

**Profile:**  
**Ian Stewart**  
"The Sixth Rolling Stone"

ICD C8560  
\$1.95

# MODERN RECORDING & MUSIC

VOL. 6 NO. 9  
JUNE 1981

## a session with: Rick Wakeman

**PRACTICAL ELECTRICAL**  
—Part III

**LAB REPORTS:**

dbx Model 20/20 Computerized  
Equalizer/Analyzer

MXR Dual Limiter

Nakamichi 1000ZXL  
Cassette Recorder

**HANDS-ON REPORT:**

Tapco EX-18 Crossover

**NOTES:**

Caring for Tube-type M.I. Amps

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PRODUCTS  
AND REVIEWS



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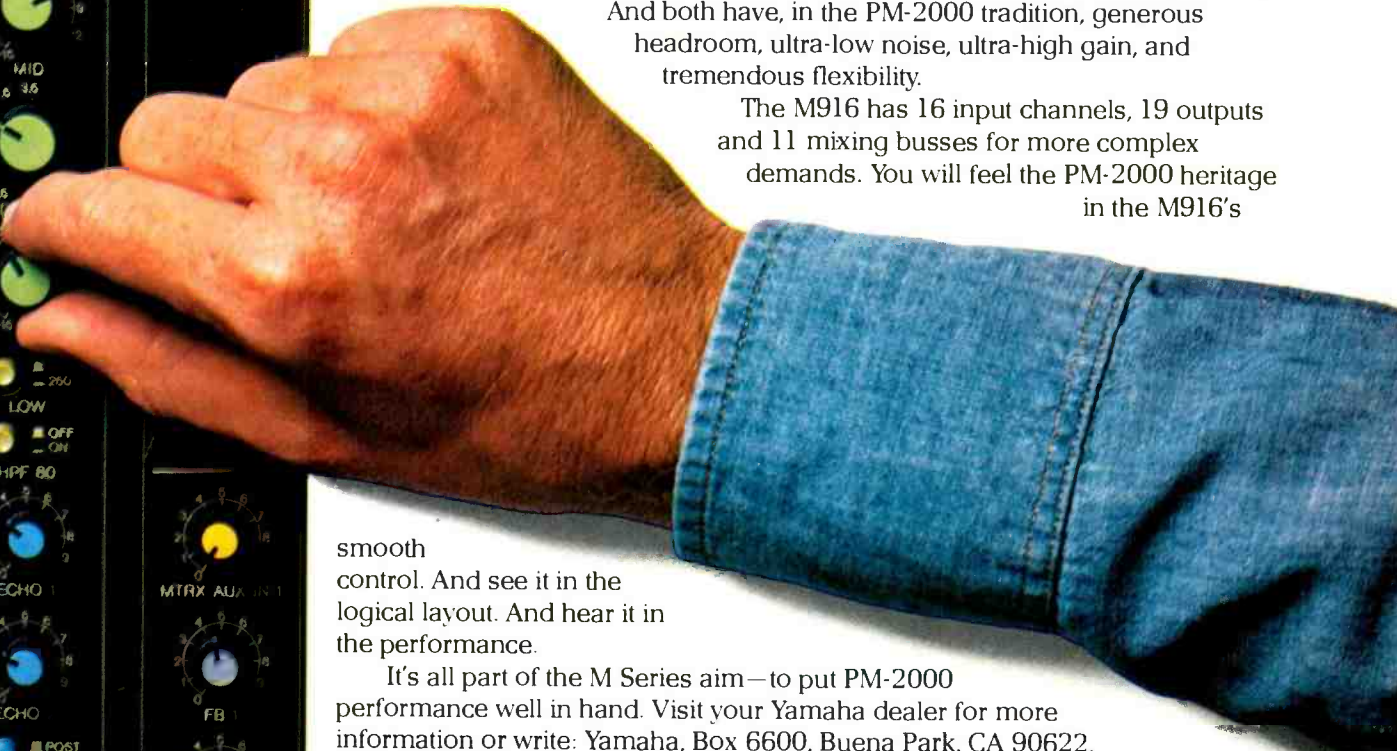
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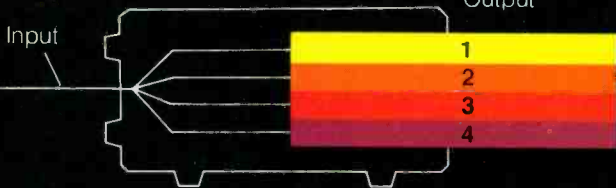


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# MODERN RECORDING & MUSIC

JUNE 1981  
VOL. 6 NO. 9

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### PRACTICAL ELECTRICAL: PART III

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36

In the final installment of this feature, Brian recaps previous parts, and takes us through the myriad world of electrical service hardware.

### A SESSION WITH RICK WAKEMAN

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A new celluloid hero? Rick Wakeman, no stranger to film scoring, worked on Ken Russell's *Lisztomania*, and now is working on the soundtrack to a forthcoming horror movie, *The Burning*. MR&M reports on some of his spine-tingling views on the importance of sound in film.

### PROFILE: IAN STEWART

By Jeff Tamarkin

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Everyone's heard of the Rolling Stones, but Rocket 88 is a new one to many of us. Both bands, however, credit Ian Stewart's talent and drive. Some call him the "sixth Rolling Stone," and he now shares some insight into fame, boogie-woogie and life without Mick.

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By James F. Rupert

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James F., fresh from the wombat farms in Nebraska, brings us *unique* guidance on the owning & operating of the small studio.

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*A Session with Pablo Cruise*  
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*Multi-Track Magic, Part II*

Cover Photo: Doug Hanewinkel  
Rick Wakeman Photos: Doug Hanewinkel  
Ian Stewart Photos: Courtesy of Atlantic Records

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# LETTERS TO THE EDITOR

## Regretted Neglect

*We regret to mention that in the Groove Views column of our March 1981 issue, we omitted Robert Henschen's name on the opening page. He wrote the review of the Kerry Livgren album, Seeds of Change. In punishment of ourselves for this oversight, we are making ourselves write, 100 times, Robert Henschen, Robert Henschen, Robert Henschen...And we will never make that mistake again. Sorry.*

## Quad in the Crystal Ball

*There are some vocal people out there who have something to say about quadrasonic sound.*

Move over! I want to get in on this quadrasonic debate with a few well chosen facts from my own personal experiences.

It was Mark Twain who said, "The reports of my death are greatly exaggerated," and Q.P. is in the same looking-down-its-nose position relative to its detractors, who, I have noticed, are all self-serving and pretty well locked into their present positions.

I agree with Mr. Feldman about the dealer/demonstration problem since I ran that mile back in 1967 with Sears Roebuck & Co. and Allied Radio, who wanted me to provide (read: "pay-for") the rooms to install my four-channel (four channel is correct), system in their stores. *Think* about that single problem alone: where in the Hell can you find a dealer who's willing to allocate precious floor space to a four-channel demo setup? Which is what is needed.

And as for SQ, QS, and CD-4 systems; they were and are, all *only* compromises, in which the engineers tried desperately to squeeze 4-channels of information into 2 channels of record grooves, or bluntly, to put four pounds of soap into a two pound bag. The net result was "NOT all that much better."

I used to (and you out-there can still do it) play four-channel SQ, CQ et al., over their required decoders (so called), complete with amps and 4 speakers. Then by switching, *by-pass* the decoders, cross over two speakers and play the same record or tape *without* decoding but with the four amps and squawkers. There is very, very little difference that can't be explained by salesman's hype. Yet, this is the system it was attempted to sell in the early 70's which was simply *not* that much better or different. You can also try a two channel stereo, or even a mono, with 4 channels of amp/speaker and be pleasantly surprised. It's the 4 amps/speakers doing the job. But don't take my word—try it.

The long and the short of which is that I too quietly and scientifically ran a market test of a 4-channel system back in 1967-69 and went broke to the tune of 75 thousand dollars (which was all I had). For more details see my patents Nos. 3,360,073 and 3,710,034 (don't write me for copy—buy your own—US Patent Office—50¢ each). I was too small to offset the phony clamor of the biggies, and their destroying of the market with junk.

It turns out that the problem of the recreation of the true ambient sound and the proper recording of live material is one hell of a problem, which all the ads for expensive, complex devices in your magazine certainly proves. There is *no* Royal road to perfection.

# Sense the heat.



Freddie White  
Earth, Wind & Fire

You're smokin' along in the driver's seat, setting up the bottom line for the dancers and the groovers. You turn on some intensity and push all the way through. Your cymbals are in constant motion as you get to where the ultimate job of creating is. Over and over, after each crash, you keep sensing the heat.

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There is, however, *no doubt whatsoever* that quadraphonics will come, will be accepted, will be standard and will replace the present stereo (no matter how much money is invested, in present production facility)...and by 1986. Any new technology—if it is a true and better innovation and is salable—will be accepted, and supplant its inferior competitor/predecessor. It's a law, as everyone knows. Four-channel, discrete with proper delay equipment, is far, far and away superior to any present

available equipment. Now all we need, we pioneers, is to get proper demonstrations to the public...i.e. market it. And...we will.

—Edward J. Murry  
 Doctor of Physics-Acoustics  
 Surround Sound, Inc.

### Punching In and Out

I recently came across the July 1980 article by Craig Anderton, on foot-switching the TEAC 3340. However, he

must be referring to the model A3340 or A3340-S, as my old 3340 does not have a remote out socket in the back. (My deck is the one with the lever function switch, rather than the solenoid switching).

Is there any way I can rewire my deck, so that I can use a footswitch to punch in or out? I have a friend who is an electronics engineer who could do the work.

—Ron Kalstein  
 Philadelphia, PA

*We have a response from Craig Anderton, himself:*

I think you might want to check with TEAC on this one to be sure, but I doubt that it would be possible to use a remote with mechanical (rather than electronic) switching. However, if you can do rolling punches with the machine then I would assume that the record button is simply something like an SPST switch. If it is, you could add another SPST footswitch in parallel with the record button so that you could at least have footswitch controlled punch-in (better than nothing, for sure). If you have to move a lever to go out of the record mode, though, I don't think you'll be able to install a punch-out footswitch.

Good luck, and thanks for your interest in my article.

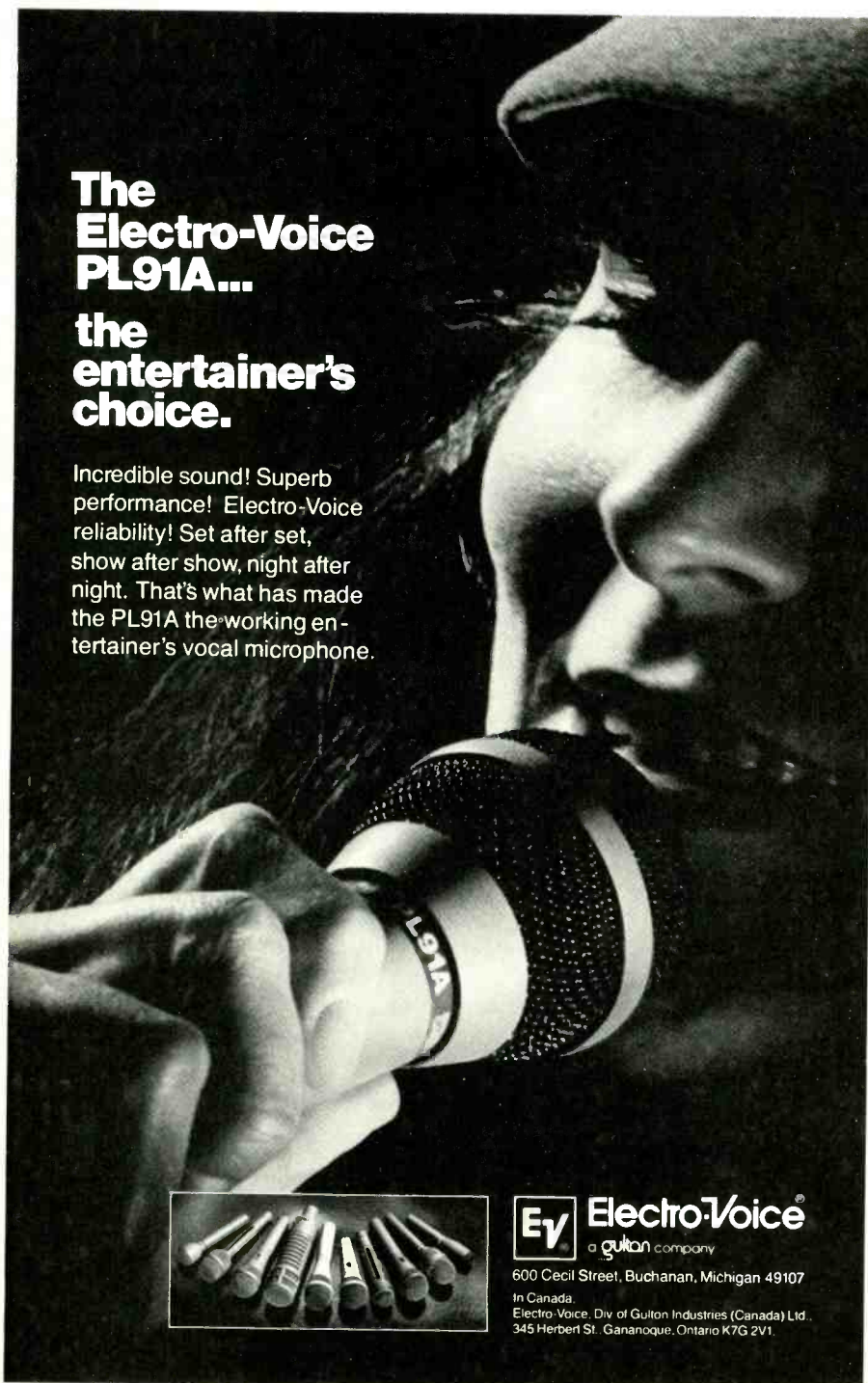
—Craig Anderton  
 Contributing Editor  
 Modern Recording & Music

### Is Phase Inversion Serious?

*The following letter was directed to Craig Anderton.*


After having built the Limiter Circuit written about in your November 1979 issue, I recognize an aspect of its design which should be pointed out to all consumers of this unit, and should have been contained within the article, and you can correct me if I am mistaken about this, but please consider the below.

The way this circuit is configured, the final output of the device is an inverted waveform, i.e. it is 180° out of phase with the original input source. This is acceptable, provided that the unit represents termination of the *total* program material, but when interfaced between a mixing board and a multi-track recorder (which seems to be a most likely application), where certain channels are limited and others are not, the



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limited channels will be out of phase with the other channels.

This is easily correctable in this limiter circuit by adding a unity-gain inverting op-amp (5534, 741, etc.) stage to the unit so that the final output would be non-inverting—this would allow the unit to be used in virtually any application within otherwise specified design parameters.

Any comments you may have would be appreciated.

—Gary Falk  
Louisville, KY

*Craig Anderton replies:*

The fact that the limiter inverts the signal is, in fact, pointed out in the article under "Specifications" on page 57 of the November 1979 issue.

When interfaced between a multi-track recorder and mixing board, the only time it would matter whether the limiter was out of phase or not would be if you limited a channel containing the sound of one instrument and did not limit a separate channel containing those same (or very similar) sounds. An example would be recording piano or classical guitar with two microphones, where you limited one channel but did not limit the other. In this instance, cancellation problems could occur when the two channels are combined in mono. However, inverting the phase of any solo track (guitar, voice, or whatever) will make no difference in the overall mix. Many special effects boxes on the market are pretty casual about whether they invert the signal or not; in many, but certainly not all cases, this inversion will not turn out to be a problem. Phase only becomes a problem when a signal is referenced against a very similar signal with a different phase.

I had considered adding an extra stage to give a non-inverting output, but decided that there would be few times where the phase of the limiter mattered—and it didn't seem worth the tradeoff of adding more noise, distortion, and the like that comes as a by-product of having another active stage.

By the way, I recently wrote a letter to *Modern Recording & Music* which appears in this column, this issue—"The Ultimate Limiter Letter," concerning a modification that drastically reduces distortion when limiting program material. Change C11/C12 to 100 uF, and R1/R2 to 33 Ohms; this lengthens the release time of the limiter. Check it out if you've

had any distortion problems in your application.

I hope the above information is useful to you.

—Craig Anderton  
Contributing Editor  
*Modern Recording & Music*

## Budgeting Your Limiting

I'm a relatively new fan of this magazine (about 3 years) and I thought I'd say hi.

I really enjoy your format. (Very *constructive* as well as instructive.) I especially appreciate the "build-it-yourself" articles, as I'm also the owner of a small but quality-oriented demo studio. Cash flow is always a struggle and each new piece of gear must be a well planned step.

Your "limiter" article came along just in time—I was wondering where the \$2000 was going to come from to purchase four channels of limiting for the "big project." The day after I read the article, I had the printed circuit artwork on a copy camera. To make a long story short, the limiters worked perfectly the first time I fired them up! I designed a 1 amp power supply (just in case another project should come along—which it did), designed a rack mount cabinet that all four channels fit in (5" x 19"), added a couple more features (¼" jacks and RCA jacks for inputs and outputs) and finished it off with white silk-screened nomenclature on a matte-black background, with a total investment of only \$150.

My next project is the "hot springs" reverb, which I'm building in a stereo configuration. Since I overbuilt the power supply for the limiters, I'm able to use it for the reverb. It takes a little planning, but it's a great way of acquiring the equipment you need without going broke in the process!

I'd like to make a suggestion, if I may. Print the p.c. layout on a heavy-weight paper stock instead of the standard paper page. The layouts are difficult to photograph because either the printing on the other side shows through (rear-lighting) or the gloss on the paper causes hot-spots (front lighting) which means a lot of opaquing on the negative. You could use the same paper that your subscription cards are made of. Sandwiched correctly, you could have the layout appear between the pages of the article. It wouldn't add much to the printing cost of the magazine and would really help us folks who prefer to "roll-our-own," from the board up.

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(Both channels driven)

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(In Bridge Mode)

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#### TOTAL HARMONIC DISTORTION:

Less than 0.1% from 40 mW to 400 watts RMS, 20 Hz to 20 KHz into 4 ohms. Typically below .04%

### CS-400

#### FREQUENCY RESPONSE:

+0, -1.0 dB, 5 Hz to 40 KHz

#### RATED POWER:

200 watts RMS per channel into 4 ohms

(Both channels driven)

400 watts RMS into 8 ohms

(In Bridge Mode)

#### INTERMODULATION DISTORTION:

Less than 0.1% from 20 mW to 200 watts RMS into 4 ohms. Typically below .05%

#### TOTAL HARMONIC DISTORTION:

Less than 0.1% from 20 mW to 200 watts RMS, 20 Hz to 20 KHz into 4 ohms. Typically below .04%



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Anyway, congratulations on your great magazine and keep those build-it-yourself projects coming!

—Dick Schalk  
Owner, Scorch Productions  
Portland, OR

*Thanks for your supportive letter. We're glad that you were able to benefit from the build-it-yourself projects. Thanks, too, for your suggestions for using heavyweight paper for the layouts. We can't assure you that it will be done, but, as with other suggestions we've received, it will be given time and serious consideration.*

### Must All Things Pass?

Rarely is there a recording studio unique enough in its character to be called a landmark as the CBS 30th St. facility certainly warrants. I speak not strictly in a technical sense, but of the aura that surrounds its history. Even before I came to New York to become an engineer, I was familiar with this studio. I grew up with many great records recorded there.

I feel badly that economic hard times

have squeezed this facility shut and gone from our eyes and ears forever. On top of this, as an engineer, I will never get a chance to record there myself. But beyond that, a cathedral to our art is passing on.

Other than praise and sorrow to see such a fine room destroyed, the main objective of this letter is to suggest alternatives to having it replaced by an apartment building. First, there must be someone who is interested in buying a potentially successful as well as already proven audio quality room. With a little bit of redecorating and some equipment update it could match any room anywhere. Another idea would be to get the room into active use in the film and video field. Mayor Koch's active moves to make New York a filmmaker's paradise again certainly helps this idea of using the room for recording and post-production. As well as making an excellent sound stage it would equally serve as a rehearsal room for many acts to prepare for tours.

I would hope that CBS would at least be willing to try and preserve this audio landmark if not under their control then under someone else's. If a decision is not

reached soon, this facility whose bookings look like a Who's Who of the music industry will find the echoes of such giants as Count Basie, Stravinsky, Sinatra, Duke Ellington, Simon & Garfunkel, and many others whistling through someone's apartment or down an elevator shaft to the laundry room instead of living within the "church" where they were once celebrated.

—Tom Roberts  
Sound Ideas Studios  
New York, New York

### Quid Pro Quad

May I take the last blow to the dead horse—"quadraphonic" sound? When quadraphonic sound was first introduced, and also at the peak of its popularity, the ideal setup was considered to be the placement of each loudspeaker in a different corner of the listening area. This setup gave the listeners a new and novel effect, however it did not give a true reproduction of any natural listening environment. In fact, if at any one time all four loudspeakers reproduced the same audio signal all that the ear and hearing had been taught in

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# FINALLY THERE'S A COMPACT YOU CAN DRIVE AT 15 ips.

## Introducing the Tascam 22-4.

After setting the standard for 1/4" 4-track recording, it's only logical that Tascam would be the one to introduce the compact generation. After all, we developed the format.

Which means we knew what we were doing when we designed this high-speed transport drive for 7" reels.

The 22-4 4-track multi-channel recorder with sync was built to use 1800 feet of one mil tape. At 15 ips that gives you 22 1/2 minutes of recording time.

And we didn't sacrifice an inch of quality to get you up to speed. Have a look.

### Specifications (15 ips)

Wow and Flutter (Teac Test Tape YTT-2004):  
0.07% peak (IEC/ANSI weighted), 0.10% peak (IEC/ANSI unweighted),  
0.04% RMS

(NAB weighted), 0.07% RMS (NAB unweighted).

Frequency Response\* Record/Reproduce  
0 dB referenced to 1 kHz: 40Hz-22kHz  $\pm$  3dB  
at OVU, 35Hz-25kHz at -10 VU.

Signal to Noise Ratio\* at a reference of 1 kHz,  
at 10 dB above OVU, 585  
nWb/m: 61dB A weighted  
(NAB), 56dB unweighted.

The 22-4 is a hard-working, no-frills machine. Which makes it perfect for the System 2C, Tascam's hard-working, no-frills manual mixer.

See them both at your Tascam dealer. For the one nearest you, plus more information, just write to us at the address below.

Then you can test drive our new compact 22-4. It's the only way to see how well it performs at high speed.

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SERIES  
TEAC Production Products



nature could only equate this with locating the sound source above the head. And who enjoys live performances from under the stage?

In contrast, the new generation of "quad" sound equipment (i.e. time-delay, ambience recovery) enhances the realistic psycho-acoustic effects so that the reproduced sound more closely retains the realism that would have been heard in the live music's environment. The only concept that this has taken from the old "quad" is the four loudspeaker array.

May equipment designed for realistic psycho-acoustic effects live on and let "quad" rest in peace.

—W.J. Pascarella  
Cincinnati, OH

### Back to the Limiter

Here is the letter, written by Ethan Winer, referred to by Craig Anderton in the May 1981 issue, in the Letters to the Editor column. We're printing it now, though it probably should have

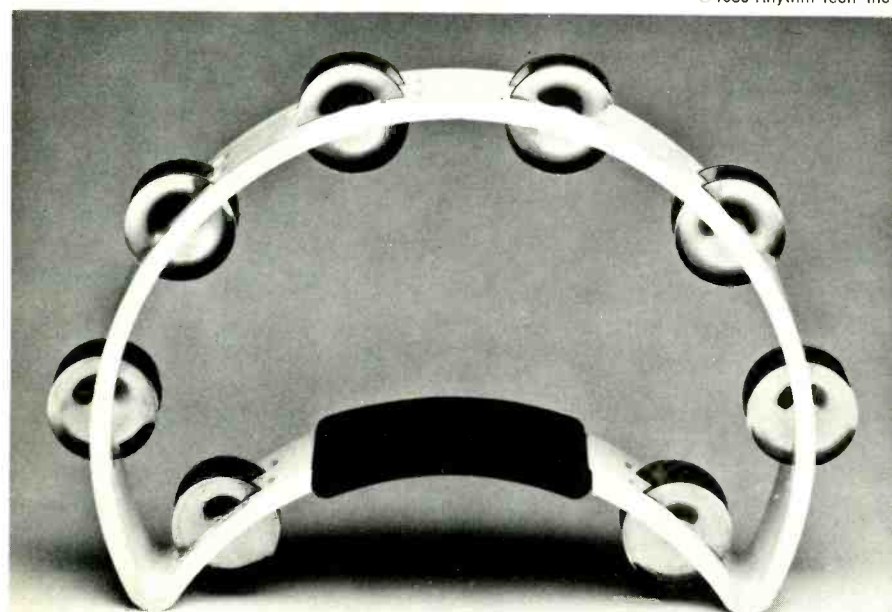
appeared earlier, because we feel it is of some interest to those concerned with the Limiter questions.

I finally had to respond to all the letters about Craig Anderton's limiter article and the buzzing or clicking sounds some readers have complained about. The problem is inherent in the design and probably not caused by faulty components. At the very input to the circuit the signal is split two ways going to the compressor IC, and also to an input level detector. The problem lies with the comparator IC used for level detection. I'm sure Craig considered the input impedance of this IC when he designed the circuit and indeed, this impedance is usually high enough to ignore. The problem happens however when the input crosses the threshold and the comparator changes state drawing input current momentarily. These input current pulses are fed back to the input of the compressor IC along with the audio if the equipment preceding the limiter has a non-zero output impedance. This probably explains why the limiter only does this for some folks, while others are probably using it with a more professional grade of equipment. I have seen this phenomenon even with 600 Ohm stuff, though. To verify this as the cause of the problem, your readers may simply disconnect the wire from the input jack going to the comparator and observe that the buzzing disappears. Please pass this along as I'm sure most people who build the project will be able to benefit.

—Ethan Winer  
The Recording Center, Inc.  
Norwalk, Ct.

### Knock-Out

Last month I purchased my first issue of *MR&R* (Feb. 81). I was particularly knocked out by Peter Weiss' Electric Primer, Part X. I started looking around for back issues in hopes of picking up the preceding nine installments. The first thing I noted is that there is no method to your madness. The articles are randomly spaced between 2 or 3 (?) years of magazines. I've managed to scrape up Part IX (Nov. 80), Part VIII (Aug. 80) & Part VI (Apr. 80). What *will* I do? Is the series available as a whole? If not it should be. As a musician the few parts of the series I have read have lent a great deal of demystification of technical mumbo-



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Photographed at RECORD PLANT, Los Angeles, CA

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CIRCLE 142 ON READER SERVICE CARD

jumbo to me. Are back issues of the magazine available? I picked up the Mar. 81 copy of *MR&M*. The Practical Electrical article was enlightening. I'm going to subscribe. Just keep kicking down the doors for me and see what you can do towards getting the rest of the Electric Primer in my anxious hands, please.

—Gary L. Parnell  
Seattle, WA

*Will do. We may be compiling all parts of Peter Weiss' much longed-for articles in the near future. And we'll get those back issues out to you.*

## Love of Dregs

Thank you for the article on the Dregs. It's inspiring to see them getting the recognition that they so richly deserve. I had never idolized any musician and would prefer not to. At least I would have preferred not to, until I had heard Steve Morse. He is the most phenomenal all-around guitarist/composer I have ever been exposed to. After becoming a loyal fan about three years ago, he (Morse) has given me the inspiration to improve my own playing.

Listening to the Dregs' music is like looking at a painting or sculpture—you can't just glance at it, you must study it to get the real impact of it. However, no matter how many times I "study" a Dregs tune I pick up something that I had not heard before. I wonder how Morse comes up with all these intricacies. If he should ever decide to take on any students through the mail, please let me know.

Also, how can I get the now unavailable Dixie Dregs on Capricorn Records?

—Alex Griffin  
Nashville, TN

*Glad you enjoyed the article on the Dregs. As to getting a hold of the Dixie Dregs, try Polygram Records. They took over most of the groups that were formerly with Capricorn. The records may now be collectors' items, but Polygram could give you the definitive answer.*

## Four More Years!

I genuinely enjoy studying your coverage and viewpoint of the music and recording business. It's a pleasure being absorbed in your up-front tackling of the

technical forefronts as they are created. Your generous knowledge sharing about the various aspects of the art are rewarded by subscriber faith. It's a shame you weren't in motion twenty years ago to catch the genesis of this lively preoccupation. God, it has most certainly expanded!

I couldn't tell you which department is more appreciated—the "live" reports, the Talkbacks, or the technical inputs like Ambient Sound, Lab Report, or The Electric Primer. (Are there plans for an expanded primer, say, into the deeper electronic aspects of the subject? I am intensely curious about what makes these toys we have tick. Peter Weiss has succeeded in whetting our appetites. Now we the yearning masses desire more. It would give us something to stew over without burying ourselves in too many unrelated abstractions.)

All in all after four years of dedicated fanhood I am totally satisfied with what I get each month. Keep up the good work!

—Bob Boyles  
Sumner, WA

## There is No Frigate Like a Book

I'm writing to you with a suggestion for your magazine.

Over the last few years I've noticed a number of readers asking for information and literature on recording methods and procedures and setting up equipment, studios, etc., and you have come to their aid by listing titles and publishers.

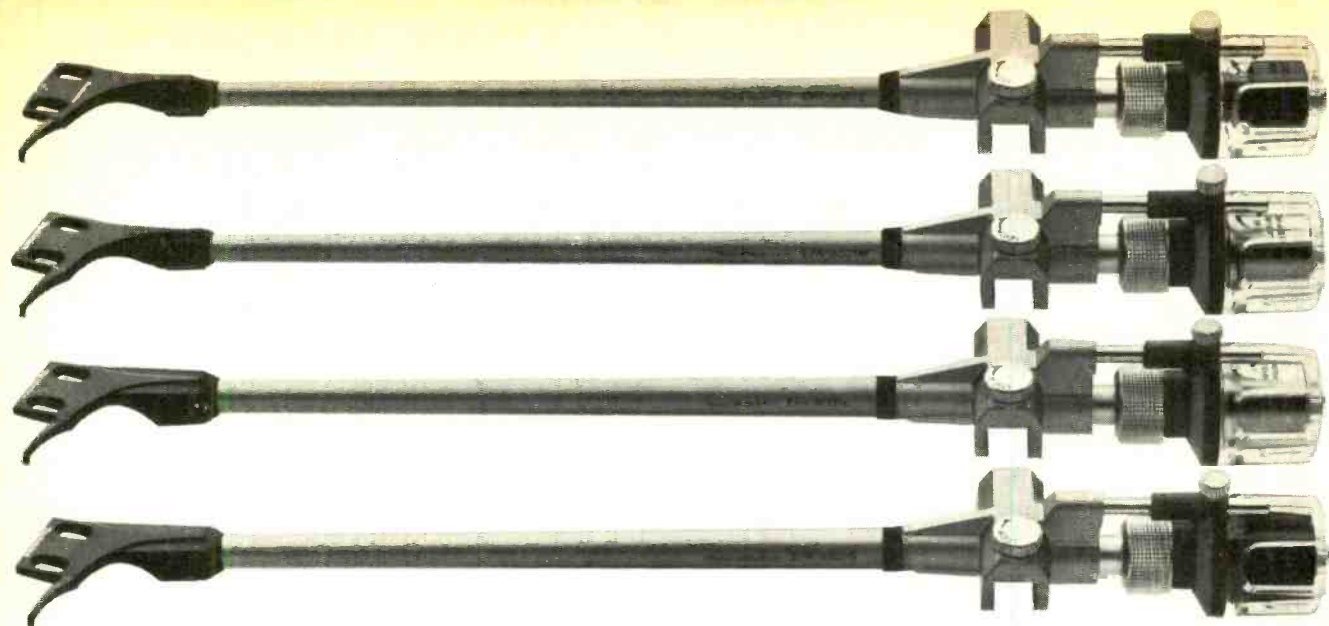
With the ever increasing quantity of literature on this subject one has to be a little discerning when choosing publications because naturally one can't purchase and read all this literature and every person's needs and requirements differ.

Therefore, would it be practical to have a section in your magazine on books or publication reviews? (Or is it already in and I've missed it?) One publication could be reviewed per month and set out in a manner similar to the advertisement for "All You Need is Ears" on page 73 of the January 1981 edition of your magazine. A photo of the book and a review to go with it.

Again, I realize that there are probably many other ideas you'd like to include but that space is a problem.

Well, thanks for your time and I hope this suggestion is of some use. Also, if anyone is interested I'd like to corres-





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The EPA-500 tonearm system is a series of 5 independent, instantly interchangeable titanium nitride tonearms that let you match the correct tonearm mass to the correct cartridge compliance. The result is music in focus, with inaudible resonance.

The SL-1015 turntable and EPA-500 tonearms are available at select locations. For one near you, call 800-447-4700 (in Illinois, 800-522-4400). We challenge you to hear anything but the music.

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pond with them on music and recording in general. My address is: 121 Westview St., Scarborough 6019, Perth, Western Australia.

A section for book reviews sounds like a very good idea. It is true that we receive many letters asking about the proper books in which to find information on building small recording studios, speaker systems, public address systems, and a slew of other things. There are many possibilities, also, for reviews of books about the music industry. So give us some time and maybe your idea will take off.

### The Source of Power

I would like the address of the company who makes the Power FEP 204 on page 28 (Product Scene) of the December 1980 issue. It's a 4-way electronic crossover.

Also, if you have an address for Superex (Gem 7) Parametric equalizer by Stereographic Concepts February 1981 issue, page 30, I would really appreciate it.

—Larry Burger  
Aurora, Colorado

The FEP 204 is a 4 way parametric active crossover. It is made by Comel, whose address is: 6, rue Rossignol-Dubost-92230 Gennevilliers, France. Tel.: 793.65.12 - Telex: 630 504 F.

Stereographic Concepts is the agency that handles Superex, the maker of the Gem-7. The address of Stereographic Concepts is: 151 Ludlow Street, Yonkers, N.Y. 10705. Their phone number is: 914-965-6906. Their telex number is: 13-1584.

The address of Superex International is P.O. Box 24023, Jerusalem, Israel. Tel.: (02) 819901.

### The Whereabouts of Minnich

In reading your 1981 Buyer's Guide, I noticed that, under the Cables and Connectors section, on page 132, you listed a company called Minnich's Audio Reports, but did not include their address in the back in your Directory of Manufacturers. What is their address? By the way, your Buyer's Guide is most satisfying.

—T. Young  
Digi-Ply Custom Sound  
Waterbury, CT

Ahh, we are so sorry. Minnich's Audio Products can be reached at: P.O. Box 5372, San Bernardino, California, 92412. Their phone number is: (714) 887-8245. The owner of the company is Daniel L. Minnich. And thanks for the compliment.

### The Bridge

I just would like to thank you for a much needed publication. Alas, something to bridge the gap between the professional/technical and the home studio recording worlds.

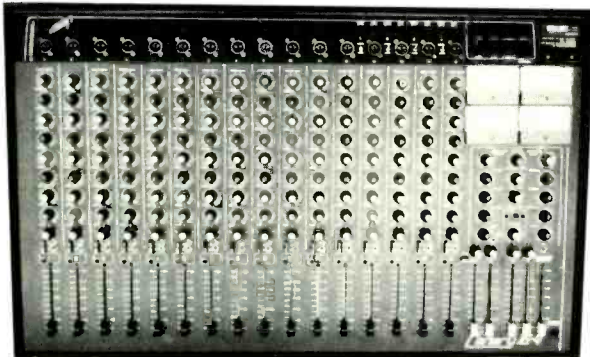
Since I've only recently subscribed to your magazine, I am left with a year's long unfilled pool of questions. How about an article concerning "Home Recording Tricks for Musicians"?

I wish I had subscribed years ago. Thanks again.

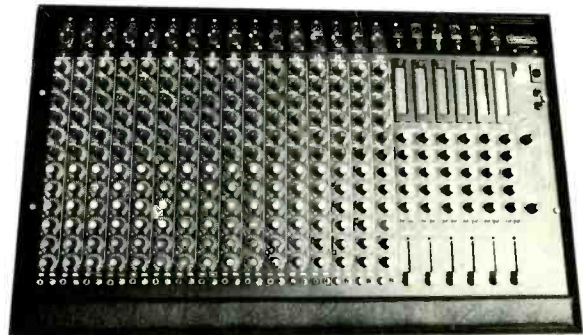
—Rodney Rajala  
Flint, Mi.

Keep sending in those questions, and we'll try to fill the pool with answers. As to your suggestion, it will definitely be given consideration. Thanks for writing and telling us how you feel.

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CIRCLE 174 ON READER SERVICE CARD

## Announcing the new Altec Lansing 9813 high-accuracy recording monitor.



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.

Enter our new 9813. We developed it to play its highly critical part in the fusion process with great accuracy. We did it by putting nearly half a century of audio alchemy into it.

The 9813 has an all new high-frequency compression driver that uses our famous Tangerine® radial phase plug.



There's a brand new network design the patent office is already looking at, and the smooth, accurate highs are controlled by an asymmetrical Manta-ray® horn.

The 9813 handles power like no small monitor you've ever experienced. It takes on big amplifiers as though it were addicted to watts. And if you should push it to the limit, there's a built-in system we call automatic power control, which *lowers the power* (never shuts the speaker completely off) and lights a red indicator on the front panel at the same time.

The new 9813 does everything

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).

Next time you're visiting your favorite pro audio dealer, ask to hear the new 9813. What you'll hear will be the honest truth.



