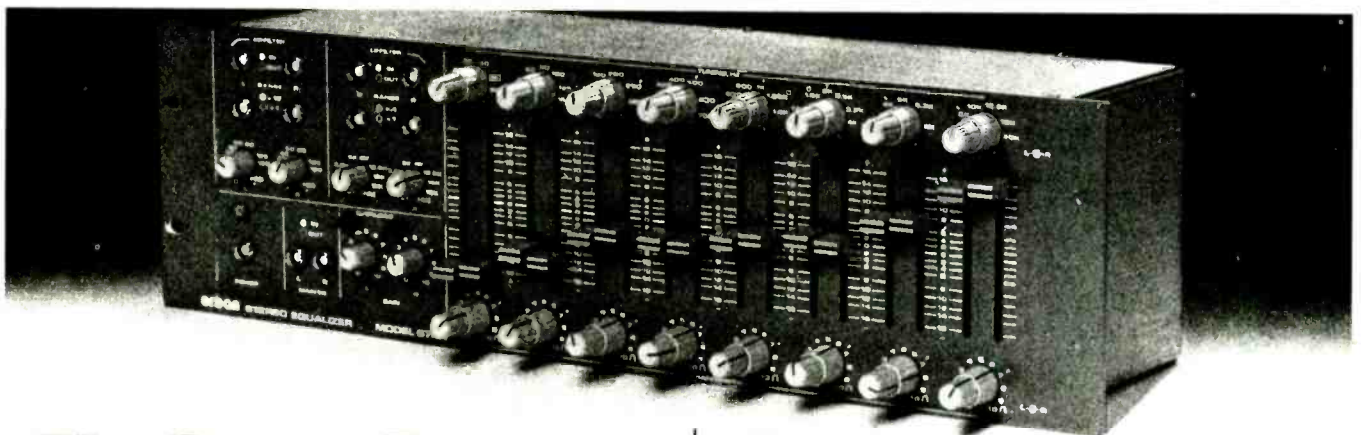
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KEY TO LAYOUT OF ACOUSTIC MODULES

- 735R8 1
- 735L8 2
- 825R8 3
- 825L8 4
- 3924R8 5
- 3924L8 6
- 4923R8 7
- 4923L8 8
- 11412 9
- 12412 10
- 21412 11
- 31412 12
- 31124 13
- 31809 14
- 92403 15
- 93803 16
- 283408 17
- 39234L8 18



Floor Plan of db Studios, showing positions and orientations of acoustic treatment modules laid out within the existing building shell.



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Control Room

Hexagonal in shape, and with extensive ceiling and wall traps, the control room echos the main studio's spacious feeling. A Live-end/Dead-end™ design, the control room floor area measures 475 square feet; total volume is 5,000 cubic feet. Primary production hardware is MCI's latest JH-600 Series console, the JH-652. Designed for use with dual synchronized multitracks, this 52-input desk is of a "split format" configuration, allowing each side to be used separately and independently, including automation. When a session requires only 24 tracks, one side of the board can be used for basic tracks, and the other side set up for mixing material from a completely different project — thus saving time when the studio is busy with back-to-back projects.

Two transformerless MCI JH-24 24-tracks are provided, two 1/2-inch stereo JH-110B machines being used for mix-

down. A 1/4-inch JH-110A is also provided, and if digital mixdown is desired it can be accomplished with two Sony PCM converters coupled with U-Matic format video cassette recorders.

Hard-wired into the console are two Studio Technologies Ecoplates, and a SDRE 2000 Digital Reverberator. Two separate cue systems are provided for the studio headphone mix, both of them in stereo. Forty-eight channels of Dolby noise reduction are available for use with the multitracks.

Three different pairs of control room monitors can be switched in from the console. The standard monitor choices are JBL 4435 systems driven by JBL 6233 "Ice Cubes" (bi-amplified), UREI 813A Time Aligned™ monitors driven by a UREI 6500 power amplifier, and Technics HoneyComb Disc speakers, driven by another "Ice Cube." Of course the ubiquitous Auratone 5C Sound Cubes are also provided.

The db Recording Studio has an open mind towards monitoring, even with all these choices available. Specially constructed roll-around speaker platforms

CONTROL ROOM EQUIPMENT COMPLEMENT FOR db RECORDING STUDIO

Multitrack and Production Hardware

- JH-652 Split Format Console; 52 inputs fully automated
- JH-45 Auto Lock SMPTE/EBU Generator/Reader/Synchronizer
- Two JH-24-24 Multitrack Recorders
- Auto Locator III
- Two JH-110B 1/2-inch Stereo Recorder/Reproducers
- JH-110A 1/4-inch Stereo Recorder/Reproducer
- Two Sony PCM Audio Converters
- Sony U-Matic Recorder
- Two TTM Dolby Frames with 24 Dolby Cards Each
- Sony DRE 2000 Digital Reverberator
- Two Studio Techniques Ecoplates

Processing Gear

- Three dbx 900 Signal Processing Frames containing the following modules:
9 904 Noise Gate/Expanders
8 903 Compressors
4 902 De-Essers
8 905 Parametric Equalizers
1 906 Flanger/Phaser
- Four UREI 1176-LN Compressor/Limiters
- Six UREI LA-3A Leveling Amps
- Two Eventide H-949 Harmonizers
- Eventide H-910 Harmonizer
- Three Eventide 2850 Omnipressors
- Eventide Clockworks FL-201 Flanger
- Two Lexicon Model 93 Prime Times
- Two Valley People Frames containing:
4 Kepex II
4 Kepex

- 4 Gain Brains
- 4 Gain Brain II
- Two Delta Lab DL-1 Digital Delay Lines
- Delta Lab DL-2 Acousticcomputer
- Two Orange County Vocal Stressors
- Three Audio Arts 2100 Parametric Equalizers
- Three Orban 622B Parametric Equalizers

Monitor Systems

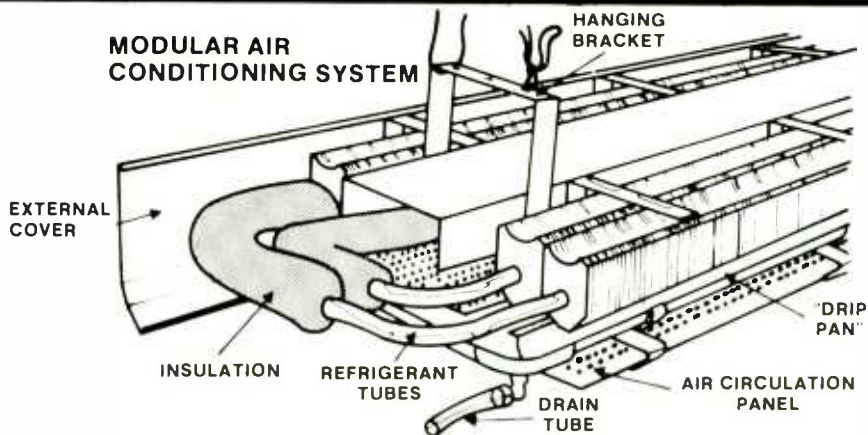
- Control Room: two JBL 4435 Monitors bi-amplified with JBL 6233 "Ice Cubes"; two UREI 813A Time Aligned Monitors driven by UREI 6500 power amp; four Technics Model SB10 HoneyComb Disc Speakers driven by JBL 6233; two JBL 4311 monitors; two Auratone 5C Sound Cubes.
- Studio: two JBL 4331 WX Monitors driven by JBL 6233 "Ice Cubes."

Microphones

- Eight AKC C-414s, five C-452s, two D-12Es, two D-170Es, two D-190Es, two D-200s, D-224, and D-1000E
- Two Electro-Voice RE55s, five DS-35s, three CO-15s, and three CS-15s.
- Five Neumann U-87s, and six U-47s
- Three Shure SM56s, two SM59s, SM53, six SM57s, and four SM7s
- Sony C-38B and three ECM 56Fs

Instruments

- Yamaha "Conservatory Model" 7 1/2-foot Grand Piano
- Fender Rhodes Piano
- Wurlitzer Electric Piano
- 7-Piece TAMA Drum Kit



are available, so that any guest engineer who wants to "bring his own" can easily move them into the control room and place them exactly where he requires. Additional monitor lines are already in place, enabling a guest's monitors to be hooked up quickly and with a minimum of effort.

A series of waist-high wooden racks attractively house almost every effects and signal processing unit imaginable, with many pairs and even four of some of them. These roll-around racks can be moved right up to the console, and all units are terminated at the JH-652's patchbay for easy access. (Rather than describe in detail what devices are available, a full list of outboard process-

ing equipment is to be found in an accompanying sidebar to this article.)

Clearly, db Recording has accomplished the objectives that Seth Snyder aimed for when he began construction, and already several major recording projects have been completed. The studio's complement of instruments includes a Yamaha Conservatory Grand piano, Fender Rhodes, and Wurlitzer electric pianos, and a TAMA Drum set; more acquisitions are planned. When interviewed for this article, Snyder summed up the construction of db Recording as follows:

"I'm very pleased with the way the facility turned out," he offers, "and as we complete more and more projects we are continuing to discover 'sweet spots' in our main studio and isolation rooms. We built this studio to show what could be done today, quickly and without 'Howard Hughes' type financing. We have invested in proven analog technology, and offer the advantages of digital mixdown to any clients who may desire it. After all, the *tune's* the thing, and the most important aspect of a successful room is that it be priced at a level which makes it accessible to new artists and their recording projects. The rates a studio must charge — unless it is in the business to lose money — are directly related to the capital that it took to build the place. When we put db together we coupled the cost saving advantages of the Modular Perfection System with MCT's proven analog multitrack technology — and are thus able to offer a tremendous creative tool [the studio] at prices which make sense to almost everyone. It is interesting to note that our complete multitrack system — console, two multitracks and synchronizing hardware to go with them — all together cost less than just one of those new digital multitracks; and we at db are confident that we can deliver a top notch sound quickly and easily to even the most demanding clients." ■■■

DECAY TIME AND ISOLATION MEASUREMENTS

All measurements were taken during July 1982 using an Inovonics Model 500 Acoustic Analyzer and AKG C-452 EB microphone fitted with an omnidirectional capsule.

Decay Time

Decay time was measured at a variety of frequencies on octave centers, and a mathematical average is quoted unless otherwise specified. In all cases at least six frequencies were used.

- Main Studio: Average decay time 0.4 seconds (RT60)
- "Dead" Room: Average decay time 0.2 seconds (RT60)
- "Live" Room: Average decay time 1.06 seconds; 1.75 at 500 Hz (RT60)

Isolation

Using the studio monitors located immediately below the main studio/control room window, the main room was driven with pink noise to 115 dB SPL measured at 1 meter on-axis to the speaker. The analyzer was used to measure broadband noise in the adjacent rooms, and the figures below represent the difference between the SPL in the main studio and these measurements. All sound locks were closed during measurements.

- Studio to Control Room: 55 dB
- Studio to Isolation Rooms (either): 50 dB
- Studio to Outside of Building: 55 dB



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A piano is capable of being literally all things to all people. An acoustic grand can be the glue that holds a ballsy rock'n'roll band together; the featured soloist of a majestic classical orchestration; or the multi-textured rebel leading an avant-garde jazz trio. Unfortunately, a piano is also the most mechanically complex acoustic instrument, as well as the toughest to master by a musician or recording engineer.



Essentially, there are three ways to record an acoustic grand piano. The simplest method is to put one microphone in the center of the room and turn on the gear. This, however, is probably feasible only for a solo piano track, or for a group that knows how to balance itself, and can play together dynamically. Since we're referring to rare and almost extinct occasions, respectively, suffice it to say that a good condenser microphone, positioned where your ears tell you the sound is appropriate, represents the best rule of thumb. Any further supplemental advice would be difficult to articulate without knowing about all the specific conditions of the event.

The two other methods available involve work in or very near the piano; these of course, are "close" and "distant" multiple miking techniques. ("Distant" in this instance pertains to that area greater than six inches from the strings, yet no more than approximately a foot or two outside the box.)

Because the topic of this article is recording *music* — the utmost intangible physical entity — subjective gauges, such as moods, feelings, tastes, and fear of not being paid by a dissatisfied client, are all incorporated to measure the quality of a given keyboard sound. As a result, the result of any survey regard-

ing recording techniques reflects a number of similarities when it comes down to fundamental approaches, but several direct contradictions in terms of individual procedures and preferences.

Certainly that's as it should be. Melodies and tones affect everyone in their own unique way, and none are inherently good or bad. Rather, they all serve a function, no matter how obscure, and the engineer's sole concern is to get it on tape.

It should be noted that, because practically all studios feature grand pianos, this article will focus primarily on acoustic grand miking. Upright and other stringed keyboard considerations are reserved for a separate section of their own.

Fundamentals of Acoustic Keyboards

It is common knowledge that a standard piano keyboard extends from the A in the fourth octave below middle C (27,500 Hz) through 88 keys to C in the fourth octave above middle C (4,186 kHz). In a typical baby grand piano, the 60 top notes have three strings each, the middle 18 two strings a piece, and the extreme 10 bass notes are produced by 10 single strings. This configuration does vary with the size of the instru-

ment. As a further point of reference, the full cast-iron frame in a small grand weighs about 250 pounds, and sustains an average tension of approximately 50,000 pounds. A concert grand frame, weighing as much as 400 pounds, may support up to 60,000 pounds of tension.

The three pedals located in the middle of the piano under the keyboard provide three specialized functions. From left to right: the "Soft" pedal shifts all of the hammers slightly to one side, so that the hammers strike fewer strings and the volume is decreased; the "Sostenuto" pedal sustains only the notes that are played at the time the pedal is depressed — all the other tones are damped normally when their respective keys are released; and the far right "Forte" pedal disengages all the dampers so that the strings are free to vibrate until the pedal is released, or the tones die away.¹

The sound of a piano originates once the strings are hit with a felt hammer attached to the inside end of a key mechanism. After that percussive attack, the energy is transmitted via a wooden bridge to a soundboard which, in turn, radiates the sound out into the air.

As well as the dominant fundamental tones produced, a piano also produces a myriad of upper harmonics, or partials.

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Recording Keyboards



However, these partials are not as musically harmonic as one would think. Only a string that lacks stiffness will produce naturally harmonic overtones. When the stiff, wound strings of a piano try to return to their normal rest position after being struck, the overtones produced tend to be noticeably sharper than the normal harmonic series. This discrepancy is what generates the unique tonal qualities of acoustic pianos, and creates the problems encountered when trying to pin down the best methods of piano miking and recording.

Interestingly enough, there is a natural progression towards a standardization of pianos — or at least of choices. According to session musician/producers like Jai Winding and Michael Omartian, the trend seems to be towards Yamahas. "When I first came to town," says Winding, "the choice of studio owners used to be Steinway B's. I think the most popular piano in town now in terms of numbers is the Yamaha Conservatory C-7. They are sort of the workhorse of the industry — the most dependable and even."

Omartian sees the same kind of tendency occurring, but offers some additional insight into the wide acceptance of the Japanese import. "Most session players want a little lighter action," he considers. "It's the fact that we're all out of practice, and the lighter the action, the less the wrist strain and muscle strain. When you're going from date to date, you don't have time to sit home and do your finger exercises. So the action's really important.

"For me, I prefer a kind of medium- to light-action piano in the studio. The old



MICHAEL OMARTIAN is probably most familiar as the multiple Grammy-winning producer for Christopher Cross, and for his Academy Award on the title theme from the film *Arthur*. But as a talented keyboardist, Omartian has a studio track record a mile long with artists such as Steely Dan, Dolly Parton, Manhattan Transfer, Neil Diamond, Billy Joel, Boz Scaggs, and many more.



Session keyboardist **JAI WINDING** moved to Los Angeles in the early Seventies. One of his first gigs was as half of a duo with an unknown vocalist by the name of Al Jarreau at a showcase club (Bla Bla Cafe) in the San Fernando Valley. Since then Winding has done albums and tours with Jackson Browne, Seals and Crofts, Dave Mason, Boz Scaggs, Cheap Trick, and Bonnie Raitt, who he also produced for the *Urban Cowboy* soundtrack.

Steinways can't be beat, but neither can the new Yamahas. In every instance I've used Yamaha, they seem to be the best right out of the box. Everybody's buying them in a studio situation. I seldom see any other brands."

Although this may sound like a commercial for Yamaha, the fact is that the brand is catching on. And that's not really too unusual when you consider the other tonal trends that periodically sweep the recording industry — such as "disco" for a large-scale example, or the rash of "What a Fool Believes" pianopart clones. But what is not normally considered when listening to the piano tracks on the thousands of records released each year, is that someone is tuning and voicing all of those instruments. Is it possible that one man could be responsible for the care and maintenance of that many keyboards? According to Jai Winding, "There are so few good piano technicians in Los Angeles that the studios have become dominated by the bias or outlook of the most popular piano technician on how to prepare a piano for recording-studio use. Keith Albright has single-handedly cornered the market in this town, especially for new pianos. His pianos have a particular sound — a great sound — and his legacy is all over the city."

By Albright's own estimation, he services approximately 30 to 40 of the major studios in Los Angeles, which means that a corresponding high percentage of the LA-produced records and soundtracks feature, or at least contain, the results of his technical experience. What follows are some of Keith Albright's insights into the acoustic piano:

Differences in Sound

"Pianos definitely differ from brand

to brand," Albright points out, "and primarily in the amount of clarity. The Yamaha is the clearest of all; that's why they're easier to tune. The partials break up pretty evenly for all three strings for any one note. But on a Steinway, there are more conflicting partials. That makes the tuning more difficult musically, and what we're trying to do is make the piano sound *musical*. Whether it's tuned to the exact formula is not the main concern. A good technician will let the individual instrument determine how to get the best sound out of it."

A piano is usually tuned by listening for specific beat tones between certain notes. An alternative is a stroboscope, but this method can be tricky. The 'scope must be calibrated as the tech proceeds up the keyboard, always increasing the sharpness of the note by a very small amount to take into account the building up of partials, which are not exact harmonics. It's these subtle relationships that define the musical character of a grand piano.

Pianos tend to sound best after about the first two years, Albright says. By that time, the hammers have cut into the string to the point where each hammer is striking all two or three strings simultaneously. This makes for much more power and clarity in the soft playing. The Japanese break their pianos in ahead of time with machines. When the instruments are taken out of the box at delivery, they already have the grooves in the hammers.

Generally, studios need to have a more brilliant tone. According to Keith Albright, "That excites the mikes so the engineers don't have to add EQ and lose some of their quality. It's easier to take some of that brightness out later, if they want to."

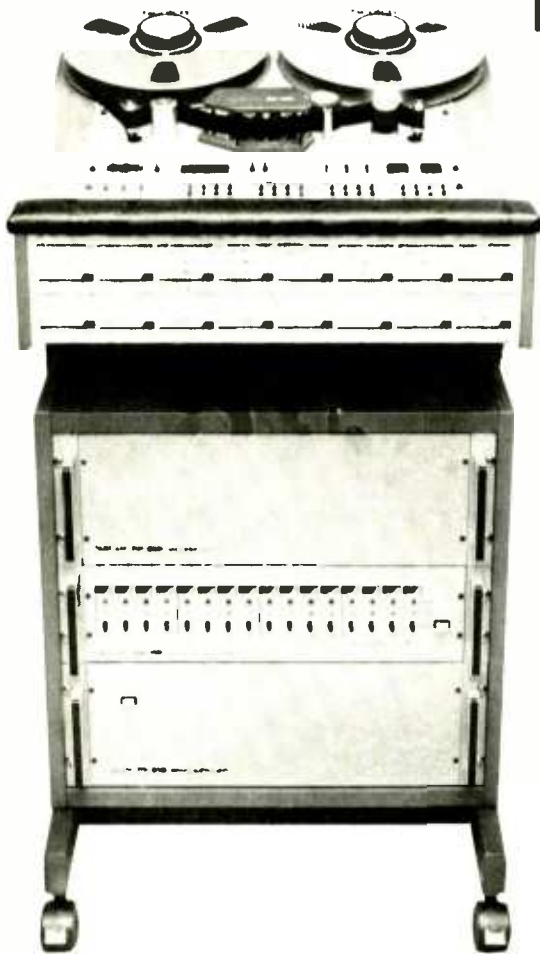
When a new piano is delivered to a studio, Albright saturates the hammers with a lacquer sealer, using whatever amount he thinks will bring it up to the degree of brightness the owner or engi-



BERNIE KIRSH started apprenticing in 1971 at Electric Lady in New York, and remained on staff there until 1978. Since then Kirsh has been chief engineer at Mad Hatter, Chick Corea's studio in Hollywood, where he does 99% of all the session work that comes in — from Stanley Clark to Roger Williams to Peter Dinklage.

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Recording Keyboards

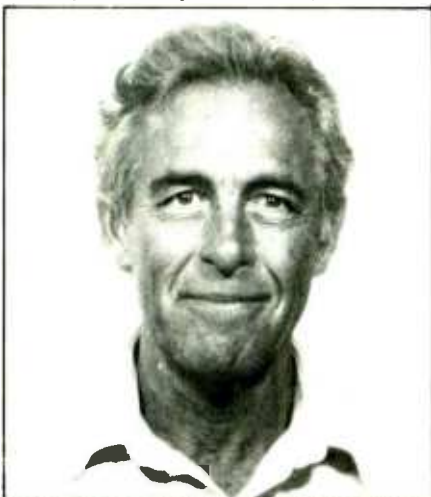


neer wants. "Usually on a new piano, it takes about two ounces of sealer to saturate the hammers," he says. "Then, if they need to use the piano right away, we dry them with a hair dryer. Otherwise, we let it dry overnight. When we come back the next day, some hammers will be a little more harsh than others. We'll needle those down to soften the felt, and make sure they're all even for a chromatic scale.

"We're basically aging the hammers ahead of time. We use the sealer, because it breaks down into a powder at about the same rate that the strings groove into the hammers. That way the hammers don't keep getting harder and harder. We used to use lacquer, but the hammers got so hard that we couldn't get a needle into them."

After two years, the tonal quality varies depending on how much use the piano has gotten: the more it's played, the sooner the strings crystallize. By gradually losing their elasticity, the strings become stiffer and stiffer, until they break.

To a guitar or bass player, a broken string is just an annoyance. To a piano owner, it could be a major headache. Keith Albright warns that "very often corrosion occurs between the coils in the wrapped wire, especially in the bass where there's only two strings per note. Then it's best to replace both of them to ensure that the timbres match. If they don't sound exactly the same, the discrepancy is obvious. Or, if the rest of the strings are getting dead because of age, or usage, one replaced string will stick



KEITH ALBRIGHT sharpened his expertise as a piano technician during his 24 years at Baldwin Piano Company, tending to concert grands. He left Baldwin eight years ago to become independent, and now counts the bulk of Los Angeles' major recording studios among his clientele, including MCA Whitney, Evergreen, Warner Brothers, Motown, Walt Disney's soundstage, Kendon, and so on.



GREG EDWARD has been engineering for 10 years; four of those as staff engineer at Caribou in Colorado, and the last two as chief engineer at Rhumbo Recorders, where he's recorded approximately 60 albums with acts like Eddie Rabbitt, Captain and Tennille, Beach Boys, and The Dirt Band.

out. In that case, it's probably time to replace the entire set."

A general maintenance schedule looks something like this. After they've been used about a year in a studio that's fairly busy, or by somebody who practices three to four hours a day, new pianos need all the screws tightened, the regulation checked, all the pedals adjusted, and so forth. But after that first tightening, the piano will usually go for maybe seven or eight years before anything else need be done. Even then it might require only minor regulation, like reshaping the hammers if it's been played hard.

"The rule for tuning is to tune it every time it goes out of tune," Albright says, laughing. "If the humidity condition is stable — not damp and dry [30 to 40%] — and if it's not subjected to unusual cold or heat [below 55°F and above 90°F], then it'll stay in tune much longer. Unless you have the piano in direct sunlight (which will provoke a change in about 10 minutes), humidity tends to destroy tuning quicker than temperature. A piano will take about 36 hours to finally get into motion with a change in humidity. If the room where the piano is becomes extremely dry, it will lower in pitch and go out of tune; the shorter strings will go farther out of tune than the longer ones."

Greg Edward, chief engineer at Rhumbo Recorders, finds from experience that "when the piano is dryer, it's sound is louder, because the wood transmits the sound quicker and more efficiently. The instrument is actually much more dynamic. This studio is not humidity controlled, but the temperature is usually a consistent 68°F."

Rhumbo, the Captain and Tennille's studio in Canoga Park, California, is also where Darryl [Captain] Dragon keeps his collection of keyboards. At the present time, the studio has two grand

pianos in the main room. One of the pair is a Yamaha C-7, "which is a very bright piano and exceptionally good for rock and roll," says Edward. "That's almost everyone's choice, simply because it cuts through on small speakers. The Steinway is a soft piano sound that's great for ballads, but it doesn't emerge through the track. It tends to sit underneath and 'muddy' up the track if you put a lot of overdubs on top. The Steinway I worked with at Caribou in Colorado was the same year, and model, but it had a very *hard* sound. The difference has to do with the hammers."

Microphone Techniques

When going for a bright sound that has to lift the track, Greg Edward uses three microphones (Figure 1). "I mike the hammers directly at the low end and top end of the hammers," he says, "and then center a microphone on the low strings at the thinner end of the box. I generally use Neumann KM-84's on the front section, pointed at the strings and about six inches above them. At the rear of the grand, I'll throw up a [Sony] C-500 or an AKG C414EB positioned about the same way in the same plane."

