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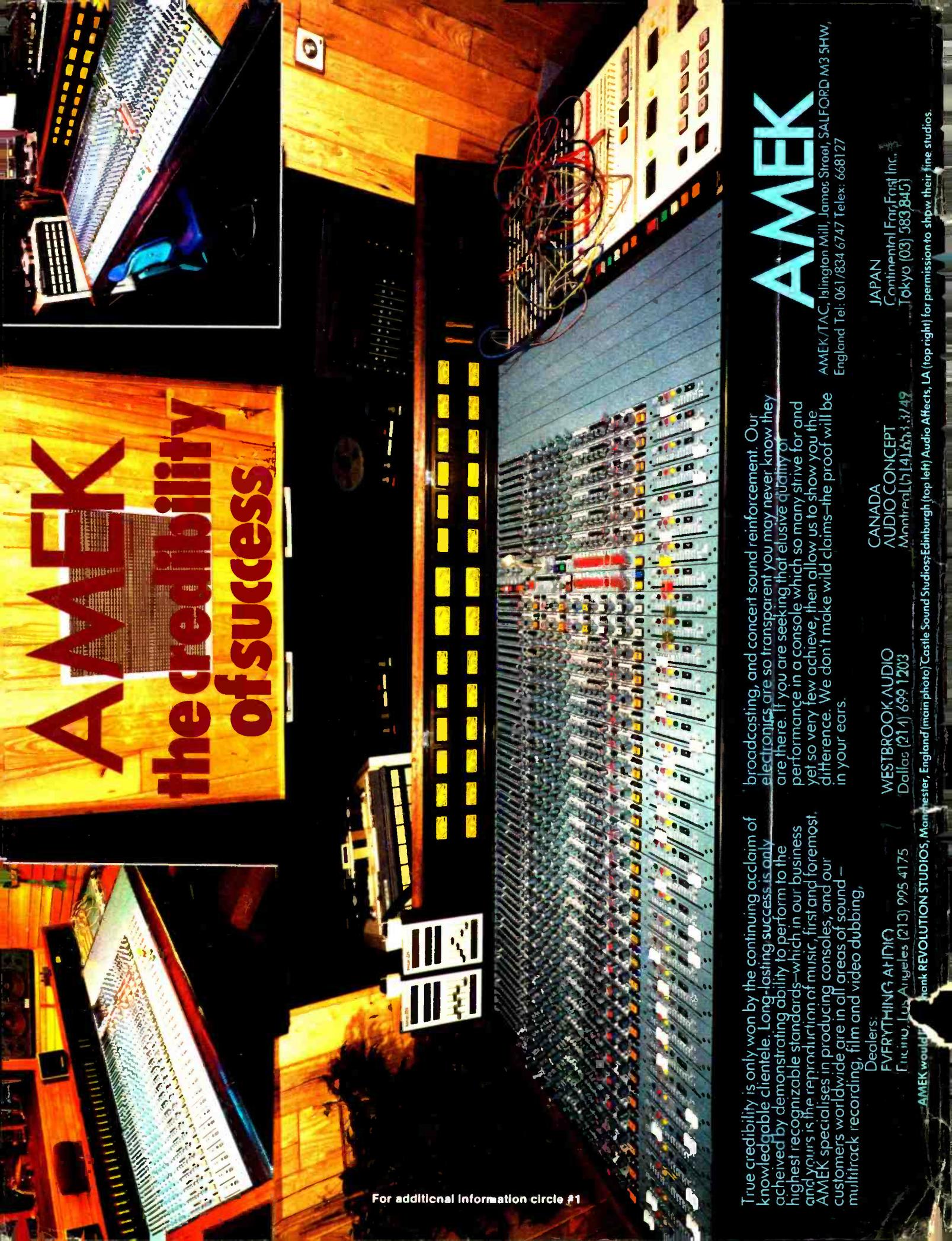
# RECORDING ENGINEER / PRODUCER

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April 1982  
Volume 13 — Number 2

RECORDING • FILM • CONCERT & STAGE SOUND • VIDEO & BROADCAST PRODUCTION



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April 1982 □ R-e/p 3

For additional information circle #2

# RECORDING ENGINEER/PRODUCER

— 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:

- Records and Tape
- Film
- Live Performance
- Video and Broadcast

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



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"RECORDING Engineer/Producer"  
(USPS 768-840)

is published six times a year by GALLAY COMMUNICATIONS, INC., 1850 Whitley Avenue, Hollywood, California 90028, and is sent to qualified recipients in the United States. One year (six issues) subscriptions may be purchased at the following rates:

United States (Surface Mail) ..... \$15.00

United States (First Class) ..... \$20.00

Canada ..... \$20.00

Foreign ..... \$25.00

(Foreign subscriptions payable in U.S. funds only by bank or money order.)



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Controlled Circulation Postage  
paid at  
Los Angeles, California

Postmaster: Send form 3579  
Address correction to:

**RECORDING** Engineer/Producer  
P.O. Box 2449  
Hollywood, California 90028  
(213) 467-1111

April 1982

Volume 13 — Number 2

## — Contents —

### Production Viewpoint —

Maxus, Christopher Cross'  
producer, arranger, musician . . .  
1981 Grammy Award Winner  
... **MICHAEL OMARTIAN**

by Robert Carr

(Christopher Cross sessions described by Chet Himes — page 30)

page 22

### Acoustic Design and Studio Construction —

#### **LION SHARE RECORDING STUDIOS**

— What the Proceeds from a Couple  
of Decades of Hits can Buy!

page 38

### Studio Operations —

#### **ELECTRONICS, TROUBLESHOOTING AND MAINTENANCE**

**Essentials of Digital Logic Circuits**  
by Ethan Winer

page 48

### Recording Techniques —

#### **MICROPHONE TECHNIQUES FOR PREDICTABLE TONAL BALANCE CONTROL**

by Bruce Bartlett

page 60

### Concert Sound Reinforcement —

#### **EARTH WIND & FIRE AT THE LOS ANGELES FORUM**

Sound System Design by Nova Research  
by Robert Carr

page 70

### — Views —

■ **Audio/Video Recording — The Digital Standards Dilemma**, by Martin Polon — page 12 ■ **Production Techniques — Janis Joplin's Sound a Generation Later: Notes on the Signal Processing and Audio Technology Used to Produce, Mix and Re-mix Farewell Song**, by David Gans — page 18

### — Departments —

**Letters** — page 9  **News**, including a **Progress Report on The Recording Community versus the California [Tax] State Board of Equalization** — page 10  **New Products** — page 82  **Digital Update** — page 94  **Classified** — page 97  **Studio Update** — page 100  **Advertiser's Index** — page 106

### — The Cover —

Control Room interior of Lion Share Studio "A," Los Angeles. A feature article describing the acoustic design, construction, and equipment selection appears on page 38. Photography by Bill Miller.





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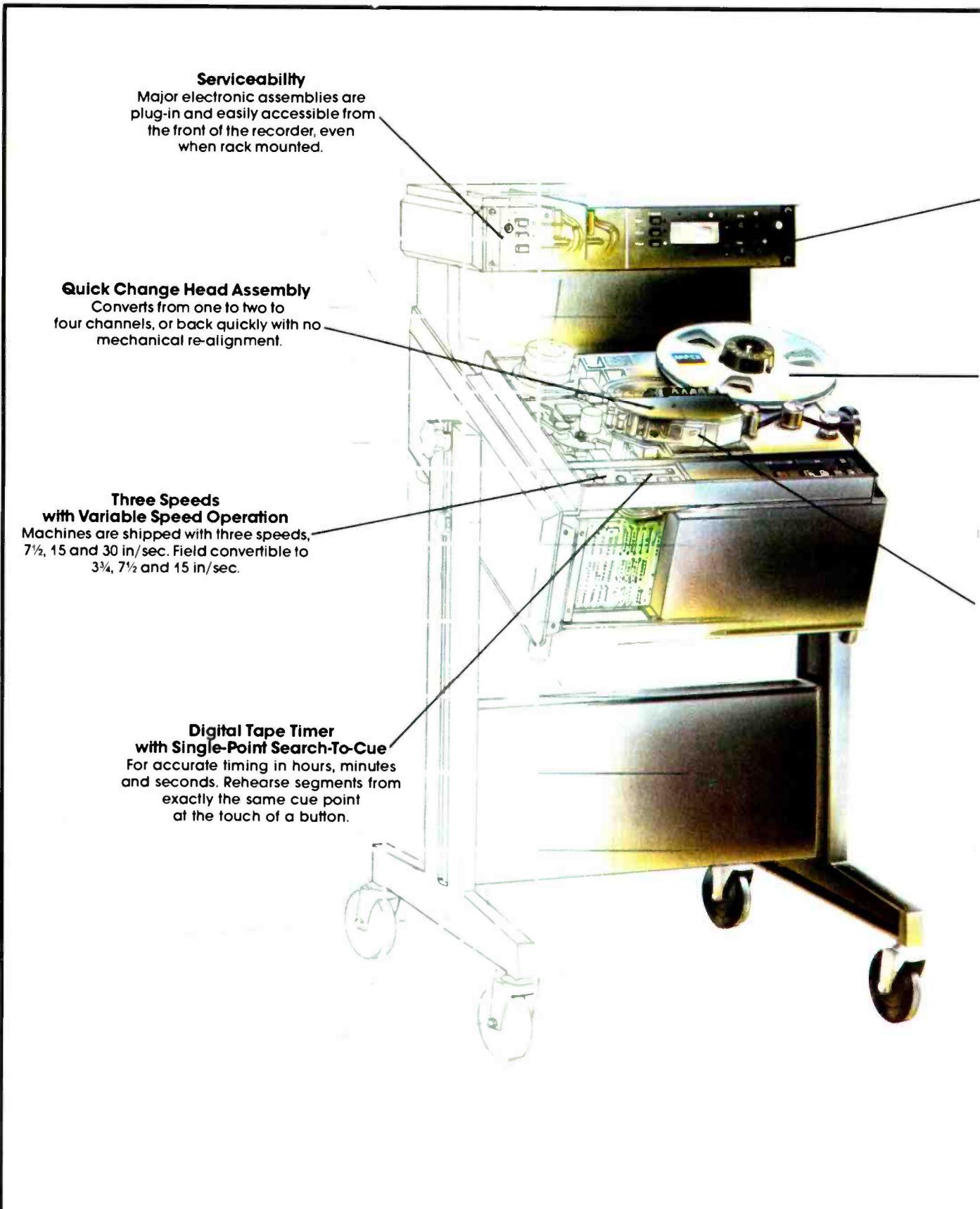
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For accurate timing in hours, minutes and seconds. Rehearse segments from exactly the same cue point at the touch of a button.

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— New tape transport design is under the full control of the microprocessor system, ensuring safe, gentle and foolproof tape handling.

**Designed For Editing**  
Head assembly is wide open for unequaled accessibility. Optional tape cutter and marker available. Dump edit and hands-on-reel editing modes included.

In a busy broadcast environment, every minute counts. That's why Ampex designed the ATR-800 with saving time in mind. With more standard features than any other recorder in its class, the ATR-800 is the perfect choice for the special audio needs of the broadcast professional. And recording studio engineers? Take note.

The ATR-800 was designed for tape editing. The wide open head assembly gives you fast, accurate tape access. Recessed head gate and transport controls prevent tape snag. And a continuously variable shuttle, under control of the microprocessor, regulates tape speed and direction.

You'll find hands-on-reel and tape dump edit modes included for convenience. The standard cue amplifier will allow monitoring of any or all channels, right at the machine while it's being cued. And with flexible transport controls, you can now mount them either to the left or to the right side of the machine —whichever way

you choose.

But the features don't stop there. You get a quick change head assembly, a digital tape timer with single-point search-to-cue, three tape speeds with built-in vari-speed, fader start for remote control from a console, simple service access from the front of the recorder and much, much more. All standard. And with a switchable NAB/IEC setup, the ATR-800 is a true international recorder in every sense of the word.

Look around, no other audio recorder has the number of standard features that meet the needs of the broadcast professional like the Ampex ATR-800. It's shipped

for rack mount installation, and it's available in console and pedestal versions as well. Look into the ATR-800. Call your Ampex dealer or write Ampex Corporation, Audio-Video Systems Division, 401 Broadway, Redwood City, CA 94063 (415) 367-2011. Sales, spares and service worldwide.



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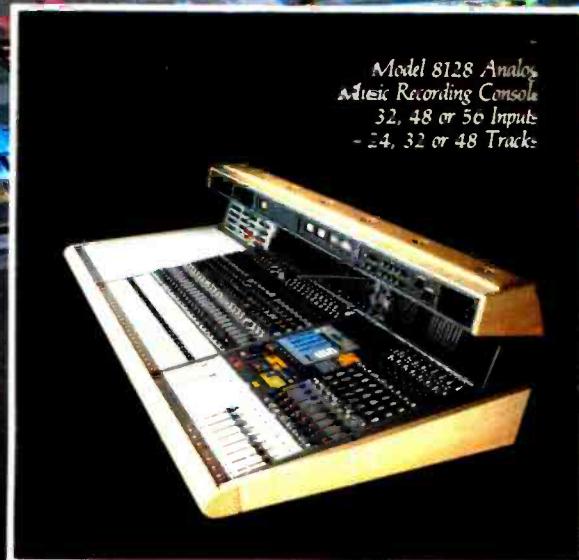
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All program path processes are handled in the digital PCM form, including filtering, equalizing, limiting, compressing, fading, mixing and assignments. Inputs and outputs are in multi-standard 16 bit formats, with greatly enhanced internal dynamic range and processing speed by applying up to 28 bit formats within the system. All program path controls may be memorized, with instantaneous set/reset giving precise repeatability. The time code synchronized computer control provides the ultimate in post production and mix-down facilities. Simply stated: everything is automated.

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views letters news

### *The Pre-Distortion Phenomenon Revisited*

*from: BOB KATZ,  
Recording Engineer,  
New York City*

Re: "Is There Life After Digital," by Neil Brody; December 1981 issue — an excellent article. The machine manufacturers should be required to read it.

Re: "The Pre-Distortion Phenomenon;" December 1981 issue. Normally this series by Ethan Winer contains both helpful and extremely accurate information, but I differ with him this time. The diode-based pre-distortion circuit he suggests building lowers distortion only on sinewave test signals.

distortion only on sine-wave test signals. Unfortunately, with music and transient signals, the distortion actually rises, producing at times an annoying clipping sound when the threshold of the diodes is exceeded. Whenever I align an old Scully 280, which contains this well-intentioned but ineffective circuit, I turn the linearity controls fully clockwise, thereby turning them *Off*. Likewise, the 3M M56 and (I think) M79 contained this circuit, but the company provides a simple switch to turn the linearizer off.

In order to provide effective predistortion for the record circuit of an analog tape recorder, the circuit must be much more complex than the simple two diodes mentioned in the December article. For one thing, small changes in bias change the nature of the tape at saturation. I vaguely recall a description of a predistortion circuit either in an *Audio* magazine of several years ago, or in the *AES Journal*. Unfortunately, this circuit was only effective for tape machines with cross-field bias; this making it completely unusable with any professional machine made today . . . so, please don't build a diode-based pre-distortion circuit because it doesn't work.

reply from: Ethan Winer  
The Recording Center  
Norwalk, CT

I am inclined to agree that the distortion characteristics of magnetic tape are more complex than the correction afforded by a resistor and a pair of diodes. But I still maintain that below saturation there is at least a "first-order" compensation, since in each case the distortion is primarily third harmonic. Bob is also correct though, in pointing out that the diodes will hard-clip at very high levels — probably worse than the tape would by itself — although an attempt has been made to minimize this effect by keeping the resistors small with respect to the diodes' impedance. But perhaps the most important factor at this point is basic recording philosophy.

Some engineers deliberately record at elevated levels as a part of their sound, and I admit that the linearizer is probably not for them. Others (myself included) prefer a more conservative approach, and would gladly trade a little hiss to minimize any clipping.

Personally, I record everything at around -4VU on Ampex 456, and use dbx noise reduction to eliminate the hiss. In fact, this is probably the reason that some people have trouble with any noise reduction system — you just can't hit the tape with high levels. Without sufficient headroom, transients will be lost due to tape saturation, causing the decoder to operate improperly.

Anyway, even if some people don't like the pre-distortion circuit, at least it will work as well as the commercial versions; and it's so simple to throw together, you won't have wasted a lot of time if it turns out to be not to your liking. Also, the linearizer was mainly intended as a vehicle for the harmonic distortion analyzer, the main construction project. Of course, I am always interested in hearing any comments on this series of articles — pro or con.

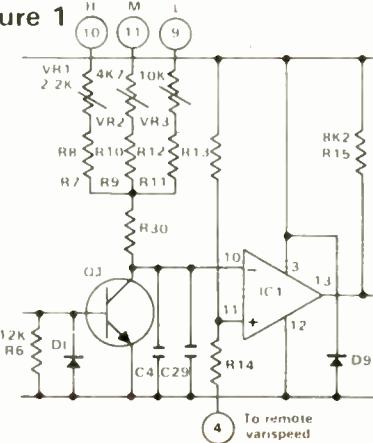
*And you might consider this:*

## An Otari Varispeed Modification

In the December issue of *R-e/p* I showed a modification to the Otari MX-5050B that improved the distortion specs by eliminating the output transformers ("The Pre-Distortion Phenomenon," December 1981, page 96). Shortly after that article was completed, I discovered another useful improvement that will be of interest to Otari owners. This modification allows the varispeed range to be greatly increased beyond the normal  $\pm 7\%$ . Actually, I would like to show two different ways to do this: the first one I figured out and, although it is not quite as simple as changing a few resistors, it will allow a continuous sweep of the tape speed from around 1: to nearly 30 IPS. When I called Otari Corporation (just to be sure there wasn't anything important being overlooked), I spoke with Tom DeFiglio, an applications engineer, who described an even easier method, although the range will only be increased to 20%.

Figure 1 shows the partial schematic for the capstan motor amplifier circuit; while R7 and R8 (etc) are shown as only one resistor, there are actually two components on the circuit board. Normally, the fixed speeds are selected by applying a voltage to the appropriate points marked H, M, and L, with the varispeed pot connected between R14

Figure



# **SIERRA/EASTLAKE DEVELOPMENTS**

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## **Variable Studio Acoustics**

As the digital age accelerates the technology of the recording science, we risk depending too heavily on the gadgetry available rather than emphasizing the craft. The journals of the professional audio industry keep us keenly aware of technological advances as they occur. But what about putting a good microphone in the right place in a good room?

At SIERRA/EASTLAKE we invest much time studying the science of acoustics as it applies to the recording art. This continual research has given us a new generation of acoustic design providing the artist as much sonic control and flexibility in the studio itself, as was previously only possible in the control room.

Its called Variable Acoustics. And it transforms the compartmentalized, inflexible studio layout of the past into a totally variable sonic environment, where the entire room, or individual segments, can be acoustically "tuned" from dead to live, or anywhere in-between. The key is not only variability, but the capability to select specific decay times by frequency.

The system is surprisingly simple. Added to the familiar layout of absorptive acoustic traps, is an array of continuously adjustable wall and ceiling louvres, sliding mirror panels and removable carpet sections. The louvre panels can be controlled electrically from the control room and are grouped in sections which can be tuned individually.

The benefits of Variable Acoustic Design are many. The studio itself can be designed as an open area; free from the corners and tiny booths which rob musicians of a natural performing environment. The multiple adjustability of the room's acoustics permits the area surrounding each instrument to be voiced individually for proper decay times, while also providing the necessary isolation between instruments. And all without having to reach for EQ or echo send busses! After all, isn't EQ introducing phase shift? Another advantage of a large, open, tunable room is ease in recording large orchestras and big bands.

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— continued . . .

#### An Otari Varispeed Modification

and ground. When not in the varispeed mode, a fixed 200-ohm resistor is connected in its place. It is interesting to note that although only two fixed speeds are provided on the front panel, a third speed is available via an internal switch on the rear of the control card.

For the Otari-designed modification, six fixed resistors are changed, and the original potentiometer is still used to vary the speed. Tom DeFiglio of Otari wisely pointed out that before you touch anything, you should record a 10 kHz tone on tape at each speed, which will be used as a reference later on to recalibrate fixed-speed potentiometers UR1, UR2, and VR3. Other than that, simply perform the resistor changes as listed, and you will have increased the control range to 20%:

	(Original)	(New)
R7	18 kohm	to 20 kohm
R9	39 kohm	to 33 kohm
R10	2 kohm	to 12 kohm
R12	0 kohm	to 12 kohm
R13	1K8	to 680
R14	1K8	to 470

For the method I devised (shown in Figure 2), you will not have to change any of these fixed resistors; therefore, the trimmers will not need to be recalibrated. You will have to

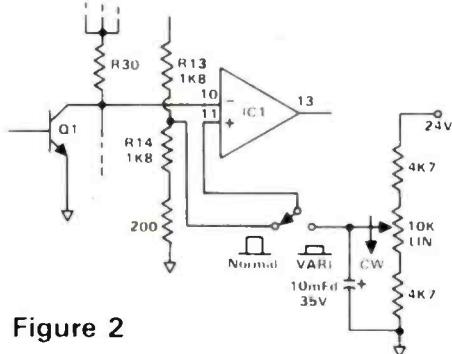
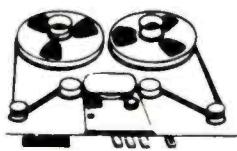


Figure 2

do a bit of rewiring, however, and the original 500-ohm potentiometer must be replaced with a 10K linear type. I was not able to find a new pot with the same kind of switch attached, so instead I rewired the memory rewind switch to turn the varispeed on and off. (I hardly ever used that function anyway.) Also, you will need to make a cut on the PC board foil to route pin 11 of IC1 out to the switch. Be sure to use the same 200-ohm resistor that was wired to the old varispeed pot, since that was in place when the original speed alignment was performed.



## PROGRESS REPORTED: THE RECORDING COMMUNITY vs. THE CALIFORNIA [TAX] BOARD OF EQUALIZATION

As detailed in the February issue of *R-e/p*, an increasing number of industry members are now bracing themselves against a potential taxation threat from the California State Board of Equalization (SBE), which has imposed a retroactive sales tax on all independent producers, engineers, production companies, and studios.

The fundamental ideological difference separating the independents from the California SBE centers around the legal definition of what exactly constitutes "taxable service." The State Board of Equalization contends that the record industry in California mistakenly has assumed that, since the State exempts from tax the sale of "intangible" personal services, producers and engineers' services were not to be considered taxable.

The State Board also states that since 1976 all costs relating to the "fabrication" of a master tape or record have been taxable, including hotel and travel expenses, meals, fees for artists, producers and engineers, studio recording time, AFTRA scales, and all other royalties except those paid to the performing artists. It also transpires that demo projects are subject to the same sales tax — regardless of whether or not the projects were sold.

By contrast, the independent engineers and producers's interpretation of the situation has been that they are selling their intangible personal services, rather than fabricating a tangible product, i.e. the finished master tape. In essence, the State Board of Equalization is suggesting that the independents have been collecting sales tax all along, but have failed to report the income to the state.

In an attempt to present a united front to fight this new retroactive taxation threat, the California Entertainment Organization (CEO), a non-profit California mutual benefit corporation, recently held a series of meetings in both Los Angeles and San Francisco. The most recent gathering — held on April 3 at The Complex in West LA, followed by a similar meeting later the same day in San Francisco — provided a forum during which executives from the CEO were on hand to discuss what recourse might be available for its members to counter these tax statute interpretations of the State Board of Equalization.

"The situation is very real and very serious," a spokesperson for the CEO said. "The CEO is fighting the state on behalf of the smallest part-time independent engineer, as well as the major record companies. If we don't join together in earnest and fight, we're dead. It's that simple." The CEO hopes to bring the issue of retroactive taxation to the public, and to organize individuals in the record industry, as well as record companies and industry associations such as RIAA, NARAS, AES, NARM and SPARS.

Many of those attending the Los Angeles meeting already had been summoned by the SBE to appear for financial audits, and several have had personal liens placed against their homes and/or personal property. The California sales tax charge is 6%, with 10% penalty for failure to file, and a 1% per month interest charge — all of which are being applied retroactive to 1976.

Under California law, sellers who reside in the state have a legal obligation to collect sales tax, even though the tax is later imposed on the buyer. Producers and engineers residing out of California, but who have done business in the state since 1974, are also liable for sales tax; as is the case when production on a project is done in California, but sold out of state.

The CEO has also raised the question regarding which engineers are eligible for "staff" engineer status, and which are considered independent. Generally, if the recording studio gives any direction to the engineer, such as scheduling session times, or paying the engineer out of the artist's funds, then the engineer is considered to be staff. The amount of sales tax — if applicable — to be paid on such engineer services is hence open to interpretation.

The State Board of Equalization accumulates its information regarding the employment of independent engineers and producers through audits of record companies. Anyone whose name appears on such invoices, royalty statements and contracts is potentially subject to an audit. The first contact an independent producer or engineer is likely to have with the SBE is a notification in the mail to appear at the local office, and apply for a seller's permit. Independent engineers and producers, as well as all other "sellers," are required by law to have and display in each place of business a seller's permit; it is a misdemeanor to collect sales tax without such a permit.

It has been reported that 'to date' Capitol Records, A&M, Columbia and Chrysalis Records have all been visited by members of the SBE, and that the Board has placed its representatives in New York, Chicago, Tennessee and Florida, to monitor potential revenue from independents residing out of state, but doing work in California.

Once the seller's permit form has been submitted, an audit of prior years earnings will be initiated, and he or she will be notified of amount of sales tax the SBE feels is owed. However, the State Board requires that, prior to any litigation by the courts involving settlement of the sales tax with an individual, the tax assessment first must be paid. If remittance of the tax doesn't accompany the sales tax return, the Board may require a security for the debt. Complete records of all business transactions, including sales receipts, purchases and all other expenditures, must be made available at all times for inspection by the representatives of the Board.

... continued overleaf —

# 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...

## One Compact System . . . Virtually Unlimited Features

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 recall 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 de-

veloped 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.



For additional information circle #6

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April 1982 □ R-e/p 1F



## **vs. The State [Tax] Board . . . continued —**

Should an independent producer, engineer or studio owner choose to challenge the initial assessment made by the State Board, they have the right to request an informal hearing held before a member of the SBE legal staff and members of the audit staff. If at this hearing the Board decides the determination to be against the individual, he or she then has 20 days to petition for a redetermination or formal hearing. If at the formal hearing the ruling goes against the producer, engineer or studio owner the only other alternative is to file suit in Superior Court. In most cases the SBE will allow the individual to enter into a payment schedule.

Currently, there are two bills about to be presented to the California State Legislature, aimed at resolving the sales tax issue. Bill AB 2871, initiated by Assemblywoman Gwen Moore, 49th District, covers the taxation period from 1976 to the present, and was scheduled to be heard before the Revenue and Taxation Committee, April 14. The second bill, still being written, was initiated by Richard Alatorre, 55th District, and covers 1971 to 1976. Both bills are written from the position that the sales tax levies are fundamentally unfair, and seek to change the law.

The CEO is urging the record industry "to immediately unite, or else the state will defeat everyone individually." Some members have already had to irrevocably assign 50% of their royalties to the state, and others have had liens placed on their personal property.

"In some cases," claimed CEO Attorney Valerie Michael Ross at the recent meeting in Los Angeles, "the Board is forcing persons to sign a waiver of the statute of limitations under the threat of taking all the money due immediately, or working out a payment plan if the person is willing to sign the waiver."

"Before CEO was organized individual members of the music industry fought their own cases alone," she continued. "Not many [engineers and producers] knew that others were being assessed in the same way, and each person went before the Board arguing many of the same issues that others were arguing in different parts of the state. Which invariably led to the same result — each one lost."

"We don't advocate that our members not pay their taxes. Rather, we recognize that the State Board may be interpreting the Sales and Use Tax Law incorrectly, according to their own regulations. Our purpose is to educate our members regarding the way the State is applying the law, and to fight to change the attitude of the Board and perhaps change the law," Ross emphasized.

There was an additional concern expressed at the Los Angeles meeting that the SBE was not applying the law evenhandedly to those audited, and that much of what one taxpayer

... continued overleaf —

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**views**

## **THE DIGITAL STANDARDS DILEMMA**

by  
**Martin Polon**

The dawn of 1982 has risen, leaving in its wake a trend for the rest of the year. While the recent European AES Show, held in late March in Montreux, Switzerland, is not the regular spring Audio Engineering Society Convention (although with one less AES convention, it may as well have been), it has served to elevate audio user awareness of digital audio to the same level felt by the manufacturers, and even the professional studio market. The dawn of the digital audio disk and of affordable video-based PCM (Pulse Code Modulation) audio recording raises the question of digital standards for the whole spectrum of the audio profession. The digital media blitz has also raised consumer awareness to what could be described as the "point of no return."

On the professional audio front, the grumbling about digital standards has not ceased, even with last November's AES Standards Committee agreement, and the harmonious March standards meeting and tentative interface agreement at Montreux. At one level, some audio professionals still feel that the agreed upon 48 kHz sampling rate is too low to yield truly error- and distortion-free recording and reproduction. Others are concerned with the difference between the 48 kHz professional rate, and the 44.1 kHz sample adopted as the standard for the Sony-Philips DAD (Digital Audio Disk.) To some observers the difference appears to be especially difficult if the original recordings will be processed at 48 kHz until pressing to 44.1 kHz for consumer DAD.

At first glance, manufacturers of other kinds of audio equipment are also faced with the dilemma of having to select 44.1 kHz to match the development of digital components (amplifiers, tuners, etc.) to the DAD system, or to utilize 48 kHz for other cassette and open-reel tape recorders, microphones, monitor amps, etc. The semi-pro audio user is an unwitting accomplice to all of this, since in the past semi-pro and top-of-line hifi have often been synonymous.

The main problem on the digital front, as is so often the case, is the seeming lack of standards. If taken to its ultimate, the standards dilemma takes the following form. First, there are the European broadcasters via the EBU (European Broadcasting Union), who have settled on 32 kHz as the sampling rate of choice for digital broadcast audio transmission. This is the only real International digital audio standard, although in North America the NAB (National Association of Broadcasters) and the Bell system have acquiesced rather than participated in the setting of the transmission standard.

Then we have the Sony-Philips Compact Audio Disk with its 44.1 kHz sampling rate, and a whole family of associated analog-to-digital and digital-to-analog conversion chips based on that system, from manufacturer's such as Sony, Toshiba and Sanyo.

— continued overleaf . . .

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

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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.

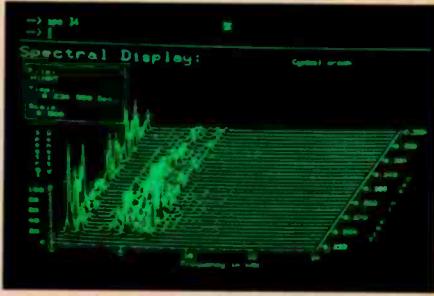
To modify or reconstruct a sound, two necessary software techniques are supplied. The first is *Digital Filtering* which permits you to reduce noise or individually filter out certain harmonics present in the sound, thereby changing the timbral characteristics of the sound.

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.



### **vs. The State [Tax] Board . . . continued —**

was told by a Board member often contradicted what they were told by other Board members within the same and/or other Board offices. It has been claimed that the Board often seemed reluctant to clarify for the record exactly what its policy were regarding specific issues, and tape recorders were prohibited from any of the meetings.

So far, the CEO has raised approximately \$30,000 through its membership fees. The Organization is currently seeking more money to pay for the costs of attorney's fees, and to provide sufficient lobbying support in the California State Capitol, Sacramento.

CEO's Board of Directors are: studio owner, producer and engineer David Rubinson (president); attorney Jane Wolf Eldridge (executive director); Hank Cicero, producer and engineer; Jerry Jacob, producer and studio owner; Ross Winetski, producer, studio owner and engineer; Phillip Miller, producer and engineer; George Massenburg, engineer and studio owner; and Chris Stone, studio owner and president of SPARS. The attorney for the CEO is Valerie Michael Ross.

Further information regarding inquiries, membership and financial support should be addressed to: CEO, P.O. Box 512, Van Nuys, CA 91408. (213) 906-2080.

■ ■ ■

### **The Digital Dilemma (continued)**

In addition, there are numerous PCM encoders designed to utilize video cassette recorders as a recording medium with the sampling at 44.1 kHz compatible with the 525-line NTSC video standard of the analog video recorder. Since these PCM/VCR recording units are utilized in many studios, 44.1 kHz serves as a professional, semi-professional and amateur standard. Unfortunately, lower-cost units also use a 14-bit technology that is more restrictive as to compatibility with other computer hardware, as well as having the fidelity limitations of a lower sampling rate.

A true 16-bit technology embraces the 48 kHz sampling frequency standardized by Sony-MCI, Studer, Ampex and migrated to by the other digital audio manufacturers: 3M, Mitsubishi (with Telefunken), and console-maker Neve (who also offers their new digital console at 44.1 kHz). Considering the popularity of 16-bit technology in the computer and electronics world, 48 kHz can take advantage of software and hardware developments from computer companies, such as Hewlett-Packard and IBM. Certainly, the establishment of a digital automated studio would be much easier if all components were standardized. Also, a 48 kHz standard converts to and from 32 kHz in a simple 2-to-3 ratio. Unfortunately, the use of 48 kHz is not directly compatible with 525-line NTSC analog video hardware. But, it is an ideal frequency for compatibility with developing digital video systems.

Finally, there is the "old" professional digital audio sampling standard of 50.4 kHz, which has been abandoned by digital recorder manufacturers, even though its 7-to-8 relationship to the 44.1 kHz sampling rate offered some design conveniences for a dual standard.

Nonetheless, the dual standard seems to be emerging as the pattern of digital audio compromise (albeit a painful and angry one in some quarters). 44.1 kHz has been firmly established for the Compact Digital Audio disk, VCR/PCM compatible via BNC plugs and a video-line signal, and used as an alternative professional standard. 48 kHz, on the other hand, has been blessed by the AES digital working group, both with a professional multitrack standard at 48 kHz and a proposal for interconnection. It would seem that a dual standard is a fact of life. The presence of the first of what will undoubtedly be many digital audio standards converters, the PCM SFC16 was recently unveiled by Studer. The architecture is in place for a digital audio matrix of technology.

What is more difficult about all of this is the user's perception of what digital audio means. At the studio level, digital audio is nothing more than the latest buzz word necessary to attract the business of recording, and to sell that recording to the fidelity conscious record-buying public. Recording studios are, after all, in the business of making money, and the potential increase in fidelity is less important than the potential increase in business that digital audio can provide. Not all studio operators are convinced that digital recording is an answer to all of the problems in the record business. But, many consider digital pressed to a quality analog disk as the best of both worlds; the

... continued overleaf —



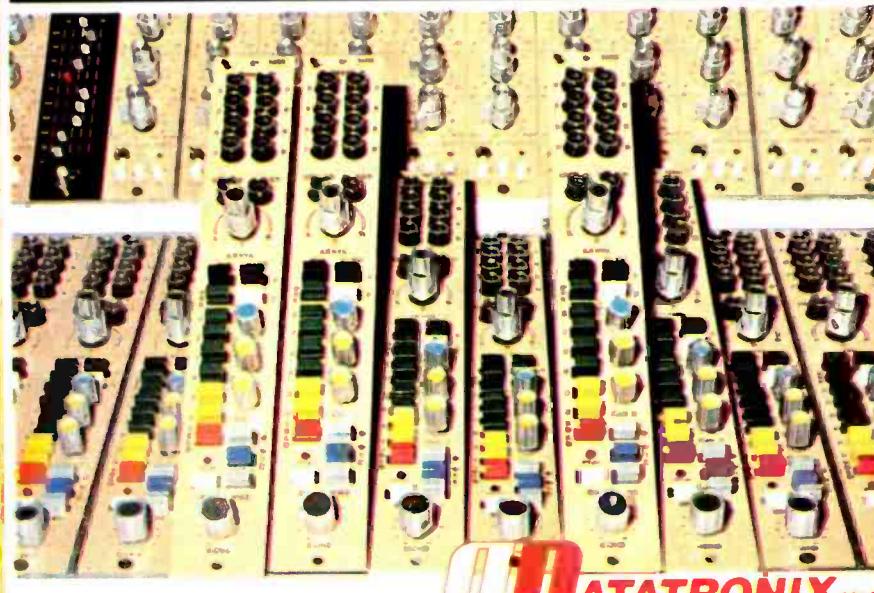
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This amazing new development eliminates the drudgery of translating your musical ideas to paper. Now you can concentrate on your creativity and let Synclavier® II

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.

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Piano

For additional information circle #10

deficiencies of each format cancelling one another out. But, whatever digital technological camp one is in, the financial ramifications are extraordinary.

Studio owners, users and operators want four things. Firstly, they want all of the digital equipment to "talk to each other." In other words, all equipment should be compatible in connection and communication of digital audio, data and commands. Secondly, they would like to be able to take a tape from one machine of the same manufacturer and play it on another, anywhere in the world. Thirdly, they would like to be able to interchange tapes, machine-to-machine between different manufacturers. Lastly, they would like to keep maintenance and operation as simple as it is with analog audio. Certainly, the first two needs are being resolved as a logical sequence of the dual standards. The third may not happen unless individual manufacturers settle on head and tape formats, as well as digital sampling standards. The days of simple audio maintenance will have to pass, but plug-in boards and circuits — plus skills picked up with other digital units such as audio delay devices — will ease the maintenance impact of digital.

On the flip side, digital will allow computerized troubleshooting and systems testing. So, like it or not, the audio industry from one end to the other will soon be riding a crest of bits and bytes that will improve (hopefully) profitability as well as audio reproduction.