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# TALK BACK

*"Talkback" questions are answered by professional engineers, many of whose names you have probably seen listed on the credits of major pop albums. Their techniques are their own and might very well differ from another's. Thus, an answer in "Talkback" is certainly not necessarily the last word.*

*We welcome all questions on the subject of recording, although the large volume of questions received precludes our being able to answer them all. If you feel that we are skirting any issues, fire a letter off to the editor right away. "Talkback" is the Modern Recording & Music reader's technical forum.*

## Look, Ma, No Feedback!

I just got involved with doing "live" sound for a local band, and I've got a problem already. I'm sure it's a pretty common one, but since I can't get a solid answer around here, I thought I'd ask the experts!

I own a Kelsey 12-channel board powered by a Crown 300 power amp. I also have a Furman 3-band parametric equalizer and a Tapco 2-channel, 20-band graphic equalizer. We are using P.R.O. monitors, Beyer mics and Altec loudspeakers.

My problem is that I can never seem to get loud monitor levels that are feedback free. I was told that by running the monitors through the Furman into the Tapco equalizer I could then feed back the monitors by pointing a mic at them until I got a little feedback going, then cancel it out by adjusting the two equalizers.

I've tried this method, and after a few very tedious afternoons, all I have to show for my time is the ability to change the frequency of the feedback! Am I barking up the wrong tree here? If this method has been successful for others, how do I know when I'm close to achieving my goal? If this is not an accepted

practice, can you tell me how I do go about getting more gain without the accompanying feedback?

—James M. Olander  
Soundman, Eat & Run  
Albany, N.Y.

Your approach is basically correct, but it needs a little refinement. The microphone should not be *pointed* at the monitor. It should be *placed* as close to the position it will occupy during the performance as possible. Even a well-tuned monitor will feed back if the microphone is pointed directly at it.

Once the mics and monitors are arranged correctly on stage you are ready to set your equalizers. Your parametric equalizer should be set flat and the 20-band equalizer should be used to equalize the monitor sound to as close a true vocal sound as possible. Now you are ready to tune out feedback. Run the gain up on the mic until it begins to feed back. Choose the appropriate band of the parametric for the feedback point. Then select about a 1.5 band width and cut the gain about 10 dB. Rotate the frequency control around until you eliminate the feedback.

Once you have found the general area of feedback, reduce the band width while fine-tuning the frequency control. Now reduce the amount of cut at that feedback point as much as allowable. The idea is to reduce only the feedback points as little as possible so as to not take away frequencies important to intelligible monitor sound.

It is also necessary to check for feedback points caused by the close proximity to the mic of a reflective surface such as a face, hand or even a cowboy hat. You need a helping hand, so to speak, to tune out this feedback problem. Have someone stand off to one side of the monitor and cup the mic with his hand. Now you tune out the resulting feedback using the previously described processes. Paying close attention to the mic gain, try to keep the monitor just on the

edge of feedback so not to deafen your assistant.

It might be possible to do some of these adjustments using your 20-band equalizer. This process can be repeated as many times as needed, again without sacrificing good quality sound.

Feedback points are caused by many things, ranging from the solidness of the stage to the size of the hall. Each situation will present different problems. Experience and knowing your equipment and how it will perform in a given situation will be your best tools in eliminating feedback.

—Dan Smith  
Chief Engineer  
Calbro Sound Systems, Inc.  
Little Rock, Ark.

## Bi-amping's the Best Bet

My problem concerns our band's P.A. system. Currently, we are running a bi-amped mono P.A. The sound is terribly muddy, and we're concerned with how to deal with it. The heart of our system is a Peavey 800 S stereo mixing board. Main power is provided by a QSC power amp which is divided into lows on the left and highs on the right. The horns are crossed over with a QSC stereo crossover. I'd like to know if you think our sound might be improved by running in stereo and eliminating the crossover completely?

—Bill Bailey  
Rockin Rollaway Productions  
Davenport, Iowa

Bill, I personally feel that bi-amping is the best way to go. Your system should perform much better in this configuration. Operating your P.A. in stereo would only confuse the audience and complicate your life.

There is obviously a problem with some part of your system that is causing the "muddy" reproduction. I am not familiar with the input and output sensitivities of the QSC products, so it is

very difficult to pinpoint the problem at this writing. I would also need to know the power rating of your power amplifier, and the type speakers, horns and drivers you are using.

I will attempt to lay out some basic guidelines and maybe you can adapt them to your particular situation.

Audio sound reinforcement systems suffer from the "weakest link" theory in that all components in the audio chain must "measure up" or something is going to run out of headroom and cause a problem.

For instance: The 800 S mixer has an output capability of approximately 4 volts which dictates the requirement of every other component in the audio chain. If you are using a graphic equalizer in your system, its input should handle 4 volts and its output should be capable of a minimum of 4 volts so that there is no loss or gain at this link in the audio chain. The power amp should be fairly sensitive at its input so that full power may be developed with a relatively low input signal (approximately 1 to 2 volts). If your power amp sensitivity is 3 volts or more, you are beat before you start because you will only have approximately 1 volt of headroom to spare with all other components running at full output.

Finally, your speakers and drivers play a very important role in low powered systems and should therefore, be the most efficient you can afford. Efficiency at the speaker components enables more sound pressure level to be obtained before clipping (distortion) takes place.

Thanks for the questions and if we can be of further assistance, please do not hesitate to call us at the factory (601-483-5365).

—Hollis Calvert  
Director of Sales Promotion/Education  
Peavey Electronics Corp.  
Meridian, Miss.

### Recording at the Professional Level

I'm concerned with getting the best recording level possible with my equipment. I have what you might term a "bedroom studio," which is outfitted with a Tascam Model 3 board, Beyer ribbon mics, Sony ECM condensers, Shure SM59 mics, a Revox A-77 model 1106 half-track at 15 ips, an Ampex 755-A, a Tandberg 1600-X, two dbx 119's, Dolby-Advent noise reduction, Soundcraftsmen 20-12 EQ, SAE parametric equalizer, SAE 1/2-octave EQ with pink

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CIRCLE 146 ON READER SERVICE CARD

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I'm Carl Countryman and I'm so excited about the EM-101 I must tell you why no other microphone offers you such fantastic performance and why the EM-101 is the most versatile mike you can own!

## 125 dB DYNAMIC RANGE

In terms of raw performance alone, the EM-101 is in a class by itself. The 25 dB noise level of the EM-101 is one of the lowest in the industry. With the EM-101 you can hear sounds in a quiet room that you can't hear with your own ears, yet it easily handles 150 dB sound levels without distortion or pad switching. That's over 300 times the threshold of pain! The EM-101 will completely eliminate microphone overload.

## LABORATORY FLAT RESPONSE

The EM-101 is GUARANTEED to have an incredibly flat frequency response; within 1.5dB of perfection over the entire audible range from 20Hz to 15kHz and we back that guarantee by shipping each EM-101 with its own individual computer verified frequency response curve. Listening tests cannot distinguish the EM-101 from precision laboratory microphones costing TEN times more!

## VERSITILITY

The EM-101 is about the size and shape of a stick of Dentyne chewing gum and has a non-reflective, black surface. It is also the most perfectly non directional microphone you can buy for recording or sound reinforcement. That makes it the ideal choice for stage, TV, motion picture, or conference work where variations in quality caused by motion and position around the microphone must be minimized. Unlike conventional microphones or "plate mounted" microphones, the EM-101's unique flat design allows it to be placed as close to the surface as desired to take full advantage of this traditional microphone placement technique.

## FEEDBACK AND LEAKAGE REDUCTION

The unique design of the EM-101 makes it almost completely insensitive to conducted vibration so it can be placed directly on or even inside an instrument where the sound level is high and you will obtain remarkably improved rejection of unwanted sound and reduction of feedback. Because PA systems feed back on response peaks, the EM-101's ultra flat response allows you to use more gain without feedback and will reduce or even eliminate the need to notch filter or equalize a system.

## YOU MUST TRY THE EM-101

I want you to have the experience of using a microphone with performance that rivals the human ear! I'm convinced that once you hear a truly accurate, uncolored microphone in your facility, with your kind of program material, for the affordably low price of \$234.50 U.S. you will never want to be without one!

Please call Countryman Associates or your favorite professional sound dealer to arrange a no risk trial of the incredible EM-101 microphone.

**COUNTRYMAN  
ASSOCIATES INC**

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CIRCLE 135 ON READER SERVICE CARD

noise generator, Sansui power and pre-amps, Sound Workshop 242-C 2-channel reverb unit, plus much more. I own and play drums, percussion, bass guitar, 6-string acoustic, 12-string acoustic, and electric piano.

Since I do not own an 8- or 16-track recorder yet, needless to say, all my recording is done by bouncing tracks on a 2-track machine. However, since all my equipment is first quality, I do not see any reason why my product shouldn't be of commercial quality.

If I record, say, 6 tracks all by myself with overdubbing I, of course, will lose some of the first track by the time the last one gets put down. Therefore, my rule of thumb is to try to record the first and maybe the second track with a very strong VU level. The question is that being there are at least three different ways to set the record level, which is the best way to get the highest signal-to-noise ratio? Am I better off a) cranking up the board's faders and keeping the tape deck's main level down low or b) keeping both levels between board and tape deck at a medium setting or c) keeping the tape deck's main level high, and letting sound in only through low levels at the board? Since the end result is all the tracks simultaneously mixed down exactly as I recorded them, to one final mono track, it is critical that I get the correct level each time. A good recording can be attained with the levels set according to any of one of these three ways due to the flexibility of the equipment, but I feel one of them probably has some advantages over the others. Is the signal-to-noise ratio about the same in all cases as long as the VU setting remains around "0 VU" during recording, regardless of where the levels are set between the board and the decks?

—Marc William Fallon  
Teaneck, N.J.

It seems that the problem in your "bedroom studio" might be resolved by looking at each portion of the recording process separately.

The tape recorders, mics, noise reduction, etc. seem of high quality so I will give you some hints for optimizing what you now have. The first point to consider is that your actual mixing process comes from bouncing tracks down to mono. This can be an effective way to simulate multi-track recording, but care must be taken in recording each instrument since you are effectively placing each instrument one generation behind the next (i.e. if the bass is put on first and you were to add on six additional in-

struments the bass would have been re-recorded six times and have the quality of a sixth generation recording).

A good alternative to this method of recording would be to use the left channel of your first stereo tape recorder as one instrument, the second channel as the second instrument, and at the same time that you blend the two instruments together to bounce to mono, blend in through your mixer one additional instrument. Taking these three instruments together will give you the opportunity to mix the sound exactly the way you want it and give you all three instruments with only one generation loss at this point. Overdubbing in this manner can be done quite easily with excellent results. This does, however, require two high quality stereo machines.

The second point deals with the subject of record level and is a two fold problem: the first one to consider is signal-to-noise. It is always best when using no noise reduction to use as much level as possible without distortion on tape. Unfortunately, when overdubbing in this manner noise reduction systems do not function properly. This is because every channel encoded with noise reduction must be decoded independently—therefore the bounced channels will not decode properly. It is to your advantage to use high quality tape and the fastest speed available on your tape recorder for the best sound possible.

The second consideration is that once you begin your blend to mono you must mix as you go. This leaves only the level of the mixdown signal to deal with which should be put on tape in the same manner as an overdub. Regarding levels between the board and the tape machine, it is best to set your tape recorder inputs to a standard level (in this case -10 dBm input to your tape recorder should equal 0 VU on your meters). This will give you a uniform level between your machine and mixer and allow you to learn how much level you can feed into your tape recorders without distortion. With these levels set properly you will get the lowest distortion and the best signal-to-noise ratio out of your console and tape recorder.

Don't be afraid to go into the red areas on console meters or tape recorder. Remember to let your ears be a guide. They are often better indicators than any piece of electronic equipment made. Taking time and care and listening to your product through each step is the only way to assure the best possible results from any equipment.

In addition, you should be aware that

# WITH SOME TAPE YOU CAN'T TELL YOUR BRASS FROM YOUR OBOE.

When the oxide particles on recording tape aren't of a uniform size and shape, you can end up listening to distortion as well as music. The sounds of different instruments get blurred together, and your music loses its clarity.

At Maxell, every inch of our tape is checked and rechecked to make sure the oxide particles are perfectly uniform. Which means when you listen to music on Maxell tape, every instrument will sound perfectly clear.

So if you can't tell your brass from your oboe, try using our tape.



**IT'S WORTH IT.**

Maxell Corporation of America, 650-1st Drive, Mahwah, N.J. 07074

CIRCLE 79 ON READER SERVICE CARD

only as little as ten to fifteen years ago most commercial recordings were made much the way you are doing it now. You have an even better advantage in that your equipment has all the benefits of current technology, including improvements in audio electronics, tape quality and all support equipment.

Remember experience, patience, and careful listening are the key. By experimenting with your equipment and really getting to know its full potential

there is no reason why you can't make commercially acceptable recordings.

—Gary Rosen  
 Director of Technical Services  
 House of Music  
 West Orange, N.J.

### Edcor Eases Monitor Muddle

The group I am currently working with has an Akai GX4000D 2-channel reel-to-reel, a Teac Model 2A mixer (6 in/4

out) with an MB-20 meter bridge, a Tapco reverb unit and several assorted Shure microphones. Knowing very little about monitoring, we come to you with the following problem: With the equipment we have we need some sort of monitoring system, some way to hear what's being recorded. What we'd like is a monitoring system for 4 to 6 people which would allow each of them to listen through headphones. I remember reading in *MR&M* about an Edcor headphone amp—would this be an answer to our problem, and how would it work exactly? If this is not a possible solution, do you have any suggestions? In short...Help!

—Dave King  
 San Antonio, Texas

The Edcor AP-10 Headphone Amplifier (see The Product Scene, June 1978, p. 34) will suit your purposes for up to four sets of headphones. The AP-10 will accept either a monaural or stereophonic feed and distribute it, via four individual 4-watt amplifiers, to as many as four headphones. If you require more than four headphone monitoring positions, you will have to feed two AP-10s "in parallel" (see Fig. 1), or construct an arrangement (to be used in conjunction with a separate power amplifier) called a "build-out" network. Two versions of



# PATCH THIS IN AND GET MORE SUBMIXES OUT.

Cue mixes, monitor mixes, echo mixes. The Teac Model 1 lets you expand the capability of your own system. So you won't have to spend a fortune on a new mixer.

You won't have to spend a fortune for the studio-proven Model 1 either. It costs less than a high quality microphone.

And that's a small price to pay to get more submixes out of your system.

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 TEAC Production Products

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CIRCLE 125 ON READER SERVICE CARD

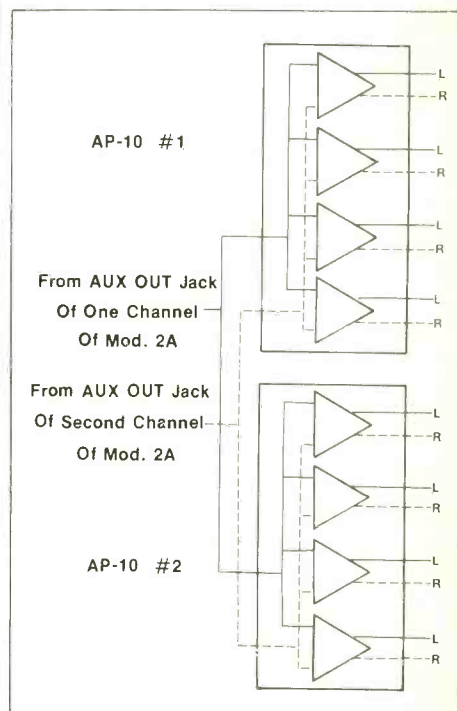


Figure 1



# There's No Success Like No Failure.

QSC Audio Products are designed and built to earn a living day after day, without fail. And that's important when you've got to deliver. When your neck is on the line, your consistency can't be jeopardized by inconsistent equipment.

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worthy and crashworthy, yet totally able to deliver in top form.

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CIRCLES ON REAR SERVICE CARD

# SIMPLIFY YOUR LIFE

ANYONE can now align a tape machine accurately! The Accusonic Tuner, a novel piece of test equipment, allows you to obtain 100% performance from your recorder every day. Perform basic recorder alignment without expensive or complicated test equipment.

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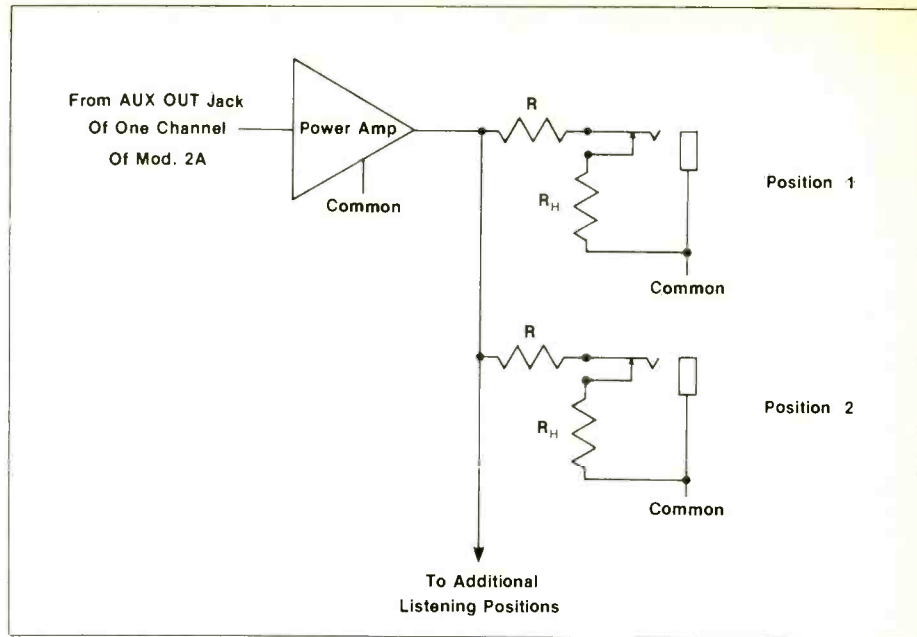


Figure 2

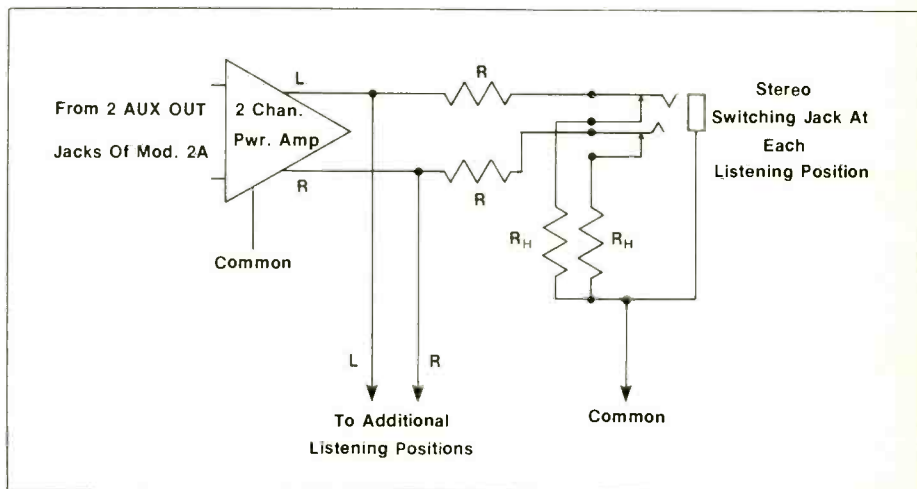


Figure 3

such a network are shown in *Figs. 2* and *3*. The circuit of *Fig. 2* is designed to accept a monaural feed and distributed it to any required number of monaural listening positions. *Fig. 3* shows a similar arrangement for a stereophonic feed and stereophonic listening positions.

The network and the switching-type jacks provide a means of maintaining a constant load on the power amplifier output(s), regardless of the number of headphones in use. The formula for finding the value of *R* is:

$$R = Z \times (N - 1)$$

where *Z* is the optimum load impedance for the power amplifier output(s) and also the impedance of each headphone unit, and *N* is the number of listening positions desired. In cases

where the impedance of each headphone unit is *not* equal to the required load impedance of the power amplifier output, the formula for finding the value of *R* is:

$$R = N \times Z_L - Z_H$$

where *Z<sub>L</sub>* is the recommended load impedance and *Z<sub>H</sub>* is the impedance of each headphone unit.

In all cases, *R<sub>H</sub>* is equal to the impedance of each headphone unit.

—Peter Weiss  
 Contributing Editor  
*Modern Recording & Music*

[Edcor can be reached at 16782 Hale Avenue, Irvine, California 92714, or call them at 800-854-0259. The AP-10 retails for about \$170.00—plus local tax, of course!—Ed.]



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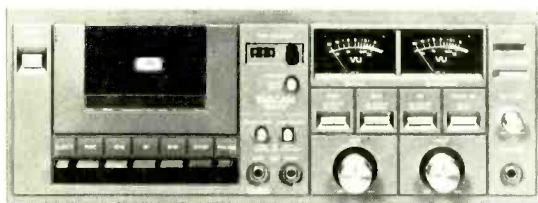
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345 Herbert St., Gananoque, Ontario K7G 2V1.

# THE **PRODUCT** SCENE

By Norman Eisenberg

## TEAC SHOWS NEW RECORDERS

New in Teac's Tascam series is the Multi-Image Series heralded by the Model 124AV Syncaset. Says Teac's David Oren: "We're trying to put the audio back into audio/visual, and we're stressing that the Syncaset represents an audible improvement over other commercial cassette recorders." The model 124AV conforms to the standard (ANSI) half-track, sync plus cue format, and is designed to interface with any of the leading brands of programmers. It also features Dolby noise-reduction, separate bias and EQ switches, a memory function and stereo sound capability. Designed specifically for the multi-image producer, the Syncaset is priced at \$450.



In its standard audio series, Teac has introduced the model V-9 "Spectrosound" stereo cassette deck, featuring three motors, and an electroload head system for loading or retracting the heads. Metering is handled by peak-reading incandescent lamps, color-coded and with a response time of 20 milliseconds. Metal-tape response is listed as 30 to 20 kHz. New accessories from Teac include electret-condenser and moving-coil mics, a recorder maintenance kit and a head demagnetizer.



CIRCLE 10 ON READER SERVICE CARD

## NEW REVERB SYSTEM



From Neptune Electronics Inc. (NEI) of Portland, Oregon there's news of a model 351 Reverberation System which incorporates NEI's "Signal Activated Reverb"™ along with special spring drive circuitry, said to reduce and eliminate spring slap, feedback and rumble due to impact and vibrations caused by high SPLs. The SAR is defeatable by a front-panel switch. Included in the 351 is a five-band graphic equalizer and mix/percentage control, claimed to duplicate precisely the reverb characteristics of almost any room, or to create reverb effects for voice or instruments. Input and output controls have associated peak LED indicators.

CIRCLE 11 ON READER SERVICE CARD

## DBX BROADCAST ANTI-NOISE DEVICE

The model 140 from dbx is described as a two-channel, simultaneous encode/decode Type II noise reduction system for broadcast applications. The 1¾-inch high rack-mountable device features RFI-protected active balanced inputs; single-ended outputs with on-board provision for Jensen output transformers; barrier-strip termination for both inputs and outputs; and dbx encoded-disc playback capability (a switch automatically reroutes the signal path through the unit to avoid the need for repatching when the unit is operated in disc mode).

CIRCLE 12 ON READER SERVICE CARD

## EDCOR SOUND REINFORCEMENT ITEMS

From Edcor, of Irvine, California, comes this view of the firm's new line of pro sound-reinforcement equipment mounted in a rack from Anvil Cases. At the top is Edcor's PM700, a six-modular-input mono mixer with four isolated outputs. Two below it is the PM-100, a 5-input mixer with four mic inputs, one aux, and a master. The unit above that is the PM-101, a six-mic-input expander for the PM100. (Not shown is the PM200, similar to the PM100 but with line-level or aux inputs instead of mic inputs).



Below the PM100 is the MA 175, a six-modular input 75-watt combination mixer-and-power amplifier with 4-, 8-16-ohm or 70/25 volt output. Next is the AP10, a four-output headphone distribution amplifier that will power headphones in stereo or mono mode from 8 to 600 ohms. The HA100, under it, is an eight-output headphone amplifier.

Continuing down the rack, there's the ECOM 3, a single-channel crystal-controlled wireless microphone receiver that operates between 150 and 216 MHz with a range of up to 1500 feet. Under it is a Multiplex Snake system, which digitally encodes eight channels of audio onto one mic cable, for up to 1500 feet, and then reconverts the information to analog signal at a decoder.

Final unit in the rack is the PA250, a 15-watt mono power amplifier with room for one input module of the operator's choice. This amp can drive 4-, 8-, 16-ohm or 70/25 volt lines. Edcor advises that the 1<sup>3</sup>/<sub>4</sub>-inch vent panel at the very bottom of the rack will soon be replaced by a four-input automatic microphone mixer with digital circuitry.

CIRCLE 13 ON READER SERVICE CARD

## DYNAMIC NOISE FILTER

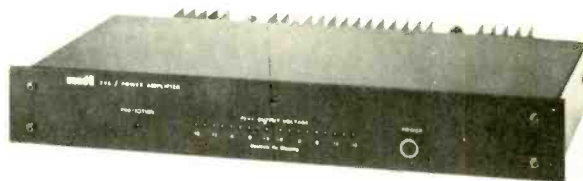
Designed to eliminate noise in program material when its level becomes audible over the musical signal is the KLH model 1201A dynamic noise filter. Under normal masking conditions (when the signal is high enough to render noise inaudible), the DNF 1201A passes the signal with no processing—it acts as a unity-gain amplifier. Under all other conditions, the device acts as a variable low-pass filter with a cut-off frequency varying from 500 Hz to 30 kHz, and an attenuation rate of 9 dB/octave. The 1201A processes any two-channel or matrix-encoded material, and its performance is claimed to possess "fidelity compatible with the finest audio components."

CIRCLE 14 ON READER SERVICE CARD

## MTI AMPLIFIERS

Exceptionally high headroom for handling signal peaks "in excess of 800 watts-per-channel stereo and more than 2000 watts mono, when needed" is claimed for the new model 545 power amplifier from MTI, Inc. of Tucson, Arizona. The amp uses three separate power supplies. Explains the manufacturer: "Until high power is required, this ultra-high headroom unit coasts along, using little energy. Consequently the 545 is very efficient." The unit is rated at 120 watts per channel continuous power into stereo 8-ohm loads; 360 watts continuous mono. Its IHF headroom is 4.5 dB. Time-aligned circuitry is said to reproduce music with "impeccable accuracy, clarity and detail" while its high headroom circuitry also makes it "clip-proof" and capable of handling the demands of musical transients. An LED readout shows output calibrated in dB over a 40-dB range, and switchable for peak or average response. Price is \$1395.

Smaller and lower-priced is MTI's model 245 power amp, which "coasts at only 40 continuous watts per channel" but which can reproduce transients in excess of 250 watts. Its price is \$595.



CIRCLE 15 ON READER SERVICE CARD

## NEW LINE OF MICROPHONES

Manufactured by Foster Electric Co. and introduced by Aria Music (USA) Inc., City of Industry, California, is a new line of "A & F" microphones offered for pro use. Included are several dynamics and an electret-condenser unit. Accessories also are offered: mic stands (boom and straight); cables; mic holders; and matching transformers.

CIRCLE 16 ON READER SERVICE CARD

## LITERATURE OFFERINGS

Crown International announces that the first several issues of PZM Application Notes—containing suggestions for using PZM mics in different situations—are available. Single copies may be obtained free from Technical Services Dept., Crown International, Inc.; 1718 W. Mishawaka Rd., Elkhart, IN 46517. Crown also is offering an illustrated booklet describing the company, and called "Crown Profile."

CIRCLE 17 ON READER SERVICE CARD

A listing of standard markings for tape boxes, developed by the (British) Association of Professional Recording Studios. Address is: The Secretary, Edward Masek, 23 Chestnut Ave., Chorleywood, Herts WD3 4HA, United Kingdom.

CIRCLE 18 ON READER SERVICE CARD

Orban pro products are listed in the Orban Condensed Catalog, available from Orban Associates, Inc., 645 Bryant St., San Francisco, Ca. 94107.

CIRCLE 19 ON READER SERVICE CARD

New in the Keftopics series are technical bulletins dealing with Overload Protection and with Crossover Filters. Write to KEF, P.O. Box 17414, Washington, D.C. 20041.

CIRCLE 20 ON READER SERVICE CARD

A demonstration cassette is being offered by Integrated Sound Systems, Inc. Time compression is a technique that effectively increases or decreases the speed of recorded voice or music without the loss of definition or bandwidth. To get the free cassette, request it in writing on your business letterhead to Stuart Rock, President, Integrated Sound Systems, Inc., 29-50 Northern Blvd., Long Island City, N.Y. 11101.

CIRCLE 21 ON READER SERVICE CARD

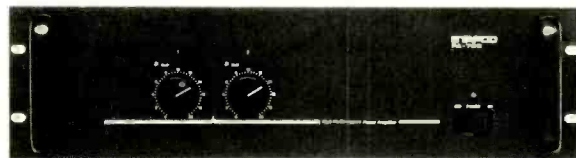
## NUMARK'S VERSATILE EQUALIZER

The model EQ-2700 from Numark Electronics is described as a professional quality 10-band-per-channel stereo equalizer with a built-in pink-noise generator that allows the user to adjust for a system output level of zero dB, octave by octave on each channel, for flat response. Next, the equalizer portion provides adjustments as desired via the 20 sliders (range  $\pm 15$  dB) in addition to the unity gain controls ( $\pm 15$  dB) for each channel. The price of \$450 includes an optional measuring microphone, the Numark STD-272, which may be used in conjunction with the device's pink-noise generator and pushbuttons to achieve 0 dB readings on the unit's twin LED meters by using the sliders.

CIRCLE 22 ON READER SERVICE CARD

## E-V/TAPCO POWER AMP

E-V/TAPCO has introduced the model PA-700, which is rated to offer 355 watts per channel into 4 ohms; 210 watts into 8 ohms; and—when mono-bridged—710 watts into an 8-ohm load. The unit's welded-steel chassis is said to provide solid roadability, and its modular construction makes for easy serviceability. The PA-700 is equipped with a two-speed fan, and LED clipping indicator. Price is \$1095.



CIRCLE 23 ON READER SERVICE CARD

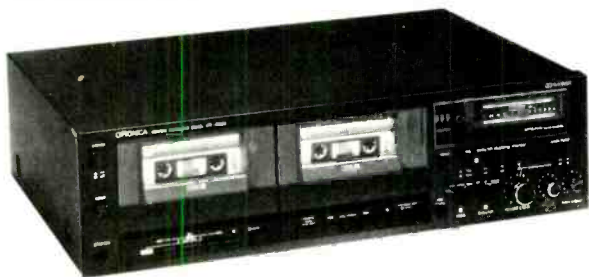
## NEW DENON CASSETTE DECKS

Denon has introduced its DR-300 series cassette recorders which feature a patent-pending "tension servo mechanism." A tension sensor arm is placed between the erase head and record and play heads to measure the tension of the tape in both play and record modes. The supply voltage to the "unique non-slip" reel-drive motor is then regulated to keep tape tension constant. Denon points out that varying tape tension can cause varying quality of sound and by this technique the quality of the recorded and reproduced sound is maintained. The system also works to prevent tape stretching, edge warping and so on.

CIRCLE 24 ON READER SERVICE CARD

## OPTONICA TWO-IN-ONE CASSETTE DECK

Separate cassette compartments—one for recording and the other for playback—are featured in the Optonica RT-6605. The former section uses a head designed specifically for recording, while the head in the second section is designed especially for playback, with a rated response of 20 Hz to 21 kHz for metal tape. For dubbing and editing, a recorded cassette is placed into the playback compartment and a blank cassette into the recording compartment. Copying, with electronic editing, is thus facilitated. In addition to a special dubbing level control, the RT-6605 employs a one-touch start "sync" control that ensures both tapes will start simultaneously when dubbing. The price of the RF6605 is \$550.



CIRCLE 25 ON READER SERVICE CARD

## THE WONDERFUL WORLD OF ACCESSORIES

A spate of equipment extras—from replacement knobs to speaker stands—has hit the audio scene.

The knobs—from Selco Products of Buena Park, Ca.—come in various configurations to fit different shafts, have several exterior shapes, and diameters, feature snap-on caps of various colors and come with or without indicator markings. Prices start at 20 cents a knob.

CIRCLE 26 ON READER SERVICE CARD

Thunderfoot Engineering of L.A., Ca. has announced an extensive series of speaker stands, including one model claimed to be the lowest-priced solid steel angled stand available (the STA-3 at \$15.95). Other stands are available in glass, starting at \$29.95.

CIRCLE 27 ON READER SERVICE CARD

The Multiplex Snake from Edcor of Irvine, Ca., is a system that uses digital and analog circuitry to transmit up to eight audio signals over a single microphone-type cable. Its use is claimed to overcome problems of decreased dynamics, RFI susceptibility, decreased frequency response, hum and noise.

CIRCLE 28 ON READER SERVICE CARD

New for record turntables is the Geo-Disc™ from Mobile Fidelity Sound Lab, Inc. of Chatsworth, Ca. Geo-Disc features a proprietary three-dimensional visual alignment system designed to let you achieve critical alignment of the playback cartridge to within 0.003-inch, and in a matter of "moments, not hours." Offset, tracking angle and overhang are the three parameters handled. The Geo-Disc physically is a 12-inch disc that fits over the turntable spindle. A raised ridge on the disc aims at the tone-arm's pivot; an indented point locates the proper position of the stylus tip; a grid around the point aids in aligning the cartridge. Cost is \$25.

CIRCLE 29 ON READER SERVICE CARD

Also for fussy disc spinners is the Signet SK305 (Signet is a division of Audio-Technica U.S.). The SK305 is an electronic stylus cleaner. The 5½-inch long device is powered by an AA battery which drives a vibrating pad through a built-in high-frequency oscillator. The brush, moistened with the supplied cleaning fluid, is placed in contact with the stylus for the cleaning action. Price is \$29.95.

CIRCLE 30 ON READER SERVICE CARD

Yet another record playing item is a hand-held microscope of 13.6 times magnification introduced by Osawa for stylus inspection. The OS-50M is a mere 1¼-inches long and ⅙ inch in diameter.

CIRCLE 31 ON READER SERVICE CARD

The last item to come to our attention this month is a gadget for unravelling cassette tapes that have become tangled or twisted. This new British-made device is called Fixotape, and it consists of a small stand-holder that may be attached to a table or shelf. Turning the unit's handle, after a cassette has been inserted, is said to straighten out tangles, twists or creases in the tape as it passes through the guide. No U.S. distributor has been announced yet; inquiries may be directed to British Information Services, 845 Third Ave., New York, NY 10022.

CIRCLE 32 ON READER SERVICE CARD



# MUSICAL

# NEWSIGALS

## MUSICAL INSTRUMENTS

Roland Corporation recently announced the introduction of a brand new Bass Guitar Synthesizer system, the GR-33B system. The new system is patterned after Roland's GR-300 guitar synthesizer system in that two different guitars are available for use with the synthesizer control unit; the instruments may also be used as conventional bass guitars independently of the synthesizer electronics. The B-33 Bass has a conventional attached maple neck, while the alternate B-88 Bass is a neck-through-body design for improved sustain characteristics. Both instruments feature rosewood fingerboards, natural finish ash bodies, plated hardware and active two-band EQ for their conventional output. Additionally the bases have quad pickups for the synthesizer and controls for the VCF and LFO (vibrato) functions of the synthesizer, and inconspicuous touch plate switches



to activate the LFO effect. The basses connect to the GR-33B synthesizer unit via a single 24-pin connector. The synthesizer unit is fully polyphonic for full four-string voicing, and features Roland's special pitch and envelope tracking circuitry to assure flawless tracking of any bassist's playing style including slurs, hammering and string-bending. The synthesizer unit has two different variable tunings and a string

select function which determines which strings will produce synthesizer sounds. Other functions of the synthesizer unit include two variable envelope generators, a VCF which may be switched to 12 dB/octave or 24 dB/octave and which may be modified dynamically by the envelope generator and an LFO with rate and depth controls.

CIRCLE 34 ON READER SERVICE CARD

The name Casio is of course best known for electronic calculators, but this well-known company has recently branched out into the musical market with several electronic keyboard instruments. Casio recently announced the introduction of two brand new instruments, the Casio-tone CT-401 and the MT-30. The CT-401 is the more sophisticated of the two, with a forty-nine-key keyboard which produces fourteen different musical sounds ranging from piano to clarinet and trumpet to violin and cello. The unit also has a rhythm generator with sixteen different pre-programmed rhythm patterns and a pre-programmed drum fill feature for more lifelike effects. The CT-401 and has a thirty-six-chord capability for manual play or three-finger or single finger automatic chording for the left hand which may be selected with or without automatic bass. Controls on the unit include vibrato, delayed vibrato, tuning, sustain, hold, rhythm tempo and master volume. The other Casiotone instrument is the MT-30, a basic, thirty-seven-key instrument capable of producing twenty-two different musical sounds. The MT-30 has memory capability to store up to four sounds for use in one performance. The unit also features sustain, vibrato and a built-in amp and speaker. It is battery powered for portability, with an AC adapter optionally available.

CIRCLE 35 ON READER SERVICE CARD

St. Louis Music Supply recently announced a number of additions to their Electra line of guitars and basses. One significant addition is the Custom Pro X420, a semi-acoustic electric guitar. This new guitar is a thin-line hollow body electric for the characteristic hollow body sound which has been enjoying a renaissance in the last few years, but without the F-holes in the top, which are often a cause of unwanted resonances and feedback in other thin-line guitars. The X420 has a number of premium-quality design features including laminated hard rock maple neck with a double reinforced truss rod, an internal hardwood sustain block running the length of the body and a high-gloss black finish with ivory bindings. The hardware is also first rate with custom Magnaflex pickups, a brass bridge and die-cast 14:1 machine heads. Also new in the Electra line is the affor-





dable Phoenix Series, which so far comprises two solid body electric six-string guitars. Both models feature Canadian ash bodies in natural or sunburst finish, hard rock maple neck and fingerboard with adjustable truss rod and magnesium channel and a solid brass nut for good sustain. One of the two models features two humbucking pickups while the other is equipped with three single-coil pickups.