The piano is usually the first instrument to get lost on the AM radio. If the sound is spread stereo left and right in the mix, phase cancellations in mono can wipe out the track. Edward has found that, "using just two mikes causes you to lose a bit of the sound from the cancellations when the stereo goes down to mono. But if the center mike is added in the back of the piano, you have



As a singer-songwriter, **STEVE RIPLEY** built a personal-use studio in his home town in Oklahoma. On the basis of his tapes from there, Ripley recorded at Shelter Records in Tulsa, which led to engineering dates for Leon Russell, as well as a stint on a couple of tours as monitor engineer. In 1979 Ripley became Russell's personal recording engineer at Paradise Studios in Burbank, California. Last year, after Leon Russell moved to Nashville, Ripley stayed on in LA, and took a gig as Bob Dylan's guitar player. Now, when he's not touring or recording, he records special projects for close friends.

a good fill when the tracks are combined, and you still have a really good center image in stereo. All the mikes are in phase but, occasionally, I'll lift the rear mike away from the strings for a bit warmer, more ambient, sound. Then I have to reverse the phase. I generally play with it until I get it sounding exactly right."

Greg Edward spreads the mikes out in the mix — the left-hand at the full left side, and the right mike hard right. Since the stereo mikes are so close to the hammers, they see the impact, or transient, from the hammers, and the brilliance of the sound remains intact when the tracks are collapsed to mono. Also, the fill-in mike is always in the center, so that the mono image isn't lost.

"There is a little center-channel build-up," Edward offers, "but those mikes are really bright. They are not pulling a lot of low-end into the mix, because there's not a lot of low frequencies being transmitted to the harp at that front end of the piano. Generally, the low frequencies are pretty much at the sound holes; the hammers are getting most of the top-end. Even [with the mike] at the low strings, you're getting most of the brilliance of the low strings. So the low-end build-up is not drastic at all. If you were to fold just two mikes together, then you would get all low-end in the center, because the top-end would just cancel and die."

Recording a ballad, Edward would probably mike the Steinway with only two 414's on top angled down at about 60 degrees. "It gives you a warmer sound," he says, "but you still have the brilliance of the piano. Then I'd spread those out in the mix as I would for the Yamaha. Again, that kind of mix is not great for mono, but records on which I'd use that technique are not usually AM records. They tend to be more for playing and listening on good systems. If I did use a third microphone, it would be a tube condenser like a [Sony] C-24 placed underneath the piano."

Equalization is relatively minor. "On the left-hand or bass side of the piano [with the mike closest to the hammer], I'll push 3 or 4 dB about 12 kHz, and add a little presence at around 3.9 or 4 kHz. Then take out a little of the upper low-mid — the 'honky' sound — around 700 Hz, probably push a little of the lows at 120, and roll off about 45 or 70 Hz."

"On the high, or right-hand strings, the hammer mike would be pushed a lot around 16 kHz — the 'ultra-top' — to give it a bit of breath. Add a little more of the lower top at 4.8 or 5 kHz; add some midrange in depending on the day and my mood, and take some of the low-end out at about 70 Hz."

Greg Edward leaves the center mike almost flat, and any top-end that's added will be really high frequency (16 kHz) — just a little bit of sparkle. The bottom might be rolled-off slightly, depending on how muddy it sounds with the bass, and the key in which the band is playing. For instance, the bass guitar

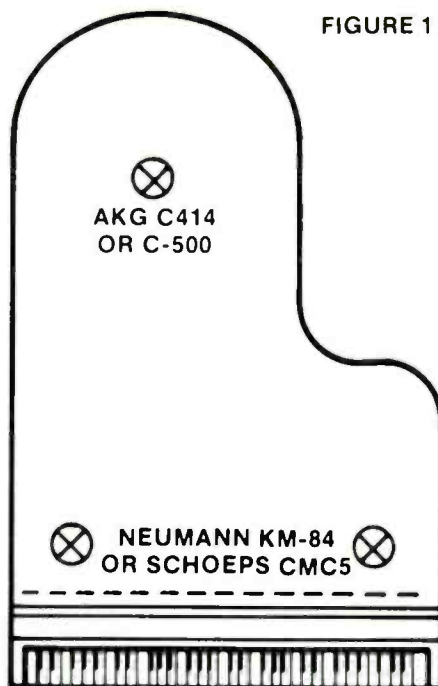


FIGURE 1

band starts playing, instruments lose their brilliance and perspective. Then you have to fine tune. It really depends on the key of the song and where the keyboard player is playing."

Bernie Kirsh, chief engineer at Chick Corea's Mad Hatter Studio in Hollywood, uses a similar miking configuration, but his choice of microphones varies a bit. Presently, Mad Hatter's acoustic grand piano is an American Steinway. However, the studio is purchasing a European-made Steinway grand in the near future. Both pianos are essentially the same model — a nine-foot concert Steinway D — but Chick Corea feels the European one sounds better. In addition, the studio is having a third concert grand custom-built by Mark Allen of Portland, Oregon. Allen established his reputation by re-building Bosendorfers, and then decided to undertake the entire construction process from scratch. The result, according to Kirsh, is excellent.

No Absolutes

tends to become lost when the player is running bass lines in the key of E. It doesn't have the same punch as it does in other keys, and the rest of the track starts sounding muddy.

"All the instruments together is where it makes sense to listen to your EQ properly," stresses Edward. "Everything can sound great soloed, but when the

After years of experience in the studio with hundreds of keyboard sessions, Bernie Kirsh has come to the conclusion that "there's probably more ways to mike a piano than any other instrument. You've got a percussion instrument with overtones, and all kinds of sound reproduction variables. Up near the hammers is a more percussive sound, and moving away from them

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Recording Keyboards



yields a 'mellower' timbre. Depending on whatever sound you want as a final product, you'll find it in the piano somewhere, just by moving your ear around inside the box."

Kirsh's choice of microphones is really contingent on what the song calls for. "My mike technique is not so much like taking a camera and photographing a scene of two mikes positioned at the piano, and then copying the photo layout to get the sound. We're [Kirsh and Chick Corea] getting into more than just reproduction. We're going for a specific kind of result or effect that will enhance the music and what it's saying, and that intent will determine the microphone technique we choose."

What he's been using the most on keyboard sessions is two omnidirectional Bruel & Kjaer mikes with 1/4-inch capsules. They're actually measurement mikes used for voicing rooms, but which have an exceptional flatness and clarity that's unmatched by any other mike. "Using two of these mikes," Kirsh warns, "you have to take some care with placement. The piano tracks come out with so much clarity and body, that altering the sound after the session with some kind of equalization is a breeze; the full sound content is there. It tends to have an *openness* that I don't get using cardioid mikes, even when the piano is closed down."

The only drawback, according to Kirsh, is that the B&K mikes are omnidirectional, which can result in phase problems. "I eliminate the phasing simply by moving the mikes around. I don't have a variable-phase adjustment on this board — just in-phase or 180-degrees out.

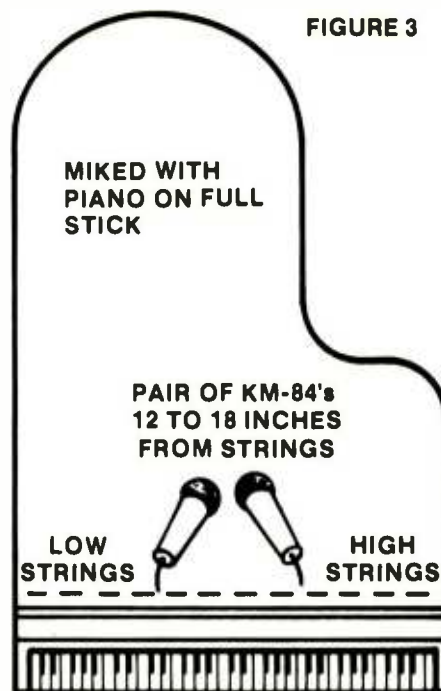
"Specifically, I'll set up the mikes in a position I've used before, and have an idea that they'll sound good. From there, I can determine the amount of presence and percussiveness by moving them either closer or further away from the strings or each other. Then I might have the piano player do a run from the bottom of the piano to the top, all the while listening to and adjusting the evenness of the image. When the top and bottom end have approximately the same impact, I know I've found the right spot."

Bernie Kirsh usually adds a few dB at 12 kHz shelving to keep the sound open. For a complex piano piece, where the piano is not being heard properly because of the other instrumentation, he'll add maybe 2 or 3 dB at 3 kHz, and 8 kHz.

"We tend to do a myriad of styles here," he points out. "For a rock date we might want to get in closer to the hammers for a more percussive and present sound. The natural tendency would be to close the piano down in order to eliminate other extraneous sound that might get into the piano. I always keep the lid open to the full stick even for a rock date, unless that's a real problem. With these B&K's, I want as much 'air' inside the piano as I can get. Even though I may have to close the lid on a loud date, I don't want the piano to sound closed on tape. The optimum working distance is about 12 to 18 inches for these microphones, because the acoustic instrument really develops its sound in air."

Using a three-microphone technique, Kirsh started with two mikes, which might be a cardioid, such as the Schoeps CMC-54U, about a foot from the hammers. Like Greg Edward, he'll also use a third mike down at the narrow end to pick up the low notes. That choice may be a B&K or another Schoeps.

FIGURE 3



"I pan the two mikes closest to the hammers hard left and hard right, and then find just the right spot near the center for the low-string B&K or Schoeps. If I image the piano the way the musician hears it, I would position it on the soft left side in the mix.

For a jazz-type date, Kirsh's approach would be approximately the same, but with a few minor adjustments. Again he would tend to leave the piano open, but this time put blankets over the part of the piano the player is looking at (Figure 2). "I would drop blankets down from the peak of the lid," he says, "and let them lay over the lyre and the back of the lid. The open side of the piano should be left as open as possible. However, I may hang a blanket down a little bit — about a foot — over the top of the full-lid stick, if all of the players are in the room together. My concern there would be to eliminate cymbal leakage. Then I can move the mikes back out of the piano a little bit. Of course, placement of the piano in the room is important, too, because you have reflections coming into that open part of the piano.

"I usually face the open side away from the musicians and towards the studio wall that has a trap behind it. That keeps other noise or music in the room from reflecting off that wall and into the piano box."

Paradise, Leon Russell's studio in Burbank, California, is currently undergoing a change of address to Nashville. Still available for comment, however, is the man who was Russell's personal engineer for two years, Steve Ripley. His selection of microphones and positioning varies with the situation, too. "My choice in the studio," he says, "when I don't have to worry about leakage, would be Neumanns in some kind of off-miking set-up. They're made to operate at least a few inches away from the source."

FIGURE 2

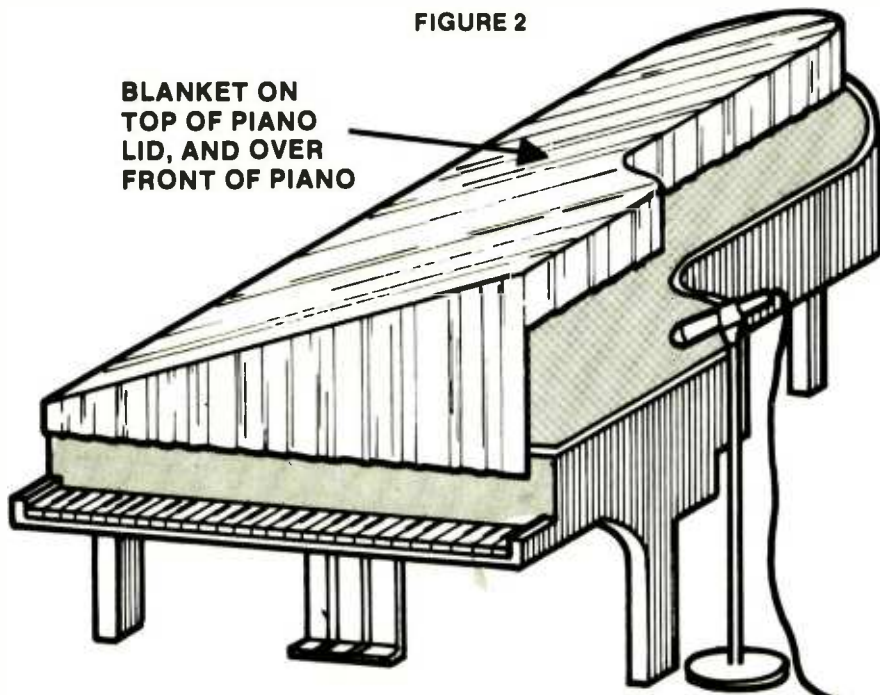
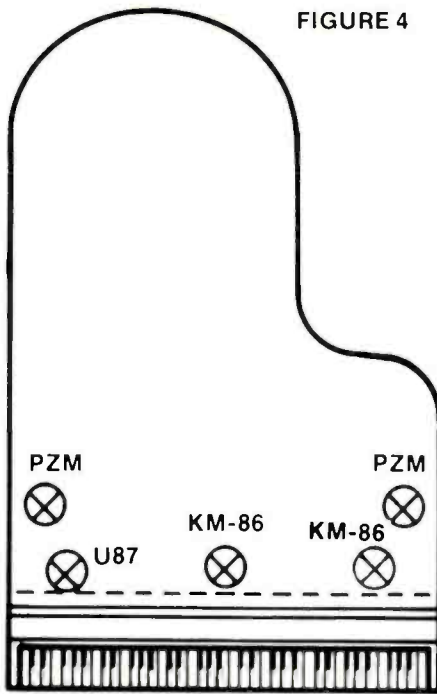


FIGURE 4



Matched-pair Miking

Ripley's favorite situation for miking solo piano is to use matching microphones, such as two Neumann KM-86's, because they're a smaller mike than the 84, and the bass, he says, isn't quite as exaggerated as with a U-87. The pair of mikes can be positioned very close together in a stereo miking configuration, to get rid of phasing problems (Figure 3). One would be pointed at the bottom strings, Ripley advises, and the other at the top. The top mike should be located at least 12 or 18 inches away from the string plane, somewhere in the center of the box. The piano top is lifted full stick to add a percentage of reflected sound to the mike. Ripley's mike layout is primarily the same concept as miking the whole band with one microphone. There's no phase problems, he assures, because everything reaches the set of mikes at exactly the same time, and blends naturally; in fact, the mixing is already done.

When leakage is a concern, the mikes can't be as far away from the instrument, and the only remedy is to go with more mikes in close. "I probably wouldn't use a condenser mike in that case," Ripley concedes. "I'd use a standard Shure SM-57 or a Sennheiser MD-421, and probably get at least one mike each for the lows, mids, and highs. That way I have more control over leakage that may get picked up."

Close miking doesn't keep out just the leakage from other instruments; it also reduces the leakage from other piano strings. Which is the justification for employing more mikes. However, unlike his colleagues, Ripley tends to place all three along the hammers. "The mikes act like electronic pickups as opposed to natural miking," he offers. "I use it all the time on Leon's [Russell] dates, because his piano parts are laid down live when the other tracks are cut. He

plays his part the way he wants it the first time, and that's the one that goes on the record.

"For an optional miking method (Figure 4), I open the piano to the first notch, put three Neumanns very close to the strings — probably a U-87 for the bottom because it has a bit fatter bottom end; an 86 for the mid, because the pattern comes off the side of the end of the mike, so you can lay it close to the strings with the pattern pointing down. The pattern on the 84 comes out of the end like a pencil tube mike, and tends to hit the underside of the piano lid. I'd use the same thing for the top for the same reason. Then probably lay a quilt or blanket over the piano, so I still have the

lid giving me some kind of acoustic treatment inside the enclosure."

The highs go on the right, and the lows on the left, with those channels spread all the way to the outside of the mix; the middle mike is generally the option mike. Lows and highs are the most important in terms of volume, Ripley stresses, and a bit of the center mike fills in the middle.

"I use less EQ with distant miking," he continues, "but I hardly ever go above 4 dB with anything. Country records are left pretty close to the original sound. Rock dates, where I'm not exactly going for 'reality,' I would play with a little.

"When I get into two- or three-mike

... continued on page 56

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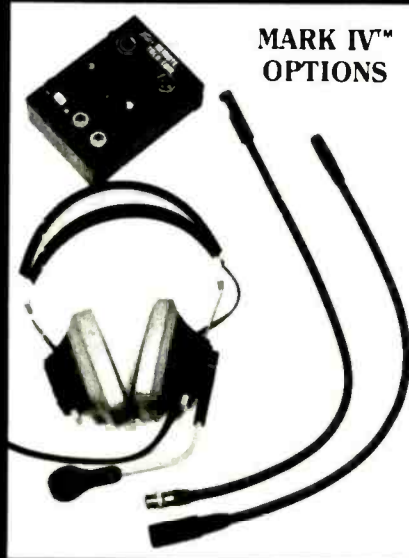
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Recording Keyboards

close miking. I look at each set of strings as a separate instrument. On the low strings, I'd boost somewhere between 60 and 100 Hz, and cut that frequency out of the other mikes. I'd also boost between 1 and 2.5 kHz, and again around 4 or 5 kHz on the appropriate microphones, and cut it out of the others."

Using PZM's

Another viable alternative to conventional mikes is the Crown PZM, or Pressure Zone Microphone. The popularity and acceptance of PZM's, however, depends on who you talk to. Bernie Kirsh and Greg Edward usually don't use them. "I tried using two PZM's plate-to-plate looking out from the center of the piano, spitting the strings perpendicularly," remembers Edward. Since a lot of the dates are tracking dates with the rhythm section laying at the same time, it's hard to get isolation that way, he says, and "putting the PZM on the inside of the lid also seems to produce a 'boomy' sound. With the lid closed, some sort of standing waves are set up, and the low-end becomes more abundant. The piano, on its own, sounds reasonably well, but the minute I put it in the track — and to me, that's

the *real* test — the piano just gets lost. It doesn't work for what I like to do."

Steve Ripley, on the other hand, has a different viewpoint: "With the introduction of the PZM's in the last couple of years, we've tried taping them to the underside of the piano lid, and closing the top down completely. We positioned them approximately over the area where we'd put normal piano mikes. They sounded really great — so bright and clear. It seemed like all the piano content was there with very little leakage. But they still tend to pick up the section of the piano wherever they're at."

Maintaining Adequate Isolation

With an instrument design like that of the acoustic grand piano, recording is always a compromise in some capacity. Either the leakage exists, or the piano is buried in blankets and quilts, and the musician suffers by not being able to hear his instrument properly.

An increasing number of studio people, however, are moving away from the dogmatic approach of strict isolation for every instrument. Take, for example, Michael Omartian's philosophy: "As far as isolation is concerned, I don't mind a little bit of leakage from other instruments into the piano. I know a lot of my peers and friends like to keep everything as isolated as possible, but I don't particularly come from that school. In the case of Christopher Cross and various other projects I've done, we

never isolate the piano." [For further details of Omartian's recording techniques, see his interview published in the April 1982 issue of *R-e/p* — Ed.]

But if one instrument and one instrument only to a track is your desire, sometimes the only answer is a completely separate room. Mad Hatter has an iso booth that's made to order for such occasions.

"The low end of the drums is always a big factor in terms of leakage into the piano," says engineer Bernie Kirsh. "We have an isolation room beside the control room that's separated from the main room by glass doors. I'll either put the piano or the drums in there, but it's always such a drag to have to separate musicians when they record. One thing Chick likes to do is have the end of the piano closest to him open as much as possible, so he can get some of the 'blossom' of the piano naturally and, in some instances, the isolation booth is the only solution."

Which seems to be a pretty common request. How can a musician play well if he can't hear what he's doing? And how can he hear if the piano is smothered in blankets and quilts? A well-designed cue system or efficiently thought-out room layout is essential.

"I've had to record in a separate room where I literally had no visual contact with the other players," says Jai Winding. "In those cases, all I can rely on is the ability of the engineer to get a good cue mix going. But if there's good eye contact, then that's not even necessary. If I rely on the musicality and the expertise of everyone involved, and that visual contact, not hearing really doesn't matter that much. It does cut me off from the subtleties of the instrument, but I can feel what I'm playing, because I'm sitting right in front of the piano. I don't need to have the piano blaring. Everybody usually complains about how loud the piano is in the headphones anyway!" Unfortunately, not all engineers are working with the likes of Jai Winding.

Special Effects

The nature of an acoustic piano lends itself to being the object of a variety of special effects but, as Steve Ripley puts it, "most of the grand pianos I record are for the grand piano sound. Players and producers usually don't want to do anything to it." But none of the people surveyed had anything against altering the keyboard's sound with phasers, flangers, and chorus effects if the song called for it.

Surprisingly, almost everyone's favorite effect was the same — to double track the same part, with one track slightly out of tune with the other. Michael Omartian and Jai Winding preferred to slow the speed of the tape machine for the second pass, and make the "double" track higher in pitch. Greg Edward got the same effect with an Eventide Harmonizer set between 0.999 and 1.000, but he favored flattening the

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double track in relation to the main recording. Perhaps the discrepancy as to which direction sounds better is a function of natural phasing versus synthesized electronics.

Other Acoustic Keyboards

The general opinion among professionals is, if you want to record a piano, make it a grand. The only uprights that exist in the studios in L.A. are tacked for a honky-tonk effect.

"Uprights are always a lot *duller*," says Greg Edward. "They don't seem to have the brilliance of a grand, and take a lot more EQ in the top-end. I'll just pull the front panel off, and put two C414's or KM-84's facing into the piano right above the keyboard player. Even with the tacks, it doesn't seem to project any top-end. I imagine if you get in close it gets right, but you'd need more than two mikes to cover the range of the piano that tight.

"I extend mikes about as wide as the part the musician is playing. If the part is centered around the middle of the keyboard, the mikes are close together. If the part extends out wider, the mikes will be positioned approximately as far apart as the two end limits of the highest and lowest piano notes in the piece being played."

Bernie Kirsh tends to use any of a wide variety of condenser or dynamic mikes on an upright, such as a U-87, Electro-Voice RE-20, Sony C-37, or whatever comes to mind. The final decision doesn't seem to be too critical.

For harpsichord Kirsh uses a pair of B&K's or the Schoeps in a layout similar to that for piano miking. Greg Edward, on the other hand, chooses two Sony ECM-50's mounted in close for harpsichord. "You don't really need to worry about stereo," he comments, "because the sympathetic harmonics in a harpsichord are not the same as in a piano."

As mentioned in the beginning of the article, the less stiff strings of a harpsichord allow the harmonics to be more aligned with the harmonic series, whereas stiff piano strings cause slightly sharp partials. The resultant mono signal of the harpsichord doesn't phase out like that of a grand piano.

Rhumbo Recorders is probably one of the only studios that has a celeste. Greg Edwards says that it is best recorded with an AKG C452, or a Schoeps; the instrument's design, he feels, is too small for more than one mike.

One final instrument that should be mentioned is the large Bosendorfer with the black keys and sympathetic bass strings. Bernie Kirsh worked with them live when Herbie Hancock and Chick Corea performed their duet concerts around the country, and found no particular difficulties involved with miking them for sound reinforcement in a large auditorium. But Greg Edward has tried to record them in a studio. Here are his findings: "The Bosendorfers are much *mellower* sounding than the Yamahas, and therefore difficult to get to cut

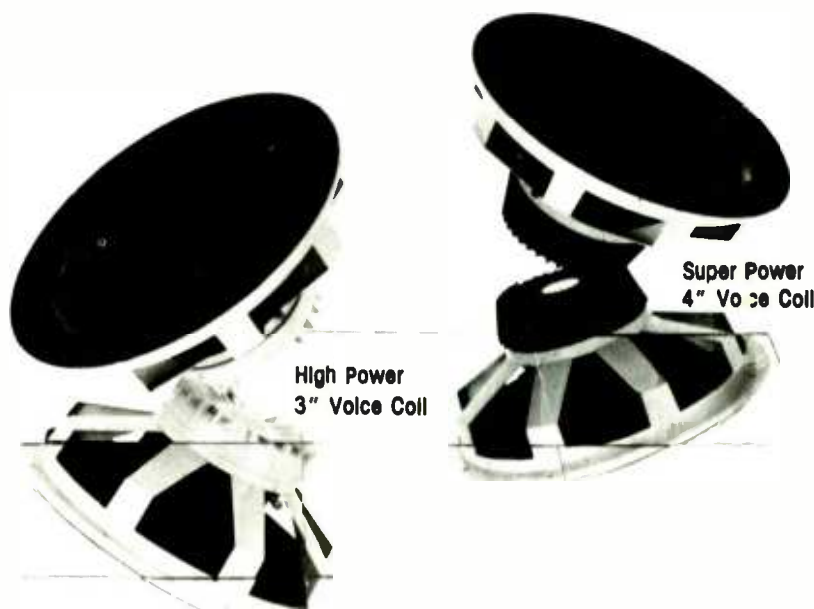
through a track. They sound beautiful as a solo instrument, but they're not a band instrument.

"Piano techs have felt dampers that they put in the strings to stop the sympathetic vibrations when they're tuning normal grands. I always put those dampers on the large sympathetic bass strings of the larger Bosendorfers, to eliminate those low tones. The bass doesn't disperse quickly enough in a studio, unless it's some place like EMI Abbey Road [with tall ceilings and large floor area]. Those pianos just don't seem to work with a band; they 'muddy' up a rhythm section track."

Much more could be written about acoustic keyboard miking, but the intention in this article is not to author a book on the subject. Suffice it to say that no rational idea should be dismissed as unworkable without first giving it a fair try; presented here are guidelines and examples only. What's possible is up to you, the engineer. The final verdict lies in what you think sounds *best*.

