ICD 08560
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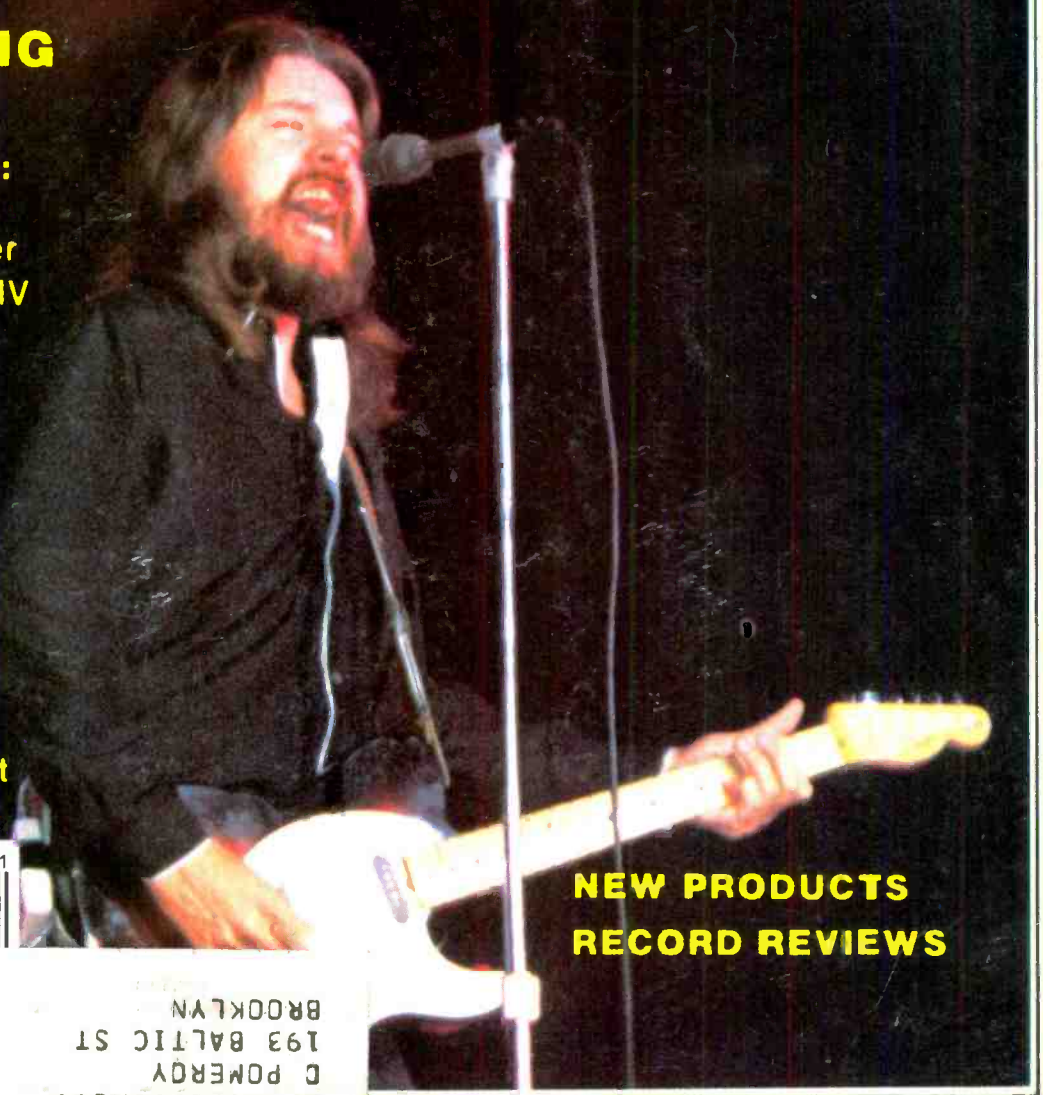
Profile: Guitarist Steve Khan

MODERN RECORDING & MUSIC

VOL. 6 NO. 4
JANUARY 1981

BOB SEGER 'LIVE!'



PRODUCING JINGLES

LAB REPORTS:
DOD R-830 Graphic Equalizer
Elec-Tec Ultima IV Noise Reducer
Neal-Ferrograph RTS-2 Recorder Test Set

HANDS-ON REPORT:
NEI Model 321 Crossover

NOTES:
Ibanez UE-400 Multi Effects Unit

NEW PRODUCTS
RECORD REVIEWS

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New realms of expression from MXR.

The Pitch Transposer is MXR's newest addition to our professional line. It is one of our most innovative products, and possibly the most revolutionary signal processor in the music industry today. It is a unique, high-quality unit which provides a cost effective and flexible package for today's creative artists.

The Pitch Transposer extends your musical boundaries by creating live instrumental and vocal harmonies. It has 4 presets which allow the artist to predetermine the intervals to be processed. Transposed intervals can be preset anywhere from an octave below to an octave above the original pitch. The chosen interval is activated by means of touch controls or a rugged footswitch. LED indicators display which of the four presets has been selected.

A mix control is provided, enabling the unit to be used in one input of a mixing console, or with musical instrument amplifiers. A regeneration control provides for the recirculation of processed signals, creating more and more notes, depending upon the selected interval. This results in multitudes of voices or instrumental chords. An entire new range of sound effects and musical textures, unattainable with any other type of signal processor, is suddenly at your fingertips.

With many other pitch transposition devices a splicing noise, or glitch, is present. The MXR Pitch Transposer renders these often offensive noises into a subtle vibrato which blends with the music, and is, in some cases, virtually inaudible. The result is a processed signal which is musical and usable.

We have been able to maintain a high level of sonic integrity in this most versatile signal processor. The frequency response of the processed signal is beyond 10 kHz, with a dynamic range exceeding 80 dB.

A micro computer based display option allows the user to read the created harmonic interval in terms of a pitch ratio, or as a musical interval (in half steps). This unique feature allows the pitch to be expressed in a language meaningful to both musicians and engineers.

We designed our Pitch Transposer as a practical musical tool for those actively involved in creative audio. It reflects our commitment to provide the highest quality signal processors with the features and performance that will satisfy the creative demands of today's musical artist. See your MXR dealer.

MXR Innovations, Inc., 740 Driving Park Ave., Rochester, New York 14613, (716) 254-2910

MXR Professional Products Group

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Get the Message?

We are the makers of **Studiomixer** and the message is *Totally Modular.* Before you ask, we'll answer. *Totally Modular* is a concept . . . our concept of how a mixing console should be built.

First, get our mainframe. Add to it as many input channels as you need, each one including such features as an overload input light, phantom powering, semi-parametric equalization, 2 effects and four monitor sends, a 100mm fader and many others. Then add as many output channels as you require for your application (up to 8 independent tape, 4 monitors, 2 effects and 2 master outputs), choose a VU meter section to meter the output section you select, and *go for it!*

If you want to start out small, we welcome you. Studiomixer can come in a version as small as 2x2x2. But from that small mixer can be built a 32X8X4X2X2! That's right, Studiomixer's output stage as well as its input is expandable. Which really makes us *Totally Modular.*

We think you will be surprised to find that beside being the most versatile mixer on the market through our *Totally Modular* concept, Studiomixer truly offers the *best* performance specifications of any mixer in its class . . . and, at the lowest price. How does $4,750 sound for a 16X8? That's right, 16 mic channels, 8 tape channels, 4 monitor and two effects sends, and 2 master channels. Unbelievable? Not any more!

To get the message, write to us for a free, illustrated brochure explaining our *Totally Modular* concept. We will also provide you with the name of your closest Studiomixer dealer. And, if you are as excited about *Totally Modular* as we are, then send us $4, your size and sex, and we'll send you postpaid a brochure *and* a Studiomixer *Totally Modular* T-shirt like we're wearing. Either way, you'll get the message.

For information on our products, please write to National Sales Manager, Amerimex Co., P.O. Box 55, Atwood, California, 92601 . . . or phone 714) 528-3360.

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For All Intensive Purposes

Flanging is a pretty intense effect. And probably the best thing about it is that properly controlled, it can be used in a lot of different musical applications. But if your experience with flanging has only been in mono, you've really only experienced half of the effect.

Presenting the next step, the Roland Stereo Flanger. The Roland Stereo Flanger is an effects device that will produce a myriad of time delay effects from classic flanging to chorus and doubling. But it doesn't just stop there. The addition of the second channel makes possible stereo panning in all modes, which dramatically intensifies the flanging effect, and makes it the most versatile time processor on the market.

The Stereo Flanger has four operating modes—three of which are used in flanging, the other being used for chorus and doubling effects. Each mode is indicated by an LED for constant monitoring. LEDs also indicate sweep rate and overload status. While in each of the time delay modes there is complete flexibility over the sweep width and depth, as well as manual delay control (from .5 to 20 ms.) and full regeneration capabilities.

The Roland Stereo Flanger is just one in a series of very special components in the system we call The Roland Rack. The Roland Rack system includes two instrument Pre-Amps (one for Guitar, one for Bass), two Stereo Power Amps, a Vocoder, Pitch to Voltage Synthesizer, the amazing Dimension D, a Digital Delay, and as we said before—the most versatile Flanger on the market.

But you don't have to take our word for it. See your Roland Dealer and find out what you've been missing.

Enclose $1 for a copy of the Roland Rack catalog.

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JANUARY 1981
VOL. 6 NO. 4

MODERN RECORDING & MUSIC

THE FEATURES

COMING NEXT ISSUE.
The Grateful Dead "Live!"
and On the Silver Screen!
The Electric Primer Returns—Part X

Cover Photo: Doug Hanewinckel
Seger Photos: Doug Hanewinckel
Khan Photo: Richard Laird

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LETTERS TO THE EDITOR

Adding Insult To (Possible) Injury

This will be a three part letter so please bear with us.

First things first. Have you in the past, or are you in the near future, going to do a session with the rock group Jethro Tull? If not, WHY NOT? Not only would the commentary on their musical style be interesting, but the problems faced by the technicians at Maison Rouge Studios in miking everything from the flute to a portative organ would make interesting reading.

Next comes the subject of equipment. We are interested in the variety of boards made by Carvin. We have been unable to obtain any positive or negative input about their quality or durability. A logical decision can not be reached until we have this information. If we don't hear from you soon we will be forced to forget the recording business and buy a bar.

The last segment concerns James Rupert. My future business partner and I have concluded that one of a number of things could have been to blame for his unnatural mental condition. They are:

1) He was dropped on his head when he was very small.
2) He is a frequent user of mind expanding drugs (We hope that this is not the case. dbx has not developed a mind compressor yet.).
3) Someone accidentally turned up the power while he was wearing his headphones which resulted in massive brain damage.

Your reply will be welcome.

—Guy H. Smith III and
—Robert "Sam" Desgrange,
Melbourne, FL

In answer to your first question, no, we have not done a session with Jethro Tull, but we will consider your suggestion. Their instrumentals are a bit off the beaten path, and would present some interesting recording situations.

As to your question about Carvin, we are doing an article on a Carvin board. It will appear in the February issue of MR&M, in the Hands-On Report, and will be on the Carvin MX 1202 mixing board.

Finally . . . we come to your speculations about the condition of James Rupert's mind. We have managed to get him to graciously reply:

I don't know how I have developed a monopoly on strange letters to reply to, but here goes, point by point.

1) No. I was not dropped on my head when I was very small. Those who have heard me sing however oftentimes claim that I must have been dropped on my throat.
2) No, I do not use any drugs, hard, soft or wash and wear. I have been known to smoke an occasional crayola, but only when I'm feeling "blue." (ouch!)

CIRCLE 104 ON READER SERVICE CARD →

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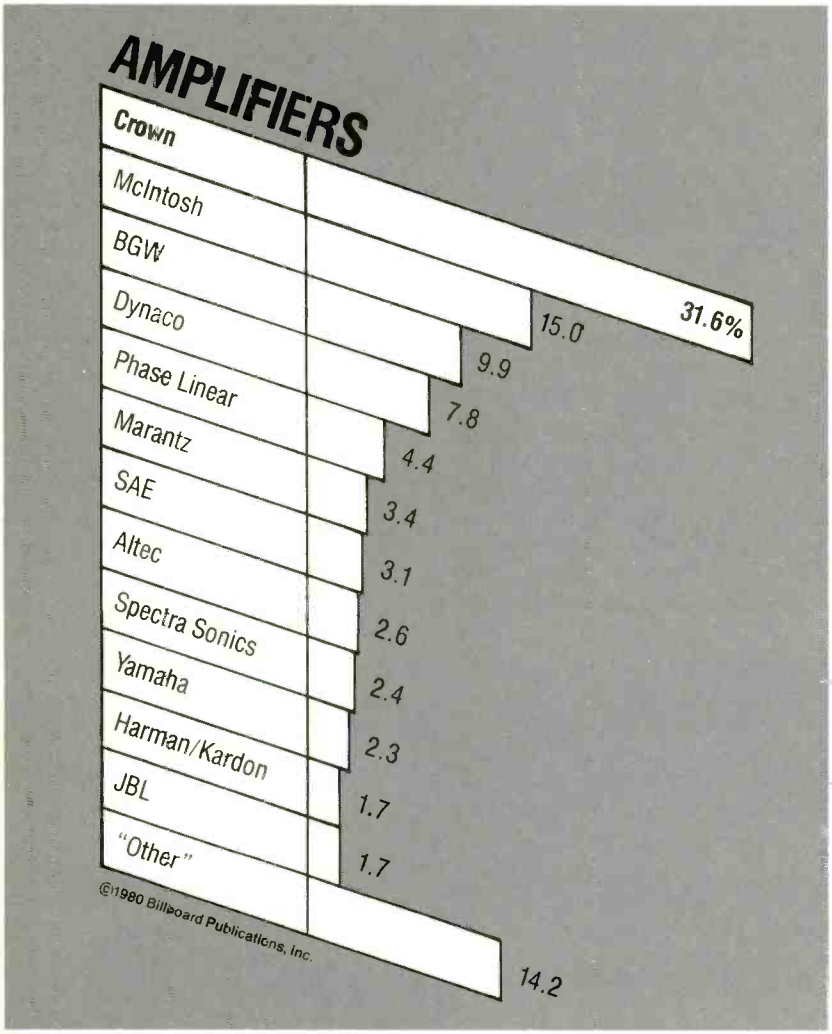
THANKS!



The 1980-81 BILLBOARD International Recording Equipment and Studio Directory again identifies Crown, for the fourth year in a row, as the first choice of US studios for monitor amplifiers.

To all the many professionals in the recording industry who made that happen, we say a heartfelt thanks.

We think we build very good amps, but your opinion is the final test. You have tested them all, and you have selected Crown.

You have also been exposed over the last few years to a large amount of promotion which tried to convince you that "Brand X" or "Brand Y" was the choice of professionals. We think the BILLBOARD numbers present our case much better than we could have ourselves.

You also need to know that we do not intend to rest on our laurels. We intend to maintain this leadership, with new amplifiers that will make the Crown choice even easier for you.

Cordially,

Ken Woodcox
Western Regional Manager

Howard King
Eastern Regional Manager

James S. Beattie
General Sales Manager

crown

1718 W. Mishawaka Rd., Elkhart, IN 46517.

Innovation. High Technology. American. That's Crown.

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3) Listen, I would like to assure everyone around that I am basically just your normal everyday guy, not unlike anyone else around. So I will disregard the crack about turning up the headphones and subsequent brain damage. Besides, a loud pair of headphones would not hurt me in the slightest because of the thick ear structure everyone from my planet has.

I was very glad to see Mr. Smith typed his letter and that whoever is responsible for him did not allow him to use anything as sharp as a pencil. I will look forward to seeing more funny comedy jokes from him printed on the back page of *Boy's Life*.

I hope this reply was welcome.

—James Rupert
Lincoln, NE

MR&M Anthology

I'd like to raise a suggestion. With the many requests you receive for back issues, it would be great to see an annual publication featuring all the articles written throughout the year every year so that people who had missed issues could obtain the "lost" information, which I'm sure is of great value. This could be done beginning with, naturally, your first year of publication. I believe another of your readers mentioned something similar a few months ago, so there are at least two of us. I realize that you have quite a job just getting out each issue every month, but I do hope that you can present such a publication. I feel sure that it would be greeted with the same enthusiasm as is your monthly magazine. How about asking your readers what they think? It would give an indication as to whether to go for it or leave it alone. By the way, I want to thank you for including the "Notes" column. I really enjoy it.

—Rick Weston
Perth, Australia

Your suggestion is a good one, and could be a thing of the future for us. We intend to compile, for example, Peter Weiss' "Electric Primer" articles. But for now, the Buyer's Guide is the closest approximation to what you're talking about that we've got. In it we reprint articles of the past that we think our readership would appreciate seeing again, or some, for the first time. And along with that there are, of course, all those fascinating specs and prices that get more and more tempting every year. So for now, in lieu of a more purely article-oriented issue, try our Buyer's Guide. It's published every winter at the low, low price of 2.95.

Wish They All Could Be California Schools

I would like to study Audio Engineering, but don't know of any technical schools and colleges that teach it. I've considered going to college and studying Electrical Engineering and then going into the music industry, but would rather go to a school that specifically teaches Audio Engineering. I plan to move to California in the near future and so would appreciate the names of some schools out there that teach Audio Engineering.

—Bob Sanford
Wadsworth, Ohio

Here is what we managed to come up with in California:

De-Essssss

The Orban 526A single-channel Dynamic Sibilance Controller is a *simple,* economical dedicated de-esser—without the complexity and compromises of multi-function processors. It sets up *fast* to produce sibilance levels that sound natural and right. Features include mic/line input, fully balanced input and output, LED level meter, GAIN control, compact size and more. Special level-tracking circuitry assures consistent results with varying input levels. And our control technique doesn't emphasize residual IM when de-essing occurs.

De-essing doesn't have to be complex, expensive, and time consuming. The 526A does it fast and *right* in recording studios, cinema, broadcast and cassette duplication.

The 526A De-Esser is available at your Orban pro-audio dealer.

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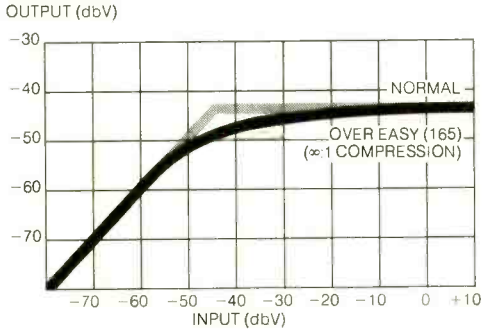
OUR COMPRESSORS GO OVER SO WELL BECAUSE THEY GO OVER SO EASY.

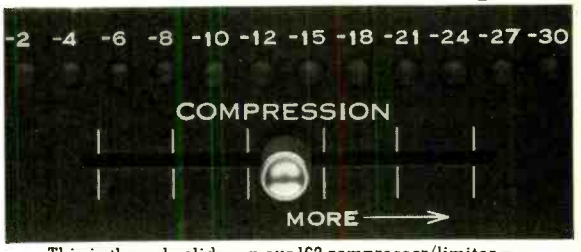


Hard knee compression vs. Over *Easy* compression. You can see the difference. But more important, you can hear it.

Cross the threshold on a dbx *Over Easy*® compressor and you'll never know it. Because our *Over Easy* compression occurs gradually over a range of several dB. Which gives you the smoothest, most natural sound around. You never hear the compressor kick in. And the music never sounds choked.

But *Over Easy* compression is just one of the features you'll like about our compressor/limiters. In the dbx tradition, each of our compressors incorporates true RMS level detection, which closely simulates the response of the human ear for the smoothest, most natural sound you'll find. And feedforward gain reduction means absolute stability and distortion-free sound at any compression ratio. Even infinite compression.

With features like these, no wonder you find dbx compressors working for some of the most demanding engineers in the world.



This is the only slider on our 163 compressor/limiter – as you move it from left to right, the 163 automatically provides the proper balance of threshold level, compression ratio and output gain for each setting – which is why it's the simplest compressor you'll find. The 163 is available in two models – the single 163, and the RM 163, which incorporates a pair of 163's in an integrated rack mount unit.

dbx compressors. They go over easy. Which is why they go over big.

The dbx 165 is our top of the line, and it's as flexible as you want it to be. Attack and release rates can be adjusted manually or automatically. Both threshold and output levels are adjustable. And the 165 can be strapped for stereo, with a front panel master/slave switch for easy operation.

For more information, write Professional Products Division, dbx, Inc. 71 Chapel St., Newton, Mass. 02195 U.S.A. Tel. (617) 964-3210. Telex: 92-2522. Distributed in Canada by BSR (Canada), Ltd., Rexdale, Ontario.

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229 Shipley St.
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(415) 546-6464
Basic studio engineering: 10 week program, 65 hours. Tuition $500. Record production: 8 week program, 50 hours. Tuition $425.

Orange Coast College
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Costa Mesa, CA 92626
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Santee, CA 92071
(714) 448-6000

AND

Los Angeles/Orange County, CA
United Audio Corporation (24-track)
1519 South Grand Ave.
Santa Ana, CA 92705
(714) 547-5466

Sherwood Oaks Experimental College
6353 Hollywood Blvd.
Hollywood, CA 90028
(213) 462-0669
Established 1972. Courses: Introduction to Record Engineering; Beginning Record Engineering Workshop; Intermediate Record Engineering Workshop; Advanced Record Engineering Workshop.

Sound Master Recording Engineer School
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University City, CA 91608
(213) 650-8000
Record Engineering Program. 1-year certificate program. Tuition $4,090.

University of Sound Arts
6671 Sunset Blvd., Suite 1508
Los Angeles, CA 90029
(213) 467-5256

AND

Laguna Beach location:
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CIRCLE 41 ON READER SERVICE CARD

I'd Rather Do It Myself

Three years ago I took my songs and my savings to a small studio in California. I came back home to Colorado both burnt and broke by several thousand dollars. After what I saw in that small studio I reasoned that I could build my own studio for the same amount of money that I lost out there in California. Working hard to build my savings, I've added one Teac unit after another along with other electronic equipment that I thought I would need. My biggest problem is that I can't find anyone who really knows *what* I need and how

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FEATURES:

PITCH CHANGE
up to one octave above or below the original signal

DELAY
31 steps between 0 and 270 milliseconds

REPEAT
a short word or riff

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an entirely new effect, previously available only in our studio quality unit

MIX CONTROL
gives the desired balance between dry and effect signal, making a mixing console unnecessary

FEEDBACK CONTROL
varies the amount of signal fed back to the input, for a variety of wild effects

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SPECIFICATIONS

Pitch change - one octave up, one down
Dynamic range - 80 dB
Power consumption - 2 watts
Weight - 3 lbs.
Delay - up to 270 ms
Frequency response - 10 kHz
Voltage - 115 V (230 V available abroad)
Size - 10½" x 8¼" x 2¼"

Low and high level inputs and outputs - may be connected directly to most instruments and amplifiers.
Pitch ratio and Repeat may be controlled by foot switches

"Harmonizer" is Eventide's brand name for a special effects device including pitch change.

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to connect it all. I haven't found books that explain it all either. My objective is to produce an LP for local sales. I know it won't be state-of-the art, but it will be what I can afford. My equipment consists of the following: a Teac 3340, Model #2 Board, dbx model 119 expander/compressor, Audio Pulse time delay, an EQ, a Spectro Acoustics amplifier, and a mic mixer with reverb, which I want to send through a Dolby noise reduction unit into a Teac 3300 half track machine for final mix. I intend to expand to the Tascam 8 track in time as I can afford it and understand it. Can you tell me what I've got and what I need?

—Gary Mosier
Longmont, CO

Without getting too philosophical (There's a song out now, isn't there, with the lyrics "... all I need is what you've got..." Oh well), I think your best chances are to hunt down colleges in your area that give courses in audio engineering and recording techniques. You are bound to find some helpful people who could advise you as to how to proceed. The other thing you could do is a bit of library research. I can suggest a few sources: The Recording Studio Handbook, *published by Sagamore Publishing Company, Plainview, N.Y. 1976;* How to Build a Small Budget Recording Studio from Scratch, *by F. Alton Everest, published by Tab Books, Blue Ridge Summit, Pennsylvania 17214; and* How to Make and Sell Your Own Record *by Diana Sward Rappaport, published by Quick Fox, New York, 1979. The last mentioned book will give you a good idea of the equipment used in studios, and you can use that as a bit of a guideline. The bibliographies of these books will lead you to more trails of information, hopefully. Good luck!*

The Affordable Pro-Mixer by Carvin

No one can match the quality and features now offered in the new CARVIN MX Series Pro Board at our low price! Features like —

- **Professional V.U. Meters with on-board calibration controls**
- **5 Balanced Outputs for, A-B Stereo, Monitors 1 & 2, and Mono A + B**
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- **On-board Phantom Power + 48V for condenser mics**
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- **Optional 9 Band Graphic EQ for main outputs or reassignment to channels**
- **Available in 12 or 16 channel models**

More important than features, you are buying quality! All wiring is done with a military type wiring harness. The steel chassis is precision formed and assembled in a modular fashion designed to eliminate strong RF fields. All P.C. Boards are super strong G-10 epoxy fiberglass. All components are securely anchored. If the board is dropped, it's still going to work.

All components used are of the highest quality obtainable like — Switchcraft connectors, Centralab switches, CTS sealed controls, low noise high slew rate Op-Amps and Discrete amplifiers. Even the sides are 1" thick solid Walnut. The entire board is backed by a 1 YEAR Warranty.

The MX board has proven itself on numerous concert tours. It's been put to the test by professionals and they are raving about its performance.

The best part are the factory prices that won't leave you broke. We currently sell the 12 Ch MX1202 for $1095 and the 16 Ch MX1602 for $1495. (Add $250 for the optional Four 9 Band EQ). Road cases by Anvil™ are available at $195 and $215 respectively.

You are probably asking "How do we do it for the price?" It's simple. We build and sell direct to you without any retail markup or commission.

Write for your FREE 64 page Color Catalog or Call TOLL-FREE 800-854-2235 (714-747-1710 in CA) for more information or to place your order. Use your Master Charge or VISA as a deposit and the balance will be shipped C.O.D. As always, if within 10 days you are not 100% satisfied, your money will be refunded.