CIRCLE 36 ON READER SERVICE CARD

## LOUDSPEAKER COMPONENTS

Cetec Gauss has introduced a new series of loudspeakers specifically designed for musical instrument use to complement its existing lines of M.I. and sound reinforcement drivers. The new line is referred to as the 300 series and is based on speakers having a 3-inch voice coil rather than the 4 $\frac{1}{8}$ -inch voice coils customary in the rest of the Gauss line. Smaller voice coils have been favored by many musicians for years



because of their richer harmonic content and the fact that the speaker breaks up at a lower overall volume than large voice coil speakers, but in the past small coil speakers have been somewhat limited in their power handling capabilities. Gauss has solved this problem with their patented double spider design which provides much more positive voice coil located within the magnet structure even with very large speaker excursions, and with a special monolithic voice coil support for excellent heat dissipation. Additionally, Gauss perfected a technique of mounting the voice coil and its double spider in the speaker frame while a signal is being applied to the coil so that any coil rubbing is eliminated from the beginning, before the cone is even mounted to the voice coil. The result is an instrument speaker with rich tonal coloration, excellent reliability and high power handling with a 150-200 watt rating. The Gauss 300 series is available in four

models, namely 18-inch and 15-inch bass speakers and 12-inch and 10-inch guitar speakers, and each model is available in 4-, 8- or 16-ohm impedances.

CIRCLE 37 ON READER SERVICE CARD

Two new diffraction horn designs were recently introduced by the Vortec division of Integrated Sound Systems, Inc. The new horns are designated the D90-8 and the D90-9, and are manufactured from a new non-petroleum based material called Technoplast, which is said to be stronger, lighter and less resonant than more expensive materials such as fiberglass, metal or foam plastic. Both models are very compact and are primarily designed for use in stage monitor speaker systems. The smaller model is the D90-9, which is designed for use with 12-inch woofers, while the larger D90-8 is suitable for use with 15-inch speakers. Driver mounting for both models is via 1 $\frac{3}{8}$ " $\times$ 18" threading on the inside of the throat.

CIRCLE 38 ON READER SERVICE CARD

Electro-Voice has just introduced a new line of musical instrument speakers known as the Force, which combines high performance and rugged construction with a moderate price tag so that they are affordable to musicians who would otherwise have to buy stamped frame, "no-name" speakers. The Force loudspeakers are built around 8-spoke, diecast aluminum with heat radiating fins on the magnet cover. The speakers use a 10 pound magnet assembly and a 2 $\frac{1}{2}$ -inch voice coil for a good balance of efficiency and tonal coloration; efficiency is in the 98 to 100 dB range for 1 watt input measured at 1 meter distance. Power rating for the Electro-Voice Force speakers is 150 watts long term average, measured as per the EIA standard. E-V Force speakers are available in 10-inch, 12-inch and 15-inch versions in 8-ohm impedance only.

CIRCLE 39 ON READER SERVICE CARD

## MUSICAL INSTRUMENT AMPLIFIERS

Most of our readers will recognize the name Vox as one of the legendary British amplifier makes, and some will no doubt be aware that Vox amplifiers have not been available in the U.S. for several years. All that has now changed with the official re-introduction of Vox amplifiers in America. Among the models which will be available on this side of the pond is the legendary AC30, which is now in its second decade of



manufacture, and the new V125 tube amplifier stack which produces 125 watts of power before distortion and which also features active equalization and master volume and sensitivity control. Brand new from the company is the V15 combo with twin 10-inch speakers and a new line of Vox accessory pedals.

CIRCLE 40 ON READER SERVICE CARD

The English company Zoot Horn has introduced a new model G500 bass guitar amplifier which has a number of interesting design features. The unit is a hybrid design with a solid-state preamp circuit for a wide range of tonalities and a tube power amplifier stage for the rich warmth of sound and operating stability of a tube amp. The preamp section of the Zoot Horn G500 has two separate inputs, each with its own gain slider, 12 dB/octave low filter and high filter with variable corner frequencies, nine-band graphic equalizer with  $\pm 20$  dB of control at 60, 125, 250, 500, 800, 1.2 K, 1.8 K, 2.5 K and 4 kHz, an overdrive circuit with variable sensitivity and an on/off switch. Two output level sliders are provided, one for master power amp gain and one for D.I. level, which is a buffered preamp out signal. In addition to D.I. output, the unit has a slave output which is a line level output derived from the output of the tube power amp stage. The power amp stage has a Power Shaper switch which is effectively a preset EQ curve for a slightly suppressed midrange and slightly boosted bass and treble, and output impedance matching for 2-, 4- or 8-ohm loads via toggle switches. The chassis of the amp is built from zinc plated 16-gauge steel surrounded with a  $\frac{3}{4}$ -inch plywood cabinet, and the chassis is wired for 110 or 220 volt 50/60 Hz AC mains power.

CIRCLE 41 ON READER SERVICE CARD

# PRACTICAL ELECTRICAL



Part III

By Brian Roth

In the two previous installments of this series [March and April 1981 issues], the basic design of a building's electrical service entrance was discussed. To recap, the high voltage distributed around town by the electric company is stepped down to the required voltage (120/240 volts for single phase installations) by a large transformer. After passing through fuses located at the transformer, the current flows through the watt hour meter into the main service panel for the building. Here, the electrical current is split up and distributed to the various circuits inside the building. For the purposes of our further discussions, it is assumed that the service equipment utilizes circuit breakers, although fuses also can be used.

The main breaker panel, like all current carrying equipment, has a maximum current limit that it can safely carry. This is determined by the physical size and construction of the conductors and terminals within the panel. Consequently, every breaker box has a label that gives the maximum safe current flow through the circuits of the panel.

Typical panels in homes and small buildings are rated at 100 to 250 amperes. Older structures often have service equipment rated at only 30 to

60 amperes. Large buildings may require many hundreds of amperes to operate the electrical equipment within.

A main fuse or circuit breaker is almost always found in the main service panel. This overcurrent interrupter is used to protect the conductors within the panel. Obviously, it is foolish to install a 200-amp breaker in a box designed to handle only 60 amperes. Because of this, the main breaker is usually permanently installed in the box so it cannot be "cheated."

The output from the main breaker then connects to several buss bars within the service panels. These busses route the electrical current to the individual branch circuit breakers.

In modern service panels, these breakers plug or "snap" into position to allow maximum versatility for the particular installation. Each manufacturer of breaker panel offers a variety of different current ratings for these branch breakers. The electrician will install the proper quantity of circuit breakers with the necessary current rating to suit the needs of a given building. This arrangement also accommodates future expansion requirements.

The number of branch circuits can vary widely from one building to

another. Generally, however, residential and small commercial buildings will be fitted with service panels accommodating twenty to forty branch circuit breakers. The larger the building, the more breakers required. Really big installations are often designed with a main panel that feeds auxiliary branch panels located at various locations in the building.

As mentioned in previous parts of this series, only the "hot" conductors are switched or fused. The grounded neutral conductor is "solid" and is never fused. Consequently, it is necessary to have some method to connect the branch neutral and grounding conductors to the main service neutral line entering the building. This is accomplished with the neutral bussbar mounted inside the service panel.

The neutral buss typically is a long metal strip with multiple set screws installed in it. Each individual branch circuit neutral is connected to this as is the main service neutral. As a result, all of the neutral conductors are tied together to the large service neutral arriving from the electric company.

In addition, all of the safety grounding conductors are tied to this bar as is the building ground wire. The ground wire (most local electric codes require a minimum size of 8 for single phase in-

stallations (runs from the neutral ground buss to a metal cold water pipe or a long metal stake driven into the soil. This arrangement helps ensure that the safety ground on all of the equipment in the building is actually at ground potential. Therefore, a person won't be shocked if he or she touches a grounded electrical appliance and a water pipe or similar grounded surface at the same time.

Generally, the ground/neutral buss bar is "bonded" to the case of the service panel. This puts the breaker panel, the branch neutrals and grounds, the main service neutral arriving from the electric company and the building ground at the same potential.

In some cases, the neutral *must not* be bonded to the service panel. An example of this is found in installations utilizing multiple auxiliary panels rather than one main breaker box. Because of the voltage drop caused by the neutral wire that carries current to the remote panels, the neutral conductor will not be at ground potential when it arrives at its destination.

In this situation, all grounds and neutral wires must be kept isolated within the auxiliary panel. Only at the main service panel must the grounding and neutral conductors be interconnected. That's why the neutral buss bar is insulated from the case of the breaker panel. To satisfy grounding requirements, an additional buss bar should be installed to tie the grounding wires to the building ground.

Service equipment designed for single phase, 120/240-volt applications will contain two "hot" busses which feed the individual branch circuit breakers. That makes sense because two main "hot" conductors are routed into the building for this type of wiring system. Half of the circuit breakers will be hooked to one buss and the remainder will be wired to the other.

Panels made for three-phase systems will contain—guess what—three "hot" buss bars. Thus, a third of the building's branches will connect to each of the "hot" phase legs entering the premises.

When wiring to a 3-phase box, it is important to know the voltages present on each of the "hot" legs. Part I [March 1981] detailed two different wiring systems: "wye" and "delta." Remember that "wye" systems have 120 volts from any phase leg to neutral, while "delta" has one phase leg that is 208 volts above neutral.

It should go without saying that equipment designed for 120-volt operation will vaporize if inadvertently connected to the "wild" leg of a delta system. So, it is necessary to use a voltmeter to determine which leg is which in this type of system. Standard 120-volt gear should be hooked *only* to one of the two 120-volt phase legs. For this reason, it is best that wiring chores in a 3-phase panel be left to a professional electrician.

**Branch Circuit Wiring:** Once the electrical current has passed through a service panel, it is necessary to route the juice to the various outlets and circuits within the building. There are several ways of installing the wiring, but the dime store extension cords stuffed inside the walls are *not* the way!

Very old buildings were wired with a method referred to as "knob and tube." In this design, insulated wires were routed through the ceiling and walls of a building with porcelain insulators. These prevented the conductors from touching the joists and studs of the structure. This system has been obsolete for many years, although it will be found in many old buildings. It is not inherently unsafe if the hardware was properly installed and maintained.

Modern wiring is installed by one of two general methods: 1) non-metallic sheathed cable (often called Romex after the brand name of one wire manufacturer); and 2) conduit. Conduit is the most common wiring method used in commercial structures, and is often mandatory in many localities. Insulated conductors are routed through specially made metal pipes which run from the service panel to an outlet or switch.

Ordinary water pipe is not acceptable in this application since rough edges and curbs without the pipe can damage the insulation of a wire. Conduit pipe is specially made so that this chaffing won't happen.

There are two types of conduit: rigid and thinwall. Rigid conduit is similar to water pipes since all fittings are threaded onto the pipe. It is very difficult to bend, so a variety of angular fittings are made to allow the conduit to be directed to the desired location.

On the other hand, thinwall conduit is much easier to install. Consequently, it is the most common type used for branch circuit applications. Lengths are joined together by couplings which have

set screws or compression fittings since this type of conduit is too thin to permit threaded fittings.

Mechanical fittings, either threaded onto rigid conduit or clamped to thin-wall conduit, attach the pipe to the breaker box and to the branch outlet or switch box. Because of the sold connection, the conduit itself will serve as the grounding conductor; there is no requirement for a separate grounding wire when conduit is utilized. It is imperative, therefore, that all conduit fittings be tightly attached to the service panel or branch outlet box.

Non-metallic sheathed cable, referred to as "NM" in the electric code consists of two or more insulated conductors that are enclosed within a plastic jacket (older types of NM used a cloth-like outer cover). If a grounding conductor is required, it need not be insulated since it does not normally carry current. NM is very easy to use, so it has become the standard wire in residential installations. Many cities do not allow it in commercial buildings, however.

A variety of NM configurations are available with different quantities and sizes of conductors wrapped inside of the plastic sheath. The number of wires and their gauges are imprinted on the outer cover of this type of cable to identify the particular type. For example, "12/3" indicates that three, 12-gauge conductors are contained in the cable.

A special type of non-metallic sheathed cable is designed for direct burial (ordinary NM *cannot* be buried in the ground). This is called "UF" for Underground Feeder, and the individual conductors are actually molded into the plastic outer covering.

**Outlet and Switch Hardware:** The next items required in an electrical system are the outlets, wall switches, junction boxes and related hardware. Since all outlets and switches *must* be installed in a box, we will look at these first.

The majority of outlet and junction boxes are constructed from metal. This serves two purposes: 1) providing a solid mounting means for the wiring device; and 2) protecting the adjoining wall surfaces should a connection within the box become faulty.

Boxes are also necessary if two or more wires are to be spliced together. Any connection in a wiring system *must* be made in a box. It is *taboo* to have a

splice inside a conduit, or hanging out open in the air. If an outlet or switch box is not conveniently located, then an extra junction box must be installed at the place where the wires will be spliced.

There are a variety of electrical outlet and junction boxes available. A single gang box can hold one outlet or switch, a double gang box can contain two outlets or switches and so on. Single or multiple gang boxes can also be used as a junction box.

Special purpose junction boxes also are made which do not have the necessary hardware to secure an outlet, so be careful when purchasing these. It's a real drag to install a box only to discover that it cannot accommodate an outlet or switch.

Knock-outs, which are round holes filled by a metal disc of the same diameter as the hole, are provided in the sides and bottom of a box. When the box is installed, the disc is knocked out, allowing a conduit or Romex clamp to be mounted onto the box.

These clamps are important since they firmly affix the conduit or cable to the box. Some outlet boxes have clamps inside the box to accommodate NM cable, so additional hardware won't be required.

A trend in recent years has been to use PVC plastic outlet boxes. These are designed for NM cable only. Their popularity is due to their lower cost as compared to metal boxes.

There are many brands of duplex receptacles and switches. Some are expensive, and others are very inexpensive; the latter types are not as good a bargain as they might appear. Since outlets and switches are subject to much usage, it is important that they be sturdy or else they won't hold up. A good brand, such as Leviton, Arrow-Hart or Hubbell are actually a better choice than the budget brands.

In addition to the standard 15 ampere, 120 volt duplex outlets, there are a multitude of other receptacles on the market. These are intended for special applications such as 240-volt connections and 3-phase wiring systems. Common examples of these are the "crow's foot"-style electric dryer sockets and "twist lock" types. It is beyond the scope of this article to describe the multiplicity of various styles. However, you should always determine if a given outlet (or its mating plug) is rated to handle the voltage and current in a given application. The manufacturer's

literature will list the maximum ratings for each connector.

#### **Portable Power Distribution Systems:**

Electrically speaking, a portable power "distro" is identical to a permanent system. Large wires route power from the stage source to a breaker panel, and individual branch circuits carry current to the various stage loads. However, there are great mechanical differences between a permanent and portable system: In a building, all of the hardware is safely tucked in the walls and attic. On a stage, the hardware is subjected to considerable abuse. Also, the portable system must be easy to set up and disassemble. The main power feeders and individual branch cables are almost universally insulated with rubber. This material is preferred over plastic due to its strength and resilience. Plastic insulation won't really hold up to burly roadies and Hammond B-3s rolling over it.

The main power input lines are typically four separate wires for single-phase circuits (two "hots," a neutral and a ground) or five wires for three phase wye applications (three "hots," a neutral and a ground.) The rubber insulated wire most commonly used is welding cable which is available in sizes ranging from 6 gauge to 4/0 or larger. Welding cable wasn't really designed for this application since arc welders use voltages less than 120 volts and draw current on an intermittent basis. Another type of cable coming into popular usage is type DLM, or diesel locomotive cable. This variety is rated at 600 volts and has a thicker rubber insulation. While it is more expensive, it is preferred over welding cable.

These main feeders usually are directly connected to the main lugs in the stage's power panel. The grounding conductor can also be hooked to the cabinet of the stage panel, but most touring companies tie the grounding lead to a metal cold water pipe. Recently, however, more and more buildings are using PVC water pipes, so it is important to check with the stage electrician to determine if the cold water lines are all metal.

The bundle of main feeders are then routed to the portable breaker panel. They can either be "hard wired" to the lugs in the panel, or they can be interfaced with large, single-conductor connectors. Popular brands of these include Twico and Cam-Lok.

In most situations, the breaker panel is installed in a road case or similar heavy-duty container. Some touring groups include voltage and current meters with the panel so that the status of the main feeders can be determined.

After going through the breaker panel, the individual branch circuits run to the various electrical loads on the stage. Again rubber covered cable is mandatory; type SO cable is available with as many as six conductors in sizes ranging from 14 gauge up to 6 gauge. The larger sizes can also be used for the main power feeders in stage set-ups that don't require large amounts of power.

Twist-lock connectors are the most popular style for terminating the individual branch circuits at the breaker panel and at the load. The various nylon body twist-lock connectors made by Hubbell are probably the best choice due to their proven durability.

It is a usual practice to install a large power inlet on the amplifier rack and then distribute the power to the individual amps inside the rack. This requires one large power cable from the breaker panel rather than multiple smaller ones. Hence, it is much easier to set up and tear down.

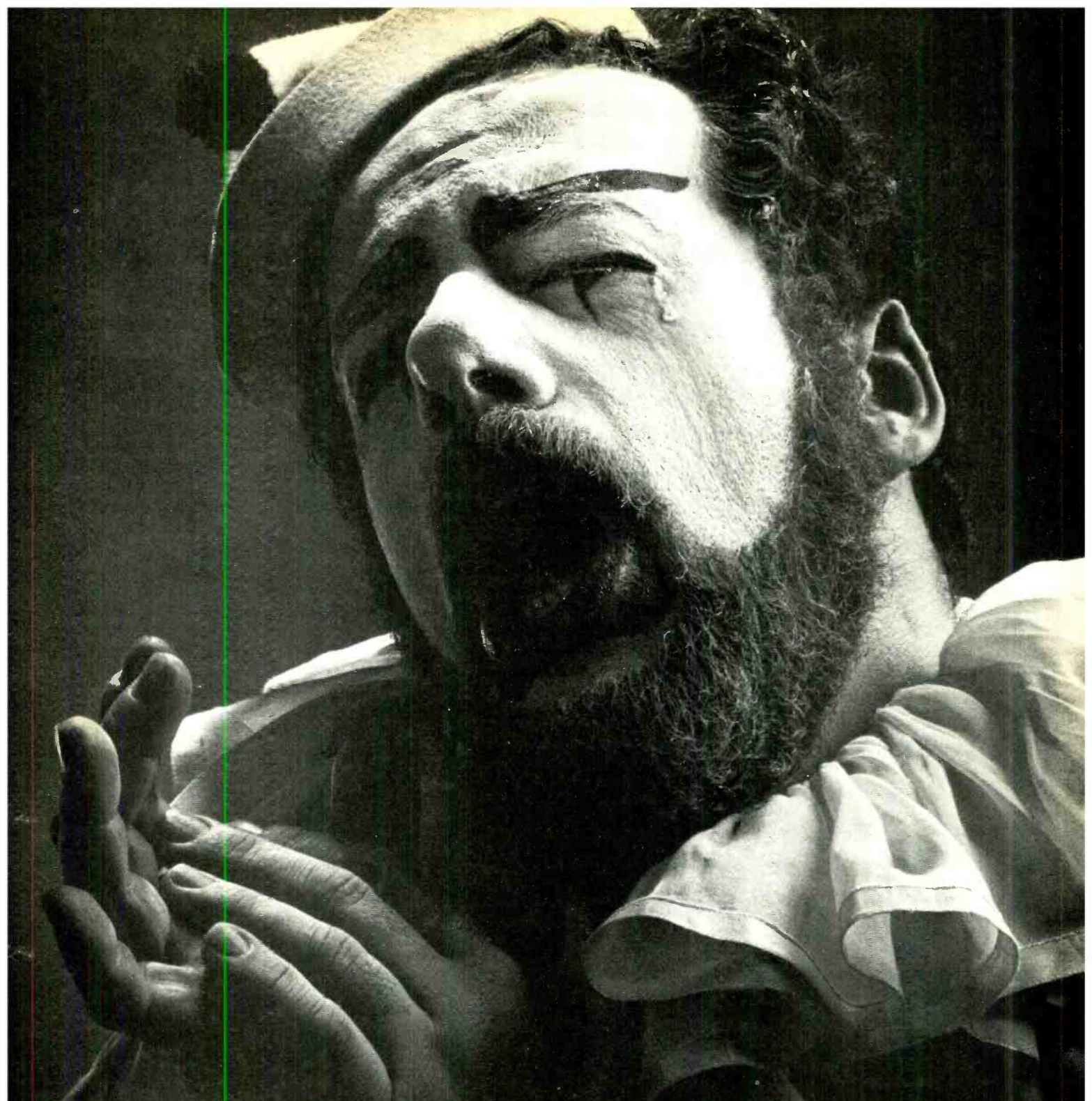
Power for the guitar amps and similar equipment is usually available from outlets mounted onto a length of SO cable. Most sound companies will mount several outlet boxes on one cable with a five or ten foot spacing between each box. Another common feature is a small neon pilot light installed in each box to indicate that juice is available at the outlets.

These outlet boxes must be solidly constructed if they are to last more than one gig. Obviously, plastic outlet cover plates won't hold up, so metal hardware is used instead. Also, the SO cable must be well secured to the box to prevent it from being ripped loose. There are a variety of different strain relief fittings available for this application.

The main rules when designing a stage distro system is to overdesign, overdesign and then overdesign some more. Flimsy hardware has no business out on the road. When in doubt, obtain heavier hardware than would otherwise be required. Otherwise, the show will *not* go on!

#### **Miscellaneous Hardware**

This section will discuss various types of equipment that didn't fit into previous categories.



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 **PIONEER**

We all owe a lot to music.

Ground fault interrupters came into popular usage for the wiring to swimming pool pumps and light fixtures. Due to the extreme chance of electrical shock in this situation, some type of protection means was necessary. The ground fault interrupter, or GFI, was the solution.

This device monitors the current flowing through both the "hot" and neutral conductors. If current should travel from "hot" to ground due to leakage or current passing through a person's body, the GFI detects this because slightly more current will be flowing through the "hot" than the neutral line. The GFI will then disconnect power immediately, and prevent a potentially lethal shock.

GFIs are available to install in the breaker box or to replace a standard duplex receptacle. They should be used whenever electricity is required in damp locations.

It is not uncommon to find that interference is "riding" into a building on the AC line. This can be caused by radio transmitters, welding equipment, neon signs and even faulty insulators on the power lines. This is a very confusing problem that has few consistent answers.

The best way to cure this problem is at the source. However, more often than not, the source may not be apparent. So, it becomes necessary to minimize the problem at the load.

There are a variety of RFI (radio interference) filters on the market that are intended to clean up some of the garbage on the power line. Some will work in a given application, while others won't help at all. Trial and error is the only way to find out.

A more universal solution is an isolation transformer. These devices can greatly alleviate offending noise, particularly static caused by industrial equipment and faulty neon or fluorescent lights. One popular type of isolation transformer will also regulate the line voltage. Even if the incoming voltage should fluctuate, the output voltage from the transformer will remain constant. These regulators are made by Sola, General Electric and a number of other manufacturers. Be aware, however, that these units create a fair amount of acoustic racket, so you don't want to install them in a control room. Also, use the "harmonic neutralized" types when powering audio equipment. The "normal


harmonic" types generate large amounts of distortion in their AC outputs.

### Conclusion

Hopefully, this series has shed some light on the magic of electrical power systems. It is such a massive subject that complete coverage is impossible in this format. That's why you should always consult an electrician whenever a wiring job is necessary.

If you are interested in learning more, consult your local library. Just make certain that the book you check out is current (pun intended); there have been numerous changes in the electric codes through the years.

An excellent book is *Practical Electrical Wiring* by H.P. Richter. It is available from McGraw-Hill as well as Park Publishing Company. A condensed version of this book, *Wiring Simplified*, is available at many hardware stores, and covers many of the most important subjects in electrical wiring. Also, the various electrician's manuals published by Audel are informative.

In closing, be safe—not shocked! 

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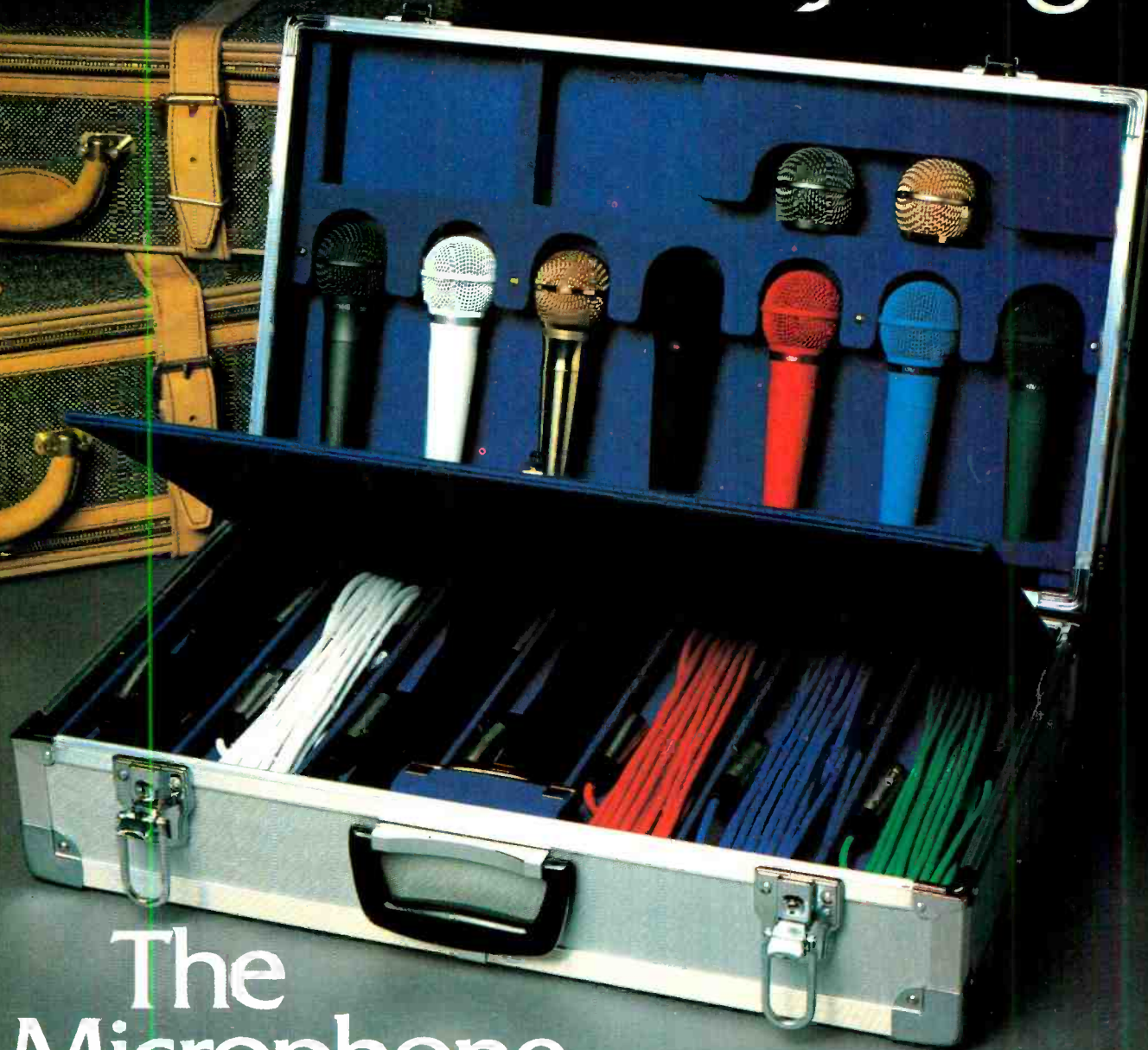
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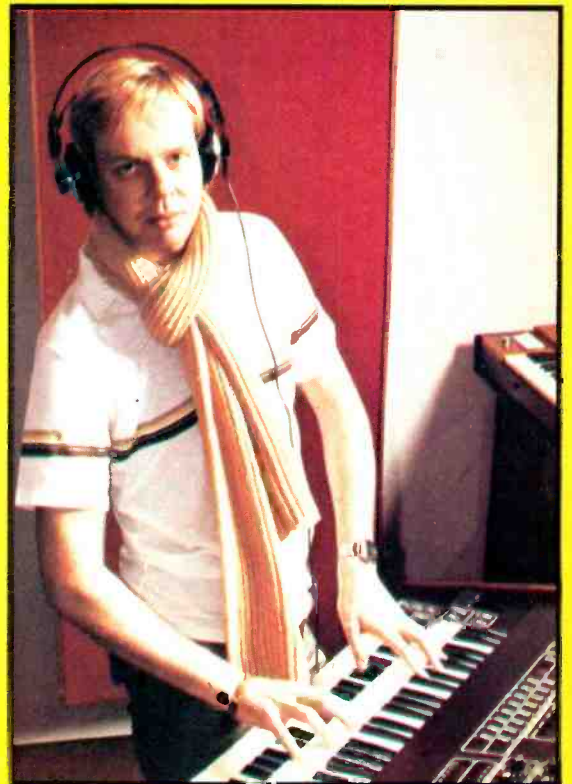
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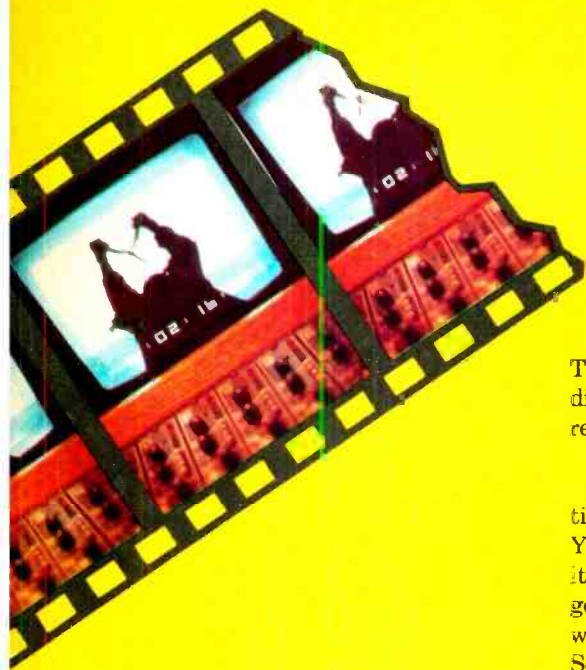
CIRCLE 102 ON READER SERVICE CARD

a session with:

# RICK WAKEMAN







**R**ick Wakeman is best known as the former keyboardist of Yes. From 1971 to 1974, and then from 1976 to 1979, Wakeman's keyboard playing was an integral component of that progressive rock group's sound. Wakeman left the group in 1979 after concluding that he could no longer be satisfied within the confines of that outfit.

In addition to his work with Yes, Wakeman has recorded several solo albums for A&M Records, beginning with *The Six Wives of Henry VIII*, and including such ambitious works as *Journey to the Center of the Earth*, and the soundtrack for Ken Russell's film *Lisztomania*. Wakeman has since left the A&M label and is now a free agent, but his current project is no less daring than his pioneering rock work in the past.

Wakeman is presently recording the music for a forthcoming horror film, *The Burning*. He is using only electronic keyboards and is not utilizing any other musicians for the project. The score will be by Wakeman and Wakeman only, and is sure to be impressive.

Modern Recording & Music met recently with Wakeman at the Workshope Recording Studio in Douglaston, New York, where the project is being recorded. Sitting in on the interview were the film's musical director Alan Brawer, and the engineer at the sessions, Kevin Kelly. All three were enthusiastic about the music being recorded and were happy to discuss the project.

The interview begins with Alan Brawer discussing the film, and the music as it relates to the film.

• • •

**Alan Brawer:** It is a film representation of a legend a lot of people in the New York area and the Northeast have heard, it's basically a campfire story. The general story is that of a guy in the woods stalking kids, campers or Boy Scouts, depending on the version you heard when you were a kid.

**Modern Recording & Music:** Perhaps the film can do for camping what *Jaws* did for swimming.

**AB:** [Laughing] I hope not, but it is a rather scary and universal story. This is applicable to normal life; lots of people have experienced stories like this.

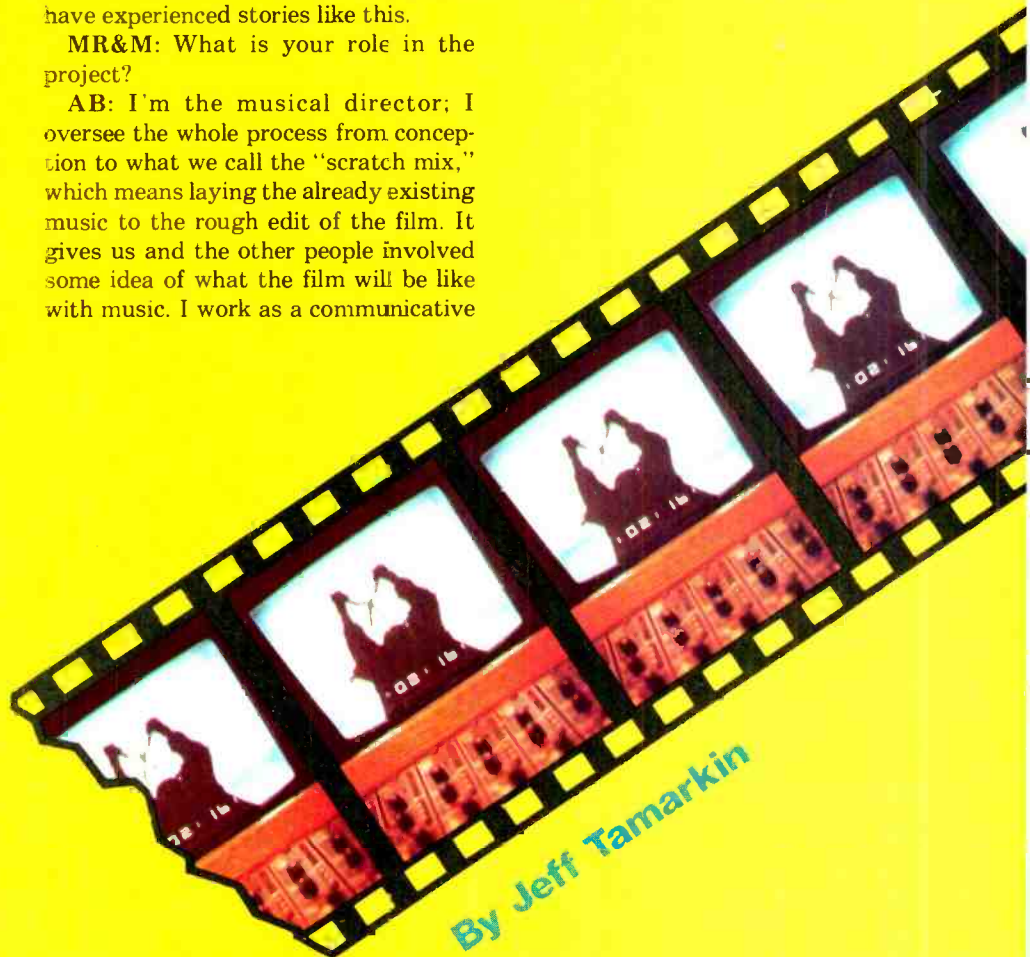
**MR&M:** What is your role in the project?

**AB:** I'm the musical director; I oversee the whole process from conception to what we call the "scratch mix," which means laying the already existing music to the rough edit of the film. It gives us and the other people involved some idea of what the film will be like with music. I work as a communicative

link between Rick Wakeman and the rest of the people in the production, so that their idea of what they want the music to do for the film and his idea of what he wants to do with it can be communicated back to the producer of the film. 90% of the actual conceptualization has been Rick's. My input was with the translation between Rick and the others, and, in the studio, how to get Rick's ideas onto tape, and how to work properly in relation to the film.

**MR&M:** Do you know in advance where you want specific pieces of music to go, or are you taking the music you have and placing it where it is appropriate?

**AB:** What we've done is to go through the whole film with the director, and take everyone's input as to where they thought music would help. Then Rick and I sat down and attempted to overscore. During the film mix, the decision is made as to whether the music will be used in certain spots. So, there's a dialogue track, an effects track and a music track to mix. The balance between those three and the decisions about



By Jeff Tamarkin

where to use music are made during the final film mix.

*Kevin Kelly, the engineer for the project, then described his role in the recording of the music for The Burning.*

**MR&M:** What are some of the problems engineering for film, as opposed to cutting a regular album?

**Kevin Kelly:** The main thing is you must realize the limited bandwidth of the optical. In the final stages you're not going to hear anything above 8 K. You have to put a 14 K sync tone down on tape, and in stereo, you have to monitor it. You have to play games to boost the outer ends of the frequency response going onto film in order to trick the film into giving you back as much as it can at the outer ends, so it almost sounds like hi-fi but not quite.

**MR&M:** What about the problems in mixing for film?

**KK:** In this case, it's a horror film, so there are lots of dynamics and things called "stings," which are bright, loud attacks. They come out of low levels, so you have a lot of -10 program, then, all of a sudden, +4 peaks. You have to preserve these dynamics while keeping a decent signal to noise ratio, so the program can be efficiently transferred onto mag. [35 mm sprocketed magnetic film stock.]

**MR&M:** When this film hits the theaters, the music will sound less dynamic than it does in this studio. How do you account for that factor when you're recording?

**KK:** It's not all that far from a monitor system with the outer ends rolled off. Basically, theater sound systems tend to be big, bottom-heavy speaker systems.