Recommended Reading:

1. "Physics of Music," a series of articles reprinted from *Scientific American*; W.H. Freeman & Company, San Francisco, 1978 — contains excellent articles describing how specific instrument groups originate and radiate sound. ■■



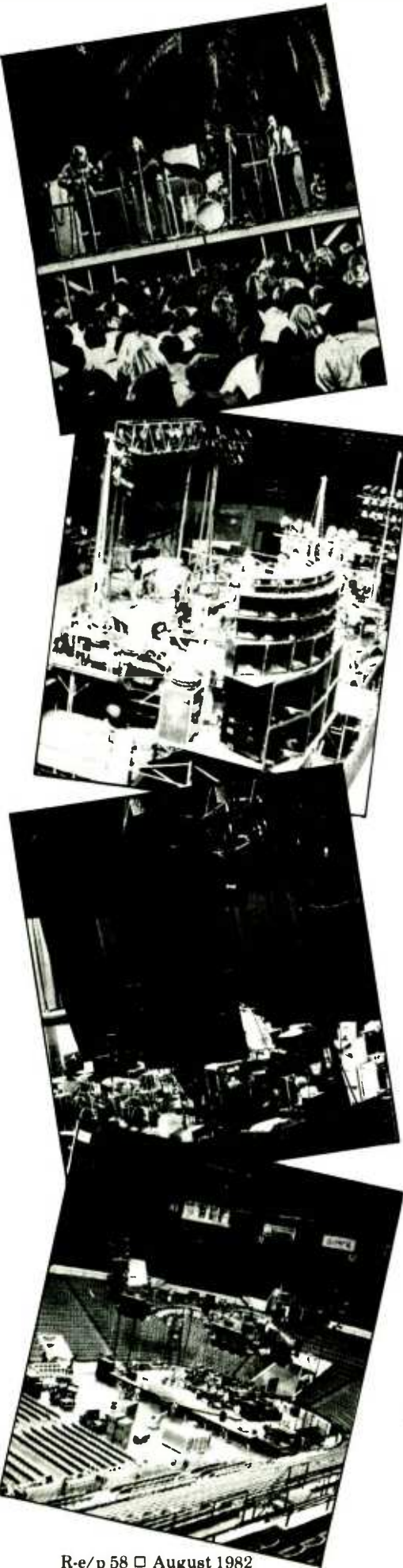
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THE FUTURE OF LIVE-PERFORMANCE SOUND DESIGN

With a Particular Focus on Loudspeaker Systems

*A Personal Assessment by Chris Foreman
Community Light and Sound*



The world faces changes so significant that Alvin Toffler says we are at the beginning of "The Third Wave,"¹ and compares the impact of such changes with the agricultural and industrial revolutions. On the surface, many of these changes seem negative: cheap energy is gone, apparently forever; and labor costs have sky-rocketed while millions are out of work.

In the midst of this turbulence, concert sound has reached the onset of its maturity as a business. Thus, while former long-haired musicians don business suits and hire accountants, they face some of the most important decisions of their careers. And, if there is no doubt about the actual *survival* of the concert-sound business, there is no question that it must adapt, and quickly, to meet some formidable challenges.

The Present: Gloom and Doom?

There are at least five major forces affecting the tour sound business today:

- 1) Rising Energy Costs
- 2) Rising Labor Costs
- 3) Economic Recession
- 4) Demographic Changes
- 5) New Technology

These forces are complex and, while their impact seems mixed at best, the prophets of gloom and doom don't have a corner on the future. To achieve a better view of what we're up against, we need to back away from these subjects, neglect the details for a moment, and put on a wide-angle lens.

Energy, the Present

Rising fuel costs have hit the tour sound business especially hard. The per-mile cost of a large semi-tractor/trailer rig has risen astronomically in the last

few years, a fact that probably surprises no one. But other fuel costs have hit home too, in less obvious, but no less important, places. The rising cost of lighting, heating and air-conditioning a large auditorium has had a real effect on ticket prices, and therefore on attendance at concerts. The cost of transportation to and from a concert has probably helped persuade some potential concertgoers to stay home. Even the every-day utilities costs for a tour company's warehouse and offices have risen, with a corresponding effect on profits.

Energy, the Future

Real energy costs, corrected for inflation, will probably continue to rise in the short term, but may well begin to stabilize in the not-too-distant future. The reasons are many, but include conservation; the apparent demise of OPEC; government de-regulation of fuel prices; and advances in the technology of energy production and storage. In the long term, real energy costs are most likely to decrease, not increase, and the idea that we might be *forced* to go back to bicycles and wood stoves is almost certainly wrong.

Labor, the Past

In the small town where I grew up there was a grocery store called "Bean's IGA." My mother used to telephone Mr. Bean, the proprietor (yes, that really was his name), once a week and read her grocery list to him. He would go to his shelves and pick out the freshest produce, the leanest meats, the best quality canned goods, and then he would deliver the entire order, all at no extra charge! This wasn't a special service for rich people, either; Mr. Bean and his

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small staff performed this service for *all* their customers. It was his way of competing with the other grocery store in town, which also delivered, free of charge.

Labor, the Present

Today, with machines to help perform a lot of services, it seems logical that these services should be even more widespread, and less costly. Why aren't they? Why is the kind of service Mr. Bean provided almost non-existent today? Why are labor rates so high for concert services? Part of the explanation lies in the technology which we think ought to bring these labor rates down. With machines and automation to help, a worker can produce far more in goods and services than was possible years ago. For that reason, in terms of goods and services, that worker's time is worth more, and therefore, that worker gets paid more.

Partly due to this factor, and partly in an effort to keep up with inflation, unions have raised their labor rates and imposed strict work rules. The wages of non-union employees of tour companies, auditoriums and other tour-related labor have also increased.

Labor, the Future

The future for labor in the concert business may be influenced by what's happening to labor in other industries. Workers in hard-hit industries like automobiles, for example, have accepted reductions in scheduled salary increases, reductions in employee benefits, and modifications of restrictive work rules in trade for guaranteed job security.

Other changes are possible. In some marginal or failing businesses, for example, groups of workers are actually buying out management and operating the businesses themselves. As owners, these workers are vitally interested in improving their own productivity, since that increases the profits of the business and therefore the value of their shares.

Economics and Recession, the Present

There are some indications that the current economic recession has "bottomed out," and things will soon begin to get better. For those people who are out-of-work, however, or have had their pay or hours cut, the "bottom" of the recession is not a good place to be. Those people are most certainly looking for any possible way to cut expenses. Thus, entertainment — a luxury in the best of times — is an easy place to cut. Even people with good jobs have recently felt the effect of inflation, including the inflation in ticket prices, and seem to be staying home a lot.

Economics, the Future

The term "recession" is a bit misleading. Taking the average of boom industries like semiconductors and bust indus-



"An Early Component System Used by Big Brother and the Holding Company with theatre-type loudspeakers (Altec)."

tries like housing, and calling it "recession" is about as descriptive of the real situation as saying that the average US citizen is a white, anglo-saxon protestant! Averages, in both of these examples, mask the diversity of reality.

In economics, at least, a better one-word description of the current state of affairs is *change*. The automotive industry, for example, is changing in response to the combined forces of rising fuel prices, efficient foreign competition, and poor management decisions in the past. The housing industry is changing in response to high interest rates (brought on by another combination of forces), and inflation in housing costs fueled by speculation on that very inflation.

The concert business is changing, too. And if some of the changes seem negative, like the apparent drop in the number of rock concerts, others are undeniably positive, like the touring successes of Broadway productions, *Annie* and *Evita*.

Other markets are opening up for tour sound. The Democrats recently held their "mid-term" convention in Philadelphia, and the NAACP staged their annual convention in Boston. Industrial shows and trade shows seem to be on the increase. Religious gatherings are more common and growing in size. All of these groups are becoming more aware of the benefits of good sound, and their gatherings often require far more elaborate and extensive systems than can be found in the typical arena. In other words, even if the rock concert business is in trouble (and I'm not certain that it is), the touring sound business as a whole is most certainly not in trouble; it's just changing.

Demographics

The "baby boom" and the accompanying growth of rock and roll fueled the tour sound business, but that once-remarkable situation has changed dramatically. The baby boom generation has grown up; today's young people are not only fewer in number, they are

unquestionably more money and job-conscious than their parents were. It even seems possible that some of the glamour has faded from rock and roll. For young people, rock and roll is now the music of their parents! Thus, New Wave, Punk Rock and other trends seem destined to go the way of Disco, and be short lived. Yet, if these forces reduce the size of the potential rock concert audience, they may also be at least partly responsible for the success of those touring Broadway musicals and other events, such as the Kool Jazz Festivals.

Technology, the Present

The movie industry talks publicly about the negative impact of home video on theatre ticket sales. The truth is, of course, that sales and rentals of movies on video tape are much higher when those movies have been big box office hits. In other words, the home video market needs the movie theatre market, and the chances are that the best movies will continue to come out *first* at local theatres and only later on home video tape or cable TV channels.

A similar argument holds true for the impact that "Music TV," satellite concert broadcasts, and other home video entertainment on live music and concerts. The availability of these entertainment forms should, if anything, make the original live concerts even more attractive to the average music lover.

The impact of technology on concert sound equipment, present and future, is important enough to rate its own section in this article. First, however, a look at how those affected are reacting to the forces we've discussed.

REACTIONS

Artists, Promoters and Venues

As a result of the increase in energy and labor costs, rock concerts seem to be moving towards the two extremes: the very large, and the very small. The large, well-known acts can still afford to

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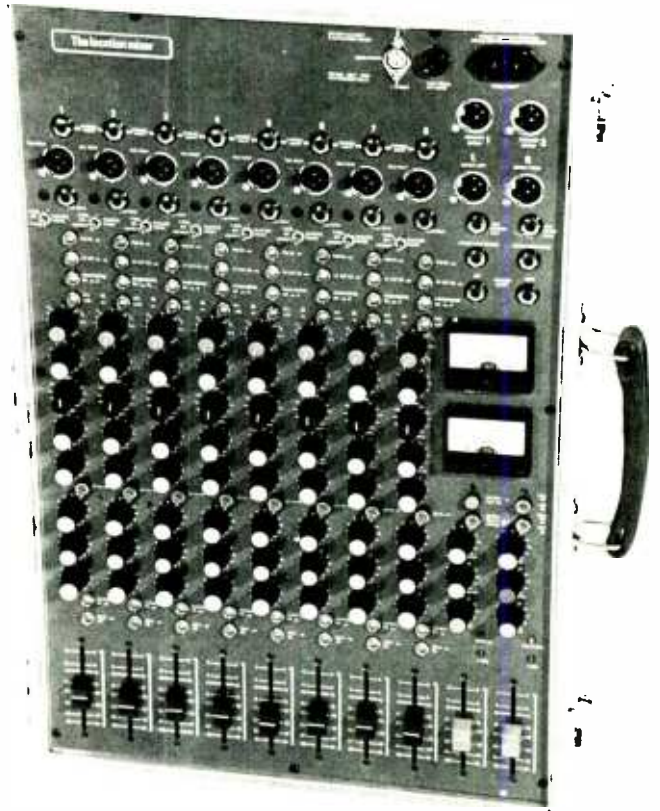
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tour in style, provided they play to extremely large audiences at each stop. Neil Diamond, for example, still tours with five tractor-trailers, two buses and six sound technicians. Last year Earth, Wind and Fire brought six tractor-trailers, three buses and a total of 34 technicians to the Los Angeles Forum².

Other acts have reacted to the increased cost of touring by going back to the club circuit (where many of them got their start). If the nightly gross in these clubs is smaller, so are the costs. Also, the intimacy of a relatively small club and audience can be very satisfying to the artist.

Tour Sound Company Reactions

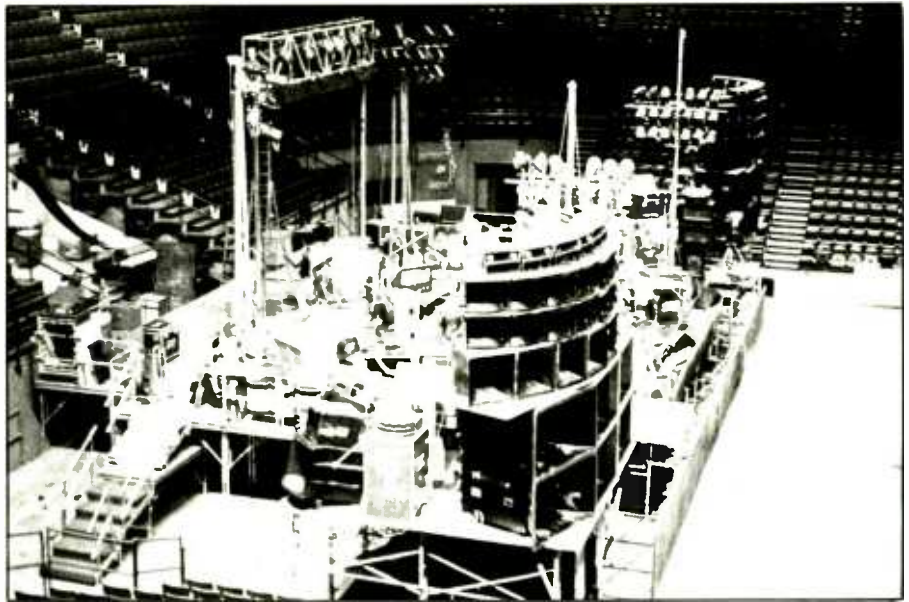
What do you do if you're a tour company, and the unions at a concert hall charge you by the truckload? You bring fewer trucks! How do you deal with large halls when you've got fewer trucks for the sound? You custom-design your own loudspeaker systems to squeeze the most SPL from every cubic inch of truck space! How do you deal with the increased labor cost of setup time? You design a *modular* loudspeaker system with modules that are small enough to be moved by two people, easy to stack or hang quickly, and versatile enough to cover any concert hall you may encounter. Loudspeaker systems are, in fact, one of the major areas of change in today's tour systems since they take up the most space, weigh the most, and are the one part of the sound system that everyone in the audience sees. What will happen from here? First, let's look at where we've been.

Loudspeaker Systems, the Past

Any number of large tour companies can tell stories about their modest beginnings. One major company, for example, got its start with a pair of small theatre speakers, a tube-type mixer and amplifier, all of which were carried around in a station wagon!

Are Two Speakers Better Than One?

Why a *pair* of speakers, when conventional theory says that a single loudspeaker, above stage center, would do a better job? Part of the answer is that tour sound got its real start soon after the term "stereo" became a household word. If two speakers were better than one for home use, certainly they were the right choice for live sound (even though that live sound was hardly ever mixed in true stereo). But there are practical reasons for two stacks, the most obvious being that, for proper coverage, a single loudspeaker system must be hung above the center of the stage which was almost impossible in the beginning of tour sound. Thus, two stacks allowed better coverage of a room's edges. In addition, the stage spill from the two stacks provided an acoustic environment for the artist that



"A mid-70s horn-loaded component system (Community Light & Sound)."

changed little from hall to hall and, along with a good monitor system, helped the artist perform consistently night after night.

Boxed versus Component Systems

Those small theatre systems consisted of a separate horn and woofer, but later versions put the two components in the same enclosure for easier setup and tear-down. From that point, the two types of systems diverged, growing into larger and more versatile systems of both types. It's worth noting that at least one of the large tour companies now has available both types of systems, in order to be able to meet customers preferences.

Advantages of a Boxed System

Boxed systems have become the favorites of most tour companies today (only one of the major tour companies that I contacted still uses primarily component systems). The reasons are many:

1) Boxed systems are, in general, smaller than component systems for the same SPL requirements. This results from good packaging and, in some cases, from physics itself. A well-designed, vented-box loudspeaker system, for example, can squeeze more SPL out of each cubic inch of space than most horn-loaded woofer systems¹.

2) Boxed systems can be designed to be very modular. Each module can be the same size and shape as every other module, which makes it easy to "design" a custom system for almost any hall, while still maintaining quick, low-hassle setup.

3) Designed properly, boxed systems can be either hung or stacked, so that the same system can be used in almost any concert hall.

4) By making slight compromises in box size or shape, boxed systems can be designed to fill a truck very efficiently.

5) A boxed system, from any distance, looks like a "blob," making it aestheti-

cally less obtrusive than a component system with lots of distracting shapes.

Advantages of a Component System

1) With long-, medium-, and short-throw devices, a component system is more versatile, and can do a better job of covering a randomly selected concert hall, than a boxed system that has only one type of coverage pattern (usually short to medium throw). Stacking can narrow the pattern of a boxed system for long-throw, but a group of stacked, short-throw horns will exhibit far more "fingering" in coverage pattern than a single long-throw horn.

2) If you assume that the component system is all horn-loaded, for the same SPL output, the horn-loaded component system requires less amplifier power than a non-horn-loaded boxed system. With similar amplifier power available, the horn-loaded system will have more headroom which can result in lower distortion levels.

And the Winner Is . . . ?

Probably neither system. I've been to concerts and watched setup and tear-down of both types of systems. Unquestionably, the boxed system can save both time and money. Yet I have seen well-designed component systems go up and down in a hurry, too. And, the last concert I attended with a boxed system was a classic example of what can happen in the all-too-common "acoustical watercloset" of a concert hall.

A Poorly-Designed Boxed System

The concert, starring a rock and roll artist, was attended by a mostly young, noisy crowd. The crowd noise, however, was probably 3 dB under the noise of the building air-handling system. Together, these two noise sources made it difficult to speak to someone more than about five or six feet away, even when the group was quiet! Top that off with a long reverberation time, and it was a case of acoustical chaos.

The boxed system was hung and

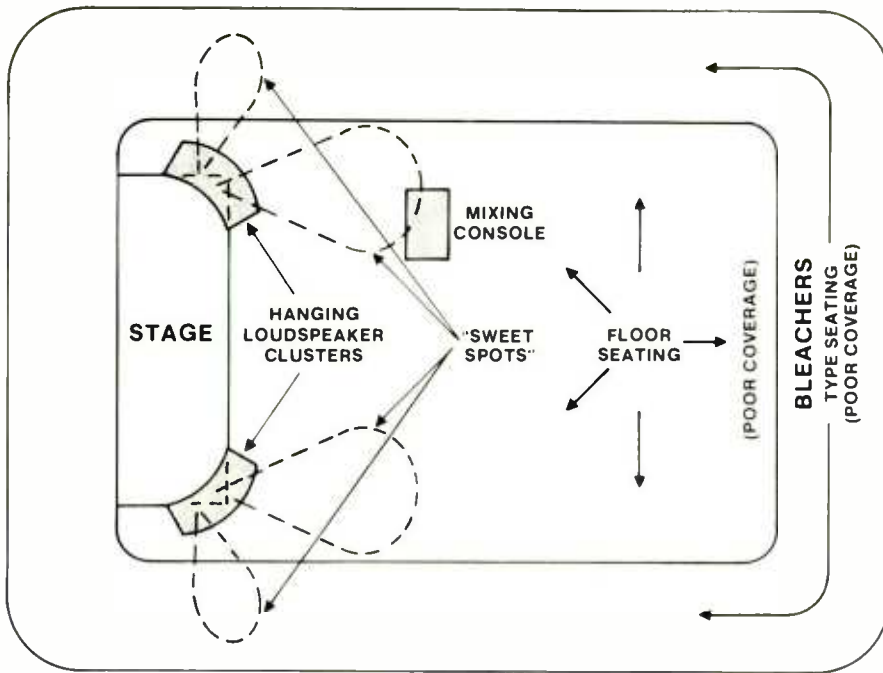


Figure 1: A low-Q boxed system failed to cover this highly reverberant auditorium.

appeared to be well "splayed" to cover the various parts of the hall. Yet, I walked the hall during the concert and found that the sound quality varied dramatically from point to point. There were two "sweet spots" in front of each hanging stack (Figure 1). Front center seats had very poor coverage except from instruments on stage. Vocals were lost in the front center, due to the poor mix of stage versus PA sound. Farther back in the hall apparent loudness stayed constant. I would guess that a sound level meter reading would probably have showed ± 3 dB throughout the hall. But the sound quality got worse and worse as I moved farther away from the stacks, due to reverberation. Even on quiet numbers, the vocals were completely lost in reverberation, and you had to know the words to a song in order to understand what was going on.

My immediate reaction was that a component system would have sounded much better. A combination of long-, medium-, and short-throw devices, well-aimed, could have done a much better job of keeping the sound on the audience and off of the walls and ceiling. This would have helped lower the reverberation level, and would have given each listener the advantage of a device with the proper "Q." On the other hand, it is possible that, had this boxed system been designed carefully and installed by someone who knew how to stack and splay the boxes for the right kind of coverage and "Q," the system would have worked much better.

Significantly, the crowd loved the concert, and their reaction confused me until I realized that the artist's performance was strong enough to overcome the poor sound quality. It became clear to me that, if this rock concert was typical, audiences have learned to put up

with poor-quality sound. This experience raises several important questions:

1) Will rock-concert goers, especially those in low-priced seats, continue to tolerate poor sound quality? What about audiences at other types of perfor-

mances?

2) Was the boxed system responsible for the poor sound quality at this particular concert, or was the problem associated with installation and operation of the system?

3) If we assume that, in the future, most audiences will not tolerate poor sound, will we have to give up the advantages of a boxed system in order to provide the kind of sound quality these audiences will demand?

The Answers

1) Except for the occasional rock concert, with an unsophisticated audience, the answer to the first question is most certainly *no*. As events and audiences continue to diversify, sound quality unquestionably will become more and more important and, in order to remain competitive, sound companies will be forced to provide higher quality sound. Those companies which refuse to upgrade their sound quality will probably end up fighting with each other for a declining number of rock concerts.

2) At the particular rock concert I attended, the problem probably was caused by a combination of system design, installation and operation, although I believe it would have taken a very clever installation and operation crew to make that system work well in that acoustical watercloset of a hall.

3) Is it possible to design the versatility of a component system into a box? Probably not if the "box" uses the tradi-



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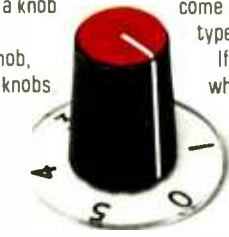
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tional vertical layout and has lows, mids and highs all in the same enclosure. Yet there may be a compromise, one already adopted by several tour companies.

A Compromise

Some tour companies have begun to "unbox" their boxed systems. A common way to do this is to put the bulky low-frequency sections in one box, and the mid- and high-frequency sections in another. Some systems, of course, are four- and five-way systems, but the concept remains the same (Figure 3). It's even possible to design the mid/high box so that it's the same size and shape as the low-frequency box.

A system like this retains the low-cost, small size and modularity advantages of a boxed system, but gains back some of the versatility of a separate component system. Here's why:

1) Woofers, especially when crossed over at about 200 Hz or below, are almost omnidirectional. It's not necessary to aim them to cover different areas of the room, at least not to the extent necessary with mid- and high-frequency devices. In addition, the woofers actually benefit from being physically adjacent to each other. The larger combined baffle improves the low-frequency directivity, and can even improve the overall efficiency of the low-frequency section due to the higher acoustical impedance presented to each woofer.

2) Mid- and high-frequency devices, on the other hand, will cover the room much better if they are "arrayed" properly (aimed at the various sections of the room). Thus, these mid- and high-frequency devices benefit greatly from

being freed from a physical attachment to the woofer section. Like the woofer sections, however, mids and highs benefit from being very close to other mids and highs. Not only is the coupling improved, but the fingering and lobing caused by multiple, stacked horns is reduced when those horns are closer together. In a boxed system where highs, mids and lows share the same enclosure, at least in a vertical orientation, the most common type (Figure 2A), the mids and highs in one box are physically separated from the mids and highs in the next box by a distance determined by the size of the woofer section.

3) It seems reasonable to place mids and highs in the same box, since they both need to be arrayed to cover the room. Side-by-side placement allows better coupling of each type of device in a vertical stack or hanging arrangement (Figures 2B and 3).

4) Subwoofers, when used below about 100 Hz, can be placed almost anywhere: on the floor; under the stage; etc. Since subwoofers are the largest components in the system, getting them out of a stack, especially a hanging one, can significantly reduce size and weight and still retain modularity. To work best, subwoofers in this type of system should receive a separate mix (keep the mids and highs out).

5) It would even be possible to incorporate a couple of long-throw horns at the top of each mid/high enclosure stack to cover the rear of reverberant rooms.

Staying Modular

Especially with separate subwoofers, which tend to be quite large, and with long-throw horns, which tend to be physically long and cumbersome, it might seem difficult to stick with a sin-

Figure 2A: While stacking boxed systems will cause some vertical beamwidth narrowing, the great distance between same-type components causes "fingering" in the coverage pattern. (Two-way system shown for simplicity.)

Figure 2B: Horizontal-layout boxed system brings same-type components closer together which reduces "fingering" in coverage pattern. (Two-way system shown for simplicity.)

Figure 2A

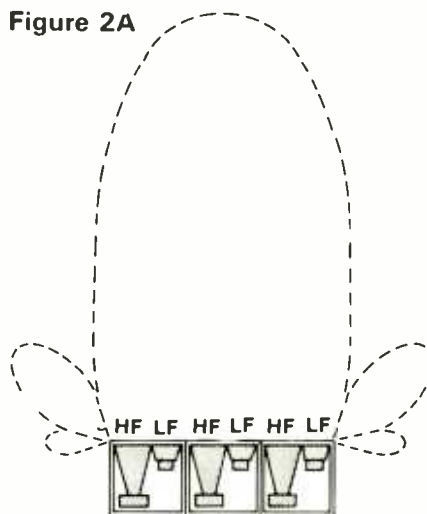
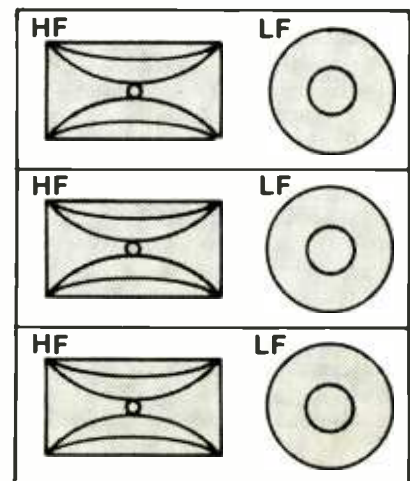


Figure 2B



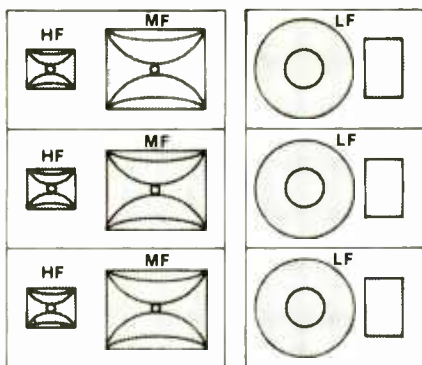


Figure 3: An "unboxed" boxed system with separate (vented) LF enclosures. This arrangement allows maximum coupling between LF components and proper "arraying" of MF and HF components.

gle box size. The solution to this problem seems to be custom-designed components, with carefully chosen sizes to reduce performance compromises to a minimum. At least one sound company, for example, has custom-designed their own mid-frequency horns to fit into the same size box as their low-frequency components. Their high-frequency horns, which take up less space, are located in the same box with the mid-frequency horns.