■ ■ ■

## JANIS JOPLIN's sound . . . a generation later:

Notes on the Signal Processing and Audio Technology Used to

Produce, Mix and Re-Mix

"FAREWELL SONG"

by David Gans

So much about Janis Joplin has been mythologized during the years since her death in October 1970. Biographies, histories of rock, and the films *Janis* and *The Rose* (which clearly intended to play on the Joplin myth) have combined to paint a contusing picture of this complex artist.

No matter what is said and thought about Janis Joplin the person, the victim, the character, the undeniable fact of her musical power is captured in the grooves of the various albums. Elliot Mazer co-produced (with John Simon) *Cheap Thrills*, one of the definitive albums of "The San Francisco Sound," and the record that propelled Janis Joplin into the world's fancy.

"Janis wanted to be a star above all," says Mazer of those early sessions. "It was very important to her — to be loved, and to be at the top of her profession. She worked harder than anybody I've ever worked with; she was the most 'into-it' artist I've ever seen, in terms of always being there no matter how boring or routine the event in the session might have been."

"She was into learning about the system. Every artist prospers greatly by understanding what you can and can't do in the studio. Janis understood that it was very important to make a good record; that it was essential

to do it well; and that it was someone else's money being spent."

Mazer was called upon after Joplin's death to compile an album of live recordings. He went through hundreds of tapes, searching for the best performances, and *Joplin In Concert* was well received by critics and record-buyers alike. While assembling that record, Mazer was asked by Columbia Records to compile tracks for a possible "unheard Joplin" album.

What Mazer put together included some powerful performances, but he found it necessary to overcome some musical and technical flaws.

"I decided to take some liberties with overdubs and change some things around to make it sound better," he says. "By 1973, certainly our perception of a good quality rock and roll record had changed."

Upon hearing a rough version of the proposed album, representatives of the Joplin estate asked that the project be shelved.

"Whatever their reasons for aborting the project, the Joplin family had the final say in the matter," Mazer offers, "and so that was that." Then, in early 1981, Mazer received word that the Joplin estate had reconsidered, and now felt that the record would be appropriate.

Once the go ahead was given, Mazer again faced the problems of upgrading the tapes to current standards, and bringing the many different sounds and bands to some sonic consistency. The songs selected for inclusion on the 1974 version came from as far back as January 1967, and as late as June 1970. They included sessions with Big Brother and The Holding Company, The Kozmic Blues Band, The Full Tilt Boogie Band, and The Paul Butterfield Blues Band, with tapes ranging from mono to 16-track.

Most of the reworking of the new album, *Farewell Song*, was done at CBS Studios in New York. Mazer explains, because of the tremendous bulk of tape involved. "A couple hundred reels were needed to do the final selection and, due to the value and condition of the tapes, it just didn't make sense to try and move it elsewhere," he says. "I also needed a studio that had 2-, 4-, 8-, 16-track and mono machines." Some of the 1974 overdubs were done at His Master's Wheels, Mazer's now-closed studio in San Francisco.

### Basic Tracks and Overdubs

We'll take *Farewell Song*'s source tapes and overdubs cut by cut, and then tackle the mixing process:

According to Mazer, the most challenging cut was "Raise Your Hand," the only song which wasn't included on the original version of *Farewell Song*. It was recorded at a television studio in Frankfurt, West Germany, on April 12, 1969, with The Kozmic Blues Band. The tape was a very highly compressed, monaural television mix, short on drums and heavy on bass.

... continued overleaf —

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THE HIT SOUND IN AUDIO SCIENCE

For additional information circle #12

April 1982 □ R-e/p 19

# views

## ... a generation later ... How They Did Janis Joplin's FAREWELL SONG ALBUM

"The rhythm guitar sounded really dead," says Mazer. "and, in the portion of the song where there was supposed to be a saxophone solo, there was nothing — just 32 bars of rhythm section vamping. But it was a great vocal."

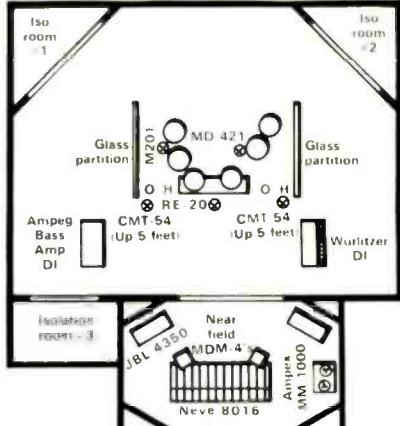
Mazer began by transferring the mono tape to one track of an MCI JH 16 16-track. Roy Markowitz, who played on the original tape, came in and recut his drum track. Peter Stroud was brought in to play the rhythm

guitar part, and add a few lead licks. Vinny de la Rocca did a saxophone solo (the section parts were intact on the original tape), and Markowitz added a tambourine.

"The idea was to give the overdubs a live feel," explains Mazer. "We used Columbia Studio B, which is a relatively big room. We used a few tight mikes — SM-57 on the snare, RE-20's on the toms and kick — and two AKG C-12's for the overheads, which also served as the room mikes for the guitar track. I put the bass drum on one track, the snare on another, and then the toms and room mike on a pair of tracks. The idea was to get the drums to sound as much like the sound on stage as possible, so that we could blend them with the original and get something that sounded sensible."

"Re-doing the drums solved another problem," notes Mazer. "There was nothing

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bright or 'tingly' about the original tape, and since it was a song that uses cymbals well, recutting the drums made the song sound brighter, as well as punchier and fatter."

The guitar, a gold-top Gibson Les Paul played through a Fender amp, was miked with a Neumann U-67 and the same C-12 room mike that served for the drum overdub. The saxophone was recorded with the same C-12 room mike and an RE-20 close up.

"Tell Mama," recorded in Toronto with The Full Tilt Boogie Band on June 28, 1970, came to Mazer as a highly saturated 8-track with Dolby-A, and a Fairchild sync tone on a couple of tracks. (This 15.7 kHz tone was used for film synchronization during the days when movie sound didn't have much content above 8 kHz).

The eight tracks comprised: mono drums, guitar, bass, electric keyboard (organ), piano, vocal, and maybe two tracks of crowd sound.

"It was just terribly recorded," Mazer winces. "They just squashed the heck out of it, recording maybe 10 dB higher than normal levels. Decoding the Dolby was a complete guess: we adjusted the input to the Dolby until it sounded right."

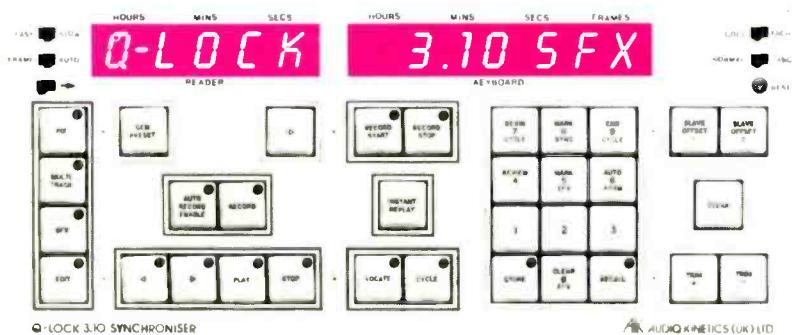
There were no overdubs on this song, but Mazer had a tough problem to deal with anyway: when he resumed the project in 1981, the original 8-track was nowhere to be found, and he had to work from the two-track he had rough-mixed in 1974.

"Magic of Love," with Big Brother, was recorded by Fred Catena, John Simon and Mazer at the Grande Ballroom in Detroit on March 1, 1968. The recording console used was a CBS custom 12x4 remote board; the decks were 3M M56 portable 4-tracks. Both guitars (which Mazer believes were played through Sunn amps) were miked with old RCA lavaliere microphones in front of the cabinets, and blended on track #1; Janis and the men sang into SM-57's, mixed together on track #2; the four drum mikes were mixed to track #3; and the bass was taken direct to track #4. House mikes, SM-57's, were blended into the bass and drum tracks.

"It's my favorite track on the record," Mazer comments. "It's a really good-sounding recording, and a great performance." No new music was added to the

*— continued on page 88 ...*

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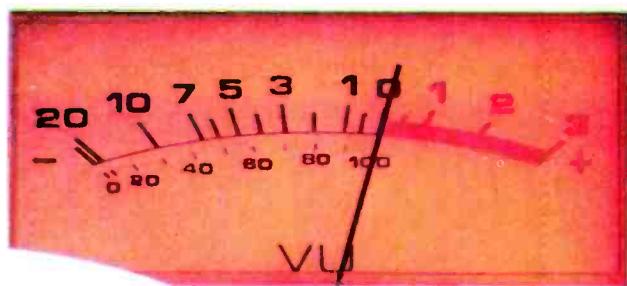
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For additional information circle #14

April 1982 □ R-e/p 21

'81 Grammy Award winning producer . . .

# Michael Omartian

. . . his production viewpoints  
with analysis of the

Christopher Cross

and

Arthur

sessions as described by  
engineer

Chet Himes

by

Robert Carr

Photography by Kathy Cotter



**M**ichael Omartian's contributions as keyboard player on albums by Steely Dan, Boz Scaggs, Dolly Parton, Manhattan Transfer, Neil Diamond, and even Billy Joel helped establish his credibility as a musician. And his Top 10 hit, "Get Used To It," covered by Roger Voudouris, proved Omartian's competence as a songwriter and producer. But after he and Christopher Cross walked away with an armful of Grammys in 1981, Michael Omartian's name became practically a household word to every serious member of the recording community.

During 1981, the Omartian/Cross combination struck again with the theme for the movie *Arthur*, and the first months of 1982 saw the completion of

his production effort with a new group; *Maxus*.

**A**fter cordial introductions and an off-hand compliment on the Maxus project, the focus of this interview, conducted at Omartian's home studio in Beverly Hills, quickly turned to the tight play lists that prevail in most radio markets throughout the country, and the difficulties that new groups encounter when shooting for the all-important "air-play" that can make or break a new act. The conversation continued from there touching candidly and sometimes emotionally, on playing/producing sessions, the current LA music scene, and the inevitable accoutrements of the ever-elusive state called "success."

. . . continued overleaf —

*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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April 1982 C-R/e/p 23

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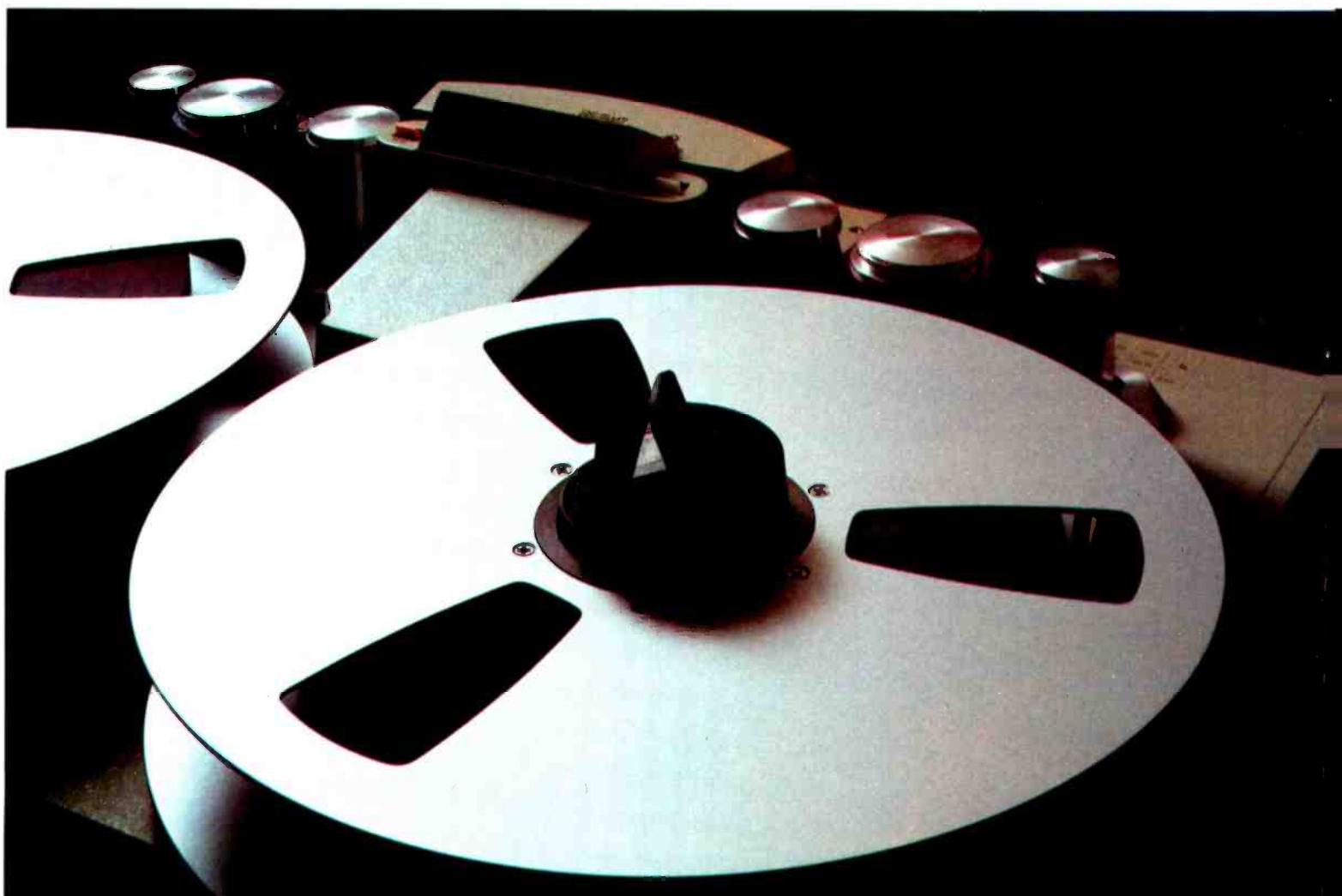
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Grammy Award Winning Producer  
**MICHAEL OMARTIAN**

R-e/p (Robert Carr): The Maxus album had a nice balance between the raw, dynamic energy of a new group, and the subtle sophistication of studio experience. How much of a role did you play in shaping the sound; in tempering the overall feel?

**Michael Omartian:** It's hard to say in a situation like that because, basically, all five of those guys have a lot of studio and road experience with other people. I think they came to me because they expected arrangement ideas.

I would say that there was a considerable involvement, but not to the point where it would tamper with what they were all about. That's basically what a producer is supposed to do anyway. I never want to have a situation where people say, "I can tell every record this guy does, because I can see his stamp all over it." I tend to want to keep the integrity of the band intact.

In Maxus' case, all the songs, except for one, were finished before I started working with them. And for the one song that was left, I rewrote a chorus for them. I'll always be changing bass lines, and drum parts here and there.

Sometimes bands get locked into a rut where they keep a certain approach happening all the time. It's just good to have an outside ear that comes in and says, "Hey, it'd be nice to change this or change that." I felt I contributed quite a bit of musical input, but it didn't change anything drastically.

R-e/p (Robert Carr): So they were hiring you primarily as an objective ear?

**Michael Omartian:** I think that, a lot of times, that's what a producer's job is.



He should try to have an overview of what's going on, listen to the 10 or 12 songs, and figure out whether they are making sense, or doing: "Here's our country song; here's our jazz song; here's our 'this' song."

There used to be a time when I saw that happening a lot. People would put out an album with all these different types of music. It was like a "Showcase of what I can do." And yet the album never did anything, because there was no market. The record company didn't know where to place the stuff.

R-e/p (Robert Carr): When you first took on the project with Maxus, did you formulate a grand design of how you wanted to work with them, and what direction would be best?

**Michael Omartian:** In a way, yeah. The circumstances with Maxus were quite a bit different than any other situation I've been in. They had a deal with A&M Records, and had already cut the album with someone else. In fact, six of the songs were cut in final form... or what they thought was final form.

R-e/p: Did you redo those tracks?

### RHEMA . . . Michael Omartian's Personal-Use Studio

Michael Omartian recently put the finishing touches on Rhema Studio, a 24-track recording/mixing facility located in an area of his Beverly Hills home. Rhema was designed and built for Omartian by Dennis Ezeland. Although used only for his own projects, R-e/p compiled a list of studio components as a point of reference:

**Console:** MCI 36-input JH-636 with JH-50 Automation.

**Recorders:** MCI JH-24 24-track and JH-110B 2-track with interchangeable  $\frac{1}{4}$ - and  $\frac{1}{2}$ -inch heads.

**Reverb:** Lexicon Model 224 Digital Reverb system.

**Echo Units:** URSA Major digital reverb for spring echo, and a Space Station for digital tape slap.

**Effects:** Audio & Design Scamprack, containing two S0-7 Octave Equalizers, two F-300 Noise Gates, two S0-4 Parametric Equalizers, a De-esser, and Stereo Panners; four Valley People



**Gain Brains** and four Kepex; two dbx Model 165 limiters; two UREI LA-4 limiters; an Eventide Harmonizer with de-glitch card; DeltaLab DL-4 digital delay; and a Lexicon Super Prime Time DDL. **Keyboards:** MiniMoog; Sequential Circuits Prophet 5; Roland Jupiter 8; Rhodes 73; and a Linn Drum Machine.

**Microphones:** AKG C-452's, two C-414's; two Crown PZM's; a Neumann U-87 (with another on order). **Monitors:** Yamaha NS-1000's with the ubiquitous Auratones on the console.

"I'll never engineer basic tracks, string or horn dates, because I don't want to have to think about VU levels, and the other side of the glass too"

**MO:** Yes, I did them all again. When I heard the original A&M tape, I got the feeling that's as far as they could ever see going with those tunes. Otherwise, they would have kept going with them. But the songs were very unfinished to me. To be very honest, I thought they sounded like A+ demos. There wasn't enough imagination in what I heard; everything was strict and regimented. They didn't seem to get into emotionally building something at the end. It was just more of the same all the way through until fade out.

That's not to say it was bad, however. It's just that sometimes — and I think this happens frequently with groups — in order to appease everybody in the group, one member or another will sometimes stand back and not make a comment. "I made the last comment that they used so, therefore, I'm not going to say this, because it's someone else's turn." That kind of atmosphere leads to the point where pretty soon everything becomes very "one-dimensional."

R-e/p: Could you name the A&M tunes that had to be redone?

**MO:** They did "The Higher You Rise," "They Danced," "A Part of Me," "Your Imagination," "Where Were You," and... I'd have to see the album for the last one. They had about a 10-tune album that I had a cassette on, and I listened to it for a solid three weeks. Everywhere I'd go that's all I'd listen to, and keep asking myself, "What's the matter with this tune; what's going wrong with this?"

I didn't want to go into the studio, and cut four tunes to augment the tunes that were already cut. As far as I was concerned, the tunes had to be cut all over again. That was kind of a shock to everybody, but they went with it.

The group also had a fixation about "nobody but the group members should play on the album." And I didn't necessarily agree with that. When we got together, we realized how much someone else would really add to the album, without taking away from the fact that they are a band. There's nothing wrong with that. I think the end result is very, very good.

In a way it's funny, that by not seeing the kind of results you feel you deserve, you can get frustrated into thinking, "Did we do something that's missing the mark?" It's unfortunate with the way the music situation — the radio promotion — is set up.

You can get incredibly good feedback immediately from people — either in the company, or anyone in general. "Oh, we love it. This is great, you're gonna do it."

Then three weeks later, it's like they didn't see the instant Number 1, so therefore you get the feedback of "no feedback." Suddenly there's silence where there was once all this praise.

*R-e/p: Like you didn't even do the project.*

**MO:** Yeah! And it becomes very frustrating. You start going, "Man, did we do something lousy here?" But every time I put that record on, and review it, I say, "No. That's a good album. I think it's genuinely a good album."

I don't see what else we could have done on a first album. You could try to do 10 versions of "What a Fool Believes," for example, just to try to capitalize on what everybody's capitalizing on — the feel, the same kind of changes. But we really wanted to stay totally away from that scene. So, we went in and did what we did.

*R-e/p: Are you assigned to a group by the record company, or do you go out looking for groups?*

**MO:** Both ways. Well . . . it's not even a matter of assignment, either. In the case of Warner Brothers, for me it's strictly, "If you like it, do it. If you don't, nobody's forcing you." Which is really nice. It's like a family, and very little pressure. In fact, the day I walked in, I was greeted by Mo Ostin, the president of the company. He came down to my



office, and said, "Look, if you find nothing for the first year, or if you want to relax, and just get an idea of what this place is about, you don't have to do anything." I'm thinking, "I never heard anything like this before . . . and he said a year! What in the world . . . ?" It's an atmosphere that's unbelievable.

*R-e/p: What attracts you to working with a group?*

**MO:** It's a reaction to being a studio player for so many years. Something happens between the members of a group. They're writing songs together; they're performing together; they've had months of rehearsal doing the tunes. All the parts are so worked out,

that I enjoy working with that kind of freshness . . . where it's not walking in with the charts.

The session guys can sit down and do some incredible things, but they haven't lived with the tune for a while. The date's got to happen fast. Even if it takes two days to cut the tune, it still has to happen quickly. Twelve hours in the studio doing a song doesn't mean that you've explored all the possibilities.

When I'm listening to the radio, I can always tell which is the studio band, and which isn't. Even without the group names. There are so many little parts that are worked out when you're doing a group project, that would just go by in a studio/session-player situation.

*R-e/p: There seems to be an energy that comes out of a group, too — a marriage of the energies of the people involved.*

**MO:** Exactly. And you realize that with the group, that music is their life. Everything is at stake. For us who go from studio to studio, it's just a 3-hour or 6-hour stint. So what if it doesn't work out. You go on to the next one. But with a group, it's that whole attitude of: "We want this music to work — the five of us, the 10 of us" . . . or whatever.

*R-e/p: You seem to be attracted to new groups.*

**MO:** I enjoy new groups. I've been offered quite a few established artists and, to be honest with you, it's very hard to say yes to some of them. They're so locked into their ways. Usually what they're calling me for is a case of: "Well, I'm tired of the kind of thing I've been into. I need a new producer to give me a fresh sound or direction." And you realize that it's not going to be any different. Everybody wants to stay where they are, because it works for them.

They all act like they have a monkey on their back called "themselves." So many [band and artists] are so tired of hearing themselves, but at the same time they're realizing that is what's making them appealing to the people who buy their records. They've got this dichotomy saying, "I don't like what I am, because it's getting stale, so I need to move on. But . . . if I do move on, I . . . continued overleaf —

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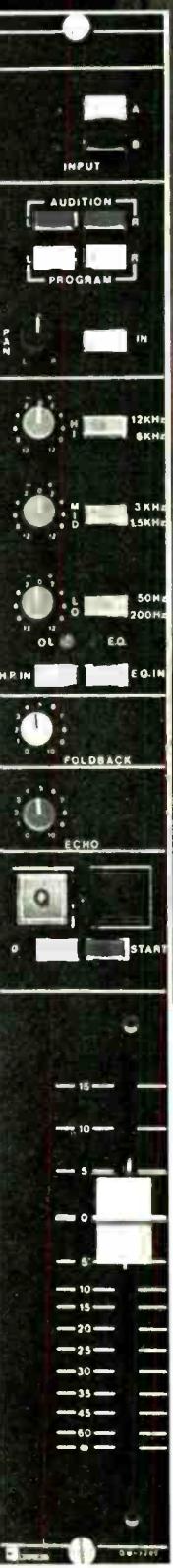
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April 1982 □ R-e/p 27

Grammy Award Winning Producer  
**MICHAEL OMARTIAN**

might lose some of my following." Then comes, "Should I take the risk? I'd like to take the risk — personally — but dollars and cents says I better not."

The one example I remember most of all was Neil Diamond. He really went through a big conflict. After he had his first three or four albums that were extremely successful, he said, "I don't like the way I am. I've got to get away for a while and emerge a different person." He went underground for two years, came back, and there was nothing different at all. The music was the same. And the media was hyping that the "new" Neil Diamond is coming out doing a "new" album. Then you listen to it and find that it's just the natural progression of the last four albums.

Christopher Cross is experiencing a lot of pressure at the moment, because his first album was that big. We're getting everything ready to go into the studio on the first of April for the second album, and I feel for the guy. I'm in an easier position than he is. I can go from one production to another, even though I feel much more involved than that statement may imply.

*R-e/p: But at the same time you had a big part in winning all those Grammys too. In a sense, you've established yourself in that direction with a particular style. I would think you'd get locked into that style, too. Maybe a case of: "Well, we need that style, call Michael."*

**MO:** Exactly. That becomes a little tough. Fortunately, there are other outlets I use, or have, where I can do whatever I feel like doing. That's a luxury that is nice to have, even though the projects I do on my own might not be appreciated by the masses. It doesn't really make a whole hill of beans of difference to me, as long as I'm able to exercise those options.

You're right about the "stylizing trap" of the business, though. I'm not ever going to make a claim that I could walk into the studio with anybody, and make a good record with them. There are certain variables that are always existing, but . . . I do get tired of the fact that people only see me as kind of a "pop" producer. That's really not the entirety of my ability at all.

*R-e/p: What else would you like to expand into?*

**MO:** I'm into serious composition a lot — symphonic productions. I used to do that all the time in college and high school. I'd write for symphony orchestra; very serious things. But when you try to get someone's attention, and say, "I'd like to do a movie score," I'm talking about something serious, like John Williams, though I don't even pretend to beat that

level. I haven't worked that long at it.

The funniest situation was an agent who told me he'd call me back. A few weeks later he did, and said, "Yeah, man, I got this gig for you. Now . . . they want Christopher Cross to sing the theme, and you'll do the record on it." I said [sarcastically], "Yeah, that's exactly what I was talking about."

It's constantly that way. I'm getting calls to do movies, but it's always: "We'd like you to produce the record that's going to be in our movie that's going to be the hit."

*R-e/p: . . . just like Arthur.*

**MO:** Exactly. And it goes on and on. That's one of the reasons I built this studio in my house. I can come back here and express myself the way I want, and not worry about anything like that kind of typecasting.

*R-e/p: Just referring to the fact that you got those Grammys, and you're talking about Chris Cross being under all that*



**"I'm not ever going to make a claim that I could walk into the studio with anybody, and make a good record with them. There are certain variables that always exist."**

*pressure, do you find that you're under a similar kind of pressure? That is, you have to go in the studio and come up with a hit?*

**MO:** In general, I felt like it enabled me to relax for the first time in a long time, as opposed to putting a lot of pressure on me. The pressure that I'm feeling now is, basically, because Chris is feeling pressure. I'm kind of picking it up by osmosis.

I'll tell you the pressure I feel more than anything. Once I got the Grammy, people want to make themselves feel good by knocking you. It's just human nature. The feeling I get is that, "Well, he hit once, but that'll probably be the last one he'll ever hit with. He might hit with Christopher Cross again, but that will be his only act. You watch."

It's unfortunate, but that's human nature. People in this business really don't wait to see the best for someone else. I sit here and think, "Gosh, I'd love Maxus to be a hit, so that people wouldn't be able to walk around and say, 'He's just a one-act producer.'" That's the kind of pressure I get under, more than producing the next Chris

Cross album successfully.

Then, of course, there's the discouraging warning that everyone encourages: "Don't become friendly with your artists. Keep your distance." I always think in my mind, "Gee, what would my reaction be if the guy came up to me and said, 'Look, I really don't want you to do my next album. I'd like someone else to do it.'" You have to deal with those kinds of feelings for whatever reasons all the time.

I know that I had valuable input on that first album, and Chris knows that too, so I'm secure in the fact that my input was not token. But you commit yourself to a relationship with somebody just like a marriage. What's it going to be like after you expose yourself, and they say, "Look, I want Quincy Jones, or Phil Ramone, to do my next album, 'cause I'm big-time now." That's what's tough. You just have to get them off your mind and forget it.

*R-e/p: You were talking about Chris Cross's style. Did he pretty much have his "sound" together before you met him? How much input did you put in to help develop that sound?*

**MO:** I really acted, in Chris's case, as an arranger. Sound-wise, he came with an engineer that had his trip together — Chet Himes. From what I heard on the four-piece demos, I said, "Man, that guy has got to engineer this stuff, because he knows how to capture Chris's ideas — totally."

See, they had worked together for many years in Texas. Chris did session work, and Chet owned the studio where they always worked. Consequently, just through the years, they had a combination going, and it was beautiful. There was no reason to tamper with it.

I felt that the way I could fit into the situation was to expand some very simplistic songs, and give them a little more "meat." I did the same thing with Chris that I did with Maxus. Take the bass player, for example. I'd say, "Look, you're doing the same thing at letter B that you're doing at letter A. Let's change the second and third beat of the second and fourth bar, and do something a little different to catch their attention — to make it build and build."

Consider, for example, the song "Ride Like the Wind." The whole introduction started in with the wind and the synthesizer build-up. It sounded like a movie score from a western or something. I thought it would be neat to put a tag out in front that would start building, and get the momentum going.

"Sailing" had that slow groove on Chris's demo, but he didn't want to cut it that way for the album. I knew there was no other way to record the song. We even brought [studio drummer] Jeff Porcaro in to try a different type of approach, and it was awful. Not Jeff's playing, but just what the change did to the tune. . . . continued overleaf —



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The track was four pieces. I put the strings on, the bicycle bells, and the piano solo. The piano solo was the biggest argument in the entire recording of the album. It was *unbelievable*. It got to a point where I felt there had to be something else

happening in the middle section. There were just synthesizer pads doing nothing, but playing the changes.

I told Chet [Himes], "Set up the piano mikes. I'm going out and trying something." It took me a couple of takes, but I got what's on the album now. Then I saw Chris in the booth scratching his beard, and I knew something wasn't right. I walked in and he said, "I don't know, man. I really

heard it the other way." So I said, "Chris, it *needs* this kind of input. It really does." It took three hours to resolve that difference of opinion. Three hours! He walked out. He had to go off by himself and think. It was very serious to him.

I was brought to Warner Brothers to function in the capacity of bringing pop music to WB. They've always been more of an FM, album-oriented company. And when I heard Chris for the first time, the people at the company had already heard him for three years, and said "No way."

Chris sent a new tape. I don't remember what the new songs were, but the tape also contained all the old stuff they had heard before. A guy named Michael Ostin, who is one of [Warner's] A&R people, brought it to me and asked what I thought. I said, "I love this stuff. I seriously love it."

*R-e p: It was radically different for that time?*

**MO:** When we finished recording, which was the summer of '79, the New Wave and Punk scene was coming in heavily. We were supposed to release the album in August, but the record company didn't feel it was the right time. I figured, "That's it. Kiss this one good-bye. It'll never happen."

When they finally put the album out in January [1980], the head of Warner Brothers' promotion came to me and said, "I don't know what happened, but they ate this thing up like crazy." The stations played "Ride Like the Wind," and it was a hit in three weeks.

*R-e p: Was there a lot of promotion done for it?*

**MO:** That's what amazed him. There was such a glut of Punk and New Wave stuff, that evidently the radio people said, "This isn't what I want to hear," and they put on Chris Cross. Both Chris and I had gotten to the point where, when you suddenly feel like the buzz [good feedback] is going down, you go, "I give up. Something's wrong." My temperament is *not* one of being a promoter. I can't do it. So I'll be swayed sometimes by what I hear to believe that maybe the music's *not* good.

With Maxus, I *know* it's good. With Chris, because of that time period, and the insecurity of the type of music, I thought that maybe I totally missed the mark about what's supposed to be happening.

*R-e p: If I remember correctly, it was rumored that you didn't want to release "Sailing."*

**MO:** I didn't. That shows you what I know. We had another one in mind. Mo Ostin [WB president] is actually the one who said we should release "Sailing." It was a good move.

I remember I was in Hawaii on vacation. I spent two days on the phone trying to figure out what everybody was trying to do. Within two weeks, I was

#### The Long Road to Success —

## CHRISTOPHER CROSS SESSIONS

described by engineer Chet Himes . . .

Christopher Cross' apparent overnight success was, in fact, a long evolutionary process. During more than a decade in Austin, Texas, Cross did sessions with engineer Chet Himes, presently the owner of The Studio, South; together they developed a style and sound that caught the music world off-guard, and culminated in a sweep of the 1981 Grammy Awards.

The following conversations with Chet Himes cover some of his techniques and approaches that were perfected over that time period, and how they were used to capture and enhance the phenomenon that is Christopher Cross.

"All the dates for the *Arthur* and *Christopher Cross* albums," Himes recalled, "were recorded at Warner Brothers' Amigo Studio in North Hollywood, with the exception of the string parts for Chris' first album, which took place in Amigo A. The *Christopher Cross* album was recorded on two 3M M79 24-track machines tied together via a pair of SMPTE time-code tracks and an EECO synchronizer.

#### Guitar & Bass

"On 'Sailing,' the bass is all direct with a flat EQ setting, and no rolloff; the bass just runs all the way down. Andy [Salmon] has a modified Precision Bass with an added pair of Jazz Bass pickups that are set back in a treble position, and basically wired like a humbucker. With his pickups, there's really no need to roll off the bottom, because all the sub-sonic stuff isn't there. The guitar was recorded in various combinations of direct and live signals.

#### Drums

"The drum kit for the tune was mixed with a technique that I like very much. All the drums were recorded individually on their own tracks, which is pretty standard. But in the mixdown is where I did something a little different. I located the basic tone or major harmonic of the drum, and keyed the signal to an oscillator that followed the envelope of the drum sound. The drums up to this point, were natural with no processing. All I did was support the fundamental tone of each drum with the oscillator. I did that with the snare drum, too.

"It can be any oscillator, but the particular ones I used for 'Sailing,' because they [Warner's] didn't have enough, were Moog oscillators. Each drum activated a noise gate that, in turn, triggered the oscillator on and off — and produced the drum's fundamental sinewave. That way we could adjust the amount of decay and tone via the Moog. The two signals — live and synthesized — were mixed together for the appropriate tone. Both were mixed to the two-track 3M digital master during the mixdown process.

#### Strings

"In the last year, I've become very fond of AKG C414's, and that's how I miked the strings on 'Sailing.' There were 22 string players, and I used a 414 for every pair of players. The mikes were as close as I could get them to being equidistant from each musician, and about 3 feet above them. In addition, we had a stereo AKG C-24 mike over Michael's [Omartisan] head as he was conducting. The strings were cut live in stereo.

"I used some effects on the strings, but you'd be hard pressed to find them in the final mix. There was a bit of slap — about 120 milliseconds — from an URSA Major Space Station to thicken the sound. I sent all the strings through that, and blended that signal in with the live sound. I also used an MXR Pitch Transposer to change the pitch about half a percent; it's not very much. The setting flickers between 0.99 and 1.00. Among the pitch-shifting products I find the MXR is a better sounding device than some of the others, and a little bit harder to detect.

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Grammy Award Winning Producer  
**MICHAEL OMARTIAN**

hearing it on the radio. It was very quick; "Sailing" just took off.

*R-e p: Do you feel that you have to personally believe in the songs of the artist that you're producing?*

**MO:** Oh boy, do I ever. I don't care what kind of music it is. If the songs aren't there, *forget it*. There's no reason to go in and record.

I see a problem with today's new music. I like the fact that some of these people are at least trying to get out of the tonality and banality of what's going

on. The chord progressions are just *tired*, with the same ones being used over and over again. So I respect what they're trying to do. But in an effort to be different, they're becoming very "unmusical." And the lyrics are just stupid in a lot of them.

I think the new songwriters really minimize the importance of lyrics. It's too easy to push the buttons on a drum machine, come up with a little groove, and a melody line, put it together, and attempt to make a hit record. And a lot of them are being made. But you won't remember them three years from now. They don't last; they don't even sell records. They're "turntable hits." There are some exceptions, like Rick James or

"Something happens between the members of a group . . . they're writing songs and performing together . . . I enjoy working with that kind of freshness."

Prince, but I don't dig at all what they're saying. They're out to lunch.

*R-e p: Maybe there's a lot of frustration being expressed in that type of music?*

**MO:** We all feel it. I feel the frustration of not being able to *really* understand what's going on in the marketplace, or in the world — what's causing the tension? I don't blame them for what they're doing, but it's very *unmusical*.

*R-e p: You wrote the music for one of the tunes on the Maxus album, "Don't Try to Stop Me Now." I wanted to ask you if there was something you related to in the lyrics . . . "growing up is just another accident, that I can do without."*

**MO:** In some ways, I have two kids, and when I look at my son who is 5½ years old, I see the honesty of that guy, and how unblemished he is by anything. He tells it like it is. There's absolutely *no* double meanings to be gotten. No inhibitions; just this beautiful little creature running around.

It's true. You get to the point where you get so sophisticated in covering yourself up, that you become totally *jaded*, and you're not a human being anymore. Maybe growing up, sometimes, can be an accident, because then you really loose a lot of the qualities that are very important.

*R-e p: And, being a musician, that jaded facade has to be stripped away, because it becomes very obvious in the music. In order to be a good musician, you can't have those inhibitions there. It has to be a clear flow coming out.*

**MO:** When you start tapping into your soul and your gut, you start dealing with concepts that don't necessarily catch the million-dollar ear. That's what really *frustrates* me. There was a time when I really felt that artists expressed themselves, and were received, because people believed in what they were doing.

*R-e p: It is the soul and guts that sell the records, and transcend just the chord changes and the lyrics. There's that energy that reaches out and touches the listener so they say, "Hey, I dig that music."*

**MO:** Exactly. Just going around this town [Los Angeles] and seeing different people, I'm convinced they're locking themselves up more and more. I don't know why, or what's going on, but the music business in LA is not as intimate a fellowship as it used to be. There are these little pockets of people running around doing their number — very competitive. Some of it's good; it's motivating, and some of it is not.