*Rick Wakeman sat in at this point to talk about the keyboards he used.*

**Rick Wakeman:** We ordered every keyboard under the sun, because I wasn't sure if I could get a [Sequential Circuits] Prophet 10 in good shape. When you're renting you never know what condition something will be in.

**MR&M:** Did you rent everything or did you bring some equipment with you from Europe?

**RW:** I didn't bring anything over, except my wife. The Prophet 10 we rented turned out to be a good one, though, so we did almost everything on that and on the piano, and on a Yamaha CS 8. The Prophet 10 covers so much; it's my favorite instrument.

**MR&M:** What about mics?

**KK:** The only mics are on the piano.

Everything else is taken direct. The piano is altered as well, so there's no situation where we're getting a big, normal piano sound. We used a [Neumann] U67 on the bottom end of the piano and an AKG 451 on top.

**MR&M:** What about special effects?

**RW:** Nearly everything has been done on the [Eventide] Harmonizer™.

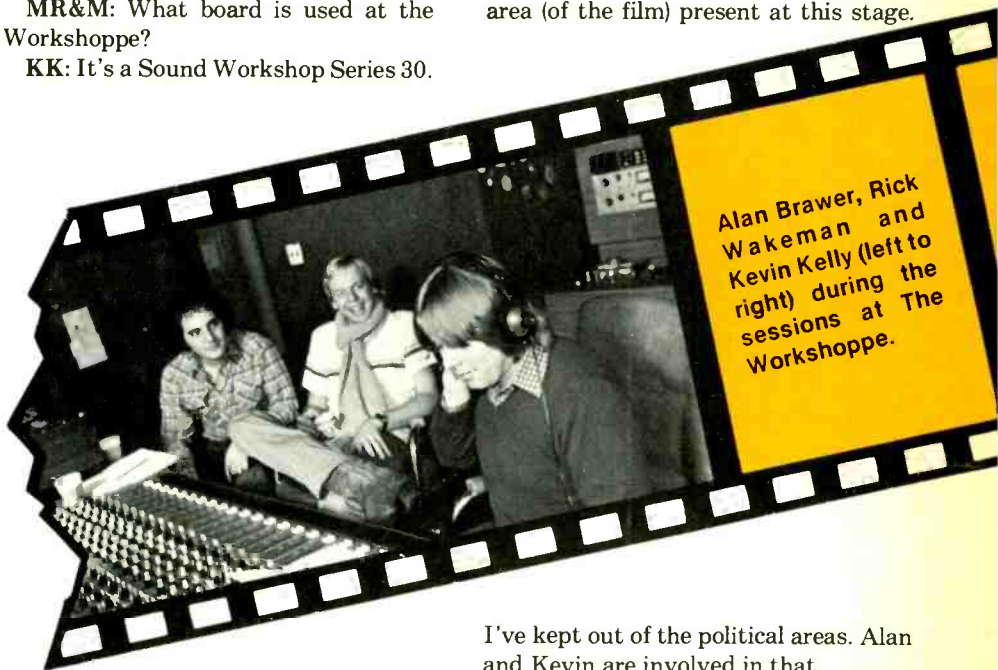
**KK:** But hardly anything had to be done on it because the sounds of the Prophet are so alterable within the keyboard that there's no need to get into very heavy effects in the control room.

**MR&M:** Was any custom equipment used?

**RW:** Customizing comes down to what you've got on the road, because in the studio you can change things like settings and sounds. On the road you can't so you need customizing.

**MR&M:** What board is used at the Workshoppe?

**KK:** It's a Sound Workshop Series 30.



**MR&M:** Any special techniques being used in the recording?

**KK:** Only recording backwards, at altered speeds, to create ominous sustains when you turn the tape back over.

**MR&M:** Are any extra musicians being used?

**RW:** I have a percussionist standing by, but because it's such an electronic recording, anything approaching natural would lose the effect of the sounds we have. So I did it all on my own. There's no orchestration—it's all done on my instruments.

**AB:** There are two cues done with acoustic instruments, but they weren't supposed to be related to Rick's elec-

tronic score. There's a rock tune and a bluegrass tune.

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**MR&M:** Rick, how did you become involved with this project?

**RW:** Through Tony Maylam, who's the director.

**MR&M:** Will there be a soundtrack album culled from the recording you're doing for the film?

**RW:** It'll be taken from the same sessions and will have narration as well.

**MR&M:** Are you concerned with the fact that some of what you're recording might be rejected by the filmmakers?

**RW:** It comes down to politics; you've got a situation where people are involved in their own area. They're sitting down with the final mix and they can't see the film as a whole. So it's important that there be a representative from each area (of the film) present at this stage.

I've kept out of the political areas. Alan and Kevin are involved in that.

**MR&M:** What are some of the problems dealing with film companies, as opposed to record companies?

**RW:** Ignorance. There's even more in film. Music is always given a low budget in film; it's always the thing that's kept for last. It's always, "Oh, we've finished the film. Who's doing the music? We've only got a week to do the music! What do you mean, there's only \$80 left for the music?" That's what happens—that's a gross exaggeration, but that's how it is.

**MR&M:** Do you worry that your contribution will be overlooked? When you record an album, it is Rick Wakeman's album, and people buy it for that reason. Here, it's just music by Rick Wakeman and the credit is buried somewhere at the end of the film.

**RW:** Ironically, that doesn't worry me because I'm basically RRR—Rock & Roll Retired. This is something that I'm interested in. Rock & roll is running out of ideas, but I've learned a lot doing this. I also like the idea that recording for a film is like painting by numbers—you're given the ideas and you fill it in.

**MR&M:** Let's reconstruct the making of this recording. What was the first step?

**RW:** I was sent a cassette of the movie and the places where the people involved



with the film thought music should go. Then I sat down and wrote out some ideas about what I wanted to do with it. When I arrived over here I watched the film and met with Alan, the director, producer and film editor. We discussed where music should go and then I came into the studio and started getting the music down. I already knew what I wanted to do. We tried to make it as off-the-wall as possible, but we were dealing with some conventional people; it was like facing someone with a color they'd never seen before. We actually got away with a lot.

**MR&M:** Your solo concerts always involved a lot of planning, there were stage sets and theatrics involved. How did the arrangement of this project differ from a concert?

**RW:** Arranging a concert was always a lot of fun, but arranging a concert tour was no fun. The rock and roll business is full of a-----s, and I can't take them anymore. I'll do odd concerts but that's

all. I'm more into making music, not thinking of ways to hang in there. I'd rather create new things than recreate old things.

**MR&M:** How long do you expect the recording to take?

**RW:** We're actually done. It took five days, but I spent a few months working it out before I came in here. I hate walking into a studio and not knowing what I'm going to do.

**MR&M:** Our readers would like to know about your career before taking on this project—your work with Yes and your solo albums. Going back to the very start, how did you first become involved in music?

**RW:** I started when I was five, with piano lessons. I took lessons until I was 18, then I went to the Royal College of Music in London for two years.

**MR&M:** Were you considered a prodigy?

**RW:** No, I was considered a pain in the ass. I was a rebel; I didn't like doing straight things. I did session work for people like David Bowie, Cat Stevens and about 2000 other sessions (literally)

between ages 18-21. Then I got the chance to join the Strawbs, for \$50 a week. They were a folk group at the time, but I loved playing in front of an audience.

**MR&M:** What was your first experience in the recording studio?

**RW:** I did demos when I was about 14. My first actual session was in a 16-track studio, for a guy named Jimmy Thomas, who was the male singer in the Ike and Tina Turner Band. To give you an idea of how stupid I was at the time: I was working in a music shop, just making a few pounds a day and spending it on getting drunk—things haven't changed a lot on that front—when this guy came in and said that he had a session booked for Jimmy Thomas and the keyboard player couldn't make it. The guy I was working for said, "Rick has done a lot of sessions," and the other guy said, "Great. Can you be at this studio tonight?" Then he asked if I did brass arrangements, and the guy from the shop said, "Yeah, he does."

So I arrived at my first session and I was petrified. I'd never seen anything like headphones, and one of the producers said, "OK, we'll just start by putting down a rhythm track." He said to me, "Rick, put your cans on." I asked myself, "What the hell are cans?" I was literally looking for Pepsi-Cola cans; I thought they wanted me to rattle cans. I figured if I asked what cans are I'd blow my session career. So I said, "I'm a bit wiped out; I can't see the cans anywhere." They said, "They're on top of the organ." The only thing on the organ was the headphones, so I said, "Oh shit, great, thank you." That was my first session. The record never came out.

**MR&M:** How did your position as keyboardist with Yes come about?

**RW:** They came back from an American tour and they decided they wanted to expand their keyboard section and get rid of Tony Kaye, their keyboardist. They asked me to join, and I said no. This went on for about two weeks, and to cut a long story short, I went to a rehearsal with full intentions of saying no. That afternoon, half of "The Sunrise" and "Roundabout" were written.

**MR&M:** What was the Yes period like for you?

**RW:** The first year was great and the second was horrific. I left in '74.

**MR&M:** Why did you leave?

**RW:** When you do albums like *Topographic Go Cart* [actually titled



Alan Brawer,  
musical director  
of *The Burning*,  
who doubled as  
co-producer of  
the sound-  
track  
album.



*Tales of Topographic Oceans*], it's horrible. Jon Anderson [Yes vocalist at the time] and I are the greatest of friends, and he likes a lot of that album, while I think it sucks. It could've been a sensational album if more thought went into it and if certain parts were thrown out—condensed from a double album to a single album. There are some nice parts, but it's like wading through a cesspool to get to a water lily. We want a nice pond with the water lily in it.

I loved the albums *Fragile* and *The Yes Album*, which were poorly recorded but had charisma. *Close to the Edge* and *Going for the One* are nice albums. *Tormato* was pretty cheap; the band was getting tired. It was time to play with new people, and on Christmas, 1979, Jon and I left together.

**MR&M:** Why did you go back with them after leaving for the first time in 1974?

**RW:** They were on the road in Switzerland and their keyboard player wasn't working out. They called me and asked if I'd come over and do it as a session player. I said yes, and went over there. I heard the songs and it was nice again; it was melodic. Then they asked me to tour, and I agreed. Then they decided to record some "live" things, so I rejoined.

**MR&M:** What do you think of the *Yesshows* album, the "live" set released in 1980 (Atlantic)?

**RW:** I think it's disgraceful. We recorded some of the dates and there were enough tapes to produce a "live" album. We always thought the group was better "live" than on record. We're dreadfully clinical in the studio; we're well aware of it and the music suffers from it. Chris (Squire, Yes bassist) mixed some stuff, which we all heard, and it was good, but nothing exciting. Jon and I disliked most of it; there was no excitement in it. Jon and I eventually left because the studio album the band was working on was terrible. Anyway, back to the "live" album. The next thing I knew was that somebody gave me a copy of *Yesshows*, and it turned out to be those horrible demo mixes. I can't do anything about it, but nobody told us it was coming out.

**MR&M:** What do you think of the two musicians who replaced Jon and yourself and of what Yes is doing now?

**RW:** If you want an honest opinion, I think it's hysterical. It upsets me because Jon and I felt very strongly about Yes and the music it produced. There were people who cared about Yes and felt that we cared. Yes meant not the people in it, but the music the group

made. Now people will wonder if it was a ripoff all along. Yes was a great part of my life and greater part of Jon's life.

**MR&M:** How did you come up with the ideas for your solo concept albums? Most of them dealt with historical subjects. Are you a history buff?

**RW:** No, but when you don't write lyrics and you need a subject to latch onto. I didn't want to just make keyboard albums.

**MR&M:** How do you recall those albums?

**RW:** I don't regret anything I've done, but I do look back and admit that some of them didn't work. At the time, you think they work, but it turns out they didn't.

**MR&M:** Two of your solo albums, *Lisztomania* and *White Rock*, were related to films. How do they compare with the current project?

**RW:** *White Rock* was more a music film, while this music is just incidental to a horror movie. As for *Lisztomania*, I wasn't ready for a film of that magnitude or for a genius like director Ken Russell. He was kind to me, but I was ignorant as far as making music for film.

**MR&M:** Some of your records admittedly were extravagant, and the critics let you have it for that. How did you deal with the criticism? Did it bother you to be negatively reviewed?

**RW:** If you've tried hard and you read in the newspaper that it was a load of rubbish, especially when the audience gave you a standing ovation, it hurts. But it doesn't bother me anymore. It can be just as bad if a reviewer says everything you do is fantastic and you know it wasn't. There's no happy medium.

**MR&M:** What have you heard lately that has impressed you?

**RW:** *Ashes to Ashes* by David Bowie. And I love early Blondie. Absolutely fantastic. *Heart of Glass* is great—it wiped me out. They're high energy and it's good musicianship. But I didn't like their latest album, *Autoamerican*.

**MR&M:** What's next, Rick?

**RW:** I'm doing George Orwell's *1984*. I'm going to put it on as an extravaganza. I'd like to do one giant concert over here. Jon Anderson and Chaka Khan are going to be involved. Then, I want to get more heavily into films, and maybe television work. The music I do is rock & roll, but it isn't. It can't be classified. I'd rather just say I'm RRR—Rock & Roll Retired.

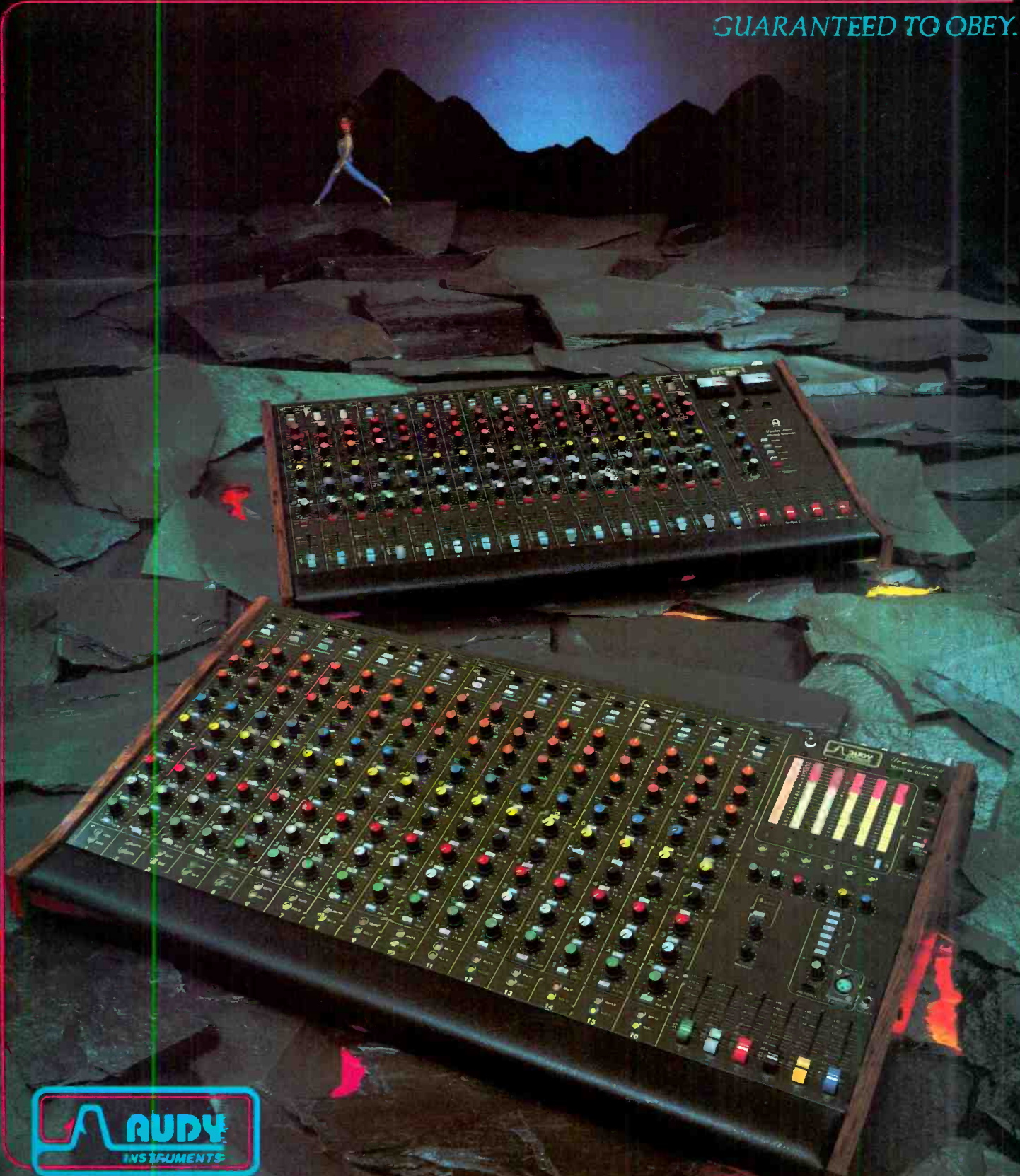
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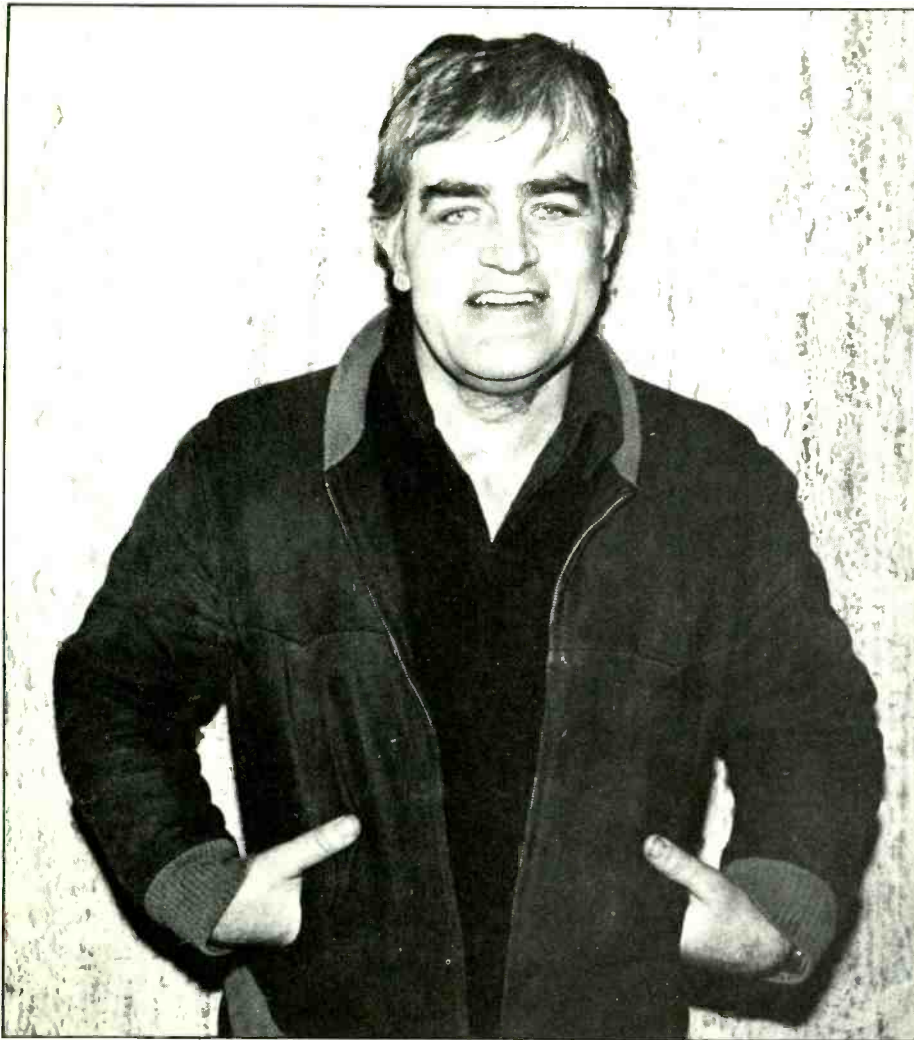
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PROFILE:

# IAN STEWART



By  
Jeff Tamarkin

During the "British Invasion" period of the 1960s, there were countless bandwagon-jumpers who brazenly dubbed themselves, "The Fifth Beatle," attempting to gain a little notoriety by whatever available means. Some almost earned the tag; others drowned in their own self-hype. But there was never any question about who deserved the title, "The Sixth Rolling Stone." That distinction always did, and always will belong to Ian Stewart.

You may be scratching your head as you read his name. Who is Ian Stewart? He's not exactly visible for a member of the Rolling Stones, is he? No; but look at the Stones' album covers: Ian Stewart plays piano on the first album, on the most recent and on most of the albums in between.

Stewart was a founding member of the Stones in the early 1960s. He, along with Mick Jagger, Keith Richards, Bill Wyman, Charlie Watts and Brian Jones, came together because of a mutual love for playing rhythm and blues music. Stewart was eventually eased out of the group's front line as it gained popularity, but he never entirely disappeared. Dur-

ing most of the American Rolling Stones tours, Stewart could be seen walking on stage, with no fanfare, to join the group on a few numbers, playing piano. His credit is listed on nearly every Stones album, playing on such classics as "Time Is On My Side," "It's Only Rock 'N' Roll," "Dead Flowers," and many others.

Recently, Stewart undertook his first production, on an album called *Rocket 88*. The music on *Rocket 88*'s self-titled debut is pure, classic boogie-woogie, and features the piano playing of Bob Hall and George Green, the supporting musicianship of bassist extraordinaire Jack Bruce, British blues guitar legend Alexis Korner, Stones sticksman Charlie Watts and a quartet of horn players.

Boogie-woogie is Ian Stewart's first love, and he was eager to describe the music and the making of *Rocket 88* (Atlantic Records). In a recent interview at the New York offices of Rolling Stones Records, Stewart spoke with Jeff Tamarkin about his experiences with the Rolling Stones and those boogie-woogie boys, *Rocket 88*.

**Modern Recording & Music:** How did you first become interested in music and what attracted you to the piano?

**Ian Stewart:** The original attraction was to the sound of the boogie-woogie piano players of the 1940s. My father came back from the war with some boogie-woogie records, including one by Tommy Dorsey. If you hear something special when you're nine or ten, it somehow stays with you. I just became fascinated with boogie-woogie, and subsequently I was lucky enough to go to a very jazz-oriented school. I got into traditional jazz and we used to play a bit at school. We were lucky in England in the 50s because we could get all sorts of traditional jazz records through a French company called Vogue which put out all the American Blue Notes. The only music we couldn't get in England in the 50s was the Chess and Atlantic stuff.

**MR&M:** Boogie-woogie and rhythm and blues were still an underground phenomenon in the 50s. What was it that attracted you to that particular style of music?

**IS:** You know, I really don't know. I think it was the magic of having the two hands on the piano (working the way they do) and the insistent left hand. The other great thing about boogie-woogie is that you can't play it very fast. I hate tear-ups; I hate bands that play at ridiculous speeds. I also don't like ballads very much and with boogie-woogie the ballads rock along very nicely. It's a pulse, really.

**MR&M:** What do you recall about the R&B scene in England in the late 50s and early 60s, in the era before groups like the Stones came into prominence? What do you remember about musicians like Alexis Korner and Cyril Davies, who really paved the way for the Stones?

**IS:** My memory is getting a bit vague, but Alexis and Cyril had been around for years. Alexis was in the Army in the 40s and had seen most of his heroes in Paris by 1948. I mean, he saw Leadbelly and Charlie Parker on the same night! That was something we couldn't do in England because we had, and still have, a really bad musician's union, which has done much more harm than good. Alexis had always been around and he would start things, but the band he put together really started everything. That was called Blues Incorporated. It was quite a crazy band and it should never have worked. But it did because there were all these

divergent styles brought together. I remember some very good nights with that band.

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**MR&M:** How did you meet and become involved with the people who would later become the Rolling Stones?

**IS:** That was through Brian Jones, who put a classified ad in a thing called *Jazz News*, which is now long-defunct. He wanted to start an R&B band. This was at a time when we'd been going through a traditional jazz craze, but that was dying and there were a lot of guys wondering what to get into next. R&B was an unknown factor, because, although you could always get a lot of traditional jazz in England, you couldn't get the R&B labels, like Chess and Vee Jay. So, very few people knew what R&B was all about. I didn't know much about it. My idea of R&B was Louis Jordan and Wynonie Harris. But Brian had access to the more obscure stuff like Slim Harpo, Muddy Waters and Little Walter. That was the sort of music he wanted to play. I went to see him and he had a couple of guys with him whom he didn't like very much. Over the next couple of years we rehearsed in small rooms with different musicians just for fun. Different musicians would come and go and then Brian himself would vanish for a couple of months at a time, because he didn't live in London. Eventually, we just settled down to the lineup of Mick, Keith, Brian and Bill. Charlie Watts came along later; we had to steal Charlie from another band (Blues By Five).

**MR&M:** What were the earliest Stones gigs like?

**IS:** They were rather good in a way because they still had the feeling of a jazz club thing. People came because they liked the music, because they were into Jimmy Reed and those people. The records were just starting to appear. The gigs were in small rooms in the back of pubs.

**MR&M:** What about the first recording sessions? What were those like?

**IS:** They were a bit crude, really. They were done in mono demo studios, all done very quickly. I wish they'd record like that now in a way, finishing four tracks in a morning. I still think that's the right way to record.

**MR&M:** At that time, did you ever expect the Stones to become as popular as they did, or even to become popular at all?

**IS:** I think I did, because we got a good reaction very quickly. The guys were very dedicated. Mick and Keith and Brian ended up living in this dreadful apartment. Keith never really worked, and Brian used to take little odd jobs. So, they never had any money. They were going around stealing milk off people's doorsteps. All they did was sit and play their guitars, all day. Keith and Brian got this really good partnership thing going. The band had the right approach. To me, it was always fairly inevitable that they'd make it. Then, when Andrew Loog Oldham (Stones' manager) came along and started steering them a bit, then it just had to happen. If Andrew hadn't been there, they could have burnt themselves out in a couple of years. They were doing too much. But Andrew was good at routining the whole operation.

**MR&M:** Were you ever asked to become an official member of the Stones?

**IS:** In a lot of ways, before Andrew came along, I suppose I was a permanent member of the band. But he decided that my face didn't fit, and I wasn't really a very good piano player, anyway. So, they quite rightly realized that if they were going to become a successful group, they weren't going to do it by singing Muddy Waters and Chuck Berry tunes; you have to do your own things and have a slightly wider repertoire. They used to come up with numbers I quite honestly didn't like. I could play the chords but I didn't want to play them. So, I was just generally eased out. But it's alright, because I sort of stayed around. It wasn't done very nicely at the time, but the only thing I've got against them for doing it is that if I had been asked to join the band, and had to play those songs, I probably would have turned into a much better piano player. Within three or four years, bands were using pianos again, and people like Leon Russell started to appear. I suppose if I had kept at it, I could have been as good as Leon Russell.

**MR&M:** After playing with the Stones for most of the past 20 years, you are, in essence, a member of the band. You're just not as visible as the others. So, why not just come out front?

**IS:** I'd rather stay in the background, in a lot of ways, because I've seen what happens to people in the foreground. I don't really want to get involved in

that. And, actually, I can't think of anyone who has been made into a nicer person because of stardom. Obviously, it would have helped to have more money in the bank, but you can see what guys have been through in the past—from being molded and stared at. I'm really quite pleased that I didn't get involved in it.

**MR&M:** On which American Stones tours did you play piano with the band?

**IS:** I don't think I played in '72. I played a bit on the 1969 tour; I also played in '75 and '78.

**MR&M:** Were you with the group during the first American tours? Did you, for example, appear on the *Ed Sullivan Show*?

**IS:** Oh, yeah. That was quite funny. I'd never seen anything like it. I don't know how to describe it. The only thing I didn't like was that there was an awful lot of bullshit. Spending three days to do a five minute slot on a TV show is a complete waste of time.

**MR&M:** Weren't you also a tour manager during some of the tours?

**IS:** Oh, yeah, certainly during the early days. When we went out in England and on the Continent, it was basically just me and them. Then the entourage grew a bit. But for some of the big tours, I'd come over before the tour would start and try to organize things like rehearsals and recordings.

**MR&M:** Every time the Stones tour, there are stories about crazy goings-on. Is all of that exaggerated or *is* it crazy?

**IS:** Oh, it's exaggerated. I haven't

seen very many crazy goings-on at all. Obviously, we do get some mad kinda things (happening). People like "Woody" (Ron Wood, Stones lead guitarist) and Keith stay up for days on end, but I never do. I always go to bed at night, and during the day I do square things like play golf. So, the craziness goes on at night and I never see it. I'd rather go to bed.

**MR&M:** If you look back at the 20 years you've been involved with the Stones, is there any particular incident—recording or tour—that stands out as a highlight?

**IS:** Good Lord, I don't know. It's difficult to think of actual highlights. Some of the highlights came on the last tour when we actually got around to playing some small places again. We played at the Academy of Music (the Palladium in New York City) and at the Capitol Theater in Passaic, New Jersey. That's what it's all about. It isn't playing the Garden. I don't care if I ever see [Madison Square Garden] again. That isn't rock and roll. Apart from that, I really liked the 1969 tour, even though it finished up in that bloody Altamont thing. We hadn't been here for three years and everybody wanted to see what had happened with us. The actual screaming thing had finished and people wanted to hear what you could do. There were the big sound systems that you didn't have in '66.

**MR&M:** There was also quite a growth in the music between those tours: It was a long way between "Get

Off My Cloud" and "Sympathy For the Devil."

**IS:** Oh, yeah. It all grew up. I liked all the American tours. I liked the '72 tour because I got a car and drove almost the whole tour and actually got to see something. I'd love to do that again. As far as individual highlights, my mind gets a bit fuzzy. I could never write a book. Everyone says to me that I ought to write the definitive book on the Stones, but it's not going to happen.

**MR&M:** Will you continue to be involved with the Stones?

**IS:** I hope so. I'd like to see the thing finished. I was there at the very start.

**MR&M:** The Stones tour every three years and this is the third year since 1978. Will we see the Stones this year?

**IS:** I wish we would. But those decisions come from Mick. I think they wanted to do something last year and why they didn't I'm not quite sure. We've got a new album due in the summer so I hope we'll do something when that shows its face.

**MR&M:** Do you have any favorite Stones recordings?

**IS:** I still think the best album is *Exile on Main Street*, and I quite like *Let It Bleed* and *Sticky Fingers*. I also like the very early stuff. After that, I thought the albums got a bit "duff." I didn't like the one done in Jamaica [*Goat's Head Soup*] or *Black and Blue*. That was all a bit dreamy for my liking. I wasn't mad about the last album (*Emotional Rescue*), but the one before it, *Some Girls*, was good.

*At this point, the conversation turns to Rocket 88, the album recently produced by Stewart for the band of the same name. Rocket 88 is actually a floating aggregation of musicians playing boogie-woogie music and R&B as it*

*was played in the 1940s and 50s. Stewart spoke about the music and musicians involved, and about the process used to record the group's "live" concerts for this LP. Rocket 88 is on Atlantic Records.*

**MR&M:** You've recently produced *Rocket 88*. What is the project all about?

**IS:** Well, it was never intended to be a project or to get any further than the back rooms of a couple of pubs in London. Very briefly, it came about through an acquaintance. Bob Hall, who is one of the piano players on the album. Bob and his mate George Green, who's also on the album, are probably the best boogie-woogie piano players in the world. They actually do play boogie-woogie and not much else.

We had ideas about putting out an album three years ago, just on a London jazz label. We were going to record it "live," using the Stones' mobile unit. We thought we ought to have a rhythm section if we were to go to record it "live," and try to hold it all together. So I asked Charlie to play because Charlie likes boogie-woogie and anything on which he can just play time; Charlie's never a busy drummer. So, he joined in. Then I thought I'd get two or three jazz horn players for the second half of the concert. We gave them some of the old

78s with people like [pianist] Albert Ammons playing with small bands. They wrote out the riffs and just did it. The reception was quite good and we were asked to do it in London, but with Alexis Korner. It was a party thing, to promote the 50th anniversary of boogie-woogie. So, we had a whole bunch of piano players up there. It sounded very good so we thought we'd try to keep the band together.

All we do now is book dates in London about six weeks ahead of time and just put together bands using whoever



is available. If Charlie is away with the Stones, we use Mickey Waller, or Pete York. Jack [Bruce] tends to come and go for three months at a time, so if he's not around we use Colin Hodgkinson [from the Jan Hammer Group] on bass. We've got it down to a pool of musicians now, and it revolves. When we first started doing this a few years ago, we'd get moans from the audience if Jack or Charlie weren't there, but now it's Rocket 88, and it's a pool of guys. Some of the best reviews we've had were when Charlie wasn't there and it was just reviewed as Rocket 88. One of the newspapers called it a travelling crap game because no one ever knows who's going to be in it.

**MR&M:** Why did you choose this particular gig for the album?

**IS:** We had intended to use the one before it, which was done at a big auditorium in Hamburg. We thought we'd get a good sound at that one and we did; but some of the band members weren't in very good shape that night, and for one reason or another, the recording got ruined. So, we played in this strange club the next night and thought we'd record it. And I guess because some of the band members were pissed at each other and had hangovers, it had a very good feel to it. So we put this out.

**MR&M:** What will become of the other shows? Will there be followup albums?

**IS:** Well, I hope so. If this one does anything, I hope Ahmet [Ertegun, Atlantic Records' chief] will put out some more. We've got another two concerts recorded—probably as good as this one. One includes a slightly bigger band, with both Jack and Colin on bass, and five horns instead of four.

**MR&M:** The record sounds almost like a throwback to that pre-Stones era in some ways. It's like listening to a record by Alexis Korner or Cyril Davies made in the early 60s.

**IS:** I think it goes back even further than that. In Alexis' band, it was more of a Ray Charles influence. This band is more of a throwback to the Lionel Hampton bands of 1948-50, and to the small bands of people such as Albert Ammons and Wynonie Harris. But in those days they were tied to three minutes. On this thing, they're not tied to three minutes and the horn players can have a go.

**MR&M:** How would you describe boogie-woogie to the uninitiated? How does it differ from blues or R&B?

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**“ I'd rather stay in the background, in a lot of ways, because I've seen what happens to people in the foreground. ”**

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**IS:** I think boogie-woogie is a direct descendant of the country blues guitar style. When black people moved to the cities in the north (of the U.S.), they accompanied themselves on pianos instead of guitars. So, all they've done is to transpose the blues guitar style to the piano. Trains were a big part of their lives; they moved north by the rails, and they usually lived near the railroads in the cities. So, the rhythm on the left hand is really a train rhythm. If you get a recording of a locomotive, you can use it as a rhythm section to play boogie-woogie to. There's also a ragtime influence as well.

**MR&M:** Can today's audiences, weaned on heavy metal and disco, appreciate this style of music?

**IS:** The heavy metal and disco people aren't going to make much of this at all. But anybody who's into Chuck Berry, for instance, should like this because his guitar playing is pure boogie-woogie. It's gone full-circle: the piano playing has been transposed back to the guitar. The early Chuck Berry albums on Chess are pure boogie-woogie. The intros are straight out of Albert Ammons. I'd think that anybody who likes R&B, Fats Domino or even Little Feat would get something out of this.

• • •

**MR&M:** It's been almost 20 years since Alexis Korner, Charlie Watts and Jack Bruce played together in any serious capacity. How did you manage to get those three guys together again?

**IS:** It wasn't too difficult. Charlie's whole thing in life is that he likes to play with good bands. If anyone asks him what the Rolling Stones are, he'll say they're a good little band. And he'll play with other good little bands if he gets the chance. As far as Jack Bruce, I was a little surprised. I met him at Eric Clapton's wedding and I hadn't seen him for a good few years. As a joke, I said we need a good bass player next week; would you like to do it? He said he'd love to. As for Alexis, he'd done a boogie-woogie reunion thing

with Bob Hall, and he said if we were going to do anything, count him in. Alexis keeps himself busy by doing a lot of radio work, doing voice-overs on TV commercials for people like Kodak and Volkswagen. He's not always around, so we have another guy named Danny Adler who can play all this 40s-style blues guitar.

**MR&M:** What are the backgrounds of the other musicians on the record, starting with the pianists, Bob Hall and George Green?

**IS:** Bob is actually a patent attorney for an American chemical company. He used to play with people who evolved into bands like Fleetwood Mac and Chicken Shack. He also used to back a lot of the American blues artists who came to England. He's not scared of them. I was petrified when I had to play with Howlin' Wolf. George Green is a much quieter guy who works for the post office and also drives a cab. He's never done much professional playing at all, yet he's probably the best boogie-woogie piano player in the world. They work as a team.

**MR&M:** How about the horn players: Colin Smith, trumpet; John Picard, trombone; Hal "Cornbread" Singer, tenor sax; and Don Weller, tenor sax? Where did you get them?

**IS:** The three British players are guys who've been around a long time and started off in the traditional bands. They're good blues players. They're not trying to see how fast they can play, the way the more modern guys do. A lot of rock and roll groups fall into a trap when they bring in horn players, because they just want to see how fast they can play. Hal Singer is an American musician, who was a session guy for the Savoy and Deluxe and King labels in the 50s. Then he moved to Paris; now he just plays in European jazz clubs. We had the chance to use him and he's perfect for the band.

**MR&M:** Why did you choose to record the band "live" rather than in a studio?

**IS:** I think the band needs to be recorded "live." I think if they went into the studio and tried to get clever, it

wouldn't work. It's a good "live" band.

**MR&M:** Why did you record in Germany?

**IS:** If I remember, it was just because the Stones' mobile unit was in Germany.

**MR&M:** What was your function as producer? Since it was a "live" album there really couldn't have been a lot of planning involved.

**IS:** No, there wasn't. I don't really like the term "producer." All I really do with a band is book the gigs and musicians, suggest the repertoire, get things written out and then do the sound. If someone else is doing the sound, I'll sometimes play with the band. Then I mix the tapes after we record them. The engineer, Mick McKenna, also mixed some of it, so we used about four of my mixes and a few of his.