Horns versus Cone Loudspeakers

Which is better? It's an apples and oranges comparison which, in some cases, has as much to do with personal taste as technical details. Yet most concert systems, which are required to perform in a variety of different acoustical environments, now use a mix of horn-loaded and cone-type loudspeakers. The reasons are both practical and technical. Cone-type loudspeakers, for example, have an important size advantage at low-frequencies. Horn-loaded loudspeakers, on the other hand, have the advantage of both efficiency and pattern control in the critical midrange and high-frequencies.

This mix of mid- and high-frequency horns and low-frequency, cone-type loudspeakers will most likely continue, since it is encouraged by both the trend towards smaller systems and the requirement for improved sound quality.

TECHNOLOGY; SOME GUESSES ABOUT THE FUTURE

Constant Directivity

A few tour companies are using the newer "constant directivity" horns, with good results. These horns can improve a system by making it easier to put the sound where you want, and keep it away from areas where you don't want it. While the large size of most constant directivity horns may limit their use, smaller constant directivity horns are being offered by some manufacturers.

Higher SPL, Lower Distortion?

Higher SPL devices would allow tour companies to carry fewer loudspeakers for a given show. For both cone-type and horn-loaded loudspeakers, however, higher SPL almost always means higher

distortion — it's in the physics. One way to significantly reduce this distortion in a horn is to increase the horn's throat size. To take advantage of this reduced distortion at high SPL levels, one manufacturer has recently introduced a high-output midrange horn and driver with a 4-inch diameter throat opening.

Limited Frequency Response?

The high-SPL type of device may also forecast another trend, that of giving up *extended* frequency response in trade for *smoother* frequency response, reduced distortion, and higher output level. That kind of trade-off makes sense for tour sound systems, which are almost always three-, four-, or five-way and do not require extended frequency response from individual components.

Electronics and Loudspeakers

At least one manufacturer now offers boxed loudspeaker systems with special electronics packages which, according to the manufacturer, reduce distortion and allow the loudspeakers to produce higher SPL levels without failure. The idea of designing a loudspeaker-amplifier combination is certainly not new, but will probably take on new forms in the future, and some of these may directly benefit the concert touring company.

Digital Loudspeakers?

Although it's probably far in the future, a loudspeaker that converts the output of a pulse-train directly into analog sound is not out of the question.

Bell Labs recently announced the invention of just such a device designed for the receiving end of a telephone handset. **Can We Defeat Physics?**

No! But we keep finding out that what we *thought* was a "law of physics" has an exception or two, or is countered by another "law." Just a few years ago, for example, few people would have thought it possible to counter the "law of physics" that said that "all horns beam at high frequencies"!

Monitor Systems

Most of the future emphasis on stage monitors will probably be aimed at improvements in performance and further reduction in size. The size reduction, however, will be aimed as much at improving stage aesthetics as at reducing truck space requirements. One way to avoid this problem altogether is illustrated by the accompanying sidebar about Neil Diamond's Under-the-Stage Monitor System reprinted from the October 1976 issue of *R-e/p*.

Markets and Trends;

More Guesses About The Future

If the future of technology is uncertain, the future of the market for touring sound is even more uncertain. Some trends, however, seem clear and, among other things, they warn us to:

Stay Lean

In sports, the small, fast athlete may be more valuable to a team than the big but slow athlete. The star, of course, is

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GA-24

Future of Live-Performance SOUND DESIGN

both: big and fast. That's what the successful tour companies are going to be like: large enough to weather the storms but flexible enough to respond to market changes and opportunities. There will,

however, always be room for small companies, too; there's always a market niche that the large companies either can't or don't want to serve. And some small rental companies doubtless will make their living by providing services to the larger companies. This may take the form of renting equipment on a local basis (to save the large companies the cost of traveling with a larger equipment load), or it may take the form of

providing equipment repair or additional labor.

What If . . . ?

Some events seem unlikely but, these days, it's always worth while to make contingency plans. Consider what would happen if, for example:

1) Ailing concert halls started ticket price wars?

2) Labor unions decided to allow competition in rates, rules and productivity for the same job?

3) Some musical group brought out a truly new musical form that took over the popular music scene, like rock did in the Fifties?

4) Soft drink or beer companies decided to "sponsor" concerts with enough money to subsidize ticket prices (witness the increasing number of Kool Jazz Festivals).

Any of these would bring about a sudden growth in concerts, and yet would not necessarily bring about a return to the "good old days" of concert sound. And, if some of those events seem unlikely, there are others that seem almost certain.

Almost Certainties

1) *More concerts will be video-taped.* That will require improved loudspeaker aesthetics. It also means somebody is going to make big bucks from sales and rentals of those tapes, and for cable TV rights. Sound companies ought to get a piece of that action at least by providing a special mix to the taping crew — at a premium price. No artist wants double the microphones on stage, and every artist wants to use their own favorite sound company. Thus, it should be easy to get the video people to comply. Ask your legal consultant.

2) *More concerts will be broadcast, live, via satellite* to multiple locations around the world. This is a way for one artist and one main promoter to make a bundle on a single concert, especially when satellite broadcast is combined with video-taping for later rental and sales. For sound companies, multi-location concerts may mean nothing more than providing a broadcast feed. On the other hand, some enterprising sound companies may figure out a way to at least manage the sound at several locations at once. The object is to provide *consistent* sound at the multiple locations, and that will require considerable skill at coordinating efforts between sound companies.

3) *Concert patrons will continue to demand better sound.* They get it at home. They're even getting better sound at the movies. They will *expect* to hear and *understand* every word in a song. If the baby-boom generation continues to attend concerts, this trend will strengthen as they grow older and more sophisticated.

4) If the future brings higher performance systems that fit into smaller trucks, are more efficient in terms of set-up and tear-down, and are more attractive to the audience, there will be an important trade-off: *those systems will*

REPRINTED FROM OCTOBER 1976 R-E/P

. . . at least one permanent fix: NEIL DIAMOND'S "UNDERNEATH" VOCAL MONITOR by Chris Foreman

Anyone who has been fortunate enough to see a Neil Diamond show in the last year or so, and diverted enough of their attention from his spectacular performance to look at the stage, probably noticed that a lot of the clutter normally associated with a pop concert was missing.

The primary credit for this uncluttered appearance goes to the stage itself. It was specifically designed by Stanal Sound of Kearney Nebraska for Neil's own distinctive style; his continuous, intimate contact with his audience. Stanal has the exclusive responsibility for Neil's concert sound reinforcement. The objective was to develop a personal monitor system for this special stage to give Diamond the coverage he needed for his wide ranging performance, with minimum feedback potential over the entire front of the stage area, *yet the monitor speakers had to remain as invisible as possible.*

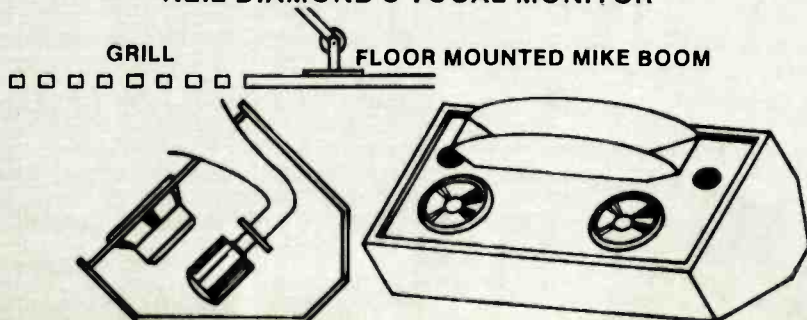
The solution to this particular monitoring challenge was a unique combination of two side-fill floor monitors, with a front-fill monitor located *underneath* the stage. The side-fill monitors are Stanal SS-1s, a biamplified version of the Altec 1218A (originally developed by Stanal). They are Formica covered to blend with the solid oak stage. The front-fill monitor covers the area in the immediate vicinity of Neil's vocal mike stand, projecting its sound upward through a grilled opening in the stage floor.

The development of this front-fill monitor progressed along two converging paths. The monitor speaker itself was conceived and built by Steve Wooley of Stanal Sound [now with CBS Musical Instruments], as a possible higher power version of the Altec 1221A slope monitor. The Stanal monitor uses an Altec 31A horn, with a special model throat, and an Altec 291-16A driver. Mounted below the horn are two Model 50-03-03333-10 Altec woofers, the same woofer used in the 1221A (a version of the 417-8H-II guitar speaker that has been optimized for vocal use).

The cabinet is the same general design as the 1221A, but larger (about 5 cubic feet interior volume) to accept the larger horn and extra woofer, and to extend the bass response. Two circular ports (one on each side of the woofers), were chosen to make the system "sound good."

Steve Wooley makes the interesting comment that a vocal monitor for front fill doesn't really need to have exceptionally good bass response since most of the vocal range is above 100 Hz, and because the main (house) speaker stacks on the sides of the stage cover the stage itself with adequate low-bass sound. Thus the primary criteria for this monitor was the production of loud, undistorted sound in the vocal frequency range. From that standpoint, the monitor is an unqualified success! Standing in front of the monitor, testing a vocal mike will "make your pants flutter" as Stan Miller, owner and president of Stanal Sound, would say. One suggestion for a model number was the "SKM-1000," for "Stanal Kill Monitor"; an apt description.

NEIL DIAMOND'S VOCAL MONITOR





"A multi-way boxed system (vertical orientation) using special electronics (Meyer Sound)."

cost significantly more, even in today's dollars. For example, reducing the size of your woofers by giving up horns and going to vented boxes requires that you buy a lot of vented boxes and loudspeakers, and the additional power amplifiers to go with them. Stage aesthetics will also cost money. This increase in

the capital requirements for a system means that it is more important than ever to plan carefully, and to anticipate every possible technological and market change. With a lot of money invested in a system, changes are more difficult, versatility is reduced, and mistakes become very costly.

5) If you use more custom-designed components, *count on hiring more qualified design and applications engineers.* Other new technologies will also demand more educated and skilled people. The sound company with more technically capable people will have a distinct edge.

6) With the increasing emphasis on the environment, *count on being involved in more noise-pollution controversies.* Open-air amphitheatres, in particular, are often located in non-commercial areas with rich, influential residents. Here's another area where technical expertise will help out (you need to be expert in laws and regulations, as well as acoustics and electronics). Constant directivity horns, by the way, are little real help here since the low frequencies (which have no constant directivity horns) travel much farther than mids or highs. One fortunate aspect of the regulations is that they usually measure noise pollution on the "A-Slow" scale, which will de-emphasize the influences of both low frequencies and transients.

7) *Concert security problems may increase, at least for the near future.* Thus, it's worth while to plan for increased security precautions in the design of your next systems. *Safety* is important, too: physical safety for hanging and stacked loudspeakers; electrical safety for artists and crew members; and hearing safety for audiences, crew

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Future of Live-Performance SOUND DESIGN

and artists. In this law-suit happy age, taking prudent safety precautions makes sense for more reasons than health.

New Markets?

Some tour companies have already begun to take advantage of new markets. Here's a sample of what is already happening, and what may begin to happen in the near future:

1) *Low-power TV* will most certainly become a reality soon. Low-power TV stations will transmit to a local audience, and may specialize in a certain market area like a primarily Black or Hispanic community. Others may emphasize religious programming, or provide educational services. Such stations will most certainly televise and even sponsor local concerts and other events (like religious gatherings), and sound companies should contact the owners of such stations as soon as they are established.

2) Consumer companies, looking for lower-cost, higher efficiency ways to advertise than national television, will almost certainly sponsor *more events like the Kool Jazz Festivals or Budweiser Superfest*. Sound companies and certainly promoters might even consider prompting local companies to take such actions.

3) Some touring companies have already started divisions devoted to *permanently installed systems*. If live music clubs continue to thrive, they are an easy target for a company that knows both rock and roll and sound sys-



"A contemporary hanging component system used by Neil Diamond with 'constant-directivity' type horns (Stanal Sound)."

tems. Consider, too, that the experience a tour company has in keeping equipment running under all sorts of conditions could be valuable in designing almost any kind of permanent system, from an in-the-round theatre system to a high-reliability, high-power voice-warning system.

4) Both *musical and non-musical legitimate theatre groups* will almost certainly continue to go on tour, and may be forced to play in ever larger venues (just like rock concerts) to make ends meet. Thus, they need sound reinforcement. The needs of such a group are different from: rock and roll, of course, and include stage aesthetics, special microphone techniques, and *theatre sound*

effects, an entirely new market avenue for tour companies.

5) Both 1982 and 1984 promise to be big years for *politics*, and one or both of the major political parties usually wind up with a big enough budget to hire a lot of sound for everything from local speeches to benefit concerts to conventions to inaugurations. There's lots of politics getting jobs for politicians, but it can be well worth while. Incidentally, here's a good place to stay flexible. If a voice-only (midrange) system will do the job, you can probably bid a lower price for one of these events. Remember that good vocal quality does not demand 20 Hz to 20 kHz, but the politicians will want to reach every member of the crowd — clearly.

Coping With the Future

Predicting the future is a bit risky at best, and some of my personal predictions will undoubtedly turn out wrong. One thing is certain: the future will bring changes, both good and bad. How we cope with those changes will determine the fate of the concert sound business.

Acknowledgements

Thanks to the following people who provided me with numerous insights into their companies' operations: Roy Clair of Clair Brothers; Ron Fox of Showco; Stan Miller of Stanal Sound, Ltd.; Ralph Jones of Meyer Sound; Chris Jennings of Thunder and Lighting; and Bill Platte of Destiny Sound.



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- 2) *Earth, Wind & Fire at the Los Angeles Forum*, by Robert Carr; *R-e/p* April 1982.
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"A two-way boxed system (vertical orientation) with extended-range components (Northwest Sound)."



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- These custom sounds can be grouped into 64 program sequences.
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- All programs can be easily edited while in use.

The PRO-FX

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STUDIO FACILITIES EQUIPMENT PEOPLE UPDATE

Northeast:

□ **PRESENCE STUDIOS** (West Haven, Connecticut) has built a new recording studio featuring a 1,100 square foot music room and a 400 square foot control booth. The studio is of a Live-End/Dead-End™ design with moveable acoustics. Materials for the construction range from stone to Sonex acoustic panels. A Yamaha G-2 grand piano has been added to the instrument package. 17 Enfield Street, West Haven, CT 06516. (203) 397-8682.

□ **NIMBUS 9 RECORDING STUDIO** (New York City) has taken delivery of a 32-in/24-out Trident Series 80 console. The board, the heart of the newly-constructed studio, was custom modified to studio owner **Geoff Daking's** specifications. The facility has also installed a new MCI tape machine, JBL 4430 monitors, and a wide range of SMPTE timecode hardware for film and video mixing. 1995 Broadway, New York, NY.



□ **FRANKFORD/WAYNE DISC MASTERING** (New York City) has opened Room "F," which features in-house Sony digital processors/recorders for all formats including the professional 1600/1610 system, PCM-10 and the new PCM-F1 formats. Room "F" is said to be capable of communicating "digitally" with any of their other cutting rooms in New York and Philadelphia. Other features include a custom Ranstele Audio automated control console, which is transformerless and features Jensen opamp circuitry; digital delay facilities; and a full complement of processing equipment. The lathe is an updated Scully with a Sontec/Block Compudisk computer control, and Technics quartz lock motor drive. The cutting system comprises an optimized

Neumann SX-74 cutterhead driven by Ranstele Audio's new 1200-watt driver package. The main tape playback machine is a custom MCI/Sony equipped for both 1/4- and 1/2-inch two-track formats. 1687 Broadway, New York, NY 10019. (212) 582-5473.

□ **EASTERN ARTISTS RECORDING STUDIO** (East Orange, New Jersey) has purchased a UREI 813-A Time-Aligned™ monitoring system, as well as a Lexicon PCM digital delay and 24-tracks of Dolby noise reduction. 36 Meadow Street, East Orange, NJ 07017. (201) 673-5680.

□ **DELTA RECORDING** (New York City), as a part of its total studio upgrading, has taken delivery of two Trident consoles. The first, a 32/24/24 Trimix capable of 56 inputs for remixing, has been installed in Studio A. A second, smaller Trimix is slated for Studio B. 16 West 46th Street, New York, NY.

□ **DARK STAR RECORDING STUDIO** (New Boston, New Hampshire) is a new 8-track studio located on a 70-acre farm in the New England countryside. The facility is equipped with a TEAC Tascam 80-8 1/2-inch eight-track recorder, a TEAC four-track machine, and a ReVox B77 two-track. Outboards include a Delta Lab DL-2 Acousticcomputer, Audioarts parametric equalizers, SAE graphic EQ, dbx noise reduction, and dbx compressor/limiters. The console is a 24 by 8 Tascam Model 15, while monitors are ADS Model 910s and Auratones. The mike selection offers models by Shure, Beyer, Electro-Voice, Sony, AKG, and Sennheiser. The instrument list includes guitars by Gibson, Fender, Guild, Ibanez, and Vox; amps by Mesa-Boogie, Ampeg, Fender, and MXR; a Moog synthesizer; and a 48-inch Taiwanese gong. Dark Star also features remote recording services. **Jaime Saunders** and **Andy Tomaszewski** are staff engineers. 63 McCurdy Road, New Boston, NH 03070. (603) 487-3314.

□ **BOOGIE HOTEL STUDIOS** (Port Jefferson, New York) has installed a new Neve Series 8108 console equipped with NECAM II automation. The new desk compliments the Studer A-80 24-track machine already on-line at the studio. Half-inch stereo mastering capability has been added with the purchase of a new Studer A-80 two-track machine. The 50- by 60-foot converted theater is said to now offer greater flexibility for mix and video projects, through the use of "live" echo chambers and expanded outboard gear. 709 Main Street, Port Jefferson, NY 11777. (516) 473-6655.

□ **RECORD PLANT STUDIOS** (New York City) has installed a second Trident console, a 48-input, in-line Series 80 featuring a remote and fully modular patch bay. The desk is now in use in The Record Plant's "White" remote truck. 321 West 44th Street, New York, NY.

□ **KINGDOM SOUND** (Syosset, New York) has installed a new Trident TSM console, featuring 40 inputs with a 32-channel monitor panel for a total remix capability of 72-channels, all with EQ. Owners **Clay Hutchinson** and **Bill Civitella** are currently awaiting delivery of a Melkuist GT 800 Floppy Disk Automation system, said to be the first on the East Coast. 6801 Jericho Turnpike, Syosset, NY.

□ **UNIQUE RECORDING** (New York City) has installed a new Studer A-80 RC 1/2-inch two-track mastering deck, and added an Oberheim OBX-A 8 voice synth with DSX 10-track polyphonic digital sequencer. 701 Seventh Avenue, New York, NY 10036. (212) 921-1711.

□ **CELESTIAL SOUNDS** (New York City) has purchased a new Studer A-80 24-track recorder, as well as a new Studer half-inch mastering machine, according to studio manager **Dennis O'Donnell**. 919 Second Avenue, New York, NY 10017. (212) 355-4825.

Southeast:

□ **MUSIC MARKET PRODUCTIONS** (Coral Gables, Florida) has installed a Harrison MR-3 recording console augmented with a Valley People 65K Series automation package. The board feeds an MCI 24-track and a Studer two-track, while monitoring is handled by UREI Time-Aligned™ speakers. 4130 Aurora Street, Coral Gables, FL 33146. (305) 442-4116.

□ **RECORDING ASSOCIATES STUDIOS** (Charleston, South Carolina) has upgraded to 16-track with a TEAC Tascam 85-16B recorder with auto-locator, and a Tascam Model 16 console. New outboard gear includes two BGW 250D power amps, a Sonic Rainbow Labs cue system, Auratones, an Omni-Craft GT-4 noise gate, and a Valley People DynaMite compressor/limiter. Installation was handled by Allen Rumbaugh and George Juodenas of Audio Architects, Nashville. Recording Associates is managed by **Ronald E. Clifton**, with **Michael J. Harbin** as chief engineer. 1045 Savannah Highway, Charleston, SC 29407. (803) 556-5770.

Midwest:

□ **MILWAUKEE AREA TECHNICAL COLLEGE** (Milwaukee, Wisconsin) has upgraded the post-production facilities of its television stations with the addition of a Neotek Series 1E 20-in/8-out console. The new board will feed an Otari MX-7800 eight-track recorder, while an Otari two-track mastering machine is on order. The Neotek console was supplied by Flanner's Pro Audio. 1015 North Sixth Street, Milwaukee, WI 53023. (414) 271-1036.

□ **PINEBROOK RECORDING STUDIOS** (Alexandria, Indiana) has installed a new EMT 245 Digital Reverb, and two Ampex ATR-102 two-track machines with half-inch head stacks. P.O. Box 146, State Road 6 South, Alexandria, IN 46001. (317) 724-7721.

□ **SIGHT & SOUND** (Omaha, Nebraska) has re-equipped both its studios with the new control room equipment, which includes a Neotek Series II 20 by 16 console; Neotek Series I 16/8 board; and Otari MX-7800 one-inch and MX-5050B MK III eight-tracks. Other recorders include Scully and Otari two-tracks, while monitoring is handled by Crown powered JBLs. The gear was purchased from Flanner's Pro Audio. 6969 Grover Street, Omaha, NE 68124. (402) 393-0999.

□ **HOLY TRAX** (Livonia, Michigan) has added two JBL 4311B monitors, a Neumann U-87 mike, and two UREI 325 active direct boxes. P.O. Box 2785, Livonia, MI 48151. (313) 522-8463.

□ **CHAPMAN RECORDING STUDIO** (Kansas City, Missouri) has added a Neotek Series III 28 x 24 recording console to its facility. According to studio president **Chuck Chapman**, the new board was supplied by Flanner's Pro Audio. 228 West Fifth Street, Kansas City, MO 64105. (816) 842-6854.

South Central:

□ **RICHARD THORTON SOUND SERVICES** (Russleville, Arkansas) is a new 16-track studio equipped with a TEAC Tascam 85-16B recorder with six-memory Auto-cue, fed by a custom modified NEI 16/16 console. The control room also features JBL 4430 monitors powered by Crown DC-300A amps, an Inter Sound spring reverb unit, and an NEI four-band parametric. Mikes are by AKG and Shure.

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STUDIO FACILITIES EQUIPMENT PEOPLE UPDATE

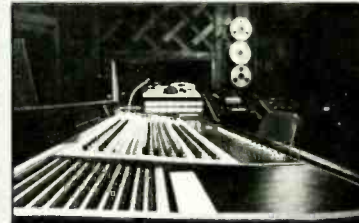
Richard Thornton is the studio's owner/operator. 1015 South Laredo, Russleville, AR 72801. (501) 968-5208.

□ **CECCA SOUND STUDIO** (Dallas, Texas) has been opened by country artist Charley Pride for both his own projects as well as outside bookings. Acoustical design is by the studio's chief engineer, **Bob Pickering**, and **Jack Homesley** of Homesley Construction Company, Dallas. The control room incorporates a combination of absorptive/reflective materials with an open bass trap to the rear of the mixing position. The length of the room was calculated so that one full wavelength of the open "E" on a bass guitar (about 41 Hz) can be radiated before reflection. The operation features an MCI transformerless JH-500D console feeding a JH-24 multitrack, with mix down on to JH-110B recorders, one of which operates in the half-inch stereo format. All the MCI and outboard gear was supplied by Southwest Pro Audio of Austin, with installation done by Dennis Lowe and Chris Green. **Kraig Pride** is CEECA's studio manager. 3198 Royal Lane, Dallas, TX.



□ **BRIAN SOUND PRODUCTIONS** (Waco, Texas) has taken delivery of a Neotek Series II transformerless console for its newly remodeled 16-track studio. The new facility features live and dead recording areas, two isolation booths, and a floating floor control room. Other new equipment includes an Otari MX-5050B two-track; a Tascam 85-16B 16-track; an array of outboards including a Lexicon Prime Time, MICMIX Master-Room reverb, and Valley People Dyna-Mite compressor/limiters; and mikes by AKG, Sennheiser, Neumann, E-V, Shure, and Crown. **Brian Konzelman** is the studio owner and manager. P.O. Box 9027, Waco, TX 76714. (817) 776-7824.

□ **A&R RECORD MANUFACTURING COMPANY** (Dallas, Texas) has installed a new Neumann transformerless cutting system with Tracing Simulator, said to be one of the first in the Southwest. 902 North Industrial Boulevard, Dallas, TX 75207. (214) 741-2027.



Mountain:

□ **THE SOUND STUDIO** (Albuquerque, New Mexico) is now a 16-track facility following its move to a new 2,200 square foot building. The operation is equipped with an MCI 24/16-track recorder; an MCI JH-110 mastering deck; a Tangent console; MICMIX Master Room XL-500 and XL-305 reverbs; a dbx Series 900 rack housing compressor/limiters, noise gates, and de-essers; Delta Lab DL-2 and DL-4 digital delays with memory; and mikes by Neumann, AKG, Sennheiser, and Shure. Keyboards include a Yamaha CP-80 electric grand, ARP Quadra, and Moog synthesizers. **E.F. Beecher** is the studio president. 130 Quincy Boulevard North East, Albuquerque, NM 87108. (505) 265-5689.

□ **SYNCHESTRA STUDIOS** (Phoenix, Arizona) has re-equipped with a Soundcraft Series 1600 console, which will complement a new Otari MTR-90 16/24-track recorder and a Lexicon 224 Digital Reverb system. The new electronics were supplied by E.A.R. Professional Audio of Tempe, Arizona. Phoenix, AZ.