Carvin Dept MR-32, 1155 Industrial Ave., Escondido, CA 92025

CIRCLE 85 ON READER SERVICE CARD

Patrician Cabinets

I would like to acquire some plans on some Electro-Voice Patrician speaker cabinets. As they were in production way back in the early 1960s, it is extremely hard to find anyone who has even heard of them. This might be due to the invasion of so many Japanese products on the market. If you could possibly help me with this problem, I would be greatly appreciative! I have even tried writing directly to Electro-Voice themselves, and I don't even manage to get past the front office secretary. So, I hope someone, somewhere can help me out on this.

—Greg Anderson
Wadena, MN

Never fear. There is someone out there who can help. What we recommend you do is phone or write to Electro-Voice West, the western offices of the Electro-Voice that you called. Their western offices are located at: 7473 Avenue 304, Visalia, California. (Address the letter to Electro-Voice West. Their phone number is: 209-625-1330, should you decide to call.) The person we spoke to at Electro-Voice explained that Electro-Voice West does not build the speaker cabinets any longer, but that they will send out the plans for them. Supposedly there are people out there with information on both the older components of the Patrician and the newer components. Yes, the name Patrician is still used. And we were told that someone out there in sunny California still makes cabinets for Electro-Voice. But to get the scoop, we suggest that you speak to Electro-Voice West directly. Good luck.

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GOLLEHON

At $299, suggested list price*, the new S2E from Gollehon is undoubtedly the best speaker value you'll find anywhere!

Gollehon qualifies as an affordable price for PA applications, keyboard reinforcement, on-stage monitoring, or playback evaluation. The S2E does it all!

Most important, there's absolutely no compromise in the cabinet's integrity or the choice of components to meet the price. The S2E incorporates the exact same woofer, horn, driver and crossover as found in higher priced Gollehon systems, and the same solid-core PLYWOOD construction.

A Gollehon 2112 12-inch woofer in the vented enclosure offers solid bottom-end response and clearly defined mid-range frequencies. The woofer can handle large amounts of power effortlessly and without distortion.

A high-temperature voice coil, strong cloth-edge diaphragm, and high-flux 60 oz. ceramic magnet provide greater control of cone acceleration and protection from electrical or mechanical failure.

The 4690 high-frequency horn/driver combination now features a Kapton[1] voice coil using a new material that can handle temperatures as high as 700°F. Wide-angle, constant level dispersion insures uniform coverage in front, at the back, and to the sides. Your audience hears you perfectly, all the frequencies...and that's important!

Solid-core plywood and tough fiberglass resin distinguish the S2E from vinyl covered particle board cabinets usually built for a beginner's PA. The S2E's plywood panels provide ten times the dimensional strength of cheaper particle board by virtue of its laminations and cross-graining.

Power handling of the S2E is 125 watts RMS, a true rating not to confuse or mislead the user. Impedance is 8 ohms. Sensitivity is 100 dB, 1 watt at 1 meter for high efficiency. Dimensions are 25" high, 20" wide, and 13" deep.

Lifting the speaker is a delight! It's only 35 lbs!

If you've been waiting to purchase new sound reinforcement equipment in the professional market, get ready. The new S2E from Gollehon really delivers!

Write or call for product information and list of Gollehon dealers. Gollehon Industries, 2431 Clyde Park, S.W., Grand Rapids, MI 49509, 616—247-8231
in Canada: 5980 Westbury, Ave., Montreal, Quebec H3W 2W9; *prices optional with dealers, higher in Canada.

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Dollar for dollar and spec for spec this is the best buy in an 8-track multi-channel recording rig. Period. The 80-8 is the most popular 8-track in the world, and the results produced on it are a matter of record. Sometimes gold. The Model-5B with new IC's and color coded knobs. is the perfect companion mixer. Together, you'll have the most functional, economical 8-track hardware package you can buy.

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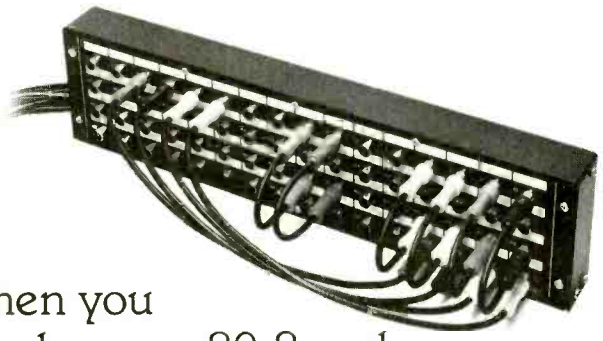
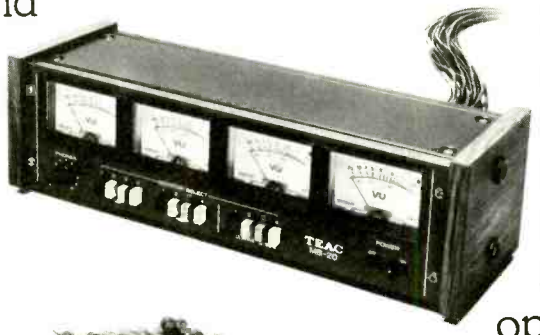
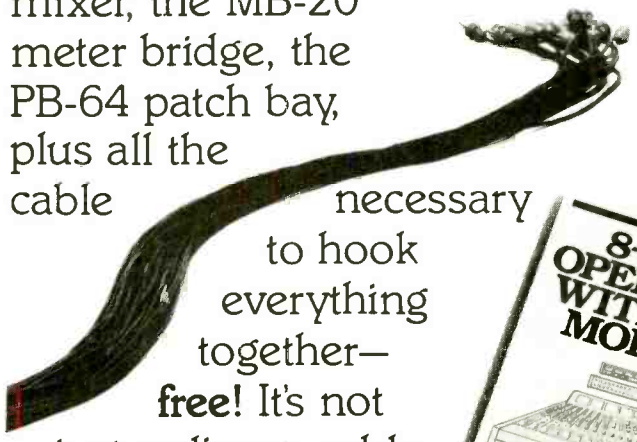
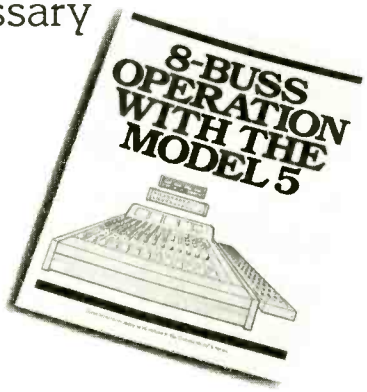


When you purchase an 80-8 and Model-5B, between January 1, 1981 and April 30, 1981, you get the Model-1 monitor mixer, the MB-20 meter bridge, the PB-64 patch bay, plus all the cable necessary to hook everything together—**free!** It's not just ordinary cable, either—it's TEAC's exclusive low capacitance cable—the same high quality cable recommended for all Tascam Series systems interface.







Be sure to contact us or your Tascam Series dealer for details on this special limited offer. He'll show you the 8-buss operation brochure we prepared that takes you step-by-step through the most flexible, functional and economical 8-track recording system available. Now, more than ever, patchwork pays off.

GET MORE THAN $800 WORTH OF GEAR -- FREE!

TASCAM STUDIO SERIES

TEAC Production Products Group

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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.*

Strange Bedpersons: Pro vs. Semi-Pro Gear

Van Webster's response in the August 1980 Talkback column was very enlightening (see "The Confusing Question of Comfortable Curves," page 16). He mentioned that some home and semi-pro recorders lack a low-frequency equalizer to compensate for "hyperbolic head bump," a rise in response at the lower frequencies.

I have two excellent semi-pro 4-track machines (Dokorder 1140 and a Teac A-3440), and first generation recordings sound fine. In fact, that low-end rise comes across as a kind of "loudness" compensation. But where I run into trouble is unfortunately in what I do a lot of: multiple recordings (transfers from one machine to the other machine for three, maybe even four, generations). By the end of a few generations, that low-end boost has increased way out of proportion resulting in an extremely boomy, bassy sound. Anyway, my question is this: In these machines costing well over a $1,000, why don't manufacturers provide for low-frequency EQ? Is it really that cost-prohibitive, considering the much improved performance that would result?

—No name
Fargo, N.D.

First, let me say that I believe the definition of "pro" gear to be gear in the hands of a pro. This belief seems to be increasingly supported by others close to me in the audio industry who have of late noticed a burgeoning amount of gear with RCA connectors—everything from graphics to digital delays—finding its way into commercial sound installations because of superior performance or specific facility. Some of the gear designed by manufacturers of "Hi-Fi," will by its nature, be unique with respect to function, having no generic equivalent in the "balanced, +4" world. Some of the gear with RCA jacks *sounds* much better or has lower distortion or is more transparent or has better specs or whatever, and just seems to be the only way to achieve the desired results in a given system. Sometimes we forsake reliability for more esoteric qualities, e.g., high slew rate or high power, qualities that do not make the kind of device that can be mounted in a rack, in an airport, be left running 24 hours a day for 20 years, and be taken for granted. Sometimes we forego certain conveniences in favor of lower cost, i.e., low frequency EQ in a tape deck that costs a tenth of the price of a large commercial deck with roughly equivalent electrical performance, like a Teac A3440.

This phenomenon presents some interesting situations albeit perplexing. Clearly the consumer-oriented piece of gear being used by a "pro" will seem to suffer seriously in the area of user serviceability, given the fact that most items of this type are under-documented and generally don't include adjusting hardware designed for frequent use. The Catch-22 here is that if large-scale documentation and user-adjustable controls were to be included in mass market, consumer-oriented products, technological chaos of cosmic proportions would be unleashed upon those of us who people the telephones and typewriters toward aiding the novice-in-distress, not to mention the poor stereo-store salespeople.

Let us for a moment mentally eschew distinction between "pro" and any other label we may choose to describe gear without 3-pin connectors, and +4 dBM output and ponder another germane concept: If a manufacturer is able to supply a wide and diverse market, with widely varying technological competence, with products which that market has literally demanded and, in effect, designed, then should not that manufacturer build the product to be as useful as possible to the largest cross-section of consumers and, at the same time, try to keep the inevitable learning curve and confusion involved with the product's use to a minimum?

The cost of a particular item, especially technical hardware, is not always obvious; that is to say, the purchase price in dollars isn't the only cost involved with the use of that hardware. It is always up to the user to determine the efficacy of a tool used to work a specific type of material, whether that material be wood, metal, plastic, or music. Twenty years ago, when there were no consumers with multi-track studios at home, there was no need for schools offering recording courses. Now such schools proliferate, and just to be a modern musician, one must know a variety of disciplines that impinge upon the art without regard for one's technical aptitude. If we choose to put music on tape at home we will pay a price either for convenience, or for ignorance.

Teac has for years striven for the largest market and, by all accounts,

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been successful in providing a product that enables people to enjoy the benefits of multi-track recording without hiring an engineer or going broke doing so. The result is that multi-track recording is now in the hands of 100,000 *plus* people who might not have otherwise had the opportunity to use it. This has had a noticeable effect on popular music and the industry that grew up around it—recording. The fact that so many musicians now own or use home multi-track rigs, has had a codifying effect on the recording process itself, the music business being eclectic as it is. One well-known group, The Doobie Brothers, even uses Tascam 8-tracks to mail rehearsal tapes back and forth, each member contributing his part to the tape, so that they need not travel or waste time rehearsing while being able to reside in different areas of the country!

It's not hard to imagine how much technology has influenced music, and it's certainly not hard to find evidence of technological change and progress all around us. If you look at your TV set or microwave oven today, you will probably find a microprocessor inside. The trend toward computerization is pervasive, even most of the electronics in music are incorporating these new devices. What does this mean in terms of the consumer? It means that we will either have to study computers and electronics and all become the equivalent of today's electronic engineer, or we will have to use the gear they design for us and leave its repair and adjustment to professionals. Even now the test gear required to measure the electrical parameters and perform basic maintenance on so-called "semi-pro" tape decks costs many times what the tape deck costs, and as the public demands better specs, the cost of the test equipment needed to R&D new products increases.

All this may seem a bit long-winded as far as an answer to the question about EQ, but a little background never hurts. You should visit a dozen or so of the larger commercial studios here in California, where you'd see thousands of engineer-hours per week being used to adjust and maintain tape machines and adjunct electronics. (A typical salary for a studio maintenance engineer here is between 400 and 600 dollars per week.) I have handled 2" reels of tape (masters) that were in-

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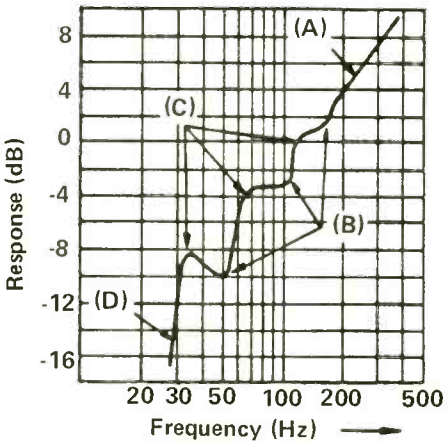
sured for $250,000 and I can tell you that the world of home recording and the world of "pro" are two different worlds on that level. Now here lies a paradox: Any tape, made in any garage, may just be a platinum record tomorrow, witness Herb Alpert.

I don't want to sound platitudinous, but it's a poor worker that blames his tools, and if an individual *has* the technical skill, he will find a way to get results from less than perfect tools. Tools and tape decks never have been perfect and never will be. It's very hard for the artist to tell the engineer, in terms both understand, what the artist needs to alleviate some nameless frustration, and so creativity takes over and the artist becomes the engineer. Communication is thus dispensed with.

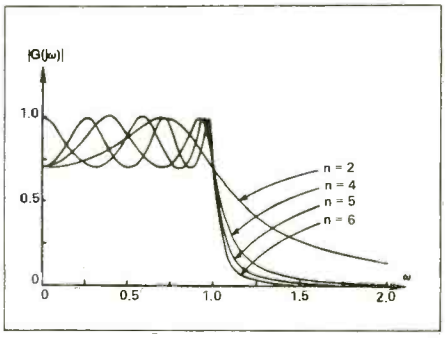
So far the metamorphoses of thousands of musicians have been fairly painless due in large part to the fact that manufacturers of equipment have done a good job of making the right assumptions about the technical propensity of the musicians/consumers that buy the equipment. As an engineer, I can say that we do our best to anticipate the needs and questions of the user. As a musician, I can say that some of the tape and electronic equipment available today is a miracle, when viewed in the context of prices and progress over the last twenty years.

Head bump is caused by wavelength anomalies and tape head geometry. It is not a simple filter function like a "bump"—if it were, a simple band reject filter could be used to alleviate it. *All* tape heads suffer this phenomenon and to correct it a complex High-Order Chebychev filter must be designed specifically for the individual head type and geometry. The manufacturers who make the commercial tape decks use relatively few types of heads in comparison with mass-market producers of decks, and so the investment in engineering time is more easily amortized into the cost of their high-priced equipment.

One method of dealing inexpensively with "bump" is the use of graphic equalizers. Placed in the recording chain in the appropriate places, good results can usually be achieved without large errors. The use of a 'scope and a sweep oscillator will facilitate easy alignment to the closest approximation possible with the deck and equalizer you are using. If you are a bit more adroit with math and electronics, a filter or set of filters can



Typical low-end head response.



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IS YOUR TAPE ERASING ITSELF EVERY TIME YOU PLAY IT?

If lately your favorite recordings sound like they're gradually unrecording, it could be the tape they're on.

You see the oxide particles on some tapes just aren't bound on very well. And when the oxide particles come off, your music could come off sounding faded and weak.

Maxell, however, has developed a unique binding process that helps stop those oxide particles from taking a hike. We also polish our tape to a mirror finish to reduce friction, the major cause of oxide shedding.

So with Maxell, even if you play a tape over and over, the music won't disappear before your very ears.

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2 *One of a Series*
The Apt 1 Amplifier

In this series we will discuss various aspects of design which vitally affect the versatility and sound quality of power amplifiers.

What is the ideal studio power amplifier? If your thinking goes like ours, such an amplifier combines demonstrably better sound with high reliability and ruggedness. Until now, such characteristics seemed mutually exclusive: "reliable" amplifiers often did not sound right because their elaborate protection circuits degraded performance when driving real-world loudspeaker loads.

Apt research found one reason for this was the often overlooked interaction between volt-ampere limiters and loudspeakers. For example, say that current is flowing out of the amplifier into an inductive loudspeaker load. Further, that the amplifier's limiter circuit is triggered by the combination of voltage and current across the output stage. Such a limiter circuit then robs the output stage of drive, putting the amplifier up against a law of nature: the current into an inductor *must* continue to flow, and the limiter is trying to prevent that. The result is large, tweeter-destroying voltage spikes.

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☐ For a set of power amp papers, please send $2 ($3 foreign).

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apt 1-2 *MR 1/81*

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be constructed for outboard use with less expensive decks, again based upon the response of the specific unit, and the sweep method is an excellent one for breadboarding.

Necessity breeds strange bedpersons, and the serious recordist will find much of a technical nature to be occupied with. I am still learning and hope to continue learning—that is what makes better music and sound.

—Drew Daniels
Technical Specialist and
Applications Engineer
Teac Corp. of America
Montebello, Ca.

The Ins and Outs of Studio Life

I have a small, 4-track recording studio. My equipment includes a Tascam Model 5 board, a Dokorder 8140 reel-to-reel, a Pioneer RT-1020 reel-to-reel, a Tandberg 9000X reel-to-reel, a Kenwood KX 910 cassette recorder, and MXR Auto-flanger, a Roland Space Echo, Tapco and Biamp equalizers and a Yamaha P-2200 power amplifier. My problem *was* that I had no patchbay for the studio; now my problem *is* that I have acquired a 48-input Switchcraft patchbay with T-332A input jacks and I have no idea how to hook it up! Can you point me in the right direction?

—Steve Brown
Mankato, Minn.

The patchbay and mixing console comprise the heartbeat of a modern recording studio. The patchbay, in particular, provides great flexibility for interconnecting recording equipment and can be easily reconfigured as interface requirements change.

Basically, the patchbay makes available the input and output ports of various signal processing and record-

1. Console Out Ch. 1	2. dbx Rec. In Ch. 1	3. dbx Rec. Out Ch. 1	4. 4 tr. In Ch. 1
5. 4 tr. Out Ch. 1	6. dbx Play In Ch. 1	7. dbx Play Out Ch. 1	8. Console In Ch. 1
9. Console Line Out Ch. 1 (left)	10. 2 tr. In Ch. 1 (left)	11. 2 tr. Out Ch. 1 (left)	12. Console Line In Ch. 1 (left)
13. Echo 1 send	14. Echo 1 Return	15. Echo 2 Send	16. Echo 2 Return
17. Console Out Ch. 2	18. dbx Rec. In Ch. 2	19. dbx Rec. Out Ch. 2	20. 4 tr. In Ch. 2
21. 4 tr. Out Ch. 2	22. dbx Play In Ch. 2	23. dbx Play Out Ch. 2	24. Console In Ch. 2
25. Console Line Out Ch. 2 (right)	26. 2 tr. Out Ch. 2 (right)	27. 2 tr. Out Ch. 2 (right)	28. Console Line In Ch. 2 (right)
29. Reverb In	30. Reverb Out	31. Parametric Equalizer In	32. Parametric Equalizer Out
33. Console Out Ch. 3	34. dbx Rec. In Ch. 3	35. dbx Rec. Out Ch. 3	36. 4 tr. In Ch. 3
37. 4 tr. Out Ch. 3	38. dbx Play In Ch. 3	39. dbx Play Out Ch. 3	40. Console In Ch. 3
41. Monitor Send Left	42. Monitor Preamp In (left) Aux. 1	43. Phono Out (left)	44. Preamp In Aux. 2 (left)
45. Cassette Out (left)	46. Tape Play In (left)	47. Comp./Lim. In (left)	48. Comp./Lim. Out (left)
49. Console Out Ch. 4	50. dbx Rec. In. Ch. 4	51. dbx Rec. Out Ch. 4	52. 4 tr. In Ch. 4
53. 4 tr. Out Ch. 4	54. dbx Play In Ch. 4	55. dbx Play Out Ch. 4	56. Console In Ch. 4
57. Monitor Send (right)	58. Monitor Preamp In (right) Aux. 1	59. Phono Out (right)	60. Preamp In Aux. 2 (right)
61. Cassette Out (right)	62. Tape Play In (right)	63. Comp./Lim. In (right)	64. Comp./Lim. Out (right)

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JBL 4313 Studio Monitor.
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Introducing the 4313.

Flat frequency response. It means accuracy. Naturalness. Reality.

JBL gives it to you without the bigger box that you'd expect along with it, since the 4313 only measures about 23" x 14"x10"!

This new, compact professional monitor produces deep, distortion-free bass. And does it with a newly developed 10" driver. Its massive magnet structure and voice coil are equivalent to most 12" or 15" speakers. Yet it delivers heavy-duty power handling and a smoother transition to the midrange than most larger-cone speakers.

The 4313's edge-wound voice coil midrange accurately reproduces strong, natural vocals and powerful transients.

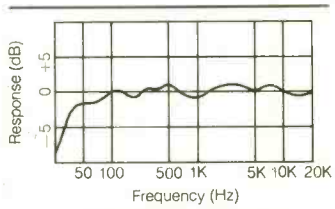
Up top, a dome radiator provides high acoustic output with extreme clarity and wide dispersion. A large 1" voice coil gives it the ruggedness needed in professional use.

Working together, these precision matched speakers offer superb stereo imaging, powerful sound levels and wide dynamic range.

Audition the 4313 soon.

We think you'll agree that its combination of flat response, power and moderate size flattens the competition.

Available in Canada through Gould Marketing, Montréal, Québec.



On-axis frequency response, 4313 monitor.

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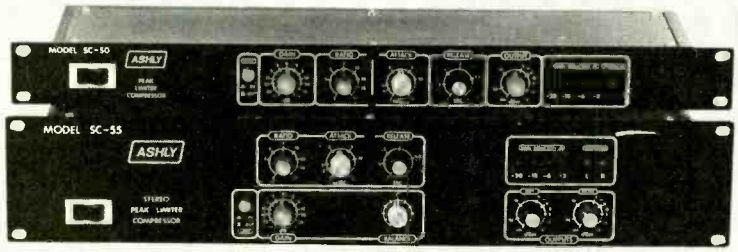
ASHLY HAS A LIMITER FOR YOU



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299 List

SC-55
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For loudness enhancement, clipping prevention, speaker protection, control of vocal levels, elimination of overmodulation, musical instrument sustain . . . Whatever your limiter application, check out the Ashly SC-50 (mono) or SC-55 (stereo) Peak Limiter-Compressors. You'll find incredible versatility, super packaging, and state-of-the-art design. You'll be amazed at the freedom from noise and distortion and the clean, transparent sound. Features like balanced inputs, stereo-tie connections, detector patch point, and high-current output stage are all standard. All this at a cost low enough to embarrass a lot of high-priced competition. Ashly limiters . . . clean, quiet, powerful control designed and built by people who still care about quality and reliability.

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ing units at one location. You convert them to standard mechanical connections (such as your type T-332A jack) so that they may be conveniently wired together in a multitude of series and/or parallel configurations. The wiring is implemented with short "jumper" wires or "patch cords" on the front panel of the patchbay. Signals may be brought into the patchbay directly from anywhere in the studio (from mic or pickup preamps, etc.) provided that 1.) they are single ended or "two conductor" signal lines, and 2.) that the signal levels and impedance match the processing requirements of your equipment. The signal may be taken from the console through any of the effects returns or the console line outputs.

The most important requirement in a patchbay set-up is the port map describing which of the 48 (in the case of your Switchcraft unit) ports are connected to the inputs and outputs of what equipment. A 4-track reel-to-reel unit, for example, will require 8 ports or 4-input and 4-output ports on the patchbay. It is often necessary to buy or build connector adaptors to convert the connection on the remote unit to the type connection required at the back of the patchbay (T-332A). It is good practice to label both ends of all interface cables as to what their function is also.

We recommend rack mounting your patchbay with as much of your equipment as possible to allow short, semi-permanent connections between these units and the patchbay ports. A short lead length helps to minimize any stray field pickup and the rack mount helps to keep your control room organized and movable.

Some equipment configurations may create secondary effects such as mismatched impedances, ground loops, signal amplitude incompatibilities, and noise problems. These require experience to identify with a port map and a verbal or functional block diagram of the signal processing to be accomplished it should be easy to interconnect the required equipment using the patchbay.

The diagram shows a possible patchbay setup similar to our own at The Last Recording Studio for your reference. This is a 64-point diagram, with noise reduction. Good luck!

—Mark Barnett and Doug Lerner
The Last Recording Studio
Boulder, Co.

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FINALLY!

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Phase Linear's dedication to audio excellence has just taken another leap forward. Introducing the Phase Linear Professional Series, designed specifically for the professional.

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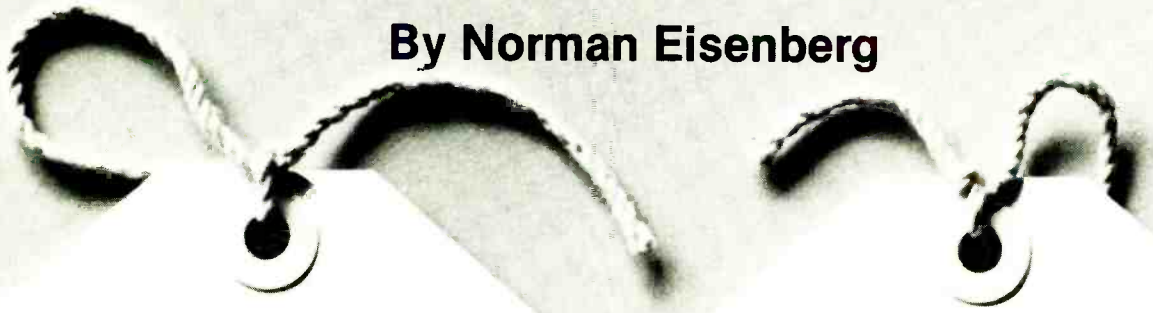
THE PRODUCT SCENE

By Norman Eisenberg



PRACTICE AMPLIFIER

Described as a practice amp/preamp is the Mini-Amp 650 from DOD Electronics. It employs a true complementary symmetry output amplifier for very high efficiency from its six "AA" batteries. It produces one-half watt RMS with only 2 ma of standby current. The unit has two 2½-inch ceramic speakers, a gain control for the input, a tone control and a master volume control. Complete with tilt-back legs and batteries, the model 650 sells for $89.95.