*R-e p: What does it take to be a*

The Long Road to Success —

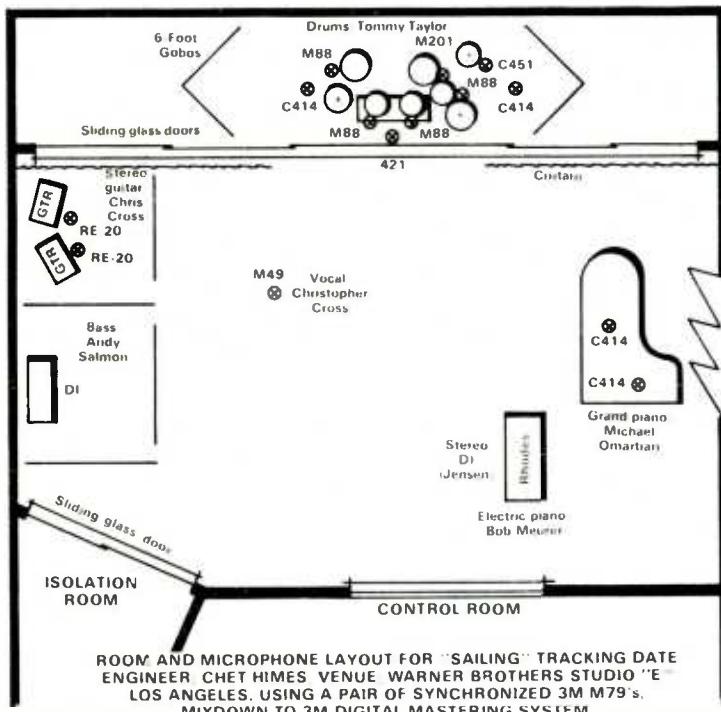
## CHRISTOPHER CROSS SESSIONS

described by engineer Chet Himes . . .

### Vocals

"Recording the lead vocal was pretty straight ahead, except for a little echo and slap, but again, there wasn't enough to be obviously noticeable. The main point I had to keep in mind was that Chris' voice is kind of high, and has a natural edge that makes it cut through the music. I have to select a mike that's pretty smooth in terms of frequency response.

"Most microphones have got a presence peak in them about 5 or 6 kHz. As soon as I add a mike like a Neumann U87 to Chris' voice, the edge is accentuated too much, and I have to start equalizing it out. Chris' vocals were cut with a Neumann M49 — an old tube mike. Sometimes I'll use a 414, because that's pretty smooth through that region, too.



"As far as mixing for AM radio, that wasn't really much of a consideration; I'm pretty much a purist. I mix for what I hear in the studio. I'll check the mix on small speakers, and maybe make some adjustments. But, in general, if I feel comfortable in a room, I'll make the track sound as good as I can in that room."

### RECORDING ARTHUR

"The piano miking for the intro in *Arthur*," Chet Himes remembers, "was a combination of a pair of C-414's and a pair of Crown PZM's. I put a 414 in the bow of the piano, right about 1½- to 2-inches above the strings, and two octaves above middle C; not exactly over the hammers, but backed down the piano from that.

Grammy Award Winning Producer  
**MICHAEL OMARTIAN**

"successful producer"? And I mean "successful" in the creative sense, not necessarily monetarily successful.

**MO:** What's important for me is to be very careful that I don't merely pick up someone who is part of a trend, and try to mold them into a radio band that happens to sound like so many others.

I've been called to speak at writer's seminars and other functions, and what I harp on most is to try to avoid merely emulating what's already there. That, to me, is what makes for a successful producer.

Monetarily, there are a lot of successful producers, but I don't respect them. They have nothing going for them, other than the fact that they can earn a lot of money.

*R-e/p: Well, the second half of my question was going to be: If I changed the word "success" to mean "monetary success," would that change your answer?*

**MO:** Oh yeah. There are so many people that I look at and say, "How? How did they ever get to that place?" And all I know is that they do have an ability to motivate — or politic, or whatever you want to call it — to create such a "buzz" on something that's just so "average."

I really believe that you can elevate the listener in what he wants to hear, by doing what they do with the trash that's being released now. It's the concept of drive the music, or TV shows, or whatever, into their system until the consumer starts to like it. I don't see it any differently. You can do experimental material, have the radio people play some intellectual piece of music over and over, and pretty soon you get the same acceptance as some stupid piece of music that's on the radio now.

*R-e/p: Being an established arranger, does that ability make you a better producer? Does a producer have to be a good arranger?*

**MO:** The way I look at the situation, there are three different kinds of producers. One is the executive producer who has the ability to have three or four arrangers at his fingertips, "X" number of musicians, and a good engineer with good ears. He also has some song sense, or three or four publishers that he's tapped into that know he's going in to cut an artist, and what tunes he needs. Usually a guy like that will end up with someone who's not necessarily a songwriter/artist, but a "voice" that needs whatever.

Let's say the producer decides the artist will be R&B. He gets his R&B staff together, his R&B arrangement, and so forth. He doesn't necessarily have any creative input, but what he's got going for him is that he's got an administrative and political input. That means he's got all the time in the world to take the promotion people out to dinner; get the marketing people excited; and kibbitz with the president of the record company.

Then there's the engineer-producer who goes in with a rock and roll band that has their act together. All he wants to do is make sure that the effects and all the latest technology are going to happen on that record.

Finally, you have the musician-producer who is usually always connected with someone who needs or wants that musical input more than any other kind of input. For gratification reasons, I think it's best to be that way. But who am I to say? I'm just dealing from the way I feel. I think my musical education or knowledge has made all the difference in making this something fun to do, instead of just a job. The producers I respect the most are all musicians — with a few exceptions.

*R-e/p: As a session musician doing a great deal of playing, do you still rely on the producer's ears and his feedback as a musician? Since you've been a successful producer yourself, does the typical musician/producer relationship change once you've been on the other side of the glass? Let's use the Al Jarreau/Jay Graydon/"We're in this Love Together" session as an example.*

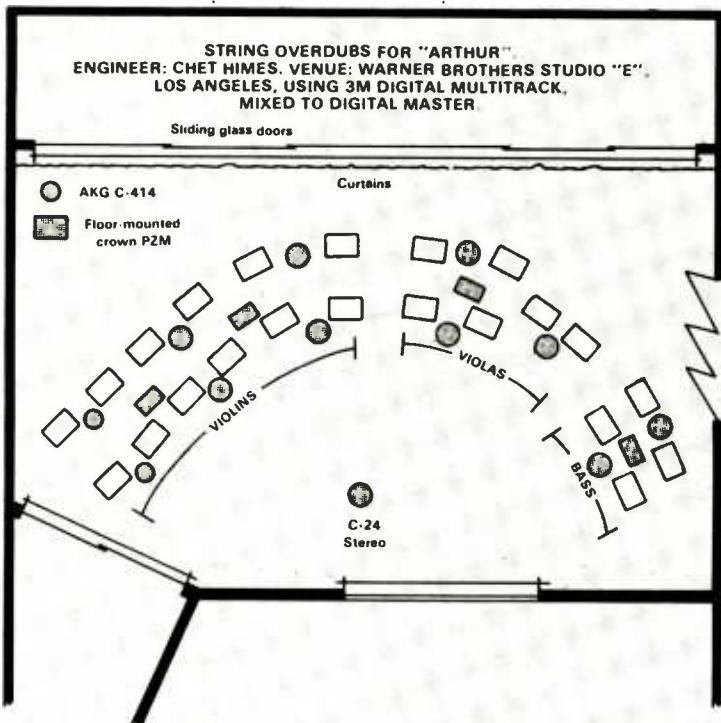
**MO:** Definitely! I still rely on the objectivity of the producer. The only

The Long Road to Success —

## CHRISTOPHER CROSS SESSIONS described by engineer Chet Himes . . .

Another 414 was placed in the thinner part of the grand in the vicinity of where the bass strings cross with the middle-register strings, and also 1½ to 2-inches high. The PZM's were almost in the same place as the C414's, attached to the underside of the lid, which was at half stick.

"I used the 414's in stereo, and then blended the PZM's to the sound. One of the problems I had with just the PZM's is that there's a drop-off in the lower register. The 414's captured more of the bottom-end. What I got out of the PZM's was improved stereo placement, and more lower-mid and middle frequencies.



"I don't like to do much equalizing to the piano, because I start to hear the overtones, and phase shift, and it sounds weird. I'll usually boost, at the most, 2 dB at 12 kHz, maybe 1 dB at 6 k, and pull out a little bit [1 of 2 dB] around 600 and 1 kHz. I roll off a little at the high-end, and at the bottom I might go down to 30 cycles and roll off 3 or 4 dB. I like to hear instruments the way they sound live. I don't want to affect the sounds a whole lot, so I don't do much radical equalizing, at all."

"In addition to the grand, Michael doubled it with a Wurlitzer piano. He's incredible at doubling; he does it better than anybody I've ever known. He'll play a basic track, listen to it, write it out, and then play the same thing on another instrument. The Wurlitzer was taken direct. I use the same EQ on most keyboards."

"Incidentally, I believe that *Arthur* was the first number 1 single to be both cut and remixed on the 3M Digital Mastering System." ■■■

difference is that when Jay comes over and does something for me, I'll say, "What do you think?" And when I'm over there, he asks, "What do you think?"

There's a community of friends that I'm around. He'll call me like in the case of "We're in this Love Together," and say, "Man, there's something missing from this tune. What do you think it is?" And I'll say, "Well, the instrumental goes nowhere, so let's change the chords." Or, "The synthesizer line should be [sings hook-line from song]. It needs that." He says, "Well, go ahead and do it!"

And it works the same way over here. He'll tell me, "Yeah, I hear a guitar line," and he does it. Because we've had experience in this, we're able to help each other. I feel no less willing to give

out any ideas for whatever with anybody else. I don't think it changes the relationship at all.

It does change, however, if I end up doing something that I really don't want to do, but I'm doing it because I like the person who asked me, and the project turns out to be lame. Then I really have to fight a bad attitude, and keep my focus on the fact that I accepted the gig, and I have to accept the responsibility that goes along with it. Don't make life miserable for the person sitting there trying to put the thing together.

*R-e/p: Before you started producing, was there one thing a producer did to you or to people you were working with, that you vowed you would never do if you started producing?*

**MO:** I resented being hired and paid as a piano player on a date, and then having someone come in and ask me to do all the charts right there on the spot. I didn't like that. I'd never put upon a musician more than what they were hired to do, unless I made sure that they knew about it ahead of time, and they're compensated for their work.

And I'm not saying I resented it strictly because I didn't get paid for it. I felt like I was being asked to do something that was less than fair. The producer or artist knew I was going to be there so, therefore, they knew they wouldn't have to prepare any chord charts. When I walked in, they came up and said, "Here's the tune. We got some music paper for you, if you want to write the changes down, and any bass lines, or any guitar ideas, some drum ideas,

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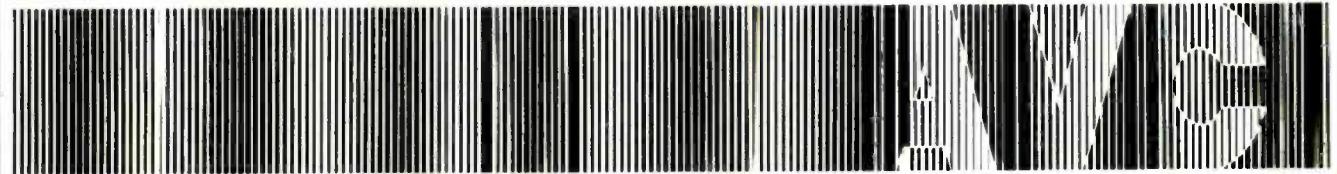
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da-da, da-da, da-da. OK. Everybody else take a break!" They'd come back a half-hour later and I'd still be writing. I just stopped doing that. Then when I presented the fact that I should be paid, suddenly I wasn't called back.

*R-e/p: Do you feel you're pretty technically oriented when it comes to working in the studio?*

**MO:** I'm just starting to get the technical side down. Jay Graydon's been over here [to my home studio] showing me stuff. It's not as difficult as I expected.

*R-e/p: Do you think you'd eventually get to the stage where you'd engineer and produce your sessions?*

**MO:** No. I'll never engineer basic tracks, string dates or horn dates, because I don't want to have to be thinking about VU levels and the other side of the glass, too. But for synthesizer overdubs, vocals, it's very simple.

*R-e/p: Do you have an engineer that you work with frequently?*

**MO:** I usually don't work with the same engineer all the time, and there are a couple of reasons why. What I've become very aware of is that engineers have as different ears as musicians have styles. What one guy hears for drum sounds could be perfectly suitable for one project, but not for another. Plus, I don't want to have an "Omartian Stamp" on all the albums I produce. That happens much too easily, especially if the artist asks me to play keyboards. That instrument becomes a very controlling force on the record. I try to reduce those elements that would make people notice my influence to as few as possible. One way to do that is to have three engineers that I really enjoy using. I think they're all very good.

*R-e/p: How would you approach a mix? Would you watch the engineer do it, do it yourself, or come in later and make a couple of changes?*

**MO:** I would do the mix the way I thought it should be, and then have a guy come in and tell me what I was doing wrong. "Well, your bass drum needs to be rolled off at such and such a frequency." "You need a little boost here." Or, "It doesn't sound quite 'whatever'."

During the years I've been in the studio as a musician, I've heard the different ways that other people mix drums, and I've made mental notes that "That's right," or "That's not right." Your ears get trained. I just play with the sounds and relationships until I get everything sounding right. That's basically all there is to it . . . and don't overload your tape by getting your levels in the red. Then you're OK.

It's pretty simple. You just have to figure out what all these little buttons

do [laughing at the ocean of buttons on his MCI JH-636 console]. People seem to be getting so concerned with the technology of putting a record together, that they're really losing sight of the *musical* end of the process. At our [Warner Brothers] A&R meetings we get so many records coming through that sound so good, man — great echo effects, delay systems, great synth sounds. But the songs are junk, and they'll never be a hit.

*R-e/p: When you're recording a song, would you normally go for the whole song at one time, or would you build up the song through overdubs?*

**MO:** I don't particularly like the idea of not hearing the chordal elements along with the rhythmic elements. I know some people do [work that way] — in fact the way I built the tracks that I did here, I started with the drum machine and built from that. For certain applications I think it works, but most material really needs hearing the piano, bass, and drums together.

Last fall, I was doing Donald [Steely

coming for my [MCI JH-110] two-track, because I want to start doing all half-inch, non-Dolby.

Digital recording enters its own sound; it's not an objective component at all. Digital has its own characteristics that are very noticeable, and one of them is that the top end really does cut off. As the recent article in *R-e/p* pointed out ["The Analog Disk — Is there Life after Digital," by Neil Brody; December 1981 issue — *Ed*] that might be right, and the analog might be wrong. But I do know that I like the sound of analog a lot better than I do digital. At 30 IPS, non-Dolby to half-inch, I like the bass response a lot, even though I do think the digital has a nice bottom-end response.

What really drove me crazy though, was that sometimes the digital decoded the signal strangely. On Tommy Johnston's album, we had to re-cut the master at least five or six times, because the master tape was entering funny sounds. The trouble might have been with the machine we were using, going a little bit left.

Another aspect I don't like about digital is service. If my 24-track should give me a problem during a session, I can call someone and have them here within an hour or two. If I have a problem with a digital machine, I could wait a week before it is actually back together again. And I don't like the fact that nothing is interchangeable. I know that Chris really wants to do the next album digitally, but I don't think we're going to do it.

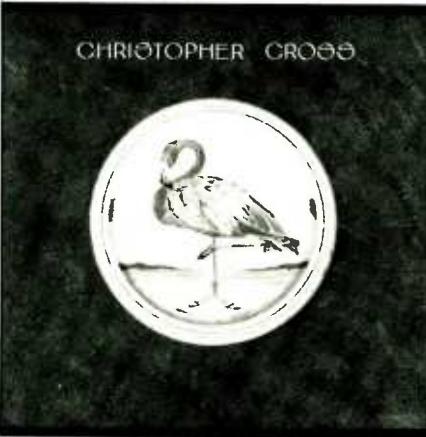
*R-e/p: Before we finish, I'd like to refer back to your last year. Having won three Grammy awards, do you see a new value or significance to receiving them?*

**MO:** In some ways, yes, and in some ways, no. I think if you opened up the Grammys to represent not only the peers within the music community, but also the public, it would be more valid. It's very easy for me to open up the nominees and see that my buddy has produced an album, and not weighing it on its own musical merits. I'll vote for my friend sometimes, instead of what might be a better record.

I know that if it were in the hands of critics, it would be a very different situation; [L.A. Punk band] "X" would be up there getting a Grammy for album of the year.

After the fact, winning has some value, but not a whole lot. It's short lived — at least until the next year. I know that after I won those three, I suddenly had a lot of calls. Then you see in the trades that the record companies make the most out of their Grammy winners by running ads, and hyping the living daylights out of them. And 40 years from now you'll see, "Rick Springfield; Grammy Winner." They'll always refer to "Grammy Winner," even though it happened 40 years ago.

But, yeah, it feels good. It's nice to be recognized that way.



Dan] Fagen's new solo album. All he had for me to hear was a Roland drum machine that wasn't even a complete rhythm section. Maybe just a high-hat and bass drum. Then he'd throw this eight-page chart in front of me and say, "I just want your right hand first, and then I want your left hand." To try to tap into some kind of feel, and get some kind of idea . . . there were no vocals; I never knew what was going on. But that's the way they wanted it.

I don't like doing things that way. They're the only people I know that can really get away with that kind of approach. One of the reasons is that the musicians dig doing the dates so much, they'll do just about anything. So I sat there going, "What is this?" Then you hear it when it's done, and you can't believe it. It's a credit to them.

*R-e/p: Have you had the chance to do much digital recording?*

**MO:** We mixed Chris's album to digital [3M four-track]. Also the Tommy Johnston album. The Maxus album we went to 30 IPS, non-Dolby half-inch tape. I've got a half-inch tape head kit



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**T**he construction of Lion Share Studio A is perhaps one of the few positive indicators in new studio construction to have taken place in recent times. This technically advanced facility was the result of a calculated plan of veterans in the recording business, with a commitment to the industry that is sadly lacking in the towers that determine our ultimate destiny. The success of the new recording facility already has proven that the pursuit of excellence will not go unrewarded.

What is now known as "Lion Share Recording Studios" was originally owned and operated by ABC Records until March 1979, when the label and its holdings were purchased by MCA

Records. Since MCA already had its own studios, the location remained vacant until October, when Dr. Scott from Colorado purchased the studio. He renamed it the Scott-Sunstorm Recording Center.

With the addition of video sweetening facilities in July 1980, the name was changed once again to the Concorde Recording Center. Kenny Rogers recorded his single "Lady" at Concorde, and it was while he was midway through recording his *Share Your Love* album at Concorde that he purchased the facility in May 1981.

Sharing a 16-year working relationship dating back to the First Edition, Kenny Rogers chose Terry Williams as the studio manager for Lion Share. In

addition to his musical ability, Rogers placed great trust in William's production and engineering background. Jay Antista, with 12 years experience in recording engineering at Walt Disney, ABC, Scott-Sunstorm, and Concorde Studios, was retained as chief maintenance engineer.

#### The Decision to Rebuild

As a result of Kenny's mandate to "make the studio better than any in town," Terry Williams decided that one of the rooms should be rebuilt and equipped with the very latest equipment available. Studio A was selected for a number of reasons. Studio C was a well established room, used frequently by Kenny and Lionel Ritchie, with a certain mystique for creating hits. Studio B, the smallest of the existing three rooms, was popular with many rock and R&B artists and producers. Therefore, Studio A, having a few electronic and acoustical problems, and being the least used room, was the obvious choice for the refurbishment.

At the May 1981 AES convention, even before the purchase of Lion Share was finalized, Jay Antista "bumped into" Lakeside Associates' principals Carl Yanchar and Steve Fouce, and indicated that something was about to happen. On June 3, with the purchase finalized, Lakeside was called in to look at the site, assess the possibilities for renovation, and develop the acoustical, electronic, and architectural specifications for the new Lion Share Studio. Terry Williams, Jay Antista, and Carl Yanchar met and shared design ideas that ultimately would be manifested in the final working blueprints.

Lakeside at once went to work preparing conceptual drawings for three possible control room and studio configurations, with accompanying construction and interface budgets. On Sunday evening, June 7, the drawings were delivered to the studio. The following Tuesday morning the decision had been made on which layout would be used, and the console and tape machine complement was finalized. In fact, the proposed equipment for the refurbished control room actually played a large part in the reaching of this decision.

To accommodate the width of the 56-input Neve 8108 console chosen, the control room shell size would have to be increased in width. Just outside the existing control room was a stairway that served as the main entrance from the first-floor lobby to the second-floor studios. To increase the width of the control room, this stairway would have to be abandoned. The closing of a main exit, the stairway, created more than one problem. A new exit had to be provided in order to comply with the City of Los Angeles Fire and Building Codes. Also, critical structural engineering had to be performed so the stairway could carry the weight load of the proposed studio above. Working in

#### acoustic design and studio construction . . .



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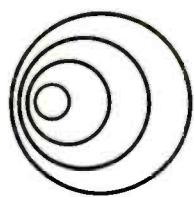
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David McLey

# *McLevyer*



conjunction with the architectural firm of Cannell-Heumann and Associates, who were charged with the task of

renovating the facade and office areas of the complex, the structural and exit requirement problems were soon resolved and building permits obtained.

On August 15, 1981, the Lakeside crew, under the supervision of Steve Fouche, began the demolition of the existing studio. The demolition work proceeded just as planned. The next step was to open the new exit and close

the stairway so that construction of the new studio could begin. With jack-hammers in hand the crew began cutting through the existing walls in the location indicated on the plans. Within minutes, a structural steel post was discovered directly in the middle of the proposed opening.

Although plans of the existing studio areas were available, the complex is composed of several adjoining buildings, plans for some of which were either nonexistent, or lacking in detail. To avoid considerable delay for re-engineering and plan approval, another location for the opening had to be found. Due to known factors, such as existing electrical conduits and plumbing, there were very few alternatives. After several test borings, the last possible location was opened. The adjacent area had been a utility sink, which with a few hours of plumbing work could be removed easily. However, the maximum opening that could be cleared was two inches short of the required opening width. But, by placing the exit door at an angle to the existing wall, the Code requirements could just be met. After some rather creative engineering, carpentry, concrete work, and the help of the building department inspector, this phase of the project was completed, and the major construction was now ready to begin.

For the first phase of the construction, Lakeside enlisted the services of Alangrove Builders of London, a construction firm with many years of experience in studio work. Leroy Pereira was chosen to handle the finish work, as well as the construction of the custom furniture required. His work, long regarded as perhaps the finest in the field, made him the only choice for the job.

#### Studio Design

The number one design goal was to make the studio as versatile as possible. The refurbished Studio A had to be capable of handling any situation that might appear, from an overdub to a rhythm session to a full orchestra, with as much isolation and ambience as the producer and engineer desire. To accomplish this, the studio design incorporates many features that allow for not only the variation of acoustics, but the physical room configuration as well.

The basic layout has dedicated areas for drums, bass, guitars, and piano, which can offer maximum separation and a very tight sound, each area being tailored for its particular instrument. A string area, which by closing some sliding glass doors becomes an isolation room, is very live by contrast in its normal configuration. This allows instruments that require reverberation to be recorded with a natural sound. Additional reverberation can be added later, if necessary, but the natural ambience induces inspired perfor-

### SELECTING THE RECORDING EQUIPMENT FOR LION SHARE

By Terry Williams, Studio Manager



Kenny and I have been together for 16 years, first as members of the New Christy Minstrels, and later as co-founders of the First Edition. When the First Edition broke up in 1975, I gradually spent more and more time producing and engineering, rather than performing. When Kenny purchased the facility (then known as Concorde), he asked if I would take over the operation, develop new clientele and basically turn the three-room house into one that affords the ultimate in recording technology.

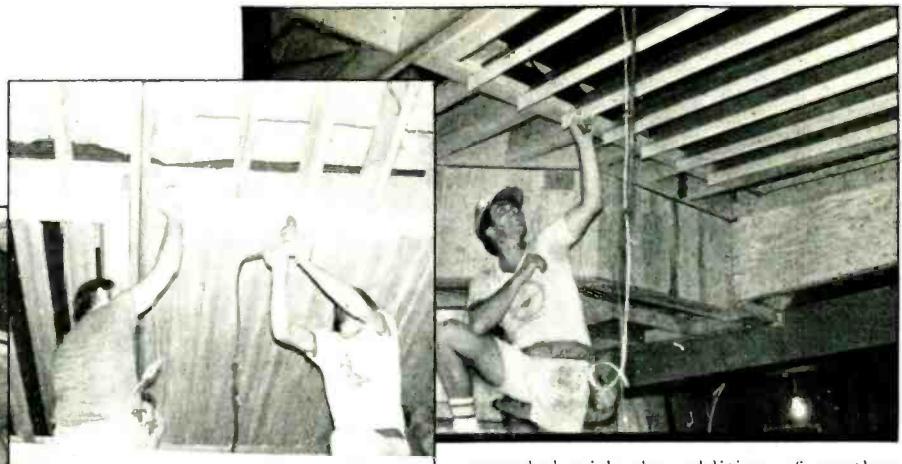
Jay Antista, Lion Share's chief maintenance engineer, and I spent many hours investigating the various equipment options. We knew that three important items—the console, tape machines, and monitors—had to be selected before the room design could be finalized, and would be extremely important from a marketing standpoint. I wanted a reliable desk with versatility and, most important, artist and producer appeal. The Neve 8108 with NECAM was selected. It has what I feel to be the finest automation system available. Studer tape machines were chosen simply because we feel they are the best available. They work extremely well in tandem with the Neve. Two Studer A-800's are locked via the

Studer TLS 2000 for multitrack work, and two Studer A-802-tracks—one in  $\frac{1}{2}$ -inch format, the other  $\frac{1}{4}$ -inch—are used for the final mix.

Probably the most difficult decision was the monitors. I wanted UREI 813 Time Align's. I had worked extensively on the 813's, and found them to be the flattest and truest monitor. Since the other two existing rooms had a custom system that many of the staff engineers were familiar with, we considered for a while the possibilities of installing both. Some of the ideas were really crazy, with motors and hydraulics. But in the end we went with the 813's, knowing (or hoping) that in a good room they would sound great.

The outboard equipment selection was much easier. I wanted at least one of everything. We ended up with perhaps the largest selection of permanent outboard gear available anywhere. If you can't do it in Studio A, it can't be done! And we feel that a client shouldn't have to rent equipment when paying top dollar for a room. We even purchased drums, acoustic and electric guitars, a Sequential Circuits Prophet 10 synthesizer, a Linn Drum Machine, and an Eddie Reynolds-modified Fender Rhodes electric piano to complement the Bosendorfer piano we already had. All of the staff helped in the final selection to ensure that nothing would get left out.





ces, which is something that cannot be added later.

To further round out the standard setup, a vocal booth was determined to be necessary, again due to the concern for the artist. Some of the best vocal performances you never get to hear were recorded during the original tracking session, but with too much leakage on the track to be used in the final mix. The booth also works well for acoustic guitar or harp when they must be recorded with the rest of the band. These considerations made such an investment in precious studio real estate worthwhile.

The provision of creative tools, and the effective utilization of available space, formed the basis for the decision to make many of these standard recording areas perform multiple purposes. Instead of the usual hardwood wall, one wall of the drum cage utilized a sliding glass door, so that it could be pushed back, thereby increasing the usable floor space when needed. Studio floor space can be divided by a series of sliding glass doors that also disappear into a pocket when separation is not required. Floors are constructed entirely of hardwood and marble, carpets being available to change the character of this surface.

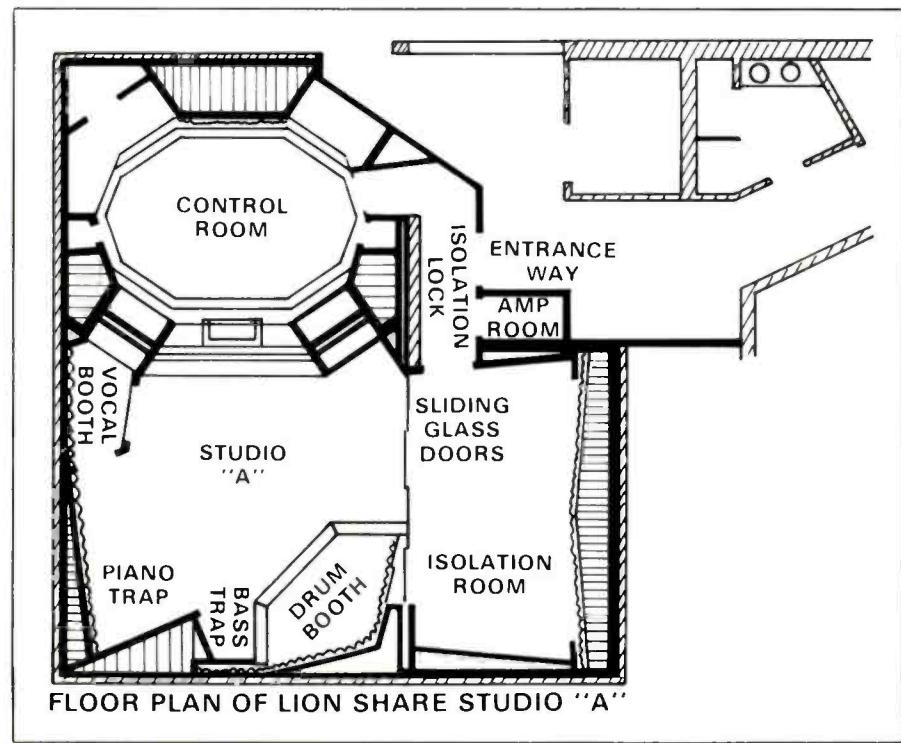
The ceiling surface appears at first to be nearly all hardwood. However, certain areas of the ceiling are actually remote-operated louvers that can be opened to expose broad-band absorbers. Having been one of the principal designers of the Fantasy Records Studio louver system (described in the April 1980 issue of *R-e/p — Ed!*), Carl Yanchar was able to use that experience to come up with a system that was not only less costly to build and install, but also more versatile, mechanically less complex and consequently more reliable. Four of these 6- by 7-foot units are almost invisibly built into the ceiling of Studio A.

One wall of the string area is equipped with six, 2-foot wide sliding panels covered with clear mirror. By opening these areas, in any combination desired, additional absorbers are exposed, and the room sound is changed. This wall, as well as the drum cage, has drapes available that can be either opened or closed to offer even further acoustic variations. Again, the overall concept was to provide, in a compact area, the option of varying the acoustics and room configuration to adapt to any set of circumstances, from dead to live.

Isolation construction was relatively straightforward since the area was previously a studio, and originally had been well built. The floor was already floated on a 12-inch base slab. The floated top slab required just a slight increase in mass to bring it up to current standards. Most of the original isolation walls were also able to be

recycled with the addition of another layer of soundboard and dry wall. The ceiling was the only area requiring substantial reconstruction. Due to the shell's comparatively light construction, an additional isolated ceiling was required, even though it consumed more than 12 inches of precious ceiling height, and made the placement of air conditioning ducts more difficult than usual.

Total construction time was 16 weeks, including eight days of demolition. Electrical, air conditioning, plumbing, concrete, and the various flooring materials were provided by outside contractors working to the specifications set out by Lakeside, and under the supervision and watchful eye of the studio building crew. The finish materials were specified as an integral part of the acoustic design, although the selection of colors was the only area where Kenny Rogers made the final decisions. Ash hardwood, light fabrics and drapes were chosen to visually enhance the acoustic feeling of openness. . . . *continued overleaf* —





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### Control Room Design and Equipment

The control room is totally symmetrical. The UREI 813 monitors were carefully positioned with precise spacing and horizontal and vertical angles. This precision throughout the entire construction process resulted in a room that offers, according to the studio's engineering staff, a very even response and extremely good stereo imaging. The monitors are slightly above ear height to allow sufficient vision into the studio through the window below.

Electronic systems design and equipment installation was also supplied by Lakeside, the coordination of this area being equally important to the successful completion of the project. The control room is capable of 46-track recording, as well as video sweetening with either an Ampex VPR-2B 1-inch or Sony  $\frac{1}{2}$ -inch U-matic machine. In addition to one of the most complete selections of outboard devices, four live echo chambers and six EMT 140 plates make Lion Share Studio A one of the best-equipped studios in the world.

The two-track master recorders are both Studer A-80 Mk II's — one in  $\frac{1}{2}$ -inch format, and the other  $\frac{1}{4}$ -inch. The two Studer A-800 multitrack machines are synchronized via a Studer TLS2000 Tape Lock System.

The 56-input Neve 8108 console has had its patchbay enhanced with an additional 11 rows of jacks mounted in one of two outboard equipment racks, to place this facility out of the producer's side of the board. The NECAM computer occupies its own "clean room" just outside of the control room.



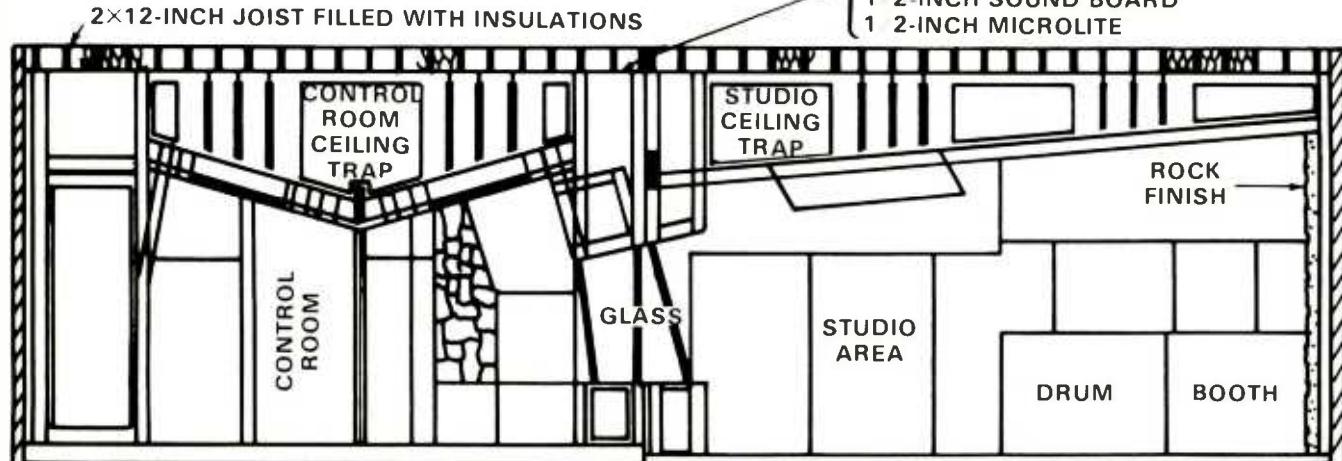
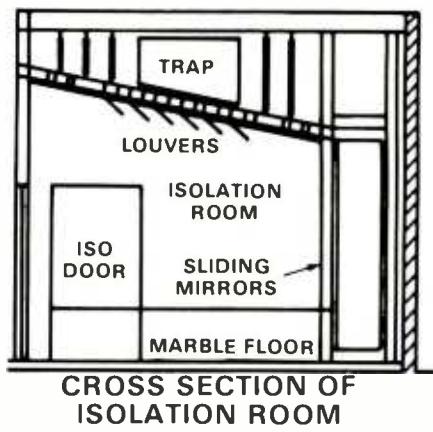
entrance. Measuring only 10- by 6-foot in size, the computer clean room has its own two-ton air conditioning unit to ensure that the NECAM system keeps its cool. Also housed in this room are power amplifiers for the various monitor and cue systems. The studio louver controls, alternate monitor and studio loudspeaker selection switches, and tape machine remote controls, are mounted in custom panels on the Neve console.

Finding space for all of the outboard equipment turned out to be quite a chore; just about every square inch of space was used for something. The Studer TLS mainframe, various power supplies, and the Copper Time Cube boxes were placed in a small closet, accessible through a door behind the multitrack machines. Special cabinets were built for two sets of Dolby M24 racks, allowing them to be stacked to conserve floor space when both, and everything else, are needed. Two Phase Linear cassette decks are housed in another cabinet directly above the multitracks.

To enable some of the outboard equipment requiring more frequent tweaking to be placed closer to the engineer, a custom trolley was designed by Lakeside in collaboration with Jay Antista and Howard Weiss, a staff technical engineer. This portable

cabinet also incorporates the Studer multitrack remote controls, autolocators, and TLS controller. And, as if that weren't enough, the back side of the cabinet has four direct boxes and two switchable cue feeds.

In the studio six, 56-input microphone panels are installed at strategic locations around the room to minimize the length of microphone cables on the floor. The panels also contain two cue feeds, switchable to six cue sends in both stereo and mono for nine possible combinations. In addition, each of the panels has two built-in Jensen direct boxes to minimize setup time. Several other smaller microphone panels are built into the sound lock, vocal booth, and key positions of the studio and isolation room ceiling for easy overhead



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miking. Four of these overhead positions are dedicated to a listen system, to ensure that everyone in the studio can be heard, especially when close miking. Tie lines are installed to each of Lion Share's other two studios, as well as the centralized echo patch bay. Panels for interfacing video cameras or monitors can be found in several locations about the room, and which terminate in a patchbay.

#### The Acid Test

As the room neared completion, everyone involved in the project awaited with great anticipation the opportunity to listen to music through the monitors, a welcome change from the sound of hammers and saws. Even before all the wiring was complete and the room voiced, a two-track tape was fed directly into the monitors. Some engineers on the staff were concerned about the choice of UREI 813 Time-Aligned monitor loudspeakers. In fact, at one point the notion of installing two sets of monitors was considered. This idea was dropped only after much discussion, and the realization that the performance of one or even both sets of monitors would be compromised if both



were installed. Fortunately, even the most doubtful were amazed at the performance of the monitor room combination. The subjective tests were corroborated the following day when the room was finally voiced, with only minor modifications and the insertion of the standard high-frequency rolloff.