Southern California:



□ **WESTWOOD ONE RECORDING** (Culver City), a division of Westwood One radio syndicators, has completed construction of its new mobile recording studio. The 45-foot truck is outfitted with an MCI JH-636 Series console, two Ampex MM-1200 24-tracks, an Ampex ATR-102 two-track, a Sony color video monitor system, and two Altec 604-E's in custom De Medio cabinets with Mastering Lab crossovers. Outboards include full limiting and equalizing capabilities, an Eventide Harmonizer, an AKG BX-10 spring echo unit, a full intercom system, and a Sphere sub-mixing system. **Jim Seiter**, formerly director of remotes for Wally Heider Recording, supervised construction of the truck, and is now in charge of Westwood One Recording. The unit is available for outside bookings when not recording for Westwood One. 9540 West Washington, Culver City, CA 90230.

□ **DAWNBREAKER RECORDING STUDIO** (San Fernando) has opened its doors after two weeks of intensive maintenance under the supervision of **Michael Stockers**. Added to the equipment list was an Ampex ATR-100 half-inch mastering machine. Adjoining the recording room is a fully-equipped rehearsal studio included with block booking. 216 Chatsworth Drive, San Fernando, CA 91340. (213) 365-9371.

□ **MCA WHITNEY RECORDING STUDIOS** (Glendale) has upgraded with the purchase of a new Studer A800 microprocessor-controlled 24-track recorder. 1516 West Glenoaks Boulevard, Glendale, CA 91201.

□ **SKIP SAYLOR RECORDING** (Los Angeles) has acquired a new complement of outboard equipment, including a Roland SDE-2000 digital delay line, two dbx Model 160X limiters, a Roland SPH-323 phase shifter, three UREI 1176-LN limiters, a Roland Stereo Flanger and SRE-555 Chorus Echo, and a Roland CPE-800 Compu-Editor automation package with SMPTE generator. 506 North Larchmont Boulevard, Los Angeles, CA 90004. (213) 467-3515.

Northern California:

□ **RYTHMIC RIVER PRODUCTIONS** (San Francisco) is a newly constructed 16-track facility featuring an MCI JH-600 automated console and the new MCI half-inch two-track with 14-inch reels. The Dennis Rice-designed control room is prepared to directly access the line outputs of today's synthesizers, rhythm machines and sequencers. Phase-aligned monitors are driven by Phase Linear A-60 amps, while the outboard gear is by UREI, Orban, and DeltaLab. 250 H Napoleon Street, San Francisco, CA 94124. (415) 285-3348.

□ **SENSA RECORDING STUDIO** (Sunnyvale), a 16-track facility, has upgraded its recording console to a CND 20-input, 8-buss board, according to studio manager **Steve Hall**. 1016 Morse Avenue #16, Sunnyvale, CA 94086. (408) 734-2438.

□ **MUSIC ANNEX RECORDING STUDIOS** (Menlo Park) has upgraded Studios B and C. Studio B, the A/V and Media studio, now features two TapeCaster cart machines, another UREI 1178 stereo limiter, plus half-inch VHS and 3/4-inch U-Matic video formats. Studio C has gone from 16- to 24-track with the installation of an MCI JH-114 multitrack, interfaced with the room's MCI Series 400 console. **David Porter** is studio manager, and **Roger Wiersema** the chief engineer. 970 O'Brien Drive, Menlo Park, CA 94025. (415) 328-8338.

□ **BODACIOUS AUDIO** (San Mateo) has formed a partnership with The Saddlerack in San Jose to supply mobile recording facilities for the Northern California nightclub. Independent recording sessions can now be booked into the club. 4144 George Avenue, #1, San Mateo, Ca 94403. (415) 573-5297.

□ **TRES VIRGOS STUDIOS** (San Rafael) has appointed **Christa Corvo** to the position of studio manager. Corva's background includes 10 years in the music business, most recently at The Hyde Street studios in San Francisco. The announcement was made by studio partner **Robin Yeager**. 1925 Francisco Boulevard, San Rafael, CA 94901. (415) 456-7666.

North West:

□ **STEVE LAWSON PRODUCTIONS** (Seattle, Washington) has completed Studio A after six months of construction. The new room, which features a full complement of audio recording equipment, as well as units for video sweetening, was designed by acoustical architect

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August 1982 □ R-e/p 73

For additional information circle #44

STUDIO FACILITIES EQUIPMENT PEOPLE UPDATE

Jeff Cooper, working closely with studio owner **Steve Lawson**. The room is fitted out with an MCI 28/24 Series 600 console with full automation, feeding an MCI 24-track recorder with transformerless circuitry. The multitrack can handle both two-inch 24-track as well as one-inch eight-track tape to ensure compatibility with Lawson's Studio B eight-track facility. The console and recorder were purchased from Pro Audio Seattle, and was installed by **Matthew Sutton**. Video gear includes a new Sony BVU-800 ¾-inch VCR coupled to the audio system via a BTX Shadow timecode synchronizer. Video monitors are by Hitachi. The video equipment was installed in conjunction with **Velle Wright** and **Jack McKeogh** of the Edit Sweet. *Sixth and Battery Building, 2322 Sixth Avenue, Seattle, WA 98121. (206) 625-9153.*

Canada:

□ **MID OCEAN RECORDING STUDIO** (Winnipeg, Manitoba) has registered with the Manitoba Department of Education as an audio engineering school. **Grant D. Klassen**, late of Motown and Wally Heider Studios, and **Dave Zeglinski**, Mid Ocean's chief engineer and formerly with CBC, are the staff instructors. The studio is equipped with a TEAC Tascam 20-in/8-out console feeding a Tascam 80-8 tape deck and a Tascam 25-2 mastering recorder. Outboards include an MXR digital delay, Fairchild reverb, Altec studio monitors, and SAE graphic EQ. Mikes are by RCA, Shure, Electro-Voice, and Sony. *1578 Erin Street, Winnipeg, Manitoba, Canada R3E 2T1. (204) 774-3715.*



□ **McCLEAR PLACE STUDIOS** (Toronto) has formed a new division known as McClear Place Mastering Studios. The record mastering facility is housed in a Live-End/Dead-End™ acoustic environment, and houses a Neumann VMS80 computerized mastering lathe, SP79C mastering console, MCI JH-110M Mastering Deck with ½-inch two-track capability. The complete cutting system is transformerless from tape head to cutter head. **Peter Norman**, the facility's mastering engineer, has had extensive mastering experience with RCA and CBS in England. To complement

record mastering, McClear also offers high-quality tape mastering for cassette and eight-track duplicating using Studer A80-MR mastering recorders. *225 Mutual Street, Toronto, Canada M5B 2B4. (416) 977-9740.*

□ **OCEAN SOUND STUDIOS** (Vancouver) has completed the move into a new, two-studio complex. Studio "A," measures approximately 1,000 square feet, and houses a 32-input custom Trident console with a 24-channel monitor section, linked to Studer A-80 multitrack and mastering machines. Recent additions include a host of new microphones, including a pair each of Neumann U-87 and U-47s, Sony C37 tube mikes, and five Crown PZMs. The second, slightly smaller, studio is currently running 16/8/2-track, mainly for voice-over and film work, as well as album pre-production and demo work. *3127 West 8th Avenue, Vancouver, B.C. V6K 2C4. (604) 733-3146.*



Great Britain:

□ **PEBBLE MILL STUDIOS** (Birmingham) the BBC Television and Radio studio complex, has ordered 12 new AMS RMX-16 digital reverb units for its audio production and post-production facilities. The new units will replace mechanical plate systems currently in use. *Birmingham, England.*

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For additional information circle #46

STUDIO FACILITIES EQUIPMENT PEOPLE UPDATE

— AUDIO/VIDEO UPDATE —

Eastern Activity:

□ **NATIONAL VIDEO CENTER/RECORDING STUDIOS** (New York City) provided post-production video for three 3-minute video promo's of **Dave Edmunds** taped live at The Capitol Theater in Passaic, New Jersey. The pieces are scheduled to air on Warner/AMEX Music Television. National's **Ann Woodward** was the video engineer, while **Roy Yokelson** handled the audio sweetening and the one-inch lay back with the aid of National's Audio Kinetics Q-Lock synchronizer. The promo's were directed by **Len Dell 'Amico** for Performance Video Productions. *New York, NY.*

□ **SHEFFIELD RECORDINGS** (Baltimore, Maryland) has completed a four-camera, one-inch video shoot at the Painters Mill Music Fair. Performing were **Frankie and the Knockouts**, and **Crack the Sky**. The latter band also recorded a live album on 24-track at the event. *13816 Sunny Brook Road, Phoenix, MD 1131. (301) 628-7260.*

□ **ICE ASSOCIATES** (Philadelphia, Pennsylvania), a cooperative partnership between Sailor Sound Studios of Philadelphia, and C&C Studios of Glassboro, New Jersey, now offers portable, multi-camera video utilizing broadcast-quality cameras interfaced with a special effects generator. The new company can handle remote, live-music video with multitrack audio, as well as concept pieces. *187 West Widener Street, Philadelphia, PA 19120. (215) 549-1539.*

Central Activity:

□ **SOUNDSHOP STUDIOS** (Nashville) has completed a major equipment upgrading program aimed toward an increased involvement in video and film projects. A full complement of new Studer tape recorders (two A800 24-tracks synchronized with a TLS2000 system, two A80VU ½-inch two-tracks, two A80VU ¼-inch two-tracks, and one B67) was used for post-production work on the soundtrack for *The Best Little Whorehouse in Texas*. Other recent acquisitions include two Lexicon Super Prime Times, vintage Neumann M49 and U67 microphones, Valley People Kepex IIs, and a video facility with JVC editors and VCRs. *Nashville, TN.*

□ **REELSOUND RECORDING COMPANY** (Manchaca, Texas) provided its 24-track remote unit to record SMPTE interlocked audio for **Jerry Jeff Walker's** 40th Birthday Bash in Austin, Texas. The concert featured Gary P. Nunn, FrummoX, Butch Hancock, and David Bromberg, among others. Video recording was supplied by **Third Coast Video**. Reelsound's engineering crew consisted of **Malcolm Harper, Mason Harlow, and Greg Klinginsmith**. *P.O. Box 280, Manchaca, TX 78652. (512) 472-3325.*

Western Activity:

□ **THE COMPLEX** (Los Angeles) recently become the new West Coast home of **CCR Video** and its full capability (five-camera) Mobile Unit. The Complex features two acoustically designed music/video stages — a 68- by 48-foot video sound stage, and a 35- by 28-foot insert stage with video and film lighting, rigging grids, and portable sound reinforcement equipment. *2323 Corinth Street, West Los Angeles, CA (213) 477-1938.*

□ **VIDEO AND MUSIC PRODUCTIONS** (Hollywood, California) has just completed a 30-minute documentary film of **Haircut 100**. Shot live at a Pasadena concert last May, the film includes renditions of the group's major hits, plus personal interviews with each member of the band. Directed by **Kim Dempster** and produced by **Anton Merken**, the film was shot for American Weekend Productions, Inc. *900 North Citrus Avenue, Los Angeles, CA 90038. (213) 466-4288.*

THE DIGITAL TRANSITION



How Manufacturers of Digital Recording Equipment are Responding to the Potential Offered by the Digital Audio Disk

With the proposed launch early next year of Compact Audio Disk players and software titles, 1983 looks set to be — both for consumer and professional markets — “The Year of Digital.” Many studios already have invested in suitable digital multitrack and mastering machines, and have been using them routinely on literally hundreds of digital recording projects. However, the added impetus of record labels now being able to take full advantage of CAD’s improved sound quality over conventional analog pressings, will result in many more studios gearing up to master in the digital domain. And, now that several manufacturers of professional digital recorders have agreed on standard sampling frequencies, error-detection schemes and track formats, the conversion and interchange of digital material and tapes between studios should become a viable reality.

To discover how the various manufacturers foresee the professional digital marketplace developing over the next decade, *R-e/p* invited each to comment on the technical and creative dimensions of the digital medium, and the direction in which they predict it may progress.



The Sony Viewpoint

..... by Rick Plushner
National Sales Manager, Sony Professional Digital Audio

In the past three years the recording industry’s reaction to digital audio has changed considerably. There no longer seems to be a “battle” of analog versus digital. Today, the questions concern when and how the transition to digital will take place. I have visited most of the major studios during this period, and my impression is that many studio owners and personnel would like to own digital equipment. It’s as simple as this: today we are releasing analog albums, and are using analog equipment to record them; tomorrow we will be releasing digital recordings, and we will be using digital equipment to record them.

Our philosophy at Sony involves education, information and demonstration, rather than the “hard sales” approach. We believe that digital audio is the future of recording, and try to provide the means that can make the transition a realistic one. We have conducted our own digital roadshows in New York, Los Angeles, and Nashville, where we have taken the digital equipment into individual studios. In this way studio

owners, engineers and staff are given the opportunity to hear the system, to evaluate it, and to fully understand what we have to offer.

The first consideration for most facilities is the expense of digital equipment. In this article I will attempt to deal with this as well as some of the question I frequently encounter:

1. Which system should I buy?
2. Is the system ready now or should I wait?
3. Is the expense justified, and will I have the clientele to support a digital system?

First of all, the person who is planning a digital purchase should thoroughly investigate all of the systems before making a decision. We encourage this approach and readily make our equipment available for such evaluations. We also recommend that prospective customers get in touch with people who have been using our system in order to get evaluations from the engineer, and studio owners and producers who have extensive hands-on exper-

ience.

The answer to the second question is: Yes, the system is ready now. Sony professional digital equipment is designed with the long-term future in mind. For instance, tapes that are recorded on our PCM-1600 digital audio processor are completely compatible with the current model, the PCM-1610. In addition, when clients have made suggestions for improving the equipment — and there have been a few instances — we have retro-fitted systems in the field. Our two-track digital mastering and editing system, available now, is in constant use throughout the world, and is entirely compatible with the sampling frequency and coding format of the upcoming digital Compact Disk.

The third question regarding finances and clientele entirely depends on the specific studio, but perhaps some further information will clarify the situation.

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For additional information circle #47



The Sony Viewpoint

by Rick Plushner ... continued —



were purchased at considerable expense, the first logical step seems to be an investment in a two-track mastering and editing system for the production of what are called "hybrid" recordings, incorporating analog multitrack and digital two-track recording. In this way, the finished product is not only of extremely high quality (no generation loss from the multitrack master; no wow or flutter; and capable of being duplicated exactly), but it is also a master that is ready for production of Compact audio disks.

A further advantage of the Sony two-track digital system is the fact that videotape recorders and videocassettes are used to record the digital material. Many studios are looking for ways to diversify into video production, video sweetening, and other related work. Our digital system uses the new BVU-800 1/4-inch videocassette recorder. The BVU-800 is a broadcast quality U-Matic, and the only one presently available with built-in editing capabilities.

Two BVU-800 videocassette recorders comprise a system for machine-to-machine SMPTE timecode video editing. This recorder is the culmination of 13 years in the manufacture of U-Matics, and not only has outstanding electronics but incredibly fast and dependable transports. Another plus is the fact that tape costs are quite inexpensive: about \$35 for a videocassette that records up to an hour of audio or video material.

In addition to the PCM-1610 digital audio processor and BVU-800 recorder, Sony also offers the DAE-1100 digital audio editor, which is capable of many editing operations that are not possible in the analog medium. Signals may be raised or lowered digitally at edit points for perfect matching of levels, as well as combined in a wide range of crossfade parameters. The electronic editor is far

more accurate than a razor blade, and allows for rehearsal and preview before the edit is recorded. Additional digital equipment now available includes the DRE-2000 digital reverberator, and the DDU-1500 Series of 16-bit digital delay/preview units for conventional disk mastering.

The most recent addition to the Sony digital line is the PCM-3324 digital multitrack, which will be made available in September 1982; a pre-production model has been in circulation for some time at major studios throughout the country.

The PCM-3324 is the result of more than a decade of costly research/development, and does everything expected of a conventional analog machine as well as providing functions unique to digital technology. The development of this technology has made it possible to produce a 24-track machine in a remarkably small package.

The multitrack transport uses 1/2-inch videotape, and provides 24 discrete digital audio channels, two analog tracks, a SMPTE timecode track, and an internal control track. It is capable of razor blade editing in the conventional fashion, and incorporates provisions for electronic editing from multitrack to multitrack. In a move towards standar-

dization, an agreement has been made by Sony, Studer and MCI whereby these companies will manufacture fixed-head recorders that are tape compatible.


At a cost of \$150,000 the PCM-3324 may be beyond the means of most studios, but there *will* be client requests and a market for digital multitrack recording. I think a good approach would be to make the machine available on a rental basis to a number of studios, to disperse the expense and allow the machine to pay for itself. Many studios have set up leasing companies for the rental of equipment to outside clients, as well as for their own use.

Sony does provide thorough technical support to those who have purchased equipment and assist in all Sony digital recording projects.

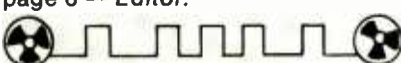
There is a need for communication among studios, artists, producers and record labels regarding digital audio. SPARS has done a great deal in creating a forum where discussion can take place. As one example, it has communicated its findings to The National Association of Record Manufacturers. By linking up all of the various industry elements the transition to digital can be a smooth and sensible one.

In conclusion, Sony is most concerned with building the very best technology in addition to supporting its products in the field. My advice to studio owners is to thoroughly investigate before making the decision to purchase digital equipment. One of our recent sales was to Motown/Hitsville Studios, Los Angeles, and this signifies a major commitment to digital audio. Guy Costa, the studio's vice president and managing director, spent a *very* long time evaluating all of the systems and equipment available. He had the financial means to make a purchase sooner, but he chose to be thorough. I advise every customer to do the same. Check around. The wrong decision could be disastrous if your studio isn't ready, but the right decision could bring artistic and financial success. ■■■

Digital Transition continues overleaf —


DIGITAL AUDIO DISK
— A Progress Report

R-e/p's consulting editor Martin Polon explores the present state of development and future dimensions of the consumer DAD in his regular *Audio/Video Recording* column on page 6 — Editor.





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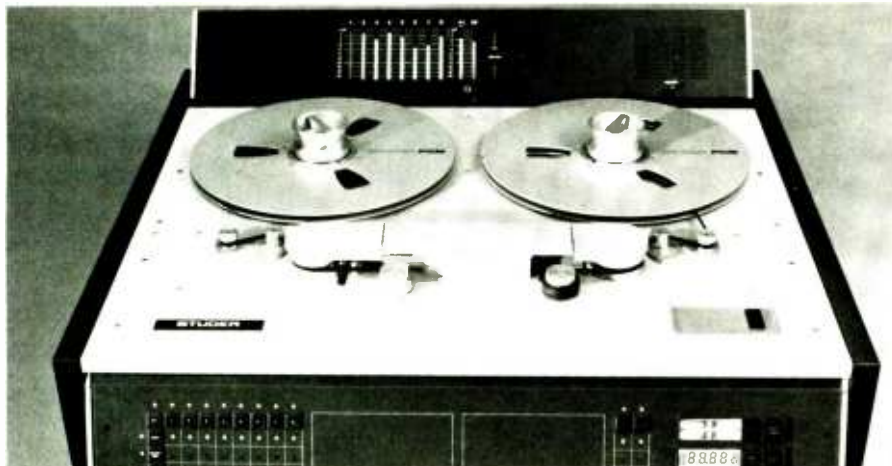
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*ship connectors ASAP for prewiring of patchbay and 24 track before arrival of console.



THE STUDER VIEWPOINT by Dr. Roger Lagadec

Product Manager, Digital Audio, Studer International AG



The market in digital audio, although still surprisingly small in sales volume, is a fact of life that no manufacturer of professional equipment may afford to ignore. Obviously, it is possible today for a small section of the recording community to pay the price of going digital, while the vast majority of users earn money with existing analog technology. Although plagued by conflicting systems vying for the combined

market of audio and video, the introduction of consumer digital disks in the very near future will mean a steady increase in digital recording and processing. A fringe market will continue to digitize their operations, from recording to mixing, while the majority of professional users will move towards digital at a pace dictated by day-to-day economics, interest rates and operational common-sense, i.e. not very fast at all.

(Being the first on your block with digital makes profits easier; having, like everybody else, to make profits from very expensive equipment is far more difficult, however.)

There is no consensus in sight regarding digital recording formats. Several incompatible formats exist for rotary-head (VCR) recording; even more for stationary-head (reel-to-reel) recording. A consensus has been reached on the sampling frequencies, but not on one single, universal standard. Digital audio equipment still cannot be interconnected freely, although a universal digital interface is slowly emerging. In all probability, and for many years, there will be four or five major formats, more than one sampling frequency, and no way of interchanging tapes between digital machines from different manufacturers.

The choice between fixed- and rotary-head as the prevalent digital recording method is still open. Studer is convinced that, in the long run, fixed-head recorders with a powerful error protection code are the right choice in the professional area. Furthermore, the distinction between professional and rotary-head machines — video cassette recorders — has already started eroding; it may well be that the low-end of the professional digital audio market will be captured by improved consumer equipment, as a simple way of reducing short-term investment and risk.

Studer will introduce a range of multi-channel digital recorders at the end of 1982, in the form of a four- and eight-channel machine based on the A800 transport, and using 1/4-inch tape. Other recorders covering today's range of channel numbers and applications will be introduced gradually, based of course on the same digital recording format. An essential goal will be to provide the same long-term service, support and compatibility as found in existing and future analog recorders.

The Studer range of digital recorders will be supplemented, also this year, by the peripheral equipment necessary for making records: a preview unit for transferring today's analog and digital audio to vinyl disk; and a universal sampling-frequency converter which adapts all existing digital audio formats and sampling frequencies to the requirements of the digital audio disk. The latter unit will also make possible program transfers between systems with conflicting formats and sampling frequencies.

Digital, at Studer, does not mean only recording the signal itself, but also control, automation, simpler troubleshooting and line-up, and increased productivity. In this sense, the microprocessor controlled A810 analog recorder recently introduced by Studer is as good an indication of the digital future as the new digital recorders. Both technologies will be supported by Studer in the same professional way. ■■■

Digital Transition continues overleaf —

PROPOSED SPECIFICATION FOR U-MATIC TYPE CD MASTER TAPES

To ensure compatibility between digital tapes containing material for pressing on to Compact Disc, Sony and Philips — co-developers of the consumer player and software design — have proposed the following format for U-Matic master tapes (abbreviated here because of space considerations).

It is reported that both Sony-CBS/Sony and Philips/Polygram will be able to handle taped material to this format, including the PQ-cue code, from start 1983 on.

Digital/PCM Format

- Sampling Frequency: 44.1 kHz
- Source coding: linear, two's complement, 16-bit
- Emphasis (optional): 15 + 50 microseconds
- Number of channels: two
- Playing time: musical duration plus minimum 1 minute
- Maximum playing time: 61 minutes (including lead-in/lead-out time)

Timecode Information

- Track position: analog track #2 (CH-2)
- Timecode standard: real time (non-drop frame)
- Sequence: continuous up-counting timecode data covering lead-in, program/pause, and lead-out periods
- Synchronization: Timecode frame should be synchronized with video frame of digital audio signal.
- Recording level: +3/-6 dB on audio track level meter of BVU-200B or BVU-800 (modified).

Cue Format

The Cue Format on a digital audio master tape is used to record information such as the numbers of the music selections, an index, timecode data, and so forth, which will generate P and Q channel data on Compact Discs. Since the Cue Format differs from the P and Q channel format of a Compact Disc, P and Q channel data must be

generated by Cue data in conjunction with the SMPTE timecode when the disc is cut.

In a digital audio system employing a VTR, Cue data is recorded on audio track #1 (CH-1) of a video tape, independent both of the other digital audio channel and of the timecode channel.

The recording data stream on the FM-encoded audio track contains a Preamble, Sectors (for Cue data) and a Postamble. The Data Field is a block of data in which Cue data for generating P and Q channel data is recorded. The Data Area consists of 128 bytes containing P or Q channel Cue data, or Control or User data. The Control channel can be used to record VTR control data for generating P and Q channel data on a Compact Disc using multiple master tapes, while the User channel can be used to record the record number of the Compact Disc. P channel Cue data consists of five bytes per word. The upper four bits of Flag data located at the first byte of the word are used for the Channel flag, and the lower four bits are used for the flag of a music, pause or lead-out signal. The bytes between the second and fifth are provided with time code data of the music or pause beginning point in BCD notation. The drop frame/full frame flag of the SMPTE timecode is deleted. P channel Cue data should be located in sequence of time on the tape. ■■■

You Can't Afford to Book Another Session ...Without FADEX.

The FADEX programmable fader system can breathe new life into your current unautomated console, or add the flexibility of automation, at an affordable price, to new consoles. In fact, the FADEX has been chosen by many leading console manufacturers as their automation system.

The FADEX system provides ease in operation, reliable performance and excellent signal quality. And, it's easily installed into any console with removable fader sections.

Only the finest components are used in the FADEX to insure superior performance. We use Penny and Giles linear conductive fader elements for optimum "feel" and durability. Since the VCA is the cornerstone of any console automation system, we use only the best, the EGC-205M.

The EGC-205M employs our patented EGC-101 gain cell and typically delivers the following operation parameters:

- Less than .015% IMD or THD under any condition of signal level and attenuation normally encountered in console use.
- 88dB signal-to-noise ratio at unity gain (—705dBm residual noise at shut-off)
- 140dB gain control range

- 150kHz ul power bandwidth (—3dB @ 100kHz)
- 100dB high frequency shut-off
- More than 50dB of control rejection
- Excellent temperature stability

To insure that program data is processed quickly and accurately, the time-proven 65K Progammer is included as a key element of the FADEX system. Priority encoding allows the 65K to automate up to 4,096 variable console functions while responding to a change in any console function within 4 milliseconds.