CIRCLE 4 ON READER SERVICE CARD

NEW SYNCON CONSOLE

The new Syncon Series B from Allen & Heath Brenell, Ltd. of London is a free-standing console totally modular in construction. The standard mainframe has a maximum capacity of twenty in/output modules, and comes complete with all necessary master and monitor functions as required by the latest multi-track recording techniques. Said to be ideal for 8, 16 or 24-track operation, the console can be expanded with no factory modifications to a 44/24 fully automated console, with comprehensive integral patchbay facilities.

CIRCLE 5 ON READER SERVICE CARD

AVAILABLE LITERATURE

Crown International has developed the "Audio Information Packet," containing over fifty pages of discussion and photographs on current audio theories and components. Claimed to be "an audio education in writing," the packet is available directly from Crown for $4.

CIRCLE 6 ON READER SERVICE CARD

Mura Corporation has prepared a 12-page catalogue of its audio products. The catalogue is available free from Mura.

CIRCLE 7 ON READER SERVICE CARD

Polyline Corporation, manufacturer of recording supplies, is offering its catalogue which highlights the company's expanded product line. The catalogue is available free from Polyline.

CIRCLE 8 ON READER SERVICE CARD

PORTABLE MIXING CONSOLE

Designed specifically for multi-track recording and sound reinforcement is a new series of AHB portable mixing consoles of which the 16:4:2 is the first to be announced by the British manufacturer Allen and Heath Brenell Ltd. The equipment is built directly into a heavy duty PFP flight case, with slip-on PFP cover and integral carrying handle. Features include 16 transformerless balanced XLR mic inputs/switchable ¼-inch jack-line inputs; 3-band sweepable EQ; 3 auxiliary channel sends; channel routing; long-travel 90 mm faders; 4 sub-group/XLR direct outputs; 2 XLR main outputs; 6 VU meters; talkback facilities; stereo tape monitor input; 2 routeable effects returns; auto PFL on all inputs, aux sends, sub-groups, main outputs and effects returns.

CIRCLE 9 ON READER SERVICE CARD

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"FREE LINE" AMPLIFIER

Dubbed the "Headroom Horseman" and described as so rugged that "You can run over (it) with a truck and it still won't stop working" is a new discrete IC, free-line amplifier introduced by Sleepy Hollow Products of Ossining, N.Y. The new amplifier, says the company, "fills a void that every professional studio engineer and all semi-pro studio personnel have been aware of for some time. In typical studio applications, the hi-fi/semi-pro levels of −10 are rarely brought up to the +4 level standard. This results in an inability to make adequate A/B's of cassette and quarter-track copies. In production applications, the −10 equipment will not properly drive a 600-ohm load." The Headroom Horseman is offered as the solution to that problem. The amp and its 50-volt power supply costs $175.

CIRCLE 10 ON READER SERVICE CARD

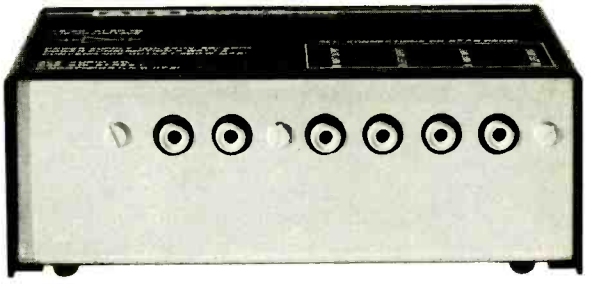
NEW SHURE MICS

Two new "Starmaker"™ microphones—the models SM77 and SM78—have been introduced by Shure Bros. Classed as professional-quality dynamic mics, and designed for hand-held or stand-mounted vocal or instrumental use, they are lightweight and are available in ebony or tan "suede coat" finishes.

Their cardioid patterns, explains Shure, effectively reject feedback and make them suitable for sound reinforcement where room acoustics or ambient noise is a problem. In the SM78, a built-in filter protects against wind and "pops" in closeup vocal work. For the SM77, an accessory windscreen is available for this purpose. Prices are $117 for the SM77 without cable; $138 with cable. The SM78 costs $150 without cable; $171 with cable.

CIRCLE 11 ON READER SERVICE CARD

ELECTRONIC CROSSOVER

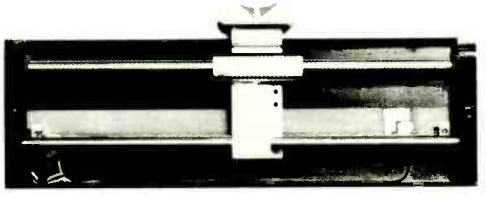


From Ace Audio comes news of a new active electronic crossover—the model 6500-DSB—said to have been especially designed to produce the best sound with modern subwoofers. The device allows connection of stereo subwoofers with frequency crossover at 100 Hz at 12 dB per octave. Optional crossover frequencies also can be supplied from 40 Hz to 200 Hz. Twin level controls are provided for balancing the subwoofers with the main stereo speakers. Active filter circuits use 1-percent precision parts, and typical distortion is listed as 0.002 percent. The unit is available in kit or wired form. The kit, which is said to take about two hours to build, is priced at $103.50; the wired version costs $142. Each version comes with one plug-in frequency module; additional modules are $33.50 each.

CIRCLE 12 ON READER SERVICE CARD

AUDIO FADER

Hutco Inc. of Huntsville, Ala. is offering a new professional audio fader manufactured by Midori of Japan. Claimed to be "the highest performance fader available anywhere in the world," the new device—series MFP-1000—is available in five standard models with an impedance choice of 600, 5 K or 10 K ohms. Custom versions also may be ordered in alternate impedance ranges. The units are designed to be incorporated into audio and video switchers, panels and other studio equipment.



CIRCLE 13 ON READER SERVICE CARD

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RUSLANG TAPE CONSOLE

A new console for professional tape recorders—the Ruslang RL 800—provides additional rack space for those who need it. The RL 800, which accommodates all standard 19-inch by 15¾-inch tape decks, features 7 inches of conveniently angled rack space positioned just below the deck. An additional 14 inches of rack space is found in the lower front portion of the console. With an optional overbridge rack added, that figure is more than doubled. Other features include Ruslang's exclusive "hinge-up" of the tape transport for convenient servicing of the underside. An optional back panel is attached with Velcro, eliminating the need for screws. The RL 800 is on casters for easy maneuvering.

CIRCLE 14 ON READER SERVICE CARD

GRAPHIC EQUALIZER

A ten-band graphic equalizer, model EQ-1500, has been announced by GLi, a division of Integrated Sound Systems, Inc. The device is said to incorporate state-of-the-art gyrator and low-noise Bi-Fet circuitries, and offer a high slew rate. Included are three sets of selectable inputs with tape monitor functions. A circuit bypass mode with LED status is featured as well as one octave-wide filter with center detents. Specified range is ±12 dB; output is rated for 10 volts before clipping. A relay circuit mutes the audio output to prevent turn on/off transients from reaching amplifier and speakers. The EQ-1500 mounts in a standard 19-inch rack.

CIRCLE 15 ON READER SERVICE CARD

MICMIX REVERB SYSTEM

From Micmix Audio Products comes word of the MasterRoom XL-210 reverberation system, that provides high-quality reverb at an affordable price. The system provides smooth and natural sound, says Micmix, even on demanding percussive material, with none of the unwanted sounds such as boing, twang and flutter that are common to most spring-type systems. This performance is achieved without utilizing internal limiting or other signal manipulation methods intended to compensate for such previous system deficiencies.

A self-contained 3½-inch rack-mount unit, the XL-210 features two completely independent stereo channels that are easily switchable to mono operation. Inputs and outputs are made via ¼-inch phone jacks on both front and rear panels, which allows convenient break-in patching. Active balanced outputs allow the unit to be easily fed by either balanced or unbalanced lines, and the balanced outputs will drive a 600-ohm load. The XL-210 can be used with the echo or effects send/return function of most consoles, or it can be placed in the main signal path. Both channels feature an EQ section that allows the user to simulate the reverb of a "live" chamber, plate or concert hall. Special chamber isolation techniques allow the XL-210 to be located near loudspeakers operating at high level. Price is $950.

CIRCLE 16 ON READER SERVICE CARD

CONSOLE AND RECORDER FROM SOUNDCRAFT

A new series of 8-bus consoles, and a line of multitrack open-reel recorders have been introduced into the U.S. by Soundcraft of England. The consoles, Series 800, come in two frame sizes—18 input and 32 input. Two types of input and output modules make possible three types of console within the series. One is an 8-group recording console with 16-track monitoring; another is a PA console with eight submasters; and the third is a stage monitor mixing console with ten discrete sends on each channel.

The tape recorders in the SCM 381 line will be available in 8-track and 16-track one-inch formats, and in 16-track two-inch format. Full remote control, varispeed and search-to-zero facilities are standard, as are separate sync outputs on each track.

CIRCLE 17 ON READER SERVICE CARD

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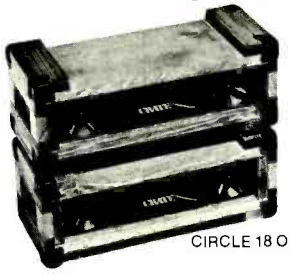
ST. LOUIS MUSIC SUPPLY ITEMS

St. Louis Music Supply (St. Louis, Mo.) has announced new items. One is the PA60, described as a small budget-priced club PA "packed with those extra features recommended by professional sound men." For instance, each channel has "more than the traditional gain, treble, bass and reverb controls." Each channel also has its own off/on switch so that a performer can be shut off or brought back readily without relying on the gain control or the need to balance sound levels. The four-channel powered board also has a master section with monitor send, master volume and master reverb. High and low impedance inputs are provided, plus three LED overload indicators. Stacking jacks allow coupling with other units for added channels. Two cabinet options are available. The PA60 designates the system with two separate closed-back 12-inch ported Thiele aligned enclosures. The PA60P offers the same system with two piezo horns in each enclosure.

Also announced are Crate Piezo Banks (two tweeters and horn per bank) housed in cabinets for add-on accessories to help bring out high frequencies.



CIRCLE 18 ON READER SERVICE CARD

SUPER SOFTWARE

The latest batch of dbx-processed discs, all cut from digital tape masters, will disappoint no one in terms of sonic achievement. Musically, they represent a mixed bag but as examples of state-of-the-art recording they are stunning.

For instance, the Symphonic Suite made up of John Williams' score for the film *The Empire Strikes Back* (Chalfont SDG 313) opens with the familiar 20th Century-Fox movie fanfare. Heard over a good playback system, this passage might make you feel as if you'd been suddenly transported to the local movie-house. If you ever needed something to get an audience's immediate attention, this is it.

CIRCLE 19 ON READER SERVICE CARD

In *Digital Hits of 1740* (another dbx product on the Digi-tech label, no. 101) several well-known favorites of the High Baroque period (including the Canon by Pachelbel, and that very hummable Adagio by Alinoni) are performed in new arrangements by a group made up mostly of musicians from the Boston Symphony. The new arrangements may raise some purist eyebrows, but they do lend themselves to brilliant acoustic display.

CIRCLE 20 ON READER SERVICE CARD

In a more traditional mode there's the new Telarc album of Bach selections played on the Methuen Memorial organ by Michael Murray (Telarc DG-10049). This is a non-dbx release but made also from Soundstream digital tape masters. If you think you've heard sensational organ tones in the past, try this one at ample playback levels.

CIRCLE 21 ON READER SERVICE CARD

And from the same label another new album features the Cleveland Symphonic Winds conducted by Frederick Fennell playing works by Leo Arnaud, Vaughan Williams and Percy Grainger. If you do not object to brass and reed instruments taking over the parts originally scored for strings, you are bound to enjoy this disc's clean surfaces and wide-range sound.

CIRCLE 22 ON READER SERVICE CARD

The first of the CBS cassettes made from digital masters and using chrome tape with Dolby-B noise reduction have arrived here. They are at least as good as, or maybe better than, other super-cassettes I have heard in the past (such as the Advent series and those from In Sync). One of the new CBS offerings contains the suites Don Juan, Till Eulenspiegel and Death and Transfiguration by R. Strauss performed by the Cleveland Orchestra conducted by Lorin Maazel (HMT 35826). The other is a real sonic blockbuster—the Petrouchka of Stravinsky done by the N.Y. Philharmonic under Zubin Mehta. The opening bars of side 2 are especially outstanding and really sound like state-of-the-art recording.

CIRCLE 23 ON READER SERVICE CARD

We did predict this sort of thing would happen sooner or later, and I am happy it's sooner.

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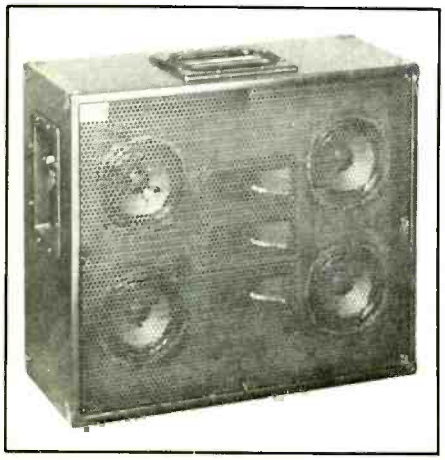
MUSICAL NEWSICALS

SPEAKERS AND SPEAKER SYSTEMS

The UM-1 UltraMonitor is the latest product from Meyer Sound Laboratories, Inc. The UltraMonitor is intended primarily for use as an on-stage floor monitor, but when combined with additional low frequency drivers such as the Meyer Sound Subwoofer System, the UltraMonitor is said to function admirably as a side-fill monitor or a small-to-moderate sized PA. Two unique features of the UltraMonitor are the patented high-frequency driver, which is said to reduce the typical horn distortion by a factor of 10, and the inclusion of a control electronics package which features a speaker protection system known as SpeakerSense. SpeakerSense monitors the voltage at the speakers continuously and reduces the drive to the power amplifiers when the speaker's limits of continuous power or peak excursion are approached.

CIRCLE 24 ON READER SERVICE CARD

GLi Integrated Sound Systems has been one of the significant names in music club sound systems and components for several years, and with the introduction of its FRA-2 full-range professional speaker, they seem to be



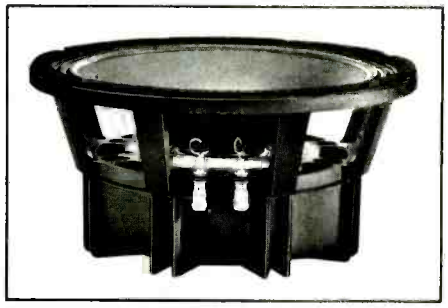
entering the PA field as well. The FRA-2 uses four 5¼-inch drivers with additional loading coming from a 15-inch passive radiator and three high-frequency horn-type drivers. The systems are rated at 150 watts of power handling capability and have a very high efficiency (99 dB @ 1 meter on axis with a 1-watt input) resulting in a rated long-term maximum acoustic output of 106 dB @ 1 meter. The cabinets are quite compact (20" x 19" x 9") and weigh in at less than 30 pounds. The finish is black with built-in carrying handles and a perforated steel grill.

CIRCLE 25 ON READER SERVICE CARD

Heppner Sound recently introduced a new, wedge-shaped musical instrument speaker, the SM-15, which was designed primarily for club and concert applications. The SM-15 is a two-way system with a 15-inch woofer and a high-frequency dome driver with a 1½-inch voice coil. The system is rated at 200 watts, 8 to 16 ohms nominal impedance, and frequency response from 75 Hz to 20 kHz.

CIRCLE 26 ON READER SERVICE CARD

Electro-Voice has just announced an updated version of its extremely popular EVM-12L musical instrument loudspeaker. The new model is designated the EVM-12S and it augments the EVM speaker line rather than replacing the EVM-12L. The difference between the two related speakers is that the EVM-12S uses a die-cast aluminum frame which is about ½-inch shallower than the 12L version of the speaker. A shorter frame meant that E-V could use a shallower, lighter, brighter-sounding cone assembly. Since the new speaker has a "punchier" sound in the 2,000 to 3,000 Hz range, it is ideal for lead guitar. The EVM-12S is formidable when it comes



to power handling thanks to a beefier voice coil mechanism and beryllium-copper flatwire voice coil and leads. The power handling rating is 200 watts continuous power.

CIRCLE 27 ON READER SERVICE CARD

Integrated Sound Systems recently developed a new line of speaker enclosures known as the Vortec Sound Reinforcement Series. This new series of speakers was designed for maximum reliability and freedom from damage caused by manhandling and speaker blow-out. The various models are all Thiele-aligned vented enclosures constructed of heavy plywood finished with an epoxy paint. The cabinets are loaded with Vortec Industrial Series components which have been designed for long linear cone excursions and extended frequency response. The diaphragms in all Vortec high-frequency drivers are easily field replaceable, and a unique selling point of the Vortec line is that each set of speakers includes spare diaphragms and the tools necessary to change one.

CIRCLE 28 ON READER SERVICE CARD

When ARP introduced its 16-voice electronic piano, the ARP engineers began to realize that conventional speaker systems were simply not up to the task of presenting the sound of their new instrument to its full potential, and so set to work building such a speaker system. The speaker they

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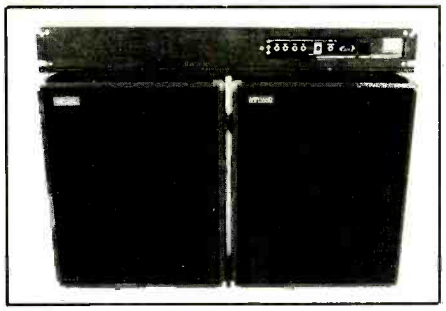

came up with was designed specifically to compliment the sophisticated voicing circuits of both the 16-voice and the new 4-voice electronic piano, but should also find many more conventional applications. The systems are self-powered by a 75-watt per channel stereo amp. For versatility, the ARP Auxiliary Speaker System has a microphone input and auxiliary inputs for use with instruments other than the ARP pianos.

CIRCLE 29 ON READER SERVICE CARD

MUSICAL INSTRUMENTS

CBS Musical Instruments recently announced the introduction of a new line of drums and accessories under the well-known Rogers Drum nameplate. The new Rogers Series II drums were designed in consultation with a team of musicians to create a line of drums with both outstanding performance and an attractive price tag. Series II drums use Fibrex shells and precision molded hardware, and are available finished in Ebony or New England White. All the Series II accessories have been newly designed for strength, durability and positive positioning. Cymbal stands, for example, combine steel legs and large-diameter aluminum tubing for both stability and light weight for easier transporting. Rogers Series II drums and accessories are all American-made.

CIRCLE 30 ON READER SERVICE CARD

The latest electronic keyboard instrument from Crumar is the Crumar Roady (not to be confused with that peculiar breed of individual who attempts to make a living caring for the needs of rock bands on the road). The Crumar Roady is a five-octave instrument which produces three basic sounds, namely vibes, piano and bass. Three distinct piano sounds are produced by the Roady which may be mixed in any combination and which may be assigned independently to the left or right sections of the split keyboard. For versatility, the vibes sound has tremolo with variable rate and depth plus a percussion voice which can be used to closely duplicate the sound of vibes played with hard mallets. The Crumar Roady has three separate output channels to allow the musician to amplify or process the various sounds separately.

CIRCLE 31 ON READER SERVICE CARD

Turner Guitars, Ltd. recently announced several additions to its line of custom-quality electric guitars. In response to popular demand, Turner is now building a bass guitar version of their Model I guitar. The Model I Bass is cosmetically identical to the Model I guitar and is available in both single and double pickup versions. The bass has a medium scale length (32") and is also available either fretted or fretless. For musicians desiring a somewhat fancier instrument, Turner now makes the Model II guitars and basses which add fancy bookmatched veneers to the features of the twin-pickup Model I guitars. The veneers are applied to the top and back of the body and the face of the peghead, and veneer choices available include rosewood, figured or burled walnut, flame maple and elm burl. Turner Model II guitars and basses come standard with twin pickups and a six-position rotary switch to select the various combinations of the two pickups, their phasing and whether they are used in series or parallel. Additionally, Turner now makes available a kit to convert single pickup Turner instruments to twin pickup operation complete with the six-position rotary switch. All single pickup Turner guitars and basses feature pre-routed cavities for the second pickup and wiring making the conversion to twin pickup operation a simple one.

CIRCLE 32 ON READER SERVICE CARD

ELECTRONIC SIGNAL PROCESSORS

Beigel Sound Labs has introduced a product known descriptively enough as the Envelope Controlled Filter. The unit is divided into two functional blocks, an envelope follower which generates a control voltage proportional to the envelope of the input waveform, and a voltage controlled filter section whose cutoff frequency is determined by a control voltage which can come from the envelope follower or the front panel Peak control. The envelope follower section has controls for sensitivity, onset rate and decay rate, plus a switch to select linear or logarithmic response to changes in the input waveform's amplitude envelope. The VCF section has controls for peak (intensity), sweep start frequency and sweep stop frequency, plus switches for high or low frequency ranges, envelope vs. manual control and low-pass, band-pass or high-pass filter modes. Patch points are provided on the back of the unit for an external processor loop (defeatable with a front panel switch) footswitches to enable the external loop and the VCF effect. The unit also features balanced and unbalanced inputs and outputs.

CIRCLE 33 ON READER SERVICE CARD

The ever prolific RolandCorp recently introduced three new units in their Roland Rack series of rack-mount signal processors. The first of these is the SRE-555 Chorus Echo which combines a high-quality tape delay (the only rack-mount tape delay unit currently available), reverb and the well-known Roland chorus effect in one unit. The SRE-555 is designed for either musical instrument or sound reinforcement use in that it will accommodate either high-level, low-impedance balanced inputs and outputs via XLR-type connectors or high impedance, unbalanced inputs and outputs via ¼-inch phone connectors. The unit features controls for input level, chorus intensity, reverb volume, reverb bass and treble EQ, echo volume, echo repeat intensity, echo repeat rate and a six-position selector switch for echo mode. For maximum signal-to-noise performance, the SRE-555 uses a Multiple Noise Reduction compander system. Five jacks are provided on the front panel of the unit for connecting footswitches to bypass each of the effects individually; front

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panel switches are provided to enable Chorus, Echo, Sound-on-Sound and Single Repeat modes when accessory footswitches are not used. The other products from Roland are a pair of graphic equalizers, the SEQ-331, which is a single-channel, 31-band, ⅓-octave unit and the SEQ-315, which is a two-channel, 15-band, ⅔-octave unit. Both units have ±12 dB of control in each filter band with detents on the sliders at −6, 0 and +6 dB, plus a separate slider for overall gain through the unit. Both units feature balanced, low-impedance XLR-type and high-impedance, unbalanced phone jack inputs and outputs for maximum flexibility. Bypass switches are also provided which actually bypass the EQ circuitry rather than just disabling it.

CIRCLE 34 ON READER SERVICE CARD

The Mini-Chorus 460 is a new item from DOD Electronics and is a compact, battery-powered unit producing the increasingly popular chorus sound. The Mini-Chorus 460 uses a six millisecond delay line which is slightly

modulated to generate the rich doubling effect known as "chorus." Speed and Depth controls are provided to control the chorus effect, and a heavy-duty footswitch is part of the die-cast aluminum housing.

CIRCLE 35 ON READER SERVICE CARD

New from DeArmond, Inc. are the DeArmond model 1930 Twister phase shifter and the model 1620 stereo volume control pedal. The Twister is a battery-powered unit with two operating modes and variable intensity and speed controls. The unit also utilizes DeArmond's phase gate to eliminate unwanted noise. The model 1620 dual volume control pedal is a passive (no powered electronics) unit designed around a custom-designed dual Allen Bradley potentiometer. The two channels of the unit are totally isolated and have separate input and output jacks. The unit uses DeArmond's proven nylon rack and pinion mechanism for smooth action and is housed in an epoxy-painted cast aluminum base with a large steel treadle.

CIRCLE 36 ON READER SERVICE CARD

Ibanez manufactures an interesting new multi-effects unit, the UE-400, which combines four popular effects in one rack-mount unit with a remote footswitch box. The UE-400 combines a Compressor with Sustain and Level controls; a Phaser with Speed, Width and Feedback controls; a Distortion circuit with Distortion, Tone and Level controls; a Chorus/Flanger effect with Speed, Width and Feedback controls; and patch points for any additional effects the musician may wish to connect. Each of the individual effects has its own remote footswitch and LED indicator, plus there is a Total footswitch to bypass the entire effects chain without affecting which effects have been preset. The remote footswitches operate via silent FET switches inside the unit itself. The unique feature of the unit is its Insta-Patch system which allows the musician to alter the sequence of which effect feeds which instantly without having to repatch anything.

CIRCLE 37 ON READER SERVICE CARD

RolandCorp US surely deserves some kind of award for proliferation of new products as they followed up the sixteen new products introduced at the West Coast NAMM show in early 1980 with no less than thirteen more new products at the Chicago NAMM show, over half of them being accessory items. For space reasons we will look at the four new additions to the Boss line of sound modifiers this month and defer the remainder of the new products until next month's column. The BF-2 Flanger is a compact version of the popular BF-1 Flanger, but with some added features and with improved performance thanks to an improved Bucket Brigade Device circuit which reduces the noise that is characteristic of most other electronic flangers. The BF-2 is housed in a compact and rugged housing with a large footswitch pad which operates a silent FET switch. Controls on the unit include Manual, Depth, Rate and Resonance. The BF-2 is normally battery powered, but there is an AC adapter available for those musicians who dislike batteries. The PV-1 Rocker Volume Pedal is the latest addition to the Boss Rocker line of pedal accessories which currently includes a wah-wah pedal and a pedal-controlled distortion device. Like the other Boss Rocker pedals, the PV-1 uses an electro-magnetic Hall-effect mechanism to totally eliminate the scratchy pot noise that used to be a fact of life with pedals, and like all Roland Boss accessories, the PV-1 has a silent FET on/off switch with LED indicator. Unlike most volume pedals, the PV-1 has a control which sets the maximum amount of boost available when the pedal is fully depressed. The PV-1 is battery powered with an optional AC adapter. The Boss RX-100 Reverb Box is an electronic reverb unit with two input channels and two output channels for use in a variety of "live" amplification or P.A. applications. Channel A's inputs are accessible on the front panel via ¼" phone plugs while Channel B is connected on the back panel via RCA connectors; Channel A will accept microphones or high or low line level signals while Channel B is line level only, and an LED peak indicator is provided. Independent input level controls are provided for each channel with a pull-for-on switch on Channel B. The fourth new Boss product from Roland is the DM-100 Analog Delay which is intended to produce slap echo effects with a wide variety of input signals. The DM-100 will accept microphone or high or low line level inputs and has an LED peak indicator to aid in setting levels. The unit uses the latest generation Bucket Brigade Device circuitry and Roland's Frequency Controlled Filter circuits for low noise and natural-sounding echo effects. The delay time of the Boss DM-100 is variable from 20 milliseconds to 400 msec.