During the following two weeks, extensive blind listening tests were performed with several different power amplifiers, including old standbys as well as some not even on the market yet.

The choices were not as difficult as expected. Subtle differences were really not that subtle anymore. When all the votes were counted, the Bryston 4-B power amplifier was the final choice.

Kenny Rogers, Don Henley and Timothy Schmidt of the Eagles, and Carole King were among the first artists to record in the new studio. Gary Klein of the Entertainment Co., producing the Marshall Tucker Band and Enid Levine, says of Studio A: "The only thing I can compare Studio A to is a Mercedes Benz. Everything is there for a reason. This obviously comes from a great deal of planning with the artists, engineer, and producer in mind. It's the most flexible studio I've ever worked in, and the control room is a joy. There's practically no fatigue factor. It's comfortable, but not too comfortable. To put it simply, everything works and works perfectly! It's definitely a 'State-of-the-Art' studio. Also, the staff and personnel work as a team and make us feel great. Everyone is wonderfully accommodating."

John Arrias, an independent engineer and producer comments: "Studio A at Lion Share is a very versatile and efficient room. The best quality of the studio is that it was built with the engineer in mind; an easy to use, high-tech room."

Future plans for Lion Share Recording Studios are both extensive and exciting. Studio C will be a larger version of Studio A, with full video shooting, post-production, and motion-picture scoring capabilities. Electronically, it will incorporate the best equipment available at the time, both analog and digital. Studio B will then be enlarged and updated to complete the renovation of the existing facility. Advance planning is underway for a video production facility. Also, the building exterior and office areas are currently undergoing a major facelift. This building has been around for a while, and it looks like it will be around for a long time to come.

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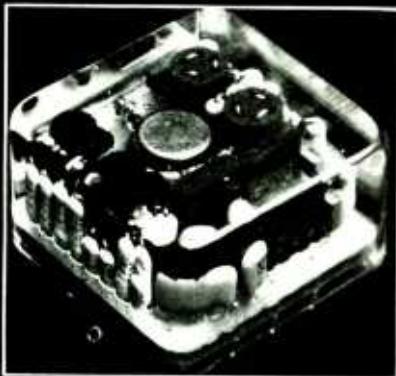
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## Electronics • Troubleshooting • Maintenance

### ESSENTIALS of DIGITAL LOGIC CIRCUITS

by ETHAN WINER

The Recording Center  
Norwalk, Connecticut

For many audio experimenters, digital circuits frequently seem strange and difficult to understand. If you're used to playing with amplifiers and equalizers, it's not hard to see how the prospect of dealing with a bunch of digital ones and zeroes could seem pretty depressing. Of course, once you get to know them, digital circuits are actually pretty tame, and in many ways easier to handle than their analog counterparts. Aside from computers that lurk inside console automation systems, most digital logic found in a studio is used for tape transport control and other relatively pedestrian applications. Digital audio is another thing altogether, and although we'll touch on it briefly, most commercial

devices are too sophisticated for casual troubleshooting. And besides, this is supposed to be an article on basic digital logic circuits, not a dissertation on advanced computer theory.

#### Relay-based Logic

Early digital logic circuits employed relays to perform all of the required functions; therefore, it would be only logical (sorry) to start there. A relay is constructed from three very basic components — a switch, an electromagnet, and a spring. But where most switches are activated by throwing a lever or pushing a button, the switch(es) in a relay change state when a voltage is applied to the coil of the electromagnet. Most relays contain at least two double-throw switches; some have as many as four or more, allowing quite a range of possible circuit combinations. Figure 1 shows the schematic of a single-pole (only one switch), double-throw relay. The term "double-throw" is used to indicate that one element — called the common — will be connected to either of two possible contacts: normally-open (NO) or normally-closed (NC).

One of the basic logic functions that a relay can perform is called a latch,

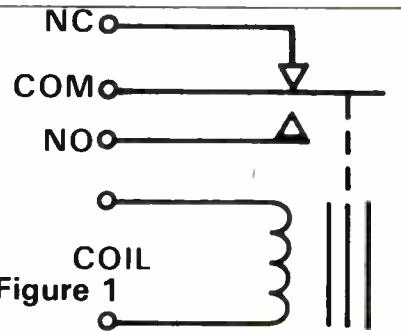


Figure 2

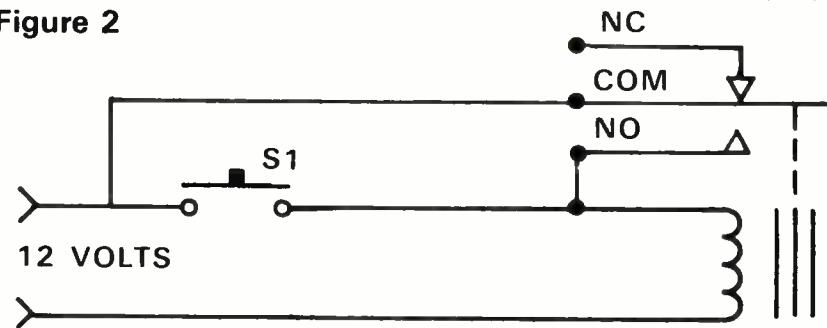
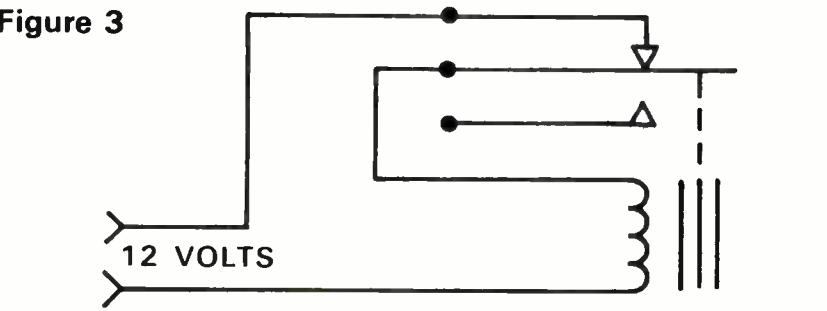
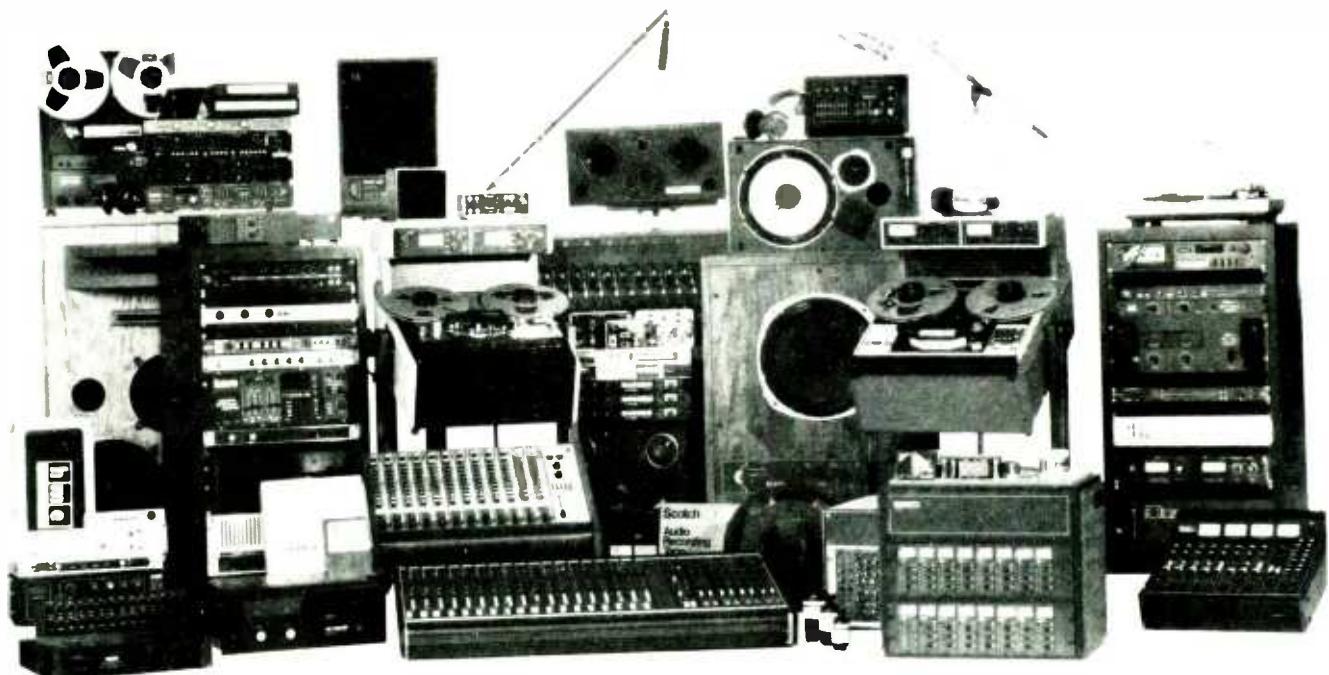


Figure 3



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## DIGITAL LOGIC CIRCUITS

which is shown in Figure 2. Here, a double-pole, double-throw relay is required, since one of the switches will be needed just to perform the latching function, and the other can then do whatever switching you want. When pushbutton switch S1 is depressed, the coil is energized by the 12V supply, causing both switches to change state. Notice, however, that the lower set of contacts are connected in parallel with the pushbutton switch, thereby maintaining power to the coil when the button is released. The relay will then be held in this activated state continuously, as long as the 12V power source is not interrupted. This circuit — or its solid-state equivalent — can be found in all professional tape machines, so that you don't have to continuously hold down the record or play buttons, for example. You could also consider this latching action to be a form of positive feedback, since the output is being used to reinforce the input.

Negative feedback can also be applied to relay operation, as shown in Figure 3. This oscillator circuit — commonly known as a buzzer — is created by wiring the switch contacts in series with the coil. When power is applied the coil is energized, which causes the switch to change. Of course, the moment this happens, power to the

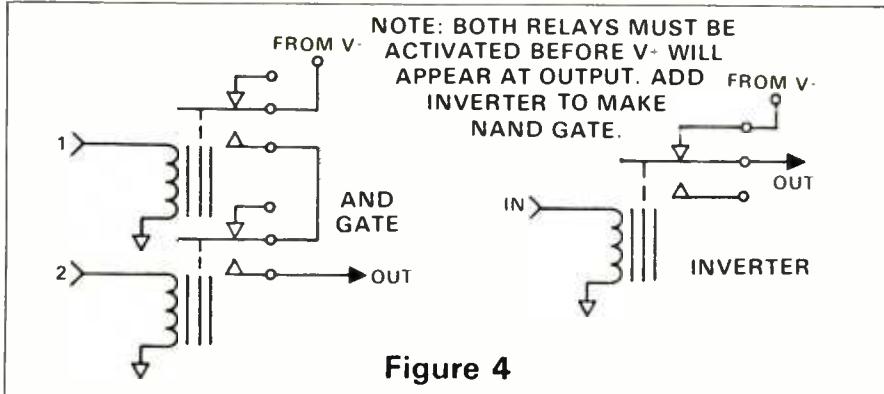


Figure 4

coil is interrupted, and the spring pulls the switch contacts back to the normal state. This activates the coil all over again, and the process will continue to repeat indefinitely. (I realize that this is pretty basic stuff although, as I pointed out earlier, so are many logic circuits.) Figures 4, 5 and 6 show relay circuits for AND, OR, and EXCLUSIVE OR gates, whose operation is explained in the next section.

### Solid-State Logic Circuits

Now, most digital logic circuits do not use a set of switch contacts as the output, but instead provide either of two possible voltages: the full supply, or nothing. In practice, the outputs of some IC devices don't quite reach up to full supply, or all the way down to ground but, as a general rule (for CMOS

devices), any voltage greater than two-thirds of the supply is considered to be a "one," or high, and less than one-third is a "zero," or low.

One of the basic logic building blocks is the gate, of which there are several types. Regardless of which type of gate is being considered, however, the output state is always determined by the signals at the input, as with any electronic circuit. There are three different categories of gates: the AND gate, the OR gate, and the EXCLUSIVE OR. Inverted versions are also available, called NAND (which stands for "not and"), NOR, and EXCLUSIVE NOR, but let's look at the regular types first.

Figure 5

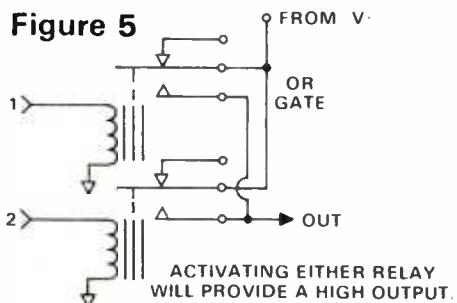
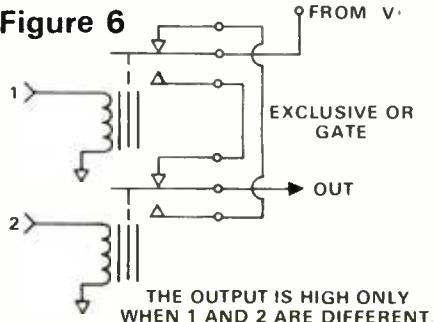


Figure 7 shows the logic symbols for the three kinds of gates; while each is shown with only two inputs, IC gates are available with up to eight or more. Under each symbol is a Truth Table showing what happens at the output, for each of the four possible input combinations. Beginning with the AND gate, if input 1 and 2 are both high, then the output will be high; otherwise the output will be low. For the OR gate, if input 1 or 2 is high, the output will be high. All an EXCLUSIVE OR gate cares about is whether the inputs are different, providing a high output when they are. As you can

Figure 6



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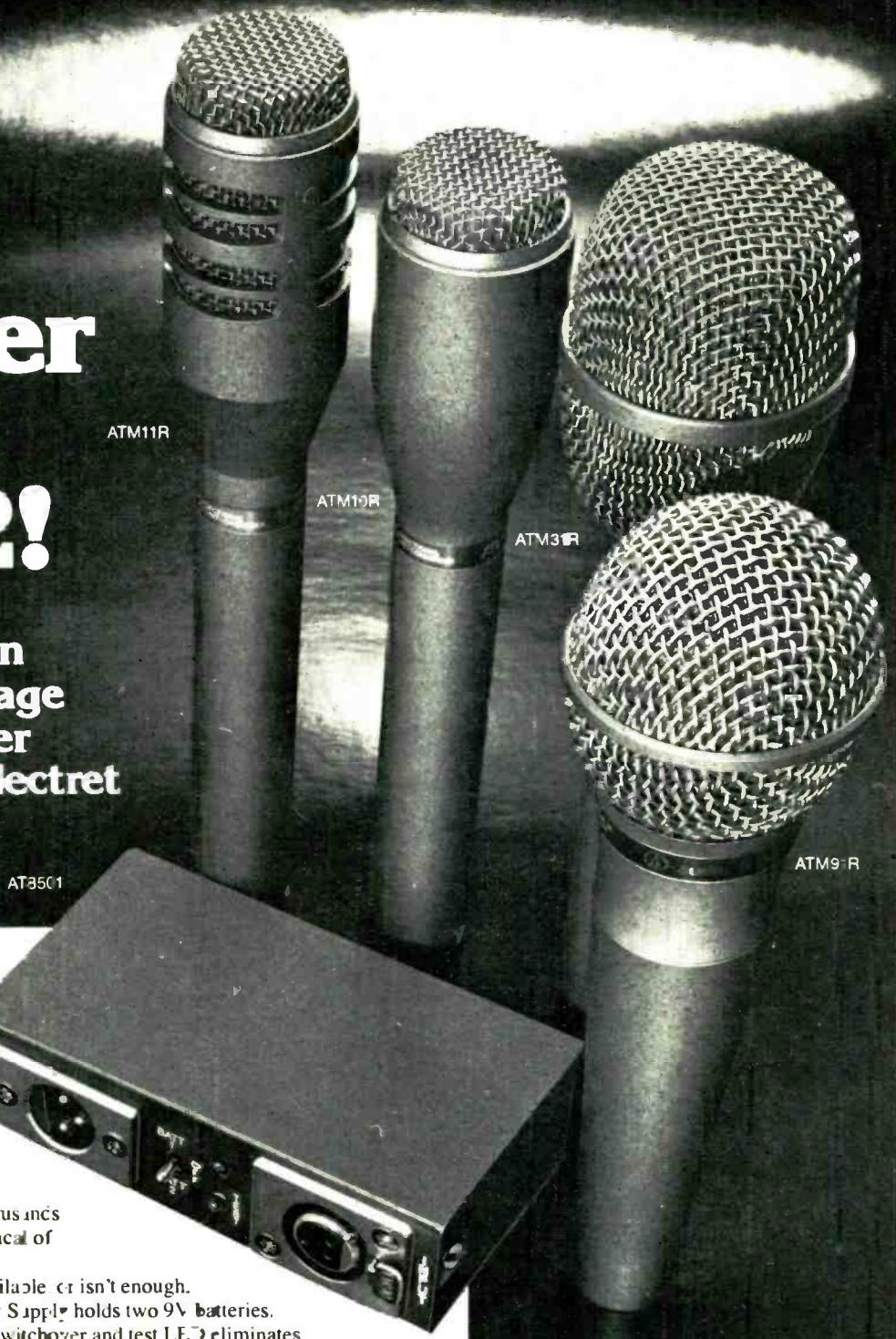
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## DIGITAL LOGIC CIRCUITS

see, a gate can be used to make simple decisions, depending on the information presented to its input.

These circuits can be said to use *positive logic*, since a "one" is represented by the presence of an output voltage, and a zero by the absence. Without wanting to make things too confusing too early, there is another frequently-used system called *negative logic*, where the definitions are reversed. This does not require the user to stock a separate family of parts, because once you think about it, a positive AND gate is the same thing as a negative OR gate, and vice versa. There are, however, inverted gates that are different from those just discussed, and these are shown in Figure 8.

Operation of these latter type of gates is essentially the same as for the non-inverted types, with the output polarity simply reversed. The circle at the right of each gate is used to indicate that an inverter has been added to the output circuit, causing the output to be "not one" when the normal input requirements are met. Some other digital building blocks are the counter, which is needed for a numerical display, and the shift register, which can be found at the heart of a digital delay. Before an appreciation of these circuits is possible though, it is imperative to understand

the concept of binary arithmetic.

### Boolean Algebra

For as long as people have had 10 fingers, mathematicians have used a decimal number system. A problem occurs, however, when trying to apply this counting scheme to digital logic circuits, since there are only two possible circuit conditions: one or zero (corresponding to "on" or "off"). Therefore, a different method of counting is required if we want to be able to make it past two. In the binary system, zero is still zero, and one is still one, but beyond that additional columns must be added to the left, just like you would normally do when you reach the number nine. It's really not as bad as it probably sounds, and I hope that Table 1 will make everything crystal clear.

As can be seen from the table, by the time we've counted to 15, four binary digits must be used; there are two ways to present this information. In a *parallel* system, there would be four output connections, with the voltage at each representing one number, or bit. A typical example would be the 4024 binary counter, which has one input and seven outputs. When a squarewave of any frequency is applied to its *clock* input, the outputs advance one count during the negative transition of the input waveform. By utilizing all seven outputs, it is possible to count up to 128.

though other IC's are available that can count much higher; and, of course, you can always combine counters to achieve very large numbers.

Another system — called *serial* — uses only one output terminal, with the digits appearing in succession. This method allows large binary numbers to be transmitted over a single pair of wires, or by telephone, with the obvious tradeoff being speed of operation. All other things being equal, an eight-bit serial system will take eight times longer to convey a given number compared to the parallel approach. Additionally, some method of synchronization must be provided to identify the beginning of each group of digits. Isn't it wonderful to know that no matter how complicated a function is required, someone will come up with a way to put it all on to a single chip!

### Logic Applications

Okay, so now we know what a binary counter does, but the real question is, "What the heck are we going to do with the darned thing?" Well, for starters, anytime a numeric display is needed, a counter circuit will be required to generate the actual numbers — whether it's a display for a pitch shifter, an indicator for a tape locator, or even a digital thermometer. In fact, when indicating tape position, it will be necessary to use an *up-down* counter, since the tape can travel in either

continued on page 56

**Figure 7**

AND



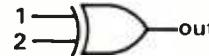
INPUT 1	INPUT 2	OUTPUT
0	0	0
0	1	0
1	0	0
1	1	1

OR



INPUT 1	INPUT 2	OUTPUT
0	0	0
0	1	1
1	0	1
1	1	1

X-OR



INPUT 1	INPUT 2	OUTPUT
0	0	0
0	1	1
1	0	1
1	1	0

**Table 1:**  
Decimal to Binary Conversion

Decimal	Binary
0	0
1	1
2	10
3	11
4	100
5	101
6	110
7	111
8	1000
9	1001
10	1010
11	1011
12	1100
13	1101
14	1110
15	1111

Decimal:  $1,309 = 1,000 + 300 + 0 + 9 = 10^3 + 3 \times 10^2 + 9 \times 10^0$   
 Binary:  $1011011 = 64 + 0 + 16 + 8 + 0 + 2 + 1 = 2^6 + 2^4 + 2^3 + 2^1 + 2^0$

**Figure 8**

NAND



INPUT 1	INPUT 2	OUTPUT
0	0	1
0	1	1
1	0	1
1	1	0

NOR



INPUT 1	INPUT 2	OUTPUT
0	0	1
0	1	0
1	0	0
1	1	0

X-NOR



INPUT 1	INPUT 2	OUTPUT
0	0	1
0	1	0
1	0	0
1	1	1

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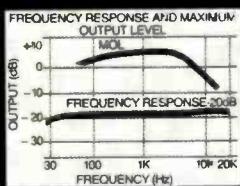
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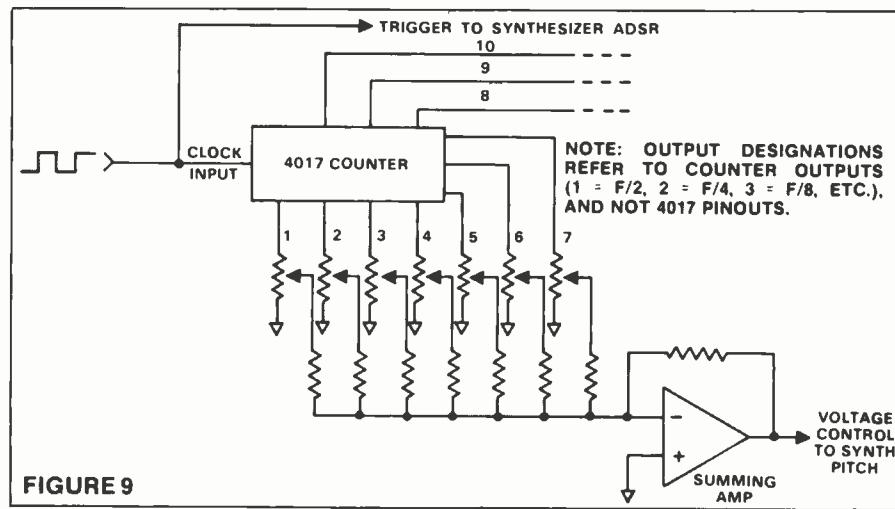
## DIGITAL LOGIC CIRCUITS

direction. Similar in all other respects to a normal up-only counter, this device has an extra input that dictates the counting direction.

Before any digital display will operate, a decoder must be used as an interface between the binary counter and the seven individual segments. For an LED display, there are seven separate LED's that must be lit in 10 different combinations to generate all of the required numerals. Unfortunately, there is no immediate relationship between what the counter is sending and what the LED's would like to receive. Therefore, a decoder accepts a binary number at its input, and provides seven separate outputs, one for each segment.

As you can imagine, this gets into a lot of wiring when you start dealing with several digits. Consequently, a multiplexing system is frequently used, whereby all of the like segments are connected together, although the common connections remain separate. The digits are scanned sequentially, with only one actually being on at a time. The scanning rate is relatively fast to avoid any visible flicker, and since each set of LED's is only on for a fraction of the time, extra current must be applied to maintain the same level of brightness. This will not cause the LED's to burn out, however, because the average current will remain the same. Multiplexing is not unique to LED displays — it provides the basis for broadcasting stereo FM on one radio frequency, and for devices that send eight mike signals down one pair of wires. For the latter, each mike line is on for only one-eighth the time — very much like the spark plugs in an eight-cylinder engine.

Another important use for a binary counter is as an octave divider for electronic organs, synthesizers, and for other frequency division applications. For example, if an 8 kHz input is used to clock the 4024 counter mentioned earlier, the first output will be at 4 kHz, the second at 2 kHz, and so on — all octave divisions of the original 8 kHz fundamental. Other IC's are available that can divide by three, or five, or almost any factor you want, while still others can be programmed to select from among several dividing ratios. One divider of particular interest is the top-octave generator, which delivers 13 successive musical notes — all precisely in tune, and equally tempered to boot — from one master oscillator. The Mostek 50240 requires a clock input of 2.00024 MHz, but this could be varied for non-standard tuning. The notes produced by this circuit will be fairly high in frequency, requiring the addition of a 4024 (or similar IC) for each note. Now, with only 13 IC's and a VCO, you could have the heart of a polyphonic synthesizer.



Speaking of synthesizers, yet another application of the counter is for a sequencer, where it can be used to generate a recurring passage of notes automatically. The 4017 would be a good choice here because it has 10 outputs, with each activated in succession (Figure 9). I once built a sequencer based on the 4017 that could play any melody containing up to 10 notes, though there is no reason that you couldn't cascade several 4017's to create any sequence length you like. By the time you get into 30 or more notes, you might want to consider using a computer to do the remembering instead. With the IC counter method, one potentiometer will be required for every note, which gets clumsy after a while and, unless you add other circuitry, all of the notes will have the same duration. By using a computer, extremely long and involved melodies can be programmed, and several tracks could be layered, all in perfect synchronization.

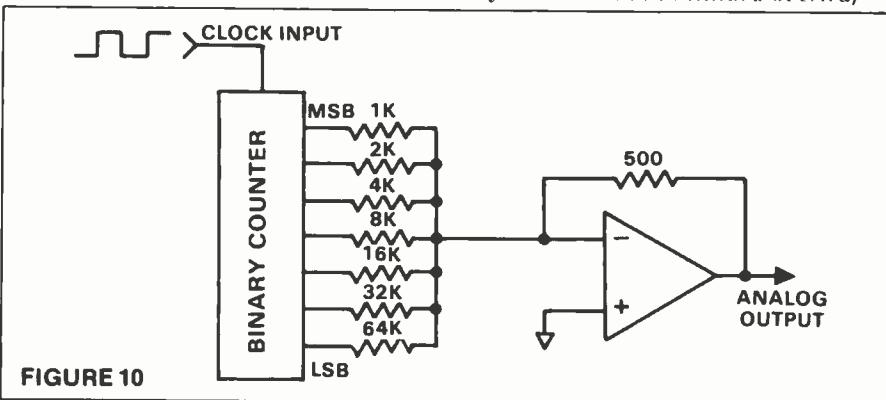
### Logic Families

There are many, many more digital building blocks that we could talk about for hours on end. Instead, it would be a whole lot easier to go out and get a copy of "The CMOS Cookbook," by Don Lancaster (Sams #21398). Nearly everything you want to know about CMOS digital IC's is discussed in plain English and, if you're really serious about such devices, you should also obtain a copy of the National Semiconductor CMOS Databook. This

handy free manual contains data for virtually all of the currently available devices in this family.

Of course, CMOS (which stands, would you believe, for "complementary metal-oxide/silicon") is not the only logic family, although it has become the "darling" of the industry for several important reasons. Based entirely on FET's (field-effect transistors), CMOS has an extremely high input impedance, and a low output impedance. This configuration allows one output to drive nearly any number of inputs, which can be useful in a large system. Also, CMOS draws very little power from the supply, especially in static modes such as a latch, or a gate when the output isn't changing. Another attractive feature of CMOS is the ability to easily make linear circuits — negative feedback and all!

TTL (transistor-transistor logic) is another common digital logic family, and offers a higher operating speed in exchange for a higher supply current. This type of logic is based on transistors and resistors, although the operation of the gates, counters, decoders, etc. follow the same basic rules. Because of its higher frequency capability, TTL can be more difficult to use — especially at the experimenter level — and particular care must be taken regarding bypass capacitors and grounding schemes. Also, TTL must be powered from a well-regulated and absolutely clean 5V supply, whereas CMOS will tolerate any supply between 3 and 15 volts. I rest my case. . . . continued overleaf —



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## DIGITAL LOGIC CIRCUITS

### Digital Concepts

Rather than go into great detail about all of the digital IC's that exist, I would just as soon highlight some other important digital concepts — such as conversion between analog and digital formats. It is far easier to take a binary number and turn it into an analog voltage, since it only takes one op-amp and a bunch of resistors (Figure 10). By using resistors that decrease in value by a factor of two, an output voltage is developed that's proportional to the value of each bit of the binary number. The "units" digit — or *least significant bit* (LSB) — has the highest resistance, hence the smallest contribution to the total output voltage. The *most significant bit* (MSB) is associated with the lowest resistor value, and therefore has the greatest influence on the output level.

Now, this example may be fine for conveying the concept, but there are several fundamental problems with the design. First, it is difficult to find resistors in values that continue to multiply by two — especially when many bits are involved; and second, even with 1% metal film resistors, the effects of very small changes in ambient temperature will cause errors.

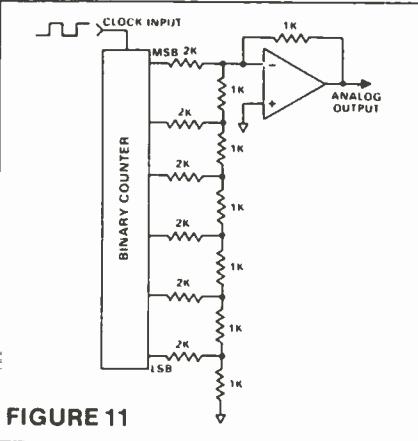
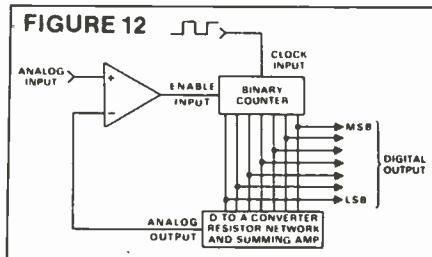


FIGURE 11

If all of the resistors were affected by the same amount, there would be no loss in accuracy, but 100-ohm resistors are not made the same as 1 Megohm resistors, and will have a different temperature coefficient. Another problem that arises when using different value summing resistors is the effect of loading on the counter outputs, particularly for the lower value resistors. Again, if each resistor were identical, this would not cause an error, since all of the outputs would be loaded by the same amount. Well, leave it to those clever engineers to devise a way out, and it only requires two different values of resistors, as shown in Figure 11. This is known as the "R/2R" method, and it effectively eliminates all of the drawbacks

inherent in the first example. It is interesting to note that these are all analog problems; the kind of things that digital designers don't usually have to worry about.

The opposite of a D-to-A converter, of course, is the A-to-D, which transposes an analog voltage into an equivalent digital value. Practically speaking, such a device is much harder to construct, and there are several different methods for doing this. One approach, shown in Figure 12, is to feed the analog input into a comparator, which enables a clock-driven counter. The counter's output is then converted back to analog, so the comparator can determine when the counter has reached the correct number. The counter is reset at the beginning of each measurement period (not shown), and counts up until the comparator shuts it off.



While this is a perfectly valid way to make an A-to-D converter, it can be painfully slow, especially when high resolution is required. If you're counting to 12 or more binary digits, it could take more than 4,000 cycles of the clock oscillator before the digital answer has been arrived at. A much faster way is by *successive approximation*; instead of beginning at zero and increasing by steps, it immediately jumps to a number half of the way up to maximum. If that turns out not to be high enough, it again splits the difference and goes (in one leap) to three-quarters maximum, where it again is compared with the input. By splitting the difference in a single bound, this converter overcomes the speed limitations of the previous design.

Yet another method uses a voltage-controlled oscillator or VCO (similar to the kind in a music synthesizer) whose output frequency is determined by the magnitude of the input voltage. Again, a counter is used — only this time clocked by the VCO — and however high it can count within a certain period of time becomes the digital output. In actual practice, more sophisticated methods are used to provide increased speed and resolution, as well as a serial output, since this is what would go on to digital audio tape, or through a delay line.

### Logic Faultfinding

With a firm grasp of how these little digital goodies operate, let's take a look at some of the ways to tell when they are not operating. Since we know that the outputs of all devices should be within well defined limits (full supply or zero

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volts for CMOS), any other voltage level will probably indicate a bad device, but there are two things to watch out for here. IC outputs aren't the only thing that go bad, and it is just as likely that the input being fed, if defective, will cause the output of the preceding stage to appear blown. If IC sockets have been used in the circuits being tested, this will make the task of troubleshooting much easier, especially if you had the foresight to keep a stockpile of replacement parts on hand.

If one output is feeding several inputs, and the voltage at the junction measures NG, there is a useful technique you might try if the IC's have been soldered in place. This is an adaptation of the famous "cut in half" method, and involves only minor surgery on the circuit board. (Although it is still probably less damaging than trying to unsolder a bunch of IC's one by one.) Simply find a branch-off point where the output splits several ways, make a cut in the foil, and disconnect half of the inputs being fed. This will allow you to either eliminate or implicate several devices at one time.

Usually, "cut in half" refers to troubleshooting many successive stages, where a signal is applied at the very input. Then, rather than testing each individual section for the proper voltages, you can save a lot of time and trouble by skipping to a point half-way through the circuit.

The second thing to watch out for when simply checking DC levels is that a working circuit may appear to have an output voltage outside the allowable range, if the output is constantly changing. For example, a high-frequency squarewave oscillator will appear to be at half supply if measured with a DC voltmeter. This is because half the time it is high, and half the time low, and the meter just averages it all together. Of course, if you have an oscilloscope there won't be any problem, but if a meter is your only means of defense, you might check the circuit with the AC setting before you start pulling out IC's.

Much cheaper than an oscilloscope, yet more revealing than a typical multimeter is the logic probe. These devices come in two basic styles and use LED's to indicate the status at the point in the circuit being measured. One type of probe resembles a small flashlight, and can check only one place at a time. Another type contains 14 or more LED's on a spring clamp that attaches directly to an IC, displaying the condition at all pins simultaneously.

Beyond checking for incorrect voltages and attempting to track down the source, there is little an inexperienced technician can do in the face of timing errors or "glitches." Oh sure, you'll find your share of fractured solder joints and lame power supplies if you look carefully enough, but don't expect to fix

anything *really* big without the proper tools. When my Eventide Harmonizer developed a slight "gargling" quality at its output, I was fully prepared to pack it up and ship it back — after checking all I could, of course. Imagine my relief when I discovered a bad rectifier diode was causing hum on the power supply. Eventide is to be congratulated for always providing wonderful documentation with each of their products; I've always found their owner's manuals to be both interesting and educational. And while Lexicon (Prime Time) does not provide service information as a normal part of their owner's manuals, they do have a very generous loaner repair policy for a fixed price — regardless of what went wrong.

\* \* \*

The next issue of *R-e/p* will contain a description of the best construction article that I've ever done (I hope); I'm not embarrassed to say that I'm quite excited about it. I had to obtain special permission from the company that holds the patent rights, and even had to sign a license agreement. Due to the use of special, custom-made integrated circuits throughout, a kit of parts will be offered as a service to the readers, since I know a lot of folks will want one. What is it? Well, I'll give you a hint: it's smaller than a breadbox, and you can use it in a recording studio. ■■■

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# MICROPHONE TECHNIQUES FOR PREDICTABLE TONAL BALANCE CONTROL

by  
**Bruce Bartlett**  
Shure Brothers, Inc.

A recording engineer has several ways of creating the desired "sound" or tonal balance of a recorded musical instrument. You can equalize the instrument's sound so that it sounds right. Or you can try to find a microphone that sounds right. Or you can experiment with different microphone positions until you find one that sounds right. As an aid to creating the desired sound more efficiently, this article considers the tonal effects of some close microphone placements.

This present study was prompted by an excellent article by W. Woszczyk in the October 1979 issue of *Recording Engineer/Producer*. Woszczyk described methods of achieving a well-balanced tonal reproduction for the baritone saxophone and viola, using multiple microphones. This present article focuses on single-microphone techniques for the acoustic guitar, piano, electric guitar amplifier, and voice.

## Why Microphone Placement Affects Recorded Tonal Balance

The tone quality or timbre of a musical instrument is mainly the

perception of its spectrum or harmonic structure. Each part of the instrument produces a different spectrum, and spectra of all the parts combine into a pleasing composite at some distance from the instrument. A microphone placed there "hears" a blend of the tone qualities of the various parts.

Most musical instruments are built to sound best when heard from some distance away. So, a microphone placed fairly distant from an instrument — say 3 feet away — tends to pick up a well-balanced or natural tone quality. But when feedback or leakage forces you to mike an instrument up close, the part of the instrument nearest the microphone is emphasized. Thus, the tonal balance picked up very close may not be representative of the instrument as a whole.

As an analogy, suppose a microphone is placed several feet from a multiple-driver, high-fidelity loudspeaker replaying a particular piece of music. A well-balanced sound usually is picked up. But if you move that same microphone very close — say next to the mid-range driver — the sound that the microphone "hears" is quite colored. Similarly, an acoustic guitar miked 3

feet away sounds reasonably well balanced. Place the microphone close to the sound hole, however, and the guitar will sound bassy, because the sound hole radiates strong low frequencies. In general, close-microphone placement can result in tonal colorations caused by the local radiation characteristics of the instrument.