Operational flexibility is provided by the FADEX system in either automatic or manual modes by the following functions:

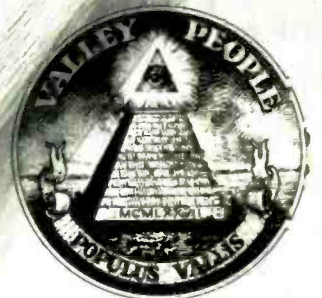
- Up to 9 VCA sub-groups (Any channel may be designated a group master)
- Channel mutes and group mutes
- Channel solo in-place and group solo in-place

- VCA Grand Master
- Automatic mute detection
- Auxiliary VCA control inputs

The FADEX System may be easily upgraded to include more channels thanks to our sectional motherboard and the expansion capability of the 65K Programmer. And, if you decide that you need the capability of computer-based automation, the FADEX will interface with both the Sound Workshop DISKMIX™ and Melkuist systems.

So what's the cost? Under \$17,000.00 for a typical 24-channel system with programmer. You can get a quote for your FADEX system from a Valley People dealer near you. He'll also tell you that your price includes installation at your facility by our factory trained technician.

FADEX... Now you know you need it!



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*DISKMIX is a registered trademark of Sound Workshop Professional Audio Products, Inc.

For additional information circle #43



THE AMPEX VIEWPOINT by E.S. Busby, Jr.
 Manager of Audio Engineering, Ampex Audio-Video Division



I see the future of digital audio as certain, yet indistinct. Using 14- and 16-bit technology, digital tape recording and disk players will soon reach the consumer. Digital broadcasting via a cable TV channel is highly probable once the legal difficulties are settled. FM (analog) broadcasting will find itself unable to support the 90 to 96 dB dynamic range that 16-bit technology offers. What the

broadcast service might do to extend dynamic range I won't presume to guess.

My main interest lies in professional tape recorders. In the near term, this field will be dominated by 16-bit technology, limited by available analog-to-digital converters. While today's technology grows to maturity, its health would certainly benefit by mutual agree-

ment on interface methods and tape format, whether in committee or, at greater cost, by trial and error. Work has begun in several standards-setting bodies to this end, but necessarily proceeds at a frustratingly slow and deliberate pace.

Today, digital audio recorders are considerably more costly to make than analog. With performance only moderately superior to the best analog systems, the resulting cost-to-perceived-benefit ratio may be slowing wide-spread acceptance. If so, this may urge the selection of methods and formats based on minimum cost as opposed to best performance and utility. While there is nothing wrong with the idea of "adequacy," the merely adequate will be replaced sooner by an inevitable new technology.

A long maturity period for a product, especially an expensive one, is beneficial to both the using industry and manufacturers. It takes a lot of money to design, tool for manufacture, test and support a product of this complexity. Manufacturers survive by making a profit. To maximize their chance of making one, they must consider many factors: suitability, acceptance, timeliness of introduction, and lifetime to obsolescence among them.

Somewhere downstream, there lurks a new technology that will send us all back to our drawing boards. In my own case, I think it is analog-to-digital conversion. Measurements have been made of the dynamic range of contemporary and orchestral music, and the noise level in homes, studios and listening rooms. Taking into account certain directional characteristics of the ear, it has been shown that a quiet living room can support a dynamic range of 120 to 128 dB, equivalent to 20 to 21 bits of digital resolution.

Among the "golden ears" who pass judgement on audio equipment are those who can unfailingly detect today's digital channel. Whether they notice quantization error, or the effects of the necessary anti-aliasing filters, or some other artifacts of the channel, is not yet clear. It is my lingering suspicion that when all has been discovered, the ideal sampling rate will be found to be equal to what we now call bias frequency, and that bandwidth restriction, when necessary, will be linear phase and done digitally.

All the digital technology except analog-to-digital conversion is at hand. While a 21-bit high-speed A/D converter may seem unattainable, I remain confident that it is attainable, having seen the unpredictable happen before. I grew up with triodes, 40 HP yellow airplanes, and Univac. Today I fly in jets with a whole computer in my pocket. In the meantime, I'm looking forward to binary Beethoven by the byte-pair, recorded on equipment which, if the right moves are made, will be useful for a long, long time. ■■■

Digital Transition *continues overleaf*—

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<p>Limiter/Compressor LC-1 \$695.00</p> <ul style="list-style-type: none"> ■ Two independent channels ■ Continuously variable slope ■ Stereo coupling ■ Illuminated V.U. meters for gain reduction or output level ■ High performance at low cost ■ Compact size (19" x 1 3/4" x 8") 	<p>Parametric Equalizer CB9066 \$650.00</p> <ul style="list-style-type: none"> ■ 3 band eq .. ■ Variable "Q" ■ Separate Bypass for each band ■ Hi & Low Pass Filters with continuously variable frequency and slope ■ Built-in power supply ■ Compact size (19" x 1 3/4" x 8")
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For additional information circle #50

**TABLE: SPECIFICATIONS OF DIGITAL AUDIO STATIONARY HEAD (DASH)
FORMAT UTILIZED BY SONY AND STUDER MULTITRACK RECORDERS**

Version	Fast Speed			Medium Speed			Slow Speed
	¼	½	1	¼	½	1	
Tape width (Inch)	¼	½	1	¼	½	1	¼
Digital channels	8	24	48	4	12	24	2
Digital tracks	8	24	48	8	24	48	8
Analogue tracks	2	2	2	2	2	2	2
Timecode track	1	1	1	1	1	1	1
Control track	1	1	1	1	1	1	1
Total tracks	12	28	52	12	28	52	12
Sampling rate fs (kHz)	48.0, 44.1, 32.0						
Tape Speed	fs=48.0 kHz	72.38 (28.50)		36.19 (14.25)		18.10 (7.12)	
cm/s	fs=44.1 kHz	66.50 (26.18)		33.25 (13.09)		16.63 (6.55)	
(IPS)	fs=32.0 kHz	48.25 (19.00)		24.13 (9.50)		12.06 (4.75)	
Quantization	16-bit Linear/Channel						
Channel coding	HDM-1						
Error correction	Cross Interleave, CRCC						
Redundancy	33% (Error correction, detection, and synchronization)						
Bit length (µm)	0.6281						
Minimum wave length to be recorded (µm)	1.8844						
Packing density (bpi)	40,426						

Digital Services

— would like to thank —

Dionne Warwick ♦ **Middle Ear Studios** ♦ **Dale Peterson**
Earl Thomas Conley ♦ **Scruggs Sound Studio**
Creative Workshop ♦ **Nelson Larkin** ♦ **Norbert Putman**
Willie Nelson and the Texas Music Awards
Bob Montgomery ♦ **Texas Baroque Ensemble**
Newpax Records ♦ **RCA** ♦ **Arista** ♦ **Third Coast Sound**
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our first year incredibly successful!

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THE MITSUBISHI VIEWPOINT by Lou Dollenger
Professional Digital Audio Div., Mitsubishi Electric Sales America



In the little less than 18 months since Mitsubishi's entry into the American professional recording market, a number of interesting and significant trends have surfaced that support the on-going transition from analog to digital recording methods. Of perhaps the most importance was the adoption (by all Mitsubishi and 3M Digital Mastering System recorders, and the Sony PCM-3324 multitrack only) of a common 48 kHz sampling frequency. With this first step towards standardization surmounted — namely the simple transfer of signals among various PCM format hardware — we foresee a bright future for digital recording — both in the professional and amateur areas. A second factor that has supported our efforts here has been the rapid acceptance of the Philips Compact Disc digital playback system by a number of markets and manufacturers of hardware and software worldwide.

Other trends have been the widespread use of digital recorders on live and mixed from analog recordings (especially in classical music); the introduction of a number of consumer-oriented digital recording systems; more questions than complaints from some of digital's traditional critics; the emergence of "politics" as a more energetic method of format selection; and, most importantly, a far better understanding of digital recording's basic concepts and terminology — at least at the recording studio level.

At Mitsubishi Electric this has been a most important year in both the marketing and development of professional and consumer digital products. Our professional product line is now available for sale with the recent introduction of production models of the X-800 32-channel recorder and the XE-1 Electronic Editor, which complements the razor-blade-produced electronic editing

abilities of our X-80/80A mastering recorders. Finally we have the ability to offer those recording studios and broadcasters that are most concerned about quality product, a full line of professional equipment; one that we think addresses nearly all of the present and future needs for digital recording.

Our work here has only really begun, however. Mitsubishi Electric also has recently announced the availability of the DP-101 Compact Disc player, and the D-102 14-bit PCM processor for VHS- or Beta-format VCRs. These are only two of the ideas that we have developed for digital recording products — a market we see as being particularly bright during the next few years.

In our professional development area we are now investigating the feasibility of making an eight-channel, "spliceable" 16-bit recorder to complement our present digital line; a digital mixing console; cutting equipment for the Compact Disc mastering process; digital microphones; outboard sound effects processors; and broadcast processing equipment (the Tsuuden satellite factory, Japan, where Mitsubishi digital equipment is manufactured, is already very heavily involved here.) Along similar lines, a consumer-oriented Compact Cassette PCM recorder is also being readied.

This type of research and product support demonstrates, we feel, that Mitsubishi Electric is ready for the analog-to-digital conversion that today is going on in the studios around the world. One area of concern, however, has always been the professional standards arena. Usually, when a step forward in technology is taken, as with PCM recording, it is of the utmost importance that a format be selected. Since digital recorders were developed simultaneously by a number of different manufacturers, this has not yet been possible.

We see the future of standards as being two separate avenues here. The first road that the professional audio industry could take would be to investigate very carefully the various proposed formats, and make a recommendation as to the relative merits of one from another. If one format was found to be superior to the others it should be selected, to the exclusion of the others. This avenue would soon lead to the situation that analog studios find themselves in today — namely the unrestricted compatibility of tapes among various manufacturer's hardware. Here, unfortunately, those clients who have invested in one of the "rejected" formats suddenly would find themselves with non-compatible machines. For this reason the second avenue is the more likely of the two.

This second approach requires a bit of rethinking, a situation that has been very typical of the digital recording process in recording studios. Now that a common sampling frequency and a bit strength has been decided upon by all PCM manufacturers, it would be a relatively painless step to transfer signals from, say, a Mitsubishi recorder to a 3M recorder. The sound loss would be negligible and, in time, the inconvenience would be a less important factor. We are often asked if the Mitsubishi X-800 32-channel recorder (using 1-inch tape at 30 IPS) can play a Sony produced 24-channel recording (using ½-inch tape at 30 IPS), and one can easily understand why it is not only difficult, but impossible. (Much like attempting to play a 1-inch Type C videotape on a VHS recorder this is not now, nor never will be possible.)

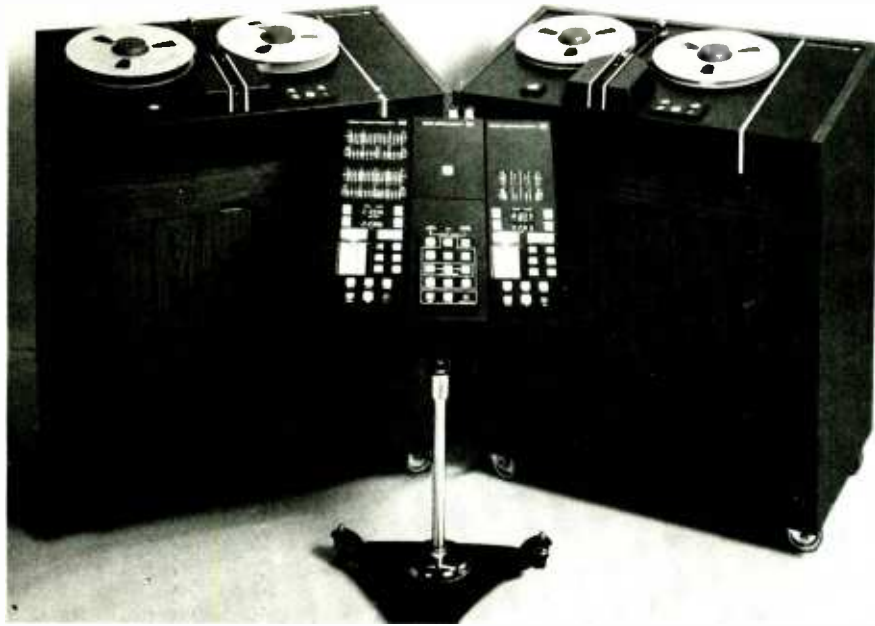
Within about five years we see the standards issue as a less important one, since most music releases will be digitally recorded and played back, and the rethinking process mentioned earlier will already be well underway. As time goes on, however, it will become more and more important — at least for the studio owner — to carefully research professional digital formats before the purchase. Each format has its own particular advantages and disadvantages for the recording specialist, but the end user of the music will have the common advantages of unsurpassed sound quality; an archival and virtually indestructible disk; nearly unrestricted portability; and reduced cost.

In the larger picture this is really true of professional digital recording hardware, at least in the sense of sound quality. The informed purchaser of such equipment therefore will only have to make his choice by considering the factors of: price, flexibility, features and, most importantly, reliability. Here at Mitsubishi we feel that we have developed a digital recording format and hardware that offers an overwhelmingly best combination of these factors, offering the best advantages for those studios who decide to make "the analog-to-digital conversion." ■■■



THE 3M VIEWPOINT by Clark Duffy

Marketing Development Manager, 3M Digital Mastering System



Recording engineers have long been impressed over the heightened aesthetics of digital audio. Most can recite the specs in their sleep: over 90 dB dynamic range and signal-to-noise ratio; flat, full frequency response; the absence of distortion; no generation loss in overdubbing, mixdown and copying; incomparable highs and lows; more audio channels; no track-to-track signal phase shift; no print through; and more.

Digital's price tag is also impressive. With today's general economy and record industry slumps, many engineers and studio owners are asking: "Why buy digital now?" The attitude among them is: We can "get by" without it for now. There's no question that some studios can get by without the added aesthetics of digital now, and for years to come. But, I believe it will soon become increasingly difficult for the major studios to do so.

While today the majority of clients

may be pleased with their "analog" sound — and perhaps even dependent upon the coloration it provides — others are becoming aware and alarmed at how much of their creativity and sound is now needlessly lost, colored or degraded because of the tape recorders used. (This isn't so surprising when you realize that after six generations the analog master has approximately one-third less signal-to-noise ratio, 30 times more distortion and about 20 times more system-induced change in the high and low frequencies as a comparable digital master.) Then, there are those clients who are simply impressed at hearing the glowing reports from digital users.

As a result, we're seeing artists and producers, including top names in all music formats, leaving their customary studios to record digitally elsewhere, or renting the digital multitrack equipment for their sessions.

A major factor contributing to awareness and interest in digital is the digital audio disk (DAD). Artists, producers and record labels obviously want some of these disks to be theirs. They foresee the potential for a double payback in the form of a better sounding hybrid record today and subsequent re-issue as a DAD tomorrow, if they record digitally. Many artists are currently doing projects already scheduled for DAD release.

Thus, the aesthetics of digital *per se* may not be the primary motivation for a studio to go digital now, but there are business considerations. In addition to maintaining clientele, digital can help gain new customers. Many "digital" studios have greatly enhanced their positions, attracting artists that otherwise would have gone elsewhere.

But, gaining business beyond the record industry may be the more important factor to studios seeking to diver-

sify or expand. Today sound sweetening of video projects accounts for approximately half of 3M digital applications. This is because video producers are suddenly aware of the ability of digital audio to enhance their total product, plus the fact that higher quality and significant cost savings are generally possible in the dedicated audio facility. Also, there has been a rapid growth in the use of sound sweetening during the past year.

Digital sound sweetening has been used for hundreds of television commercial soundtracks; several movies, including *Annie*, *Fantasia* and *Star Trek II*; audio-video presentations, including over 700 soundtracks produced in two and one-half years for Disney's EPCOT facility and numerous TV specials; videodisks and cable programs.

Just as digital audio can add a new dimension to video productions, it can add new dimension to a studio's business. Certainly, many studios can get by now without digital, but they should explore how much better they might be putting digital to work for them to maintain or gain business. Rental for digital remote sessions and for another studio's use has been a popular source of added revenue.

What About Standards?

The two most important issues involving digital audio standards now seem to have universal acceptance. 3M helped to standardize the 16-bit, two's complement digital word and 48 kHz sampling rate. A switch-selectable sampling rate feature will be introduced shortly, providing flexibility for recording and playback at 48, 50 and 44.1 kHz rates.

While tape interchangeability between digital recorders of various manufacturers would be ideal, we do not see this occurring soon, nor presenting a real problem to artists and producers. With some 75 3M recorders currently in use worldwide, artists and producers can seek out those studios with the desired equipment, or often rent it for use in a favorite studio. "Studio-hopping" is not unusual, and selecting a certain studio because of a specific brand of digital recorder is not unlike choosing one for a particular console — except that the recorder has the benefit of portability.

3M sees the digital market gaining momentum, especially during the past six to eight months. The trend to digital has grown because of increased adoption of the equipment by major artists and the many new video sound sweetening applications. Awareness will be further increased as other manufacturers introduce multitrack digital equipment. One very important difference is this: with more than 75 3M recorders operating in studios today, combined with over three years of studio experience and continued refinements, 3M isn't just talking about digital... we're recording. ■■■



Digital Transition continues overleaf —



As the pioneers of commercial digital recording in the US, Soundstream looks ahead to an ever expanding market, a market which it helped create. Digital recording no longer is the province of a few forward-looking audiophile labels — it has become the recording standard for all major and most independent classical labels. The “revolution” has become an “evolution.” Inroads into the pop field have been slower, but with the introduction of viable multitrack digital recorders that offer all the sophistication — and more — of the best analog machines, there is no longer any doubt that this vast market will change to a digital format in the foreseeable future. This development will be spurred on by the introduction next year of CD home players, which will bring to the record buyer a quality of sound all but equal to the master recording, thus directly involving the listener through a realism and immediacy he has never previously experienced.

In addition, Digital Recording Corporation, in conjunction with Soundstream's proven digital audio technology, is developing its own home player, the AudioFile™. This unique player utilizes a stationary 3- by 5-inch card embedded with a photosensitive emulsion, on which digital information is “pressed” and later read by a scanning light source. It will be compact, simple to operate, and will easily fit into a car radio slot. The records will be durable and virtually scratch-proof; they will fit in quantity into a shirt pocket. The players will provide a very fast change capability, coupled with programmable select and play features highly valued both in the home and by automated broadcasters.

Since its first digital recordings in 1976, Soundstream has been in the forefront of the development of digital

recording and editing, and has continuously incorporated improvements in state-of-the-art technology into the two-, four- and eight-track recorders it manufactures. In addition, Soundstream is constantly updating its Instant Access Editing™ system to make it still faster, more flexible and creative.

Perhaps “creative” is the best term to apply to Soundstream's general philosophy because, as a service-oriented company, we strive to provide new and innovative ways to deliver on important but changing technology. Clients know they can count on a trained engineer/maintenance person to accompany our portable digital recorders assigned to sessions anywhere in the world. These engineers not only work to assure that the machines are maintained to highest standards, they also operate the equipment, keep session records, and are qualified to cooperate with the session recording engineer and producer in many areas.

Because it is entirely computer-based, Soundstream's two-, four- and eight-track Instant Access Editing system dispenses with the use of tape during the editing process, thus totally eliminating time-consuming tape shuttling. Edits can be quickly made or changed in order and at any point, with the ultimate convenience of random, instant access to all material. Infinitely variable cross-fades, level fading and level changing — even on individual tracks — as well as numerous other creative aids are available to the imaginative producer/editor. The speed with which this system works is so high that it offers cost advantages in the editing of analog recordings as well. In addition, the IAE System constitutes a kind of digital standard, because it is capable of editing digital recordings made on any digital machine. The editors who operate the

Instant Access Editing system in Los Angeles, Salt Lake City and Gutersloh, West Germany, are all trained musicians, capable of reading the most complicated scores, thus enabling us to offer yet another special service: “producerless” editing — when a producer needs to use his time in ways other than attending an editing session.

Once recording and editing are complete, edited masters are provided with preview either via digital tracks on the tape, or special delay hardware. Master tapes can be cut at full- or half-speed.

Soundstream master tapes and equipment provide the state-of-the-art in archival permanence. Not only is a safe copy created that is digit-by-digit identical to the original, Soundstream equipment also allows any tape to be easily checked at any time for the complete integrity of each and every digit it contains (there are about 5 billion of them). What is more, two archive masters can be compared digit-by-digit for absolute identity when copies need to be made for worldwide distribution, or long-term archival rejuvenation. Even in the original production processing, Soundstream equipment automatically monitors for the assurance that every digit passes intact from the recording stage to the mastering room.

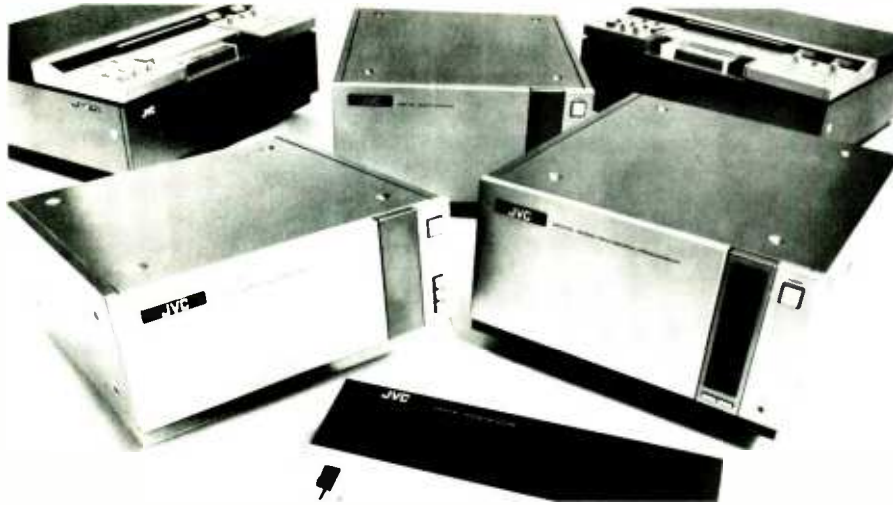
Soundstream services are tailored to provide the latest in digital recording methods and equipment while shielding the record company, producer, or engineer from the risks of a developing technology. This is done by providing continuously upgraded equipment and methods, along with experienced digital engineers only for the time needed for production, and by delivering digital masters directly applicable to future, as well as present consumer end professional formats. ■■■

Digital Transition continues —



THE JVC VIEWPOINT..... by Larry Boden

Chief Engineer, The JVC Cutting Center



By now, there can be no doubt that the digital age is upon us. What isn't so obvious, however, is where it will take us, at what speed, and what kind of shape will we all be in when we get there. (And I'm also talking about manufacturers here, not just studios.)

To evaluate just how far along we are at the moment, let's borrow a few well-worn cliches from our friends in the mass media. Right now, we feel almost every digital critic falls into one of three categories:

The first is the "hapless victim":

"Why do I need all this digital mess! Life's complicated enough. We don't need digital. This whole mess just brings us within two blocks of Armageddon."

The second is the "innocent bystander":

"Digital will come to me; until then, I'll just wait. Sure, the stuff is slick, but is it practical? No one can maintain the gear unless they went to MIT. I'll wait until the sampling rates are higher."

The third one is the most vocal; he's the "horrified onlooker":

"This digital stuff is the worst thing to come along since the heart-break of psoriasis. Look at the prices! My clients can barely afford my rates now. Nothing's compatible with anything else. Analog is a known factor that everybody is comfortable with."

No one said that the digital transformation of the audio world would be painless.

In many ways, the analog/digital transition has many parallels with the mono/stereo evolution we had with disks. We heard cries that "It's not compatible; the cutting equipment is too complicated and breaks down a lot. And it costs too much."

Hmmmm. Have we not learned anything? Progress will have its way with us.

Several rather obvious facts confront us about digital.

1. The cost will come down; how much is another matter. JVC feels that digital

must be affordable. It does us no good to introduce and market a machine that only 5% of studios can afford. We're working on this. Be patient.

2. Digital is not going to go away. (A little bit, I suppose, like psoriasis.) While we do not expect potential customers to line up with cash in hand, we feel these same people do themselves a great disservice in not learning more about digital technology generically.

3. While it is coming, no mad rush to digital is necessary. We feel that manu-

facturers who introduce equipment without proper field testing, service manuals, sufficient spare parts and untrained or unqualified service personnel hurt both themselves and their customers. *Caveat emptor.* JVC believes all the above are vital.

And, if you're one of the ones waiting for higher sampling rates, or one total digital standard, you may be in for a long wait.

By the next five years, the all-digital studio should be reality. And, it's quite possible that the tape machine as we know it will disappear; its functions taken over by the console, material being stored on an advanced disk-pack system with complete random access to any point in an instant.

JVC's policy can be stated very simply:

1. Digital tape machines should be priced at no more than 50% above the best analog machine available for a similar track capacity.
2. Machines should be field serviceable, parts should be readily available, and service training should be offered to all purchasers. Size and ease of operation are also a consideration.
3. No user should be unknowingly used as a guinea pig. Debugging a machine design in such a complicated area as digital is no easy task. Forgive me if I borrow another well-worn cliché when I tell you that JVC will "sell no machine before its time." ■■■

BRYSTON



The most respected audiophile-quality power amplifier line in the world was available first to professionals! Bryston amplifiers bring with them years of hands-on experience in sound-studios, where they have proven their unique accuracy; on the road, where they have proven absolutely unmatched reliability; in hundreds of professional installations all over the world, where they continue to prove every day that for uses requiring flawless sonic quality, tremendous load-driving ability and zero down-time, Bryston has no equal.

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(802) 223-6159

BRYSTON MARKETING LTD
57 Westmore Dr., Rexdale Ont., Canada M9V 3Y6
(416) 746-0300

August 1982 □ R-e/p 87

New Products

NEW MODEL M1532 MIXER FROM YAMAHA

The M1532 sound reinforcement mixer has 32 input channels, 13 mixing busses (including a 5 by 4 matrix) and 17 outputs (plus 40 patch out/in points). According to Yamaha's Bob Sandell, the M1532 "makes an excellent main mixing board for complex theatrical, nightclub, and broadcast jobs. It's manufactured to meet the needs of any critical sound mixing application, including recording."