CIRCLE 38 ON READER SERVICE CARD

MUSICAL INSTRUMENT ACCESSORIES

DiMarzio has once again expanded its line of guitar accessory items with the introduction of two new, solid brass bass guitar bridges, and the reintroduction of its custom guitar and bass guitar replacement necks. The bass bridges are massive units with recessed

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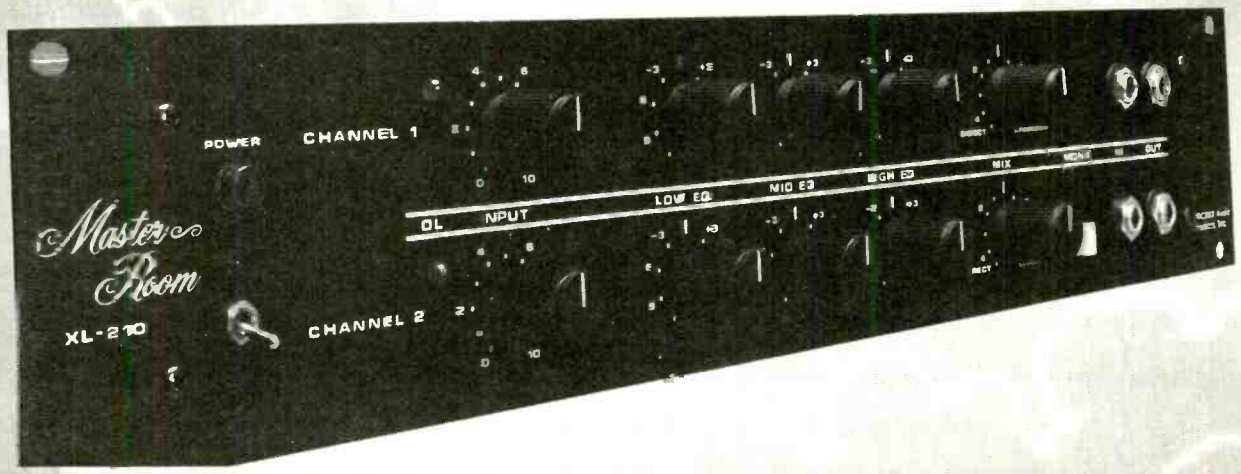
A NEW DAWN IN REVERBERATION!

XL-210



UNMATCHED PERFORMANCE AT AN AFFORDABLE PRICE!

For years, companies have tried to develop a self-contained, rack-mount reverb of professional quality that would sell for under $1,000. All attempts have been based on the same basic design, some using signal manipulations in an attempt to conceal the inherent inadequacies of the reverberation elements. Not one of these designs successfully eliminates the unwanted side-effects such as boing, twang and flutter.

The new MASTER-ROOM™ XL-210 however, incorporates revolutionary technology (patent pending) which provides smooth, natural sounding reverberation without unwanted side-effects . . . even on the most demanding percussive material.

The XL-210 operates in true stereo as well as full mono. This unit can be used with the echo/effects section of any console or can be connected in the main signal path. The versatile EQ allows the user to effectively simulate the reverberant sounds of a live chamber, plate or concert hall. The XL-210 is ruggedly built for road use and is triple-isolated to prevent acoustic feedback.

The MASTER-ROOM™ name has long been synonymous with the highest in professional quality reverberation and can be found in the most respected studios and on tour throughout the world. The XL-210 provides performance that is far superior to what has previously been considered the best of inexpensive reverbs and establishes the new standard for excellence in systems priced below $1,000.

Visit your MASTER-ROOM™ dealer for a very revealing demonstration of reverberation at its finest. Listen and compare . . . You'll hear the difference.

MASTER-ROOM™

MICMX Audio Products, Inc.
2395 Lacybird Lane
Dallas, Texas 75220 (214) 352-3311

CIRCLE 48 ON READER SERVICE CARD

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screws and self-aligning adjustable saddles. The size and weight of each component of the bridges are said to have been calculated to maximize the instrument's projection and sustain. Both the standard and the deluxe models are chrome plated and protected with an epoxy finish. The DiMarzio replacement necks are furnished in primed condition ready for final finishing and are available in maple and maple with rosewood fingerboard versions for Fender Stratocaster guitars and Precision and Jazz basses.

CIRCLE 169 ON READER SERVICE CARD

The T. W. Doyle Company is primarily a custom guitar ship doing construction and repairs on fine instruments, but along the way Tom Doyle has developed a versatile low-impedance, high-output guitar pickup. The T. W. Doyle SD-1 guitar pickup and BD-1 bass guitar pickup utilize the same basic low-impedance pickup he developed, but packaged in a form which will retro-fit most humbucker-equipped guitars with a minimum of physical modification. The basic pickup comes complete with a two-position toggle switch and step-up output transformer, and there is an optional six-position rotary switch which expands the two basic sounds produced by the pickup to twelve distinct sounds. In addition, Doyle makes a version for acoustic guitars with the same sound possibilities, and a mounting system and sound box to adapt the pickup to most round-hole guitars.

CIRCLE 40 ON READER SERVICE CARD

An aid for musicians who like to practice at home without disturbing their neighbors is the Headgear, a pair of self-amplified headphones. The comfortable, vinyl earcups of the Headgear shut extraneous noise out as well as containing the sound of the musician. An easily accessible 9-volt battery powers the unit when switched on. When the headphones are switched off, they may be plugged into any standard stereo headphone jack and used as common stereo phones.

CIRCLE 46 ON READER SERVICE CARD

Jana Enterprises has introduced an interesting new product for users of Fender Rhodes electric pianos. The product is a remote cable-operated sustain pedal apparatus for the Fender Rhodes which allows the keyboardist to stack his Rhodes piano anywhere in his stack of keyboards rather than strictly on the bottom as required when using the standard, rod-actuated sustain pedal. Two basic models are available, a foot pedal and a knee pedal. Either one attaches in addition to the regular sustain pedal which may still be used if desired, giving two points to control of the Rhodes' sustain.

CIRCLE 167 ON READER SERVICE CARD

Metone has two small, battery-operated electric metronome models, the model 23 and the model 23F. Both units feature tempos from 40 to 220 beats per minute with high accuracy, and have built-in speakers. In addition, the model 23F has a bright LED flasher for use where the speaker cannot be heard, such as on stage. Both of these models use a single 9-volt battery and they are housed in 4" x 3" x 2¼" enclosures.

CIRCLE 42 ON READER SERVICE CARD

Perfect Fretworks Co. makes a line of replacement bridges for electric guitars known as Tripp Suspension Bridges. These bridges are said to couple the mass of the bridge to the strings more efficiently and eliminate the friction between the strings and saddles of conventional bridges resulting in more output and improved timbre from the guitar. The bridge is made to work only with strings having concentric, swaged-on terminations such as Fender Super Bullets and will not work with conventional ball-end strings. Several models are available to fit a wide variety of guitars using Tune-O-Matic bridges, Gibson or Badass bridge/tailpieces or Fender Stratocaster Tremolo bridges without modification to the guitar. All Tripp Suspension Bridges are solid brass plated with chrome or gold except for the parts of the intonation mechanism which are stainless steel.

CIRCLE 43 ON READER SERVICE CARD

Tres Amigos Wood Care Products Company is a division of Silver Eagle Designs which has manufactured a line of premium wax and polish products specially formulated for use on fine musical instruments. Tres Amigos recently added several new items to its line including the Tres Amigos Polishing Kit which comprises two grades of rubbing compound, optical-quality felt rubbing pads and complete instructions. Other new items include a 100% Flannel Polishing cloth, a Tres Amigos Musical Instrument Wiping Cloth and new, larger sizes of its Lemon Oil and Carnauba wax products.

CIRCLE 44 ON READER SERVICE CARD

One of the most useful but most overlooked product lines from Roland-Corp US is the Ultimate Support Systems line of products designed to support a variety of musical instrument and loudspeaker items on stage. Roland recently expanded the Ultimate Support Systems line with the KT-20 Ultimate Tripod Stand and the KS-15 Ultimate Single Keyboard Stand. The KT-20 tripod stand is designed to support loudspeakers or monitor speakers up to 9'2" above floor level. The height of the stand is continuously adjustable up to the maximum height. For stability, the base of the stand has an adjustable diameter with a maximum of 62 inches. Like all other Ultimate Support System stands, the KT-20 is constructed from large diameter, drawn aluminum alloy tubing which combines light weight with plenty of strength. The KS-15 stand is a four-legged stand designed to support a single keyboard instrument up to 200 pounds in weight. The stand will adjust to accommodate any keyboard from 21½ inches to 47 inches in width, and has continuous adjustments for height and tilt to give the musician the most comfortable possible position.

CIRCLE 45 ON READER SERVICE CARD

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AT LAST.

AN AMP DESIGNED FOR THE STUDIO MUSICIAN

We designed our new Studio Pro™ especially for the busy studio musician. Small size and light weight let you carry it from session to session without breaking your back, but it has more kick than the proverbial "size 12."

Three-band equalization and pre and post gain controls allow almost unlimited tonal variation while our new "SATURATION™" effect gives the Studio Pro™ an exceptionally warm and singing sustain.

Special "studio" features included are an effects patching loop for quieter, more efficient operation of external effects devices and a unique frequency compensated pre-amp output circuit with roll-off characteristics closely matching those of a loudspeaker. This means that what you hear at the amp is what you get at the mixing console!

To get that signal to the board, we have provided an almost unlimited interface capability with a transformer balanced output from a three-pin XLR connector, and a low impedance unbalanced output from a standard ¼" phone jack. We have also included a 12" heavy-duty loudspeaker, a high quality reverb, and ¾" cabinet construction.

Whether you're a busy studio musician or an amateur wanting an amp to grow into, check out our new Studio Pro™ at your local Peavey dealer.

PEAVEY

"Peavey Makes It Possible"

PEAVEY ELECTRONICS 711 A Street Meridian, Mississippi 39301

CIRCLE 89 ON READER SERVICE CARD

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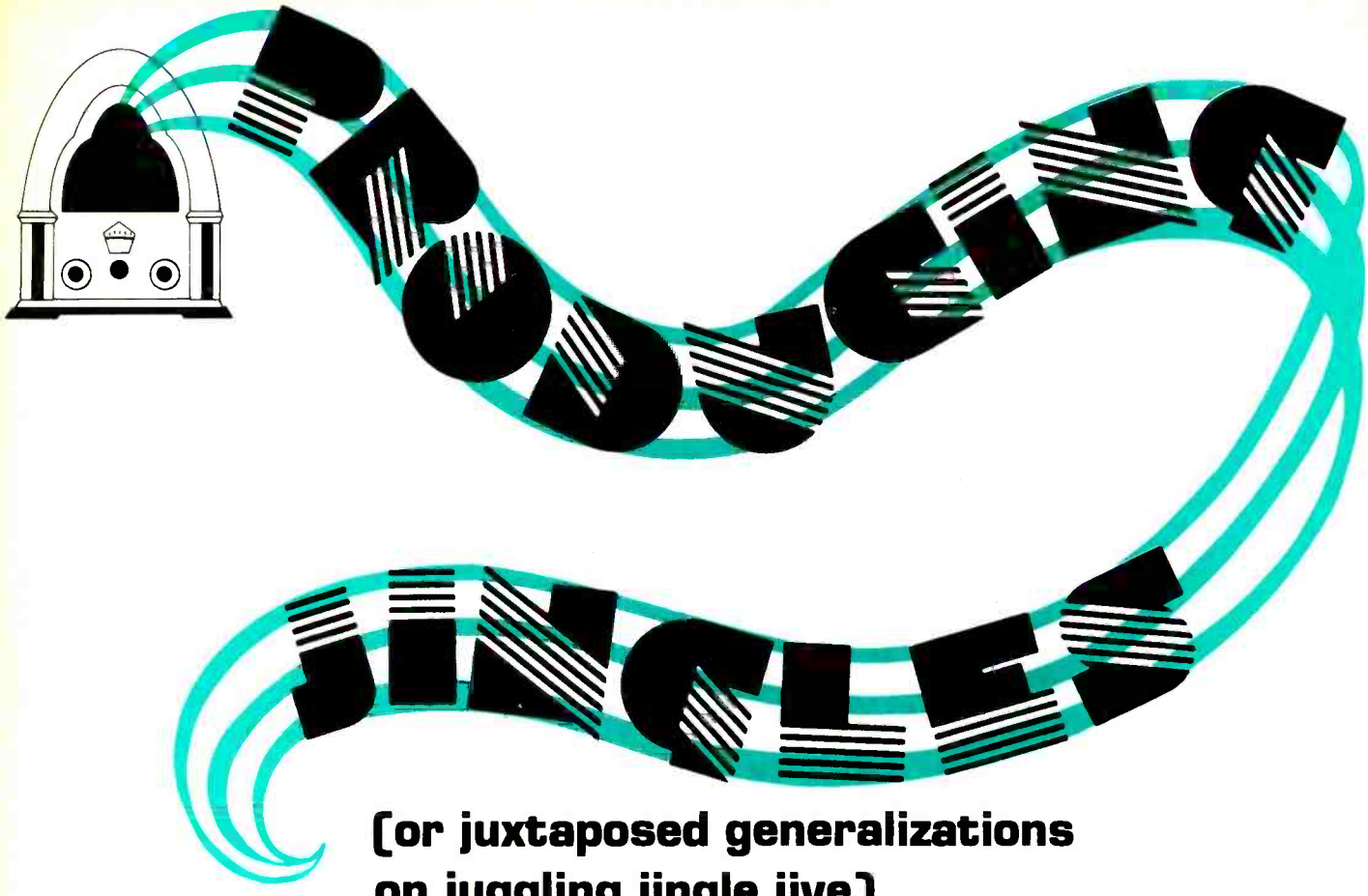

[or juxtaposed generalizations on juggling jingle jive]

by James F. Rupert

Imagine my surprise upon reading the "Letters to the Editor" column in the August 1980 issue of *Modern Recording & Music* and learning that I was supposed to be working on an article on the world of jingle production. Why, my feet almost fell off the desk I was airing out my shoes on! Realizing I must have made the promise while on an M & M binge (of which frequently my memory melts in my head and not in my hand), I am attacking this typewriter on that very subject.

There probably are not too many of you out there who have not heard a jingle on the radio or boob tube and thought to themselves, "I could have written something like that with one eye tied behind my back." The jingle industry is Big (with a capital B) business around the world today. There are a few top jingle writers that pull in the same kind of money that kilobuck rock stars take in *before* expenses. For the most part however, most jingle writers who depend strictly on their particular art for income make Little Orphan Annie look like Jackie Onassis. (Before expenses.) Landing an account like Coca Cola, McDonalds or Michelob will guarantee the would-be 60-second Beethoven a tidy sum indeed. (Who ever said money was dirty, anyhow?) But the odds are much more in favor of the possibility of being limited to accounts more on the order of Al's Garage or the Dew Drop Inn.

The point to remember up front in beginning your trek through the jingle jungle is that the jingle for Al's Garage is just as important to Al as a jingle for McDonalds would be to Ronald. The music, the lyrics, the instrumentation, the general tone of the commercial is creating and establishing an image. And that image should correspond directly to the one the client is trying to establish on his end, namely to his customers once they walk through his doors.

Everything that ends up in the final production has to be carefully considered. Do the lyrics say what the client wants to get across about his business? Do they stress his strong points? Is the style of music appropriate for that firm's type of business? Are the instruments used conveying the right mood? Instrumentation is very important. For example, if you were doing a spot for a local funeral home, it would probably not be wise to use multiple screaming synthesizers. Nobody wants to bury Uncle Fud to the strains of Alan Parsons. On the other hand, nobody wants to go to a disco that advertises with the music of Lawrence Welk, either. Whether intended or not, music can automatically attract or alienate groups of people by differences in age, background, income class, ethnic upbringing and so on.

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Music is a medium and a message. (Stick that one in your ditty bag, Marshall McCluhan!) If we can use the analogy of a table, then music would be the table legs. The lyrics or advertising copy would be the main course served on the table top itself.

Selling the Idea

But before we get ahead of ourselves, let's start from scratch and go through a typical jingle production from start to finish. You have wormed your way into the office of the president, owner, manager or advertising manager of a company you would like to sell a jingle package to. They are willing to listen to your pitch and if the red carpet has not been rolled out, at least the atmosphere is not brown with hostility, either. You are seated in front of the prospect's desk, you're dressed neatly and professionally, the invisible starting gate opens up right in front of you and signals "Go!"

Perhaps a good starting point is to explain why you have selected his or her company to approach about the possibility of a jingle. And why have you indeed, Harvey? Do you know someone in the firm who referred you to this office? Did you once work there? Have they used a jingle before but then dropped it after wearing it out? Did they drop a jingle because it was not effective? One suggestion that kills multiple birds with minimal stone throwing is to sit down in front of the radio for an entire day and make a list of every sponsor advertising on that station. Then make sub-lists of who used a jingle in their advertising and who did not. Then make a third sub-list of the leading, successful firms who did advertise using a jingle. You then have a list of people who are definitely buying radio time, and who might up their community recognition with a jingle to use in their regular scheduled spots. When approaching these clients, stress the importance of using a repeated jingle that people will recognize the second it comes on the air. Then whip out the list of successful local businesses who do utilize the jingle concept in their advertising. Let that client know that the jingle has been a definite factor towards their success. You're associating the concept with proven winners that the client can identify with. More power to you if you can show that his competition is using the jingle in their ad spots.

If the client is hesitant about the entire concept of musical jingles, try to find out his reasons. Has he heard an (unbased) horror story from one of his business acquaintances? Were they burned in the past with a poorly planned and produced jingle? Is the client suffering from spinal linguini? Whatever the objection or fear, nip it in the proverbial bud.

Once you feel the waters warming toward the idea in general, with a well-timed flick of the wrist you can draw forth your demonstration tape. Don't have one you say? Then slap your wrists, you whipsnake! You better have an audible example of your best recorded work, and you'd be smart to bring your own tape player. You can give yourself a slight advantage in this regard by mixing and mastering your demo tape especially for the tape machine you will carry with you for demonstration. Cassettes work the best for this purpose, unless you're dealing with an advertising agency. More on them later.

The point is, the client will want to know two basic things if he is considering hiring your services. Can you produce a professional recorded product, and can you produce a professional musical product? Hopefully your demo tape will ease his mind on both counts. If it does not, don't automatically be discouraged. Your next customer's socks might go up and down when he hears it. However, if ten or twelve clients make subtle little criticisms like, "Gee that tape really stinks up the joint!" it's probably time to get yourself a better demonstration tape and start over.

By this time either your potential client's tongue is going to be hanging out or he will be trying to hide a yawn. Either way he's probably on the verge of laying the ol' giant killer question on you: How Much?

Now comes the artful dodging part. You can't give him a price until you know what he expects by way of production. Is he going to want to hear strings, brass and the Mormon Tabernacle Choir on the finished product, or are his expectations more realistic? Whichever it is you've got to give him a price that includes everything. It has to be bid out as a total project. Sure, you've figured studio time and tape and dub costs, but what about musician's fees? The composer's fees? Are you going to have to pay an arranger too? Did you remember to include editing and mixdown?

Once this is figured, you still might not have the magic figure. Some studios have three separate figures for jingles. If it is for local use, say within a hundred mile radius, there is a basic fee. If it is for regional play, maybe a chain of stores within a five hundred mile radius, there is a somewhat higher cost. If it is for a national account (Bless them!) with national airplay, there is yet a higher charge. This may or may not seem fair, but generally the wider the area of airplay, the more pressure you will feel and the more that will be expected of you. The scaled prices usually prove their value very quickly.

One of the toughest parts of jingle sales, before or after the sale, can be trying to decide what kind of image the client wants to project. This might be something the customer has never legitimately thought about. You've got to know so you can plan the right music, lyrics and mood. Find his direction. Help that client know exactly what he wants that piece of music to say, whom he wants it to reach and the manner in which the whole thing is to be accomplished. You must get a clear cut picture of what that client wants *before* you run back to the studio. Otherwise you are bound to run into the weiner who listens to the jingle you proudly bring him only to have him toss it back to you disdainfully saying, "That's not what I wanted at all." Worse yet, he might be yelling, "I ain't gonna pay for that piece of crud!" Consequently it is worth repeating: *Help that customer know exactly what he wants before you leave his office.*

Gimme a Donut!

If somebody were to ask my most embarrassing moment in this business, it would have to be the day I talked for an hour to convince a potential client that I was his boy if he really wanted a professional job done. He finally said, "Okay gimme a Donut 60, MOR approach, with no longer than eight seconds head and tail." I was pretty young and green at the time and I think by the way I casually replied, "Huh?" he knew I was trying to feed him one with a worm in it.

A donut is a spot that begins and ends with five to twelve seconds of lyrics with thirty-six to fifty seconds in-between of strictly instrumental fill

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in. This is so an announcer can insert new copy (an advertising pitch) in-between the singing every week or two. This type of jingle is becoming by far the most popular for the radio medium because the sponsor can feature something new in his ads every few days while still keeping the familiar beginning and ending theme so the public will immediately recognize it as his commercial. While the announcer is speaking, the music will fall from the "Head" opening and roll along in the background till he is through and the music rises for the closing "Tail" vocal. Some commercials are timed out for the tail vocal to finish with still three to five seconds of instrumental and fade out so that a "Tag" can be inserted. A tag is the announcer coming back to repeat the name of the store and maybe, in the case of a chain store operation, the address and/or phone number of their store in that particular listening area. It is usually just one last reminder of the company that just sponsored the preceding commercial.

Do not forget that length is also critical. If your jingle comes out to be one minute and two seconds, don't think "Well heck, that's close enough." Chances are the radio station will turn it down. If the client orders a 60-second spot, fade it out to nothing at 59 seconds. If the order is for a thirty-second spot, kill it at 28-and-one-half seconds. These two rules alone can save up to one hundred dollars a year worth of aspirin and Bi-so-dol.

Each situation has to be individually judged, but it has been my experience that doing a jingle with no formalized contract agreement is inviting trouble. Try to avoid ever doing a spot on approval, gambling that the client will accept it. Otherwise you're shooting craps with an opponent who's rolling loaded dice. The client can dismiss your efforts on a whim and you could still be stuck with bills from musicians, composers, arrangers, engineers and anybody else who worked on the project. Get all terms in writing and names on the dotted line. Having a customer back out on a jingle that you have worked on for weeks can cut you right to the quick. (Quicks don't bleed much but they itch something fierce while they're healing.)

Backing Up the Bologna

So now that you have established the direction, mood and theme of the jingle, worked out the terms and signed the contract, what next? Now comes the really hard part. That is, backing up all the bologna you just sliced off in the client's office.

If you are a composer yourself, you will probably come up with your own first ideas and versions of the jingle-to-be. If not, this means working closely with the composer you will choose to whack out the music. At all times, *you* must be in control. You talked to the client, you got the feel of what is wanted and it is your head that is on the block. If something doesn't seem quite in line, or just doesn't feel right to you, speak your peace or be prepared to forever hold it. If the composer tells you, "It'll sound better with more instruments," try to visualize it in your mind to determine if this is a real possibility. Too many times this turns out to be like saying, "We'll fix it in the mix!" Go for the concepts and high standards that you have set in your own head. The object is to keep selling jingles, not just sell one and run with the money. The best way to keep selling jingles is to keep developing satisfied customers. As them French guys say, "Simple, *oui?*"

When you are assembling studio musicians, try to surround yourself with *flexible* musicians with professional attitudes. If you don't want a screaming guitar riff in a certain piece but that's all the musician insists on playing, get another guitarist. Once again, it's your butt. Your local musician's union should be able to put you in touch with good people and give you the straight poop on what rates are usually paid to studio musicians in your area. Once the work is done, be sure you have each musician sign a release form that states they were paid for their work and retain no rights to the piece of music. The same should apply to the composer and arranger. These forms do not imply that anyone involved is a crook. They merely insure that nobody can call anybody else a crook down the road.

Pay attention to the vocal qualities of the singers involved in your production. A commercial for a florist's shop probably would not want a lead vocalist that sounds like he just gargled a hand grenade. A word to the wise: Vocalists can be the toughest decision to make in the whole process. No magic tricks available here. Just remember that overall image problem. If your project is really just a "bed," (straight instrumental background, no vocals), you'll probably sleep a lot better at night.

You'll probably also feel a lot better when you are awake if you will remember to keep your music simple. You want it to be unique, distinctive and immediately recognizable, but remember that in the case of a donut the music is to be in the background of the announcer's voice. You want the music to *support* his voice, not be wrestling two-out-of-three falls for dominance.

We recently produced a jingle that could have been a single with a bullet if they would accept 30-second songs on the *Billboard* charts. However, the client referred to it as, "Stinking up the joint!" because it was just too "busy." And he was right. We tried to cram everything we could into that short amount of time and it was just overwhelming. It was a hard lesson (not to mention an *expensive* lesson) to learn.

If you are looking for good announcing and straight speaking vocal talent, check with the speech and drama department of any local colleges and universities. Some amazing talent might be looking for an opportunity to work on a project like yours for nothing, or just a token payment.

Finalizing the Project

When finally mixing down the finished product, be sure to mix it onto a two-channel, half-track machine. This is the format most radio stations will require for broadcast. They sometimes can, if they must, dub your quarter-track master onto a half-track tape, but there is the obvious loss of one generation to contend with. If the station is using a cartridge format for their commercials, the lesser quality of your quarter-track will become very much evident.