Musical instruments radiate different spectra in different directions, and from various parts of the instrument. As a result, a microphone used on an instrument picks up a different spectrum depending on where it is placed. Thus, the recorded timbre and transient character vary greatly with the microphone position.

## Spectral Measurements for Acoustic Guitar

Experiments were performed at Shure Brothers to quantify the tonal differences of various close microphone placements. To do this, we recorded the spectrum of a musical instrument at several close microphone positions, and then compared these spectra to the spectrum picked up at a distance from the instrument.

For example, an acoustic guitar was recorded with a microphone placed 3 feet away to pick up a well-balanced tone quality, or an overall blend. Simultaneously, the guitar was recorded at several typical close-in positions (Figure 1); the spectrum picked up at a distance of 3 feet was compared to the spectra picked up very close to the instrument.

The 3-foot position (Figure 2) was chosen as a "natural"-sounding reference because it was far away enough to pick up a good blend of all the parts of the guitar, aided by early room

FIGURE 1

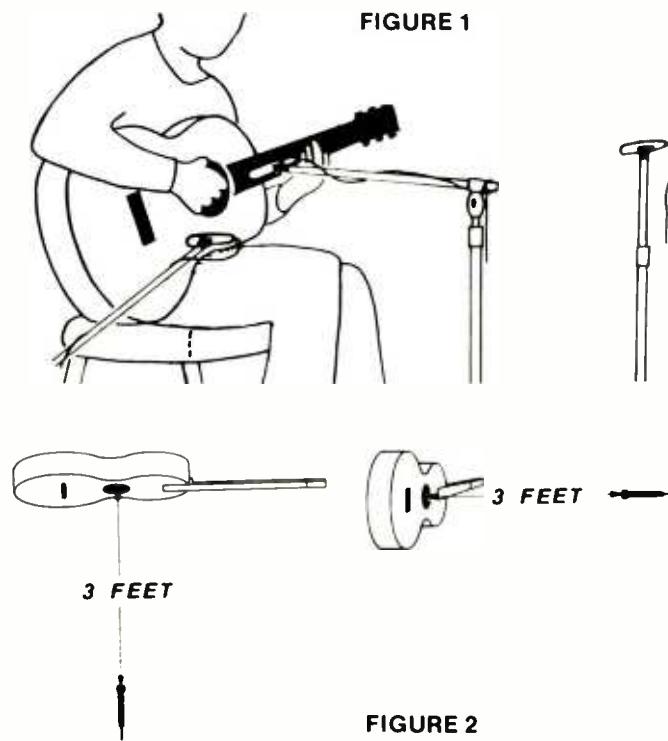


FIGURE 3

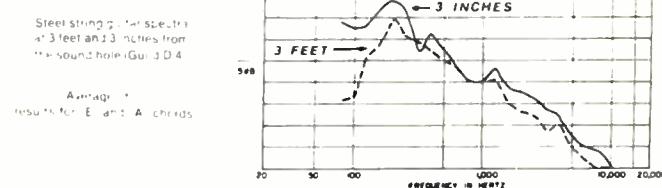


FIGURE 4

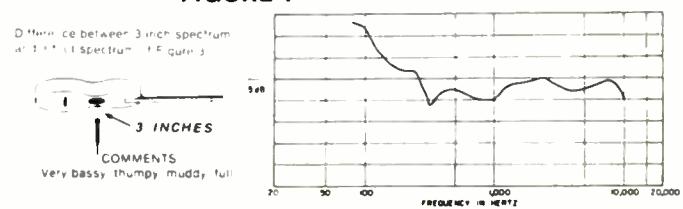
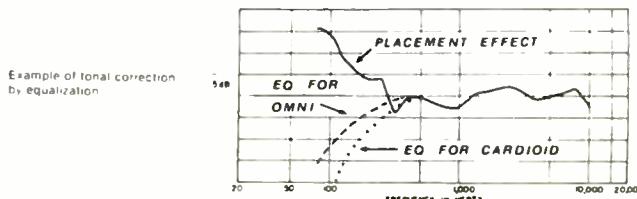


FIGURE 5



# "The EX-18 could well become a classic audio tool"

June 1981 Modern Recording and Music. ©1981 Ccwan Publishing.

That's what Modern Recording said about the EX-18 stereo 2-way/mono 3-way electronic crossover. The same statement could very well apply to the new TAPCO 2210 and 2230 graphic equalizers as well.

The EX-18 provides all the necessary controls and functions for bi-ampifying stereo or tri-amplifying monaural speaker systems, and this can be accomplished

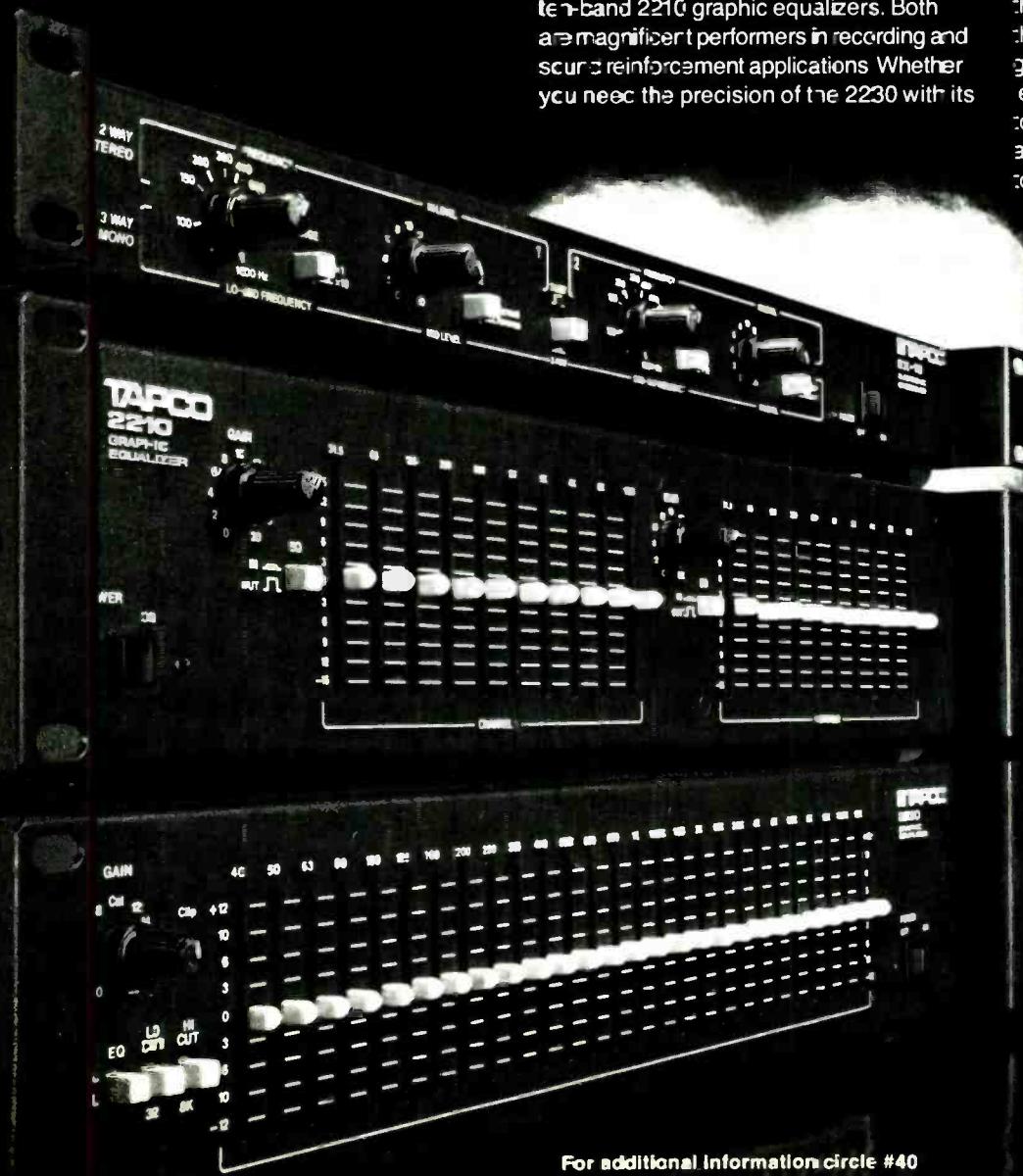
using a unique mode switch so no external patching is required. A single knob on each channel adjusts the crossover frequencies, with a 10K multiplier available for very high frequency crossover operation. It is definitely one of the cleanest and quietest electronic crossovers available.

The same precision design and human engineering found in the EX-18 is found in the one-third octave 2230 and the dual ten-band 2210 graphic equalizers. Both are magnificent performers in recording and sound reinforcement applications. Whether you need the precision of the 2230 with its

combining filter action, switchable high and low-pass filters and floating balanced outputs, or the economy and flexibility of the 2210, there are simply no better values in today's marketplace.

All three units are equipped with removable security covers to prevent accidental operation of any of the controls once your requirements have been set.

There is no need to settle for less than the best sound available. Especially when these E-V/TAPCO signal processing units give you professional sound quality for less than you'd expect professional quality to cost. These units must be auditioned at your E-V/TAPCO dealer. It's the only way to hear how good your sound can be.



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2-10-15 Suyai Shinjuku-ku  
Tokyo, Japan 160

reflections, but was close enough to minimize the influence of standing waves and reverberation that can color the results. There may be other positions that work as well or better; this position is a matter of personal taste.

For the first test, a steel-string guitar was recorded simultaneously with two microphones: one placed 3 feet in front of the sound hole, and one 3 inches from the sound hole. Figure 3 shows the third-octave spectra picked up in these positions. (Measurement details of these tests are provided in the author's Engineering Report, "Tonal Effects of Close Microphone Placement"; October 1981 issue of the *Journal of the Audio Engineering Society*.)

To make the spectral differences easier to see, Figure 4 shows the difference between the two spectra. When the guitar is miked 3 inches from the sound hole, there is a pronounced low-frequency emphasis compared to the spectrum picked up at 3 feet. In other words, that is how the spectrum *changes* as you move the microphone in from 3 feet to 3 inches away. The bass boost is *not* due to microphone proximity effect, however, since omnidirectional microphones were used to make the recordings. Instead, the bass rise is due to a strong 80 Hz resonance of the sound hole and the air inside the guitar. The resonance is picked up and emphasized by a microphone placed near the sound hole.

The recordings also were played for a



FIGURE 6

listening panel of eight musicians and audio engineers. In a blind A/B test, the panel compared the tone quality of each close-placed microphone to that of the more distant reference microphone. The majority of the participants considered that a microphone placed next to the sound hole makes the guitar sound bassy, "boomy," "thumpy," and full compared to the timbre picked up at 3 feet; these comments might be expected in view of the spectrum measurement.

If you want a full, bassy tone quality from a recorded guitar, a good place to put the microphone is near the sound hole. On the other hand, if you want to make the guitar sound more natural or well-balanced when miked close to the sound hole, you can roll-off the bass as shown in Figure 5. The solid line is the

spectral difference close to the sound hole that was shown in Figure 4. The dashed line on Figure 5 is the inverse or mirror image of the spectral curve at low frequencies, and is a suggested equalization to compensate for the bass boost caused by microphone placement close to the sound hole. This equalization is for an omnidirectional microphone with a flat frequency response.

If a cardioid microphone is used instead, it might have an additional inherent bass boost related to close placement called *proximity effect*. So, to make the guitar sound natural with a cardioid microphone, you must roll off the bass an additional 6 to 12 dB at 100 Hz, as shown by the dotted line in Figure 5. Such equalization will compensate for proximity effect and the effect of close microphone placement. (It should be noted that some cardioid microphones have a built-in, switchable bass rolloff filter.)

As Woszczyk pointed out in his previous article in *R-e/p*, the spectral effects of close microphone placement cannot always be accurately compensated by equalization. The required equalization is complex and varies from note to note. Also, harmonics that are missed by close microphone placement cannot always be recovered by equalization. Still, some general equalization probably is better than none at all.

As an alternative to equalization, you might consider using a microphone

Figures 7-10: Difference between close-miked spectrum and 3-foot spectrum, for steel-string guitar (Guild D-40). Average of results for "E" and "A" chords.

FIGURE 7

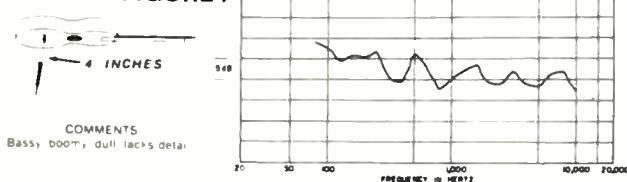


FIGURE 8

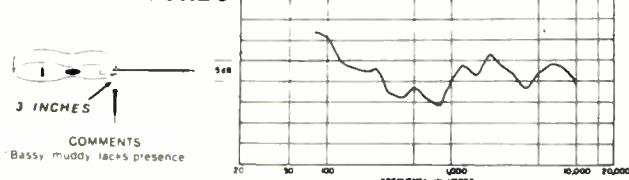


FIGURE 9

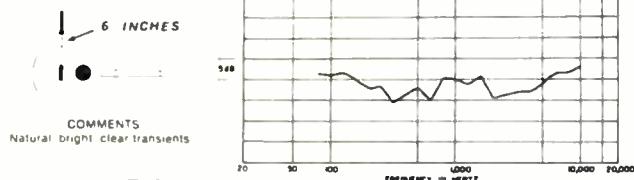
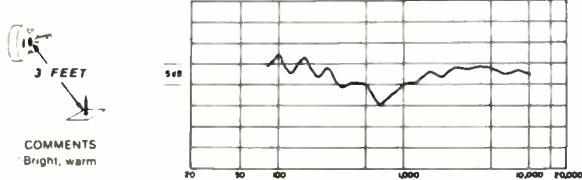


FIGURE 10



Figures 11-14: Difference between close-miked spectrum and 3-foot spectrum, for nylon-string guitar (Sakura). Average of results for "E" and "A" chords.

FIGURE 11

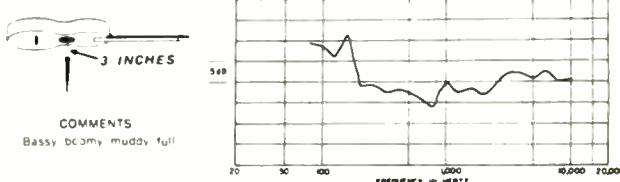


FIGURE 12

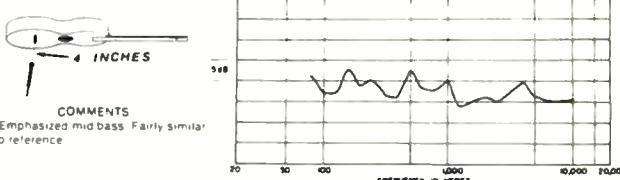


FIGURE 13

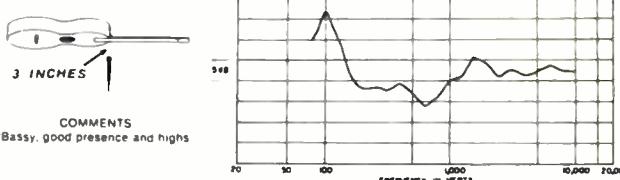
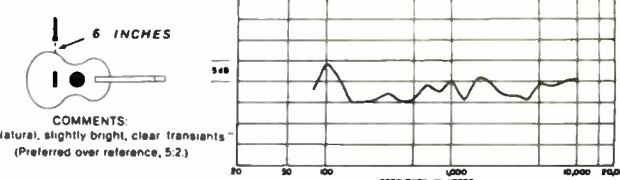


FIGURE 14



# Ambient Alternatives

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An exciting and versatile alternative to conventional plate-reverb systems, digital reverberation has become a fact of life in the modern recording studio. Any one of today's digital reverberators can provide a broader variety of useful reverberation characteristics than a conventional plate unit, but the 8X32's uniquely informative and accessible front panel makes the sounds easier to get to.

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Up to 64 pre-sets encompassing all adjustable reverb parameters are instantaneously accessible for immediate use or modification. The 8X32's ease of operation and advanced level of sonic performance makes it a natural option for any situation where reverberation is required (decay time is 0.2 to 20 seconds, dynamic

range is 80 dB).

In the recording studio, the 8X32 provides clean and natural sound signal processing for the enhancement of percussion, vocal or instrumental sounds. Special effects are made more accessible for broadcast and video post-production use. And the 8X32's instant-recall feature optimizes its ability to re-create different ambient environments based on visual images in film production.

Like other digital audio products, the Ursa Major 8X32 is largely software based (PROMS), allowing easy retrofitability of new programs. At Ursa Major, we are committed to the ongoing development of software and will make these enhancements available to all 8X32 owners as they are developed.

The Ursa Major 8X32 stands alone as the most compact, easy to use and cost-efficient alternative to the increasing number of digital reverb units available today.



Photo: Mixing Room, Record Plant Studios, N.Y.

For additional information circle #39



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with an appropriate frequency response. For example, an omnidirectional microphone with a low-frequency rolloff would tend to make a guitar sound natural when placed close to the sound hole. Ideally, the microphone should have a low-frequency response similar to the dashed line of Figure 5. An example of such a microphone designed to provide a good starting-point tonal balance when clipped onto the sound hole of a guitar is shown in Figure 6.

#### Reasons for Equalization

Of course, there are many other reasons for equalizing an instrument besides correcting the tonal effects of close microphone placement. One major use of EQ is for special production effects. Or, you may have to use EQ to compensate for microphone off-axis coloration, microphone frequency response, monitor frequency response, or masking by other instruments.

Another reason for equalization has its origins in the psycho-acoustics of our hearing. As discovered by Fletcher and Munson, the ear is less sensitive to bass and treble frequencies at low volume levels than at high volume levels. Suppose you are listening to a very loud musical instrument, live, such as an amplified electric guitar. If this instrument is recorded with a flat-response microphone and played back at a lower level than you heard live, you probably will hear less lows and highs in the playback than were heard during the recording — the sound may be thin and lacking in punch or presence. So, when recording very loud instruments like electric guitars or drums, it may help to use a microphone with bass and treble boost — in other words, proximity effect and a presence peak. This will help compensate for hearing pheno-

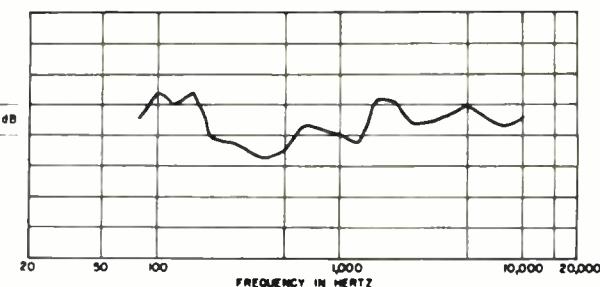
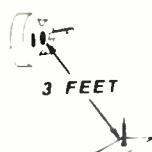


FIGURE 15

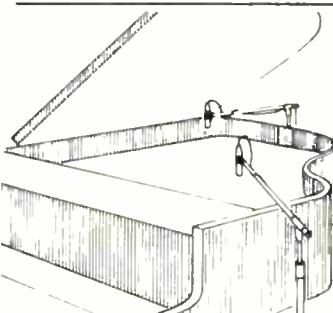


FIGURE 16

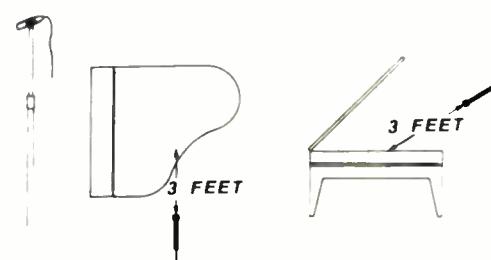


FIGURE 17

mena that occur with playback that is quieter than the live instrument.

#### Other Acoustic Guitar Spectral Measurements

We've seen what happens when a guitar is miked close to the sound hole. Let's now look at what occurs at some other close positions.

If the microphone is placed 4 inches in front of the bridge (Figure 7), the top-plate vibrational modes starting around 200 Hz are emphasized. The result is a mid-bass boost, producing a somewhat bassy, boomy, and dull sound character. In positive terms, you could say that this microphone pickup sounds warm, "woody," and "mellow."

A microphone placement 3 inches

from the neck where it joins the body of the guitar (Figure 8) de-emphasizes the mid-bass frequencies because the microphone is relatively far from the front plate. The sound-hole resonance is still noticeable in this position. Listeners reported that the timbre was bassy and lacking in presence — perhaps due to low-frequency masking of higher frequencies. With another guitar, the presence range may well be audible.

When the microphone is placed 6 inches over the top of the guitar, above the bridge and even with the front plate (Figure 9), the spectrum and timbre picked up at this point are fairly similar to what is picked up 3 feet in front. With such an "over-the-top" position,

**Figures 18-25: Differences between close-miked spectrum and 3-foot spectrum, for grand piano (Baldwin "B"). Nearly all keys were pressed simultaneously.**

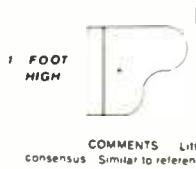


FIGURE 18

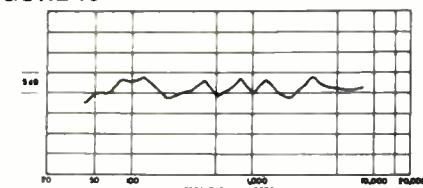


FIGURE 19



FIGURE 19

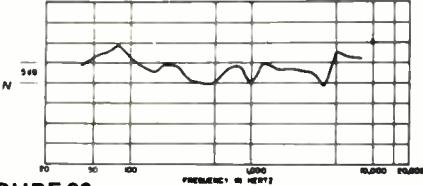


FIGURE 20

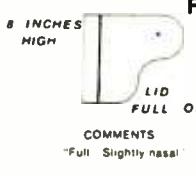


FIGURE 20

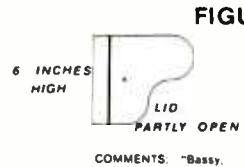
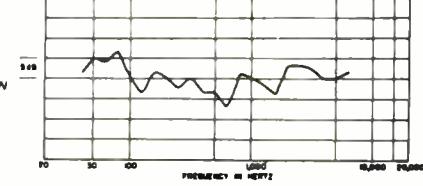


FIGURE 21

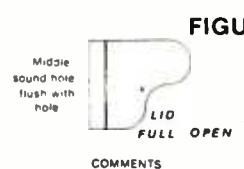
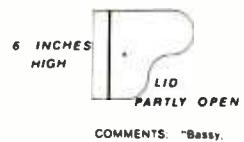


FIGURE 22

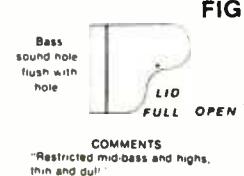
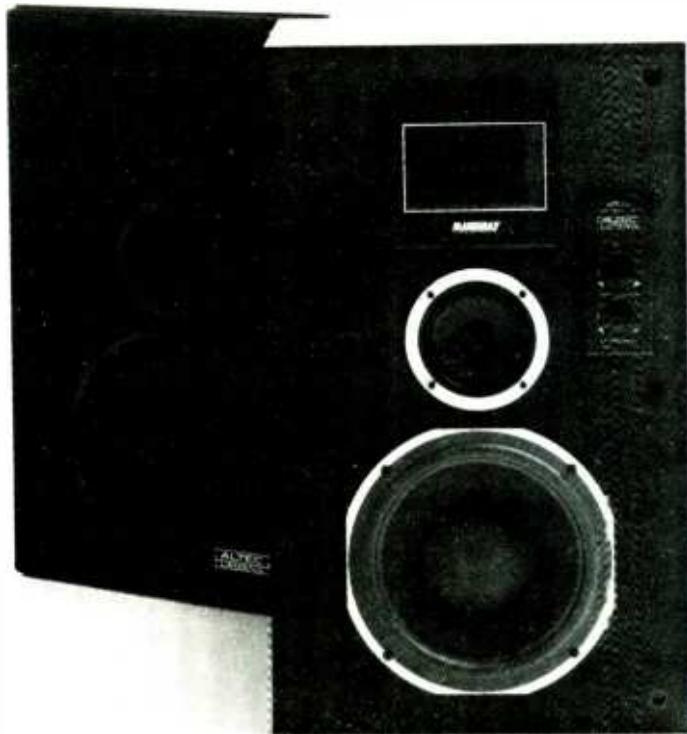


FIGURE 23



# The Altec Lansing 9813 High Accuracy Recording Monitor. The truth never sounded so good.



Loudspeaker accuracy. It's a highly controversial subject. And for good reason. The most prized result of a recording session is an accurate sonic illustration of what is going on in the heads of the producer, musicians, arrangers, and composers. Recording is a process of fusion, and the monitor is responsible for an accurate painting of the completed sonic picture.

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a great monitor should: It sounds super (accuracy need not be unpleasant), handles power extremely well, mids and highs adjust through very wide amplitude ranges, and its great-looking hand-rubbed oak cabinet is small enough for even mobile recording vans (25½ H x 15½ W x 13½ D).



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listeners reported that they heard a natural, bright sound with clear transients. The spectra of the various parts of the guitar combine in a pleasing manner in this location.

Another realistic-sounding location, according to the listening panel, is shown in Figure 10. The microphone diaphragm was positioned 0.05 inches from a one square-foot sound-reflective plate on a carpeted floor (a hard floor also could be used). If feedback or leakage present no problems, this may be a useful microphone position. (It should be noted that Crown PZM microphones feature a similar principle of operation — Ed.)

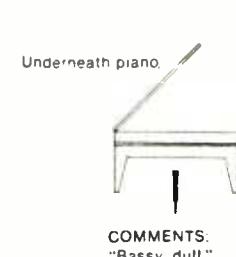
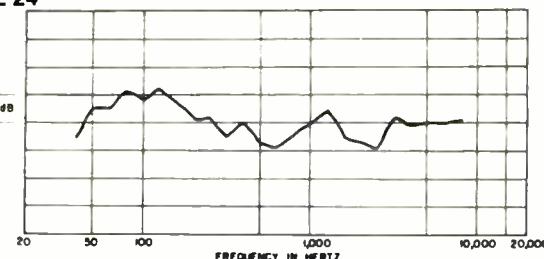
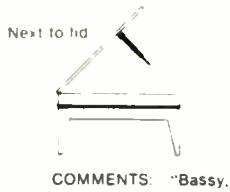
The same measurements were repeated using a nylon-string guitar with generally similar results (Figures 11 through 15). Differences occurred in isolated frequency bands. Each individual guitar will produce slightly different results; also, the effects vary from note to note. The results shown here are meant to indicate only general trends.

### Grand Piano

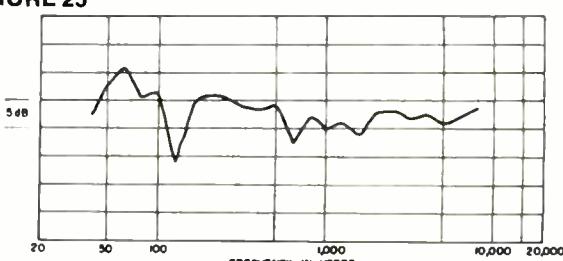
Another instrument tested was a 5½-foot baby grand piano (Figure 16), which was recorded from several typical close-up positions and, simultaneously, 3 feet away from the strings (Figure 17) to pick up an overall blend or a reference spectrum. Figures 18 through 25 show the difference between the 3-foot spectrum and each of the close-miked spectra.

In Figure 18, the piano is miked 1 foot over the middle strings, 8 inches horizontally from the hammers, with the lid on the long stick (full open). There are only minor differences between the spectrum picked up in this position and the spectrum picked up 3 feet in front. Thus, 1-foot over the middle strings is a suggested close microphone placement for a natural timbre. If the microphone is moved to 8 inches over the treble strings (Figure 19), the sound is still well-balanced and bright.

**FIGURE 24**



**FIGURE 25**



Results for other microphone positions are shown in Figures 20 through 25. Two of the positions tested offer good isolation but an unnatural sound: inside the piano with the lid on the short stick (Figure 21); and located in the sound holes (Figures 22 and 23).

The spectral effects vary with microphone position because areas close to the microphone are emphasized. In addition, sounds from various areas of the piano and the lid combine and cause acoustic phase cancellations that vary with microphone placement. Like the guitar, the sound from a piano can be equalized to complement each spectral curve to approach a natural timbre.

### Electric Guitar Amplifier

An electric guitar amplifier/speaker was also recorded. The amplifier tested was an open-back design with dual 12-inch loudspeakers. Pink noise was played through the amplifier, and the acoustic output equalized flat at the 3-foot reference position (Figure 26). This position was selected to minimize

acoustic comb-filter effects due to sound arrival-time differences of the two loudspeakers.

Note that sound reflections from the floor still can cause acoustic comb-filter effects at the 3-foot microphone position. However, it is unclear whether these effects color the instrument timbre or enhance it. Floor reflections will be heard while listening to a live instrument; they add information about the spectral content of the instrument and its environment. Unfortunately, the comb-filter notch frequencies and notch depths picked up at the microphone position are different from those heard in the audience area. Regardless of whether there is coloration occurring at the reference position, it is still a known standard to which other microphone positions can be compared.

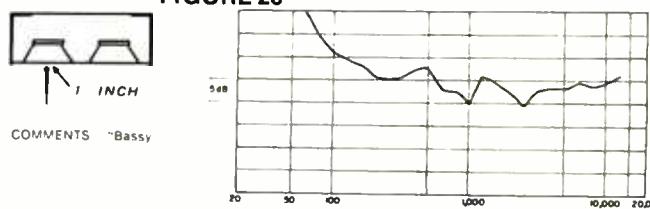
At 3 feet from the loudspeakers, the rear wave from the speakers tends to cancel the front wave at low frequencies, because the two waves combine in opposite polarity. If the microphone is placed closer, say 1 foot away (Figure

**Figures 26-29: Difference between close-miked spectrum and 3-foot spectrum, for electric guitar/amplifier/speaker (Yamaha G-100-212-II). Pink noise input.**

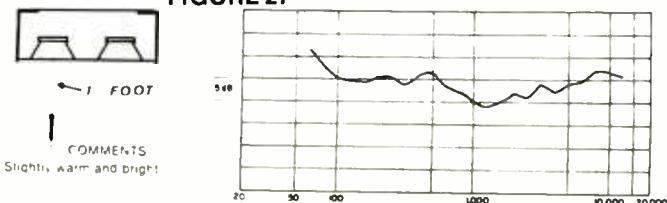
**FIGURE 26**



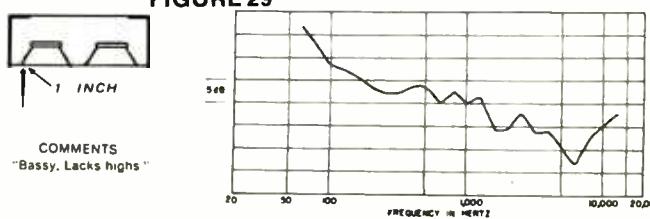
**FIGURE 28**



**FIGURE 27**

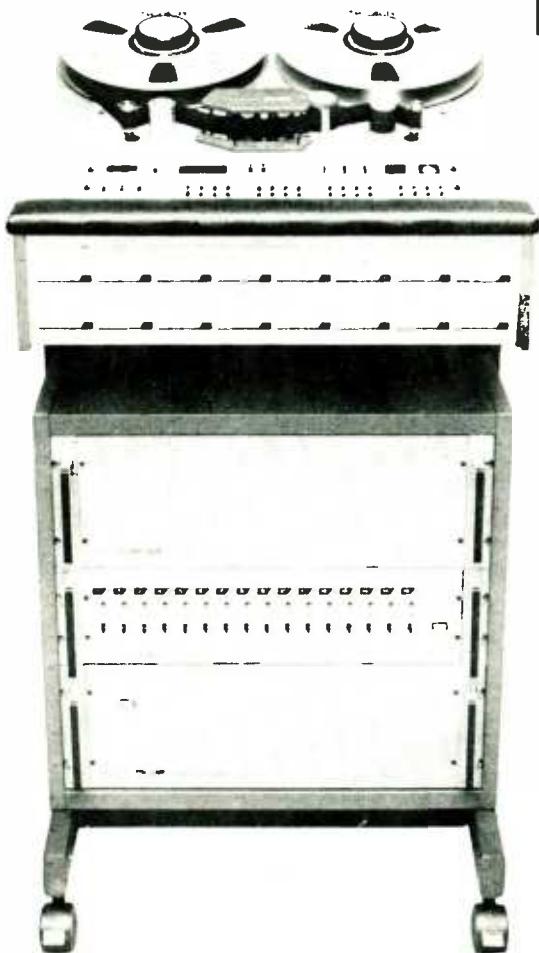


**FIGURE 29**



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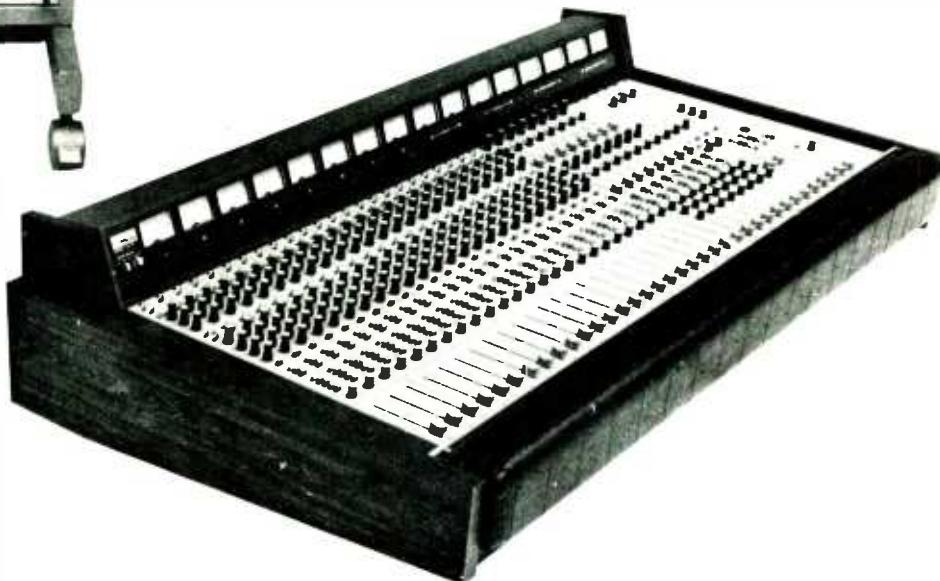
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27), the front wave is emphasized at the microphone position, resulting in low frequencies not being cancelled so completely. Thus, there is an apparent bass boost compared to the spectrum at 3 feet.

In Figure 28, the microphone is one inch from the grille cloth, so there is even more apparent bass boost. It should be remembered that, because omnidirectional microphones were used, this boost is not due to microphone proximity effect; it results from the loudspeaker radiation characteristics.

Note in Figure 29 what happens to the high frequencies as the microphone is moved to the edge of the speaker cone. The high-end is lost, producing a dull sound quality. This occurs because the microphone is far from the center of the cone, the high-frequency radiating part of the speaker. Pickup of amplifier hiss and crackle can be reduced by this microphone placement.

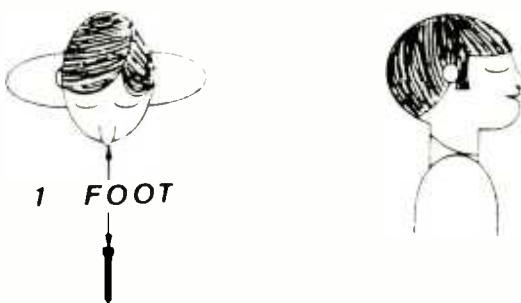
As these curves have shown, it is easy to control the bass treble balance of this type of guitar amplifier by varying the microphone distance and position relative to the speaker cone center.

### Vocals

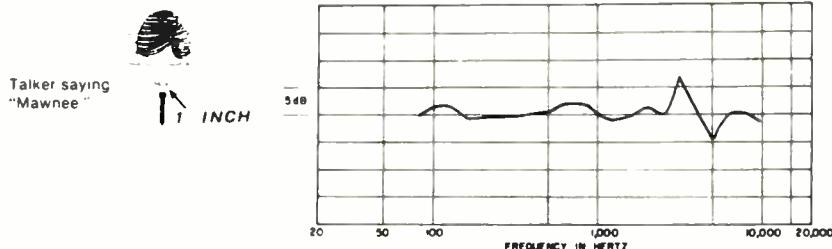
To reduce audible reverberation, a voice was recorded with the reference microphone position 1 foot away (Figure 30).

Some members of the listening panel experienced difficulty hearing the

**FIGURE 30**



**FIGURE 31**



**Figure 31: Difference between close-miked spectrum and 1-foot spectrum, for male voice (compare with Figs. 32 & 33 overleaf).**

spectral effects of placing an omnidirectional microphone one inch from the mouth (Figures 31 and 32). Thus, a flat-response omnidirectional microphone placed close to the mouth produces only minor coloration.

A nasal-sounding word, "mawnee," was used for one test (Figure 31). When

a microphone is placed very close to the mouth, the sound from the mouth is picked up louder than the sound from the nose (especially when the microphone is highly directional). Consequently, the nose sounds "closed," lending a "nasal" coloration to the voice. Note in Figure 31 the peak at 3 kHz, which often is associated with a "nasal" tonal coloration. Possibly the effect would be more audible if a hypercardioid or bidirectional microphone were used, since each one has reduced output off-axis (in the direction of the nose).