**MR&M:** Did you have any previous production experience?

**IS:** Nah, I hate record producers.

•••

**MR&M:** Let's run through the cuts on the album and find out something about each song and the writers. What about the title cut, "Rocket 88"?

**IS:** "Rocket 88" and "Roadhouse Boogie" were tunes from, I think, 1948. They were both recorded as 78s by Pete Johnson, who also wrote "Roll 'Em Pete" on the second side (along with Joe Turner). I believe they were done for the Swingtime label, and were literally three minute cuts with riffs on the front, a tenor sax solo and maybe one or two choruses. We've just stretched them out.

**MR&M:** "Waiting For The Call" was written and sung by Jack Bruce.

**IS:** Since Jack has such a good voice, we asked him to come up with something, and he came up with this. It sounds arranged but it isn't. The horn players just listened to the pattern and put little riffs behind it. It's all fairly spontaneous.

**MR&M:** There's an interesting bass solo in that number.

**IS:** It originally was intended to be just a bass solo, but John Picard, the trombone player, loves playing duets with bass, so he got stuck in behind it. Jack plays on a double bass.

**MR&M:** "St. Louis Blues"? That's an old W.C. Handy tune.

**IS:** The arrangement is taken straight off Albert Ammons' arrangement of the song.

**MR&M:** "Swindon Swing"? That's

the only cut you play piano on.

**IS:** Colin Smith came up with that. The horn players thought they shouldn't only rely on old arrangements, and thought they'd like to write something for the band. It's easy to play boogie-woogie to that song; it's got the right feel.

**MR&M:** Why didn't you play on any other cuts?

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**“ I think the reason we got the old-time sound was because the acoustics were bloody awful in the place. ”**

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**IS:** Largely because Bob and George were there and they're both better than I am. I'm happy just to organize the band and pick the musicians. If you're going to put your dream band together, you might as well be out front listening to it. If you're up there playing, you only hear half of what's going on. I do still play with the band a lot, but I like doing the sound from the audience.

**MR&M:** "Talking About Louise" is written and sung by Alexis.

**IS:** That's the only thing on the record that has actually been edited. We chopped it a bit to get four tracks on one side.

**MR&M:** Let's talk about the recording process itself. Was it a problem getting the old-time sound on modern equipment?

**IS:** I think the reason we got the old-time sound was because the acoustics were bloody awful in the place. The sound came out that way because that is how the guys play.

**MR&M:** A lot of "live" albums sound as if they were done in the studio, but this one is very "live" sounding. Was anything special done to get the sound on the record to be so raw?

**IS:** A lot of "live" albums *are* done in studios! This one *is* "live," alright.

**MR&M:** Let's run through the equipment used on stage, starting with the pianos.

**IS:** They were just ordinary upright

pianos; I don't know what [brand] they were. Charlie's drums were his original Ludwig set which he had refinished. I keep it at home for him and we use it at these Rocket 88 things. His Gretsch kit he uses with the Stones. Jack used a double bass; I don't know what kind of pickups, but he used Marshall amps. Alexis runs around with an original Les Paul semi-acoustic; I don't know what type of amp he uses.

**MR&M:** What about microphones?

**IS:** Shure all the way. We used the P.A. company's microphones. The back cover of the album lists all of the recording equipment. The back cover of the album is even set up to look like an old Atlantic recording from the 50s.

*[Author's Note: The album cover lists the following information: "This is a high fidelity recording, recorded and mixed on the Rolling Stones Mobile Unit, using 2 x 3M M79 24-track recorders and Scotch 207 tape with Dolby and M79 recorder and Ampex 456 tape. Shure SM54 microphones were used on horns. SM58 on vocal and guitar, SM7 on bass drums and the SM81 condenser microphone was used on the kit and the pianos. The record was mastered on a Neumann Lathe type SX74"]*

**MR&M:** Were there any problems in miking or setting up for this recording?

**IS:** No, not really. The stage was quite big and we could get the mobile close to the stage, so it was just a matter of running cables.

**MR&M:** What was the engineer's role? Did he have any specific requirements?

**IS:** He always managed to make things a bit more involved than they are. But he's very good. That mobile works quite a lot and I think Rocket 88 was quite an easy one for it. The only problem he had was with the horn players blowing on and off the microphones. When they started moving around, that was a problem. A lot of jazz players haven't got a very good mic technique.

Another problem he had was that we were using a powerful rock and roll P.A. system so there were a lot of monitors lying around. When you're recording, the monitors can be a menace because the horn players are getting [leaking] into the drum mics, and so forth. So, on the album you hear an occasional bit of feedback. Also, miking the piano was a problem. A couple of the musicians tend to play very loudly, so you have to bring everything up to their level. Even

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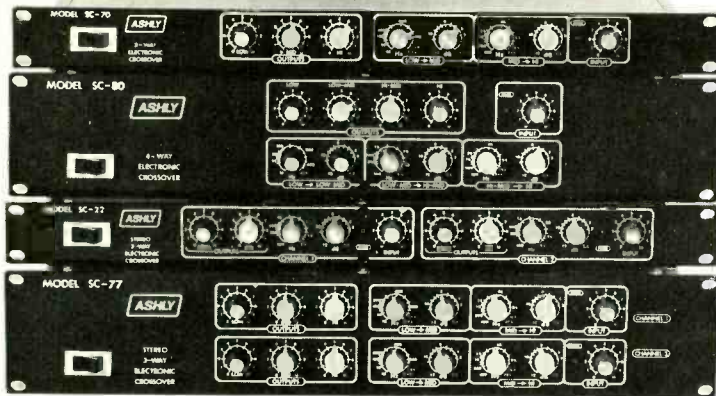
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though you use the best pickups on an upright piano, the soundboard of the piano does tend to start vibrating in time with the bass frequencies. So you tend to get a bit of a rumble from the pianos. But we just used mics on the pianos, not pickups.

**MR&M:** Are there any plans to tour America?

**IS:** It's not really practical. A few of the guys have never been here and would love to come, but the idea behind this band was just to play in clubs in London. It was a fun band. That's as far as, say, Charlie wants to see it go. Charlie said to me, "Wouldn't it be great to go to the States and do three or four clubs?" But the economics of bringing twelve guys and a bunch of equipment to play a few small clubs is unfeasible. Somebody would lose some money.

**MR&M:** Have any of the other members of the Stones expressed interest in doing something like this? Mick Jagger, of course, started out singing in small R&B bands with some of these same guys.

**IS:** Mick has been to a few of these gigs and I think he has itchy fingers. Keith has also been to a few. But Keith and "Woody" had that Barbarians thing [Richards and Wood toured with a "thrown-together" band called the New Barbarians in 1979. Critical and audience reception was not always favorable] and I think that was a bit of a mistake. If they have tried to keep that to a small level instead of making a big hype out of it, it would have been good. Bill isn't really interested. He did something quite amazing: he wrote a score for a movie. I couldn't believe it when he said he was doing it, but he shut himself away for a few months with a few synthesizers and came up with this score. It's actually very good.

**MR&M:** One last question: What would you like to see happen to this album? Do you think it can help revive the boogie-woogie style of music?

**IS:** We didn't set out to revive anything. Basically, the band is intended as a band for fun and enjoyment. The only thing I'd like to see happen is for more people to hear it. In a way, it would be embarrassing if this record was really successful. Then we'd *have* to go out and tour. If there was some way to come over to the States and play a few clubs, and play to a moving audience, that would be great. But this kind of music just doesn't work when you're sitting down.



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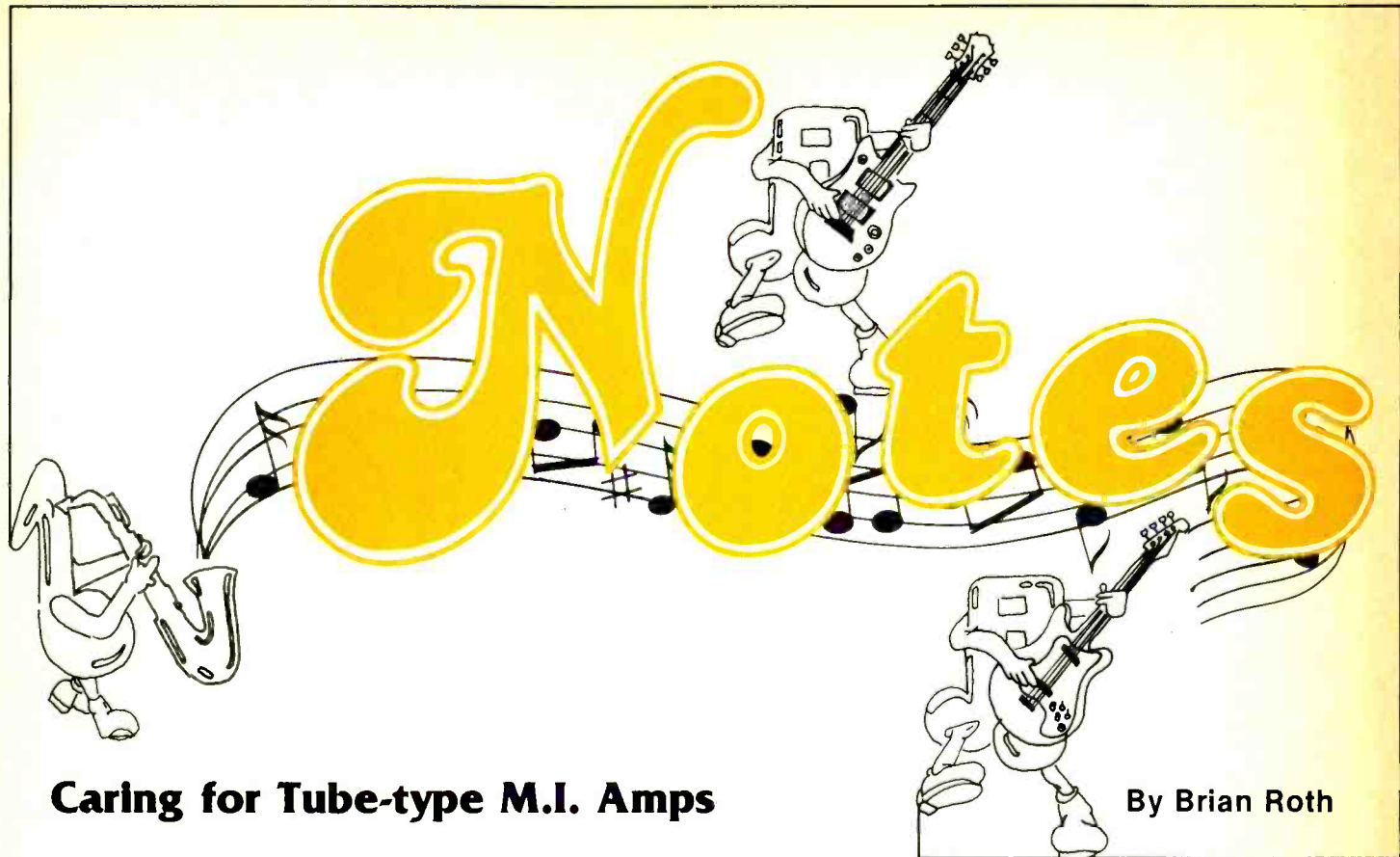
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## Caring for Tube-type M.I. Amps

By Brian Roth

Originally, instrument amplifiers were designed to boost the acoustic output of a stand-up bass or guitar in the rhythm section of a "swing" band (I wonder if the makers of this first generation of guitar amps really knew what they were unleashing on the world?) Thanks to Rock 'n' Roll, the instrument amp has become a necessity in the music biz. Not only guitars, but pianos, synthesizers and even drums can now be plugged into an amplifier.

But then comes that terrible day when your ol' reliable amp develops gastritis and belches black smoke while bellowing and buzzing. Of course, this will happen five minutes before you go onstage. And the only solution is to use a spare amp...*if* you have one.

Now it's the day after. You chase a handful of Vanquish with a strong shot of Folgers, and stare at the carcass. Is there any hope? Cheer up; there usually is!

There are myriads of possible malfunctions, but many can be easily corrected. Others may be extensive enough to require the attention of a technician. I will attempt to cover as many common maladies as possible in this and future columns. Since many (if not most) instrument amps are designed with vacuum tubes, they will be the subject of these first service clinics.

The ancestry of most tube type-circuits can be traced to the original Fender equipment of the 1950s. Of course, each manufacturer of tube amps has its own circuit or mechanical variations. I will be using Fender amps as general examples, and will discuss variations found in other makes of equipment.

### Analyzing Major Breakdowns

Malfunctions in tube amps can be grouped into two broad categories: 1) Important operation (noise, excessive distortion, low output); 2) Complete failure (repeatedly

blowing fuses, burning parts, no output). The latter failure modes tend to be the most traumatic to the equipment's owner, so I will look at these first.

Fuses are installed in electronic equipment to act as "safety valves." If something in an amp should drastically fail, the fuse will blow and thus prevent fires and shock hazards. A fuse can also cash in its chips for no apparent reason. The fuse should be the *second* thing checked in cases of a "dead amp." What's the first? Be sure the amp is plugged into a working power outlet!

Examine the fuse closely. The thin silver wire (or the entire mechanism of a slow blow fuse) should be intact from one end to the other. When in doubt about the health of a fuse, substitute a new one.

You can also check a fuse with a VOM (Volt Ohm Meter). Set the meter to measure resistance (ohms) on the meter's lowest scale, usually labeled "R x 1" on the selector switch. Place the red test probe on one end of the fuse and the black probe on the other. A deflection of the meter's needle indicates a good fuse. No deflection means the fuse is defunct.

Be sure to use the same fuse rating when replacement is needed. The proper size should be printed near the fuse holder on the amp. Also, by carefully scrutinizing the metal end caps of a fuse, you can determine the ampere capacity, the maximum voltage rating and even the manufacturer of the fuse.

A fuse's ratings will usually be abbreviated; "1½ A" means 1½ amperes. "125 V" means the fuse is safe to use in equipment powered by standard U.S. electrical circuits. (Car fuses are intended for operation at 32 volts or less; they are not to be used in line powered equipment. Proper fuses will be imprinted with a 125 or 250 volt rating.)

When an inspection of a fuse reveals that it has really

blown out (the inside of the glass has been obviously blackened), major problems within the amplifier are possible. Try one, *and one only*, replacement fuse of the correct size. Should the new one meet the same grizzly fate, *STOP!* Poking more fuses into the holder won't fix the problem. It's time to look elsewhere.

Common fuse fizzlers are the power output tubes. They are subjected to considerable electrical and thermal stress, particularly since some brands of equipment are designed to push them to their maximum limits.

Allow the ailing amp to cool completely, and remove the power tubes. These are easy to spot since in current models they are the big bottles. Common types are from the 6L6, 6V6, 6CA7/EL84, 6550 and 8417 families. Extra letters are often tacked onto the end of the tube numbers to denote design variations and improvements. For instance, current 6L6 tubes are marked 6L6GC.

In some older equipment, another series of tubes is often found in addition to the output bottles. These actually start with a "5" (such as 5U4, 5AR4 and 5Y3). These tubes are called *rectifiers*, and perform a different function than the power output tubes. Nevertheless, rectifiers can cause blown fuses if they should fail. (Most current amplifiers use solid-state rectifiers which are generally more reliable.)

In very old amplifiers it may be hard to determine which tubes are the outputs since *all* tubes were big in size in those days, so take every tube out. However, be sure you write down which tube goes into which socket. The bases of these tubes are all the same, but they are not necessarily interchangeable. If the wrong tube is plugged into the wrong socket, the amp's circuitry can be damaged.

After you have removed the power output and rectifier tubes, install a new fuse of the proper rating and re-energize the amplifier. Observe the pilot light and the interiors of the remaining preamp tubes. If these light up, and the new fuse doesn't blow, the problem should be with one or more of the big bottles. I suggest that these be "shot-gunned" (replaced all at once) rather than trying to determine which is the offender. Chances are that all of the tubes are on their way out, anyway.

Rarely, the miniature preamplifier tubes (usually protected by removable metal covers) can develop an odd ball short which will pop fuses. This is uncommon, but can be easily detected by removing the little guys and re-energizing the amp to see if those are causing the fuse to fail.



When an amp continues to obliterate fuses even without the tubes installed, the problem is in other parts of the circuitry. The diagnosis of this kind of ailment will be covered in the "Technician's Corner" segments of this series.

After replacing a set of output tubes, switch the power on and observe the insides of the new tubes. The filaments should emit a ruddy glow. However, *be sure* that the remainder of the tube's metal parts remain dark; glowing plates in a set of outputs indicates an internal failure in the amp, and possibly in the tube itself. Immediately disconnect power and determine the cause. If possible, try installing yet another set of outputs and see if they misbehave in the same fashion. Unfortunately, glowing plates in output tubes are generally due to circuit malfunction (for the technicians in the crowd, the negative bias voltage applied

to the control grids of the output tubes is too nonexistent.)

I know of many musicians who practice a preventative maintenance ritual of regular replacement of all tubes in their amps. This is not a bad idea, particularly if the amp is used every day. However, there is not a real need to replace the small preamp tubes. These can live for many years because they lead an easier existence than the outputs. If crackling or microphonic "pinging" is not a problem, leave the little fellers in service.

It is getting more difficult to purchase high quality tubes these days. Since the entire galaxy is going solid state, production of vacuum tubes has significantly dropped. And, it seems that quality control has dropped even further.

I heard a rumor that some vacuum tube manufacturers don't even bother to test the tubes before they leave the

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## "What should you check first when an amp fails?"

### Be sure the amp's plugged in!"

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factory; they leave it to the purchaser to determine if the tube is good or faulty. True or not, I have noticed a high percentage of funky tubes coming right out of a new box. So beware, just because it's shiny and new doesn't mean that it's better than the tube it is replacing.

Very few tubes are currently made in the U.S.A. Most come from overseas, even those distributed by big American companies like RCA and Sylvania. European-made tubes appear to be the best, particularly English and German types. I have recently had good luck with Amperex, Telefunken and Mullard brands, but even these are subject to variability.

### Technician's Corner

This section of "Service Notes" is intended for service personnel or the musician who has some technical background. I will discuss some of the common problems found *inside* the chassis of an instrument amp.

First, I need to emphasize the fact that *very* high voltages (up to 500 volts) are present at nearly every point of the circuitry in a tube-type amp. Solid-state equipment requires much lower voltages for operation, so it is easy to develop careless habits. Touch an exposed wire in a battery powered device, and you won't feel anything. Touch a connection in a tube amp, and you may be jolted across the room. We're talking big volts here, so for heaven's sake, **BE CAREFUL!**

Once you have determined that a problem can't be resolved by simple tube swapping, it is time to pull the chassis out of the case. On Fender amps, remove the four screws securing the rear cover. Remove the four long bolts that secure the metal straps on the top of the cabinet; each bolt is secured by a nut that cinches onto the chassis. Remove the clamp that secures the AC power cord to the cabinet. Now, the chassis should slide out the back of the case.

Marshall and other amps disassemble in a similar

LOW, OR  
e  
examine the cabinet, and remove the  
ware to allow extraction of the chassis.

the interior of the chassis. Look (and sniff) for  
an often overlooked cause of fuse blowing is  
themselves. If you see that the bottom of  
a black, sooty-looking deposit, then that  
socket must be replaced. This problem is usually caused by  
driving a loudspeaker of the wrong impedance. A 16-ohm  
loudspeaker used with an amplifier designed for 8- or 4-ohm  
operation will often fry the tube sockets. Marshall (and  
other amps) have an impedance selector switch. But, if it is  
incorrectly set, bye-bye sockets and hello blown line fuses.

The power and output transformers are another potential  
cause of excessive line current. Although generally reliable,  
transformers can fail if they are abused by running  
marginal output tubes. The fuse should blow when the out-  
put tubes are conducting too much current—unless some-  
one has cheated by installing the wrong size fuses or

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**"It is getting more difficult  
to purchase high-quality  
tubes these days, the entire  
galaxy is going solid-state  
and production has  
significantly dropped."**

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defeating the fuse with foil. A transformer usually makes  
its failure known by emitting an acrid, burnt odor. Also, the  
varnish used to impregnate the iron will have bubbled and  
turned dark in color. (Note: Some varnish bubbles are  
normal.)

Depending on the type of failure, the wounded  
transformer may blow fuses only when the output tubes are  
in place. This failure is caused by shorted turns in the  
primary windings of the output transformer. This can often  
be detected by measuring the resistance of the transformer.  
This can be often detected by measuring the resistance of  
the transformer from the center top to either end of the  
primary.

Disconnect the AC power and allow the power supply  
voltages to bleed off. Remove the output tubes. Place one  
VOM probe on either terminal of the standby switch (the  
switch should be "on") and measure the resistance to pin 3  
of the left-hand output tube. Compare this reading to that  
obtained by measuring to pin 3 of the other output tube  
socket. This resistance typically is several hundreds ohms  
and should be identical when measuring to either output  
socket. This procedure works with most amplifiers that use  
6L6, 6V6, 6CA7/EL34, 6550 or 8417 tubes. Amplifiers that  
use four output bottles also can be checked with this  
technique. The pair of tubes on the left is wired in parallel,  
as is the pair on the right, so, it won't matter which pin 3 of  
a given pair is used for the comparative measurement.

Some amps don't have a standby switch; this makes it

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**"Many musicians practice  
a preventive maintenance  
ritual by regularly replacing  
all the tubes in their amps."**

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necessary to trace the center tap of the output transformer  
to the point where it connects to the high voltage  
B+ supply. A schematic is most helpful in this situation.

Low-powered amps use only one output tube, so the com-  
parison technique won't work. The only solution is to see if  
the resistance matches that mentioned in the manufac-  
turer's service literature (if that particular info is included).

Transformers have been known to develop shorts from a  
winding to their case. An ohmmeter is useful in detecting  
this problem.

I have run into situations where the transformer appears  
to be good when tested with a VOM, and yet is still defec-  
tive. For that reason, replacement is the best way of  
determining if the transformer is sick; a costly method, but  
effective.

---

Other causes of fuse blowing can be traced to defective  
electrolytic filter capacitors or shorted diodes in the B+  
power supply. The VOM is the key to finding these prob-  
lems. With the power disconnected, measure the  
resistance of the capacitors (located under the rectangular  
cover on the top of the chassis in Fender models). Use the R  
x 10 or R x 100 scale. When the probes are first applied to  
the capacitor, the needle should momentarily deflect, and  
then settle back into its original position. If a very low  
resistance value is observed, the capacitor should be remov-  
ed from the circuit and rechecked. A low resistance reading  
out of circuit means the capacitor is faulty. Another likely  
sign is gunk oozing from the end of the capacitor.

The power supply diodes (usually small solid-state  
devices housed in a round metal or plastic cylinder) can be  
tested with an ohmmeter in a fashion similar to that used to  
test capacitors). The indications will be somewhat different,  
however. With the probes applied to each end of the diode,  
you should observe either a deflection to a low value  
(typically 25 to 100 ohms on the R x 1 range) or no deflec-  
tion at all. Reverse the leads, and the other reaction should  
occur. If this high/low combination doesn't occur, the diode  
is shot.

### Parting Thoughts

I will again state one thing: *Be careful when poking  
around inside tube amps.* The voltages are very high, and  
injury can result. Always disconnect power, and allow the  
voltages to bleed down before making resistance readings.  
This will protect you, and your poor VOM.

In future issues I will carry on the tube amp clinic with  
an examination of other ailments. The preamplifier section  
will be the main topic of those future clinics.



# Studio Notebook #1

By James F. Rupert

*If enthusiasm could somehow magically be transformed into ability, then nine out of ten businesses that since 1900 have drawn aside the curtain and joined the choir invisible would still be around; operations having been maintained by the sheer force of their respective owner's personalities. Yet history and Dun and Bradstreet have proven this is just not the case. There is so much phony glamour surrounding ownership of one's own personal business that if it could be cut into strips it could be hung on Christmas trees. Studio owners are constantly assailed by eager young faces seeking employment based only on the assumption that a studio would be a real neat place in which to work. Oftentimes that same unbounded enthusiasm towards the art of audio recording will manifest itself in the extreme of one of those same shining faces opening up his or her own recording emporium. Without practical exception, the vision of a huge business complex bustling with activity and profit burns like an acetylene torch in the back of the minds of these would-be entrepreneurs. Cash flow, creditors and bankruptcy are problems that only happen to other chumps. Without any sense of reality the young business-person is ready to leap headlong into the (seemingly) open and welcome arms of capitalism, anxious to make his first million so that they might then get down to the business of making some real dough!*

Modern Recording & Music has tried to fill a definite need in the audio-conscious community. It has walked the razor blade edge between talking over its readership's head and sounding as if it were talking down to them. And it has done it well, if I do say so myself [Thanks, Jim. Forget that cash you owe us—Ed.] Yet in the process of trying to bring its readers up to the level of the industry, the glamour of recording sometimes has overshadowed the practical realities of the situations. Yes, it can be an exciting industry. Yes, it can be enjoyable. Yes, it can be rewarding to the ego, the imagination and to the pocketbook. But no, repeat, no, there is no guarantee it will be any of these for you. Those of you who already have worked hard for years in a specialized school and/or on the job training situations probably can attest to this if you've done any pavement pounding looking for work in your chosen craft.

Recently, a Mr. Paul E. Johnson of Rockford, Minnesota wrote to me stating that the only scary thing about starting a studio business is: "You might forget something, like a contract, or taxes, or forgetting to push record, you know, something like that." Mr. Johnson has released another one of those potential great truth statements that reflects the concern of most of us at one time or another.

If you are thinking of starting your own recording studio business, this is no time to depend on lady luck for insurance of your success. If this or any of the above describes you, we are going to be working together over the next several months trying to develop methods for developing your own luck. The purpose of this series is to introduce you to a whole new set of statistics and specifications that hopefully will become just as important to your studio's

plans as the specifications of the equipment you choose to use. These are the specifications of business structure, proper record keeping, tax and governmental obligations and a whole lot more. Some of what will be explored has been touched upon in previous articles ("Small Studios—The Lighter Side of Business," February 1980 Modern Recording & Music), but much will be on previously uncovered topics. I expect (I hope!) that much more will be ideas that you, the readers, end up providing. If the world of business is Greek to you, let us know exactly what is puzzling you. The bottom line is that we want the series to be whatever you want it to be.

The topics we'll be covering will not be off the wall theories or generalizations. The concern is for how they affect you and your studio. (The "Letters to the Editor" Editor says there has been very little interest in how financial planning concerns the wombat farmer.) Owning and operating a recording studio requires a knowledge—however basic—of inventory, bookkeeping, accounting, cash and credit planning, receivables collection, tax reporting and about a jillion-and-one other things. Worse yet, this is all on top of the technical knowledge of your equipment you need for operation, maintenance and repair. We cannot climb these individual mountains for you, but we hope through this series of articles to reduce them to more of a molehill stature.

We cannot stress enough that we need your contributions, ideas, criticisms, suggestions, anecdotes, tips, hints and shortcuts. The series can go in any direction that the wind is blowing for each of you. On any aspect of your business, in almost any practical detail.

In an upcoming issue we will begin the series from scratch with the subject being financial planning for opening your own recording studio. How much money will you need? How much of your total dollar budget will go into equipment? How much into inventory and supplies? Have you considered an allowance for insurance? Rent costs? Utilities? How about advertising, taxes and equipment repairs? Anything else you might not have thought of?

Starting to get the picture? Anybody who thinks that all there is to running a studio is an occasional turning of the odd knob is in for a series of hideous surprises. Any business is at best an experiment. One that has to be cared for, planned in meticulous detail and, most importantly, learned from. It might be true that we learn the best lessons from our mistakes, but we definitely don't need to learn the hardest lessons from making the same mistakes twice.

If after reading this far you still think your business dream is a star worth reaching for, then good for you! (I secretly think so too, but don't tell anybody, okay?) Till next month, while you're cleaning up those basements and sweeping up that garage out back, don't forget to clear off a spot on your desk to work on and dust off those thinking caps, too. If we all keep our nose to the grindstone, our shoulder to the wheel, our eye on the ball and our ear to the ground, we'll all be in traction in no time!

# Ambient Sound

BY LEN FELDMAN

## Bridging the Preamp/Mixer Gap

Perhaps disco is dead (though there are those who would argue that it is still alive and well) and there may be those who welcome its demise. But whatever else disco did or did not do for music, there is no denying that its meteoric rise during the last half of the last decade produced a variety of useful audio electronic equipment which will find a variety of continuing uses even in the post-disco 1980s. I refer specifically to a special breed of preamplifier/mixer component which offers features that were particularly important for disco DJs but which are useful to small radio station operators, commercial production facilities, musicians, recording studio engineers and, yes, even for some of the more sophisticated home audiophiles who want the kind of signal-routing flexibility and versatility that they can't find in hi-fi preamplifiers intended for home stereo systems.

We recently embarked upon a project which involved looking at a half dozen preamp/mixer products from six different companies. The object of the exercise was not to test these preamp/mixers on the bench or in the lab (we have enough test reports to do each month, thanks!), but rather to explore the features and capabilities of this new breed of component. Our purpose was not to compare one product against another, either, since the product mix for this study included everything from a small two-microphone preamp/mixer and known as an Accessit Dual Microphone Preamp/Mixer, to a 60-watt per channel mixer/amplifier manufactured by the professional audio division [Ramsa] of the Panasonic Company. In between these two extremes we looked at such other units as an MXR System Preamp II, a GLi PMX-9000 Mixer/Equalizer, an Audioarts Engineering Model 5200A Stereo Discotheque Mixer Preamplifier and a CM Labs Model CM620 mixer-preamplifier. As diverse as these units were, the one thing that they all had in common was

*mixing* capability; a capability that is *not* found in home stereo preamps, no matter how flexible they may be in other respects. So, with that in mind, here is a brief summation of what we found out about each of the six preamp/mixers we have been playing with for the last couple of weeks.

## GLi Emphasizes Professional Applications

The GLi PMX-9000 Mixer/Equalizer is clearly intended more for disco and broadcast applications than it is for home service, though, of course, one of the main points of this particular column is to point out there is nothing to prevent a user from adapting these units to whatever applications may arise. This unit can handle three signals (two of which may be *either* low-level phono or high-level line) plus a microphone which feeds both output channels of a stereo sound system. A cleverly arranged "transition control" allows one-hand fading from Input I to Input II while the third input remains mixed in with the total program. This is the first



of the six units we analyzed which uses slider controls instead of rotary knobs. It is also the first unit to incorporate a built-in five-band equalizer with center frequencies at 55 Hz, 250 Hz, 1 kHz, 5 kHz and 15 kHz. A cueing system found in the PMX-9000 allows the user to preadjust a sound source *before* it is fed to the program channels. Cued inputs appear in a mono mix at the left channel of the associated headphone jack while a "program" button, when depressed, will deliver program channels via the right channel headphone output. A talkover circuit associated with the mic input automatically lowers program level by a pre-selected amount. There is also a signal processor external loop and an associated front panel switch which is used to introduce whatever signal processing device (reverb unit, expander, etc.) that might be connected to the loop. The PMX-9000 also features level meters for each output channel and since gain of the line amplifiers is rear-panel adjustable (0.2 volts, 1.25 volts, 1.5 volts or 2.0 volts output level), meter sensitivity can be arranged to show "0 VU" with the master gain sliders set at a convenient 75% or maximum. At a suggested price of \$435, this GLi unit seems to offer a great deal of what more expensive professional mixers provide at much higher cost.

CIRCLE 1 ON READER SERVICE CARD

### MXR Emphasizes Home Audio Control

MXR Innovations System Preamp II was really designed to serve as the central control unit in a high-quality audio component system. It allows the user to route two independent signal sources simultaneously to a monitor output, tape deck, or power amp and speakers. A mixing control can blend the two signals together and can provide effective fades between program selections. The separate monitor channel operates without affecting the main channel and has its own selector and level controls. The second half of the owner's booklet outlines several possible application ideas which give some notion of the versatility of the unit. Two external input/output loops give the user the means to connect such devices as equalizers, expanders, noise reduction units, etc. Examples of possible connections and switching schemes include:

Listen to expanded and equalized phono input, record signal from phono or tuner to tape and monitor phono, tuner or recording using headphones.

Listen to equalized phono input mixed with guitar, record mixed signal on tape and monitor phono with headphones.

Operate two separate stereo systems, listen to equalized phono in one location while listening to expanded tuner in second location, record signal from phono or tuner on tape and monitor tuner with headphones.

Listen to 4-channel tape deck while processing front and rear signals independently.



Mix music in "DJ" style, blend record to tape (using an external extra phono preamp), record to tape or tape to tape, use a microphone as one of the sources to blend to or from, and equalize the mixed or blended output signal.

These are just a few of the possibilities afforded by this MXR preamp which includes two independent RIAA phono preamp circuits, complete unit duality from two input selections to two output amps, mix control for fading and blending, front panel headphone jack with associated selector and level control, front panel musical instrument or mic input with its own gain control and switchable left mono, right mono, stereo and reverse.

CIRCLE 2 ON READER SERVICE CARD

### CM Labs Aims at Multiple Uses

CM Labs, division of Audio International Inc. lists among the uses for which their CM620 Mixer/Pre-amplifier is intended: 1.) Permanent or portable discotheque systems; 2.) Broadcast station mixer for "format" tapes; 3.) High-quality home preamplifier. The unit features three phono and two aux. inputs, two microphone inputs with their own equalization controls, complete headphone pre-cueing and output facilities, an overall 3-band active equalizer and LED output level indicators. While there is only one full tape monitor loop on the CM620, there is also a signal processor in/out loop which could be used for a second deck if desired. A control which is peculiarly adapted to mixer/preamp applications (and not found on either recording consoles or home preamps) is the "depth" control, which we found on this CM unit as well as on



high we discussed earlier. This control amount that music level will be dropped over or "talkover" switch is turned on. In this unit, adjustment ranges from no level to a maximum drop of around 15 dB. Another feature primarily aimed at the disco usage is the ability to monitor more than one input at a time by flipping on an "addition" switch. This feature makes "beat cueing" possible even if the user is acoustically isolated from the selection being played. The CM620 lends itself to rack mounting (though it tends to occupy more panel space than it need have) but can be positioned on a desk or table top as well, thanks to its forward sloping front panel. Any of the inputs to the CM620 can be pre-cued at the flip of a switch. Playing with the CM620 we were struck with the realization that its designers must surely have talked with a great many DJs before settling on panel layout and features for this unit. All of which led to a better design than is possible if you try to make the unit first and then tell the DJs how they should adapt to it!

CIRCLE 3 ON READER SERVICE CARD

### Audioarts Had Disco in Mind

The Audioarts Engineering Model 5200A was obviously designed for commercial and professional disco applications. This unit occupies a minimum of space (measuring only 3½ inches high, 19" wide and 10½" deep) while providing a maximum degree of mixing flexibility. The unit consists of two stereo phono preamp circuits, two stereo line level tape inputs and one mic preamp with two balanced inputs to provide for either high or low impedance mics. Each input channel has its own individual stereo gain control. Any



stereo input can be assigned to either a program or monitor output channel (or to both channels at the same time) via illuminated alternate action push-button switch pairs. The switching arrangement allows any input that was previously in the "program" mode also to be assigned to the monitor channel for comparison with the cued input signal. Cueing operations can therefore be cross-compared without program interruption.

The microphone channel offers the operator two types of talkover functions. In the first, the program button directs the signal to both main outputs and to tape-out jacks, permitting voice announcements to be taped along with the music. In the second, the mic signal is directed only to the main output but not to the tape output, allowing announcements to be made

without affecting the music signals being taped.

Structurally, the Audioarts unit has been well thought out. ICs are socket mounted for easy servicing, and the slim configuration (only 3½ inches of panel space required) leaves plenty of room for other rack-mounted components, such as power amps and lighting boards. The suggested price for the Model 5200A is \$862.

CIRCLE 4 ON READER SERVICE CARD

### The Accessit Keeps It Simple

The Accessit Dual Microphone Preamp/Mixer, made in Great Britain by Bandive, Ltd. and distributed in the U.S. by The Mike Shop [a division of Omnisound Ltd.], in Elmont, NY, is designed to accept either balanced or unbalanced, low or high-level signals rang-



ing in level from -40 dBm to 0 dBm. Each channel has its own gain control and a 20 dB attenuator switch. The unit has two outputs. The left output yields a mono mix of the two input signals, while connecting to both left and right outputs disconnects the mixing circuit and yields two independent stereo outputs. A separate little Accessit Power Supply was used to power our sample, but two nine-volt batteries smoothed by a 1000 mfd capacitor or any low-ripple source of DC supplying 18 to 24 volts at approximately 50 ma. would do nicely. Portability is, of course, a plus for this little mixer, and it has phantom powering capability for mics that require such powering. As for applications, it fits in perfectly with all of those other components (signal processors, equalizers, noise reduction units) that normally only provide line-level inputs. Suggested retail for the mixer itself is around \$80, while the matching power supply goes for about \$65.

CIRCLE 5 ON READER SERVICE CARD

### Panasonic's Ramsa WA-140 Combines Preamp/Mixer and Amps

Ramsa is the trade name that Panasonic's Professional Audio division has given to its pro audio products. In the case of the WA-140, that company has combined a pair of 60-watt per channel power amplifier stages with a highly flexible preamplifier/mixer arrangement. Despite its size (if rackmounted, it uses up three standard EIA rack spaces, is nearly 14 inches deep and weighs over 30 pounds), the unit presents a

fairly compact appearance when installed. Features and performance are exemplary. There are *nine* input circuits and two output circuits. Each of the four available mic inputs includes a pan-pot and fader. Two turntables can be connected to the system in addition to three high level (aux.) input sources. A five-band equalizer provides 10 dB of boost or cut at center frequencies of 100 Hz, 330 Hz, 1 kHz, 3.3 kHz and 10 kHz. Low cut filters can be switched in for 8-dB-per-octave attenuation below 100 Hz while a high-cut filter



can be introduced to cut highs above 10 kHz at a rate of 12 dB per octave. There are seven input level controls in the form of slider pots, a single rotary balance control and a master volume control for overall output sound level adjustment. Meters are conventional types which read "peak" dB levels.