We talked about advertising agencies earlier; they will also require half-track mixed masters. Don't think in either case you can squeak a quarter-track tape by. The differences in head configuration just do not allow for professional results. Ad agencies are people you definitely want on your side. Even if they are not opening any doors for you, they can poison a lot of wells if they consider your work poor quality and amateurish. You may think you've succeeded in selling a jingle only to discover the ad agency has talked the

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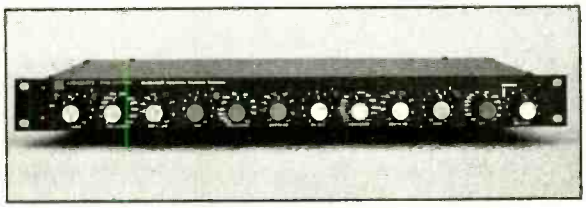
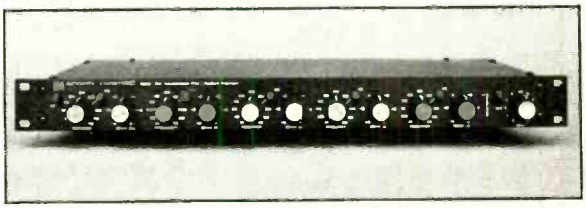
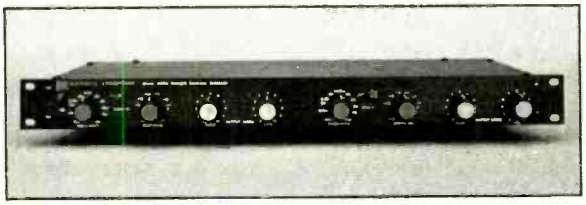


Model 1400 Parametric Electronic Crossover



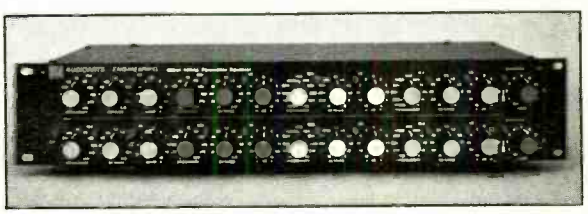
Model 1500 Feedback Suppressor



Model 2100A Tuneable Electronic Crossover

Model 4100 Parametric Equalizer – Preamp

Model 5200A Stereo Mixer/Preamplifier



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CIRCLE 156 ON READER SERVICE CARD

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The Crown Real Time Analyzer (RTA-2) can help you stay ahead of the competition. It will show you what's wrong with frequency response in studios, control rooms, circuits or equipment. You'll know exactly where to start to improve signal quality.

The RTA-2 is yours free, for thirty days.

It's easy to use, rugged and self-contained. 60dB dynamic range. Five-inch CRT. Complete with high-quality microphone. If it doesn't help, send it back. No obligation.

Call Dennis Badke at 219/294-5571 for the details.

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Innovation. High technology. American. That's Crown.

CIRCLE 104 ON READER SERVICE CARD

client out of using it—for just about any reason.

Another thing to remember when assembling your spot is that the client may want a 30-second *and* a 60-second version. If you do not wish to cut two separate versions, allow yourself an easy edit point or points to pare it down to the desired shorter length. If the 30-second spot is to be a bed for a television spot, mix two versions: one with vocals and one without. Odds are the straight instrumental jingle will end up over the airwaves.

It might be good PR to toss in a few cassette dubs of all the final versions for the client and a few key people in his organization. They will probably not have access to a half-track open-reel machine, but a cassette player is generally within everyone's reach. The more they proudly show off the final product, the more exposure you gain. In this way, a good jingle can become a commercial for your studio as well as the client's services. And that ain't all bad!

There probably could be a volume written on this one subject of jingles alone. Jingle and commercial advertising production in total can be a fascinating and profitable enterprise. On the other side of the coin, it can also be exasperating, nerve wracking, unprofitably time consuming and a pain in the patoot. Any way you look at it, jingle production will require truckloads of elbow grease and skull sweat. Many studios have put themselves on the map very nicely with one super jingle. It's a lot like playing pinball, in that one good ball can get you right back into the game. The trick is to keep that momentum going when your turn comes up again.

Once again, if your own experience has yielded wisdom regarding jingle products, the "Letters to the Editor" column of these holy pages can be your outlet to share that wisdom with your peers. This article is intended only to offer basic glimpses into what is necessary to know before hopping off the end of the jingle dock. You've got to get your feet wet, but it is up to you to poke around and see how rocky the waters are in your particular locale.

As for my feet, I'll be returning them to the top of my desk now and resuming my M & M orgy. I can't wait until my copy of *Modern Recording & Music* comes in the mail so I can see what I'll be writing about next!

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How serious are you about a synthesizer?

Even if you don't have an unlimited budget, you still want virtually unlimited expression from your synthesizer. Yamaha knows this. We also know what kinds of features and functions give you this expression. The musicians who evaluated our prototypes told us. And we listened. The result is a new line of affordable synthesizers from Yamaha built especially for live performances. They are capable of many of the sounds of our larger, costlier models, and have all of the quality and reliability.

CS-40M. Duophonic, programmable and highly portable describes this top model in the new line. It has four VCO's, two VCF's and two VCA's plus a Ring Modulator, an Attack/Decay EG for the LFO and Ring Modulator, and a unison mode which converts the unit to mono operation by doubling up the VCO's for richer sound. The keyboard has 44 keys.

The CS-40M can store and recall, at the push of a button, up to 20 sounds that you've created, even after the power is shut off. Interface with a tape recorder requires just two patch cords.

CS-20M. Up to 8 voices can be stored and recalled in this model. The CS-20M has two VCO's, an LFO, a noise generator, a mixer (for the VCO's and the noise), a 3-way VCF and a VCA. It is a monophonic instrument with a 37-note keyboard.

Both models have keyboard trigger in/out jacks and control voltage in/out jacks for convenient use with a sequencer. Rear panel jacks are provided for ON-OFF foot switching of Sustain and Portamento/Glissando effects, and for foot-pedal control of the filter and volume.

CS-15. This compact, very affordable synthesizer has two VCO's, two VCF's, two VCA's, two EG's and one LFO. One-touch knobs and switches free you from complicated patch work. Sawtooth wave, square wave, white noise, and triangle wave give unique tonal characteristics.

MODEL	KEYS	VCO	VCF	EG	NOTES	DIGITAL MEMORIES
CS-5	37	1	1	1	1	N/A
CS-15	37	2	2	2	1	N/A
CS-20M	37	2	1	2	1	8
CS-40M	44	4	2	2	2	20

CS-5. This is our most compact monophonic synthesizer. It has 37 keys, but with the 6-setting Feet selector switch, the instrument's range is extended to a full 8 octaves. A Sample and Hold circuit allows you to automatically play a continuous random pattern. There are many other features that make this model's very affordable price even more attractive.

For more information on the full line, write: Yamaha, Box 6600, Buena Park, CA 90622. (In Canada, write: 135 Milner Ave., Scarb., Ont. M1S 3R1.) Or better yet, visit your Yamaha dealer for a demonstration of the synthesizers that take both your creative desires and your budget considerations seriously.

Because you're serious.

YAMAHA

CIRCLE 99 ON READER SERVICE CARD

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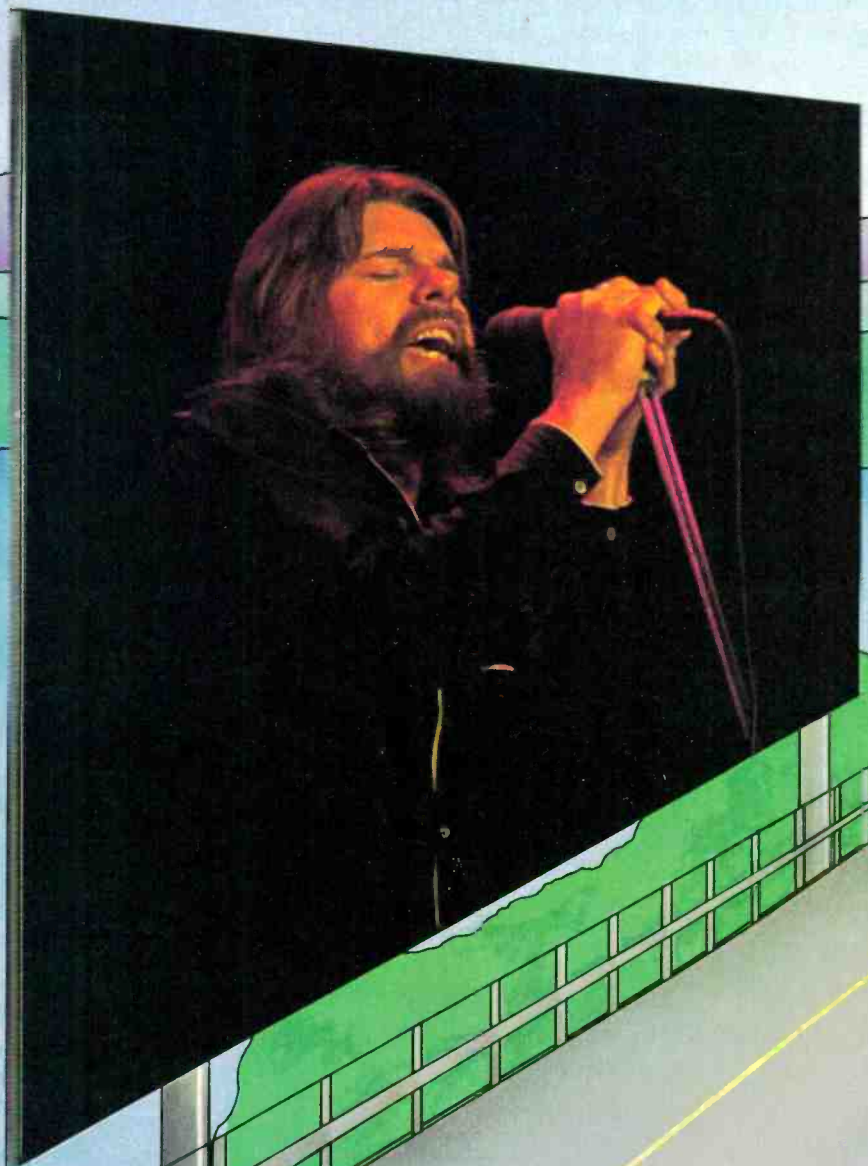
SOUND REINFORCEMENT

Bob Seger 'LIVE!'



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It seems technical overkill has become an accepted reality in the realm of "live" musical production: laser effects, computerized stage lighting, portable hydraulic stages and musicians that fly over the audience—while playing a solo. While all of this may be entertaining, it can sometimes cause a severe case of overload for the technicians employed to set it up and tear it down. No one should expect truckloads of electronics to function up to specs night after night. Too many tours are gauged not by the technical apparatus or the knowledge and expertise necessary to stage a well run show, but by the number of forty-foot tractor trailers necessary to cart the gear from one show to the next. Electronics are easy to cope with, so long as it's understood that they can quickly turn against you, beat you, ruin a show. Oftentimes this can be layed to human error, many times not. From a professional standpoint, the technology either justifies its presence or it does not. This is not merely a matter of the electronics. People, technicians, must make the electronics work by planning their production carefully in an attempt to control this sometimes uncontrollable beast. This is particularly true in the area of sound reinforcement.

No area more than sound is as vulnerable to the close scrutiny of the values of the technology at hand. When creativity and technology reach an impasse, everyone suffers. It's usually because somewhere along the line the performance was forced to take a back seat to technology.

Fortunately, this grim appraisal of what can and does often happen, is more the exception than the rule. Recently *MR&M* had the opportunity to spend a day with Bob Seger and the Silver Bullet Band and their entourage of technicians who proved the performance need not be overshadowed by the technology.

Seger has often been labeled a "journeyman" in the world of rock 'n' roll, having struggled artistically for

By Marc Silag

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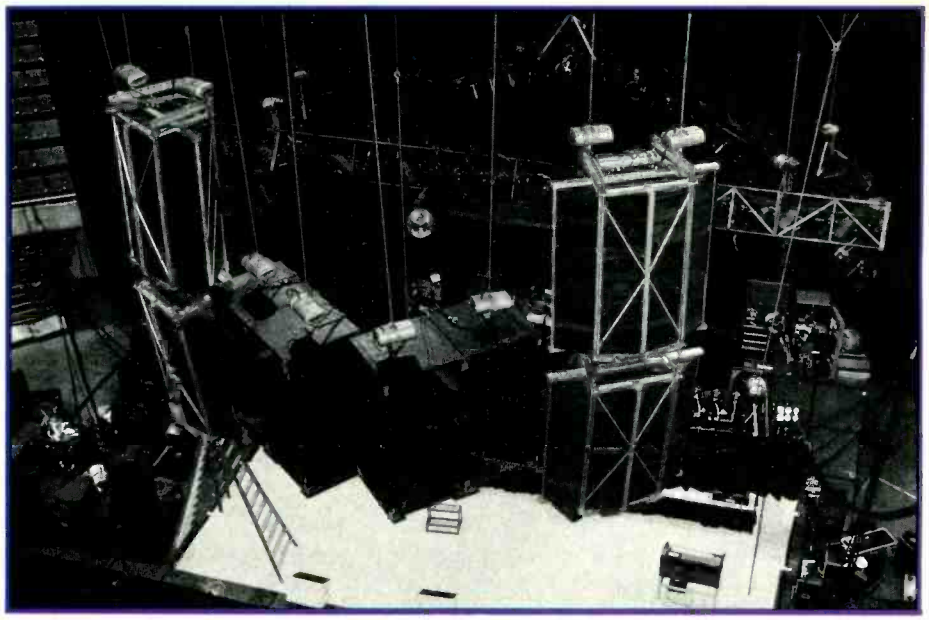
over ten years before establishing himself on record and on stage as a "must see" performer. From college frat parties and small bars in his native Michigan 15 years ago to his current stature as an artist who must play arenas to satisfy his large audience, Seger has certainly seen and dealt with the evolution of sound reinforcement equipment and techniques. Perhaps this is why one couldn't help sense this performer had not lost sight of what it was all about—*music*. Put simply, he has surrounded himself with a crew of dedicated and prudent technicians and hit the road.

Over the last four years Seger has been working with Fanfare Audio of Jackson, Michigan. Speaking to Jay "Hot Sam" Barth, systems engineer for Fanfare and sound engineer for Bob Seger, it was apparent that this organization has a very unified approach to its task at hand. Barth explained that the common goal of sound company and client was to achieve the optimum in reinforcement capabilities with a minimum of hassles. Both organizations have applied this axiom to their respective areas of application—P.A. and stage equipment. They realize the only acceptable results occur when there is no division between the electronics and Seger's performance. Thoughtful P.A. design and well-conceived band gear, in the hands of an extremely talented tech crew, provided *MR&M* the opportunity to chronicle one of the smoothest, most efficient productions ever witnessed by this writer.

At Nassau Coliseum [Long Island, N.Y.] the morning of the show, the riggers prepared the hoists and cables that would raise the lights and P.A. to their positions above the stage. Barth and his associate, monitor mixer Craig "CB" Blazier, directed the crew in setting the stage stacks of the P.A. that would augment the "flying P.A.," now standard to reinforcement jobs in large halls like the Coliseum. Barth explained that although the stage stacks seemed small, they produced a big sound. Fanfare is fortunate to have a valuable associate in David Clark, a theatre equipment contractor who dabbles in speaker design. With the exception of the radial horns used in the stage stacks and monitor side fills, Clark is responsible for the design of all of Fanfare's cabinets.



Overhead view of Fanfare's 3-way flying P.A. with the steel baskets in place.

Utilizing Electro-Voice components in the low and mid cabinets and mostly Gauss or JBL components in the high end, Clark's cabinet design affords the Fanfare system maximum efficiency and minimum bulk. The stage stacks include Clark's "Sidekick" bass cabinet, using two EVM 15-inch speakers; the "Clark Horn," a folded horn using two EVM 12-inch speakers; and an assortment of high-frequency drivers of JBL design using either Gauss HF 4000 or JBL 2440s. One exception in the mid-range cabinets not designed by Clark is a JBL lens assembly with a 2395 driver used to disperse the mid range to those seats on the floor of the Coliseum. The stacks are arranged in a curve, wrapping down stage left and right corners, arranged to cover the floor of the arena and those seats up in the house immediately adjacent to the stage.

As the stage stacks were being completed, the stage crew rolled in what at first appeared to be the world's largest speaker, but was actually a mammoth assortment of cabinets stacked together and encased in a steel frame or "basket." Closer investigation revealed that each basket consisted of six rows of cabinets, four to a row, all of Clark design. The same "Clark Horn" used in the stage stacks for mid-range coverage was alternated with a Clark hi-frequency cabinet equipped with either two Gauss HF 4000 or two JBL 2440 drivers in each.

With the basket in place and attached to the hoists, the riggers slowly raised the one ton unit until it hung about eight feet off the plank covered ice of the Coliseum. The crew then rolled another basket under the first, attaching it to the steel bracing of the suspended basket and then raised the entire unit to its position over the stage. This was repeated stage left so each basket assembly was angled slightly to the sides of the hall. Barth pointed out that the lower basket differed from the top in that the top row of the lower basket consisted of all mid-range cabinets. He added that during the next break in the tour, Fanfare was planning to convert the present three-way system to a four-way design by removing one of the high-frequency drivers from each of the cabinets and replacing it with a JBL 2441, biamping each cabinet with a crossover point of about 5 or 6 K.

With both basket assemblies in position, two large bass bins were assembled on the floor, each consisting of two cabinets housing four EVM 18-inch speakers each. Each bin assembly, known as the "Bigfoot," is hoisted up between the two basket units so that the two rear corners of the bass assemblies form a 60 degree angle directly over downstage center. "The speakers are phase coherent," explained Barth, "reducing the tendency of most large halls to make a P.A. sound boomy, while adding to the projection of the low end throughout the hall. The 'Clark Horns' are very efficient," he

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continued, "in fact, we have to set the amps down a notch on them to keep them on the same par with the rest of the P.A.."

The riggers' job done, the band crew began to set the stage with band equipment while Barth and "CB" tended to the wiring of the large banks of Crown DC 300As, Crown PSA and PAS 800 power amps that power each side of the P.A. The power racks were discreetly hidden behind the stage stacks, as were the Crown VFX-2A crossover units."CB" computed the total power to be somewhere in the neighborhood of 12,000 watts per side.

Meanwhile, one could not help but notice the sophistication of the band gear being placed in position on the stage. The back line looked about as typical as one might expect: Marshall full stacks, Boogie amps, a Yamaha grand piano with a Helpinstill pickup. However, as the accompanying equipment list will bear out, each instrument's electronics had been customized to suit its particular requirements on stage in a large hall.

It became apparent that Seger and the Silver Bullet Band are in the hands of a crew sensitive to the needs of the musician and his instrument. While it is generally conceded that the P.A. is the ultimate monster to be reckoned with when performing in large venues, one could not but sense that, in this case, the monster had been somewhat tamed by the high-quality components used for the band's on-stage amplification. A look at the electronics used for the grand piano's amplification will help illustrate the point. The grand piano was once a reinforcement engineer's nightmare. Miking invited feedback, and finding levels to match the guitar player's four Marshall stacks was an illusive dream. With the advent of contact pickups, some of these restrictions were eased, but true fidelity was non-existent. When the Helpinstill piano pickup was first introduced, stage technicians and the sound engineers were delighted. No more feedback! Piano levels could readily compete with a wall of guitar amps!

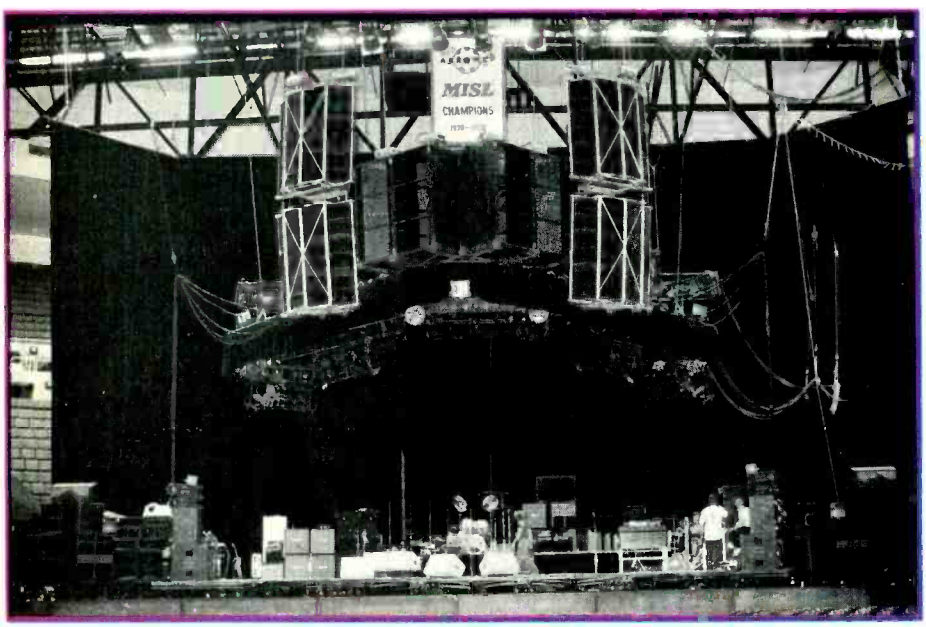
However, tone quality remained a problem. The Helpinstill "preamp" was little more than a passive leveling device, combining the signals of the six pickup elements to one output. Equalization at the mixing board helped. But not enough. There had to be a better way. Seger's crew came up with a solution of its own. The sound of the Yamaha grand piano Seger plays on the road is about as faithful to the instrument as this writer has ever heard.

Each of the six pickup elements of the Helpinstill is fed into an individual channel of a Tapco C-12 Mixer. This allows more EQ and level control on each individual pickup element. The outputs of the board are then processed through an EXR Exciter and a dlc DL 100 limiter, at which point the signals are split and sent to the main splitter for the P.A. and monitors. The signal for on-stage amplification continues on to a Urei 527 A graphic equalizer before it enters two Crown VFX 2A crossover units. The final stage is a three-way mono signal utilizing Crown power and sent to a special Fanfare "1812" Cabinet, consisting of an EVM 18-inch and an EVM 12-inch speaker, as well as an E-V 1506 high-compression driver. This arrangement proved to be most successful in reproducing the sound of the Yamaha while allowing a tremendous amount of control of the electronic signal. Barth feels the Tapco mixer is largely responsible for this success by providing exceptional EQ on each pickup element and eliminating most of the inherent dullness associated with piano pickups.

As the stage set up continued, Barth conducted a guided tour of the stage gear used by the band. The guitar setup used by lead guitarist, Drew Abbott, was merely a Music Man 2 x 12 brain [amp head] and a Boogie brain driving four Marshall 4 x 12 Cabinets. The bass rig was a bit more extravagant but just as straightforward, using a Nasty 500 wireless receiver, dbx 160 Compressor/Limiter fed into a Crown VFX 2A crossover unit, and then bi amped using a BGW 250 power amp driving two cabinets with two K120 12-inch speakers each and a BGW 750 powering two Cerwin-Vega 18-inch folded horn assemblies. (It should be noted here that in virtually every rack, instrument or P.A., spare power amps abound, ready to go to work should the original amp fail. Mike Clark, a veteran of band road work, whose primary responsibilities concern the guitars of the band, pointed out that equipment failure was part of the process. 'It's a given. With the spare right there, ready to go, it's merely a matter of how quickly you can pull your leads from the bad amp and plug them into the spare.")

Responding to a comment about the cleanliness of the bass rig, Barth stated, "The best P.A. in the world can't get rid of a buzz in a guitar amp. The P.A. will do just as good a job reinforcing that buzz as it will the instrument itself. So, you cover yourself."

In terms of efficiency with regard to the production, it's appropriate to point out that it had been less than three hours since the first light truss



Front view of the completed stage setup and the flying P.A. system.