Each input channel has a pair of switch-selectable XLR connectors, either of which can be used with mike- or line-level sources. Channel EQ offers 15 dB of boost or cut at any of 16 frequencies. More flexibility is provided by patching in other signal processing equipment at the interstage patch points on each input channel. Patch points are also provided on the program, echo and foldback busses. Two peak indicating LEDs on each input channel monitor normal and near-clipping level, enabling optimum headroom to be determined.



Of the M1532's 13 busses, four are for program, two for foldback, two for echo, four for mix matrix and one for cue. "The unique mix matrix is really a five by four 'mixer-within-a-mixer'," Sandell added, "that is invaluable for setting up individual stage monitor mixes, feeding different speaker mixes, or feeding local and remote programs simultaneously."

Echo and foldback sends are pre/post switchable on each channel, and the four effects input channels can be assigned to any combination of the four program busses or to the four mix matrix channels. Seven illuminated VU meters are switchable to display program, matrix, foldback, echo, cue and talkback output levels.

Suggested retail price of the M1532 mixer is \$18,000.

YAMAHA COMBO PRODUCTS
P.O. BOX 6600
BUENA PARK, CA 90622
(714) 522-9134

For additional information circle #54

MELKUIST UNVEILS VERSATILE EVENTS SELECTOR

The new Event Selector has been designed as both a stand-alone unit, and as an intelligent peripheral for the Melkuist GT800 console automation system. Easy to operate, versatile and accurate, the unit is said to set new standards for synchronized sound in video post-production.



The unit comprises up to 32 changeover relay contacts, which are programmable to control all external sound effects. Synchronized by an SMPTE timecode, any combination of contacts can be programmed at up to 250 cue points. Comprehensive 'Freeze' mode facilities are included for the entry and modification of events by engineers who prefer not to work direct with SMPTE code.

Timing for an event is pushbutton controlled by incrementally increasing or decreasing the display by hours, minutes, seconds or individual frames. The time value in the display can be precisely trimmed, using the 'Trim plus' or 'Trim minus' keys.

New events can be inserted into the existing timecode, or existing events can be overwritten. The unit automatically amends the cue sequence, and indicates if the maximum number of cue points has been exhausted.

An optional facility provides automatic dumping of memory contents on to audio tape for storage.

Operation of the freeze mode enables cues to be programmed, even if specific timecodes are not known. The 'Freeze' button is depressed at the instant that a cue is required, and the unit automatically captures and stores the timecode from the display.

MELKUIST, LTD.
35A GUILFORD STREET
LUTON LU1 2NQ
ENGLAND
0582-416028

For additional information circle #55

AKG UNVEILS BX-15E PORTABLE REVERB

The new BX-15E reverb unit utilizes the patented Torsional Transmission Line principle used in the larger AKG BX-25E, and features independent decay-time adjustment, high- and low-frequency equalization, and reverberation/dry signal mixing for each of the two electronically and acoustically separate channels.

The unit may be rack mounted in the control room or used as a portable system, and weighs 47 pounds. Its unique two-point suspension is said to make the BX-15E impervious to acoustic feedback and mechanical



vibration; there is no need to "lock-down" the system for transport, nor any need for adjustments after transport.

A five-position switch provides optional decay-time selection of 1.5, 2.0, 2.5, 3.0 or 3.5 seconds.

The BX-15E is said to provide a genuine two-channel design. Either channel can be used and controlled separately. (Reverberation channel separation is greater than 35 dB).

AKG ACOUSTICS, INC.
77 SELLECK STREET
STAMFORD, CT 06902
(203) 348-2121

For additional information circle #56

JBL INTRODUCES ULTRA COMPACT 4401 STUDIO MONITOR

Offering ultra compact dimensions and a newly developed 6½-inch low frequency driver, the new two-way 4401 is described as being ideal for use as a main playback system in applications where space is at a premium, or as a console-mounted secondary monitor. The low frequency driver has been specially designed for optimum performance in a compact enclosure.

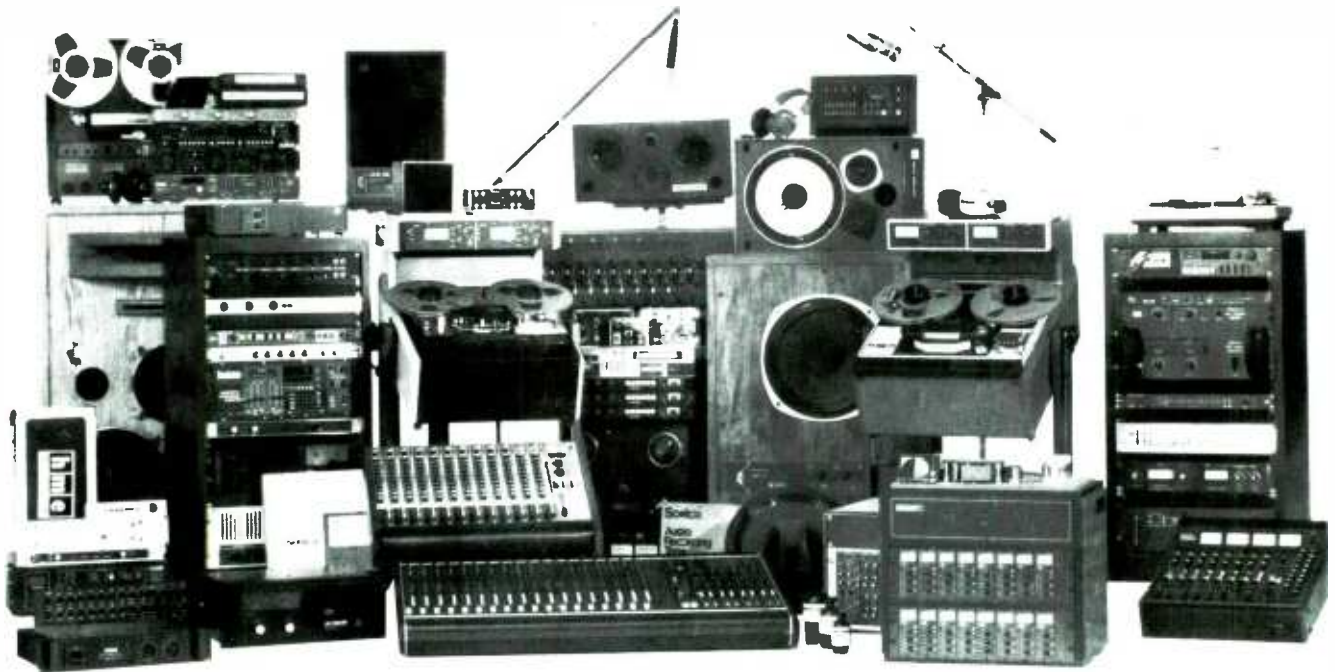


Featuring JBL's exclusive Symmetrical Field Geometry (SFG) magnetic design, the driver is said to exhibit significantly reduced second harmonic distortion. The laminated cone successfully combines light weight with rigidity, and the coating formulation adds a precise amount of mass to provide proper damping characteristics. In addition, an unusually long voice coil is utilized for exceptional excursion linearity.

... continued overleaf

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Eventide Clockworks UMC Beaucart Gauss Cetec Inovonics Kahn Communications Sontec Koss Lang Electronics MRL MXR GML/Novra Research Sounder Sound Workshop Pultec Audio and Design Recording Suparex White Marshall ESE Audio Interface RTS Countryman IVIE Whirlwind Wire Works BPI Westlake Professional Products. Custom Acoustic Design and Construction.

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to down beat...

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Audio**

Professional Audio Sales Group
7255 Santa Monica Boulevard
Los Angeles California 90046
(213) 851-9800 Telex 698645

New Products

To achieve high frequency accuracy and definition, the 4401 is equipped with JBL's specially designed one-inch dome radiator, formed of a light-weight phenolic material coated with a microscopically thin layer of aluminum. This hard dome construction provides smooth response with higher efficiency than a comparable soft dome component.

JAMES B. LANSING, INC.
8500 BALBOA BLVD.
NORTHRIDGE, CA 91329
(213) 893-8411

For additional information circle #58

NEW FOUR-CHANNEL, FOUR-BAND PARAMETRIC EQUALIZER FROM TASCAM

Each of the unit's four independent channels feature four overlapping bands whose center frequencies may be swept from 40 to 800 Hz, 500 Hz to 10 kHz, and 800 Hz to 16 kHz. Dual-concentric knobs adjust the "Q" (bandwidth) of each band from 1.1 to 5, and gain for up to 15 dB of boost or cut. Precise control of each parameter makes it possible to zero in on frequency-response anomalies, notch out noise without otherwise significantly affecting the program, make broad tonal adjustments, or, in some cases, to enhance the timbre of individual instruments in a mix.

In PA work, the PE-40 can be tuned to the



exact center of each feedback node, removing them more effectively than a graphic equalizer, and with less of an audible effect on the sound system.

In addition to the parametric EQ section, each channel has three push-button-selectable filters — two high pass (60 Hz, 18 dB per octave and 160 Hz, 6 dB per octave) and one low pass (15 kHz, 12 per octave).

TASCAM
7733 TELEGRAPH ROAD
MONTEBELLO, CA 90640
(213) 726-0303

For additional information circle #59

NEW AKAI VC-X2 VIDEO CAMERA ALLOWS TIME LAPSE VIDEOTAPING

Automatic features of the VC-X2 include auto focusing, auto iris, auto white balance and auto fade-in and fade-out for both audio and video. The telephoto lens has a motor-driven, six-times zoom with two speeds, and a macro setting for close ups.

Akai's exclusive "intervalometer" serves as a time lapse device, making the camera useful for surveillance and security purposes, as well as for special effects work. Time lapse can be set for recording periods from eight hours up to 11 days.

"Owners of our camera can videotape anything from a flower opening or an egg hatch-

ing to many days of area surveillance," said Jerry Astor, Akai's director of video marketing. "Some of our dealers are buying a VC-X2 for their own use to help in analyzing traffic patterns in their stores."

The camera is said to have the highest resolution — 300 lines — of any VHS-manufactured camera, and has both a standard boom microphone attached and a jack for a second microphone. A stereo microphone is available from Akai to provide stereo soundtracks.



The unit is a lightweight 5.3 pounds, and has a suggested retail price of \$1,195.

AKAI AMERICA, LTD.
800 WESTARTESIA BLVD.
P.O. BOX 6010
COMPTON, CA 90224
(213) 537-3880

For additional information circle #60

NEUTRIK XLR-TYPE RIGHT ANGLE CONNECTORS

Available in 3-, 4-, 5-, and 6-pin configurations, the new right angle connectors have a unique indexing feature allowing exit at any one of seven positions. Also new is the 3FP6C locking phone jack suitable for a var-



ety of applications. The majority of Neutrik connectors are available in various pin configurations, and finished in high quality nickel or black-chrome housings, with silver- or gold-plated contacts.

NEUTRIK PRODUCTS
77 SELLECK STREET
STAMFORD, CT 06902
(203) 348-2121

For additional information circle #61

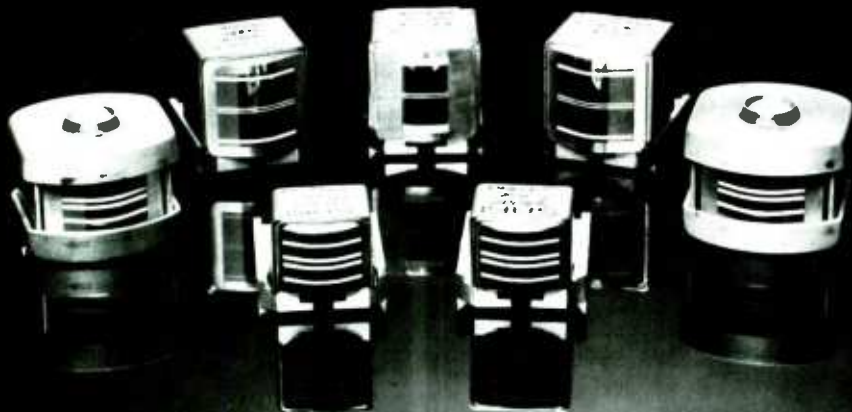
TELEX MODEL 6120 TAPE DUPLICATING SYSTEM

The new Model 6120 system consists of modules for cassette-to-cassette, reel-to-cassette or reel-to-reel duplicating. Modules can be mixed in any desired configuration, and all simply plug into a central control module. Either half-track/two-channel or quarter-track/four-channel configurations are available, each with track selection and track transfer patch panels.

Reel modules accept both 7- and 10½-inch reels, and operate at speeds of 60 and 120 IPS; cassette modules operate at 30 IPS. This constitutes a duplicating speed ratio of 16:1 and, since both sides of a cassette are duplicated simultaneously, a C-30 cassette is

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*40,000 MILES PER HEAD of tape travel — routine performance for Saki premium quality audio heads. We are the world's leading manufacturer of professional long-life audio and instrumentation heads. Ask about our 2-track, ½ inch format.



SAKI MAGNETICS, INC.

8650 HAYDEN PLACE, CULVER CITY, CALIFORNIA 90230



duplicated in less than a minute.

Particular design emphasis was placed on ease of operation and simplicity of maintenance. Equipment consoles can be mounted vertically or horizontally for utmost operating convenience and space conservation. Virtually all maintenance, including head alignment or electronic adjustments, can be made directly through the front panels, without time consuming disassemblies.

Basic system prices start at \$3,570, and include equipment consoles.

TELEX COMMUNICATIONS, INC.
 9600 ALDRICH AVENUE S.
 MINNEAPOLIS, MN 55420
 (612) 884-4051

For additional information circle #62

**ANCHOR MODEL 100/200
 SELF-POWERED MINI-MONITORS**

The Anchor Model 100 with 35 watts and Model 200 with 55 watts of built-in power feature line, mike, and phono inputs to cover almost any requirement. Rear-panel controls provide for speech and music equalization, input selection and system volume.



The Model 100 contains a 4½-inch high compliance, full range speaker in a 6- by 7- by 8-inch cabinet, while the Model 200 features two 4½-inch speakers and one 1-inch HF dome speaker in an 8- by 12- by 8-inch cabinet.

ANCHOR SYSTEMS INC.
 4510 FEDERAL BLVD.
 SAN DIEGO, CA 92102
 (714) 262-9901

For additional information circle #63

**URSA MAJOR RELEASES NEW
 PROGRAMS FOR 8X32
 DIGITAL REVERBERATOR**

Representing the first major revision of the 8X32 reverberation programs, Edition E4-1 comprises four programs that replace the four programs of the same names in the original Edition E4-0: Plate I, Plate II, Hall, and Space. Edition E4-1 programs are said to be broadly improved: coloration is significantly reduced; diffusion (echo density) is increased, decay envelope smoothness is superior; and the sense of ambient spaciousness (incoher-

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For additional information circle #64

Jeff Cook, of supergroup ALABAMA:



“One of the reasons I feel I can trust Syc Mitchell Sound is they check the equipment thoroughly before putting it on the market, and they offer the equipment at fair prices.”

Jeff Cook
 Cook Sound Studio, Inc.
 & ALABAMA

SYE MITCHELL SOUND CO., INC.
 22301 Cass Avenue
 Woodland Hills, California 91364
 (213) 348-4977

Professional Audio Equipment Brokers

For additional information circle #65

New Products

ence) is better.

The new programs are in two PROMs (read-only memories) and are easily changed by dealer or user. In keeping with its original commitment, the new programs are available *free of charge* to all 8X32 owners, and will be installed where possible by the local dealer.



During the optimization process for Edition E4-1 programs, URSA MAJOR's president and engineering director Christopher Moore made extensive use of custom computer software to allow exhaustive searching through literally thousands of random and pseudo-random sets of delay and gain values, to yield tuned values for use within the reverberation algorithms.

These optimization techniques were always weighed against a rigorous auditioning of the trial sets. Auditioning used not only a broad range of dry musical tracks, but such trying test signals as pink noise, pink noise bursts, isolated impulses (clicks), impulse bursts, and pure tone.

URSA MAJOR, INC.
P.O. BOX 18
BELMONT, MA 02178
(617) 489-0303

For additional information circle #66

QSC ANNOUNCES SERIES THREE LINE OF POWER AMPLIFIERS

All three present units in the Series Three range share common features, varying only in size and output power. Studio testing led to the use of a complementary direct coupled output section, together with the NE 5532 op-amp front-end for accurate reproduction and low noise. Generous continuous output power combined with high dynamic headroom and the use of multiple parallel, low ESR filter capacitors are said to have contributed to an exceptionally tight bass response.

Passive cooling is used to reduce ambient noise and long term maintenance problems due to dust build-up. A two-step, high efficiency output section is employed in order to deliver high output power in low profile packages; this circuit reduces waste heat by over 50%.

To minimize downtime, Series Three has been designed with front removeable channel modules. All electronics (except AC power transformer, AC switch, and circuit breaker) slide out, assuring a complete repair upon module exchange. A Flexible Internal Connector System is used to prevent contact damage from chassis vibration while on the road. Channels can be exchanged while the amp is mounted in the rack.

The Model 3500 is the highest power version. Occupying just two rack spaces, the 3500 delivers 285 watts per channel at 8 ohms, 425 watts at 4 ohms, and 625 watts (at 1 kHz) into 2 ohms. Auto Backup™ while in



bridged mode will automatically connect the load to the remaining channel in the event of failure on one channel.

Suggested list price is \$1298.00.

QSC AUDIO PRODUCTS, INC.
1926 PLACENTIA AVENUE
COSTA MESA, CA 92627
(714) 645-2540

For additional information circle #67

dbx UNVEILS COMPUTERIZED ROOM EQUALIZER FOR PROFESSIONAL APPLICATIONS

Designed for professional applications such as recording or broadcast studio monitor equalization, and for fixed or portable sound reinforcement system equalization, the dbx Model 610 Autographic™ Computerized Equalizer can automatically equalize a listening field for flat or user determined frequency response in less than 15 seconds, using its own calibrated microphone, pink noise generator, real time analyzer (RTA), and specially designed, digitally controlled one-octave filters.

The stereo equalizer section of the 610 incorporates two tracking sets of 10 digitally-controlled, octave filters on ISO centers, combined in a series/parallel arrangement to

THE 8-TRACK RECORDING/MIXING/PRODUCTION SYSTEM:

With each of the individual equipment units selected for their technical excellence, operational efficiency, and above all, their accuracy and reliability, the Suntronics 8-track production system has been studio-tested, and packaged in two ranges. The *Maxi* system to meet the requirements of a start-up facility... or the *Mini* to meet the requirements of an operator who already has a power and monitoring system...

The Maxi System \$9,150



BGW 250-D

Tascam 80-8 Sound Workshop Logex

JBL 4312's

The Mini System \$7,750

The Suntronics *Mini System* consists of the incomparable Sound Workshop 12x8 Logex control console, matched to the studio-tested Tascam 80-8, 8-track recorder. The *Maxi System* adds a BGW Model 250-D power amplifier and a pair of JBL 4312's for an ideal monitoring environment. Both systems include interface cabling.

in stock, ready for set-up!



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7760 Balboa Blvd
Van Nuys, CA 91406
(213) 781-2537 - 781-2604

7560 Garden Grove Blvd
Westminster, CA 92683
(714) 898-6368 - 898-9036

11151 Pierce Street
Riverside, CA 92515
(714) 359-5102 - 359-6058

For additional information circle #68



optimize signal to noise and avoid excessive control interaction.

Special equalization curves can be stored in any of the 610's nine memory locations and recalled instantly. Any combination of the memorized curves can be averaged together by the microprocessor to produce a new, composite curve.

The Autographic Equalizer's display panel consists of more than 300 LED bar segments that can be switched to display either the selected equalization curve, or the output of the unit's real time analyzer. The RTA can be used to monitor the calibrated microphone or system line inputs, and will display the information in either peak hold or average mode over an 80 dB range.

dbx, INC.
71 CHAPEL STREET
NEWTON, MA 02195
(617) 964-3210

For additional information circle #69

ORBAN UNVEILS NEW 422A/424A "STUDIO OPTIMOD"

Utilizing technology developed in the Optimod-FM Model 8100A, the new 422A/424A offers a system approach to dynamic range control featuring a full-function, variable compressor/limiter with adjustable attack and release times, followed by an independent de-esser.

The de-esser section provides 25 dB of available de-essing gain reduction, in addition to 25 dB gain reduction from the compres-

sor/limiter. A circuit similar to the popular Model 526A is used to control excessive sibilance on voice, thus making the unit highly flexible and cost-effective as a vocal processor.

One of the unique features of this new product is said to be "defeatable" gate with adjustable threshold. During pauses or during program material below threshold, the gain moves toward user-adjustable value, preventing noise rush-up, pumping or breathing.

Key specifications include: THD less than 0.05% at 1 kHz; system signal-to-noise 90 dB typical; absolute peak output level of +26 dBm.

Price for the mono 422A is \$569.00; \$899.00 for the two-channel 424A.

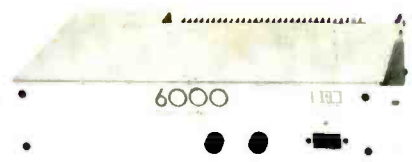
ORBAN ASSOCIATES, INC.
645 BRYANT STREET
SAN FRANCISCO, CA 94107
(415) 957-1067

For additional information circle #70

BGW MODEL 6000 PROLINE POWER AMPLIFIER

Delivering a full 100 watts per channel into 8-ohm loads, the new BGW Model 6000 is a compact, low-profile 3½-inch high rack-mount package of all welded steel construction, designed to deliver its full rated power with greatest reliability even in the most demanding environments.

"For longer product life and less stress, we have engineered the BGW 6000 with eight rugged large geometry output devices: four 150-watt output devices per channel. That's twice as many as our competitors use," says Brian Wachner, president of BGW Systems. "In addition to its easy-to-service modular design, the 6000 features ultra-low noise discrete circuitry, with numerous protective cir-



cuits of critical importance, such as thermal circuit breakers with reset buttons, thermostatic switches on the heat sink assembly and



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RESTORATION audio refurb

15904 Strathern St. #23 / Van Nuys, CA 91406
Phone: (213) 994-6602

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For additional information circle #72

What you see is what you get...

For a catalog and a list of over 60 dealers in the USA and Canada, contact J. G. (Jay) McKnight at:

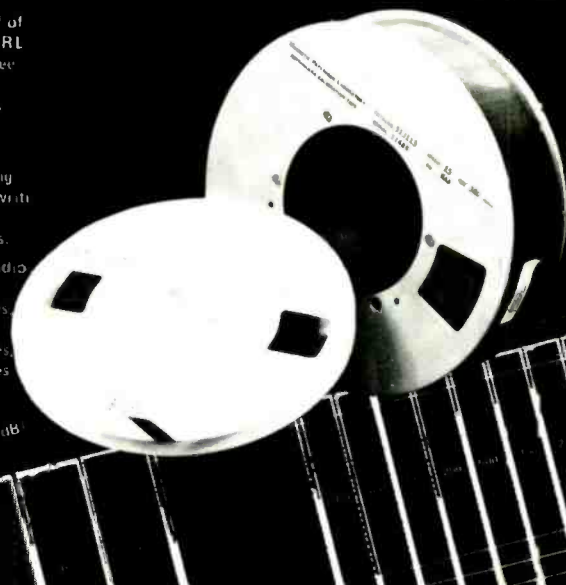
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The MRL Calibration Graph is your proof of the quality control that goes into every MRL Reproducer Calibration Tape. We guarantee each one to exceed the performance requirements of IEC, NAB, AES, and EIA Standards.

MRL Calibration Tapes are designed and supported by experts in magnetic recording and audio standardization... we helped write the standards. Each tape comes with detailed instructions and application notes.

The MRL catalog includes tapes for all studio applications. In addition to the usual spot frequency tapes, we make single-tone tapes, rapid-swept frequency tapes, wideband or 1/3rd octave-band pink random noise tapes, and difference method azimuth setup tapes. Most are available from stock.



Tape Fluxivity Level: Value in Table (lowercase) Tab

For additional information circle #71

New Products

in the power transformer, as well as current limiting circuits to protect the output stage from short circuit operation."

With its unique mechanical packaging, outstanding electrical ruggedness, and ample sensitivity, the BGW Model 6000 PROLINE power amplifier is said to deliver the kind of performance and reliability that is essential for live entertainment or recording/broadcast monitoring. It is priced at \$579.00.

BGW SYSTEMS, INC.
13130 SOUTH YUKON AVE.
HAWTHORNE, CA 90250
(213) 973-8090

For additional information circle #73

SYMETRIX MODEL A-220 STEREO AMPLIFIER

According to Symetrix, the new A-220 amplifier is intended to fill the need in the pro audio marketplace for a high performance, low power, stereo amplifier. The A-220 is said to develop better than 20 watts per channel into 8 ohms, with full power distortion of less than 0.02% at 1 kHz. Typical application include the powering of headphone distribution boxes and small monitor speakers.

Special features of the Model A-220 include balanced bridging and unbalanced inputs; a bridge mode generating greater than 40 watts into eight ohms; and compact 1 3/4-inch rack mounting. While designed to operate into loads of 4 ohms or greater, the unit is pro-



vided with both high temperature thermal shutdown and output short circuit protection to ensure reliable long term operation.

Suggested price is \$289.00.

SYMETRIX, INC.
109 BELL STREET
SEATTLE, WA 98121
(206) 624-5012

For additional information circle #74

WHITE INSTRUMENTS ANNOUNCES IMPROVED MODEL 141A MICROPHONE MULTIPLEXER

The Model 141A is basically a microphone commutator that amplifies the signals from three microphones to line level, and scans them so as to present a spatial average of the soundfield to a real-time analyzer or sound



level meter.

Output of the Model 141A is an extremely low impedance, line-level signal that may be transmitted to the analyzer located some distance away via a simple, unshielded pair of wires. Other features include battery operation; LED bar graph metering; microphone selector switch; and XLR and redundant five-way binding post output connectors.