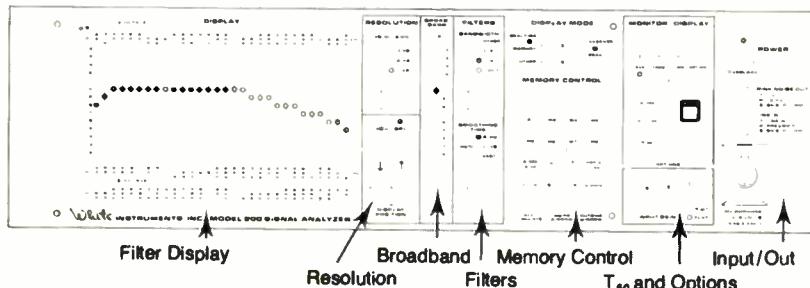
To test for sibilance differences, the word "seven" was recorded (Figure 32). The voice is somewhat directional at high frequencies, so sounds that are strong in high frequencies, such as sibilants and lip noises, are slightly emphasized close to the mouth. This can be corrected with a high-frequency rolloff. Also, a 3 dB cut at 800 Hz may make the close-miked voice sound more natural.

In Figure 33, the microphone is 1 foot away like the reference microphone, but is positioned 45 degrees off-axis to the mouth. Again, since the voice is directional at high frequencies, the microphone placed to one side picks up a duller-sounding spectrum than the same microphone placed in front. This position, or one farther to the side, can be used to minimize sibilance.

### Summary and Conclusions

The spectral plots presented in this article suggest some starting microphone placements to achieve particular tonal effects. According to the listening panel, the 3-foot reference microphone positions generally were judged to provide a more realistic and natural-sounding tone quality than the close positions tested. Such observations

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FIGURE 32

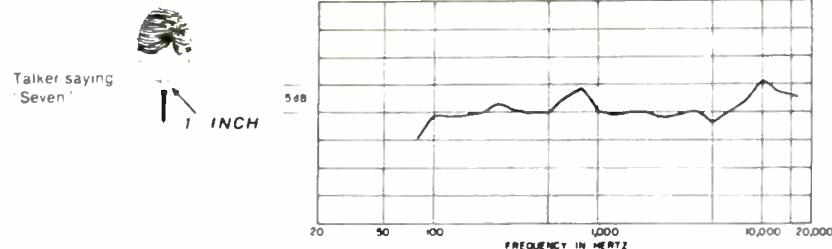
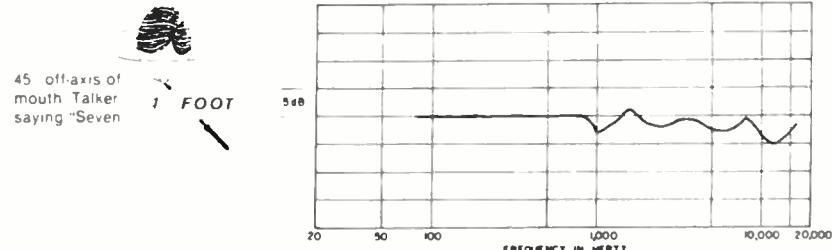


FIGURE 33



Figures 32 and 33: Differences between close-miked spectrum and 1-foot spectrum for male voice (compare with Figure 31 on previous page).

suggest that a natural sound is best obtained by relatively distant microphone placement — assuming, of course, that the room acoustics are suitable.

Some close microphone positions were discovered that pick up a tonal balance similar to that picked up 3 feet away. For acoustic guitar, the best matching position tested was 6 inches over the top of the guitar, above the

bridge, and even with the front face. For grand piano, a good match was found with the microphone located 1 foot above the middle strings, or 8 inches above the treble strings, 8 inches horizontally from the hammers, with the lid on the long stick. Remember that these positions are for flat-response, omnidirectional microphones; unidirectional microphones may sometimes add bass boost caused by proximity effect.

Other locations not tested in this study may work as well or better.

If a natural sound is desired, but you are forced to place the microphone in a bad-sounding position, the instrument can be equalized as suggested in this article as a beginning — or use a microphone with an appropriate frequency response. Final adjustments should be done by ear to suit the particular instrument and application.

Surprisingly, a flat-response microphone does not always provide the most natural reproduced sound, because close microphone placement itself can color the tonal quality. So, it is necessary to experiment with various microphones and microphone positions to find the best compromise.

The bass and treble balance of an open-back guitar amplifier can be controlled easily by varying the microphone distance and position relative to the speaker-cone center. If a voice is miked up close with a flat-response omnidirectional microphone, only minor coloration occurs.

The purpose of this article has been to indicate the general tonal effects that can be expected in various microphone positions. Whether or not these effects are desirable is up to the engineer and the producer. The more you know about microphones, musical instruments, and the interface between them, the easier it is to achieve the desired end results.



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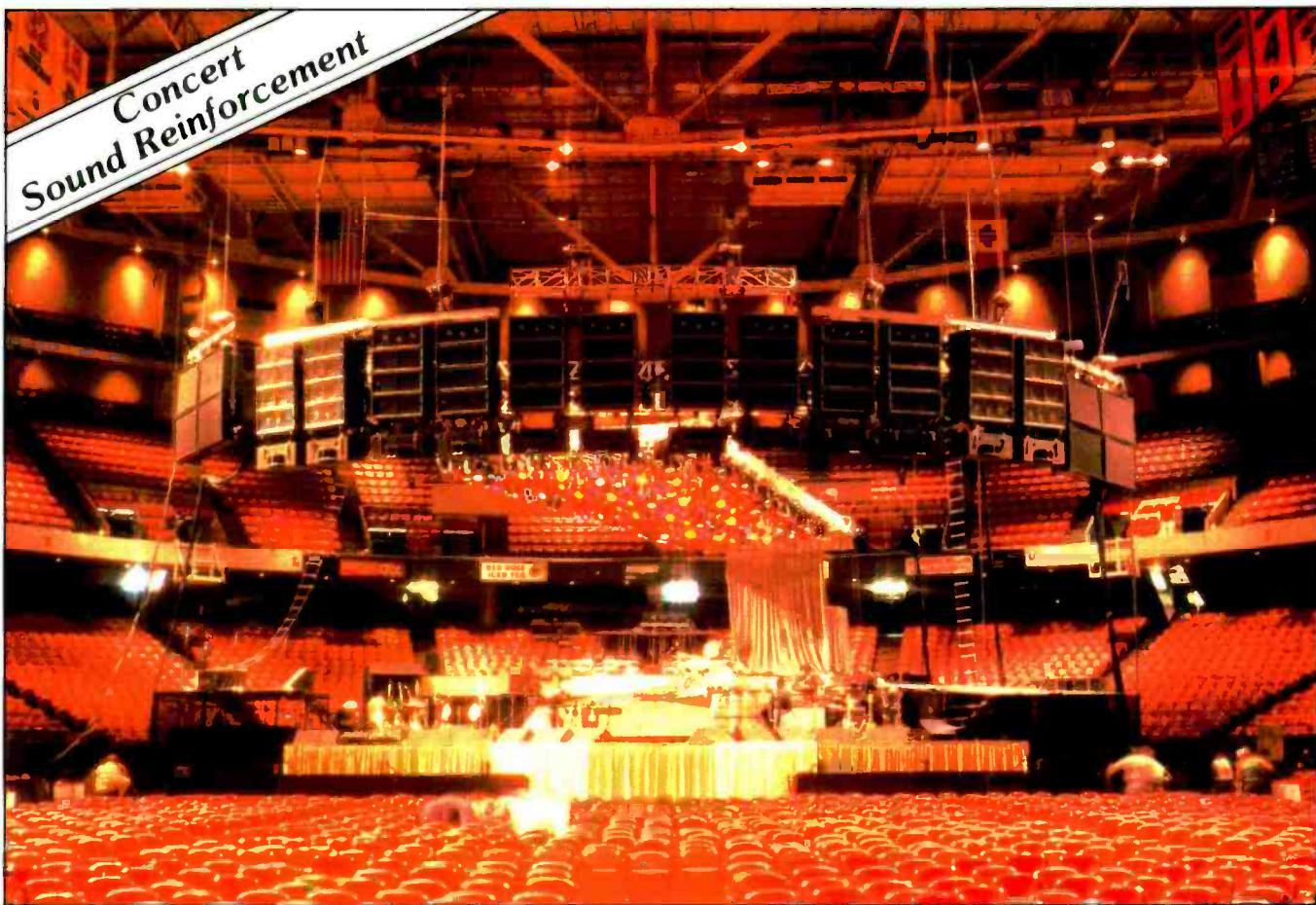
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*Earth Wind & Fire at Philadelphia, Fall 1981. Photo by Richard Benson*

# EARTH WIND & FIRE

## AT THE LOS ANGELES FORUM

### *Sound System Design by Nova Research*

by Robert Carr

"Since the day my life began  
A band has been my true life plan  
Time to get back on the road  
Feel the music, take the stand."

© Saggafire Music/  
Steelchest Music, 1980

Watching the recent Earth Wind & Fire concert at the Los Angeles Forum brought these lyrics to mind from their song "Back on the Road," by Al McKay and EW&F founder, producer and lead vocalist, Maurice White. Outwardly, during set-up, sound check, at dinner, and while the show was being presented to a packed house of enthusiastic fans, everyone in the group and on the crew seemed to genuinely enjoy and appreciate each other, the music, and the tour in general.

Augmented by strategically-placed flash pots, LaserMedia's rear-screen-projected symbols of ancient Egypt, and a climactic confrontation between Maurice White and a Darth Vader character bent on destroying the world, the show had something for everyone—not the least of which was some of the

best in-concert sound that this writer has had the pleasure of experiencing.

The man responsible, in part, was Chief Sound Engineer Ken Fowler. As a result of his seven-year association with the group, George Massenburg Labs, Nova Sound Research, and ARC Records — all of which are housed, along with three recording studios, in

**House mixing engineer: Ken Fowler**



The Complex, West Los Angeles — Fowler has some unique insights into how best to reinforce the live concept that is Earth Wind & Fire.

For the tour in the States, the crew totaled approximately 34 people, which breaks down to 25 for lights, stage, sound and band gear, six truck drivers for six semitrailers, and three bus drivers. The audio crew, by itself, comprised three people, not counting Ken Fowler. Ed Maloney served as chief rigger for the flown PA rig, and was crew chief for the tour.

The shows at the Los Angeles Forum were spread out over the Christmas holidays, which meant moving in and out of the venue three times to accommodate other scheduled functions on the alternate days, as well as fulfilling an Earth Wind & Fire concert commitment in San Diego on one of those off nights. But Fowler and monitor mixer Steve "Flash" Callahan like the acoustics of the arena, and that made the stint a little easier to handle.

"The sound crew doesn't get much of a chance to do anything with any of the

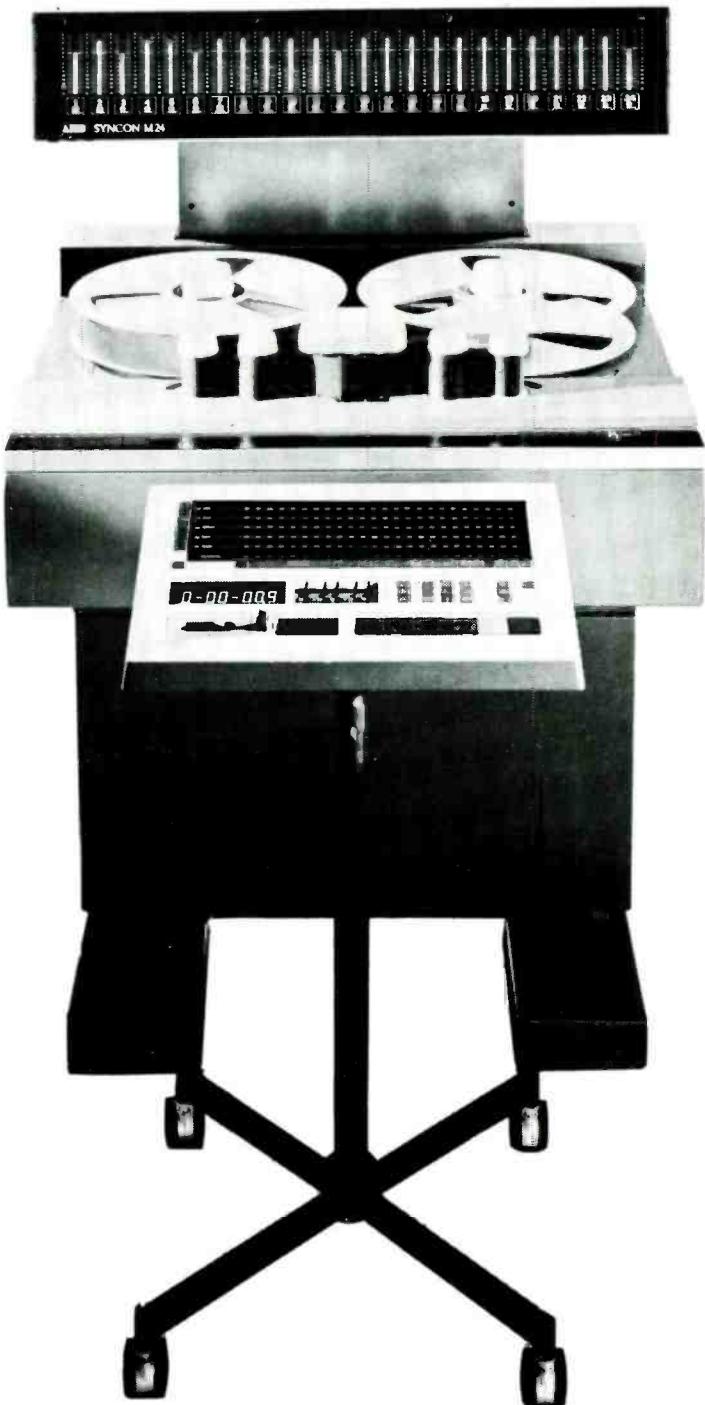
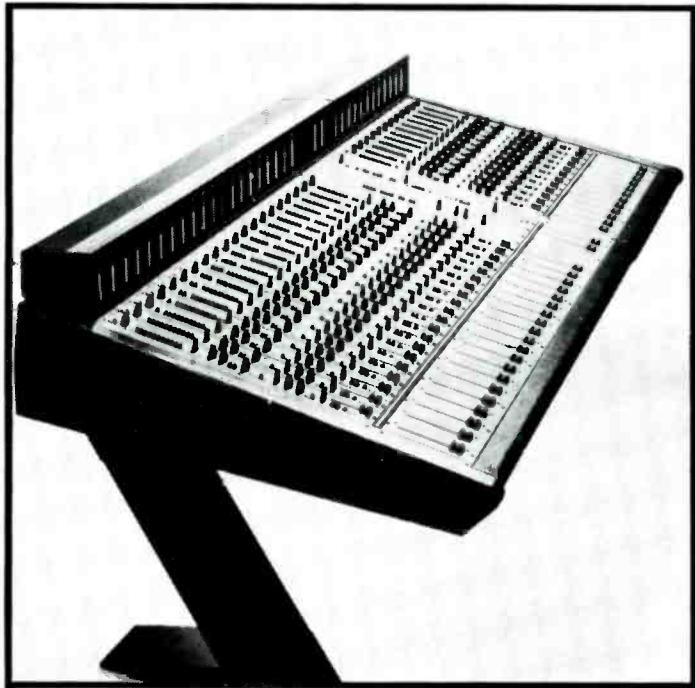
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**Figure 2:** Nova speaker system prior to being flown at the LA Forum.

venues," says Fowler. "They put the PA up in the air, and deal with the acoustics the best they can. Traveling around the country, we got to appreciate the acoustics of The Forum. There are so many halls with really long reverb times, and a lot of slap that destroys the sound quality. Working here has always been a pleasure as far as the sound is concerned."

#### Flown House system

The house system is hung just about the same every night, with only slight variations. Depending on the shape and slope of the upper sections, the direction of the side speakers becomes critical to good coverage. If the room is very deep on the sides, and extends up quite high, the cabinets on opposite sides of the stage get pointed practically straight out so that their backs are parallel to each other. In most other cases, the



**Figure 3:** MSI side-fill cabinets flown stage right.

speakers are angled for a deeper throw in the room.

The entire Nova Sound Research PA rig is a custom-designed, five-way system. Layout of the house speakers are shown in Figures 1 and 2, with the applicable amplifier models, power ratings, and frequency bands.

When Nova first took the system on the road, they found that the Spectra Sonics Model 700 plug-in amplifier cards on the low band weren't powerful enough. Instead of the present 12-inch Gauss speakers, Bozak 8-inch speakers were the first choice, but they turned out to be too inefficient. Overcoming the



**Figure 4:** MSI's Paul Giansante beside the side-fill Crown amp rack.

inefficiency soaked up what power there was from the amp cards, and left nothing to boost the signal.

"The system sounds good in the top end," offers house engineer Fowler. "The response extends up higher than most PA's, which start to roll off anywhere from 6 to 12 kHz. The Nova system is very bright in that region. Overall, the system is clean, but the bottom end isn't big. To sum up the approach with this set-up, I generally push the bottom end, listen for clipping in the low-mid band, and lay back on the top end."

Ken Fowler's philosophy towards sound systems is to use a large number of horns with plenty of power. By employing twice as many drivers, the system can be run 3dB lower. The music is just as loud as before, but fewer components are blown up.

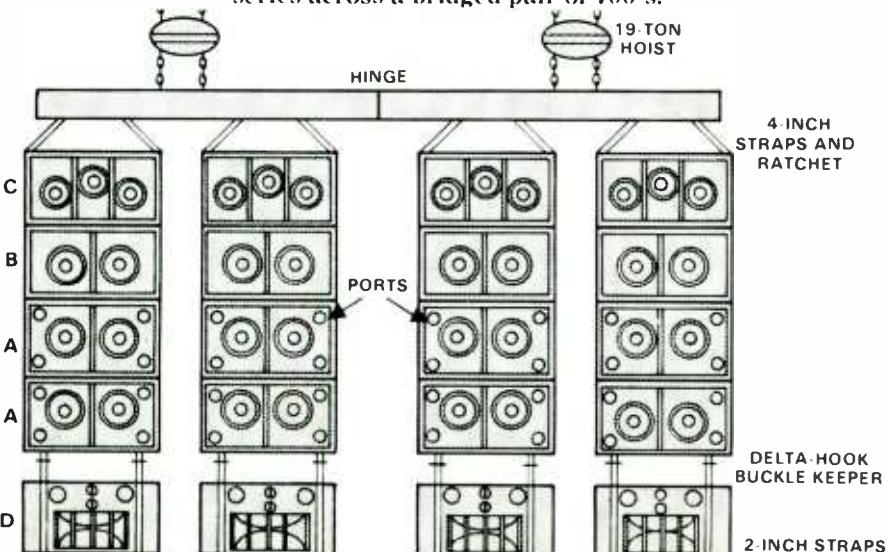
"I'm always trying to buy headroom, and there's tons of headroom in this console," he says, "but it's not a stock board. All the op-amps that Midas uses have been removed from the submaster section, and replaced with 5534's. I also push the gain setting on the crossover all the way up to maximum, which translates to about 12 to 16 dB of added gain. That way I get to run the console mix busses a lot lower. So far, that's worked the best for me. In fact, this has been one of the best sounding tours we've had."

Maryland Sound Industries was contracted to join the group in Washington, DC. MSI engineer Paul Giansante brought in four cabinets per side, two of which were 4-way with two JBL 2205B's, four JBL 2202H's, two 2-inch Gauss HF-4000's, and two Yamaha 4281 tweeters, while the other two boxes were only 3-way and eliminated the sub-woofers. Figures 3 and 4 show the flown MSI side fills, and their associated amp racks.

#### AC Power

The AC power required to run the PA system is two legs of single-phase. The whole rig running at full blast, including MSI's system, draws close to

**Figure 1:** Speaker configuration for Nova Sound Research five-way PA system at the LA Forum. Speaker cabinets "A" contain a pair of E-V 15B 15-inch drivers (20-250 Hz), driven by a BGW 1000 amp. Cabinets "B" and "C" contain a pair of JBL 2220A 15-inch, and three Gauss 2841 12-inch units (250 Hz-1 kHz), powered by two bridged pairs of Spectra Sonics 700 amps. Cabinets "D" are 3-way systems housing an Altec 288-8G on a 511E horn (1-5 kHz) powered by a bridged pair of 700's; a pair of JBL 2400's on 2307 horns (5-10 kHz) across a bridged pair of 700's; and a pair of JBL 2405 radiators (10-20 kHz) in series across a bridged pair of 700's.





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## EARTH WIND & FIRE Sound System by Nova Research

125 to 135 amps per single-phase leg, but neither is dedicated specifically to the monitor or the house system.

Nova borrows some three-phase AC power from the lighting company during the afternoon to fly the speaker cabinets. That tie is later disconnected to ensure isolation between the sound and lights for the performance at night.

Grounding for the sound equipment is accomplished at the crossover located in the house rack. Even though the power supply for the monitor system is also AC grounded, that ground is floated between the supply and board. The monitor board is grounded electrostatically through the Faraday shields on the splitter box transformers. Audio grounds are picked up through the cable shields.

### Amplification

Nova has taken a novel approach towards supplying amplifier power to their speakers. The system is comprised of 22 small, identical amplifier cards plugged into each of six racks (Figure 5). Unfortunately, that avenue hasn't been without its potholes. In Ken Fowler's opinion, "that's the weak link in the system — at least in the low-mid band."

At one time, Spectra Sonics Model 700 amplifier cards capable of putting 60 watts into 8 ohms powered the entire sound system. A pair of cards could be bridged into 8 ohms to achieve 120 watts, but that didn't seem to be sufficient for Earth Wind & Fire's needs.

"Basically, the low-mid band is underpowered," Fowler offers, "and, as a result, that range tends to clip earlier than everything else. Since the clipping produces square waves, we're constantly blowing up low-mid Gauss speakers.

Figure 5: House system amplifier racks of Spectra Sonics Model 700 cards, and BGW Model 1000 units.

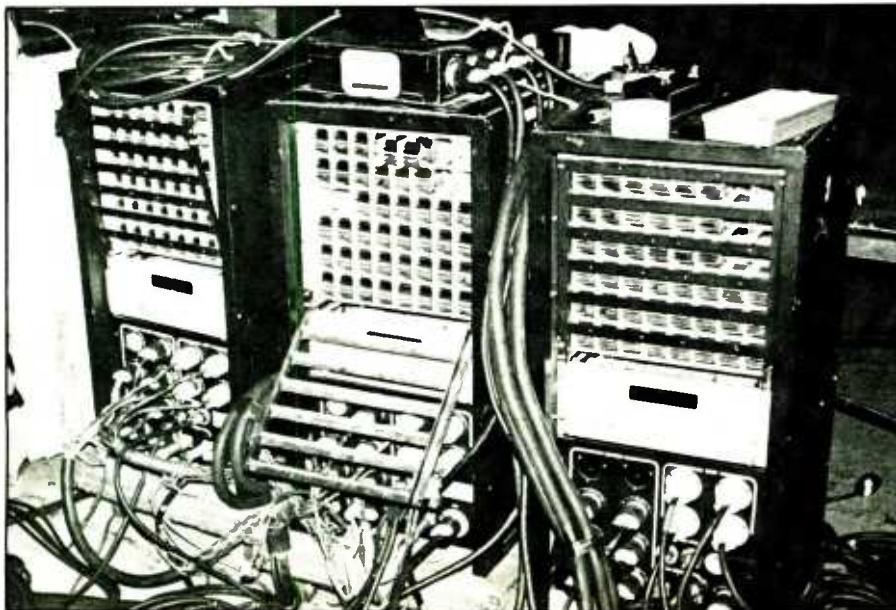


Figure 6: Midas 32-input PR Series stereo house console. Effects and outboard units also located at the house mixing position include a Roland SRE555 Chorus Echo, GML/Nova Research Model 8045 five-way stereo crossover, GML/Nova Series II Dynamic Gain Control compressor-limiters, Eventide H949 Harmonizer, Orban Model 622B parametric equalizer, Nakamichi 550 cassette and a ReVox B77 stereo reel-to-reel.

Actually, instead of blowing up, they just start to sound like trash, with a lot of distortion."

Nova eventually switched to slightly modified BGW Model 1000's on the low band. According to monitor mixer Stever Callahan, the BGW's generate a peak-to-peak sinewave that's almost 1,200 watts into four 15-inch speakers.

Fowler wanted to replace the amplifier cards with BGW's in the low-mid section, too, but changing connectors to accommodate the new amps was so time consuming that the idea had to be scrapped. "There's not really that much time on the road," he says, "and we couldn't get the changes together in one day."

As for the rest of the Spectra Sonics cards, the engineers feel that they seem to produce adequate power for their corresponding speakers. However, in the frequency band for the Altec 288 horns — 1 to 5 kHz — the cards are

putting 120 watts into 8 ohms, when the drivers are only supposed to take 30 watts RMS. Limiters have been employed to protect the drivers, but that's not a foolproof solution. Lowering the threshold hasn't eliminated blowing up Altecs either.

Fowler recounts one experience: "We had been faking our way through several shows — ever since we left Texas — and by the time we got to San Francisco less than half of the horns in the system were working. A shipment of diaphragms was sent out by Federal Express from LA — you know: 'When it absolutely, positively has to get there overnight.' Well . . . the diaphragms went to Atlanta. We put the PA up 25 minutes before the show that night in San Francisco."

"Once you blow out one or two horns," adds Callahan, "any system will start getting weaker and weaker. The tendency is to push the band harder to compensate for the lack of horns, and the rest fail progressively faster."

### Limiting and Compression

The house-system stereo five-way crossover has a package containing 14 channels of limiting (seven-way/stereo) that sits out at the house console (Figure 6). The limiters are in each band of the crossover in-line right before the power amplifiers. Ken Fowler ends up using a number of limiters, especially on the keyboards, which are capable of generating wicked transients. In an attempt to protect the Altec 288 mid-range drivers, he strives to keep level signals going to the amplifiers by squashing those transient spikes.

Nova also supplies 10 channels of rack-mounted GML/Nova compression/limiting. Separate units were used on the four main vocals, the bass guitar, the solo horn mike (which was moved around to follow the solo horn player), the Yamaha electric grand, which was on a separate feed, and on all the rest of the keyboards that were funneled

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## EARTH WIND & FIRE Sound System by Nova Research

through an on-stage multi-channel mixer. Fowler also uses compressor/limiters to pump up softer parts that are under the musical threshold.

For a while Ken Fowler tried a limiter on the kick: "During the time that the system was smaller—before we got the extra equipment from MSI—the kick drum would cause the system low-band limiter to go on. To avoid the whole bottom-end of the system from going out, I patched a separate limiter in-line to squash the kick."

He avoids any hard compression or limiting, because the breathing becomes audible in the sound system. A typical setting might be +6 dB gain reduction on a 10:1 slope, but never anything radical. Individual attack and release times vary depending on the instrument and the desired effect.

Surprisingly, Fowler doesn't usually put any limiting or compression on the snare drum at all. In fact, there were no problem transients with any of the percussion. Since the microphones are mostly Shure SM-56's, they can take the level in their stride. If anything, the music parts on top of the mix were what was hitting the limiter thresholds. When the system got loud, that would be primarily the vocals parts.

Another tendency that comes out of having so many cards together in a rack is that if one Spectra Sonics card in a particular output band starts to oscillate, the oscillation doesn't stay segregated. Instead, the *entire* band commences oscillation. Since the inputs, grounds, and power supplies for all the low-mid amps in each rack are tied together, finding the one culprit card in so many little amps is very difficult and time consuming.

"The crew tries to stay on top of the system by periodically going through all the gear," Fowler stresses. "Usually, we've been lucky enough to sort the problem out during the testing in the afternoon, because we have the opportunity to shut the system down. But you can imagine what it's like if the oscillation starts during a show. Sometimes the search takes quite a while. Sometimes we're unable to find it altogether."

Tight scheduling, and the limited amount of time allowed for move-in and set-up, reduces the time for sound system component checks to a minimum. Fowler will usually test the open speakers with a 9-volt transistor radio battery, by touching the connectors in the back of the cabinets and listening for the DC "click" in the speakers. Such a test is adequate for eliminating open speakers, but the low-mid band speakers have to be cranked up pretty loud before any distortion is audible.

"I'll turn the entire system on, and play some music through it," he says.



Monitor mixer : Steve Callahan

"If all the [frequency] bands sound good, and I can run a lot of level into them without anything breaking up, I leave the system alone—I don't go searching for problems. But if there's a weak component, I'll take care of it when there's time."

### Dealing with Room Acoustics

The Los Angeles Forum, like most arenas, is oval-shaped, and the natural location for the stage is right at the focal point of one end arc. In fact, the focal points of both ends can wreak havoc when trying to control excessive sound levels and the resultant reflections.

"Sometimes we'll get loud echoes or slaps that come from a specific part of the room," says Fowler. "Very often when I mix on the floor, I find that that location is one of the worst in the building. Walking around the arena, the sound tends to get much better up in the audience on the sides; the bottom end sounds tighter. By staying only on the floor, I was actually fooling myself as to what the sound was really like. The overall sound down there is always a little 'boomier,' and doesn't have as much clear bass. At least that's what I've been experiencing."

"I did the mix at Madison Square Garden from up on the side. The difference was phenomenal. I remember wondering how the system could sound so good."

Earth Wind & Fire is a very big band (14 pieces), but at the beginning of any tour the overall performance volume will be "fairly cool." But, as the tour progresses, the crew has noticed that the band, the PA, and the monitors slowly get louder and louder. Even during the course of a show, the band's

level gradually increases as the end of their set draws near.

"Generally, sound checks are a waste of time," Fowler offers. "The band members are all relaxed, and they're kind of faking the playing, and saying, 'I'm not playing loud. This is my normal volume.' Then when they come back for the show, the music turns out to be a lot louder, because the musicians get excited and wound up. They haven't necessarily turned anything up, but they're playing harder."

If a sound check does anything constructive, it's that the band knows what the room is going to sound like. From that aspect, they know what kind of levels and limits to expect.

"In rooms that sound really bad," says Fowler, "the acoustics are usually reaching the saturation point, where there's so much slap coming back at you that you can't distinguish one part from another. Ideally, the key to the situation is trying to get the band to play quieter, and having the house and the monitor systems quieter—just trying to bring everything down. That way, the whole band becomes more audible."

Of course, that's not always possible, and the need for a solid equalization philosophy becomes clear, particularly as a means of counteracting less than perfect sonic parameters.

Feedback is probably the number one curse that plagues sound-reinforcement efforts, and is caused by peaks in the frequency distribution curve. To run the overall volume up to levels that are sufficient for most concert expectations, the peaks in the system have to be located and smoothed out.

"Our EQ is not really so much for getting good tone," Ken Fowler explains. "We don't have the studio luxury of, 'Let's make the guitar warmer,' or 'Let's make the keyboards brighter.' Those aren't the parameters that we're dealing with."

"The bottom line is to get rid of the feedback. That's where all the equalizers get used, and on a very sharp bandwidth setting. I boost the level and roll the frequency until it starts to feedback. When I get on either side of the peak, the feedback quiets down, and that tells me exactly where the problem area is. By putting in the appropriate cut, the peak is neutralized."

"What we're dealing with is the mix that's coming out of the board," he emphasizes. "We're talking 'sound

Table 1: Monitor Amplifiers and Speakers

The 25-input GML/Nova monitor console provides eight main mix, and two foldback bus outputs. All inputs and outputs are equipped with parametric equalization. Automated solo and mute facilities are also featured.

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## **EARTH WIND & FIRE** Sound System by Nova Research

reinforcement,' and that means compromises. We're dealing with whatever we have to to augment what's coming off the stage, which is something that's not being pushed by the board."

To accentuate his point even further, Fowler offers the following example: "If I were to make a tape directly off the house console, the relationship of the instrument and vocals might surprise you. The tape will show the drums about in the middle of the overall level. All electric instruments, depending on how loud they're being played on stage, will be soft in the mix. The vocals will be way out front. What we're really driving the system with mostly is vocals, and that's where we're getting all the compression that you start to hear in the system."

Contrary to several of his previous statements, Ken Fowler's main philosophy is not to just "get the sound out there" and relegate tone considerations to the background. "We go for different sorts of sound," he offers, "but as far as the sound that they're getting on something like a guitar or keyboard, most of that is done on stage. They have pedal boards and other effects, and they're constantly switching those devices on and off.

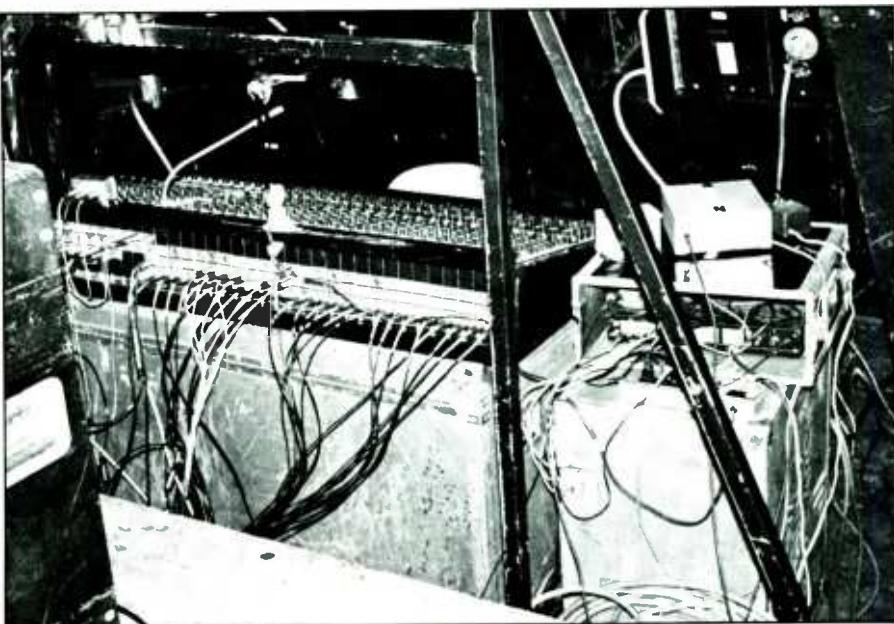
"Take Roland Batiste's guitar as a case in point of controlling the tonal considerations from the house. Because the guitarist wanted a "fatter" sound, an AKG C441 microphone was used instead of an SM-56, because the AKG was much smoother in the top end which, in turn, made the guitar a little smoother. Then the low-mid range was boosted on the console to fatten up the tone."

Doing house sound allows the mixer some choice of using the equalizers as tone controls, whereas "Flash" Callahan doesn't have that kind of flexibility with the monitor system.

### **Monitoring System**

Earth Wind & Fire has a powerful monitoring system (Table 1 provides a listing of monitor components and amplifier configuration), yet the stage is usually located in one of the focal points of the room-end arc where there's a great deal of slap from the house system. The result is massive wave interference piling up on stage, and Callahan's only alternative is to push the monitors so the band can hear. Figure 7 shows the somewhat cramped monitor mix position beneath the on-stage Pagoda.

But excessive volume levels and interference is a two-way street. The monitors can also get so loud that the microphones lose their ability to sufficiently reject stage levels, and the entire PA starts to sound like it's phase shifting. That's also the cause of hollow



**Figure 7: Monitor mixing position located beneath the on-stage Pagoda.**

vocal sounds.

"The engineers involved have to work out a balance together," Fowler points out, "because the people in the group generally don't understand about the problems with interference. If they can't hear, they just want more and more. They don't think about 'less.' They just want themselves turned up, and that's where the problems come from."

As with the house system, monitor mixer "Flash" Callahan depends on equalization to control the peaks that cause the annoying feedback. But after those settings are made, he usually finds that he's used most of the equalizers, and is stuck with what the cabinets sound like.

"I end up getting my tonal quality by the amount of cut I'm doing on a peak," Callahan says. "If I want to make the monitors sound like they have more edge, for instance, I put back as much as I can of the upper mid-range cuts that I took out. For this tour, I kept the limiting and compression of the instruments to a minimum as far as the monitor system is concerned."

A monitor trough conforms to the front of the stage, and all the monitors housed there are essentially the same design. The six down-stage-center monitors grouped together in the point are all fed from one mix. By keeping them together, the mechanical coupling increases the system's efficiency for lead vocalists. Additional monitors are arranged in a line along the front of the stage, but there is a different mix coming out of each cabinet, or sets of cabinets.

Except for the bass drum, which goes through most of the monitors, each of the mixes depends on who is being cued. "It's a good bet that a vocalist is going to want his voice on top in his monitor," Callahan points out. "That's just rule of thumb. Whoever is in front of a monitor

generally gets his voice or instrument louder in that mix."

Verdine White's bass guitar is only run through the monitors during his solo. The rest of the night, that instrument is relegated strictly to the bass amplifier. If that were not the procedure, the bass "ring" would create chaos all over the stage.

"The only electric instrument that ever shows up in the monitor system is Roland Batiste's guitar," relates Flash. "Electric instruments generally don't turn up in the monitors, because the instruments themselves have extension speakers all over the stage. The bass guitar has speakers everywhere you look, and the situation is the same for the guitar rigs."

That's part of the key for improving the overall sound of the band, too.

"Sometimes it helps to have more amplifiers, or at least speaker cabinets, spread out across the stage," adds Ken Fowler, "rather than have one amplifier and cabinet that is responsible for all the volume. By breaking up the sound sources, the musicians can run their instruments a little bit quieter."

Roland Batiste's guitar, for example, is going through several small Boogie amps scattered across the stage in strategic positions. Guitarist Johnny Graham has one or two. The monitor stand upstage of the horn players and stage-right of the necktie (drum riser) is comprised of a bass cabinet, one of Graham's speakers, one of Batiste's speakers, and a band monitor all stacked up together.

### **Stage Miking**

Because of the size of the band, Ken Fowler found that he was very short on microphone inputs (32 plus 4 line inputs), and the stage miking turned into a get-by situation (Figure 8).