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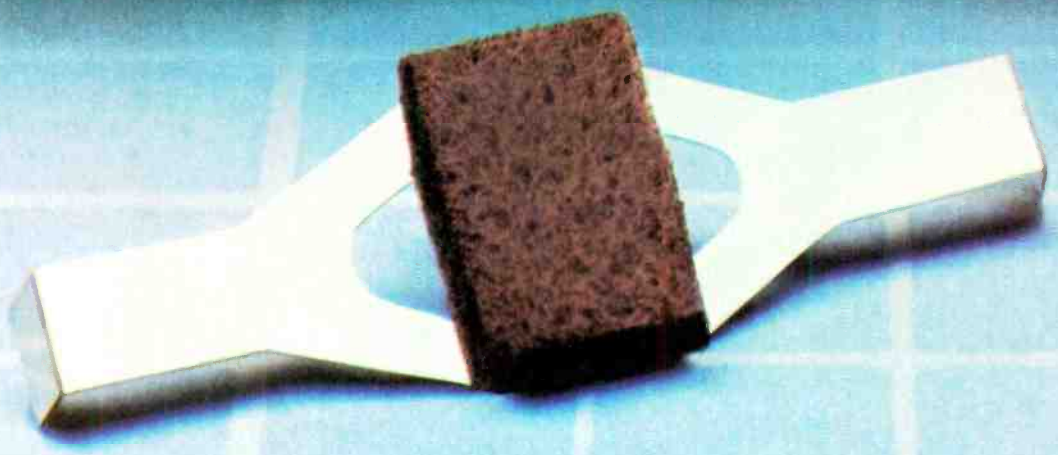

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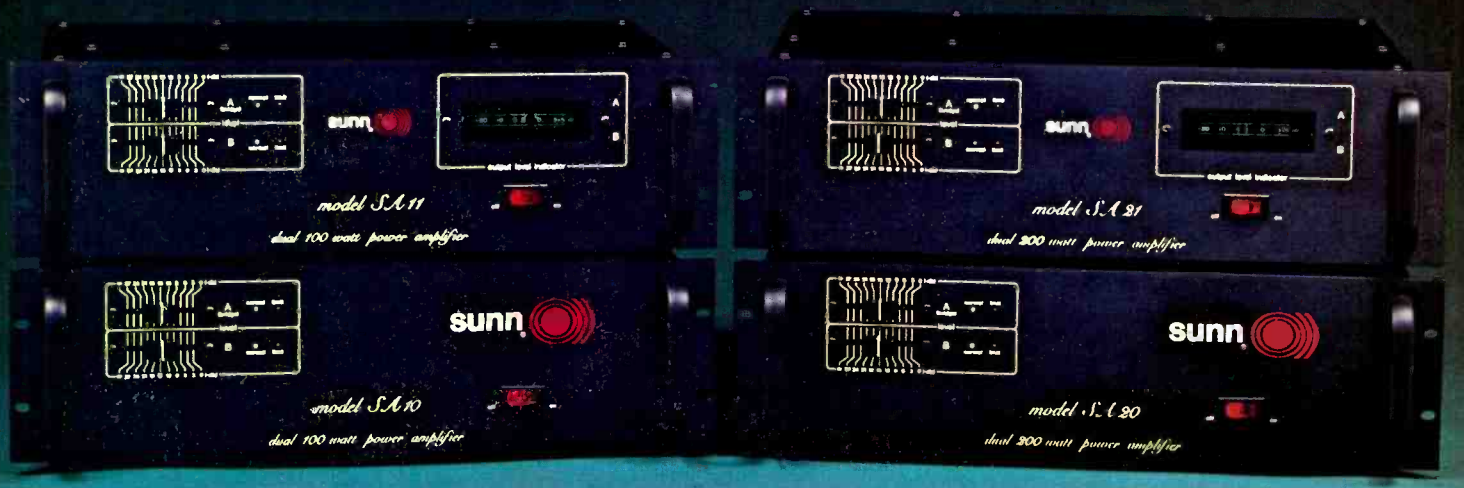

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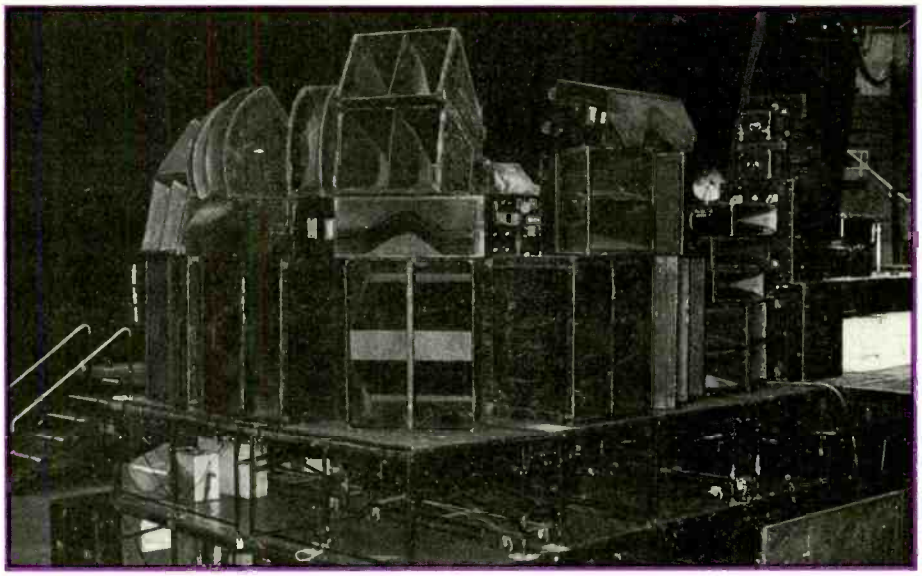

The curved stage stacks which provided the sound for the floor seats.

had gone up in the air and already the stage equipment was in place. Sound check was four hours away. Seger's crew, many of whom have been with him three years or more, went about their work in a relaxed manner, the good-natured banter infectious. As Barth strolled around the stage checking with each technician, he explained that the crew worked well together because they communicated well and shared a common dedication towards their work. There is a pervading attitude of "try to make it better." And this attitude shows.

"CB," who's been mixing Seger's monitors since 1977, began to place mics and run lines to the splitter, assisted by Dino Ozers, a member of the sound crew. With mics in place and cables run, "CB" began his daily routine of "ringing" the monitors, explaining his procedure as he went. "The band requires eight monitor mixes. I place a mic in front of each monitor position, setting all of my equipment flat. Each individual mix has its own Urei third-octave EQ and an Orban 621B parametric equalizer. I primarily use the Orban to locate troublesome frequencies and tune them out. By bringing the level of each mix up one at a time, I can quickly locate the frequencies that can cause trouble and regulate them. Once the major trouble spots have been eliminated, I use the Urei to do some shaping. I never use a recorded tape to check the monitors; it has to be a more natural sound and each hall is different, so, each day is different."

"CB's" board is a 26 x 8 design of Custom Audio Electronics (CAE) of Ipsilanti, Michigan. The 26 inputs of the board are assigned via a patch bay located on the extreme left side of the console, which allows access to each of the 54 possible inputs of the main splitter. With inputs assigned to the monitor board, each input module affords "CB" an input pad, phase reverse, signal gain or attenuation and an input break select which allows the signal to bypass the preamp and go right to the master output. "Sub Assignment" actually refers to the monitor mix the signal is sent to. CAE provided rotary pots for each of the eight sub assignments on each module, which allow adjustment of the amount of level sent to each output. Continuing down the module is a channel on/off select, stereo pan, A/B effects send with pre/post EQ select and pre/post fader select. By utilizing the effects sends, the board is expandable to ten mixes. Solo capabilities include individual channels or individual master output. The EQ section features two band EQ, ± 15 dB at four shelving positions in each band.

MIC LIST

Drum overhead: AKG 452
Drum overhead: AKG 452
Floor tom: E-V RE-20
Floor tom: E-V RE-20
Rack tom: E-V RE-20
Rack tom: E-V RE-20
Hi-hat: AKG-452
Snare (bottom): AKG D-2000
Snare (top): Sennheiser 421
Bass drum: Sennheiser 441
Bob, vocal: E-V PL-95
Bob, vocal (wireless): Vega/E-V PL-95
Keyboard vocal: E-V PL-95
Guitar vocal: E-V PL-95
Bass vocal: E-V PL-95
Back-up vocal: E-V PL-95
Back-up vocal: E-V PL-95
Back-up vocal: E-V PL-95
Drum vocal: E-V PL-95
Alto-sax: E-V C-15
Alto-sax: Direct
Bass: Direct
Bass mic: E-V RE-20 (2)
Acoustic guitar: Direct
Bob, acoustic guitar: Direct
Guitar amp: Sennheiser 421
Bob, guitar amp: AKG D-2000
Grand piano (Helpinstill p/u): Direct
Grand piano (Helpinstill p/u): Direct
Clavinet: Direct
Arp Omni: Direct
Hammond B-3, Leslie: AKG D-2000 (2)

As noted earlier, the monitor system is equipped with a third-octave and a parametric equalizer on each mix. This equipment is mounted in a rack adjacent to the monitor board. After selecting a solo mix, "CB" can hear that mix either pre or post the Urei, pre or post the Orban or simply the main output from the board, by means of a switching panel built into the outboard rack. The monitors utilize Crown power and crossovers and an assortment of speaker configurations in the monitor cabinets depending on the performer's priorities.

"CB" is keenly aware of the human element involved with his position. "I have to please nine musicians. I don't mix for myself. There's a point where technical skills or experience or equipment don't mean that much. A lot of it is based on how well I get along with the individual, the person. And it's important that the person who needs me to help him hear, knows I'm sincere about my job and that I'll help as much as I can.

Out in the house, Barth had wired up his CAE 36 x 8 x 2 board to a relatively small array of outboard equipment. The house board, though similar in appearance to the monitor desk, provides Barth with an extraordinary amount of control and is impressive in that it is an extremely easy board to read by nature of its design. Most impressive about both CAE boards Fanfare uses with Seger are their EQ sections and the general cleanliness of the boards output sections. Individual channel modules contain input pad, breaker switch, submaster assignment (there are eight stereo subs) and three aux-

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iliary sends with select positions of off, pre/post EQ and post fader. The EQ section is a three-band parametric design utilizing dual rotary pots for each band—one for bandwidth select and one for frequency select. Alongside these pots are shelving and peak selector switches for the low and high ends, and both bandwidth and frequency select operate in the shelving and peak modes. Cut and boost of 15 dB in each bandwidth is achieved via three faders located below the EQ section of the module. Barth commented that the board afforded extreme flexibility in processing each individual input, thereby allowing him to concentrate on his mix at the board, rather than having to adjust outboard equipment during the show.

The master output is stereo, but, Barth explained, his is not a stereo mix. "There's not a lot you can do with stereo in places like this; this group at any rate doesn't use the special effects that lend themselves to a stereo mix. I generally mix thinking up and down instead of left and right, balancing the flying rig with the stacks on stage. Fanfare is toying with the development of a drive system that incorporates both up and down and left and right, but for Bob's show right now, it's not essential."

Two small racks alongside the house mixer contain all the outboard equipment necessary to augment the console and the entire system is driven from the house mixing position. The master outputs from the board are fed to two Urei 527A third-octave equalizers, and, if necessary, to a dbx 162 Compressor/Limiter. Two Crown VFX-2A crossovers with a pre-set Gain Brain on each output to control peaks, send the signal to the mains. Outboard gear also includes an MXR digital delay unit, a DeltaLab DL-4 Time Line, a DeltaLab DL-2 Acousticomputer and a dlc DL-100 stereo limiter. An EXR Exciter and a dbx 160 Compressor/Limiter are also at Barth's hand. Should he wish to record a stereo mix, a Technics RS-65 cassette deck is also mounted in the rack. As he prepared to sound out the room, Barth took some time to discuss the DeltaLab equipment he carries. "The DL-4 is a superb echo device and I can recommend it to anyone. If Dres, our guitar player, were ever to use it, he'd never go back to a tape echo again."

Before the band arrives for a sound check, Barth tunes the system to the room using the Ivie IE-30A audio analyzer with Ivie's pink noise generator. Barth stated he does this as a matter of course because it introduces his ears to the room and what effect the room might have on the sound during the show. Studying the Ivie's readout, he can make any adjustments necessary on the crossover units and balance the system with his graphic equalizers. That done, he listens to pre-recorded tapes he's familiar with and does some final shaping. "It's nothing you can swear by, this place is empty right now. Once they open the doors, it's a whole different world."

Waiting for the band to arrive for its sound check, Barth relaxed and spoke about life on the road with Bob Seger. "We're a very tight knit crew and ego rarely gets involved in how things are done. Bob's successful now, but it hasn't changed his attitude. Hell, if a mic goes out during a show he'll just pick up another and sing. Any problems that develop, well, it's our job to straighten them out, and we do. Sure, we've experienced growing pains over the years, we've gone through weird times, but we do the job, provide what's needed and enjoy it. Fanfare is a small company and Marty Precis and Curt Andrews, the owners, are always in a state of research and development. David Clark does not work for Fanfare, he's a very good friend who has some very good ideas. There's always the potential to change. You can't settle back. Sure we've got it down; we've been on the road for five months this tour, but that's no reason to get lazy. There's always a challenge, even if nothing is blowing up or falling apart. The hardest challenge is to take something you know is good and make it better."

As a rule the band always does a soundcheck even if only for one tune. At the Coliseum it was obvious that the band felt like playing. In no time, the crew, the house ushers and the security people were moving and shaking to a medley of Seger's greatest hits. Barth concentrated on his mix while listening to the room from his position. ("I hate mixing from the side.") A walk around the empty arena proved all of Barth's claims about David Clark's designs to be true. One couldn't help feeling a little lost though, when looking at the stage stacks and the four pieces of sound gear hanging high above the Coliseum floor. Sure the P.A. was there, but the only thing a listener noticed was Seger, his band and his music.

The show itself was a well-paced crescendo of energy and excitement that never let up until the house lights came up three hours after they'd gone down. Barth's mix was clean and accurate throughout the house; "CB" was constantly adjusting his equipment to keep nine musicians happy; and 14,000 fans went home after hearing Bob Seger and the Silver Bullet Band play their hearts out.

INSTRUMENT AMPLIFIER LIST

Guitar (Seger):	Fender Stratocaster Ovation Adamis
Amplifier (Seger):	Mesa Boogie (2) Roland JC-120 (head) Marshall 4 x 12 cabinets (4) Roland Space Echo
Lead Guitar:	Les Paul Gold Top Ovation Adamis
Amplifier:	Mesa Boogie (head) Music Man 2 x 12 (head) Marshall 4 x 12 cabinets (4) Roland Chorus Echo MXR Phase 90
Bass Guitar:	Fender Precision
Amplifier:	BGW 250 power amp BGW 750 power amp 2 x 12 cabinets w/ K120 speakers (2) Cerwin Vega 18" folded horn (2) Nasty Pro-500 Wireless P/U Furman Parametric EQ dbx 160 Comp/ Limiter
Keyboards:	Yamaha grand Hammond B-3 w/ Leslies (2) Arp Omni
Drums:	Rogers Kick (1) Rack toms (2) Floor toms (2) Snare Zildjian cymbals
Sax, Flute:	Selmer Roland Chorus Echo 501-E MXR DDL EXR Exciter Tangent 802 mixer

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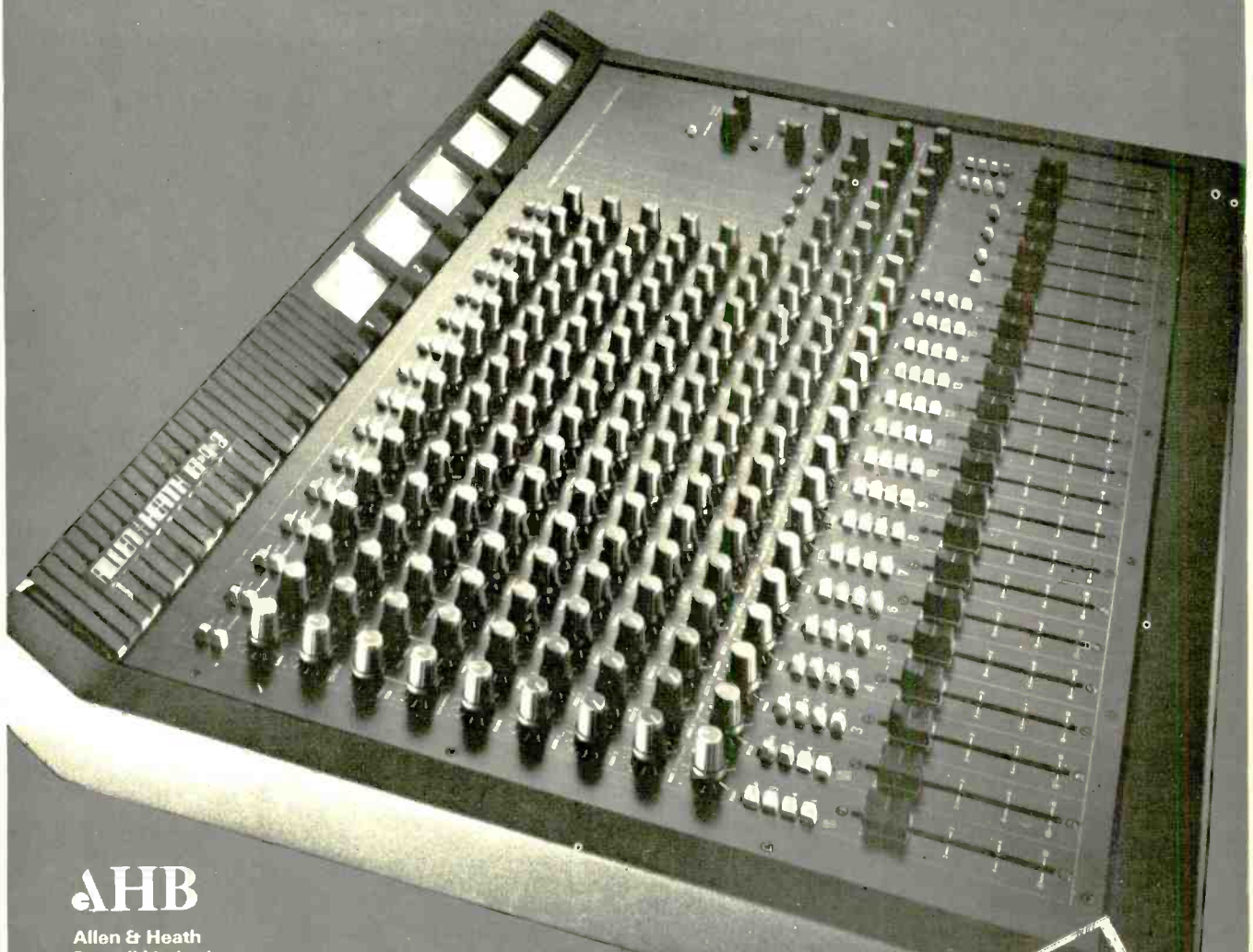

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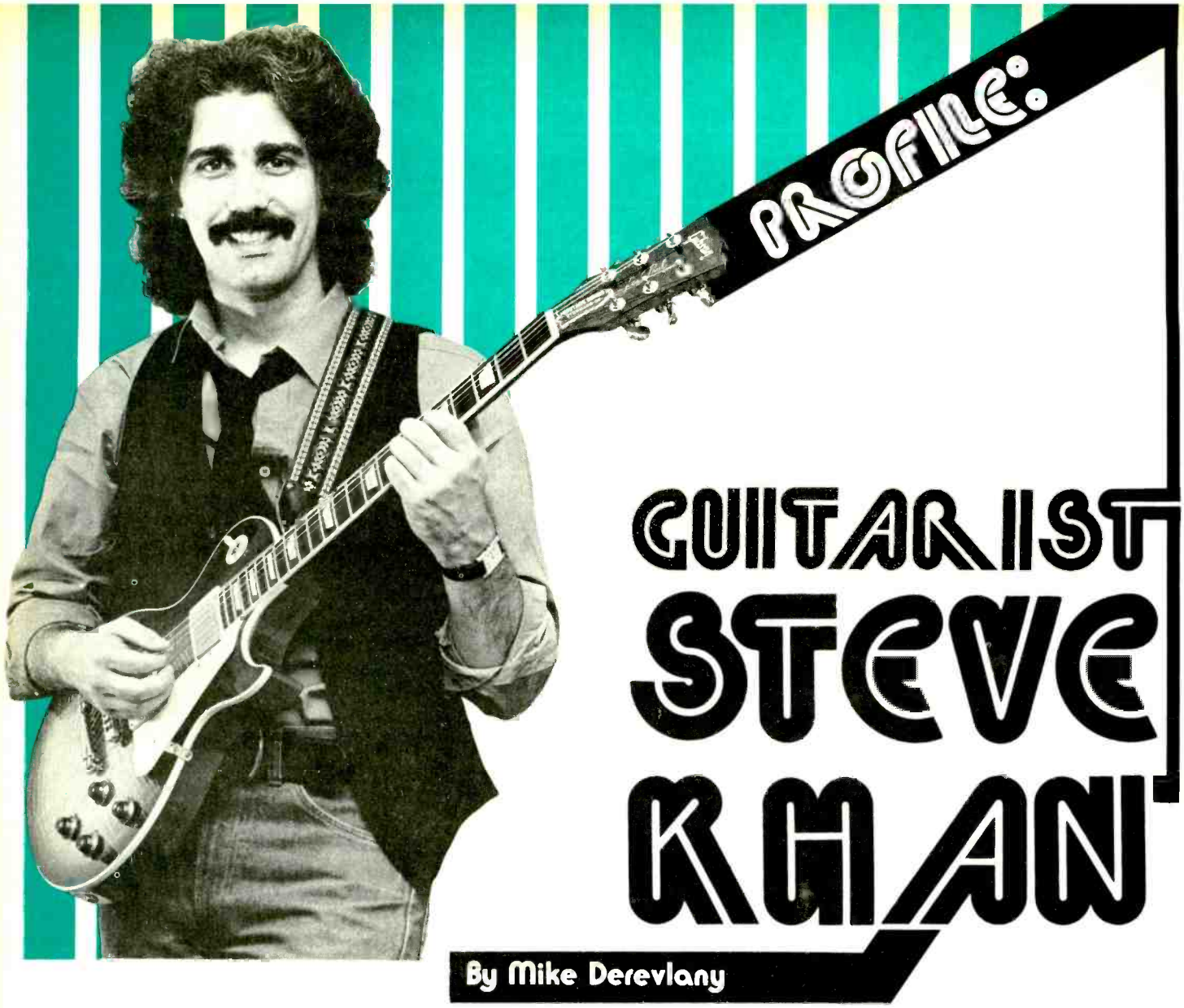

GUITARIST STEVE KHAN

By Mike Derevlany

*From a rather unsensational start as a drummer in a local California "surf" band, Steve Khan has moved on to become not only one of the most highly demanded studio guitarists but a budding jazz legend as well. He has three solo albums released on the Columbia label—*Tightrope, The Blue Man *and* Arrows*—plus a fourth which will soon be released on the Arista/Novus label.*

*With the list of credits he has, though, it's hard to see where he managed to find the time to do his own thing. He's worked extensively with Steely Dan (*Aja *and their forthcoming album), Billy Joel (*Stranger *and* 52nd Street*) and many others besides playing more than occasionally on soundtracks and commercials.*

While versatility is clearly a key to Khan's success, his dedication to his music provides the impetus that has made him one of the best guitarists around.

Modern Recording & Music: With all the studio work you do, among other things, you're probably one of the busiest musicians in the country.

Steve Khan: Well, sometimes I am. I've been very lucky. I mean, it's a mixture of good and bad. It's great when you do have the chance to do what's really wonderful about being a studio musician. And that can mean doing a very finely crafted commercial and working for some really terrific jingle companies that have terrific writers and getting to see some of your favorite musicians showing up on these dates. You can do that, and then you can go in and work with a Billy Joel.

Doing *Stranger* and *52nd Street* were absolutely two of the best musical and personal experiences I've had in music, period. That I was asked to do it was very fortunate for me, and I had a great time. Billy's a very loyal guy to the musicians in his band, and that's why I didn't do *Glass Houses;* I missed doing it. But the album certainly came out great and it's the right thing when you have a band to use the players, if they can play the music. He's like that, and I really respect him for that.

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MR&M: In light of that, why didn't you end up playing in Billy Joel's band?

SK: Well, I did get asked to go tour with Billy after the *Stranger,* and the reasons I didn't were: A) I thought my career was going to be taking off with *Tightrope* and all that stuff, and B) in the context of Billy's music, there's not that much for me to really do night after night. The guitar has taken on a bigger role in Billy's music since those two albums, but at that point it was all doubling bass lines. I'm not saying I have to have a solo on every tune, but when a guy's up there for two-and-a-half hours and he doesn't get to do very much, and you're on the road for forty out of forty-two nights or something it gets . . . for someone like me it would get hard after a while. I wouldn't want to come off the road not liking anybody. I like those guys too much. And that's what happens, you become testy, and it gets hard.

MR&M: So in essence you prefer the studio?

SK: No, the reason I didn't do that tour was that I was hoping to go on the road with my own thing at that point. But I did enjoy doing the records. Also, I really enjoyed working for someone like a Phil Ramone, who's an incredible producer. He picks unique talents and people who really may not be great singers per se but have a great quality, say like Paul Simon. Then you have someone really incredible like Phoebe Snow. Or two people who I think are really great singers, Kenny Loggins and Billy Joel, who just have the pipes. Kenny Loggins is an unbelievable singer. I'll tell ya, when that voice comes in the headphones and you're playing, it's like seeing God or something. You know you're hearing something special.

MR&M: What about your own work? Which of your three albums was "best?"

SK: Well, I think that they got progressively better for lots of different reasons. The first one, even though Bob James was the producer, could be considered to be co-produced by me, because I was actively there, every step of the way, from playing to mixing and everything. Aside from Bob's influence on the first one, I gained more control as we went to *The Blue Man* and *Arrows.* I guess the thing is there's a lot of good music, some of the best music on *The Blue Man* and *Arrows,* but I think that overall *Arrows,* soundwise and everything, probably is the most highly evolved of the three. Perhaps it sounds better.

MR&M: Do you mean in a strictly technical sense?

SK: Yeah. Probably. And that's not the fault of the engineering on the first two; I think it was primarily my fault. I think that my influence on Doug Epstein, who engineered *The Blue Man,* perhaps made it a little lighter in the bottom than it should have been. And maybe it's only on a couple of tunes, but I think, if anything, that might have been a criticism of it. But other than that, it's some of the best music. There's some real good playing on those two albums.

MR&M: Technically, though, there doesn't seem to be a major difference in quality from album to album.

SK: There isn't. It's not as if someone would listen and say, "Gee, what happened?" You can hear all the instruments. I mean if you felt like going through a whole track and saying "I'm just gonna listen to the Rhodes," or something like that you can [find differences]. But I don't think there's really a problem with the balances or anything like that. Just different concepts and stuff.

MR&M: Which album did *you* like most?

SK: It's really hard to say. I probably . . . I think as a whole album, I do like *Arrows* the best because it is the most recent, it's the most up-to-date. I think that I can pretty much stand by every tune on there, and probably a few years from now I'll still feel the same way. Whereas with *The Blue Man,* I really like everything on it except one tune called "Some Down Time." It's not a terrible tune or anything, it's just that I've grown to like it a lot less than some of the other things. But the other five things on that record are just as good as anything on *Arrows.* I really like all those things.

MR&M: What about your playing with Brecker Brothers Band? Wasn't that when you really decided upon the direction in which you wanted to go?

SK: Yeah. That's true. I mean there were a lot of steps in my musical development where hearing somebody, listening to somebody, hearing a record, seeing them play, really gave me an idea of something, a part of something I wanted to do. And I always dug almost anything Michael and Randy [Brecker] had done, whether solos, or whatever. We'd been involved in different things together prior to that. It was really sort of weird how it started. Randy, Michael, Steve Gadd, Rick Marotta, myself, Don Grolnick and a bass player, Andy Muson, who now lives in L.A., went to Japan to play behind Yoko Ono in '74. And on the plane ride back, Randy told me, "I have all these tunes"—I think he was just ending his stay with Billy Cobham's band—and he said "I just want to make a record and get them out, 'cause Billy won't do them," and so on. So that was the first inkling I had that there was going to be a record. I did a lot of rehearsing for it and lost a lot of work and didn't end up playing on it, which didn't make me feel too great. But when that record came out, I said "Boy, that's really fresh." I mean I knew it when we were rehearsing it, but [when] I finally heard it all together . . . this was really fresh stuff, it was New York stuff, it didn't happen anywhere else and I felt really close to it.

Subsequently I ended up playing in the band and doing the next couple of records. We also spent a lot of time out on the road together. Then they started going away from that original concept and getting . . . well, I don't want to say badgered, but there was a subtle pressure put on them—or that they put on themselves—to try to be more commercial.