Examining this unit, we came to the conclusion that the emphasis here was on recording and, perhaps,

sound reinforcement work, rather than on disco applications, though again, all of these units lend themselves readily to all three purposes or applications. The pan-pots are ideal tools to be used when making "live" performance recordings and could, of course, be set for any position from "stage left" to "stage right" and points in between, for an effective stereo wall of sound. But the pots could just as easily be used as faders for assignment of mic signals to the desired output buss. While the unit is equipped with a mono/stereo switch, that switch is located inside the unit, so, for all practical purposes, the unit, as received, is a stereo mixer/preamp/power amp in which high level and phono program sources all have dual left/right inputs and only the mic inputs lend themselves to "channel assignment" or panning and fading.

As we said at the beginning, new forms of audio entertainment can, and do generate new forms of audio equipment. And the new equipment, in turn, gives audio enthusiasts ideas for their use that were perhaps never envisioned in the original designs. In the course of this analysis we were limited to looking at only a bare half-dozen preamp/mixer units, yet the diversity of features and the many applications which became apparent even from examining these few units suggests that even if the music format that prompted their creation in the first place, disco, is on the wane, the need for this type of equipment, if anything, is greater than ever.

CIRCLE 6 ON READER SERVICE CARD



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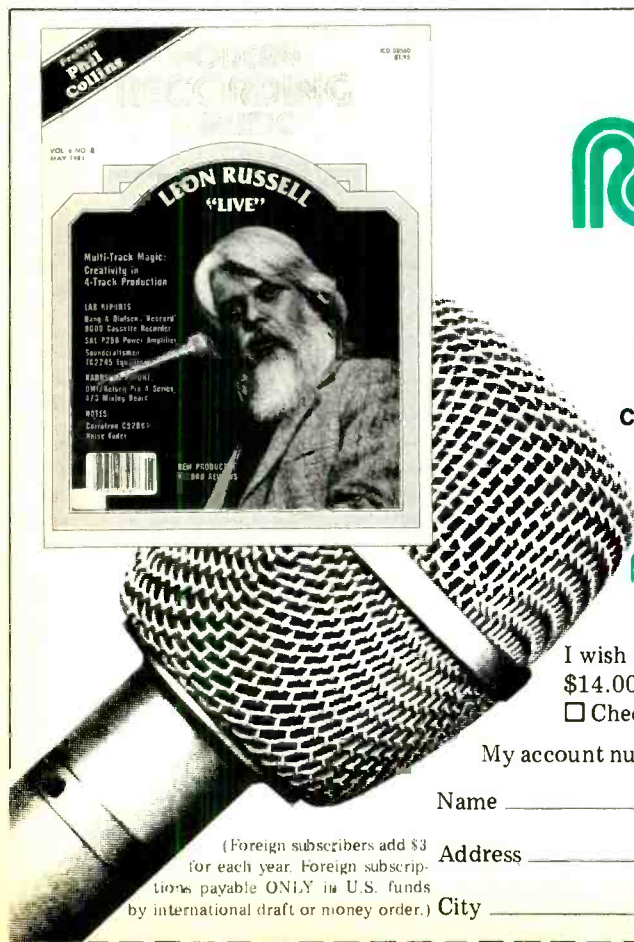
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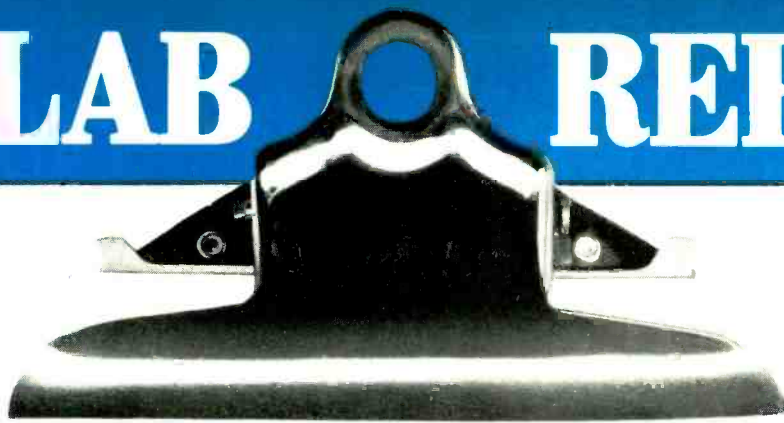
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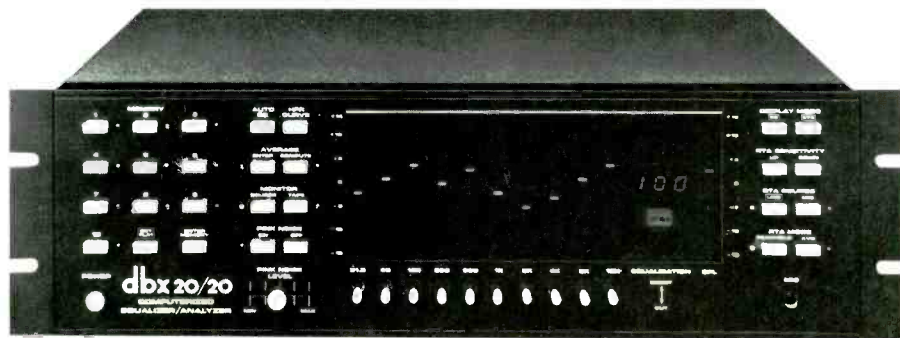
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NORMAN EISENBERG AND LEN FELDMAN

## dbx 20/20 Computerized Equalizer/Analyzer



**General Description:** The dbx 20/20 combines, in one computerized instrument, the functions of an octave graphic equalizer, a real-time analyzer, pink-noise generator and dB/SPL meter. It is supplied with a calibrated microphone for making room measurements, and up to ten different location response curves may be stored in the device's computer memory, and recalled at the touch of a button. The computer also can perform an averaging function for any combination of curves stored in its memory, and in turn this data may be stored and recalled. Its automatic equalization capability allows the model 20/20 to analyze its own generated pink-noise, as it is reproduced by a system's loudspeakers, and—in a matter of seconds—readjust system response and establish an EQ curve for flat power response with respect to the spot selected for the microphone which hears the pink-noise output from the speakers. The model 20/20 also has a built-in fixed HFR (high frequency rolloff) option which may be added to any equalizing curve to simulate the characteristics that prevail at a "live" performance in large halls.

The model 20/20 will interface with a wide variety of audio equipment and sound systems, including between preamps and power amps, or into the tape-monitor loops of integrated units. Provision is made for interfacing with tape recorders, including the option of feeding equalizing signals into a tape recorder, as well as of using the 20/20's pink-noise for testing a recorder's response.

The front panel contains the memory bank switches, another group of "instruction" switches, the spectrum display and a set of buttons for display mode. The controls for boost or cut of the ten frequency bands (octave spacing from 31.5 Hz to 16 kHz) are not the usual sliders, but rather are "spring-loaded" toggles. Holding one up or down raises or lowers, respectively, the amplitude of the signal in that frequency band until the switch is released. The result of the switch action is shown on the LED display. More than one switch may be activated at the same time. In addition to the ten octave-band display, this section also has a warning indicator for the 20/20's batteries (two penlight cells) which retain the memory for the device when AC power is turned off. There also is a digital indicator for the display's center horizontal line which shows what the "zero dB" reference level is for a given mode of operation. For real-time analysis (RTA), "zero dB" may be set by the operator for a range of 60 to 110 dB in steps of 10. The displayed LED position (-15 to +14 dB) is then added to the reference number shown to determine the dB/SPL in any frequency band. In the EQ mode, the reference number displayed is always "zero dB—the center horizontal line on the graph thus becomes "zero dB" literally. Two printed scales, one at either end of the graph, facilitate the readout in either mode. When in the RTA mode, an additional vertical LED scale becomes activated; this one shows dB/SPL values for the complete signal.

The memory switches at the left of the panel are numbered 1 through 10, for the ten curves that may be stored in and recalled from the device's memory. Each switch has its own LED indicator. There are also switches for "set flat" and for "enter memory." The set-flat switch may be used to bypass or "defeat" any previous EQ curve. The "enter memory" button is used for entering a given curve into the memory—to do so, you press it and then the numbered memory button desired. To erase a stored memory curve, you press "set flat," "enter memory" and then the numbered memory button itself.

Next to this group are eight more switch-buttons. An "auto EQ" button allows the model 20/20 to equalize a room automatically, in conjunction with the supplied microphone and the 20/20's built-in pink-noise generator. The process is extremely simple and fast, and results in automatic, computer-controlled equalization of the sound system for flat response with respect to the microphone's position in the room.

Next to the auto-EQ button is the HFR button. This switch may be used to introduce a preset high-frequency rolloff to any displayed EQ curve; it simulates the natural rolloff of highs that normally occurs in large halls.

The pair of switches labeled "Average, Enter/Compute" allows the 20/20 to create a new EQ curve that is the average of two or more EQ curves previously entered into the memory bank. In this way, for instance, you can first derive a number of EQ curves using the microphone in different parts of the listening room, and then arrive at an overall average curve that will equalize the system over the widest portion of the room. The average EQ may be entered into the memory bank along with the individual specific-location curves (up to the bank's capacity, of course, for ten curves). However, even if you have already entered ten discrete curves into the memory, you still can obtain their average—in less than one minute—by pushing the correct switch sequence.

Below this pair of switches are two for selecting "source" or "tape"—their use is determined by the manner in which the model 20/20 is interfaced with a given sound system.

The switches for the pink-noise generator come next, and below them is a horizontal slider for adjusting the level of the pink noise.

Switches associated with the display are over at the extreme right. One pair selects the mode (EQ or real-time analysis). The buttons below them adjust the relative value of the display graph's "zero dB" line in the RTA mode, so that the total net range available for display extends from 45 (60 minus 15) to 124 (110 plus 14) dB/SPL.

Another pair of switches chooses, for the RTA mode, between line inputs (from the sound system) and the microphone input. The final two buttons select—also in the RTA mode—between peak-hold and average readings on the display graph.

The AC power switch is at the lower left of the panel,

while a microphone input jack is at the lower right. The panel itself is fitted with flanges that are slotted and dimensioned for standard 19-inch rack-mounting.

A second mic jack is at the rear; the front panel mic jack overrides this one. Either jack may be used for the mic supplied with the model 20/20; the user is cautioned not to use other microphones. Also at the rear are the signal in and out jacks—four stereo pairs for line in, line out, tape recorder in and tape recorder out. An additional jack is provided for direct take-off of the 20/20's pink-noise. The battery compartment and the device's AC power cord complete the rear picture.

*Note:* dbx advises that the model 20/20 is available through its normal hi-fi dealers rather than through its regular pro outlets, and that the model 20/20—inasmuch as its two channels are linked—cannot provide independent control over each channel which could limit its application for pro use. The device's connector's and signal levels are those of "traditional hi-fi" and since it clips at +15 dBV, the model 20/20 would not be the best choice for all sound-reinforcement work, not to mention that it provides one-octave steps rather than lesser-band steps.

**Test Results:** A good deal in the way of performance is claimed for the dbx 20/20 by its manufacturer, and it all was confirmed—and then some—in our tests of the unit which included bench-lab measurements and actual use in voicing different rooms fitted with different sound systems. For instance, *Fig. 1* shows the device's front panel with its LED display showing the EQ settings that the 20/20 "decided" were needed for a sound system in a given room, as measured by the device from a location often used for listening. The equivalent response curve of the electronics of that system, with this EQ added, is plotted in *Fig. 2*. A treble boost of 12.9 dB was shown to be needed for "flat" response at that particular listening position.

The upper curve of *Fig. 3* shows the 20/20's flat response. The lower curve here shows how this response may be modified when the HFR (high-frequency rolloff) curve is engaged. The rolloff begins above 2 kHz and continues at a gentle slope to beyond 10 kHz. (Vertical sensitivity in *Fig. 3*, as well as in *Figs. 2* and *4*, is 10 dB per division.) This HFR curve is what sound contractors refer to as a "house curve"—house, meaning large halls and auditoriums. In such a listening environment, if we sit in the reverberant (rather than the direct sound) field, the frequency response we hear is actually not flat. Instead, it exhibits a gradual rolloff at the high end, since a significant portion of the highs is absorbed by architectural surfaces. The HFR curve in the 20/20 is designed to simulate that effect, and so more closely resemble the overall balance likely to be heard at a "live" concert, when it is desired.

*Fig. 4* details the maximum boost and cut range of a single octave filter of the 20/20. Actual peak boost and

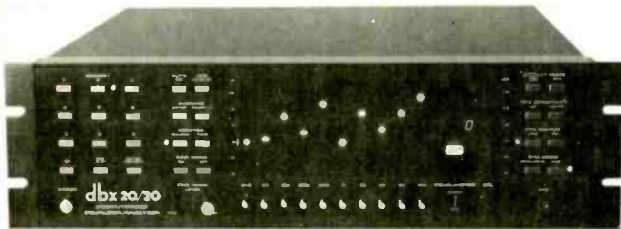


Fig. 1: dbx 20/20: Front panel view.

cut of the 1-kHz band filter occurred at 980 Hz, but the closest test-frequency available in our Sound Technology 1500A test set was at 940 Hz, for which the maximum boost measured was +13.7 dB, while maximum cut was -14.6 dB.

The overall display of Fig. 5 was obtained by the multiple sweeps of our spectrum analyzer. Here we see the boost and cut ranges of all ten bands of the model 20/20. Note the precise spacing between bands, and the extremely uniform maximum boost and cut amplitudes from band to band. This test points up the fact that, quite apart from its computerized and analytic functions, the 20/20 is a precise 10-band equalizer, something that should not be overlooked in the course of discovering (and marveling at) its more unusual, advanced "high-tech" features.

Fig. 6 is another sweep, from 20 Hz to 20 kHz, in which the amplitude of the device's pink-noise signal is amplitude slope of 3 dB per octave, in a negative direction with increasing frequency, and if a line were drawn through the center of the noise-band of Fig. 6 (from upper left to lower right), that is precisely the slope that would result.

The "Vital Statistics" data for this unit are presented for its various operating sections; in sum, published specs were either confirmed or bettered, including the all-important figures for signal-to-noise and for distortion. But what sets this device apart from all others is its

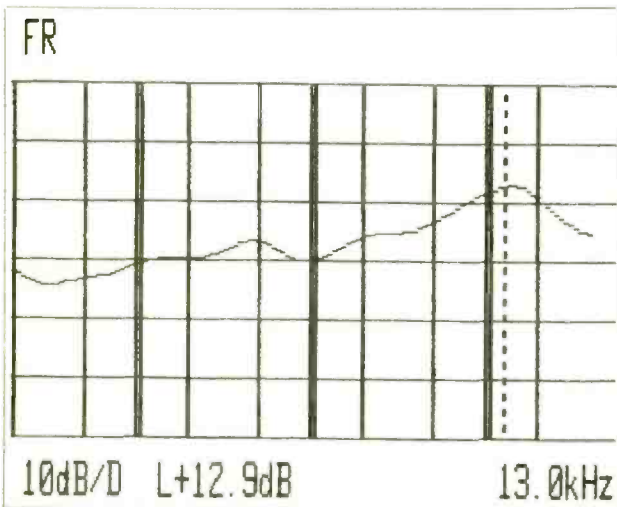


Fig. 2: dbx 20/20: Typical EQ curve established by the 20/20 for a listening room with less-than-perfect acoustics.

almost literally instantaneous capability for accurately "voicing" a system in a room, with all the requirements for doing so contained in one well-crafted and smoothly operating instrument.

**General Info:** Dimensions are 19 inches wide; 5¼ inches high; 12¼ inches deep. Weight is 21 pounds. Price: \$1500.

**Individual Comment by L.F.:** I have been waiting a long time to try out this thoroughly remarkable instrument from dbx, Inc. Having been very familiar with the company's products (both audiophile and professional), I was well aware that the introduction of the 20/20 marked the beginning of a new product category for this firm, which has up to now been engaged almost entirely in making products that increased dynamic range and reduced noise levels.

It's one thing to get involved with equalization and with equalizers, but for dbx to have produced, in "one fell swoop," an octave graphic equalizer *and* a real-time octave analyzer *and* a pink noise generator *and* an SPL level meter, and to have combined the functions of all of these devices by means of a microprocessor that, for the first time, performs system equalization automatically in a few seconds is nothing short of miraculous. As accustomed as I am to being presented with highly advanced electronic technology in my work, I am still in something of a daze over the awesome capabilities of the dbx model 20/20. It's the kind of product that anyone involved in professional sound system contracting has dreamed about at one time or another but never imagined that it would exist. It's the sort of product that the dedicated audiophile would instantly want or, if he or she can't come up with the \$1500 asking price, will try to borrow from a more affluent friend.

As for equalization of a home stereo system, ever since the first octave or five-band stereo equalizers appeared

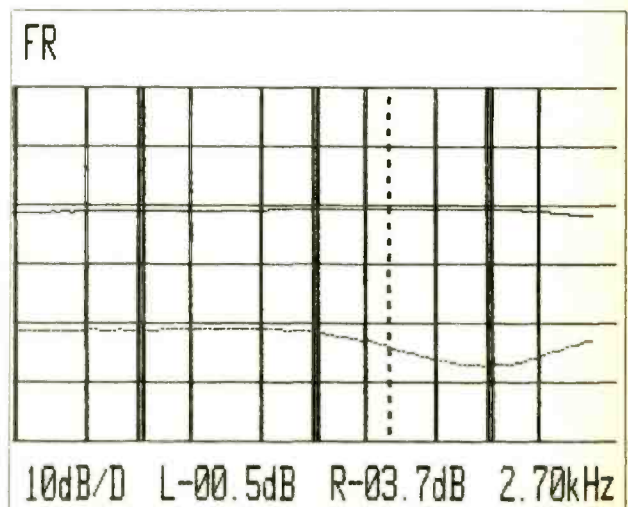


Fig. 3: dbx 20/20: Upper curve shows flat response setting of the unit; lower curve shows response modification by HFR curve.



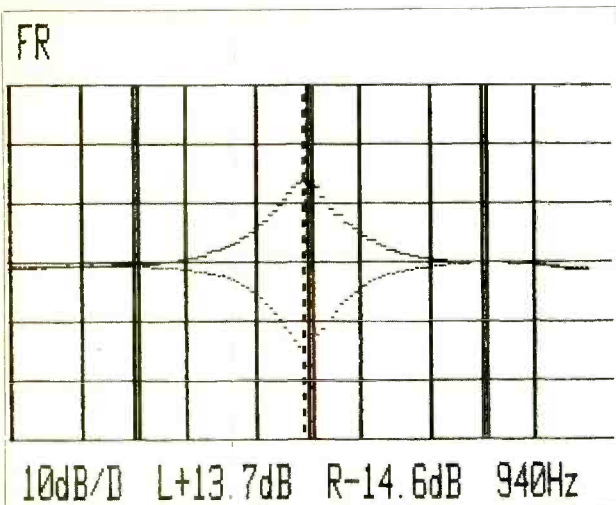


Fig. 4: dbx 20/20: Maximum boost and cut range, single band of the 20/20.

on the market a few years ago I have been writing about how difficult it is for the average listener to use an equalizer properly. I have decried those manufacturers who "leave it up to your ears," and haven't had too much good to say even about those equalizer makers who give you a "test record" and then let you do the rest by ear. The only "right" way, of course, is with a real-time analyzer, a calibrated microphone and a source of wide-band random pink noise. But until now, even if you could afford all of these devices, the trial-and-error settings of an equalizer's controls can still be a long and frustrating task; largely because of the interaction of adjacent filter bands and their controls.

The dbx 20/20 does it all in a few seconds, lets you see what it's done, allows you to confirm that it has done the right thing by your sound system and much, much more. In summary, the dbx model 20/20 is a "first of its kind" instrument that illustrates what good engineering in-

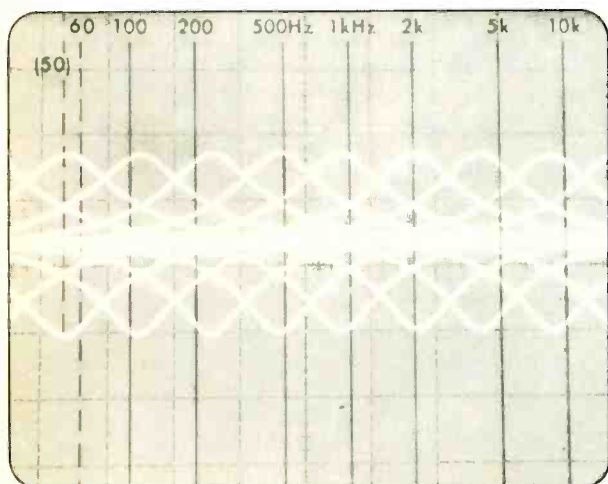


Fig. 5: dbx 20/20: Overall multiple response curves, showing boost and cut range of each octave-band control.

novation and modern electronic technology can accomplish. Viewed as just an equalizer, the 20/20 is quite expensive. But if you add up the costs of a good real-time analyzer, a precision 10-band equalizer, a calibrated microphone and a pink noise generator, the 20/20 becomes a real bargain. And even if you had those four separate components, you couldn't "voice" a room as quickly or as precisely as the 20/20 can!

**Individual Comment by N.E.:** The dbx 20/20 was first demonstrated for me at the C.E.S. in Chicago last summer. I was amazed at how it improved the response of a stereo system installed in a relatively difficult room—not only was the EQ correction effective, but the procedure needed to arrive at that correction was unbelievably simple and fast. Patch the 20/20 into the system, plug in the microphone, switch to pink-noise, punch in auto-EQ, raise the pink-noise level control and lo!—there on the LED graph bars begin to move and as they do the character of the pink noise changes as you hear it from the speakers. In less than a minute, the system has been equalized for flat response.

Now, enter that correction curve in the device's memory. Move to another spot in the room and repeat the procedure. Get another EQ curve for that listening spot. Enter this one into the memory too. And so on. Now the precise EQ for any of those listening spots can be recalled at the touch of a button. What is more, you can obtain an average curve of all the others and enter that too into the memory. You then can recall that curve for a roomful of listeners, or—if you are so inclined—make instant comparisons of the various EQ curves and see and hear exactly how the response differs with respect to various listening spots.

I have now had the chance to use the dbx 20/20 in my own (and one other) listening room, and my net impression of this near-miraculous device is even more favorable today than it was last June. It makes system/room matching so easy that you *want* to do it.

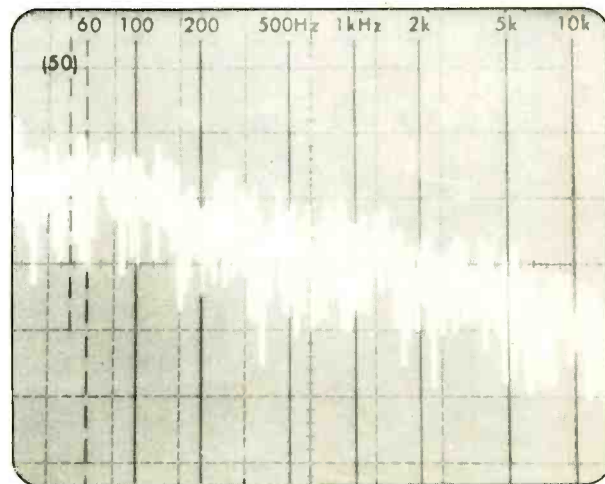


Fig. 6: dbx 20/20: Pink noise generator of the equalizer/analyzer produces random wide-band noise with proper 3 dB/octave slope.

What is more, the results, in terms of a clarified sound and generally smoother response, are real, tangible and quite audible. Other fruitful discoveries facilitated by the dbx 20/20 include confirming that there are a couple of spots in the room that have been upping the bass response of my system, and at least one that tries to swallow the highs. And if you've ever wondered about the distribution of energy, in terms of frequencies, in a given piece of music, the 20/20 can help clarify that question—allowing of course for whatever frequency weighting your own equipment may be lending to the source. If you want instant confirmation of the fact that the same sound does sound different from different parts

of the room, just plug in the mic, switch to pink-noise and amble about the room with the mic in your hand while you watch the frequency response display on the graph.

And if you want to compare the equalization necessary for flat response with the actual frequency content of a given program, it's as easy as touching two buttons. As I see it, the dbx 20/20 is one of the most ingenious devices ever to come down the pike [the Mass Pike (Massachusetts Turnpike), that is]. In addition to functioning as a real aid to improving system response, it is also a handy device for studying source-system-room relationships and as such could become a useful adjunct in education as well as at audio dealers.

#### DBX 20/20 COMPUTERIZED EQUALIZER/ANALYZER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
<b>Equalizer Section</b>		
Number of bands	10	Confirmed
Bandwidth	One octave	Confirmed
Center frequencies (Hz)	31.5, 63, 125, 250, 500	
	1.0 K, 2.0 K, 4.0 K, 8.0 K, 16.0 K	Confirmed
EQ range	+ 14/ - 15 dB	See Fig. 6
Max input level	+ 15 dBV	Confirmed
Max output level	+ 15 dBV	Confirmed
S/N, at output	- 80 dBV	- 90 dBV ("A" wtd)
Gain	0 dB $\pm$ 0.2 dB	0 dB
Input impedance	47 K ohms	Confirmed
Output impedance	470 ohms	Confirmed
THD (20 Hz to 20 kHz)	Under 0.01%	0.012%
<b>Real Time Analyzer Section</b>		
Number of bands & bandwidth	10 bands, 1 octave	Confirmed
Filter type	2-pole bandpass, Q = 2.5	Confirmed
Center frequencies	Same as equalizer	Confirmed
Dynamic range	80 dB	Confirmed
Resolution	1 dB increments	Confirmed
Absolute calibration accuracy	$\pm$ 3 dB (Mic & Line)	N/A
<b>SPL Meter Section</b>		
Bandwidth	15 Hz to 20 kHz	Confirmed
Dynamic range	80 dB	Confirmed
Resolution	1 dB	Confirmed
Relative accuracy	$\pm$ 1.0 dB	Confirmed
Absolute calibration accuracy	$\pm$ 3 dB	N/A
<b>Pink Noise Generator Section</b>		
Accuracy	$\pm$ 1.0 dB	N/A
Output level		
Main	1 mV to 175 mV	1 mV to 190 mV
Pink noise jack	150 mV fixed	50 mV
Output impedance	100 ohms (at noise jack)	Confirmed
<b>Microphone</b>		
Type	Electret, omnidirectional	Confirmed
Output impedance	2 K ohms	Confirmed
Frequency response	20 Hz to 20 kHz, $\pm$ 1.0 dB	N/A
Cable length	20 feet	Confirmed
Power consumption	30 watts	30 watts

CIRCLE 7 ON READER SERVICE CARD

## Nakamichi 1000ZXL Cassette Recorder



**General Description:** The newest of the Nakamichi 1000 cassette decks (previous models were the original 1000 and the 1000-II) is a three-head, four-motor unit with built-in microprocessor. The heads are separate for erase, record and play. The four servo motors control the dual capstans, the reel drive, a head-positioning cam and the record head for alignment. Azimuth alignment is accomplished by the microprocessor as part of a four-adjustment process known as "A.B.L.E." for azimuth, bias, level and equalization. This auto-calibration may be engaged for each cassette tape used. The deck applies its own test-run to a portion of the tape, and adjusts itself according to the kind of tape. The resultant data then may be stored in the recorder's memory along with playback equalization and noise-reduction settings for four different basic tape formulations, including of course, metal-particle tape. This data, and the requisite internal adjustments for a particular kind of tape, then may be recalled by the user. In addition, provision is made for a limited application deliberately of under-bias or over-bias, as well as of EQ and noise-reduction. The 1000ZXL has built-in Dolby-B, and it also has been designed for easy interface with an external noise-reduction system (such as Nakamichi's own High Com-II), in which application the deck provides its own 400-Hz test signal for calibration. This test tone also is useful for level adjustment when dubbing from the 1000ZXL to another tape-recorder.

The 1000ZXL has a memory option for locating the start of a selection on a tape, and to automatically play (or repeat) a given section of the tape. The deck's "RAMM" (random access music memory) may be used to record an inaudible signal (5 Hz) on the blank space between selections, or even during a given selection, which then may be used to program the machine for desired stops and starts.

A cueing option also is provided that enables you to

hear a tape while in fast wind—this is accomplished by pressing the pause button after you have pressed either the rewind or the fast-forward button.

A record-mute function is provided in an unusual way. If, after having engaged the record button, you press it a second time while recording and keep it depressed, the incoming signal will be muted. However, the line output in this instance will still be audible for monitoring.

Two optional remote-control accessories are available—one for handling only the normal transport functions, and another which also includes the RAMM function.

For retaining data in its memory bank when power is turned off, the deck uses two "penlight" battery cells which fit into a compartment at the rear. When these cells need replacement, one of the front-panel memory buttons will flash instead of remaining steadily lit. Transport action permits fast-buttoning, including going into record mode from either fast-wind mode. However to record from the normal play mode, the stop button must be pressed first.

Slack or loose tape within a cassette is taken up by the right-hand spindle automatically after inserting the cassette. There is a 10-second delay before any of the transport buttons will operate after power turn-on.

The Nakamichi's front panel is divided into four horizontal sections. The top section contains the displays for the auto calibration procedure, the RAMM function, EQ, noise-reduction, four-digit tape counter, and signal meters. The metering—twin horizontal bar-graph fluorescent types—may be switched to show peak and peak hold values, or VU and peak values (simultaneously). Calibration is from -40 to +10.

The large portion below this section contains the cassette compartment behind a swing-down transparent door. To its left are a pitch control (useful during

playback to vary the speed by  $\pm 6$  percent, and with a center detent for normal speed), and the cassette-eject button. The cover on the cassette door is removable for access to the heads. Directly to the right are the tape-index counter reset button and the RAMM control panel. The balance of this section is given over to seven slider controls—one pair for line output level adjustment on each channel; a second pair for line input adjustments; a third pair for microphone level adjustments; and the final single "blend" slider for adjusting the signal from a monophonic center microphone. All microphone and line-input controls can be mixed.

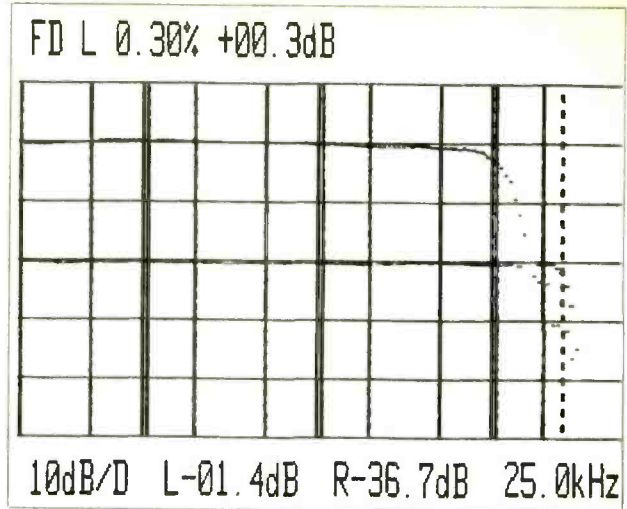
The third section of the panel contains the transport buttons, which are "feather touch" and generously proportioned. These include pause, record, rewind, fast-forward, stop and play. This section also includes the buttons to activate the automatic calibration procedure, a standby/set button, the four buttons associated with the tape-calibration memory and a manual set button for EQ and noise-reduction. All buttons in this section are illuminated when activated.

Additional controls are found across the lower portion of the panel. These include: the deck's power off/on switch; a stereo headphone output jack; switches for using an external timer (to record or play unattended); the memory option (stop or play); the deck's test tone; the manual bias option (under, normal or over); the manual EQ selector (70 or 120 usec); a filter (subsonic, off, MPX, MPX with subsonic); the noise-reduction selector (external, off or Dolby); the meter display selector; and monitor (tape or source). Of standard rack-mount width, the panel is fitted with handles and slotted at either end.

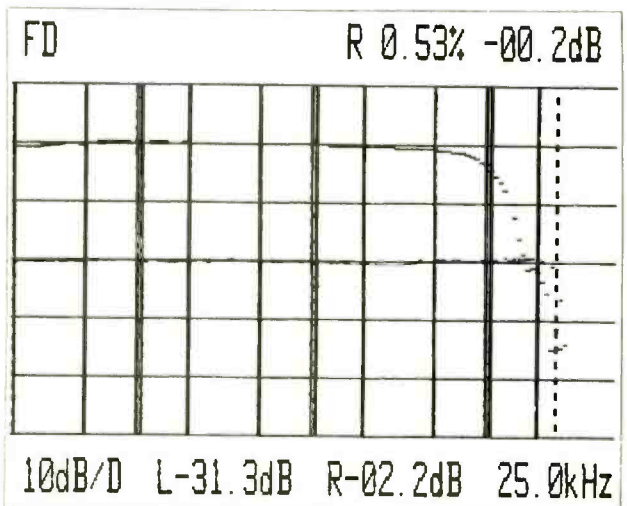
The three microphone inputs (standard  $\frac{1}{4}$ -inch jacks for left, right and blend) are at the rear. Also here are the normal line in and line out jacks, plus a special panel for interfacing the deck with an external noise-reduction system. These jacks all are gold-plated pin-jacks. The rear also contains the receptacles for connecting the remote-control accessories; the battery compartment; the AC line cord; and a system grounding post.

**Test Results:** It should come as no surprise that published specifications for the Nakamichi 1000ZXL were, in our lab tests, confirmed or exceeded. What may be cause to sit up and take note are the unusually wide (for a cassette deck) frequency responses we measured—out to 26 kHz for normal-bias and high-bias tape, and out to 28 kHz for the metal tape. We used the cassette samples supplied with the deck—Nakamichi's EX II; SX; and ZX for normal, high and metal bias, respectively.

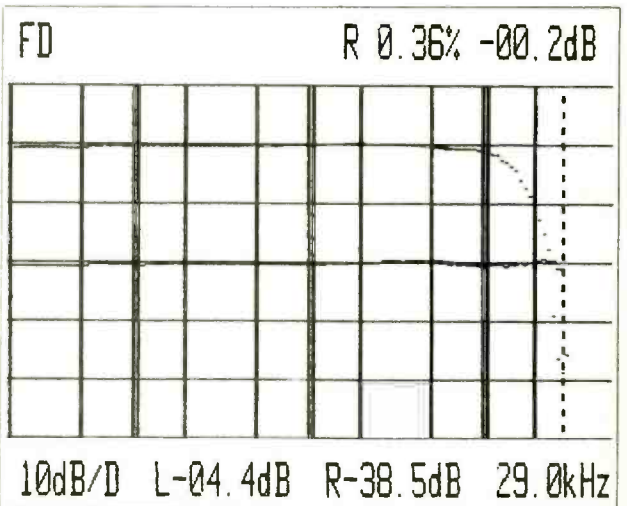
Our tests of an earlier metal-capable deck from Nakamichi—the model 680ZX, *MR&M*, April 1980—indicated that this was one of the few metal-capable cassette recorders in which metal tape did score consistently higher in all areas. We expected nothing less of the new 1000ZXL and we were not disappointed. Again, as in the 680ZX, test results were definitely better with the metal. The results with the other two tapes were uniformly excellent. In addition to the extended frequency response, the 1000ZXL showed outstanding headroom and very low distortion for all three tapes.



1A. Ferric-oxide (EX-II).



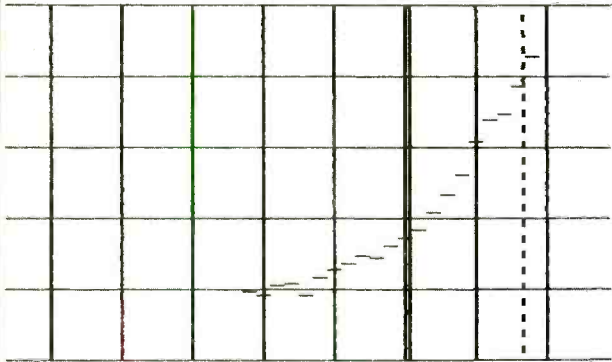
1B. High-bias (SX).



1C. Metal (ZX).

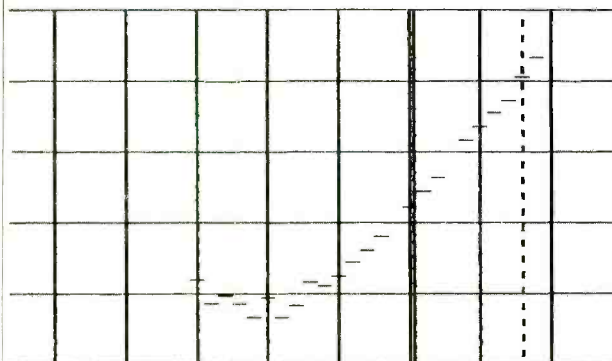
Fig. 1: Nakamichi 1000ZXL: Frequency response (record/play) when optimized for each of three tapes tested. Upper trace is record/play response at 0 dB record level, lower trace is response at -20 dB record level (ref: 0 dB = 200n Wb/m.)

D3 L 2.7%



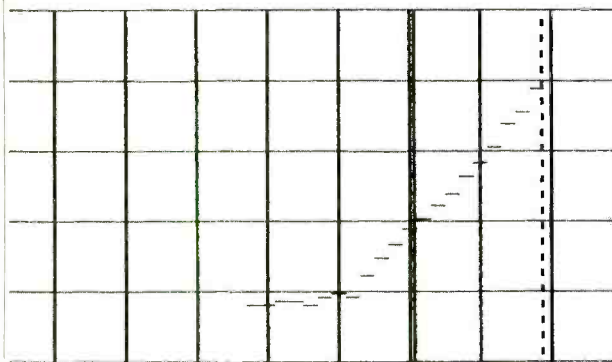
2A. Ferric-oxide (EX-II).