"The band knows no limits," says Fowler. "Money's not there? What do

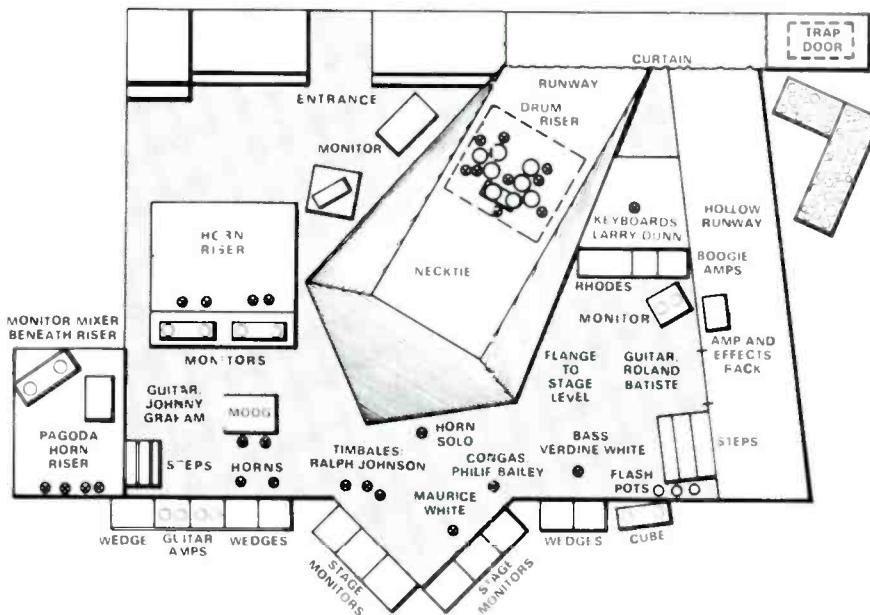


Figure 8: Stage layout for the Los Angeles Forum concerts.

you mean? Just do this! It's not the kind of situation where they want to hear about not having the finances. My only choice was to try to provide what they wanted, and since it wasn't in the budget, I was caught in the middle."

With two such opposing forces, something had to give. As a result, a few instruments, like the gong, didn't get miked. In addition, where there used to

be two overheads on the drums, one was removed.

The house mixer sums it up this way: "I tried to eliminate mikes on the drums where there were phasing problems. We had to add phasing switches to the console on the last 16 inputs, which is where all the drums were. Ideally, I'd want phasing [switches] on all the channels. I ended up running the kick

out-of-phase a lot of times. I had two mikes on the snare and, of course, one of them had to be run out-of-phase. The phasing switches on the overhead, the tom toms, the snare, and the kick were swapped all around depending on what sounded good."

Unfortunately, eliminating microphones wasn't enough. Ken Fowler had to double up on inputs, too. Say, for instance, that the line input of the tape machine ran into channel #1 for tape playback at the beginning of the show. Later, channel #1 became the line input for the Kalimba.

On top of that, the stage design offered its share of challenges to the sound crew. The design was not conceived with microphones and monitors as a matter of prime concern — especially for the drummer. When the drums come up through the riser floor at the beginning of the show, some of the crew have to run out, raise up the cymbals, raise up the mike stands, and make sure everything is in position. Sometimes a mike is positioned incorrectly and the sound suffers.

The show dictated a certain criteria for layout and, according to Fowler, the designers didn't take into consideration that there should be a place to put monitors around the drummer. The riser is just big enough for the drum kit and drummer Fred White to sit down. Eventually he went to using a Beyer earpiece — a Beyer transducer that's

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molded to his ear like a hearing aid — as his monitor, driven by a Crown D-60 amplifier.

"The audience can't see the earpiece, but we're continually blowing them up," says Fowler, "because the drummer is very erratic with what he wants from day to day. Obviously we can't get a very good kick drum sound in an earpiece, but there's just no place to put monitors."

**Microphone Selection**

With these conditions in mind, Ken Fowler offers the following comments to explain the "whys" and "wherefores" of his mike placement:

"The *toms* are all [covered by Sennheiser] 421's. I label them low, mid, and high toms. There were five drums, but only three mikes, so two of the mikes were split between four drums — another result of a shortage of [console] inputs.

"The *bass* DI is a Fat Box that's fed by a [Nady] Nasty wireless unit. They have a couple of back-up systems; sometimes the wireless is a Cerwin Vega. There's no transformer on the Fat Box.

"The two *timbale* mikes are 'Y'ed with both mikes in-phase, and each placed between the rims of two timbales.

"There are three *congas*. The low drum is called the Tumba; Conga is the middle, and the Quinta is the high one. Because the low drum requires a little bit different EQ, that's on one channel, and the other two mikes are 'Y'ed together.

"The *Kalimba* is hardwired into a Nova direct box, because a pickup was built into the instrument.

"All the *horn* mikes are Sennheiser 421's. There were two different horn

**Table 2: Microphone Assignments to House Console**

INPUT	Instrument	Microphone
1	Kalimba'	Direct-inject
2	Verdine White Vocal'	Shure SM-56
3	Philip Bailey Vocal'	Sennheiser MD-431
4	Maurice White Vocal'	Sennheiser MD-431
5	Ralph Johnson Vocal'	Sennheiser MD-431
6	Belyod Taylor Vocal'	Sennheiser MD-431
7	Andrew Woolfolk Vocal'	Shure SM-56
8	Horn Vocals/Solos'	Sennheiser MD-421
9	Trumpet - Rahmke Michael Davis'	Sennheiser MD-421
10	Trumpet - Michael Davis'	Sennheiser MD-421
11	Trombone - Louis Satterfield'	Sennheiser MD-421
12	Saxophone - Don Myrick'	Sennheiser MD-421
13	Saxophone - Andrew Woolfolk'	Sennheiser MD-421
14	Vocoder/Mini Moog'	Direct-inject
15	Yamaha Grand - Larry Dunn'	Direct-inject
16	Keyboards Mixer'	Yamaha EM-300/DI
17	Guitar - Roland Batiste'	Sennheiser MD-441 (2)
18	Guitar - Johnny Graham'	Shure SM-56
19	Bass - Verdine White'	Fat Box DI/Nasty Wireless
20	Kick Drum'	Sennheiser MD-421
21	Snare Top'	AKG D224E
22	Snare Bottom	Neumann KM84
23	Hi-Hat'	Neumann KM84
24	Floor Tom	Sennheiser MD-421
25	Mid Tom	Sennheiser MD-421
26	High Tom	Sennheiser MD-421
27	Overhead Right	Neumann KM84
28	Overhead Left	Neumann KM84
29	Bells	Sennheiser MD-421
30	Conga & Quinta'	Shure SM-56 (2)
31	Tumba'	Shure SM-56
32	Timbales	Shure SM-56 (2)

\*These inputs are also paralleled to the 24-input monitor mixing console.

The eight subgroups on the Midas 32-input PR Series house mixing console are assigned to the lead vocals, background vocals, effects, horns, keyboards, guitars, percussion, and drums. Four effects returns are connected to an AKG BX-10 spring echo, a delayed return from the BX-10, a Lexicon Prime Time, and an Eventide Harmonizer.



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positions: the regular on-stage position stage right of the drummer; and a position on the wing above the monitor mixer. Each position has four mikes set up at all times, and they're all connected to a Grayhill switcher up on stage.

"The *trumpet* mike, for example, in each stage position can be plugged into the same selector so it comes down the same input line. No additional mixing is required — just a flick of the switch, and we get the second trumpet mike down the same channel as the first. The tone setting stays the same, and the second mike shuts off the first one. The set-up applies for all the horns. Sometimes I can't see what's happening on stage if the lights are out, so Flash does the switching. The mike splitter box sits right next to him, and the switch box sits right on top of the splitter within arms reach."

"The *keyboard* player has a little Yamaha EM-300 12-input mixer. He has a stereo send, and we choose left and right using the pan pots. I take the Yamaha Grand separately, because the direct electronics are already built into the piano. All the rest of the keyboards I get off one stereo channel. Everything, except his Yamaha piano is panned to one channel on his mixer. The grand is panned to the other side. That lets Larry [Dunn] get all the keys through his on-stage cabinet, while I get two separate feeds [Grand direct, and all the keyboards from the Yamaha mixer] for

different house EQ settings.

"Roland's *guitar* is miked using two [Sennheiser] MD-441's 'Y'ed together with a 6-dB mike pad on one of the microphones. He has two separate speaker cabinets — one is a regular rhythm amp, and the other an overdrive amp for lead that's turned on and off via a switch on his pedalboard. The mike with the 6-dB pad was located in front of the overdrive amp. The two microphones were 'Y'ed in-phase into one input on the house board."

"Andrew [Woolfolk]'s *vocal* mike was a Shure SM-56, because we didn't have anymore 431's. The 431's are very fragile mikes. Maurice [White] sometimes likes to clap full force while the mike is in his hand, and it eventually destroys the capsule. We had to mark all the 431 mikes that were being used with the vocalist's name, so Maurice continually got the mike he was beating up. There were only eight of these [431] mikes to start with, and most of the time there was always one sitting at Sennheiser being repaired. We decided we had to save the good mikes for the lead vocalists — Beloyd, Maurice, Ralph and Phillip. The other vocals [Verdine and Andrew] were SM-56's."

"Andrew, as well as all the other horn players, plays *percussion*. The horn mikes are set up for a horn tone and power, and the light percussion instruments get lost unless it's

something like a loud cowbell. Andrew had one that was especially overbearing. I had to ask him to play it away from the MD-421. All the other mikes were hearing it, and spreading it across the stage through the monitors. There were two SM-56's 'Y'ed together for Beloyd [Taylor]'s percussion. That was just a lack of microphone choices available, and a lack of inputs. He eventually started playing a gong, too. I didn't have a mike for that, either, so I couldn't do anything for him."

#### To Europe

Nova Sound Research is taking only the monitoring system to Europe for a winter EW&F tour. Electro Sound (Originally Tom Fields Associates, and then TFA Electro Sound) has been contracted to supply the rest of the equipment.

"It's a Turbo System, the same one I used on the last tour," says Ken Fowler. "The design is their own, and the result is increased efficiency."

Fortunately for the crew, the TFA Soundcraft house console will be larger, and travels in two separate sections — one with 30 inputs, and the other with 20. Obviously, the added flexibility will make the mike assignments much easier to deal with, and probably enhance the overall sound presentation. Although, after hearing the quality of their Forum concert, I think that's going to take some doing. ■■■

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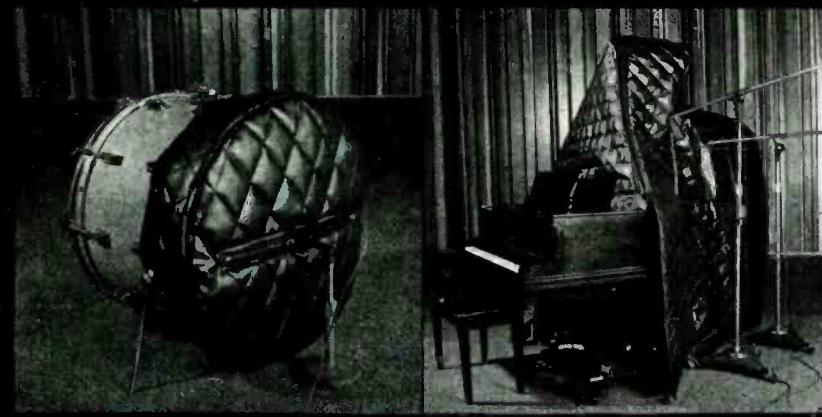
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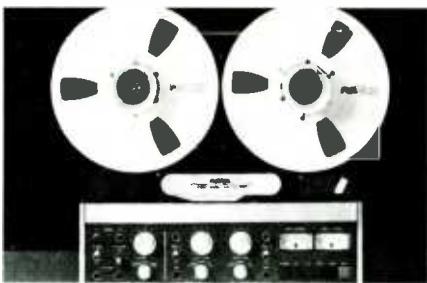
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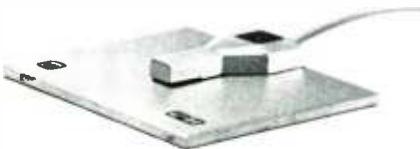
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Applications include any system where microphone/loudspeaker interaction can occur to cause feedback, particularly unattended sound systems in meeting rooms, churches, auditoriums, etc.

Standard features on the 1620A Acoustic Feedback Suppressor include LED attenuator displays (at 3, 9, 15 and 28 dB), clipping indicator light, direct hardwire by-

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The new XL-210A is a 3½-inch rack-mount reverb system featuring the capability of operating in either stereo or mono. Each channel incorporates three bands of reciprocal peak/dip equalization, a mix control, an input level control, and a dual-colored LED that doubles as a power/overload indicator. Reverberation decay time is approximately 3 seconds.

Suggested user price is \$890.

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The Model E51 is described as the first five-band parametric equalizer to be introduced in a 1 ¼-inch rack space configuration. Designed for instrument and sound reinforcement applications, the Model E51 augments Phase Linear's existing Professional Series line, which includes the



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A60, A30 and A15 Power Amplifiers, the X20 Active Crossover and the E20 Graphic Equalizer.

A key feature of the unit is the option of switchable peak or shelf response on bands One and Five. In addition, the E51 offers automatic balanced, unbalanced XLR and 1/4 inch phone inputs; +20 dB system gain for low-level sources; overall level control and bypass switch with LED; "Signal Present," Power Ready and System Overload LED's; output relay control; and line drivers.

The new E51 parametric Equalizer carries a manufacturer's suggested list price of \$549.

#### PHASE LINEAR

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Exclusively distributed in the United States by BGW Systems, the Tannoy SMR 10B and SRM 12B professional sound monitors are said to offer all the advantages of the proven Tannoy Dual Concentric principle within a small, compact package.

According to Brian Wachner, president of BGW Systems, Inc., "The free-standing Tannoy monitors are ideal for use wherever space is at a premium — in small studios, on location, or in the mobile. The Tannoy SRM 12B provides the professional sound engineer with an outstanding monitoring system, at a highly competitive price, while still performing as well as many larger monitors."



The Tannoy SRM 10B features a 10 inch Dual Concentric drive unit, with maximum output level of 109 dB SPL (recommended amplifier power at 8 ohms: 50 watts minimum). It is priced at \$550.

The Tannoy SRM 12B, featuring a 12-inch Dual Concentric drive unit, has a maximum output level of 112 dB SPL (recommended amplifier power at 8 ohms: 100 watt minimum). The SRM 12B is priced at \$650.

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#### LOFT MODEL 450 DELAY LINE FLANGER

The new Delay Line Flanger is described as utilizing new design technology to provide more musical and natural sounding results in both the delay and flange modes, at a reasonable price.

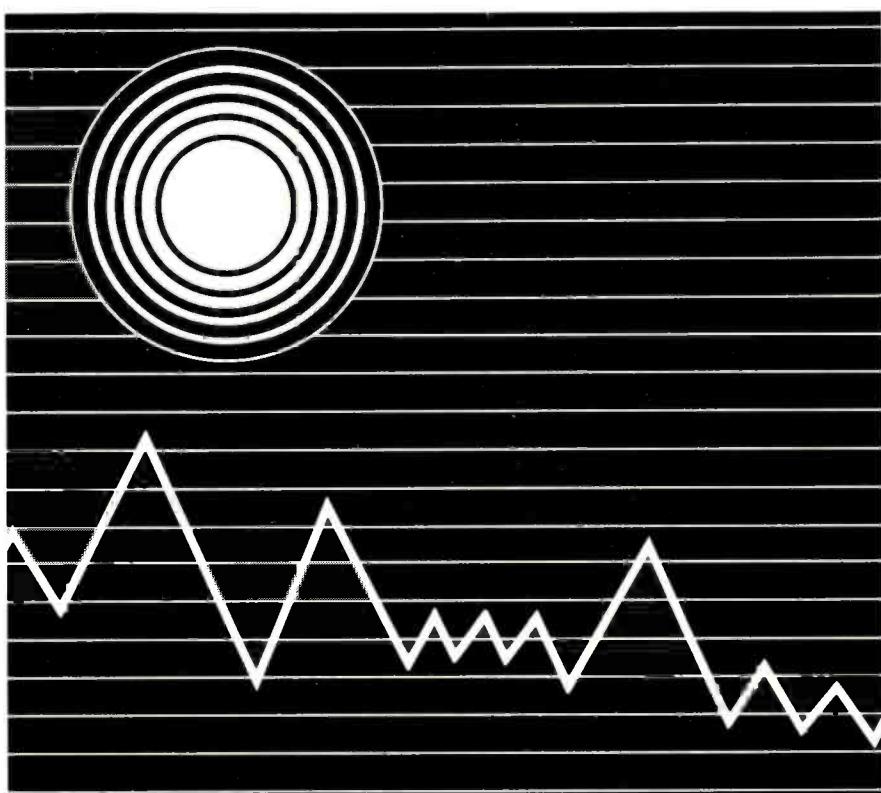
The Model 450 has a maximum bandwidth of 18 kHz, and comes standard with up to 160 milliseconds of delay. Addition of the EM-450 extender module will provide delay up to 320 milliseconds. The unit has a quoted signal-to-noise ratio of -90 dB.

The LOFT 450 is claimed to have exceptional control and flexibility in creating special effects such as flanging, chorusing, double tracking, slapback echo and other types of effects. Both 1/4 inch phone jacks and XLR connectors are utilized on the inputs and outputs.

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## views

...continued from page 20 —

... a generation later . . .

How They Did

### Janis Joplin's FAREWELL SONG ALBUM

original recording.

On "Misery'n," which was done originally at Columbia Studio E in New York, the bass and drums were replaced at HMW in 1974. Chrissy Stewart, who had just left Spooky Tooth, was chosen for the bass part, drums being played by Denny Seiwell, who had just left Wings. Mick Weaver added Wurlitzer piano, which was recorded direct, as was the bass. The drums were recorded with Schoeps CMT-54 overheads, Sennheiser MD-421 on the snare, an Electro-Voice RE-20 on the kick, and Beyer M201's on the toms. The board at His Master's Wheels was a Neve 8016; the deck an Ampex MM-1000.

"One Night Stand" was originally a 16-track, cut at Columbia D in Los Angeles with The Paul Butterfield Blues Band, Todd Rundgren producing.

"The board was a custom Columbia board," Mazer notes, "and there was a union engineer on hand, but it's safe to say the sound on tape was Todd's."

Nevertheless, to update the 1970 sound, Mazer added vibes, electric piano, tom and cymbal fills, and tambourine, all recorded at His Master's Wheels.

Perhaps the most interesting piece of music on *Farewell Song* is "Harry," a totally outside piece of jazzy jive. "It was meant to be on *Cheap Thrills*, but CBS executives didn't think it belonged," Mazer recalls. "They really wanted Janis to be seen as an R&B singer at that time."

John Simon (who co-produced the *Cheap Thrills* sessions with Mazer) did most of the effects live on the eight-

track, says Mazer. "A lot of people liked to create their complete sound during the recording of the project. They treat the sound as part of the arrangement and get it on tape." The splice was part of the original recording; Mazer did no overdubbing or editing on "Harry."

"Farewell Song" was recorded April 13, 1968, at Winterland in San Francisco, with Big Brother. John Simon was the producer; Dave Diller engineered in the Wally Heider mobile unit. Mazer himself redid the bass part, direct, in 1974 at CBS in New York.

"Neither the recording nor the part itself seemed good enough," Mazer comments. "I tried to play something that felt exactly like what they would normally have done in '68, and since I'm not your 'el slicko' bass player, it was appropriate for me to do it."

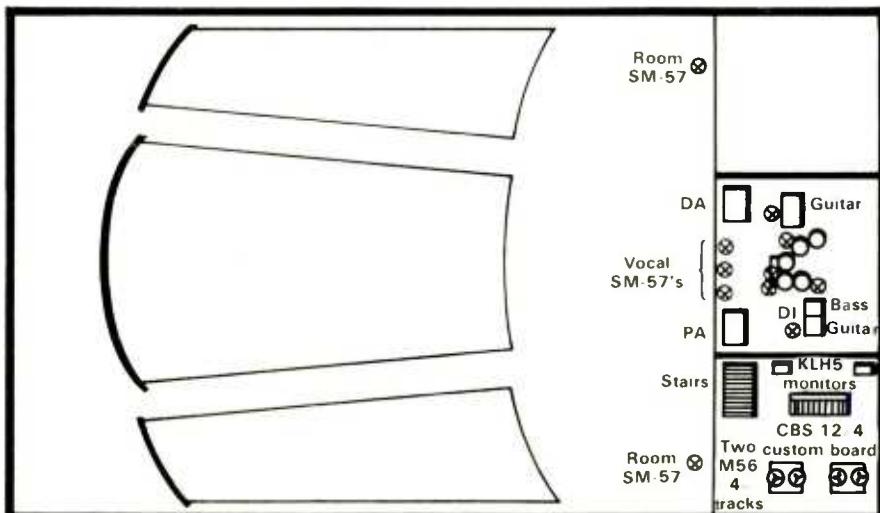
The raw material for the "Amazing Grace/Hi Heel Sneakers" medley was a two-track recorded live with Big Brother at San Francisco's Matrix on January 31, 1967.

"I created the medley," says Mazer. "It just seemed right — they did 'Amazing Grace' *acappella* a few times, then they did a really raucous put-on of it, uptempo and nutty, that didn't sound very good. It just seemed nice to have the *acappella* part, and then tempo-wise and key-wise 'Hi Heel Sneakers' worked well. For some reason, we only had a limited amount of that song to work with, so the entire medley only runs 2½ minutes."

"Catch Me Daddy" was recorded the same day as "Misery'n" at Columbia E. Drums and bass were totally replaced by Seiwell and Stewart, respectively, and Mick Weaver added electric piano. These overdubs were done in 1973 at HMW, recording details for which are identical to those for "Misery'n."

## Mixdown Sessions

"The concept of the mix was to try and make the end result of each song sound like it was all recorded in the same



ROOM AND MICROPHONE LAYOUT FOR "MAGIC OF LOVE", RECORDED AT THE GRANDE BALLROOM, DETROIT, MARCH 1968.  
PRODUCER: JOHN SIMON. CO-PRODUCER: ELLIOT MAZER  
ENGINEER: FRED CATERO.



**"Farewell Song" producer Elliot Mazer —**

place," Mazer offers. "It sounds like an oversimplification, but a lot of records today don't sound that way at all — there are different ambiances on different instruments.

"All the recorders on this modern turnaround were MCI, and the console was a custom-made 36-input board at CBS in New York. Signal processing consisted of a full [Audio & Design Recording] Scamp rack, a Vocal Stressor, and a brand-new Lexicon 224 Version 4.4 digital reverberator. The outboard gear made the difference — Scamp equalizers are cleaner and quieter than any others that I've used. Sometimes you tweak a Scamp EQ by ear, and it shocks you to realize that you're adding 10 or 12 dB."

For the stereo mix, the signal went first through the compressors to tighten the sound, then through a pair of ADR F-300 gates, which in this case Mazer used as expanders to open up the dynamics — "to make the quiet parts a little quieter." The signal then went to the equalizers, then was distributed to the Lexicon Model 224; the returns were balanced in, and then to the recorder.

In selecting his two-track medium, Mazer and engineer Larry Keyes did a blind comparison between a Mitsubishi X-80 digital, an MCI ½-inch two-track at 30 IPS with no noise reduction, and the same MCI at 15 IPS with Dolby-A — the latter two on Ampex Grand Master 456 at 320 nW/m flux level.

"Half-inch two-track wasn't available to us in that particular facility," Mazer notes, "but this would have been the classic record to do that with."

A representative song was chosen, and Keyes mixed to the three machines. Mazer found the most appealing sound to be from the 30 IPS, no-NR version.

"The Mitsubishi just didn't flatter Janis' voice," says Mazer. "I can't explain it — it's a completely personal opinion."

In the mixing process, Mazer dealt with the general sounds and effects, while Keyes balanced and handled the

cues at the board. "Larry's a musician himself, so he's got the right kind of mentality for this kind of work: he knows where you are in the song. He's also brilliant at remembering cues — he can do the same cues and create the same balance time after time."

#### Signal Processing

As a general rule, Mazer used the ADR Vocal Stressor — a combination compressor-limiter-expander-noise-gate

... continued overleaf —

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# views

... a generation later ...

## How They Did Janis Joplin's FAREWELL SONG ALBUM

and sweep equalizer — any time he had a discrete Janis vocal track to work with. The settings were similar, with EQ points varying depending on the condition of the source tapes. He set it up with the Stressor's equalizer inserted post-compressor; the compressor was on a 2:1 slope, never attenuating by more than 2 to 3 dB. He also used the expander here and there to pull the breaths down a bit, and to get rid of other miscellaneous garbage in between.

"I remember how phenomenal it sounded the first time I put Janis' voice through the Vocal Stressor," Mazer enthuses.

"The version of 'Tell Mama' on *Farewell Song* came from a rough mix that we did the first time around — 15 IPS, Dolby-A, the same format as *Joplin in Concert*," says Mazer. As mentioned earlier, the original 8-track had disappeared by the time *Farewell Song* was resumed.

"I was faced with a very dead-sounding tape, with a tremendous amount of voice and a very way-back

## RECREATING ROOM AND HALL AMBIENCE ON FAREWELL SONG WITH THE LEXICON MODEL 224 DIGITAL REVERBERATOR

Producer Elliot Mazer made extensive use of the Lexicon 224 Version 4.4 during the remix of *Farewell Song*, to enhance and recreate the natural reverberation sound from the original Sixties and Seventies recordings. The Model 224 Digital Reverberator is available with up to a total of nine effects programs — eight reverb programs, and an 8-voice polyphonic chorus. The basic system comes equipped with a Small Concert Hall (program #1) and a Percussion Plate (program #5); other programs can be added as required, by simply inserting the relevant cards.

Room program #14, one of the latest programs to be released by Lexicon, and which Elliot Mazer used primarily during mixdown of *Farewell Song*, is similar to Lexicon's existing Concert Hall programs, except it emulates a space of much smaller size and volume. Like other Hall programs, it is configured as stereo-in, quad-out; the four outputs simulating a chamber with four microphones. According to Lexicon, the Room program "adds the richness of a good live chamber to a voice or drum set, without the metallic sound associated with other reverbs or plates."

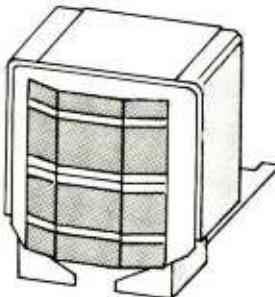
Unlike natural spaces and the other 224 programs, the echo density of program #14 is constant as the sound decays, producing a characteristic smoothness and color; the basic sound is similar to a metal plate. Inputs are mixed digitally before the decay is synthesized, but are added separately in a cluster to the start of the auxiliary outputs B and D. These outputs can be used alone, or mixed with the main outputs A and C to make a clearer sound on vocals.

The 224's remote front panel provides six faders to control the parameters for each preset of Hall program #14:

1. Bass Decay Time is variable from 0.6 to 70.0 seconds.
2. Midrange Decay Time is variable from 0.6 to 70.0 seconds.
3. Crossover Point between bass and midrange — i.e., frequencies affected by parameters 1 and 2 — is variable from 100 Hz to 10.9 kHz.
4. Treble Decay, or the shelving point at which decay begins rolling off, is variable from 100 Hz to 10.9 kHz. Decay time is unspecified but rapid — "just about kills reverb above the selected frequency," says Lexicon.

... continued on page 92 —

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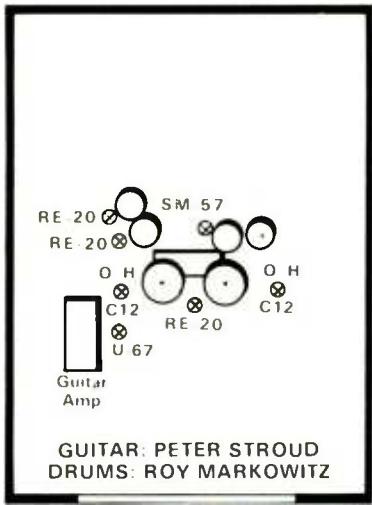
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rhythm section," Mazer recalls. "To improve the voice-to-track relationship, I ran through a locked-together pair of Scamp S01 compressors. Janis is compressed about 1 to 1.5 dB all the time, and the other stuff comes up around her."

Mazer also used a Scamp S03 three-band Sweep Equalizer on each channel: "To fatten the bass drum, I boosted about 8 dB at 85 Hz; to add presence to the voice, +8 dB at 4.2 kHz; and to open the top end of the piece in general, and give it more air, I raised about 6 dB at 10 kHz," he says.

"The particular problem on 'Magic of Love' was that both the band and Janis were singing on the same track and, in a couple of cases, they were louder than she was. When that happened, it was the loudest part of the track, so that stuff got squashed more than anything else, which achieved the desired result: it brought the men's voices down around Janis. And I'm not sure that I didn't hand-ride the compressor a little bit during that particular mix."

The guitars were given some 'dimension' with the Scamp S24 ADT unit, using about 35 milliseconds of delay with no modulation. The bass was equalized through the S03 and compressed with the S01; the drums were run through the S03 to enlarge the bass drum sound, give the snare more attack, and open up the drum sound in general with 5 to 6 dB boost around 14 to 15 kHz.

The ambience of "Magic of Love," which was recorded live in a 2,000-seat hall, was enhanced with the Lexicon 224, using a modified version of Program 14 (see accompanying chart).

"We didn't aim to change the ambience — just to make it a little bigger, more clearly-defined," says Mazer.

On "Misery'n," F-300 gates and S03 equalizers were used to give body to the guitars. The gates cut down on hum, buzz and leakage from the bass and

drums, which were recut.

"Again, even though this was a studio recording, I chose to give it a wide ambience with the 224," explains Mazer. The original tape was a 1-inch 8-track, 15 IPS, with no noise reduction. It was transferred to 16-track at 30 IPS with Dolby-A at His Master's Wheels, where the bass and drums were overdubbed.

"The backing vocals you hear on the record are leakage," Mazer points out. "They were a little out of tune, so I tried to use them as little as possible." He also had to loop the ending, since the take broke down after the last verse. On the downbeat after Janis sings, "... great big bed with two pillows for my head/ but lately I've been sleeping."

sleepin' alone," Mazer alternated the second and third bridges for the fade.

"One Night Stand" was a straightforward mix of the original 16-track plus the 1974 additions, which were done at His Master's Wheels. A small amount of equalization was added with the Scamp rack, but Mazer applauds Todd Rundgren's original production. "He's a brilliant guy in the studio," he says. "Todd got a different sound from what people were normally doing in 1970."

For "Raise Your Hand," Mazer used the Vocal Stressor on the raw mono tape, with a combination of compression, four-band EQ and expansion: "There was some muddy stuff around 500 to 600 Hz I wanted to remove; the voice needed more presence; and I added

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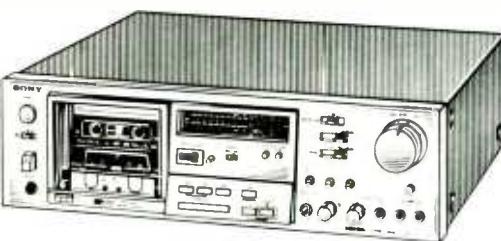
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## views

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How They Did

### Janis Joplin's FAREWELL SONG ALBUM

some at the top to give it some overall brightness." A low-pass gate was used to remove hiss.

"Farewell Song" again used the Vocal Stressor on Janis' voice. The S01 and S03 were used to compress and equalize the guitars, and the S03 to punch up the mono drum track. "There wasn't enough ambience on the tape, so the point of the 224 here was to make the recording sound like Winterland," says Mazer.

"Amazing Grace Hi Heel Sneakers" was a live two-track, equalized with the S03's. "What you hear is what Peter Abrams balanced at the Matrix in 1967," says Mazer.

The closing cut, "Catch Me Daddy," was handled the same way as "Misery'n."

The Lexicon Model 224 digital reverb was programmed specifically for each song as necessary and the music balanced accordingly, says Mazer. "Tell Mama" was recorded outdoors, so I used the 224 to create all the ambience.

'Raise Your Hand' was recorded in a very dead German television studio with no ambience at all; I wanted to give it more of a rock-and-roll, Winterland kind of feel — a round, wide, hollow kind of room.

"Even though 'Magic of Love' was recorded indoors at the Grande Ballroom, there wasn't much ambience on the tape, so we created it with the 224."

In sequencing the songs, "The idea was not to create the impression that they were all recorded at the same time and place," Mazer explains. "The things we were concerned with song-to-song were the general level and the vocal power. There's obviously a very drastic difference between 'Magic of Love,' a four-track recorded in a very live auditorium, and 'Tell Mama,' an overly saturated eight-track recorded outdoors with a different band . . . different everything!"

Elliot Mazer spent a lot of time at home listening to the tapes before proceeding with the final mix. Because the songs ran together, groups of them were mixed in sequence.

"We rehearsed the whole mix," he says. "We had three or four tape machines, and the 224 can be changed with the push of a button.

"I think it took one, maybe two takes to do it. The only thing that would

### RECREATING ROOM AND HALL AMBIENCE ON FAREWELL SONG WITH THE LEXICON 224 DIGITAL REVERB . . . continued —

5. Depth of Reverberant Room. The value specified is an integer from 1 to 70, with 70 representing a room depth of 140 feet.

6. Pre-reverb Delay Time. In Room programs, the decay time ranges from 24 to 140 milliseconds; in Plate Programs, from 0 to 250 milliseconds.

Operating system Version 4 also added a new feature to the Model 224. The amount of diffusion in each reverberation program can be set from the remote panel by holding the "Shift" button while moving the "Depth" control, and allows the user to continuously vary the sound from a smooth "dense" reverb, ideal for drums, to a "crisp," clear reverb for vocals. For Room program #14, the diffusion has an arbitrary scale of zero to 64, and comes up set to about 24. Low values result in very little diffusion, while a setting of 35 to 40 produces the densest sound.

Listed below are the program numbers, six preset settings and diffusion values used on *Farewell Song*:

Song	Program	1	2	3	4	5	6	Shift/ Depth
"Tell Mama"	14	standard						
"Magic of Love"	14	1.8	1.8	540	8.8	23	24	63
"Misery'n"	14	1.8	1.1	540	10.9	23	24	—
"One Night Stand"	14	1.8	3.4	540	10.9	23	40	24
"Harry"	14	standard						
"Raise Your Hand"	14	1.8	1.8	540	4.4	23	24	37
"Farewell Song"	14	standard						
"Amazing Grace/ Hi Heel"	14	standard						
"Catch Me Daddy"	4	0.6	0.6	1000	5.3	0	0	—

happen would be one of us forgetting to turn on a certain machine at the right time, or maybe I tripped running over to start the four-track."

The care, patience and attention to detail that Elliot Mazer put into the enhancement and remixing of the Janis Joplin album *Farewell Song* should, like Janis' music, stand the test of time.

## news

### TOP AUDIO ENGINEERING AWARD TO DR. WILLI STUDER

The Audio Engineering Society has presented its highest award, the Gold Medal, to Dr. Willi Studer, founder and director of the Studer company, for his "lifelong outstanding contributions to the development and making of the highest quality recording equipment."

After accepting the award, Dr. Studer displayed characteristic modesty in his brief remarks to dignitaries attending the awards banquet at the recent AES Convention in Montreux, Switzerland. "It is a great honor for me to be distinguished with this Gold Medal from the AES," Dr. Studer said, "and I wish to express my heartfelt thanks. But really, I hardly know why I earned this medal. I've merely been pursuing my lifelong hobbies of electronics and precision mechanics — to be sure, in the area which seemed most sensible, that of audio electronics."

"I feel fortunate to have been useful in helping our branch of engineering achieve ever higher levels of quality," he added.

The Studer company is distinguished as the only firm in the world fully involved for more than a quarter century in all three main branches of audio — studio recording, broadcasting, and home high fidelity.

### SOUND WORKSHOP ANNOUNCES JAPANESE REPRESENTATION

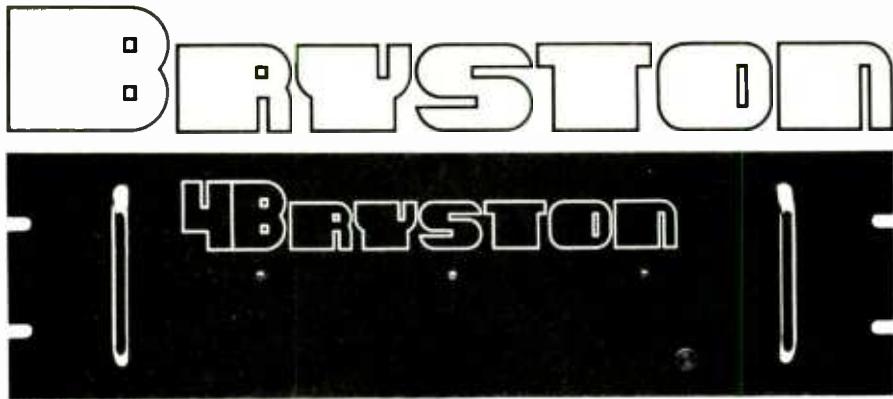
Negotiations were finalized last March at the AES Convention in Montreux, Switzerland, between Mr. Takao Aoki, director of the Otec Corp., and Emil Hanke, sales manager for Sound Workshop, for the representation of Sound Workshop products in Japan. The Otec Corp. is a division of Otari Electric Company, Ltd.

### MICMIX AUDIO PRODUCTS UNDER NEW OWNERSHIP

After months of negotiations, Bill Allen, David Rettig, and Bob Rodgers have purchased 100% of the stock of MICMIX Audio Products, Inc. This privately-owned Texas corporation manufactures professional and consumer audio products, including the Master-Room reverberation systems, along with the Dynafex, a new line of noise-reduction systems.