There have been so many different things in print about Mike and Randy and their relationship, good and bad, with Arista. You know what you spend on an album and you know what it sells. And then the company starts saying well, we could do better, and we could do better if you did more tunes like tune X. Then that gets them [the group] thinking, and then they start doing more things like tune X and sort of go away from what may have been their stronger suit. And I think that's been the sort of baffling point with all their albums. There's a vast difference of material and the public doesn't know what to do with it. They can't handle an R&B-feeling vocal and then one of Randy's great instrumental compositions. For John Q. Average it's just too wide a musical spectrum.

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MR&M: Why didn't you tour after your albums came out?

SK: It isn't that I didn't want to. It's just a matter of . . . it meant, again, finding some young players who were willing to go out for less [money], and I just wasn't coming into contact with them. Also, you get spoiled when you're lucky enough to play with Michael Brecker and David Sanborn. It oftentimes makes other sax players—no matter how great

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"You get spoiled when you're lucky enough to play with Michael Brecker and David Sanborn."

they are—sound sort of dumb, and you get used to guys like Don Grolnick as a soloist and an accompanist. It's such a great pillow the way he plays. It's just great. And then there's Steve Gadd. It's hard to find people like that and you've got to get out of thinking that way. When I finally got away from that so I could enjoy playing with other people, it was too late.

The other thing to consider was that I was never told by Columbia to put a band together and go out on tour. I was always sort of a low-priority artist, frankly because my records weren't the hottest sellers. So at one point, after *Tightrope*, I did a tour with Billy Cobham, Tom Scott and Alphonso Johnson. It was a fairly nice tour, although Columbia somewhat pulled the rug out from under us at one point. We were drawing fine and the audience response was great but we got universally terrible reviews because critics didn't understand the concept. They expected to hear a new group, but that really wasn't what it was. What it was was the four of us cooperating and trying to—as best we could—realize the music from each of our four albums at the time and present a nice evening of music for people. But the critics kept saying there was no group sound. We were just getting together to play. We did end up making a "live" album. We called it *Alivemotherforya*, which surprisingly did very well.

After *The Blue Man* came out, Columbia put Tom Scott and me together. It was basically Tom's tour, but it was supposed to be "Featuring Steve Khan"; we logged a lot of miles. I think we did thirty or forty good sized cities—real good gigs that got terrible support from the company. I mean, I ended up carrying around a tube of my own posters and putting them up at the clubs because nobody was there to do that. And it wasn't just for me, it was for Tom. Nobody would even show up to put Tom's stuff up. It was really depressing, especially when you believe in the music you're playing and people out there are responding to it. On a business level I don't really care if a company guy comes backstage and shakes hands with me after a gig so he can say, "I was here." It's a nice courtesy, but I'd rather see him bring in one poster and put it up when people walk in so that they know what to look for if they like what we play.

MR&M: What about the new album that you're working on? Do you still plan to call it *Hats Off?*

SK: I was hoping to, but I had a problem with the artwork. I decided to call it *Evidence*, which is the title of a Thelonius Monk tune. That was a simpler title to go with. It's one word, and it's easy to remember. You start thinking about the title of the album when the music is totally uncommercial. That's the time when you start to think of something that's short and hopefully easy to remember. 'Cause there's no point in having something that's too long to print or that no one can say.

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MR&M: On this solo album, you're completely solo, doing all the tracks yourself. What guitars do you use, and what kind of effects?

SK: Well, the guitars I used on the solo album are very close to what I use on a day-to-day basis. The main acoustic voice is my six-string steel string by David Russell Young, a California guitar maker. I also use a twelve-string, an acoustic twelve-string, that's also made by Young. Then there's a Fender Stratocaster and a Gibson ES-335 twelve-string, plus an Ovation six-string which I usually only use on the road. Still, I guess, my primary solo guitar is a customized Telecaster.

MR&M: The Telecaster is the one you use for most of your studio work, isn't it?

SK: Yeah. It goes between that and the Strat, sort of depending on my mood. Sometimes, on a certain kind of music, you feel one will be better than the other. But on a Steely Dan tune, "The Glamour Profession," I used my Gibson 347, which is basically an update of the 335. But I had to have it customized, too. Almost any guitar you buy you have to have some work done. You almost never buy something perfect off the line. My Strat is the most stock thing that I have but even it had to be shielded, among other things. For studio work, for things that strictly require strumming on acoustic guitar, I use a Guild—an F-50—mainly because it's strung up with regular medium-gauge strings. My David Russell Young has a plain G-string. I string it up that way because I primarily use it as a soloing instrument, as my per-

SELECTED DISCOGRAPHY

Taking Off, David Sanborn	(1975)	Warner Bros.
So, So, Satisfied, Ashford & Simpson	(1976)	Warner Bros.
Benson & Farrell, George Benson & Joe Farrell	(1976)	CTI
Windjammer, Freddie Hubbard	(1976)	Columbia
Romeo and Juliet, Hubert Laws	(1976)	Columbia
Send It, Ashford & Simpson	(1977)	Warner Bros.
New Vintage, Maynard Ferguson	(1977)	Columbia
Heads, Bob James	(1977)	Columbia/ Tappan Zee
The Stranger, Billy Joel	(1977)	Columbia
Tightrope, Steve Khan	(1977)	Columbia
Celebrate Me Home, Kenny Loggins	(1977)	Columbia
Never Letting Go, Phoebe Snow	(1977)	Columbia
Montreux Summit, Vol. I, Various Artists	(1977)	Columbia
Blam!, The Brothers Johnson	(1978)	A&M
Two For The Road, Larry Coryell	(1978)	Arista
52nd Street, Billy Joel	(1978)	Columbia
Blue Man, Steve Khan	(1978)	Columbia
Against The Grain, Phoebe Snow	(1978)	Columbia
Aja, Steely Dan	(1978)	MCA
Alivemotherforya, Various Artists	(1978)	Columbia
Montreux Summit, Vol. II, Various Artists	(1978)	Columbia
Stay Free, Ashford & Simpson	(1979)	Warner Bros.
Lucky Seven, Bob James	(1979)	Columbia/ Tappan Zee
Arrows, Steve Khan	(1979)	Columbia
Naughty, Chaka Khan	(1980)	Warner Bros.
The Best Of, Steve Khan	(1980)	Columbia
Evidence, Steve Khan	(1980)	Arista/Novus
Gaucho, Steely Dan	(TBA)	(TBA)

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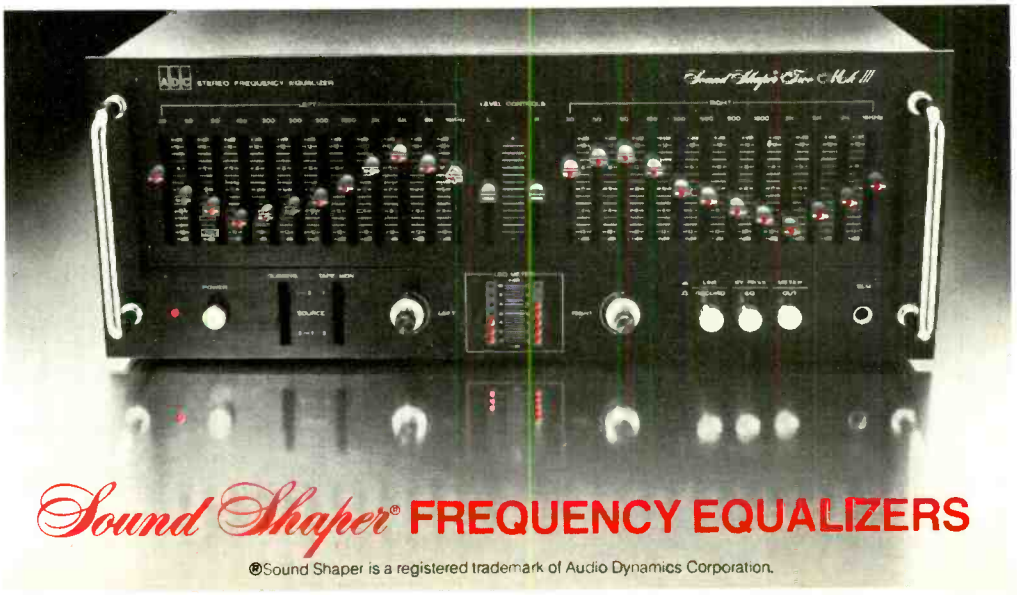

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sonal voice, so it has a more rock feel to the way the strings feel in your hand, not that that's how I can see the music, but it's easier to bend the strings and have the kind of vibrato I like to use. That sometimes makes it better to bring the Guild in for the straighter parts.

I have other guitars that I occasionally use. Like on Billy Joel's "Zanzibar," in the jazz section in the middle, I wanted to get a very authentic jazz guitar sound. I brought in my big Gibson Super 400 and sent, with the producer, Phil Ramone, for a very warm, dark jazz sound which you can hear in that section behind the trumpet solo. The rest of the tune I did with the Telecaster.

MR&M: What kind of sound have you been aiming for on your new album?

SK: I've always liked an ambient sound, the kind of sound you might imagine hearing in Carnegie Hall if I were up there playing, a very "echo-y" sort of sound. Most people like it. Sometimes the engineers sneer at it; some of them like things very up-front and dry. That ambient sound is something I always try to get, and it's been captured on all three of the albums. On this new one, it's been captured in really a different way. I'm doing it with Doug Epstein, who engineered *The Blue Man* album and has done engineering on all the albums. He may have been the assistant or worked just on certain overdubs, but he's been a part of all the albums in one way or another. Doug's a real master of guitar sound. He's been a tremendous help on this project.

One of the sounds that we used was the Ovation going into a Roland Chorus Ensemble, and taking that and plugging it direct into the board, then compressing it. It comes out in stereo, although technically it's not real stereo. One side is just straight and the other side has the effect, and through the mix it sounds like stereo. But with this sound, the way we've doctored it, it almost sounds like a Fender Rhodes playing behind the acoustic guitar. Then we've also done things with that sound, with volume pedals and stuff, to use as an effect on a couple of other things. The funny thing is, here I am doing it on my own record and I can offer it to somebody but they won't be interested. Now I know a lot more about that pedal and what I can do with it. Sometimes you can tell people, "Hey, I can make a sound that if you use the volume pedal it'll sound like three trombones, do you want me to put a nice cushion behind something?" And they won't believe you, or you'll do it and they'll say "That sounds nice, but it'll never cut through the mix." Well, they're wrong, usually, 'cause I've heard it work. It can be frustrating dealing with producers because they often don't trust you. They want the new ideas, but they don't want to use them.

Basically, on the technical side of things, you just try to do what's right for the thing you're working on. On this solo album I have a really free range to take a chance and try and do something. Why not? Fortunately, I came up with some ideas that I didn't even think were going to happen. Sometimes you don't even know what your own potential is, especially when you're doing a record like this, where you can't hide behind the drums or any number of things. And best of all, it turns out that there's been some real interest expressed in this album, at least by one label. It really does look good.

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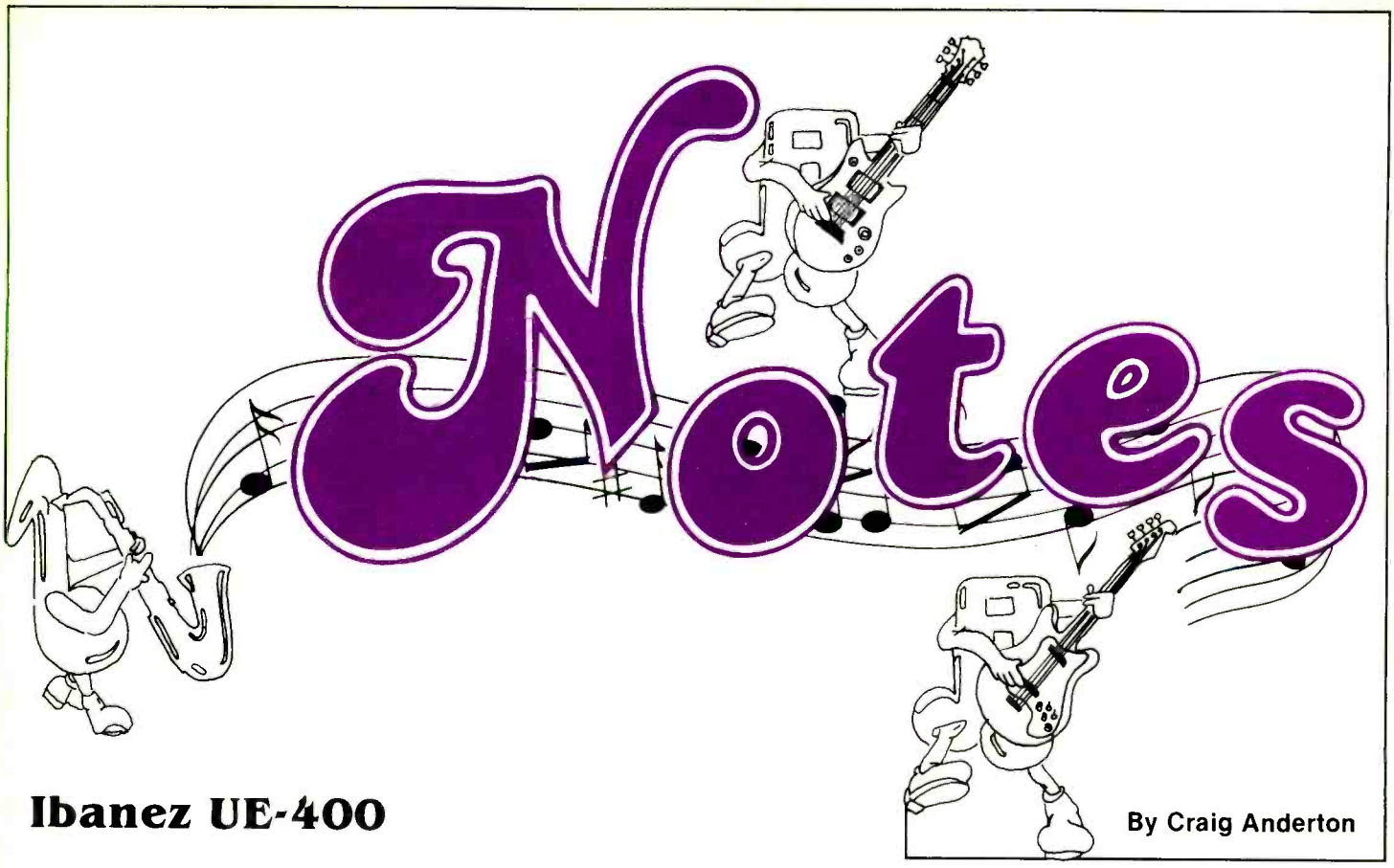

Ibanez UE-400

By Craig Anderton

In a 1978 column written for another publication I ventured the opinion that "individual (effects) units will fade away and be replaced by functional groups of units. I'm most astonished that manufacturers aren't doing this on a widespread basis—compressor/fuzz/filter/flanger combinations, for example." Then in a later 1979 issue, I introduced a do-it-yourself switching system for effects and said, "I'm sure it won't be too long before you see manufacturers putting out systems like this." Well, it took a couple of years, but both predictions have come true with the introduction of the Ibanez UE-400.

WHAT is IT? The UE-400 combines four popular sound modifiers (compressor, fuzz, phaser and chorus/flanger), with associated remote electronic switching and an effects loop option, in a single rack-mounted package. While apparently intended for the performing guitarist, bass and keyboard players could make good use of its capabilities as well.

There are no patch cords; all four effects (plus the loop) connect in series. Each effects module, as well as the loop, includes a five-position rotary switch that allows you to switch a given effect into any one of five places along the signal path. For example, you could switch the fuzz into the 1st position, followed by the phaser and then the fuzz; or put the compressor 1st, the fuzz 2nd, the loop 3rd, the phaser 4th and the chorus 5th; or any permutation and combination thereof—merely change the switch positions. Attempting to put two units in parallel (i.e., into the same place along the signal path at the same time) mutes the output and causes an LED labelled "insta-patch error" to flash. Switching the modules into a "legal" all-series combination restores the sound and extinguishes the light.

An integral part of the UE-400 is the remote footswitch, which allows you to "clicklessly" switch any of the four effects in or out. There is one status LED located near each effect on the panel, as well as a similar LED at each footswitch, to show you when the effect is in. There is also a master in/out switch. This is a thoughtful addition, as you can set up a combination of several of the effects by depressing their associated footswitches, and then bring the whole mess in and out with the master footswitch. The alternative would be to punch each desired effect in and out real fast when you wanted more than one effect at a time - which would be nowhere nearly as convenient as a simply pressing the master switch.

Each footswitch makes virtually no mechanical noise when you step on it, and requires very little pressure for actuation. The entire remote footswitch assembly connects to the UE-400 through a long cord that terminates in a multi-pin connector. This brings up a small complaint: it would be nice if the cord was detachable from the footswitch as well as from the UE-400. Granted, this would require the use of another set of connectors and add to the expense, but, if someone rolled an amp over the connector of the remote footswitch and broke it, you would not be able to use the UE-400 at all. With a detachable cord you could carry a spare to forestall these kinds of problems; otherwise, your only "insurance" is to buy a spare footswitch assembly. Incidentally, I don't mean to single out Ibanez for this complaint, since I feel that *all* cables using non-standard connectors should be easily replaceable.

Moving right along, the UE-400 is AC powered (naturally), and includes an AC on-off switch and associated LED power-on indicator. There is a fuse on the back panel. The cord is a two-conductor type. I did note that during operation, the transformer got a little warmer than I would like; the voltage regulator, on the other hand, is more than adequately heat sinked and runs cool.

Mechanically speaking, the quality of the UE-400 is consist-

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precisely one reason why the UE-400 is available at a relatively affordable price. The rather large circuit board is not an epoxy glass type, however, the case is very well constructed and sturdy, there are plenty of mylar capacitors used where precision is important and the whole unit appears very easy to service (an often overlooked consideration). Everything is bolted solidly to the frame, so I don't think the UE-400 would be unreliable as long as it was treated with even minimal care.

At this point, Ibanez's latest offering might sound like a guitarist's dream come true: no patch cords, no batteries, clickless remote switching, more than adequate construction and a price that is cost-competitive with a like number of effects and AC adapter bought separately. But, clever ideas do not a product make—the sound has to be there as well. So, let's plug in and evaluate the sounds of the various modules.

PRE-FLIGHT for the UE-400. The UE-400 is very simple to set up: plug your axe into *input*, your amp into *output*, connect up the remote footswitch (it plugs in on the back panel) and find yourself an AC outlet.

Verify that the master in/out switch is in the out position (the associated indicator LED near the footswitch and on the panel should be extinguished) and play; you will hear the straight sound of your instrument. When initially turned on, all the UE-400 effects default to the "out" position, a nice touch. Now it's time to start adding effects.

First, note the "insta-patch position" switch associated with each effect (and the effects loop). As mentioned earlier, these determine where the effects go in the signal path. For now, place the compressor in 1, the phaser in 3, the fuzz in 2, the flanger/chorus in 4 and the effects loop in 5. Next, depress the compressor footswitch (which is easy to find: the footswitch lettering is big and yellow against a black background) and then the master footswitch. The compressor LED and master LED should glow, indicating that you're in the compressed mode.

EVALUATING the COMPRESSOR. The compressor is quiet, features a fast attack/slow decay action for a very smooth compression effect, and generally has a nice sound. The level control is straightforward, and sets the overall output level of this stage. The sustain control is something else. As you change this control, the peaks of your playing do not get any louder; instead, adding more sustain brings up low level signals while leaving the peaks relatively unaffected. The result is a true one-knob compressor where you don't need to re-adjust the level as you increase the amount of compression.

Although there are a few "pops" at the beginning of notes (especially with extreme settings of the sustain control), this is the price you pay for using a compressor and actually, the UE-400's compressor is better than most in this respect. Thanks to the slow decay action, there is very little "rippling" of the sound as it decays—even with complex chords.

A final point worth mentioning is that once your input starts increasing past about a Volt peak-to-peak (p-p), the compressor starts limiting and adding a certain amount of distortion. This distortion is particularly noticeable with a sine wave, but is far less noticeable with guitar because the guitar puts out a more complex waveform, and also, much of the large dynamic range of a guitar is due to short duration transients that can be clipped without any audible effects. So, all in all I would give high marks to the compressor—especially with respect to its low noise and smooth action.

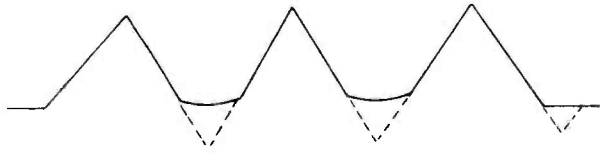
EVALUATING the DISTORTION SECTION. No effect is as open to subjective opinions as fuzz devices; what may sound great to one player might sound terrible to another. Taking that into account, let me say that I like the UE-400 fuzz very much . . . and I'm not all that easy to please. Part of the reason why I like it is because it's really useable with the UE-400's compressor, and compressor/fuzz combinations create some of my favorite fuzz sounds.

The fuzz has three controls, which should be handled with care. The tone control accentuates the highs as you turn it clockwise, and I do mean *accentuate*! I don't crank this control open too much, and you probably won't either unless you have severe hearing loss in the upper octaves. Once you find the sweet spot on this control, though, the fuzz tone is fine.

The level control is again self-explanatory. The distortion control increases the "grunch" factor (well, *you* try to come up with scientific terms to define a fuzz!) as you turn it clockwise. I didn't find the sound too satisfying when attempting to get light amounts of fuzz for rhythm use, but the fuzz sound for leads is great.

The fuzz distorts in a very interesting way. With signals up to about 20 mV p-p, there is virtually no distortion. At about 60 mV, the signal starts distorting; at 250 mV, the signal snaps into a square wave with very slightly rounded corners. Past 500 mV p-p, the square wave becomes a very sharp square wave. The resulting square wave fuzz sound has a wind instrument kind of timbre that is not unlike the type of "guitar sounds" obtained by some keyboard synthesizer players. Overall, I'd say this is a good fuzz that becomes even better with a little compression. Some players might not like the metallic-sounding "edge" associated with semiconductor distortion devices, but I do, and as a result feel as favorable about the UE-400 fuzz as I do about the compressor.

EVALUATING the PHASER. After two hits, here we had a bit of a miss . . . initially, that is. There are three controls: width, speed and resonance. I started my evaluation by turning the width up full and setting the speed for slow. However, the resulting sweep sounded like this:



In words, the phaser would sweep up smoothly, but on the way down it would bottom out at a low resonant frequency and stay there. I took the unit apart to see if there was anything I could do, and noticed that the circuitry used matching FETs as the voltage controlled elements. That implies a trimpot to match the sweep oscillator to the FETs (different FETs have slightly different characteristics, necessitating some type of trim to compensate). Thanks to the nicely legended board, I had no trouble locating VR102, the appropriate trimpot. I turned it ever so slightly clockwise and surprise—the sweep now swept smoothly from its lowest to highest point. This is a very critical adjustment, so I can see where it might get out of alignment during shipping. If you experience an uneven sweep with the phaser, get someone at your local service center to tweak the phaser's trimpot for you.

The phaser sound is nothing spectacular, really, just your basic "four stage/four notches in the passband" phase

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shifter. The speed control goes from fast enough to slow enough, and the resonance control does indeed add resonance (it seems somewhat weighted towards higher frequencies, by the way). Signals greater than about 2 V peak-to-peak create distortion at some points during the sweep (especially with the resonance up; this is probably due to using FET voltage control elements), but I only found this to be a problem when using hot-rod pickups in series, which can generate a lot of signal. The passband notches are around −25 dB at low frequencies, and become more shallow at higher frequencies.

This phaser may not have a particularly distinguished sound, but it is very quiet and does the job as well as, or better, than other four-stage shifters out on the market.

EVALUATING the CHORUS/FLANGER. This module uses an MN3007 1, 024 stage delay line with compansion (provided by an NE570 IC), resulting in very quiet operation. The MN3007 is a quiet part even without compansion, which means that there is no audible noise present at any time while you're playing (this is not always the case with other companding effects, where the noise may disappear only when you're *not* playing, remaining as a sort of backdrop when you *are* playing). Actually, this section is really more of a chorus unit than a true flanger; the delay doesn't ever get quite short enough to qualify for "classic" flanging. But don't let that bother you, the chorus effect is just fine as is, and besides, you still get flanging-like effects as a by-product of chorusing.

As with all the other effects except for the compressor, there are three controls. For the chorus, these are width, speed and feedback. With the width control fully counterclockwise, you can hear a doubling of your sound that resembles very fast slapback echo. Increasing the width introduces the chorusing effect at a rate determined by the speed control. Turning up the feedback (which I believe is in-phase, or positive, feedback) creates tubular, metallic sounds that can be either beautiful or bizarre, depending on your playing and attitude. There is no way to vary the blend between straight and delayed signals on the unit itself, but there is a "stereo chorus" option which you engage by pulling on the width control's knob. In this mode, the *send* jack of the external effects loop carries the straight signal (providing that the loop precedes the chorus in the signal path), while the output jack carries the chorus signal only. By feeding these two outputs into a two channel mixer or amp, you can then vary the blend of delayed and straight signals. Note that this "stereo chorus" does not create the same kind of synthesized stereo effect that we encountered last month with the DOD 690. Also note that by selecting the "stereo chorus" option and running the UE-400 through a standard mono amp, the chorus unit can produce true pitch-shifting vibrato since you are only listening to the delayed output from this effect.

Incidentally, there is a way that you can convert the chorus/flanger into more of a flanger than a chorus by turning VR 107 on the circuit board conterclockwise about a half-turn. This shortens the delay time of the line. Personally, I prefer the setting chosen by Ibanez at the factory, but I mention this for those who perhaps already have a chorus unit, and would like to use the UE-400 to get a slightly different sound from the chorus unit that they already have. To be on the safe side I would not recommend adjusting any trimpots yourself, since you could get a shock if you accidentally brush against the fuse post. Service centers will do the job for you; if you must fool around with this or any other unit, make all changes while the thing is unplugged from the wall. Plug it in only when it is time to observe the results of these changes.

MORE FUN and GAMES. The effects loop is a welcome addition to the UE-400, as it allows for much greater flexibility. Ibanez apparently recognized that while everybody likes compressors, fuzzes, phasers and chorus units, people also have other effects they like to use (echo units, wa-wa pedals, etc.). The effects loop allows you to insert these effects, and what's more, the insta-patch feature lets you put the effect anywhere in the signal chain. Although the loop does not have its own footswitch, you can either use the in/out switching provided with the effect, or bring the loop in and out with the master footswitch (the master footswitch affects all effects, even those in the loop). You are not limited to putting just one effect in the loop—a series combination of two or more effects will also work.