WHITE INSTRUMENTS, INC.
P.O. BOX 698
AUSTIN, TX 78767
(512) 892-0752

For additional information circle #75

DORROUGH PROGRAM LEVEL METER

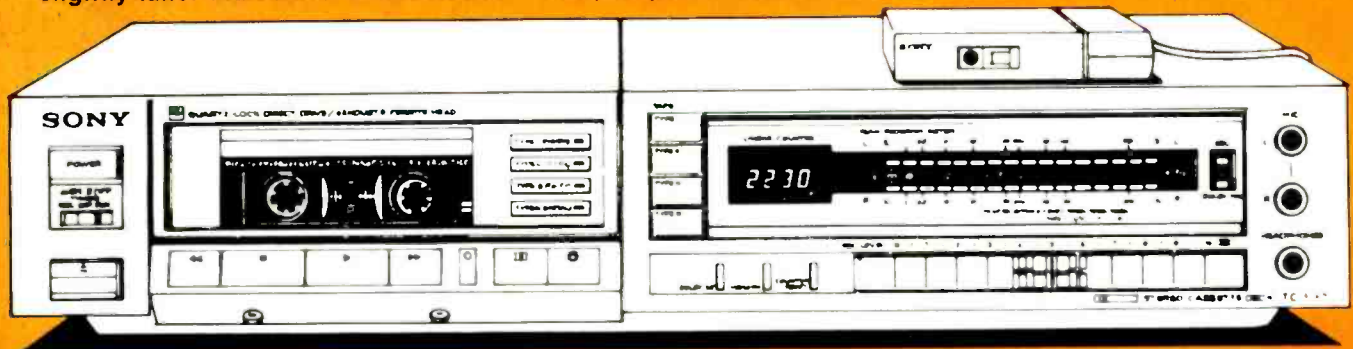
The new program level meter, by accurately defining energy content of the audio waveform, is said to offer an engineer a controlled solution to the problem of inconsistent signal loudness.

The Loudness Monitor meter features a dual function on a single LED display. An LED bargraph shows normally weighty persistence material, which the engineer needs to hold at center 0 dB, and a dot mode for peak indication, which has a normal operator range at the +12 dB scale to the left. These two separate points of reference are discer-

Sony Introduces a New Look in Cassette Recording: The Ultra-Slim FX7

The Sony TC-FX7 offers solid reliability, outstanding convenience and above all, unadulterated reproduction of musical sound. Yet it is only slightly taller than the cassette itself.

OUTSTANDING FEATURES: Direct-drive system with Linear Torque BSL (brushless, slotless) motor for efficient and precise capstan drive • Quartz lock prevents even minute speed variations caused by external factors • Digital Linear Counter of playing time, for the most precise index of tape location available. Count remains accurate even in fast-forward and rewind
CONVENIENCE: Feather touch controls respond to the slightest finger contact for fast effortless function selection • Memory counter brings tape to stop and play at any pre-selected spot • Auto play offers automatic transfer from rewind into play • Auto Space/Rec Mute for an interval of silence between selections • Optional remote control (RM-50) and wireless remote control (RM-80) available • Fast, 16-segment LED peak program meters, with double indication peak hold, for precise readings of recording levels
TECHNOLOGY: Sendust and Ferrite (S&F) record and playback miniature head for long life and metal tape capability • Two-motor tape drive with frequency servo control for accuracy and reliability



Manufacturer's suggested retail price for the Sony Model TC-FX7 is \$550.00

ADRAY's "the best deal people" brings the truly remarkable FX7 to you at the unbelievable price of: \$185.00

Optional RM-80 Wireless Remote Control—\$80.00. Optional RM-50 Remote Control—\$36.00.

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Los Angeles, CA 90036
(213) 936-5118

Adray's

6609 Van Nuys Boulevard
Van Nuys, CA 91405
(213) 908-1500



nable at all times.

The Loudness Monitor is available as a single unit, a rack-mount (single or dual), and as replacements for panel meters. Price: \$465.00.

DORROUGH ELECTRONICS
5221 COLLIER PLACE
WOODLAND HILLS, CA 91364
(213) 999-1132

For additional information circle #77

LOFTECH TS-1 AUDIO TEST SET FROM PHOENIX AUDIO

The new TS-1 Audio Test Set combines all of the basic audio test equipment — oscillator, dB meter and frequency counter



— together in one small, functional, accurate, easy to operate and low cost package.

An accompanying booklet shows the user how to perform basic alignment, calibration and testing of audio systems and equipment, including level calibration and verifying frequency response of mixing consoles, tape recorders, and outboard equipment.

Suggested retail price of the TS-1 Audio Test Set is \$249.00.

PHOENIX AUDIO LABORATORY, INC.
91 ELM STREET
MANCHESTER, CT 06040
(203) 649-1199

For additional information circle #78



LAKE SYSTEMS UPGRADES DEMO CONTROL ROOM

Lake System's original room, which was used to set-up equipment, proved too small to accommodate a working control room. However, before the room and acoustics could be finalized, three important questions had to be resolved amongst the engineers and audio specialist: which console, tape machines, and speakers should be utilized? The final choice was a Soundcraft 2400 24-track console mated to a Soundcraft 24-track, two-inch recorder, and an Ampex ATR-100 for mastering. To offer a choice of monitoring, UREI 813As, E-V Sentry 100s, Tannoy Super Reds and SRM-12Bs, plus JBLs were installed.

The old control room was gutted, patch panels and cables run, and acoustic materials mounted on the walls and ceilings. Two wall-mounted outboard equipment racks house a variety of power amplifiers from Crown, BGW, and UREI, as well as MICMIX Dynafex and Master Room reverb, Lexicon Prime Time, Eventide Harmonizer, White Sig-

nal Analyzer, Audioarts 4200A Parametric Equalizer, dbx compressor limiter, UREI 1176LN, and an Orban stereo equalizer.

In the end, Lake says, it has one of the finest audio control rooms for demonstrating professional audio equipment.

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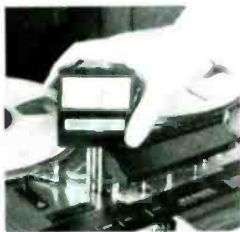
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news

tem recently completed a successful demo tour of major national recording centers, including Atlantic Recording Studios in New York, Soundshop Recording Studios in Nashville, Harbor Sound in San Francisco and Pasha Recording Studios in Los Angeles.

Mixing engineers presently using tape-based automation were said to be particularly impressed by the DISKMIX System in terms of the creative freedom and time-saving it offers in addition to its ease of operation at the console. Whereas tape-based automation has previously enhanced the mixing pro-

cess, certain inherent limitations have also added problems to the mixing process, Sound Workshop says that its new disk-based system eliminates these limitations and frees up the mixer/recorder to be totally creative in any mixing situation.

Interfacing easily with MCI JH-50, Sound Workshop ARMS and the Valley People 65K systems, DISKMIX is described as allowing the user to get involved with automation gradually because it's an add-on system. A "chaser" system which follows the mixing engineer's normal mixing moves, DISKMIX use one track of SMPTE timecode that locks all automation data stored on the disk to the master tape.



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Digital Update

MOTOWN/HITSVILLE OPTS FOR SONY DIGITAL SYSTEM

"I am recommending to our clients that they mix down to digital master," states Guy Costa, Motown vice president and managing director. "Not only can their masters be preserved without the normal analog tape degradation and wear, but also be ready for the upcoming digital compact disk."

Motown/Hitsville presently has three studios, each equipped with Neve consoles and NECAM automation. The studio's disk mastering operation is interfaced with the new Sony system for the mastering of records from digital tapes.

"Our current prices will remain the same for digital disk mastering, and there will be no additional charge for the use of the Sony processor and 16-bit digital delay line," Costa added.

The total digital purchase includes two Sony PCM-1610 digital audio processors, a DDU-1520 delay line and preview unit for disk mastering, and five of Sony's new BVU-800 videotape recorders, which are used to record the digital information.

"A big advantage of the Sony digital system is in the multiple applications of the equipment," Costa offered. "The BVU-800s are being used for both video and audio recording and editing. The separate SMPTE timecode track allows us to record stereo audio for video post-production and sweetening."

Motown is currently developing a plan whereby international licensees will receive digital masters around the world. "We will begin converting our entire catalogue to digital tape because it's practical and economical," stated Costa. "Not only does this benefit the company, but also the artist and producer. In addition, the Sony system provides compatibility with digital studios throughout the world."

NEW ZEALAND'S FIRST DIGITAL SESSION

Wes Dooley, chief engineer at Audio Engineering Associates, Pasadena, California, recently engineered New Zealand's first digital recording session. Using the stereo JVC BP-90 PCM digital system with a 3/4-inch U-Matic video cassette recorder, the session is also the first recording of American composer Joseph Carl Breil's 60-year-old original score for D.W. Griffith's classic silent film *The Birth of a Nation* (released in 1915). Forty members of the New Zealand Symphony Orchestra were conducted by Clyde Allen, conductor of the Los Angeles Ballet Orchestra, and music director for KFAC radio.

Dooley was assisted on the digital session by Geoffrey Eyles of New Zealand Broadcast and Sara Beebe of AEA. Schoeps mikes, an AEA custom mixer and Studer B-67s completed the recording chain. Monitoring consisted of Hitachi MOS FET amplifiers driving KEF Model 105 speakers.

FIRST DIGITAL STEREO TV/RADIO SIMULCAST

The Music of Windham Hill, an hour-long television special and the nation's first digital stereo TV/radio simulcast, aired early July on San Francisco's KQED. Produced by Emmy award winning Charlie Moran, the show featured Windham Hill recording artists George Winston, pianist; Will Ackerman, guitarist; Michael Hedges, guitarist; Darol Anger, violinist; and Barbara Higbie, Pianist.

Use of the Sony Digital PCM 10 Transmission Encoder had been donated for the broadcast, and was made available to other stations to air the program at another date.



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views

Transforming a Movie Theater Into a Recording Facility

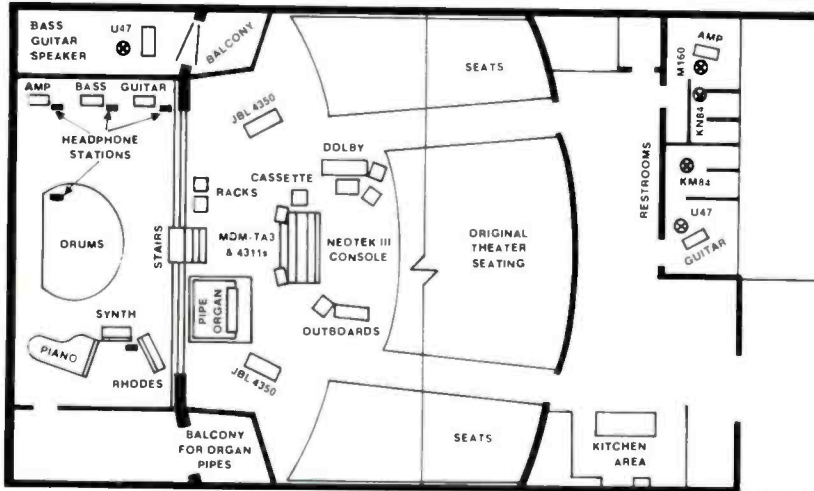
— continued from page 14 ...

top of the auditorium. The true harbinger of uniqueness is the fact that this is an in-place, regular studio in a very unusual setting. If it wasn't for the Neotek custom-made console sitting in what once was about the 8th row, the casual

observer would have a hard time differentiating between the Eddie Offord Studios and the Rialto of his childhood memories' eye.

Eddie Offord will be remembered by most *R-e/p* readers as the man who produced several albums by Yes, that seminal British classical-rock band. Such standards as *Tales From Topographic Oceans* and *Yessongs* were produced by this fairly small, friendly and enthusiastic session master. He's also worked with Billy Squier, Pink Floyd, Levon Helm, and Dr. John, among many others. The man obviously deserves respect.

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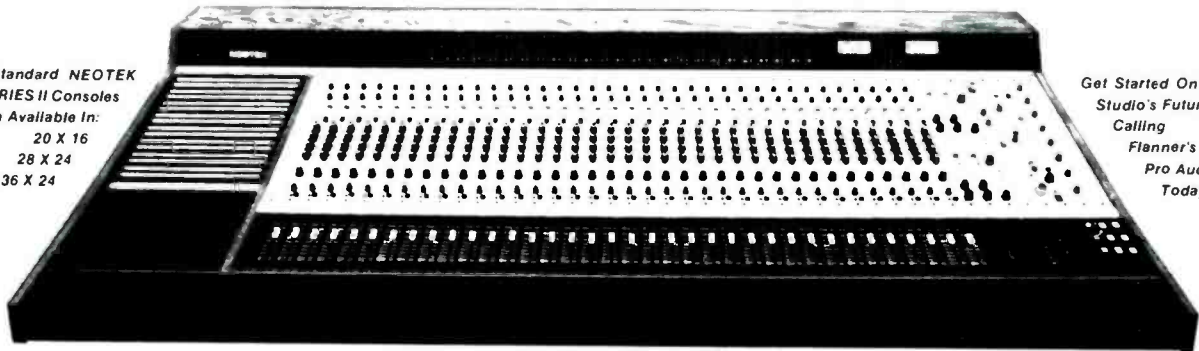
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For additional information circle #95

views

Transforming a Movie Theater Into a Recording Facility

But what's Eddie Offord doing in East Point, Georgia, of all places? To describe the life path that led Offord from the glass-enclosed, fishbowl existence of the "standard studio," to the no-intercom, no-walls, open spaces of a forgotten small town old reelhouse is, in large part, to annotate the philosophies and experiences of the man himself. Accordingly, Offord, surveying his cushioned domain, picks out a seat and recollects.

"Initially I was born and raised in London. Yet I had been touring this country for many years with bands like Yes. I really liked America — fell in love with it as a matter of fact — and eventually I moved to Woodstock, New York. There, I did some work with Todd Rundgren, but then started missing city life. I began to explore alternatives. However, I wanted to think about other places besides New York or Los Angeles."

It was in 1980 that Offord began to fuse his city-shopping with his recording philosophies. "I've worked in recording studios for a long, long time," Offord states, "and for a player, the 'aquarium-type' atmosphere of most



Eddie Offord at the customized 36-in/24-out Neotek III console.

All photography by Rick Diamond

studios is normally uncomfortable. Here, however, I can talk to players naturally, rather than me being some guy in the glass where each of us are wondering what the other is saying. There's no glass here.

"I wanted a place something like this. So when I began looking, my friend Lee Abrams, who is a well-known radio programming consultant based in Atlanta, showed me the area. He had heard that the East Point Theater was available; he had a friend who was planning to restore it should the Fox [a similar yet larger edifice in downtown Atlanta] be destroyed, as seemed probable in the late Seventies.

A Dream Becomes Reality

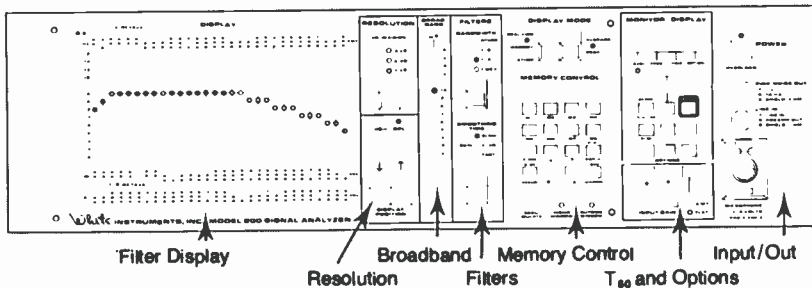
Following acquisition of the East Point Theater, Offord began to turn his perceptions of the facility's acoustical characteristics into practice.

"This room," he states with a good amount of respect in his voice, "was built over 40 years ago for vaudeville. They knew more about workmanship back then. You can notice that the floor sloped down, and there are no standing waves, like in a warehouse where there are resonances at different frequencies. This is why, when I was looking for a studio, I didn't go that route."

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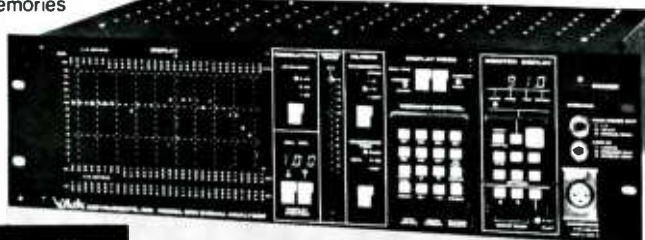
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Both in terms of professional standards and the atmosphere he has created, Offord is steadfast in his deserved pride. "I want the very best in equipment. If I'm considering an alternative which is slightly better, but twice the cost, I'll buy it. I want people to feel comfortable automatically when they come in here to record, for after all you are dealing with a band's career. Time, as related to their recording budget, is money."

To that end, Offord's business procedures are not very similar to other studios. While many competitors get chills if their operations are not booked around the clock, Offord does not take in off-the-street speculation or demo projects, simply to fatten the schedule. He won't sell you say, 10 hours of time to do your own single. He works slowly, methodically, on one album undertaking at a time, taking weeks or months to complete his tasks.

While Offord's standards are high, he is perceived as real mellow, easy to work with, and not pushy. The rapport he achieved on the Dregs' Arista project was one deriving from mutual respect between a skilled quintet of studio veterans and a pro with a very respectable track record. Perhaps to Offord's credit though, he is not a "nuts-and-bolts" producer. He does, of course, have a wide range of technical experience and knowledge to his credit, but much, if not most, of the specs are dealt with by engineer Chuck Allen.

Allen and Offord are truly a team. In their working relationship, there seems to be no excessive egotistical demands or dictates, but simply the mutual respect and camaraderie that has marked their dealings ever since they met through Todd Rundgren at Woodstock nearly four years ago.

"I was working for Bearsville Sound in the late Seventies, working a lot with live sound," recalls Allen. "We were working with people like Todd Rundgren, Jackson Browne, Mick Ronson and Toby Beau when Eddie and I

crossed paths."

When Offord moved to Georgia, it was to Chuck Allen that he turned for specific technical input. On a broad level, Allen served to help create an environment that "was like mixing a live show. Here, you have the ability to get a performance rather than just a musician playing a part. You get more of the spontaneity of a live performance here; in fact this is more of a concert or club atmosphere." ... concluded overleaf —

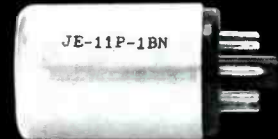
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Transforming a Movie Theater Into a Recording Facility

Recording Live

Specific logistics contribute to this. The theater has a functioning, performance stage; here is where the players are positioned, much like as if they were performing in a "real" concert. While the Dregs, during their stay, utilized certain concepts which led to overdubbing of parts from sets in the audience or even in the men's room (chosen for a certain echo effect), the stage itself was the main setting.

Offord and Allen have consciously perceived that such a setup would be subliminally, if not actively, relaxing to a new band that had played in clubs and small theatres before signing their record deal, and were used to this environment. Many group's first effort in the obligatory "aquarium" — as Offord scornfully terms the control room in most studios — is unnecessarily stiff, due to the newness of the procedure for many young bands. Here, however, the producer and engineer sit behind the console, talk directly through the air to musicians, and there isn't a window in

sight.

The console itself is new. Built especially for Offord and Allen by Neotek, it is a completely transformerless 36-input/24-output configuration, whose purchase is directly attributable to a shopping trip Offord and Allen pursued at the AES show in Los Angeles in early 1981.

"We spent three days looking," recalls Allen. "We didn't want a console with an array of whistles, buzzers, and bells; just one that sounded the best." Their previous console was a 28-in/24-out Neotek, which had served them well, but Offord and Allen were looking for something new; "It was time to update. We didn't want a console that has transformers which have distortion or coloration," Allen adds.

Allen's philosophy? "We're willing to try almost anything... to bend and even break the rules to get the best sound possible."

While not cast in stone, many of their operating procedures and elements are options elected after a long period of experimentation regarding the acoustics involved. Indeed, they have turned a long-dormant theater into a very live place; while you wouldn't know it is a theater from listening to the work recorded there, it is an environment that has fostered the maturation of a novel idea into an innovative working concept.



SELECTION OF STUDIO EQUIPMENT FOR EDDIE OFFORD STUDIOS

Engineer Chuck Allen has provided a list of the kind of equipment used in this somewhat live recording environment.

Monitor Speakers: JBL 4350, 4311, and MDM TA-3. "The 4350's are our big monitors; they go real loud. Also, when doing an overdub, we use them for most of our moniotring. The 4311's are our close-field monitors. MDM TA-3's are used generally for time-and-phase mixing."

Effects: Barth Equalizers. "They are real clean, and do things slightly different;" Eventide Phasers and Flangers; Klark-Teknik DN34 Analog Time Processor "Real high-quality."

Tube Limiters: LA-2A's; "We use them here and there to squash or calm down a guitar track."

Multitrack: MCI JH-24 24-track with Dolby, and Grandy heads, "which are very well serviced. I master without Dolby on mixdown."

Cue/Foldback System: Designed by and custom-made for Allen, each set of headphones has its own controls that enable the band member to control his own mix. "If the bass player, for instance, wanted to hear just his and the drum part to make sure the rhythm was right, he could eliminate all other sounds from the

[headphone] mix to zero in on his area of concern."

Microphones: The information here is specifically relevant to the miking used on Offord's Dregs album project, but in most cases is representative of the equipment with which both Allen and Offord normally prefer to work.

Drum Mikes: "Snare, SM-57 on top, near the rim; you can get a really good head sound. Tom, SM-57 over the rim, facing the center of the head. Bass drums, Electro-Voice RE-20, miked without the front head on. Schoeps ambience mike in back, to reinforce while kit rather than individual drums. Cymbal mikes: Neumann U-87."

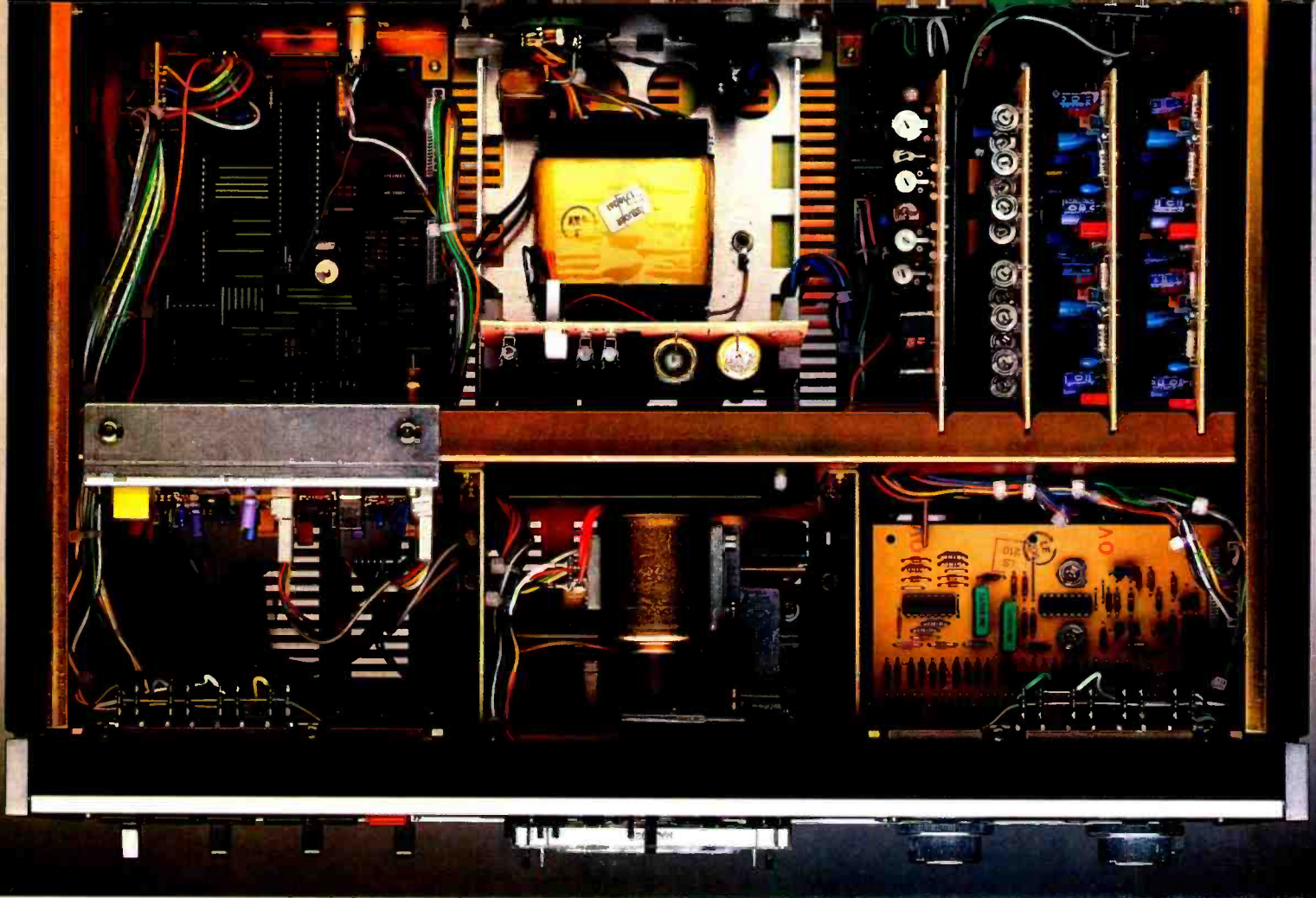
Electric Bass: "Take it direct with a UREI active box, and run through a guitar amp and speaker. Sometimes for close miking, Neumann U-47 for fullness of direct sound."

Guitar: "Neumann U-47 for close; Neumann KM-84 for ambience; and [Crown] PZM 130."

Grand Piano: "Neumann U-47 or PZM over the hammer area."

Allen stresses, in summation, that many of these choices are not cast in stone. "We are flexible about the way we do everything," he emphasizes.





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