D3 L 3.3%



2B. High-bias (SX).

D3 L 2.8%



2C. Metal (ZX).

Fig. 2: Nakamichi 1000ZXL: Third-order distortion versus record level, for three tape samples tested on the unit. Cursor is set to read third-order distortion closest to 3%, in dB above 0 dB reference record level (200 nWb/m).

The R/P curves we derived in our tests are shown in Figs. 1A, 1B and 1C. The upper trace in each shows the "0 dB" record level, and we see the usual rolloff beyond 10 kHz (denoted by the rightmost double vertical line), with the metal tape (ZX) doing a bit better than the others.

The lower trace in these graphs shows the -20 dB record level, which is of course the normal "spec" level for cassettes. Here we find that even the ferric-oxide sample (Fig. 1A) produced virtually "ruler flat" response across the band, being down only 1.4 dB at 25 kHz. Note that in each of these graphs, the lowest value of dB shown (1.4 dB for Fig. 1A; -2.2 dB for Fig. 1B; -4.4 dB for Fig. 1C) represents the reading for the -20 dB R/P response at the frequency designated by the dotted line cursor and printed at the lower right.

Plots of third-order distortion versus recording level are shown in Figs. 2A, 2B and 2C. For each of these tests, we moved the dotted-line cursor upward to reach about 3 percent distortion. The dB levels required for that level of distortion are indicated at the lower right of each graph. The double vertical line represents "0 dB" recording level, and the third-order distortion for that level is shown as a percentage along the top of each graph.

Response tracking with and without Dolby switched on at the -20 dB record level is shown in Fig. 3. Some slight mistracking may be seen at mid-frequencies with the Dolby circuit activated, but this is hardly a serious flaw.

The deck's playback-only response is shown in Fig. 4. This test was made using the full-track width test tape produced by Standard Tape Laboratory, Inc. for use with our Sound Technology 1500A Tape Recorder Tester. The curve we measured on the Nakamichi 1000ZXL is the flattest response we have ever achieved for any cassette deck. Note that the slight rise at the low end is not really a departure from flat response, but rather is caused by the fact that our test tape is a full-width recording—which of course would not apply when recording music on an actual cassette in the normal manner with proper track format.

We also measured channel separation for the 1000ZXL (Fig. 5. Nakamichi claims separation of 37 dB at 1 kHz; we did better with an excellent 42 dB. Also superb was the deck's speed accuracy (Fig. 6). Some 150 seconds after the deck was put in play mode, deviation from perfect speed was a negligible 0.029 percent fast.

The computer-controlled operations were tested and found to work smoothly and flawlessly. The whole "ABLE" process from start to "ready" only took about two minutes.

**General Info:** Dimensions are 19 inches wide, 9 $\frac{1}{8}$  inches high, 14 $\frac{1}{2}$  inches deep (including handles). In rosewood cabinet, dimensions are 20 $\frac{3}{4}$  inches wide, 10 $\frac{1}{2}$  inches high, 14 $\frac{1}{2}$  inches deep (including handles). Weight is 41 lbs., 14 oz. (in cabinet). Price: \$3800.

**Individual Comment by L.F.:** This is one of those times when I wish N.E.'s testing facilities and my laboratory were closer to each other. At \$3800 a crack, Nakamichi was understandably reluctant to supply a

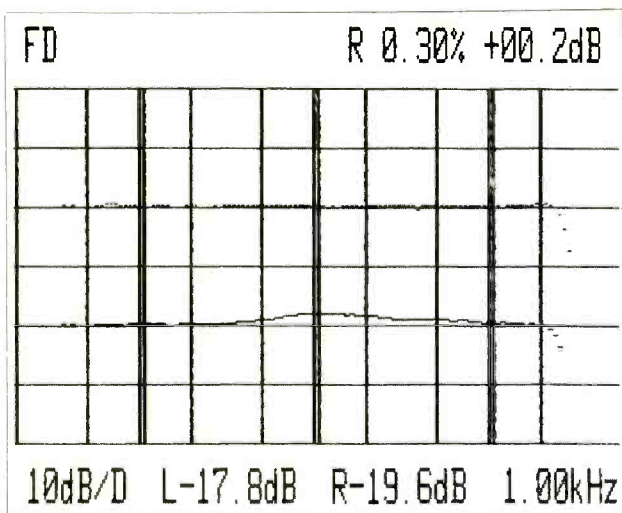


Fig. 3: Nakamichi 1000ZXL: Comparison of response tracking with Dolby (lower trace) with response obtained with no Dolby in circuit (upper trace).

separate unit for my evaluation and another for N.E.'s use. As a result, I had to give up my sample 1000ZXL much sooner than I would have hoped to. The 1000ZXL is the kind of machine that you don't want to give up—ever. In a word, it is a magnificent example of what can be done with a cassette format tape deck if the manufacturer imposes neither price nor technological limitations upon a dedicated engineering staff.

To be sure, at a suggested retail price of \$3800 we would hardly have expected anything but superb performance from this latest deck. It, like its predecessors the model 1000 and the model 1000-II, is certain to quickly become the cassette deck against which all others are compared. With the firm of Nakamichi constantly outdoing itself every couple of years, one wonders what they can possibly do for an encore after the 1000ZXL! But enough of these generalizations. On to the features I

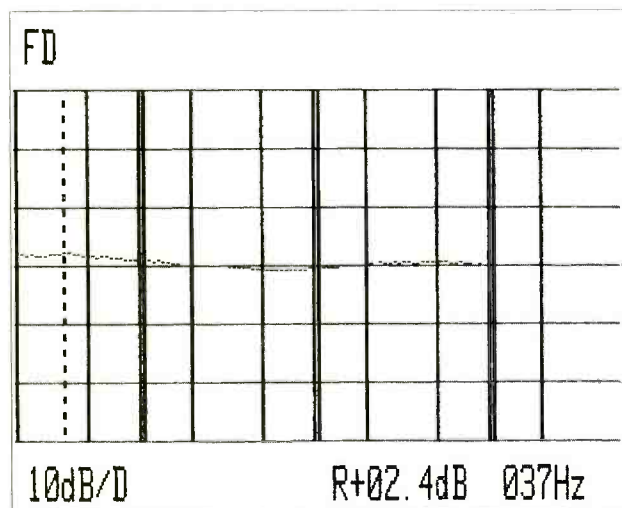


Fig. 4: Nakamichi 1000ZXL: Playback-only response, using standard full-track test tape.

thought were great and those that represented, in my mind, just a bit of overkill for the semi-pro and pro recordist.

This is the first self-adjusting cassette deck I know of that bases its adjustments on extended frequency response to well beyond 20 kHz. In other words, using the automatic adjustment feature (which Nakamichi has dubbed A.B.L.E. for Azimuth, Bias, Level and Equalization—the four parameters which its microprocessor circuits optimize automatically), you are going to come up with virtually flat response, whether you want it or not, to around 25 kHz with almost any decent or half-way decent tape you pop into this machine. As most readers are surely aware, by emphasizing such extended frequency response, Nakamichi must give up just a bit of the potential of the machine for ultra-low distortion and ultra-high signal-to-noise ratios. Still, we were amazed at the combination of performance which the machine achieved even when emphasizing flat response as its most significant performance spec.

Nakamichi wisely provided a three position switch on the front panel of the unit, for those of us who *insist* upon providing higher or lower bias currents than the microprocessor decides a given tape ought to have and, of course, that is all to the good and restores some control of the situation to the user.

As to the feature that Nakamichi calls RAMM (Random Access Music Memory): To begin with, this is not the first machine which allows the user to encode various musical selections on tape by number and then recall them in any desired order by programming the deck to search for the number codes along the length of the tape. That distinction (if indeed it is a distinction) belongs to Sharp Electronics, if memory serves, and there have been other machines since that have the same capability in one form or another. Certainly, for the hobbyist who transfers music from popular albums to cassette tape as a regular procedure, there is some merit in this or in any other automatic programming system. I wonder,

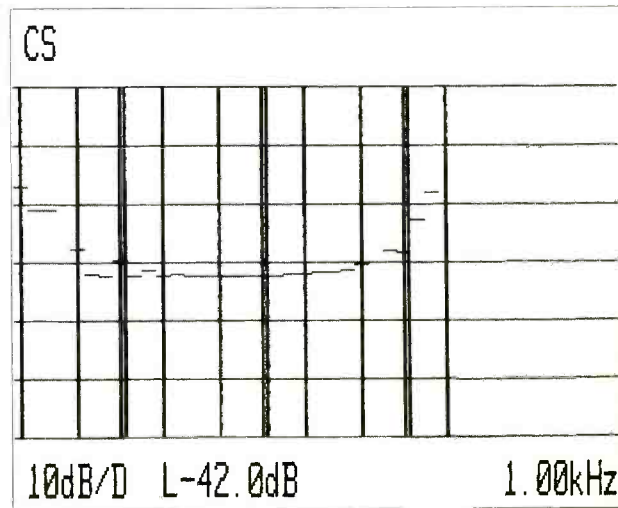


Fig. 5: Nakamichi 1000ZXL: Channel separation vs. frequency.

however, if anyone would ever really *need* fifteen different codes, or, for that matter, thirty different commands for playback. What I'm driving at is really a question of cost. How much does the RAMM feature add to the already high cost of this elegant machine and how many more people might have been able to afford the 1000ZXL if this extra feature had been omitted?

For all of that, however, there is no doubt in my mind that the 1000ZXL is the new definitive cassette deck and will be recognized as such, worldwide, in a very short time. If your studio needs a reference cassette deck, for whatever purpose, you should consider either this one, or Nakamichi's most recently introduced "lower cost" version, the model 700ZXL, which does nearly everything the 1000ZXL can do. I use quotes around the phrase "lower cost" simply because the 700ZXL is still not exactly a bargain basement item: its suggested retail price is only \$800 less than that of the model 1000ZXL, or an even \$3000!

**Individual Comment by N.E.:** I recall a balmy day in June 1973 when a crowd of us press people sat in a demo room at the Chicago C.E.S.—open-eared and open-mouthed as a fabulous new cassette recorder was introduced. It was the Nakamichi 1000.

To be sure, the cassette format had undergone significant improvement prior to that eventful date. In 1970 Advent had brought out the model 201 which incorporated Dolby-B and the capability for handling chromium-dioxide tape together with an improved, rugged transport that had been built for it by the Wollensak division of 3M.

But the Nakamichi went far beyond even that worthy offering. The 1000 was literally unprecedented for a cassette machine. It offered, among other goodies, such desiderata as extended response to 20 kHz; three separate heads for erase, record and play; a logic-controlled "soft-touch" transport; built-in provision for head alignment; three-channel input mixing; and lots more. It soon became acknowledged as the world's best cassette recorder, the standard against which everything in audio cassette performance would be judged. It also spurred a general industry-wide upgrading of the cassette format and helped lift the slow-moving, compact cassette to a position of eminence that no one had dreamed too likely a few years earlier. With the original model 1000 as a pace-setter, a spate of very worthy cassette decks from many manufacturers began to appear in all price ranges and with varying degrees of performance capability and operational features—enough variety to appeal to a very broad public, from casual users to serious and professional recordists.

Not content with this accomplishment, Nakamichi eventually brought out a model 1000-II, and now has produced the 1000ZXL which carries the "state of the art" further along. If you care to make a scrupulous comparison of specific test parameters between the 1000ZXL and a few other top-ranking cassette decks, you will find a given area here or there in which the Nakamichi is outscored. For instance, while 0.05 percent wow-and-

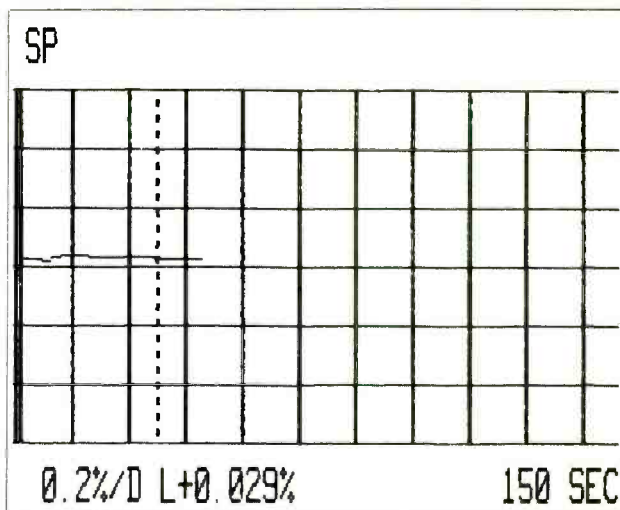


Fig. 6: Nakamichi 1000ZXL: Speed accuracy vs. time.

flutter is very low, we have measured lower values on some others (including Nakamichi's own 680ZX, reviewed here in April 1980). The 1000ZXL has fine signal-to-noise characteristics, but those of, say, the Onkyo TA-2080 (June 1980 report) are perhaps a shade better. When it comes to headroom, the Onkyo is no slouch and neither, for that matter, is the Technics RS-M95 (November 1980 report).

What the Nakamichi 1000ZXL does have, uncontestedly, is the widest-range record/play, and the most linear playback-only, response of any cassette machine we have yet tested. Now, readers of *MR&M* are audio-sophisticated enough to realize that wide-range response in itself is no guarantee of superior sound. There always is a danger of "mud" at the very low end, and of "hash" in the extreme highs. If these undesirables are to emerge, respectively, as a clean solid musical foundation at the bottom, and as a natural, clear and open sound at the top, then the wide-range response had better be accompanied with low noise, low distortion, linearity, ample headroom and superb mechanical attributes like smooth tape motion and good head-to-tape contact—not to mention the correct and precise matching of a given tape to the recorder in terms of bias, equalization, recording sensitivity and azimuth alignment.

Of course, the Nakamichi 1000ZXL does provide all this, and so perhaps—on final count—it does add up to being a "little better" to "lots better" overall than others. To many users, this may be less than overwhelmingly vital, particularly in view of the Nakamichi's very high price. There are some, in fact, who may feel that pushing cassette response to beyond the 20-kHz mark is fairly unimportant, except perhaps for the "golden ear" type of enthusiast. Even so, no one could deny that the Nakamichi 1000ZXL—with its sterling performance and its unflappable built-in microprocessor-controlled automatic adjustments—is one hell of a cassette machine, something of a technological tour-de-force that may well, once more, set a new world standard for this format.

## NAKAMICHI 1000ZXL CASSETTE RECORDER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Frequency response, standard tape	± 3 dB, 18 Hz to 25 kHz	± 3 dB, < 20 Hz to 26 kHz
high-bias tape	± 3 dB, 18 Hz to 25 kHz	± 3 dB, < 20 Hz to 26 kHz
metal tape	± 3 dB, 18 Hz to 25 kHz	± 3 dB, < 20 Hz to 28 kHz
Wow-and flutter (WRMS)	0.08% peak	0.05%
Speed accuracy*	NA	+ 0.029%
S/N ratio, Dolby off (re: 3% THD record level)		
standard tape	NA	58 dB
high-bias tape	NA	59.5 dB
metal tape	NA	61 dB
Same, Dolby on		
standard tape	NA	67 dB
high-bias tape	NA	68.5 dB
metal tape	66 dB	70 dB
Record level for 3% THD (0 dB = 200 nWb/m)		
standard tape	NA	+ 8 dB
high-bias tape	NA	+ 8 dB
metal tape	NA	+ 9.2 dB
3rd order distortion at 0 dB record level		
standard tape	< 1% (THD)	0.3%
high-bias tape	< 1% (THD)	0.53%
metal tape	< 0.8% (THD)	0.3%
Line output at 0 dB	1000 mV	1000 mV
Headphone output at 0 dB	45 mW	520 mV (8 ohms)
Mic input sensitivity for 0 dB	0.2 mV	0.2 mV
Line input sensitivity for 0 dB	50 mV	54 mV
Fast-wind time, C-60	NA	50 seconds
Bias frequency	105 kHz	105 kHz
Power consumption	60 watts	60 watts

\*Speed is adjustable on playback

CIRCLE 8 ON READER SERVICE CARD

## MXR Dual Limiter



**General Description:** The term "dual" in the title of this new limiter from MXR indicates that it consists of two independent channels, with the same inputs, outputs and controls on each channel. The two channels may be operated independently of each other, or they may be strapped (via a front panel switch) for use in stereo. In addition, the Dual Limiter may be interfaced with an external equalizer (via special jacks linked to the detector loop in each channel) for "de-essing" applications.

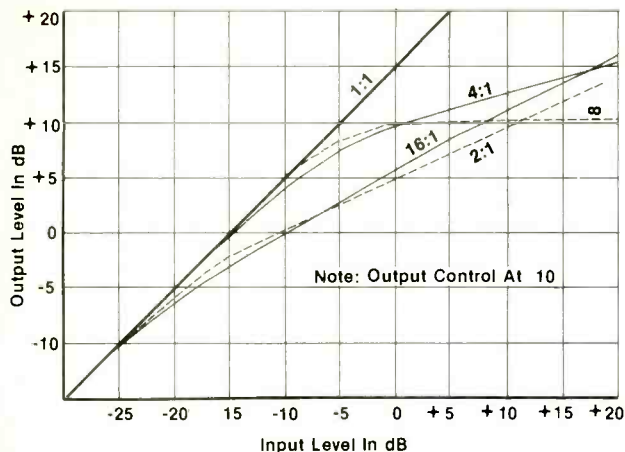
For each channel, the Dual Limiter offers identical front-panel facilities. An in-out button chooses between the device's being in the signal path or out of it. Next to it is a button that determines the compression/limiting

slope. When pushed in, this button selects a 4:1 slope (a signal level above the limiting threshold that changes by 4 dB at the input will result in a 1 dB change at the output). When in the out position, this button selects an "infinite" slope—in this mode, the output level remains about the same regardless of changes in the input level.

Four knobs handle the functions of input level, output level, attack and release times. The input knob is marked from 10 to -30; the output knob, from -30 to 10(dB). A range of 0.5 to 50 milliseconds is handled by the attack control; a range of 0.1 to 5 seconds is adjusted by the release control.

An LED display indicates the amount of gain reduc-





**Fig. 1: MXR Dual Limiter: Some of the various limiting and compressing slopes available with this unit.**

tion, and is marked T (threshold), 3, 6, 12 and 18 (dB).

An identical set of controls and indicator is provided for the second channel. Between the two sets of controls is the "stereo/dual" selector, and at the far right end of the panel are the unit's AC power off/on switch and power-on indicator. The panel is flanged and slotted for standard rack-mounting.

The rear contains signal inputs and outputs, again duplicated identically for each channel. There are both XLR and 1/4-inch jack connectors for inputs and outputs. All inputs are balanced, for compatibility with the balanced lines normally used in studio and in P.A. applications. All outputs are unbalanced. However, when the Limiter is bypassed, the balanced line is preserved. The inputs may be used with unbalanced lines by using an ordinary two-conductor (tip-sleeve) phone plug, or by tying together pins 2 and 1 of the XLR connector.

The in and out jacks for the Detector Loop option take standard 1/4-inch phone jacks (two-conductor).

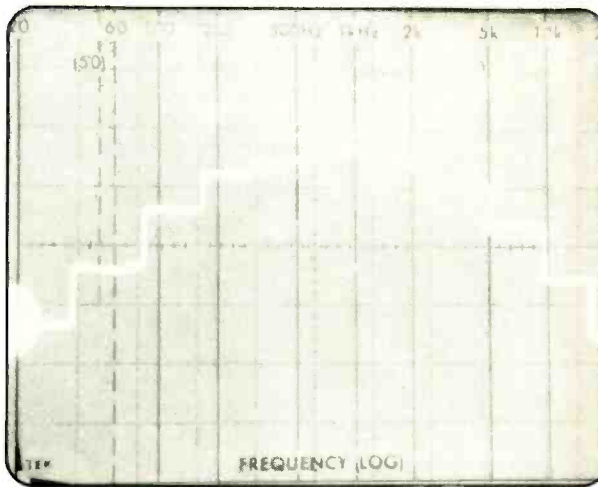
Input impedance of the Dual Limiter is high enough (20 K ohms, balanced) to permit using the device with a wide variety of sources capable of supplying a line-level signal (about 0 dBm average level). For use with musical-instrument pickups or other "low level" signal devices, an external preamp is needed to bring the signal up to line-level. Output impedance of the MXR device is low enough (200 ohms) to permit driving long lines and a wide variety of input impedances at their ends. The unit's power cord is fitted with a three-prong (grounding) plug.

**Test Results:** Tests of the MXR Dual Limiter confirmed or bettered its published specifications, and also—to the limited extent we were capable of managing—its general effectiveness as a "subtle and unobtrusive" signal processor, not to mention its convenience of use. The curves shown in Fig. 1 (taken from the preliminary owner's manual) tell much about the kind of job it does. The curve identified with an "infinity" symbol is the input/output transfer curve that will

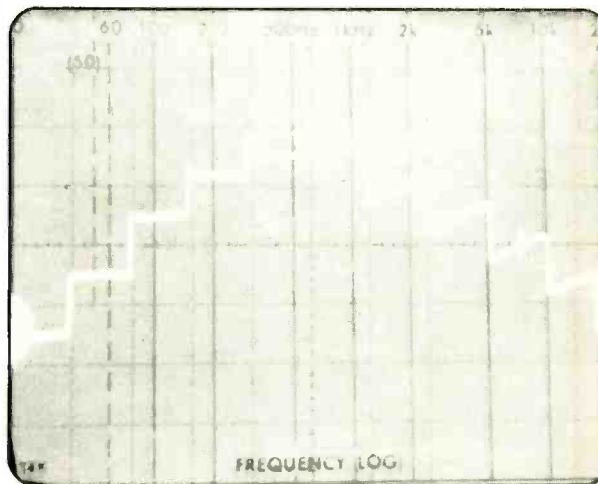
be obtained when the MXR unit is used as a compressor. Above threshold, further increases in output level do not produce increased output levels. The device would be used in this manner only to prevent clipping of a P.A. system in a sound-reinforcement situation.

The other curves shown provide a much smoother transition, and when they are used with the proper attack and release control settings (depending on the nature and content of the music and/or vocals), they can control the dynamic range of the program material while maintaining good sonic clarity.

Fig. 2 illustrates the device's limiting action using the 4:1 slope, with attack time set at 0.5 ms. and release time at 0.1 second (100 ms.). Steps in the ramps are 10 dB in amplitude, and the frequency was fixed at 1 kHz (disregard the frequency notations at the top of the



**Fig. 2: MXR Dual Limiter: Ascending and descending signal amplitudes, in 10 dB (input) steps, as seen at the output terminals of the limiter. Attack time is set at 0.5 msec.; release time at 0.1 seconds.**



**Fig. 3: MXR Dual Limiter: Same display as in Fig. 2, but attack time has been changed to 50 msec., while release time is now 5 seconds.**

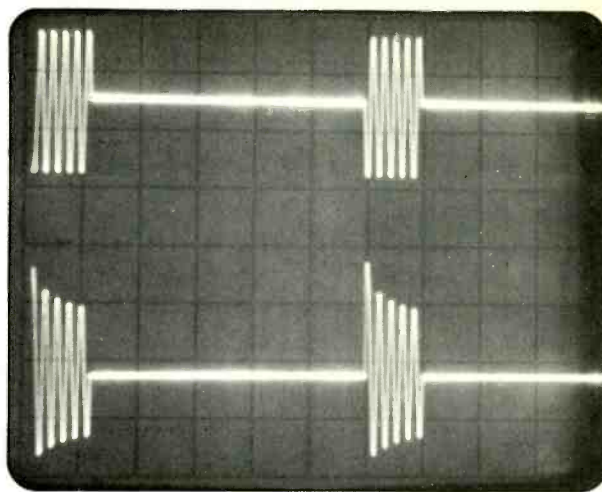
'scope face since they do not apply to this display, nor to the display in *Fig. 3*). The limiting action is clearly apparent at the upper "steps" of the display. While a slight overshoot is evident as amplitudes are reduced in 10-dB steps (right section of the 'scope display), correct amplitude is rapidly restored with this relatively fast release time in use.

The same increasing and decreasing amplitude signal was used to produce the results shown in the 'scope photo of *Fig. 3*. However, in this case, the attack time was changed to 50 ms., and the release time adjusted to its maximum of 5 seconds. Note that now, even on the rising portion of the ramp (upper three steps), there is some evidence of overshoot and time delay, while the differences in the decaying amplitude steps are quite apparent when compared to the same portion of *Fig. 2*.

*Fig. 4* shows what happens when a tone burst (upper trace) is applied to the Dual Limiter, with settings of 0.5 ms. attack time, and 0.1 second decay time, with the Limiter slope still set for 4:1.

**General Info:** Dimensions are 19 inches wide; 1¾ inches high; 7 inches deep. Weight is 10 lbs. Price \$450.

**Joint Comment by L.F. and N.E.:** Our lack of access to "live" musicians this time necessarily put a limit on the extent to which we could fully evaluate this unit. We did, however, run some wide dynamic range program material (open-reel master tapes) through it and we were able to make a fair number of bench tests—all of which add up to our feeling that this is a well-designed instrument and one which should introduce a minimum of undesired side-effects when in use. It also is easy enough to work with. If anything, the range of attack and release times is probably greater than anyone might need under



**Fig. 4: MXR Dual Limiter:** Tone burst applied to input of the limiter, with unit set at 4:1 limiting slope, 0.5 msec. attack time and 0.1 second decay time results in output waveforms shown in later traces.

real working conditions, but it was easy enough to find the "right" control settings for desired effects with different music material. We would say that a fair amount of experience with the device and careful reading of the material supplied by MXR would be a good idea before introducing it into your signal path on a permanent basis, if one is to realize all the "creative effects" described, such as reduction of sibilance in a vocal track or—in a multi-track mixdown—reducing, say, the level of a guitar when you want a lead vocal to predominate. A soundman who is accustomed to working with musicians should, in short order, be able to master and get the most out of this very flexible limiter.

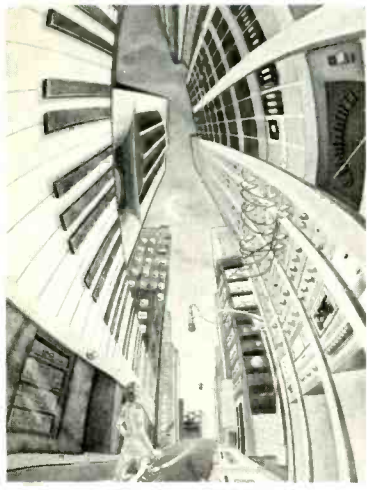
#### MXR DUAL LIMITER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPECIFICATION	LAB MEASUREMENT
Maximum input level	+ 19 dBm	+ 19 dBm
Maximum output level	+ 19 dBm	+ 19 dBm
Input impedance	20 K ohms, balanced	Confirmed
Output impedance	200 ohms	Confirmed
Output noise	90 dB	101 dB unwt'd 106 dB "A" w'td
Maximum slew rate	More than 7 V/usec	Confirmed
THD below threshold	0.05%, 20 Hz.-20 kHz.	0.018% @ 1 kHz., 0.03% @ 20 kHz., 0.05% @ 20 Hz.
THD with 10 dB of limiting	0.1% 20 Hz. to 20 kHz.	0.06% @ 1 kHz., 0.042% @ 20 kHz., 0.1% @ 20 Hz.
SMPTE IM below threshold	0.05%	0.065%
SMPTE at 10 dB limiting	0.1%	0.35%
Frequency response, ± 1 dB	20 Hz. to 20 kHz	10 Hz. to 26 kHz
Maximum limiting	24 dB	24 dB
Attack time	0.5 to 50 msec.	Confirmed
Release time	0.1 to 5 sec.	Confirmed
Slope	4:1 or infinite, user selectable	Confirmed
Power requirements	18.1 watts	Confirmed 15 watts

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# Tapco EX-18

## Electronic Crossover

By John Murphy and Jim Ford

The EX-18 is a new product from Tapco and represents an effort by that company to produce a high performance crossover at a modest price. The new crossover is packaged in a shallow rack mount chassis (single width) and can be switched between two-way stereo and three-way mono modes of operation. The filters employed in the EX-18 are 18 dB/octave Butterworth types which exhibit an accurate summed frequency response. Crossover frequency selection is made by way of a continuously variable front panel control. There is also a front panel attenuator for the Hi output signal. Because of the ease of set-up and high level of performance, Tapco's EX-18 could easily become a standard audio building block, especially at the suggested price of approximately \$250.

**General Description:** Loudspeaker design has in recent years begun to emerge from the realms of "black magic" into the light of science based technology. Loudspeaker designers no longer slap random speaker components into a random box and call it a "system." (Do they?) Instead, we've picked up on the research work of Thiele and Small and developed computer-aided design techniques which give us loudspeaker sub-systems with predictable performance. The task is hardly complete, however, since these limited frequency-range sub-systems must be combined into a single full-frequency range system. After coming this far, it would be a shame to drop the ball now. This is why the system crossover is more important today than ever before.

One of the most important characteristics of a crossover is the frequency response that results when the separate high- and low-output signals are recombined, because this summed response curve will be superimposed on the response of the system. Many crossovers used in the past and even some of the currently available crossovers suffer from inaccurate summing. (See the Hands-On Reports titled "An Overview of Crossovers" in the August and September 1980 issues of *MR&M*). An ideal crossover would have a perfect flat summed frequency response—not just a flat amplitude response, but a flat phase response as well. Such a crossover would have the capability of passing square waves without distorting the waveform. Since there is no general agreement as to whether moderate deviations from flat phase response are audible, it seems reasonable to relax the requirement for flat phase response for general purpose applications (such as sound reinforcement systems). However, for critical monitoring applications (such as



recording studio control room monitoring) flat phase response should be a goal not only for the crossover, but for the complete loudspeaker system as well. Such a system would be capable of reproducing square waves without distorting the waveform. With this model of an ideal crossover in mind, let's now return to our discussion of the EX-18.

The front panel of the EX-18 is dominated by two identical groups of controls, one group for each of the two channels. At the left of each control group is a rotary frequency control and its associated push-button range switch. The frequency control is calibrated at nine points ranging from 100 Hz to 1600 Hz. Depressing the frequency range button shifts the frequency range upward by a factor of ten so that the frequency range becomes 1000 Hz (1 kHz) to 16,000 Hz (16 kHz). Located to the right of the frequency controls is a high-frequency signal attenuator which allows very convenient calibration of the Hi/Lo signal balance. Just to the right of each Hi-level control is a push-button switch labeled "phase" which reverses the polarity of the Hi signal when depressed.

Between the two control groups is a push-button switch which when depressed internally patches the two channels for operation as a single channel three-way crossover. The control functions for the two modes of operation are clearly identified by separate color-coded front panel graphics. The white graphics above the controls apply to two-way, two-channel operation; in the three-way single channel mode gold colored graphics below the controls apply. During three-way operation the two level controls attenuate Mid and Hi output signals. At the far right of the front panel is a small power on/off switch and LED pilot light.

The crossover's front control panel is recessed behind its rack mount ears to allow for guarding of the controls. A simple tinted plastic security panel (supplied with the unit) fits over the front panel and attaches at either side



by way of one of the rack mounting screws. All control settings remain visible through the security panel. We were very pleased to see this provision for securing the crossover controls. It seems that there is often a tendency to view crossover frequency and level settings in the same way that we view the EQ controls on a mixer; that is, controls to be adjusted as desired according to musical taste. However, this would be a serious error. In fact, a loudspeaker system's crossover frequency should be determined when the system is initially designed and then not tampered with. The same goes for the calibration of the Hi/Lo level settings.

All signal connections are made at the rear of the EX-18 by way of 1/4-inch phone jacks. The input is balanced (active rather than transformer) but accepts an unbalanced input signal as well. The output signals are unbalanced. Signal connectors are identified by two sets of graphics for the two operating modes (two-way/three-way). The only other item on the rear panel is the AC line fuseholder.

**Listening/Handling Test:** In order to subjectively evaluate the audio quality of the EX-18 we interfaced it with our precision summing amplifier in order to combine the Hi and Lo output signals. The crossover and summer were then inserted into the effects loop of our preamplifier. Under these conditions an ideal crossover would be perfectly transparent to the audio signal and there would be no audible change when switching the crossover in or out of the listening chain.

Listening to several different high quality discs over our reference monitoring system we found the Tapco EX-18 to be highly transparent to the audio signal. We heard no audible effect when the crossover was either bypassed or switched into the listening chain. We also noted that the crossover introduced no audible noise into the system. There were no odd pops or thumps heard

when any of the front panel controls were operated.

The preliminary owner's manual supplied with the crossover explained the operation of the unit adequately and gave a couple of paragraphs of applications information. More applications information and some service information would be a nice addition.

**Lab Test:** We gave the EX-18 a thorough lab evaluation and were pleased with our findings. The specific results of our tests are contained in the "Lab Test Summary" below.

The maximum input and output signal levels are appropriate for professional audio use. The crossover has unity signal gain from input to output.

Noise levels at the output were quite low (better than  $-85$  dBV). We observed that lifting the unit's equipment ground (third pin of the AC connector) reduced the buzz component of the noise about another 10 dB, but this is not a safe practice in general so we don't recommend it.

Distortion levels (total harmonic distortion) at a  $+10$  dBV signal level were extremely low, being below our measurement limit of .002% over much of the frequency spectrum. Depressing the front panel polarity reversal button increased the high-frequency distortion a slight bit but not enough to really be concerned with.

We found the crossovers slew rate limit to be 11 volts per microsecond which is consistent with the observed power bandwidth of about 135 kHz. This works out to a normalized slew rate limit of 0.85 volts per microsecond per volt which is well above the minimum of 0.5 recommended<sup>3</sup> for freedom from slewing induced distortion.

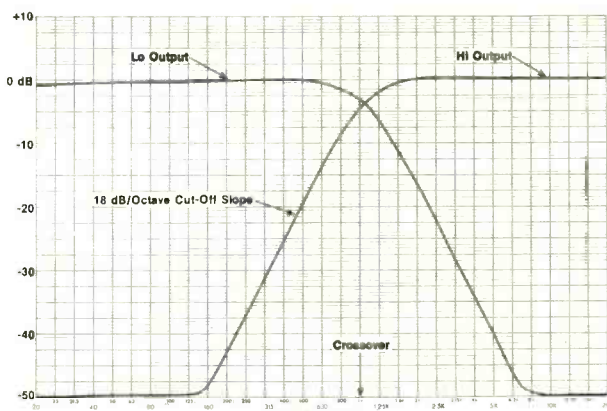


Fig. 1: Tapco EX-18: High and low output frequency response curves.

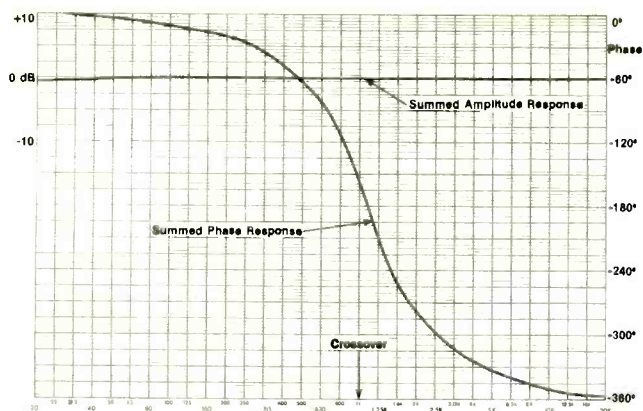


Fig. 2: Tapco EX-18: Amplitude and phase response when the high and low outputs are summed ("normal" polarity).

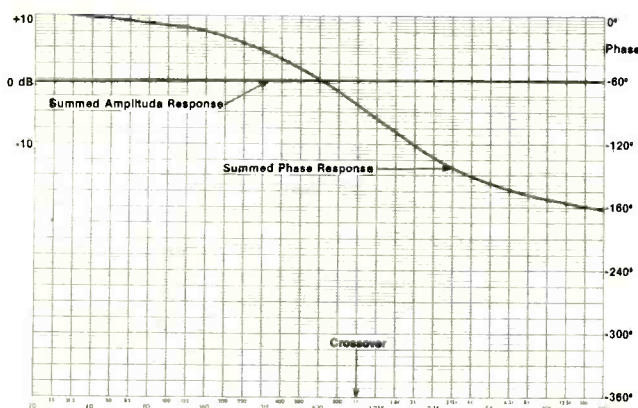


Fig. 3: Tapco EX-18: Amplitude and phase response when the high and low outputs are summed ("reverse" polarity).

The frequency response curves for the Hi and Low output signals are shown in *Figure 1* for the case of a 1 kHz crossover point. Note the cutoff slopes of 18 dB/octave. *Figure 2* shows the frequency response that results when the Hi and Lo output signals are accurately summed with the polarity reversal switch in the "normal" position. The amplitude response is absolutely flat as it should be for a properly designed 18 dB/octave Butterworth filter pair. The phase response is also as expected for this filter pair. Depressing the polarity reversal button on the front panel provides the summed response shown in *Figure 3*. Again, the amplitude response is absolutely flat but now the crossover exhibits half the total

phase shift of the non-inverted case. Because of the better phase characteristic, operation with the polarity button depressed is recommended. In either case the crossover exhibits an accurate amplitude response when the outputs are summed. This puts the EX-18 far ahead of many crossovers on the market which do not exhibit an accurate summed response. Good work Tapco!

**Conclusion:** The EX-18 electronic crossover from Tapco was evaluated both in the lab and in the listening room and found to perform excellently in both situations. This is one of the few crossovers available that provides an accurate summed amplitude response. Considering the ease of operation and modest price, the EX-18 could well become a classic audio tool. We recommend the unit highly.