Babs B. Saul, majority owner, had been seeking to sell the corporation since the death of her husband, John R. Saul, former president and co-founder of

...continued on page 106 —



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## Digital Update

### SONY DIGITAL CAPTURES DIXIELAND'S ROBUST SOUNDS

The Beverly Hills Unlisted Jazz Band, a Dixieland group with strong support in the Los Angeles film colony, recently was recorded live-to-digital at Hollywood's Clover Studio, utilizing Sony's PCM-1610 digital audio processor. Organized two years ago, the Beverly Hills Unlisted Jazz Band's seasoned players include leader trombonist-musician-actor Conrad Janis.

For the band's new digital album on the Los Angeles Theasium's Jazz Chronicles label, free wheeling solos and exciting ensembles sparked such standards as "Washington & Lee Swing," "Yellow Dog Blues," "St. James Infirmary Blues" and "Everybody Loves My Baby." Commenting on the digital jazz session at Clover, leader Conrad Janis said: "We are knocked out by the clarity and the realism of the digital sound. The natural sonic quality of the master tape captures all our strengths. Any musician interested in sound has to react to digital."



Conrad Janis (left) at the Sony DAE-1100 digital editor, with Dan Morehouse, Clover's chief engineer (center), and Theasium director, Harry Babasin.

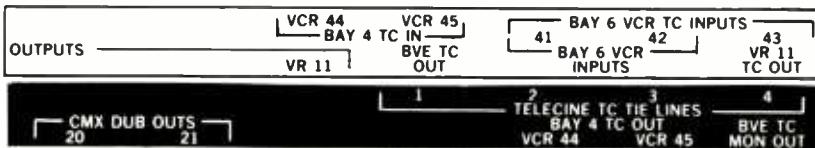
Additional information is available from the AES International Headquarters, 60 East 42nd Street, New York, NY 10165. (212) 661-8528.

### AUDIOFORCE OFFERS MITSUBISHI X-80 DIGITAL TWO-TRACK FOR RENT

The Mitsubishi X-80 digital recorder will be available for rental to studios, musicians or mastering facilities in the New York and Eastern seaboard area, on a daily or weekly basis. Audioforce owner Sid Zimet emphasizes the ease and efficiency of the Mitsubishi unit. "Digital projects that can be done in one or two days are ideal for the X-80, because the machine eliminates the weekly rental charge in favor of a smaller daily rental, and you can edit directly on the machine," he said.

The X-80 has already been used on a live, direct-to-two-track recording at Carnegie Hall of a Canadian group, Starscape Singers. The X-80 is also available at Sterling Sound in New York for disk cutting duties.

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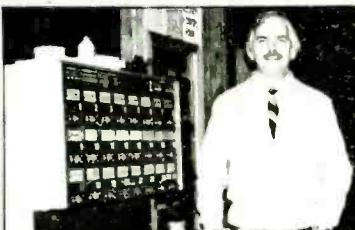
## Northeast:

- **EUROSOUND STUDIO** (New York City) is the newly opened facility run by **Raul Alarcon**. The studio features a Neve console with NECAM automation, feeding a Studer 24-track and half-inch 2-tracks for mastering. 1733 Broadway, New York, NY 10019. (212) 541-6072.
- **KAJEM RECORDING STUDIOS** (Philadelphia, Pennsylvania) is nearing completion of a new lounge and dining area for its Studio A, while new equipment at the facility includes a Sony DRE-2000 digital reverb unit. 1400 Mill Creek Road, Gladwyne, PA 19035. (215) 649-3813.
- **ZEAMI STUDIOS** (New York City), utilizing the services of Harvey Professional Audio/Video, has added two BTX Shadow SMPTE synchronization systems with controllers. The new systems allow sound effects to be dropped in with frame accuracy on a multitrack machine. Zeami will now be able to synchronize 2-, 4-, and 8-track machines with U-matic video cassette decks. 102 Green Street, New York, NY.
- **BROOKLYN COLLEGE PERFORMING ARTS CENTER** (Brooklyn, New York) has taken delivery of a custom APSI Model 3000 audio console designed to provide 4-channel sound reinforcement, audio recording, and broadcast mixes. Brooklyn, NY.
- **SONIC SOUND STUDIO** (Freeport, New York) has purchased a new MCI JH-24 24-track recorder from Harvey Professional Audio/Video. Freeport, NY.
- **KINGDOM SOUND STUDIOS** (Long Island, New York) has installed a new Trident TSM console with floppy-disk automation, and announces the appointment of **Dee Deis** to the position of studio manager. 6801 Jericho Turnpike, Syosset, Long Island, NY 11791. (516) 364-8666.
- **UNIQUE RECORDING STUDIOS** (New York City) has taken delivery of a new, fully-automated MCI JH-636 32-in/24-out console, equipped with eight VCA subgroups. This addition complements the Otari MTR-90 24-track recorder and the Ampex ATR-100 machines, all of which are fitted with Dolby-A noise reduction. **Joanne Georgio** is Unique's studio manager. 701 7th Avenue, New York, NY 10036. (212) 921-1711.
- **TROD NOSEL RECORDING STUDIOS** (Wallingford, Connecticut) has purchased a new MXR Pitch Transposer and several new Shure SM-58 microphones. Also, the studio's monitoring system has been upgraded with the re-tuning of its Altec 604 Big Reds for a "flatter response," and the addition of a set of Visonik David speakers. Instant comparisons can now be made between the Altec 604's. ADC bookshelf's and the new Visonik Davids. 10 George Street, Wallingford, CT 06492. (203) 265-0010.
- **NORTH LAKE SOUND** (North White Plains, New York), a 24-track facility, complete with live-in accommodation, has added a Lexicon Model 224 Digital Reverb, and Linn Drum Computer. 3 Lakeview Drive, North White Plains, New York 10603. (914) 682-0842.

## Southeast:

- **CHESHIRE SOUND STUDIOS** (Atlanta, Georgia) has opened its second automated 24-track studio, and has acquired a new MCI JH-636 automated console and an Ampex MM-1200 24-track for its first room. The new studio features an MCI JH-428B automated console, interfaced with an Ampex MM-1100 24-track equipped with dbx noise reduction. 2093 Faulkner Road North East, Atlanta, GA 30324. (404) 633-6626.

## South Central:

- **BELMONT COLLEGE** (Nashville, Tennessee) has taken delivery of a Studer A-800 24-track recorder, which will be used by students enrolled in the Music Business Program of Belmont's School of Business. The purchase of the new A-800 marks the first phase of an ambitious studio upgrading program initiated by **Dr. Jay Collins**, director of the Music Business Division. Later stages of the program call for the purchase of a new automated console and signal processing gear, and the renovation of the studio and control room. "We want to get students familiar with the equipment they would be using should they leave here, as some will, to find a job in a state-of-the-art studio setting," says Dr. Collins. "We don't want to be one step behind the industry. I think we should approach our program the same way they approach teaching at a medical school. You expect them to have the latest and very best equipment, and that's what I think we should have here." Nashville, TN.  


recording studios. One of the new rooms is capable of accommodating 50 musicians, while the other comprises a 240-seat theater with a 30-by 40-foot stage, dressing rooms, and  $\frac{3}{4}$ -inch video capability. The theater boasts a Baldwin studio piano and a Gulbransen theater organ. A 2,500 square foot engineering wing supports the two rooms with a full in-house technical and engineering staff. Phase Two of the Roxy Production Center will include a 60- by 90-foot television sound studio, and a similarly sized audio room. 827 Meridian Street, Nashville, TN 37207. (615) 227-0920.

- **THE SOUND EMPORIUM** (Nashville, Tennessee) was the site of the digital mix of Joe Waters's upcoming single, "The Queen of Hearts Loves You." A JVC 2-track digital recording system was supplied for the dates by Mastertronics of Nashville. Nashville, TN.

□ **RECORDING INDUSTRY MANAGEMENT SOUND STUDIO** (Murfreesboro, Tennessee), an operation of Middle Tennessee State University, has upgraded with the addition of a new MCI JH-24/16 recorder fitted with Autoloocator III, and a complement of test equipment including a new Tektronix 2213 oscilloscope, a B&K precision Frequency Counter, and a B&K Precision Signal Generator. A Yamaha C-5 Grand piano has also been purchased by the studio. Box 21, Middle Tennessee State University, Murfreesboro, TN 37132. (615) 898-2813.

- **THE TOYBOX STUDIO** (Brentwood, Tennessee) has upgraded from 16 to 24 tracks with the purchase of a new Studer A-80VU multitrack recorder, and a Harrison MR-3 console. Also included in the upgrade package are a Studer A-80 2-track, a Revox PR99 2-track, a Lexicon Model 224 digital reverb, and a rack of Rebis signal-processing devices. The Toybox is owned by **Tom T. Hall**. Brentwood, TN.

□ **THE SOUNDSHOP** (Nashville, Tennessee) has appointed **Travis Turk** to the post of studio manager. Working with Turk will be newcomer **Clifton Harris**, as well as regulars Sherry Roney, Mike Bradley, and Mike Black, and Rick Landers. 1307 Division Street, Nashville, TN 37203. (615) 244-4149.

- **GOLDEN TRIANGLE RECORDING** (Denton, Texas), formerly Average Joe Studios, has totally remodeled its 8-track facility utilizing a nine-sided, Live-end/Dead-end control room design. New monitors are Yamaha NS-1000's, while the instrument list has been updated with the addition of a Sequential Circuits Prophet 5 synthesizer, and a Gretsch wood-shell drum kit. **Darwin Grosse** is the resident engineer. 313 North Locust, Denton, TX 76201. (817) 566-2367.

## Midwest:

- **SOLID SOUND RECORDING STUDIO** (Hoffman Estates, Illinois) has acquired a new Otari MTR-10 half-track mastering machine with autoloocator, a Studio Technologies Ecoplate II, a Baldwin Grand Piano, and an Aphex Exciter. 2400 West Hassell Road, Suite 430, Hoffman Estates, IL 60195. (312) 882-7446.

**THE MAUD MOOD WEYERHAEUSER STUDIO** (St. Paul, Minnesota), the production facility of Minnesota Public Radio, has installed a 3M Digital Mastering System, making MPR probably the first broadcasting operation in the United States to be equipped with a multitrack digital recording and editing system. "The acquisition of 3M's Digital Mastering System and Digital Editor will enable MPR to produce and broadcast programming with the finest quality sound technologically possible today," commented Tom Voegelei, Vice President of MPR Productions. "Because MPR transmits programming to public radio stations nationwide, listeners across the country will now have the opportunity to enjoy these sonically superior productions. The equipment will also be used by the commercial recording artists who lease the Maud Moon Weyerhaeuser Studio for their productions." MPR, referred to as the "flagship of the national system," has already earned a reputation for its quality productions. The network has won three Peabody Awards in the last four years for its programs, and currently produces and distributes more programming for the public radio system than any other station-based entity. 45 East Eighth Street, St. Paul, MN 55101. (612) 221-1525.



**AUDIO GRAPH PRODUCTIONS** (Haslett, Michigan) announces the appointment of **Charles Norton** to the engineering and production staff. Audio Graph is a full service production company, with Wildwind Sound Studio as its in-house recording facility. The 8-track studio features a music room with Live-end Dead-end design, a Tangent console feeding a TEAC 80-8 recorder with full dbx noise reduction, JBL 4311 monitors, plus mixes by Beyer, Shure, Sennheiser, and Electro-Voice. Instruments include an Oberheim OBX-A synthesizer, and vintage Fender, Gibson, and Marshall amps. **Marvin Hall** is the owner of Audio Graph. 6285 Reynolds Road, Haslett, MI 48840.



**THE UNIVERSITY OF ILLINOIS EXPERIMENTAL MUSIC STUDIOS** (Urbana-Champaign, Illinois) has acquired two Professional Series amplifiers donated by the Phase Linear Corporation. The Experimental Music Studios consist of five laboratories and two workshops where approximately 100 students per semester follow an intensive curriculum of research and composition. Urbana-Champaign, IL.

**PEPPERHEAD SHOWCASE STUDIO** (Madison, Wisconsin) is a new fully equipped 16-track recording facility featuring an in-studio "live" recording capability, tied to a syndicated radio broadcast concept. The announcement was made by studio owner, **Stephen Wilcox**. The studio has a specially-designed glass control room to provide visibility from a large "live" room, which will hold an audience of up to 150 people, into a more typical acoustically damped studio room, where bands will set up and perform on showcase nights. 3602 Atwood Avenue, Madison, WI 53714. (608) 241-2001.

#### Mountain:

**KLUDGIT SOUND** (Santa Fe, New Mexico) has upgraded to 24-track with the installation of an MCI JH-24 24-track transformerless tape machine, a Sound Workshop Series 40 30-in/24-out mixing console with 32-channel ARMS automation, a Lexicon Model 224 Version 4.4 digital reverb unit, and UREI Time-Aligned and JBL Bi-Radial monitors powered by a UREI 6500 amp. The facility is owned and operated by **Baird Banner**, P.O. Box 171, Cerrillos, NM 87010. (505) 471-0051.

#### Southern California:

**CONWAY RECORDING STUDIO** (Hollywood) has taken delivery of a second Studer 24-track recorder that can be locked to Conway's existing Studer multitrack via an Audio Kinetics Q-Lock synchronizer. Waterland Tecno Sonics Ltd. handled the control room alterations, which included a new tape machine bay on one side of the room, and similarly sized lounge area opposite to maintain the room symmetry. **George Augspurger** of Perception Inc. was responsible for the new room voicing. 655 North Saint Andrews Place, Hollywood, CA 90004. (213) 463-2175.

**STUDIO 55** (Los Angeles) announces the addition of **Roman Olearczuk** to the technical staff. For the past four years, Olearczuk served as Technical Director for Rusk Sound Studios in Hollywood, and was recently appointed a consulting editor for *R-e p*. The announcement was made by Studio 55's studio manager, **Larry Emerine**, 5505 Melrose Avenue, Los Angeles, CA 90038. (213) 467-5505.

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**ARTISAN INSTALLS FIRST GERMAN PARAM AUTOMATED EQUALIZER IN THE U.S.**

Artisan Sound Recorders (Hollywood) has installed a Leunig PARAM automated equalizer — the first in the United States. Installation was supervised by Reudiger Barth of Hamburg, and Sierra Audio's Vencil Wells. The PARAM is a 32-channel 6-deck parametric, computer-controlled equalizer. The system is the only one in the world that provides automated equalization; it is programmed via a central joystick, allowing the engineer to draw the curve on a video display. This graphically presents the curve while showing interaction between bands. By bypassing in-console EQ, a resultant signal-to-noise of better than 90 dB can be achieved — quieter than any console in use today. A total of 64 completely different "looks" at the set-up of the PARAM console may be stored during a mix, allowing the ultimate in flexibility. All settings can be recalled from memory at any time during a mix. Long-term storage of console settings can be done on any type of audio tape format. Some four dozen standard EQ curves can be preset and stored for recall, and any channel can have an instantaneous A/B comparison of two complex EQ settings. This PARAM installation is described as the crowning touch on Artisan's newly opened "Variable Acoustics" studio, which presently is block-booked by producer/engineer Hank Cicalo. The PARAM system will also be available for rental. It has already been used by REO Speedwagon in the preparation of the forthcoming new EPIC album currently recording at Kendun Recorders Studio D, 1600 N. Wilcox, Hollywood, CA 90028. (213) 461-2751.

**Northern California:**

- BAY SOUND REPRODUCTION** (Oakland) has enlarged its control room and upgraded to 16-tracks with the purchase of a new 3M Series 79 tape deck with Search-to-Cue. 5 Yorkshire Drive, Oakland, CA 94618. (415) 655-4885.
- HEAVENLY RECORDING STUDIOS** (Sacramento) has moved into its new Jack Edwards-designed facility. The control room features a Quad-Eight Pacifica console feeding an MCI JH-16 24-track machine, and two MCI JH-110B 2-tracks. The new UREI 6500 power amp drives UREI 813-A, JBL 4311's, and Auratone monitors. Outboard gear includes 28 channels of dbx noise reduction, an AKG BX-20 spring reverb, Lexicon Model 224 digital reverb, Marshall Time Modulator, Eventide Harmonizer, and a collection of compressors and limiters. Mikes are by Shure, Sennheiser, Electro-Voice, Neumann, AKG, and Crown. 620 Bercut Drive, Sacramento, CA 95184. (916) 446-3088.
- BODACIOUS AUDIO MOBILE RECORDING SPECIALISTS** (San Mateo), in conjunction with Concert Music Design of San Carlos, California, now offers a Harrison 24-input Alive console, EMT 250 digital reverb, a full Audio & Design Scamp effects system, ADR Vocal Stresser, ADR parametric EQ, and an Eventide Harmonizer. 4114 George Avenue Number 1, San Mateo, CA 94403. (415) 573-5297.
- MOBIUS MUSIC RECORDING STUDIO** (San Francisco) has recently installed an MCI JH-24 16-track recorder with Autolocator III. 1583 Sanchez, San Francisco, CA 94131. (415) 285-7888.



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## STUDIO UPDATE

FACILITIES  
EQUIPMENT  
PEOPLE

**DIFFERENT FUR RECORDING** (San Francisco) has installed Studer multitrack and mastering machines in its John Storyk-designed control room. Explains studio manager Susan Skaggs: "After listening to the latest Studers, rather than just get a new A-80VU MkII 24-track as we originally planned, we went Studer throughout. Now our clients can begin their projects on the Studer 24-track, and then choose either Studer  $\frac{1}{4}$ -inch or  $\frac{1}{2}$ -inch for their two-track mastering." **Pat Gleeson** is Different Fur's owner. *3470 19th Street, San Francisco, CA 94110. (415) 864-1967.*

**OUT THERE RECORDING STUDIOS** (Belmont) is a new 8-track studio owned and operated by **Robert Firpo** and **Cookie Mareno**. The facility is equipped with Otari multitrack and mastering machines, a Sound Workshop Series 20 console, MICMIX Master Room XL 305 reverb, and mikes by AKG, Electro-Voice, Sennheiser, and Shure. The control room was tuned by Sonic Landscapes, and the music room is augmented by two isolation booths. The studio's instrument list boasts a Steinway 7-foot grand piano, a Sequential Circuits Prophet 5 and SMS Voice 400 synthesizers and sequencers, a Hammond B-3 organ, a Fender Rhodes piano, Muser Pro-Vibes, and hundreds of percussion instruments. Special effects units include a 4-channel 350 watt Walter Woods amplifier. **Bob Orban** has been acting as consultant to the studio, which is located in the Belmont Hills. *P.O. Box 874, Belmont, CA 94002.*

### Northwest:

**TRIAD STUDIOS** (Redmond, Washington), a newly opened 24-track facility, has installed a new JBL 4430 monitoring system, and added an Aphex Aural Exciter to its list of outboard equipment. *4572 150th Avenue North East, Redmond, WA 98052. (206) 881-9322.*

**THE MUSIC SOURCE** (Seattle, Washington) has been utilizing the new AKG BX-25ED Reverberation and Digital Delay System. The new AKG unit, which features four pre-reverb delay lines, was made available through the cooperation of Ray Bloom and Matrix Marketing of Seattle. The Music Source is an MCI-equipped 24-track studio with video post-production facilities. *615 East Pike Street, Seattle, WA 98122. (206) 323-6847.*

### Canada:

**ULTRASOUND** (Montreal) has built a new 24-track facility with equipment supplied by Richard Audio, Inc. The studio is fitted with a Soundcraft Series 2400 28-in/24-out console, and an SCM-762-24 multitrack. Monitors are UREI 813's with UREI amplification, and mixdown machines comprise an Ampex ATR-102 and an Otari MX-5050B. Outboards include Symetrix noise-gates, MICMIX Master Room reverb, and Delta Labs DL-5 and DL-4 digital delay lines. Mikes are by AKG, Sennheiser, Neumann, and Audio-Technica. *Montreal, Canada.*

**STUDIO ST. CHARLES** (Longueuil, Quebec) has upgraded its 24-track facility with the installation of a set of UREI 815 monitors. *Longueuil, Quebec, Canada.*

**PRODUCSON** (Montreal) has added a Studer A-80 2-track machine to complement its existing Scully 280 deck. *Montreal, Canada.*

**MUSHROOM STUDIOS** (Vancouver) has appointed **Linda Nicol** to the position of studio manager. Nicol began her career with Mushroom Records in 1976 as assistant to the promotion director, and by 1978 held the post of promotion coordinator for Western Canada.

# STUDIO

FACILITIES  
EQUIPMENT  
PEOPLE

# UPDATE

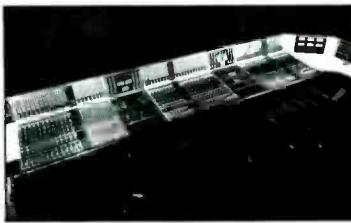
She assumed the post of production manager for the studio when it was sold in 1979. 1234 West 6th Avenue, Vancouver, Canada, V6H 1A5. (604) 734-1217.

□ **STUDIO VERT** (St. Hubalde, Quebec) has installed a new Soundcraft 2400 24-in/24-out console. St. Hubalde, Quebec, Canada. □ **STUDIO SON' AUBERGE** (Montreal) has upgraded from 8- to 16-track operation with the purchase of a TEAC Tascam 85-16 16-track equipped with dbx noise reduction. Other new gear includes a Tascam 2-track, Tannoy monitors, and AKG BX-10 spring reverb. Montreal, Canada.

□ **ROUND SOUND STUDIOS** (Weston, Ontario) now offers audio sweetening for video tape post-production. The studio has acquired an Audio Kinetics Q-Lock 3.10 synchronizer with Gen-lock to provide SMPTE timecode and three machine sync for its JVC  $\frac{3}{4}$ -inch VCR, MCI multitrack and Otari MTR-10  $\frac{1}{2}$ -inch 4-track machine. 357 Ormont Drive, Weston, Ontario M9L 1N8. (416) 743-9979.

#### Great Britain:

□ **PINEWOOD STUDIOS** (London, England) has taken delivery of a fully custom-designed 60-channel, 32-group film post-production mixing console manufactured by Theatre Projects, Ltd. The desk incorporates three operator stations, which are separated by intermediate sections containing ancillary equipment such as panners and limiter/compressors. The console was designed for ease of service and future modification. One of the unique features of the board is said to be Theatre Projects' Multipan System, which consists of six X-Y joystick controls. These, together with the Master selection unit and a microprocessor system, provide a multichannel, programmable memory panning system. The joysticks can also be linked to provide parallel panning of separate sources, thus allowing for separate dialogue, music and effects mixes until the final mix is made. London, England.



#### South Korea:

□ **JIGU RECORDING STUDIO** (Seoul, South Korea) is a new facility owned by **Jeong Soo Lim**. The studio is equipped with a Neve 8066 20-in/16-out console, interfaced with a Studer A-800 multitrack and an A-80 for mixdowns. **Tae Kyung Lee** is the studio manager. 233-1 Daeja-Ri, Byokje-Eup, Koyang-kun, Kyunggi-Do, C.P.O. Box 2539, Seoul, South Korea. (387) 3111-3.

Studio Update is intended for R-e/p readers to report equipment additions and upgradings, new service offerings, and personnel changes. Photographs (black and white or color) are always appreciated, as are quotes concerning why a particular piece of equipment was selected for your studio.

Submissions for Studio Update should include the address and phone number of the audio or video facility, and should be sent to:

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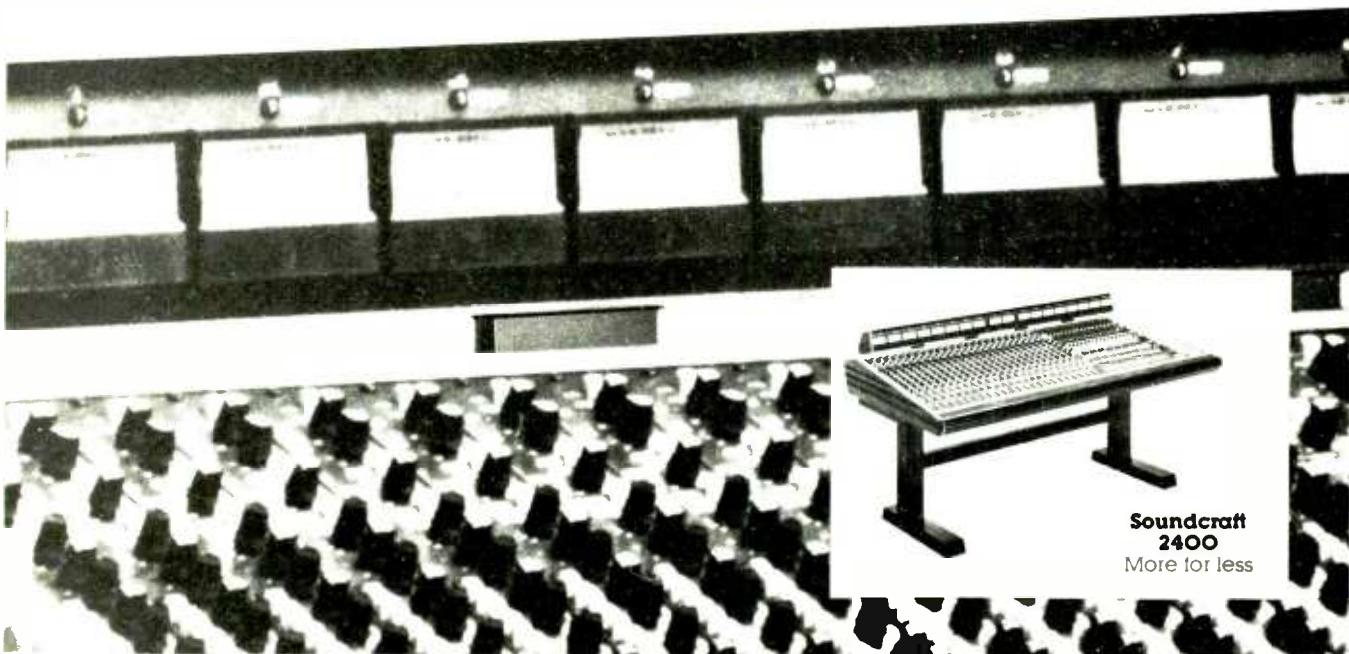
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## STUDIO UPDATE

FACILITIES  
EQUIPMENT  
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### AUDIO/VIDEO UPDATE —

#### Eastern Activity.

□ **REEVES TELETAPE** (New York City) reports that Steve Kahn, head of RCA Record's video department, has returned to Reeves to edit two video promotions by War from their upcoming album. "You've Got the Power" and "Outlaw" feature the group performing with special effects and quick cuts to vignettes that illustrate the lyrics. Kahn produced and directed the promos and worked at the facility with editor Barry Waldman and his assistant Wendy Friend. 304 East 44th Street, New York, NY 10017. (212) 573-8888.

□ **VIDICUE** (New York City), a division of Cue Recordings, is now offering comprehensive audio-track production and sweetening services for video. The operation utilizes a VCR/multitrack-ATR slave/master interlock system to allow the audio track and SMPTE timecode from 1- and 2-inch video tape to be transferred on to  $\frac{1}{4}$ - or  $\frac{1}{2}$ -inch audio tape, in order to bypass the quality loss of VCR's. Audio signal processing gear at the studio includes a collection of equalizers, noise gates, compressor/limiters, filters, and reverb. Music and vocal recording is also available, as is an extensive sound effects library. 1156 Avenue of the Americas, New York, NY 10036. (212) 921-9221.

#### Central Activity.

□ **OMEGA AUDIO** (Dallas, Texas) was recently in Tulsa, Oklahoma, with its remote truck for a video shoot with Quarterflash. The rig was called upon to record 24-track audio linked via SMPTE to the video portion of the program. The concert was taped for Warner Amex's MTV Music Channel by producers Gowers, Fields, and Flattery of Los Angeles. Video facilities were supplied by AVT Television, Knoxville, Tennessee. Engineering was by Paul Christensen, Russel Hearn, and Ken Paul. 8036 Aviation Place, Box 71, Dallas, TX 75235. (214) 350-9066.

#### Western Activity.

□ **KAY-SMITH STUDIOS** (Seattle, Washington) recently completed construction of Studio C, which contains a computer-oriented  $\frac{1}{2}$ -inch video off-line editing system. Included in the room is an MCI 24-track recorder, MCI Series 500 console, and two Sony BVU-800 video editing transports. Also available is a complete BTX Shadow control system, with console, for SMPTE synchronization of the  $\frac{1}{2}$ -inch video decks with the 24-track and 2- or 4-track recorders for sweetening, mixing and editing of audio and video source material. 2212 4th Avenue, Seattle, WA 98121. (206) 624-8654.

□ **HOUSTON RECORDING** (Sonoma, California) recently supplied its mobile recording truck to provide audio for video taping of Earth, Wind and Fire at the Oakland Coliseum. The mobile unit was outfitted with dual 24-track recorders, 2-tracks and cassette decks, while supplying a simultaneous stereo feed to the VTR machines. Engineering was handled by Maurice Leach and Rich Houston, assisted by Fred Runner and Kathy Meyer. 2355 Sobre Vista Road, Sonoma, CA 95476. (707) 996-8881.

□ **BUZZY'S RECORDING SERVICES** (Los Angeles) has expanded its audio operation to include a computer-controlled video system designed especially for automatic dialogue replacement, narration to picture, audio sweetening and mixing, and video scoring from four different production music libraries. The heart of the frame-accurate system is the Commander II video editor, which utilizes SMPTE timecode and/or control track to interlock the multitrack machines to  $\frac{1}{2}$ -inch video cassette playback. CMX-compatible edit-list management, a programmable talent cue system, and an "auto-mute" function have also been incorporated for faster, more efficient production. The studio also provides a comprehensive sound effects library, dbx and Dolby noise reduction, 16 mm and 35 mm mag transfers, and a full range of audio services. 6900 Melrose Avenue, Los Angeles, Ca 90038. (213) 931-1867.

— continued from page 93 . . .

MICMIX, who died in January 1981. The new owners have been long-time employees of the company. Bill Allen, former sales manager has assumed the role of president. David Rettig, who formerly served as production manager, will be vice-president secretary, and Bob Rodgers will assume the position of vice-president treasurer of the corporation.

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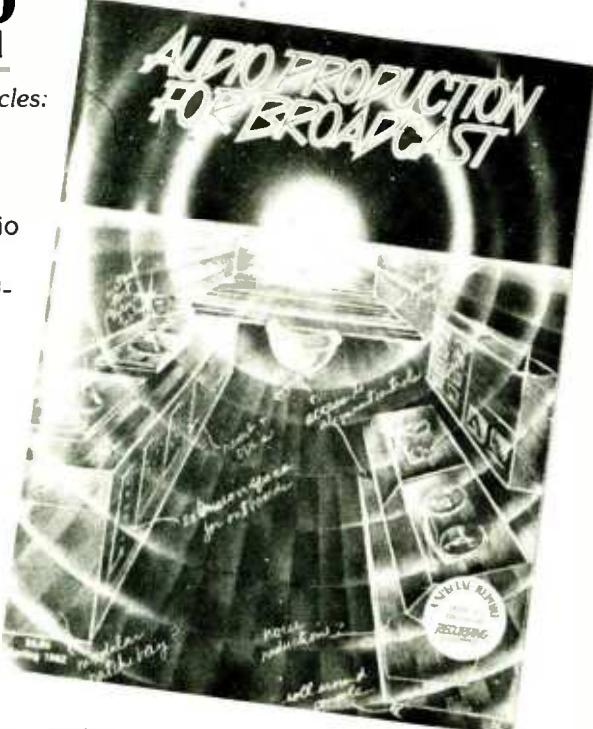
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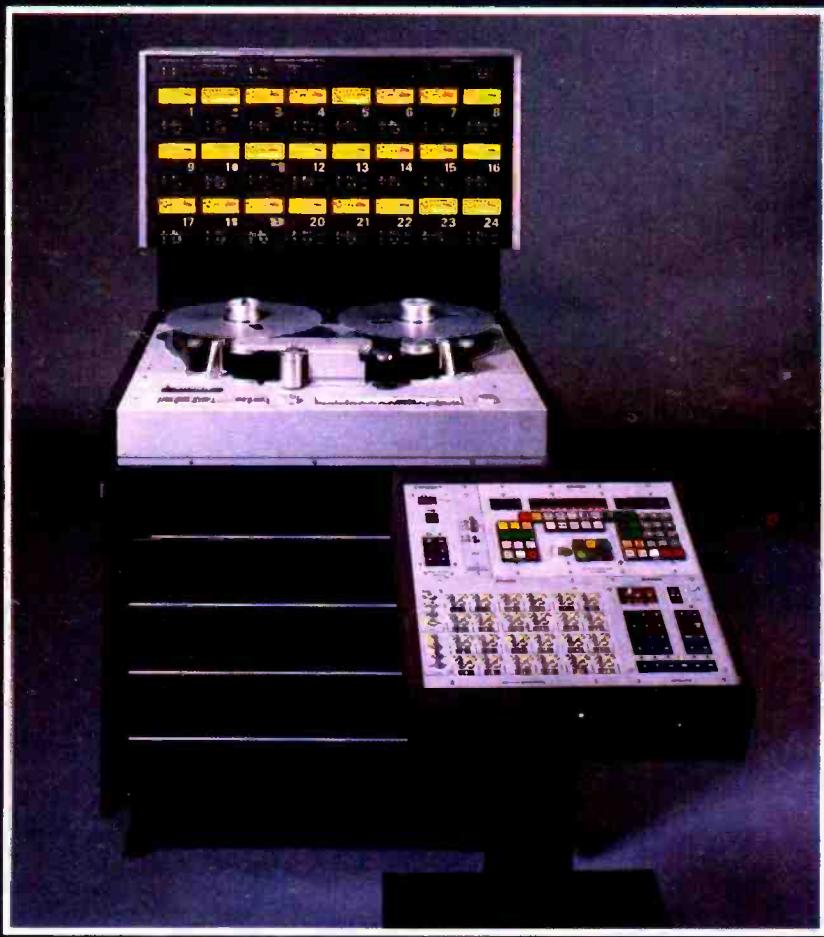
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Gotham Audio Corporation . . . . .	93
Hardy Company . . . . .	48
Hy James . . . . .	77
Institute of Audio Research . . . . .	88
Jensen Transformers . . . . .	89, 98
Lake Systems . . . . .	105
Lakeside Associates . . . . .	59
Lexicon Inc. . . . .	45
Linear & Digital Systems Inc. . . . .	94
MCI . . . . .	5
MXR Pro Audio . . . . .	31
Magnetic Reference Lab . . . . .	101
MICMIX Audio . . . . .	99
Mike Shop . . . . .	58
McLeyvier . . . . .	39, 40, 41
Sye Mitchell Sound Company . . . . .	26
Rupert Neve Inc. . . . .	8
New England Digital . . . . .	11, 15, 17, 81
Neumann . . . . .	93
Omega Recording School . . . . .	92
Omnicraft, Inc. . . . .	46
Orban Associates . . . . .	79
Otari Corporation . . . . .	24
Pro Sound, Film & Video Inc. . . . .	97
Polyline Corporation . . . . .	84
Professional Audio Services . . . . .	102
Pro Audio Systems . . . . .	80
Professional Recording & Sound . . . . .	85
Restoration . . . . .	86
Rumbo Recorders . . . . .	37
Saki Magnetics . . . . .	50
SESCOM Inc. . . . .	90
Shure Brothers . . . . .	108
Sierra Audio . . . . .	9
Sound Workshop . . . . .	29
Standard Tape Labs . . . . .	12
Studer Revox/America . . . . .	107
Studio Technologies . . . . .	103
Summit Audio . . . . .	86
Suntronics . . . . .	67, 90, 104
TAD/Pioneer . . . . .	75
TDK . . . . .	53
Tascam Div./TEAC Corp . . . . .	54-55
Tom Hidley Design . . . . .	9
TAPCO . . . . .	61
3M Companies . . . . .	23
Trident Audio . . . . .	73
UREI . . . . .	47
URSA Major . . . . .	63
Valley People . . . . .	57
Westlake Audio . . . . .	49
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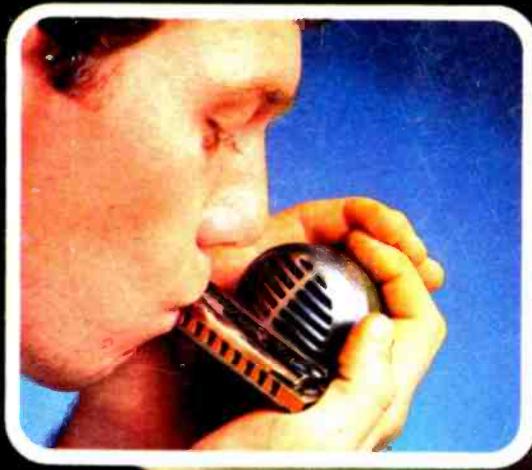
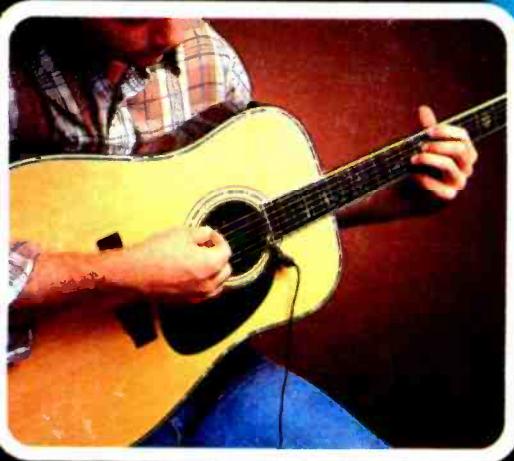
STUDER has established a *multitrack* record, having pioneered most of the functional innovative features found in multitrack recorders today. STUDER remains the standard-setter for the entire industry, producing a steady succession of technological breakthroughs.

The A800 is another one.  
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