### LAB TEST SUMMARY

(Note: 0 dBV is referenced to 0.775 Vrms)

#### Input/Output Levels

Maximum input level before clipping:	+ 21.3 dBV
Maximum output level:	
20 k ohm load:	+ 21.3 dBV
600 ohm load:	+ 14.5 dBV

#### Noise Performance

(Note: 20 kHz filter; unweighted; Hi level attenuator full clockwise)

Noise at "Hi" output (CH 1):	- 88.3 dBV
Noise at "Lo" output (CH 1):	- 88.0 dBV
Noise at "Hi" output (CH 2):	- 85.5 dBV
Noise at "Lo" output (CH 2):	- 87.8 dBV

#### Distortion Performance

(+ 10 dBV output level)

Frequency	THD plus Noise
100 Hz	.002% (measurement limit)
500 Hz	.002%
2 kHz	.002% (.0026% w/phase rev.)
10 kHz	.0027% (.0095% w/phase rev.)
20 kHz	.0031% (.0195% w/phase rev.)

Small Signal Bandwidth: (- 3 db) 3 Hz to 290 kHz

Power Bandwidth: 135 kHz

Slew Rate Limit: 11 volts per microsecond

Normalized Slew Rate Limit: 0.85 volts per microsecond per volt

### References

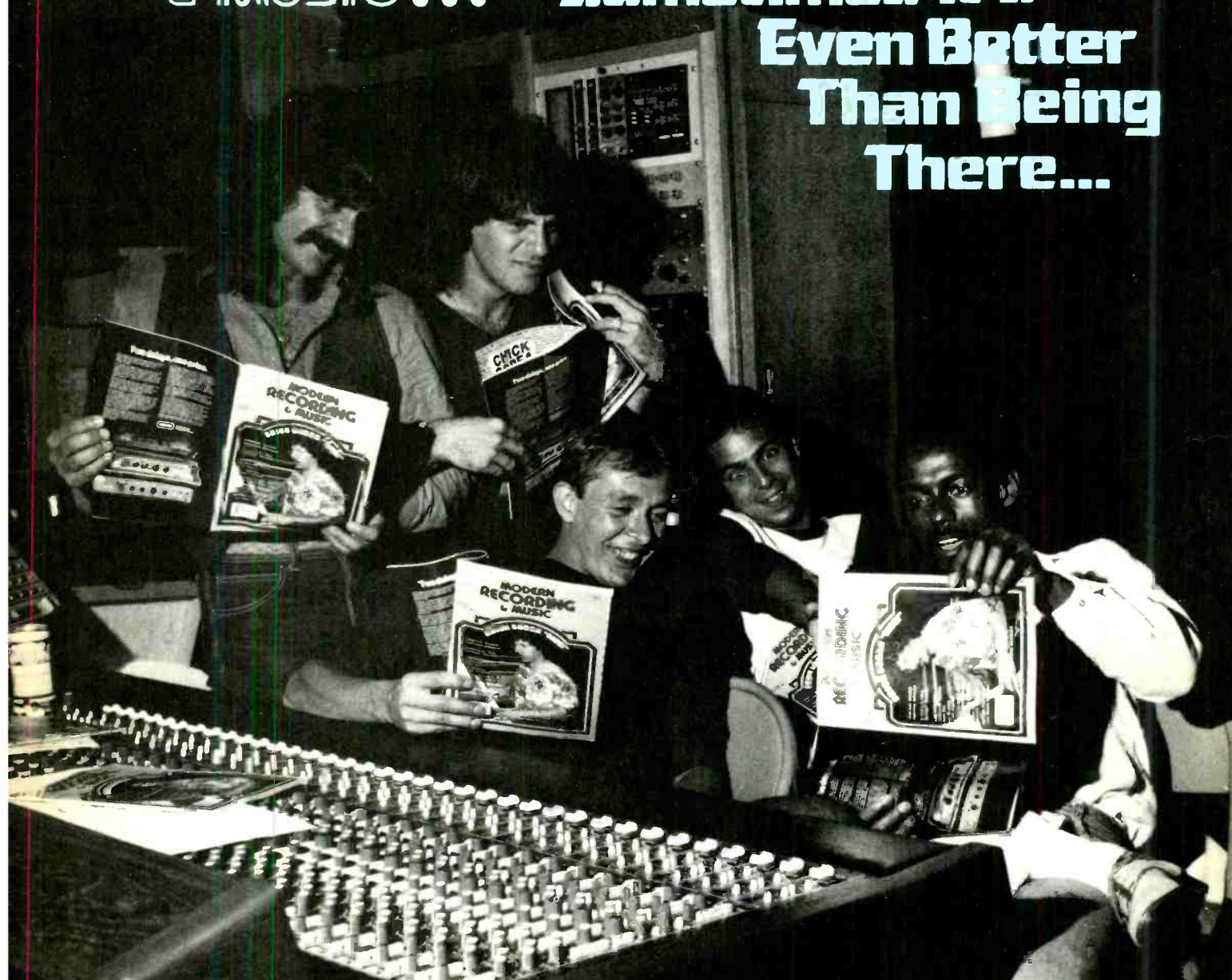
1. A.N. Thiele, "Loudspeakers in Vented Boxes," *Journal of the Audio Engineering Society*, Vol. XIX, No. 5, p. 382; no. 6, p. 471 (May, June 1971).
2. R.H. Small, "Closed-Box Loudspeaker Systems," *Journal of the Audio Engineering Society*, Vol. XX, p. 798 (December 1972); Vol. XXI, p. 11 (Jan./Feb. 1973).
3. W.G. Jung; M.L. Stephens; C.C. Todd, "An Overview of SID and TIM, Part II," *Audio*, 38-47 (July 1979).

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## POPULAR

**STEVE TIBBETTS:** *Yr.* [Steve Tibbetts, producer and engineer; recorded at Atma Sphere, St. Paul, and Oxit Roxon, Minneapolis.] Frammis 1522-25.

**Performance:** Brilliantly conceived and executed

**Recording:** Exquisite do-it-yourself job

Steve Tibbetts is certainly an enterprising young artist. He not only produced and engineered this, his second album, but played most of the instruments, wrote the music, mixed the recording, did the cover art, and pressed, distributed and promoted the finished product. Of course, none of that would mean a thing if the recording and the music weren't wonderful. The fact that both are superb makes this one of the great, undiscovered gems.

Tibbetts is essentially a guitarist, and both his classically and folk-oriented acoustic playing and his spacy, cutting electric work are ceaselessly impressive on this LP. Tibbetts, who is based in Minneapolis, is a craftsman, and tasteful musicianship is his calling card. One gets the impression that Tibbetts would be right at home in a crunching heavy metal outfit, an advanced fusion group or a classical guitar ensemble, if he had chosen those routes. But instead, he decided to combine all of those avenues and more, charting his own course.

This music runs in several different directions, but always holds together—

Tibbetts is a composer who knows how to create effective changes. His musicianship stands on its own—it can be listened to intently, but it can also be listened to as ambient background music because it does not *demand* involvement. Tibbetts doesn't want to show off; he's more interested in putting together a total work.

Tibbetts' compositions fall into a number of classifications—there are elements of jazz, rock, folk, classical, Eastern and experimental sound landscapes present here. It is always exciting because it is always moving

somewhere new, maintaining imagination and precision at all times. Tibbetts has a fine sense of dynamics, so that just when a moody, dreamy effect is taking hold, a cymbal and an electric guitar will crash through that base, establishing a whole new point of reference. Beneath all of those eruptions of style, a constant rhythm is kept up, with both Tibbetts' instruments and a myriad of well-placed percussion instruments winding in and out of the mix.

The classy, tasteful music of Tibbetts is accented by his considerably professional production and engineering work.



**STEVE TIBBETTS:** Tasteful musicianship is his calling card.



It is almost impossible to fathom, at times, that this recording was not made in one of the more elaborately embellished, expensive recording studios. The clarity of sound, the fine balance achieved between acoustic, electric and percussion instruments, the avoidance of overdoing any single aspect, are the marks of a producer/engineer with years of experience, not a relative novice working with limited resources. Yet Tibbetts has bucked the odds and has come up with a smart and smooth piece of vinyl.

This record should serve as a training course for other would-be do-it-yourselfers. But it is also a reminder to those who think mounds of money and fancy equipment are all that are needed to make a good recording, that natural talent is still the most important component in the making of a record that matters. (Available from Frammis Enterprises, Box 6164, Minneapolis, MN 55406). J.T.

**ADAM AND THE ANTS: *Kings of the Wild Frontier*.** [Chris Hughes, producer; Hugh Jones, engineer; recorded August 1980 at Rockfield Studios, Monmouth, England.] Epic NJE 37033.

Performance: **Invigorating journey into forgotten frontiers**  
Recording: **All the right moves in all the right places**

The old Webster says an ant is "any of a family of insects, generally wingless, that live in colonies." One couldn't find a more vivid picture of colony life—be it ant hills, tribal communities or heathen pirates—than on Adam and the Ants' *Kings of the Wild Frontier*. And what makes this exploration of different lives so interesting is that this music revitalizes forgotten sounds as well as bugs.

Beginning with its strongest cuts, the album moves from '60s-ish melodies sewn into a fabric of pseudo-Indian chants to a psychedelic guitar line screeching irritably. Drums and vocals play the key roles on most songs, while the guitars tend to add flavor rather than melody. Effective work at the mixing board pushes the drumbeat—whether it's a tom tom, kettle or tapping sound—to the front of the catchy, memorable tunes, while strategic emphasis on blaring guitar notes does come through on some heavy-metal-type numbers. This is music for those slightly bored with what is now common pop fare.

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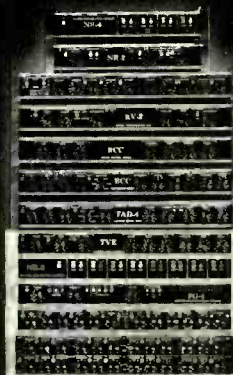


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In general, the lyrics are simple and basic, but the best songs tell tales of Indian persecution ("Kings of the Wild Frontier," "The Human Beings"), ask questions about human identity ("The Magnificent Five," "Dog Eat Dog"), and most importantly, raise an important point about the similarities between ants and the human dilemma ("Ants Invasion," "Don't Be Square [Be There]"). Basically, these are heavy messages.

But Adam and the Ants don't really seem to be all that serious and righteous as those messages might lead one to believe. Creeping throughout the hypnotics is a subtle sarcasm, be it an exaggerated vocal (try the repetition of the words "press darling" in the song of the same name) or a toe tapping underscore in "Antmusic," which brings to mind the old Shirley Temple tap dance scenes of the '30s.

This record's finest attribute lies in the clever emphasis placed on each instrument (as well as some uncommon sound effects) at various points of the songs. This strategy does more to illustrate a picture than do the lyrics. "Ants Invasion," a prime example, has a horrifying guitar line that hypnotizes the listener into seeing an invasion of thousands of ants/people obediently marching over ant hills/mountains to the target food/battle. "Los Rancheros" begins with a cowboy-on-the-trail guitar melody and the song even incorporates a real live gunshot into the structure. "Physical (You're So)," whose lyrics spoof the macho man attack without meaning to do so, features delirious music and that's what pulls the number off.

Obviously, there's cleverness in them there ant hills. E.Z.G.



**RALPH TOWNER: Solo Concert.** [Manfred Eicher, producer; Martin Wieland, engineer; recorded October 1979 during concerts in Munchen and Zurich.] ECM Records ECM-1-1173.

Performance: **Prestidigitous  
pyrotechnics**  
Recording: **True grit**

Through his efforts with the acoustic jazz group Oregon and through his

numerous solo recordings, Ralph Towner has singlehandedly established the twelve-string guitar as a major instrument for jazz improvisation. This is an absolutely remarkable achievement—given the sheer ponderous mass of the oversized guitar. Folk singers like Leadbelly popularized its use by exploiting its sheer volume of sound and rich bass response. It's a terrific guitar to strum with abandon when a player needs to fill an acoustically dead hall with ringing chords. But jazz?

Towner brings to the twelve-string a hauntingly light touch, magically quick fingers, and a gift for creating brief compositions that explore the instrument's melodic as well as rhythmic potentialities. The opening cut on *Solo Concert*, "Spirit Lake," is an ideal example of the genius of the Towner style. It sounds, simultaneously, like an anthem and an Indian raga. Ringing chords are alternated with achingly delicate high notes. The melody suggests a possible musical influence: Robbie Basho. Basho was fascinated by the drone possibilities of the twelve-string and composed raga-like tone poems on the Blue Thumb and Tacoma labels—all, alas, long out of print. His ghost lurks behind Towner's microphone.

My favorite example of the Towner technique on *Solo Concert* is "Zoetrope." In six minutes, Towner creates a whirling carousel of sound. Miracle of miracles, it's an example of wit raised to the highest power. Rare these days (or any) in the jazz world.

*Solo Concert* also features Towner on classical guitar, an instrument he plays with slightly less distinction. His cover of the Miles Davis tune, "Nardis," seems cold and lifeless compared to the original. He shines, however, on the evocative "Chelsea Courtyard," a probing, rather gnomic and mysterious impressionistic piece about that English shrine.

The recording closes with a piece for twelve-string guitar entitled "Timeless." That is exactly what the best of Ralph Towner's music is. And *Solo Concert* is a rich place to explore the latest work of one of the world's original guitar stylists.

And now...a word about the recording quality. One word, ladies and gentlemen: *deplorable*. Towner's twelve-string is miked poorly. The vital bass response is murky. The treble sounds tinny. Engineer Martin Wieland must have had a tough time. A twelve-string can be a tricky instrument to capture under



**RALPH TOWNER:** One of the world's original guitar stylists.

concert conditions. Hard to balance the massive bass against the high strings. Suffice it to say that a better engineering job would have been welcome.

And my copy features a high level of surface noise and rather exquisite warpage (shades of Picasso's cubist period?) If I had to pay \$8.98 for a pressing so crudely done, I would be furious. ECM uses for its advertising motto: "the most beautiful sound on earth." They should not have let Warner Brothers manufacture that "beautiful sound." The result is like letting Julia Child cook at the local McDonald's.

Maybe Mr. Towner will take the audacious step of starting his own record company. Music of such exquisite refinement and class warrants the finest in production. N.W.

**JEANINE OTIS/HEIKKI SARMANTO:** *Magic Song*. [Tommi Luhalla and Heikki Sarmanto, producers; Jukka Teittinen, engineer; recorded at Takomo Recording Studios, Helsinki, Finland, 1980.] Hi-Hat HLP 144.

**MAIJA HAPUOJA/HEIKKI SARMANTO:** *The Voice Maija*. [Heikki Sarmanto, producer; Tom Vuori, engineer; recorded at Takomo Recording Studios, Helsinki, Finland, October 1980.] Bluebird BBL 1012.

Performances: **Thoroughly professional.**  
Recordings: **No complaints.**

I get the feeling that after his mon-

ument to jazz liturgy, the *New Hope Jazz Mass* (which I reviewed favorably in November 1979 in *Modern Recording*), Heikki Sarmanto is trying for a bread and butter record that will net him enough fame and fortune to advance his next ambitious project. Both of these recordings seem aimed squarely at the mass market. For the jazz crowd, there's the Bluebird album which features Maija Hapuoja's voice used as an instrument in concert with saxophone, double flute and rhythm section. The idea is as old as the hills. Duke Ellington did it years ago with records like "Creole Love Call" and "The Blues I Love To Hear." It achieved its greatest popularity in the hey-day of bebop with Charlie Ventura, Jackie Cain and Roy Kral. Maija is too good a singer to sacrifice her vocal sound to blending with a horn and Heikki has not written anything for her that leaves a lasting impression. If the record catches on, so much the better, but I'd write it off as a good try but not quite ready yet.


The album of songs with words with Jeanine Otis is a different animal. Totally bilingual, Heikki Sarmanto has managed to set these song texts by Aina Cutler with consummate taste and inventiveness. If I never hear anything better than their "Sunday Morning" I will not consider myself cheated. True, Heikki Sarmanto has more to work with on this album, given Cutler's exquisite sense of poetry, more horns and the strings of the Helsinki Philharmonic, yet I think the difference between these two recordings has more to do with his sense of the dramatic, as was

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poignantly illustrated in the *New Hope Jazz Mass*.

The future hope for Heikki Sarmanto and for many others like him is that the pressure of economics will be lessened by commercial ventures such as this, which in no way demean the talent of the composer, therefore allowing him the luxury and time to write the masterpieces that may not do as well at the box office, but will in the long run mean more to the history of jazz.

The recording gets the music all down. Maybe something more could have been done in the control room to mix Maija's voice in with the horns indistinguishably but I doubt that is what Maija had in mind. She is a singer at all times and there is something in being a singer that rebels against being orchestrated like a second saxophone. As far as the album with Jeanine Otis goes, it is certainly a slick project through and through reminding me very much of the efforts between Chuck Mangione and Esther Satterfield on A&M. It's all done very professionally: the mixing, the recording, the playing, the singing, the writing. If you'll excuse the pun—and you should be used to my puns by now—a truly *Finnished* product.

Currently these recordings are available on small Finnish import labels. I hope a major company picks them up... particularly the *Hi-Hat* album. Heikki deserves a hit. Then maybe he'll have the time and funds to work on his next mass or opera or symphony or concerto.

J.K.

**STEVE SWALLOW: *Home*.** Music by Steve Swallow to poems by Robert Creeley. [Manfred Eicher, producer; David Baker, engineer; recorded at Columbia Recording Studios, New York, N.Y., September 1979.] ECM-1-1160.

Performance: Spellbinding  
 Recording: Lush

Steve Swallow has distinguished himself over the years as an inventive acoustic and electric bass player. With *Home* he makes his mark as a startling composer of jazz song. The fact that Swallow uses the sparse and abstract poetry of Robert Creeley as a text to develop his music setting around makes his achievement all the more remarkable. Creeley's poems are romantic, wispy lyrics with all the solidity of cigarette smoke rings. Swallow puts

together a stellar band fronted by one of America's most shamefully neglected jazz singers and suddenly the sung poems and music *soar*.

*Home* draws upon the talents of Steve Kuhn and Shiela Jordan and these two literally steal the show from Swallow and his talented companions. Last year ECM released a Kuhn/Jordan effort called *Playground*, a record that seems the forerunner of *Home*. Kuhn composed some rather odd sounding prose-poems which Jordan sang in a vibrant vibrato. Kuhn's piano support of Jordan's singing was fitting—constantly inventive and flowing.

So this time around, Swallow uses Creeley's poems, takes the place of Kuhn's regular bass player, keeps Kuhn's drummer from the *Playground* session, and adds Lyle Mays (from the old Pat Metheny band) on synthesizer and David Liebman on sax. This is *Playground* revisited. A stronger recording perhaps, because of the addition of Liebman and the sheer *density* of Creeley's tight lyrics.

The album opens with "Some Echoes," a lush and phantasmagoric tune with effective synthesizer and piano duet work by Kuhn and Mays and a bracing sax riff by Liebman. Jordan sings the airy words as if her life depended on it. The overall effect is spooky. The pace quickens with "She was young..." a fragment of a long poem by Creeley about seeing his wife's many faces while undergoing an LSD trip. The song opens with a smooth-stepping solo by Swallow and Jordan bursts into a lifting song. Her enthusiasm is infectious. She makes you *care* about whatever the hell she chooses to sing about. And the emotional range her voice is capable of is stunning. As Jordan sings: "She was young, she was old, she was tall, with extraordinary grace..." I think the same is true of Shiela Jordan. That she has had to sell her body and soul as a typist in order to earn a living is nothing less than shameful. But the suffering of the obscure jazz genius is a cliché, no?

The opening of side two is a reminder of the wonderful instrumental support behind Jordan. "In the Fall" opens the side with a busy and finely crafted drum solo by Bob Moses. His cymbal work is always delicate and feelingful. Liebman's sax lovingly echoes Jordan's vocal style while Swallow's bass line is propulsive. "Ice Cream" has Jordan introducing some welcome humor into the session with a flip and wry lyric followed by a challenging Kuhn solo. Listen with

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care to Kuhn and the name "Tristano" might come to mind. Kuhn is well on his way to becoming that original a stylist on keyboards.

Eicher's production is pluperfect. Very spacious and sumptuous sound prevails throughout. The record packaging is both attractive and useful. Creeley's lyrics are printed on both album cover sides (not that you'd want to try to sing along).

"Home is where the heart is" is an old cliché, but I'm certain that if you listen to *Home* it will remind you where your own true home resides—slightly to the left of your breastbone. N.W.

**THE TONY RICE UNIT: *Mar West*.** [Anthony Rice, producer; Bill Wolf, engineer; recorded at 1750 Arch Studio, Berkeley, Ca.] Rounder Records 0125.

Performance: **Bursting with gypsy passion and speed**  
Recording: **Bright and well separated**

Cross the very best, driving country bluegrass band with a swinging acoustic jazz group and the result is what Tony Rice calls "Spacegrass." Rice, along with former partner David Grisman, is an outstanding practitioner of this genre-crossing music that is only now, in the 80's, beginning to draw a wide public. The marriage of bluegrass instrumentation (mandolin, acoustic guitar, bass and violin) with jazz is not quite the anomaly we might first believe it to be if we remember the music Stephane Grappelli and Django Reinhardt created in Paris during the 30's. If you believe in the migration of the soul after bodily death, perhaps Grappelli and Reinhardt briefly inhabited the forms of Flatt and Scruggs before materializing in our time as "The Tony Rice Unit." If so, let's hear it for reincarnation.

*Mar West* consists of eight instrumentals (seven are Rice originals, one is a Miles Davis cover) performed by a four-piece band possessing stunning versatility. Tony Rice flatpicks his old Martin D-28 with a speedy inventiveness and swing that leaves me literally breathless. Sam Bush shares the honors on mandolin with Mike Marshall and both extend the musical vocabulary of that traditional country instrument by light years. Richard Greene (formerly of Seatrain and Loggins and Messina) plays violin with taste and

authority. The bass work of Todd Phillips is solid (though I wish they gave him some room to spread his wings and solo). The total cooperative effort of these four working together is a joy to listen to. Individual egos are held in check. These are pros who actually seem to listen to each other with respect and sensitivity.

The opening cut, "Mar West," sets the tone of much of the session. It's a rousing blending of melodic improvisation by Rice, Bush, and Greene, performed at a breakneck pace. Quick tempos dominate the recording, though two exceptions are worth noting. "Waltz for Indira" is a relaxed and laid-back song while "Whoa Baby, Every Day I Wake Up With the Blues" is a bluesy change of pace featuring positively sultry violin riffs by Greene. Every cut on the album is eminently musical. I would, with some difficulty, single out "Neon Tetra" as my favorite. Composed while Rice was a member of David Grisman's group, "Neon Tetra" moves with a ferocious energy. These guys with their unamplified country instruments can outplay dozens of "fusion" bands with their truckloads of synthesizers. This is

a young band (Rice is 29) and I expect even greater surprises in their future releases.

The recorded sound is bright and warm. The channel separation (a touchy issue when working with guitar and mandolin in such interlocking melodies) is clear. I have only a single complaint: I would have appreciated a little more bass clarity in the final mix. Poor Todd Phillips. He's given no space during the session to be in the limelight and then gets slightly lost in the mix. From what I have heard of his playing, he very much deserves to be heard more extensively in the future.

Many jazz fans shudder at the thought of having to listen to country music. If *Mar West* doesn't change their attitude, nothing ever will. N.W.

**McCOY TYNER: *4x4*.** [Orrin Keepnews, producer; Rudy Van Gelder, engineer; recorded and mixed at Van Gelder Studios, Hackensack, New Jersey.] Milestone M-55007.

Performance: **Boils then simmers**  
Recording: **Versatile and steady**

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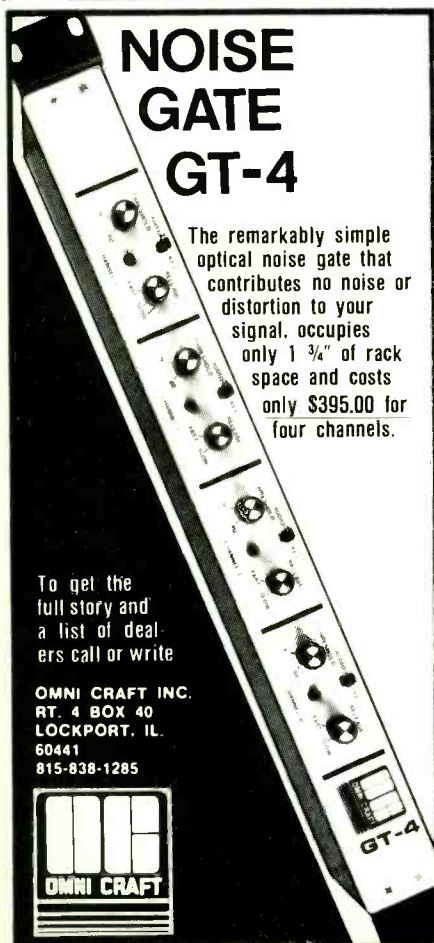
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## A PERENNIALY HOT FIDDLER AND THE ONLIEST "BAGS"

By Nat Hentoff

Max Roach was telling me recently that one of the benefits of jazz was that it keeps its players young. "Because you have to challenge yourself every night," he said, "you've got to stay resilient, always ready for the unexpected." A prime illustration of Max's point is Stephane Grappelli, now in his early 70's and playing with a zest and keen appetite for surprise that makes him sound decades younger.

In *Stephane Grappelli at the Winery* (Concord), the crisply swinging violinist is heard "live" with two guitars and bass in a set that ranges from Stevie Wonder's "You Are the Sunshine of My Life" to a vintage collaboration between Grappelli and Django Reinhardt, "Minor Swing." Throughout, Grappelli is ceaselessly inventive, and the continuous stream of ideas flows with a naturalness, an exuberance, and a sheer delight in improvising that makes this one of the most truly spontaneous jazz albums in months. Add too the strength and mellowness of Grappelli's sound, and you have the complete jazz violinist, of whatever age.

Concord, once more, sets superior sound standards. On no other of his recordings has Grappelli sounded as "live," and that unforced vibrancy of sound is also heard in the playing of his colleagues. Indeed, you can revel in this just for the beauty of the sound—even if the music weren't as compelling as it is.

The dividend of youth that jazz bestows on its players is also very much evident in Milt Jackson's *Night Mist* (Pablo). Still the pre-

eminent vibist in jazz, Bags (as Jackson is called by his colleagues) never sounds—here or anywhere else—in the least jaded. The conception, the sound, the pulse—all are fresh, each time.

This date, however, is even more invigorating than Bags' previous albums for Pablo, because Norman Granz has assembled a band of powerful individualists who so dig each other that they create an often intoxicating collective—as well as solo—momentum. Among those vividly present are: Eddie "Cleanhead" Vinson on alto; the huge-toned Eddie "Lockjaw" Davis on tenor; Harry "Sweets" Edison, trumpet; and a rhythm section of Ray Brown (bass), Art Hillery (piano), and Larance Marable (drums).

All the tracks are blues-laced, though not necessarily precisely the blues in form. Like all jazz masters, these players find endlessly new dimensions in this, the most basic, common language of jazz.

As for the engineering, having heard just about every Pablo record, I would nominate this as the most exciting, wide-ranging, reproduction of the full-scale sounds of the jazz experience yet to be achieved on this label. The one word is—exhilarating.

**STEPHANE GRAPPELLI:** *At the Winery*. [Carl E. Jefferson, producer; Phil Edwards, engineer.] Concord Jazz CJ-139.

**MILT JACKSON:** *Night Mist*. [Norman Granz, producer; Arne Frager, engineer.] Pablo D2312124.

After several experimental tries—and some misses—at expanding into new choral and orchestral areas, McCoy Tyner seems to be back on track with the kind of music he does best: Jazz at full boil. *Horizon*, released early in 1980 using Tyner's working band, and now *4x4* both demonstrate a return to essentials, with only a few exceptions.

*4x4* is not as relentlessly propulsive as *Horizon*, which was quintessential Tyner in league with reedmen George Adams and Joe Ford, violinist John Blake, and a rhythm section of Al Foster (drums), Charles Fambrough (bass), and Guilherme Franco (percussion). But *4x4* does manage to hold a thread of consistency through four sides of notably diverse quartet music with four different artists. Using Cecil McBee (bass) and Al Foster (drums) as his very solid foundation, Tyner invites one extra guest for each side of this collection: trumpeter Freddie Hubbard, guitarist John Abercrombie, vibes great Bobby Hutcherson, and saxophonist Arthur Blythe.

Hubbard's opening side sets a pace that cannot be maintained for the duration of *4x4*. As a leader of bands himself, Hubbard has been suspect. But put him in front of a cooking jazz combo and he can still rip. "Inner Glimpse" (by Tyner) and "Paradox" (by McBee) are formidable progressions, with great soloing by both Freddie and McCoy, plus a motivated Foster and McBee. Even Hubbard's flugelhorn treatment of "Manha De Carnaval" sounds fresh and live.

The Abercrombie side spaces out as expected, diffusing some of Tyner's trio energy at times. But then again, the contrast of styles can be fascinating too. For one thing, Abercrombie plays not guitar, but electric mandolin on his own "Backward Glimpse," and Tyner's "Forbidden Land," both about ten minutes in development. His haunting lines sometimes crisscross the trio's latent energy like earth tones atop a molten pool, flexing with an often unseen magma. But we've heard both artists in even hotter settings.

Hutcherson is in fine form, but side three of *4x4* is perhaps the least dynamic. Tyner's piano seems to lose a bit of its edge by comping for the mellower-toned vibes, and Hutcherson sounds better when bouncing ideas off of a horn. His own "I Wanna Stand Over There" and Tyner's "The Seeker"

are interesting compositions, but they'd work even better with other instrumental pairings.

On side four, Arthur Blythe takes his alto sax through some paces on McCoy's "Blues in the Minor," then settles into "the tradition" (as one of his recent albums called it) by covering two old standards, "Stay As Sweet As You Are" and "It's You Or No One." The former loses some of the group's energy, while Blythe and Tyner both take off on momentarily exciting

tangents during "It's You Or No One." Still, Tyner's superb "Blues In The Minor" is a tough act to follow.

*4x4* does a relatively good job of turning a big name guest session into more than just another marketing ploy to sell records. The music may not always be nudging frontiers, but the quality is there, particularly on the more intense sides one and four with Hubbard and Blythe. Even the engineering sounds crisper when the music is really happening. R.H.

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## CLASSICAL

**STRAVINSKY: *Suite from The Firebird*; MUSSORGSKY: *Pictures at an Exhibition*.** Robin McCabe, pianist. [No producer or engineer listed; recorded at Vanguard's 23rd St. Recording Studio, New York, N.Y., October 1979.] Vanguard VSD 71264.

Performance: **Commanding and compelling**

Recording: **Full and vibrant piano sound**

The liner notes to this album proudly proclaim that this is the first year recording of the piano transcription of Stravinsky's *Firebird Suite*. Yet despite competition from the pianist heavyweights of the world, including Horowitz and Gilels, it is the Mussorgsky which most impresses this listener.

Ms. McCabe's tonal portraits are infinitely aided by the unfortunately anonymous engineer who has managed to capture the full sound of the instrument free of distortion. If a bit much is made of the heavy luxurious sound of the piano's lower register, well, that's a part of the recording business too. If you can get it down on disc, flaunt it.

About the age of this record: It's an unfortunate fact of life but relatively few albums of what categorizers like to call classical music are released in the same year they are recorded. In the pop field, there is a tendency to get the product out fast before popularity fades. In the concert field even the superstars (Rampal, Pavarotti, etc.) can be counted on to be around for awhile so there isn't as much imperative rushing to get the disc in the stores. More time and care can be taken with the editing and the mastering—thank heavens for that! More thought can go into the liner notes, and these are among the most thoughtful and intelligent and, for once, we are given some background on the artist as well as the composers and the history of the music.

Finally we come to the thorny question of Guido Agosti's piano reduction of the music from Stravinsky's *Firebird Suite*. First, let it be made clear that this transcription for piano includes only the Danse Infernale, Berceuse and Finale, something like

half the music included in the orchestral suites which Stravinsky extracted from his ballet score in 1910, 1919 and 1945. Secondly, this is orchestral music first and foremost. It is far easier to add orchestral colors to a series of piano pieces as Ravel did with great success to Mussorgsky's "Pictures" than to reduce music familiar in orchestral colorations to the limited hues of the piano. Agosti has not been successful in supplanting the listener's vivid memories of Stravinsky's genius of orchestration (one of Igor's most admirable talents) with the sounds available to him from the piano. True, Ravel's task was more easily accomplished since the orchestration enhanced, rather than reduced, the effect of the original work. However, it should be pointed out that in Ms. McCabe's hands the piano version of "Pictures" is a separate entity which owes nothing to the Ravel orchestration. Ms. McCabe does her best to make something memorable out of Agosti's truncated "Firebird" but I'm afraid that even she can't keep the sounds of Stravinsky's orchestra from intruding upon her interpretation. J.K.

**TREVOR PINNICK: *A Choice Collection of Lessons and Ayres*.** [Simon Lawman, producer; Bob Auger, engineer; recorded at St. Botolph's Church, Swyncombe, Oxfordshire, England, by CRD Records Ltd.] Vanguard VSD 71263.

**TREVOR PINNICK: *Plays Historic Instruments at the Victoria and Albert Museum*.** [Roy Cater and Simon Lawman, producers; Bob Auger, engineer; recorded at the Victoria and Albert Museum, London, England, by CRD Records Ltd.] Vanguard VSD 71272.

**BACH: *Concerto in E; Concerto in G*. MOZART: *Concerto in D after J.C. Bach*.** Trevor Pinnick, solo harpsichord, The English Concert, Trevor Pinnick, cond. [Simon Lawman and Roy Cater, producers; Bob Auger, engineer; recorded at the Church of St. George the Martyr by CRD Records Ltd.] Vanguard VSD 71265.

**VIVALDI: *Il Cimento dell'Armonia e dell'Inventione*.** Simon Standage, baroque violin. The English Concert, Trevor Pinnick, cond. [Simon Lawman, producer; Bob Auger,





engineer; recorded in England by CRD Records, Ltd.] Vanguard VSD 71257.

**VIVALDI: Concerto in D for Flute and String Orchestra.** Stephen Preston, baroque flute. The English Concert, Trevor Pinnick, cond. [Same production credits as above.] Vanguard VSD 71273.

**VIVALDI: Concerto in B Minor for Cello and String Orchestra.** Anthony Pleeth, baroque cello. The English Concert, Trevor Pinnick, cond. [Same production credits as above.] Vanguard VSD 71274.

Performances: **Authentic yet still musical and listenable**

Recordings: **Flawless**

Here, in half a dozen Vanguard LPs, is a strong argument in favor of the use of original instruments and original instrumentations in the performance of baroque (and pre-baroque) music. Too often such scholarship begets dreadful noises made by musicians whose only concern is authenticity on instruments which scratch and wheeze not quite in tune with our ears or with each other. This is not the case here. Musicality goes hand in hand with musicology in Trevor Pinnock's way of things. Still the first two LPs listed above may be a bit too much for the average listener. Unadorned harpsichord often is. By the time one gets to the C.P.E. Bach and Mozart Harpsichord Concerti the orchestra is there to add color. Even so, Pinnock's harpsichords (he plays several on these discs) and other keyboard instruments of early British origin are not the metallic clangy affairs that the Pleyel instrument on which Landowska recorded her famous version of Bach's "Well Tempered Clavier" for RCA was.

As far as this writer is concerned, the gem of these releases is the complete recording of Vivaldi's Opus 8. Too frequently all that is heard of this series of a dozen concerti for violin and orchestra is the famous *The Four Seasons*. Indeed that was the first item recorded (circa 1976) from Opus 8 by Pinnock and the English Concert with Simon Standage playing baroque violin. It was also issued here by Vanguard sometime before the balance of these recordings. Still, they are remarkably well matched and mated in sound and style showing a true dedica-

tion on the part of players and engineers alike.

This brings us to the thorny question of whether it is a viable performance idea to play baroque music on baroque instruments. Why not? That's what the audience heard when this music was first performed. On the other hand, who's to say what Vivaldi would have written had he had today's modern instruments. The fact is that he didn't have the modern violin so he wrote for the baroque violin. I'm willing to take the word of the producers, the players and the musicologists that this is what Vivaldi heard in his mind when he put Opus 8 down on paper and what he heard in actuality when he heard this music performed. It certainly has a different flavor from the modern interpretations and yet each, in its own way, has its special quality.

What is important is the recorded evidence of *Il Cimento Dell'Armonia E Dell'Invenzione*, even more so than *The Four Seasons*. That's not to say that there aren't other recordings available of these works. There are several; in fact, they go all the way from A for Felix Ayo to Z for Pinchas Zukerman. The C.P.E. Bach concerto is a fine example of the work of this member of the Bach family and the Mozart, although Mozart was not a baroque composer but a classic composer remembering his baroque roots, is fashioned after J.C. Bach.

The shorter and less momentous pieces by such names as Handel and Purcell as well as such lesser known composers as Maurice Green and William Croft have their charm and certainly belong in this in-depth covering of baroque music by English composers and those imported composers who were fashionable at the time. Of the two albums, I would tend to choose the one recorded at the Victoria and Albert Museum if only because of the interesting contrast between the two harpsichords used and the "Queen Elizabeth's Virginals."

CRD Records Limited, who originally recorded these LPs in England, and Vanguard who has issued them here, deserve much commendation for the sonic clarity of it all. I only wish recording dates had been furnished rather than having to guess at them from the copyright line on the album cover. The liner notes give ample history about the music, the musicians, and perhaps more important, those baroque instruments on which they perform. J.K.

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