If desired, the *send* jack of the loop can serve as a signal take-out point. For example, by switching the effects loop between the phaser and chorus, you could use the send jack to send the phaser output to one channel of a stereo amp, and then feed the UE-400's regular output (with the combined phaser and chorus sound) to the second channel for a lush stereo effect. The *receive* jack can also serve as an auxiliary input point to the signal chain.

The insta-patch switching is another useful feature. While I suspect that many musicians will find a favorite effects placement and not vary too much from this, others will enjoy the experimentation afforded by being able to switch the order of effects around. Compressor before fuzz gives a very sustaining sound, while fuzz before compressor gives a somewhat gentler sound that is also more quiet. Phaser before and after distortion gives very different effects, and putting the phaser and chorus unit in series produces some very animated sounds. But I won't spoil all your fun; play with the combinations yourself and see what turns you on.

APPLYING the UE-400. Many companies are now producing rack-mounted guitar preamps with effects loops (Intersound, Roland, Advanced Audio, etc.). A unit such as the UE-400 is ideal for this application, as it is rack mountable, compact and very versatile. While some musicians might balk at paying several hundreds of dollars at one crack for effects, the fact remains that four effects with similar capabilities would cost about the same. But the UE-400 offers the additional advantages of operation without patch cords or batteries, and includes good sounding effects as well.

As a stand-alone unit, the UE-400 can sit on a stand or mount in a cabinet at arm's reach for easy adjustment of the controls, while the remote footswitch sits on the floor.

OVERALL EVALUATION. I'm glad someone out there in the world of commercial effects has finally looked at these devices from a system standpoint; the result is less noise, less hassle and more reliability. I've rack mounted all my effects and used remote switchings for many years now, and can attest to the merits of that kind of setup. It's about time that musicians who don't have the inclination to make their own pedalboards from scratch can enjoy the advantages of a true effects system.

The UE-400 is conceptually right on target, priced fairly and boasts some good sounds. For all of you who would like to use multiple effects but can't put up with the battery/patch cord/floor box scene, this device is for you.

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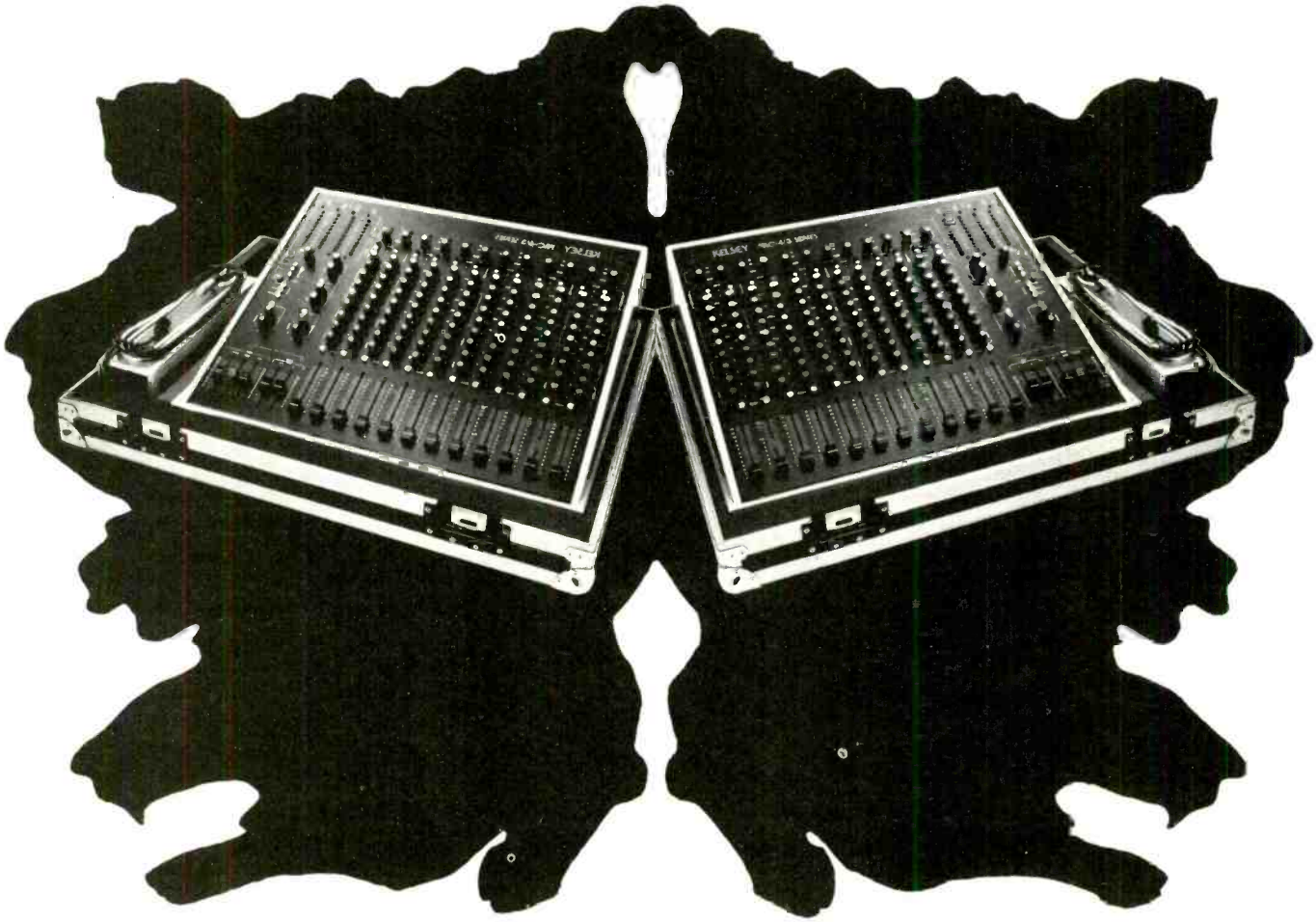
What Do You See In This Ink Blot?



No, what you see is not in your imagination, the Kelsey Pro 4/3 Series is really two mixers in one. Whether you need a four track recording board with stereo mixdown capability, or a live performance board with two true stereo sub masters, the touch of a single button transforms the 4/3's basic mode of operation. And all for one low price.

Flexibility is the cornerstone of the 4/3's strength, but *performance* is what you hear. We've combined an overall voltage gain of 110dB, with diminishing low noise and distortion for matchless sonic clarity and breathtaking dynamics.

Like all Kelsey boards, the 4/3 Series is built to take abuse. Rugged aluminum extrusion construction and top quality components ensure year after year of flawless operation. Each 4/3 comes in it's own foam lined fiberglass SMF road case with a regulated outboard power supply.

So what do WE see in this ink blot? We see the mixer of the future!!

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Ambient Sound

BY LEN FELDMAN

Chocolate Fondue in Nashville

I recently returned from an all-too-brief trip to Music City, U.S.A., better known to non-musical types as Nashville, Tennessee. To be sure, the three day trip included the mandatory visit to The Grand Old Opry, now housed in a 4,400-seat auditorium in the vast Opryland complex on the outskirts of the city (the older, somewhat smaller auditorium located in center city and previously used to house the Opry has been turned into a museum-like tourist attraction). And, of course, I visited several famous recording studios, including the famed Woodland Sound Studios where there are enough gold records to fill several walls. But these were not the primary purposes of my trip.

Perhaps the best known manufacturer of professional recording equipment in the world decided to dedicate its new facility in Nashville in late September, and several members of the audio press, sales representatives and key pro audio dealers were invited to Nashville for the occasion. The company: Studer-Revox America, Inc., the wholly owned subsidiary of the famed Willi Studer Company of Switzerland and West Germany. In truth, the new facility, basically dedicated to warehousing of Revox and Studer products, quality control inspection, servicing and sales, had been in full operation for several months prior to our invasion of Nashville in September. But on the occasion of our visit, Dr. Willi Studer himself was to make one of his very rare visits to the United States (his last one occurred some fifteen years ago) and was prepared to express his views on the state of the audio art and to answer our questions, if we had any.

Well, we had plenty of them, and most of the questions concerned the future of digital audio. Some of the Doctor's answers were to be expected. Others came as something of a surprise. For example, Dr. Studer contends that although we are now witnessing the use of what he calls "fourth generation" PCM or digital recording equipment, results obtained from this equipment are not yet as good as those obtained from top-grade analog equipment. That is not to say that he does not see a future for digital or PCM audio. Quite the contrary. We learned that Studer is not only working on PCM hardware and expects to have a multi-track digital machine by late 1981 or early 1982, but that the company is extremely active in seeking industry-wide standards for PCM recording and reproduction, both in the consumer audio field and in professional equipment.

At the 66th AES convention in Los Angeles [May 1980], Studer and Sony announced that they had agreed upon a new format for stationary head digital recording. At our meeting in Nashville, we were given the bare-bones outline of this proposed standard and would like to share its features with readers of *Modern Recording & Music.*

Dr. Studer noted that, at present, a large number of formats for stationary head digital audio recording have been proposed. His reason for proposing yet another format was to cover a much wider range of application than was previously possible, so that future machine design and interfacing would be much easier. The newly proposed format more than covers the range of channel numbers in use today and is based upon the same nominal tape speeds used in current analog machines. It applies—with no basic change in electronic boards—to professional studio recording, broadcasting and consumer applications.

The jointly supported new format has three nominal sampling rates for the digital information: 50.4 kHz for highest quality studio recording; 44.1 kHz for other studio applications and digital audio discs; and 32 kHz for broadcasting and other applications, corresponding to a standard already adopted by EBU (European Broadcasting Union).

Digital "Word" and Tape Formats

The Studer/Sony proposal conforms with the recommendation of the AES Digital Audio Technical committee and recommends that a 16-bit uniform quantization word format be used as a standard. Furthermore, today's tape widths and nominal tape speeds are used in the format, which accommodates ¼-inch, ½-inch and

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1-inch tape at 30, 15 and 7½ ips. Nominal tape speeds refer to the higher-quality 50.4 kHz sampling rate, and are accordingly decreased when 44.1 or 32 kHz rates are used. Video quality tape is used, with mechanical tolerances in width and track geometry ensuring tape interchangeability. Quarter-inch tape has 8 digital audio tracks, ½-inch tape has 24 and 1-inch tape has 48. In addition, all tapes have two analog tracks, one on each edge, and two auxiliary digital tracks for control and time code. The time code would be SMPTE compatible and the control track allows storage of an adequate quantity of user data.

Tracks and Channels

At the higher speed of 30 ips, a single track is assigned to each channel. At medium speed (15 ips) two tracks are used per channel, with the electronics remaining basically unchanged. At the lowest 7½ ips speed, four tracks are assigned to each channel so that ¼-inch tape is used for stereo recording.

Dropouts, Error-Correction and Editing

A strong error-correcting method called "Cross Interleave Code" with 33.3% redundancy insures a high data security against dropouts. Error protection insures that punch-in and punch-out and electronic editing can be done without signal degradation. The format also offers protection against fingerprints and allows for tape-cut editing, a feature which the professionals have deemed to be extremely important. In the formats proposed the level of fingerprint protection and tape-cut capability is better at high speed than at the lower speeds, but, according to the two proponents, should prove adequate in all appropriate applications.

Studer and Sony expressed the hope that their joint proposal will generate interest in defining a final format which covers the full range of possible applications of digital audio. They said that they would appreciate response from the technical community, and are ready for an open discussion. So, if any of you technical types have any ideas or useful input to impart, you might want to let your view be known by writing to Studer-Revox America, Inc. at 1425 Elm Hill Pike, Nashville, Tennessee 37210. I'm sure that Mr. Bruno Hochstrasser, President of the American subsidiary would be glad to forward your comments to the home office.

Studer Favors Unisette for PCM

Dr. Studer indicated that for consumer PCM recording, he favored a linear system using stationary heads, rather than the hybrid rotary-head video cassette recorder adaptation that is already available as a very limited consumer item from Sony and others. He maintains (and rightly, we think) that a much quieter system can be made using linear tape travel and non-rotating heads, and that such a system would provide longer lasting heads than are possible with a VCR-type rotating head format.

I asked Dr. Studer to comment about the current controversy that concerns the sharp-filter cut-off requirements inherent in just about all PCM consumer systems proposed thus far. With a sampling rate not much higher than twice the highest audio frequency to be recorded, it is imperative that input signals be band-limited to no higher than 20 kHz. Did the good Doctor think that such band limiting would degrade audio fidelity? (After all, there's a whole school of thought that maintains that it is necessary to extend audio bandwidth way out to "RF frequencies.") After assuring me that he did not even hear out to 20 kHz any longer, he went on in a more serious vein to explain that, in his opinion, if the band-limiting filter is well designed, there should be no audible effect from having to filter everything above 20 kHz. Studer, in fact, has developed a filter for this application which is phase-linear to 18 kHz, flat in response to 20 kHz and offers attenuation of 85 dB at 22 kHz!

As for physical formats for consumer versions of PCM linear recorders, Dr. Studer and his company favor something like the now abandoned Elcaset or possibly the Unisette format instead of a reel-to-reel approach.

New Product Introduction

To those of you in the professional end of audio, Studer's professional division has probably seemed to be the dominant portion of the Studer-Revox Company in America. For audiophiles, the identification probably has been with the Revox trade name, with only some vague recognition of the fact that another division of the company also "dabbles" in pro audio. These images have been created rather deliberately, and the truth is that almost equal emphasis (and volume of sales) occurs in both divisions.

As if to prove the point that Revox consumer product sales are of extreme importance to the company and its founder, we were treated to a preview of the first cassette deck in the company's history. To be introduced early in 1981, the model B-710 has eliminated all drive belts, pulleys, friction clutches and mechanical braking; all sources of potential problems. Its dual capstan system will be direct driven by two separate magnetic disc drive motors while its two spooling motors will also feature direct drive and use optical tachometers in a servo system to maintain constant tension during fast-winding. As an example of the Studer-Revox touch so recognized in their open-reel consumer and pro decks, the clear leader at the ends of the cassette tape will be optically sensed and the reels electrically slowed to a stop before any strain is put on the tape-hub connection. All transport functions, including a 4-digit tape counter, will be electronically governed by a microprocessor, which will also generate a clock signal that can be used as an internal timer to turn the deck on and off at predetermined times.

As for the Chocolate Fondue in the title of this column, it was actually served as our dessert at the Opryland Hotel, after the Opry performance. Talk about music bringing far corners of the world closer together!

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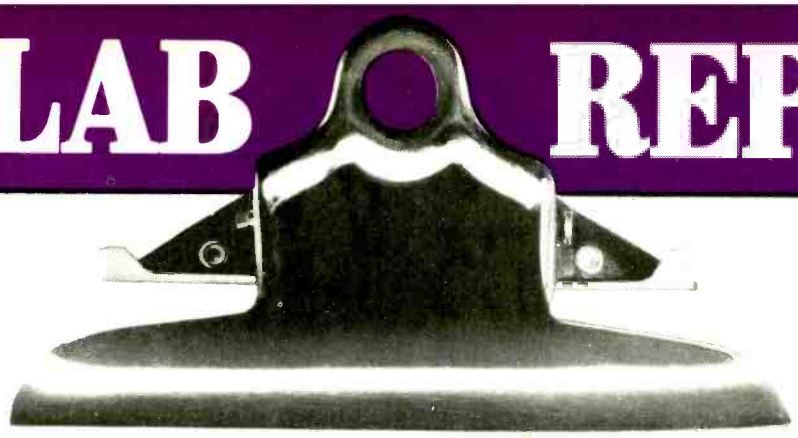
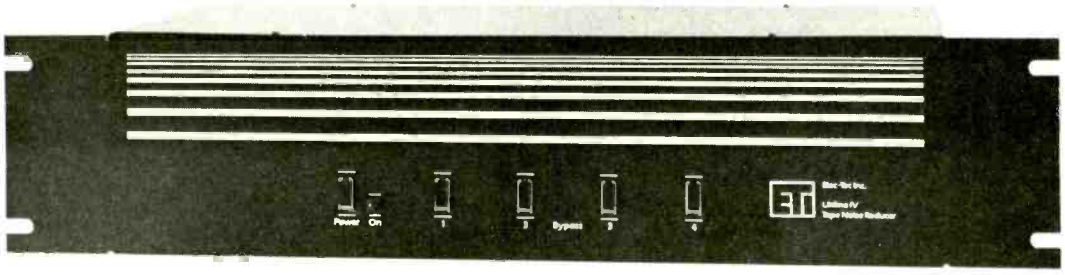


NORMAN EISENBERG AND LEN FELDMAN

Elec-Tec Ultima IV Noise Reducer



General Description: The Ultima IV from Elec-Tec, Inc. is a four-channel simultaneous record/reproduce noise-reduction device designed for use with a direct record/reproduce tape system. The Ultima IV works by compressing the signal in recording and expanding it on playback. Signal-to-noise ratio and dynamic range are said to be improved by as much as 30 dB. A drawing supplied with the device shows its action as providing a 2:1 compression and a reciprocal (1:2) expansion.

The front panel contains the power off/on switch and pilot lamp, plus four buttons to activate or defeat the action independently on any of the system's four channels. Sixteen jacks at the rear handle all inputs and outputs for record and reproduce on each of the four channels the unit is capable of handling. The set's power cord is fitted with a three-prong (grounding) plug. Although the chassis is a bit over 15 inches wide, its sides are fitted with angled pieces that permit standard 19-inch rack-mounting.

Test Results: Lab tests confirmed most of the published specs for the Ultima IV, and use and listening tests confirmed the system's effectiveness in achieving its avowed noise reduction and dynamic range enhancement.

The device's basic operation in the record mode is perhaps best explained by *Fig. 1.* Our analyzer was adjusted to respond to a single frequency (in this case, 1 kHz) without sweeping. The lower trace shows how incremental changes of 10 dB per step were applied to the Ultima-IV. That is to say, the lower trace represents the amplitude of the signal fed into the input terminals. The upper trace shows the amplitude of signals that then would be applied to a tape deck connected to the "record out" terminals of the Ultima IV.

Note that we have *upward* compression for about the first five steps (50 dB), and downward compression for the last or sixth step where the two curves cross each other. Thus, 60 dB of input level change (the scale on the 'scope face is 10 dB per division) comes out as only 30 dB of level change after linear compression has been applied by the Ultima IV. Of course, during playback the reverse or reciprocal procedure occurs, and the 30 dB of level change would be processed back into 60 dB of dynamic range.

Because of the upward compression imparted to signals at low levels, signals are elevated above "noise floors" for up to 30 dB of noise reduction through the entire process. Evidence of this effect is obvious in the 'scope photo of *Fig. 2.* Here, the lower trace represents playback of a tone that was recorded at 40 dB below reference level. Residual noise represents a substantial percentage of the signal. Using the same tape sample on the same cassette deck, we interposed the Ultima-IV in the signal paths for record and playback, and the playback trace now appears as shown in the upper trace, relatively free of the residual noise.

Downward compression of loud signals tends to reduce third-order distortion in tape recordings, as evidenced by the two distortion plots of *Fig. 3,* created with our Sound Technology model 1500A test set. The companding process was used for the left channel but not for the right. In this situation, third-order distor-

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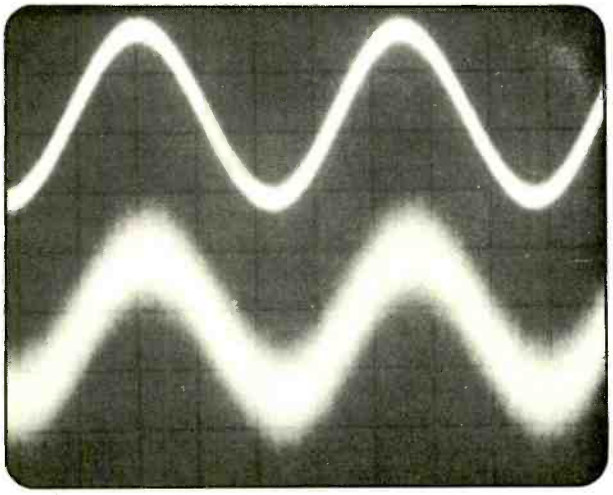

Fig. 1: Elec-Tec Ultima IV: Linear amplitude changes (lower trace) are compressed by a factor of 2:1 before they are recorded.

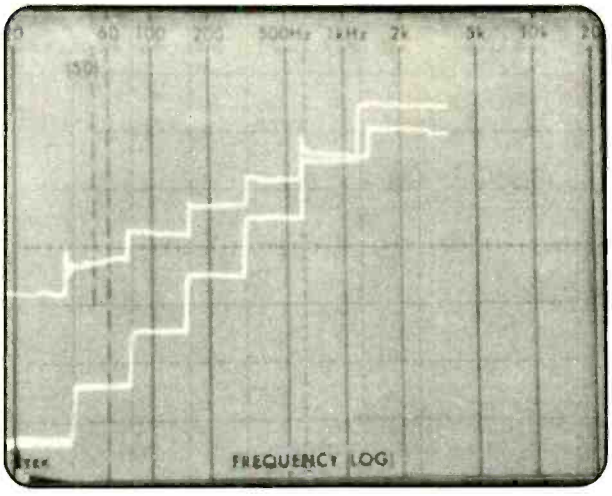

Fig. 2: Elec-Tec Ultima IV: Both signals were recorded on a cassette tape at −40 dB level. Upper trace is playback via Ultima IV compander processing.

tion at a recording level of +5 dB was only 0.48 percent (or −46.2 dB below reference level) for the companded left channel. It remained higher at 1.3 percent (−37.2 dB) for the non-processed right channel. The lower trace represents third-order distortion at other "left" record levels, while the other upper trace shows third-order distortion for various record levels of the unprocessed "right" channel.

By the same token, the companding process also can improve high-end frequency response, as shown in *Fig. 4*. Here, the upper trace shows the right channel, for which the Ultima IV companding was used, and the response is still at +1.7 dB out to 20 kHz (R channel). The lower trace shows the L channel, for which no companding was used. It was recorded at the same level as the R channel, but is displaced in the display for ease of viewing. Its response is already down by −2.8 dB at 20 kHz.

Using tape in the record mode but with no signal applied, we measured residual noise (with respect to 0-dB record level reference) with and without the compander in the circuit. Without the Ultima IV, measured results were −45.1 dB, as shown in *Fig. 5*. With the tape subjected to processing by the Ultima IV, the signal-to-noise ratio increased to a remarkable 74.4 dB, an improvement of 29.3 dB.

General Info: Dimensions are 15⅛ inches wide (plus added portions of panel for 19-inch rack-mount); 4 inches high; 8 inches deep. Weight: 14 pounds. Price: $449 (with RCA phono jacks); $535 (with BNC connectors); $570 (with XLR connectors).

Individual Comment by L.F.: In just about every way that I could think of, the Elec-Tec Ultima IV Noise Reducer resembles a similar, much earlier product by dbx which does just about the same thing that this unit does, but does it in a slightly different way. Elec-Tec says nothing in its descriptive title of this product about the fact that it also improves the dynamic-range capability of any home tape deck, but of course the 2:1/1:2 companding with which we are all familiar does that in addition to reducing noise introduced during the tape recording process.

So similar is the approach of Elec-Tec to dbx (externally, at least) that the brief (all too brief) owner's manual supplied with the Ultima IV even uses the familiar "bow-tie" diagram popularized by dbx to explain how 100 dB of dynamic range can be compressed

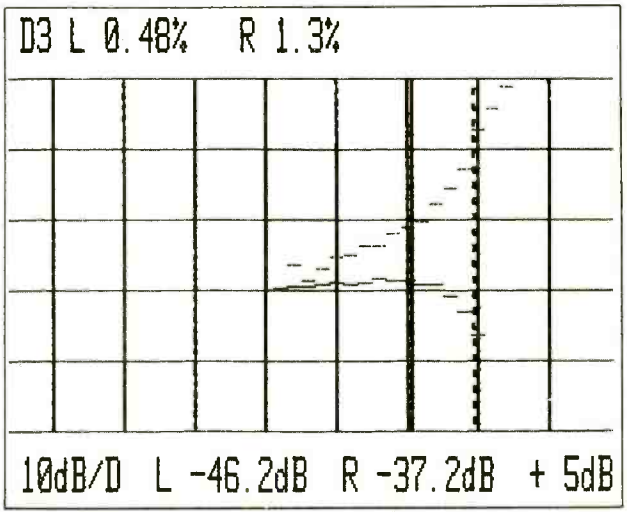

Fig. 3: Elec-Tec Ultima IV: Companding also reduces distortion at high recording levels (0.48% with companding vs. 1.3% without).

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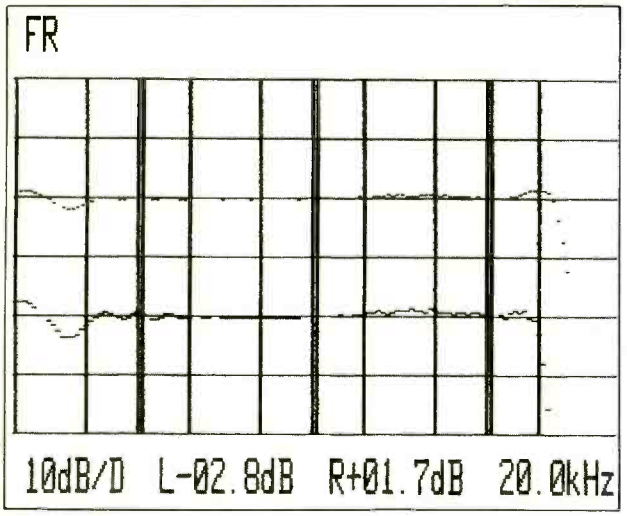

Fig. 4: Elec-Tec Ultima IV: Companding can improve record/play response on cassette deck. "R" channel used Ultima IV companding while "L" channel did not. Note difference in responses at 20 kHz.

down to 50 dB during the record half of the companding cycle and then expanded out again to its full glorious 100 dB during playback. To those of us who are familiar with dbx companding and the new dbx-encoded discs, it all has been said before.

What I did learn is that the particular sensing technique used to provide logarithmic compression and expansion in this unit differs from that used by dbx, and that is why you are not likely to read about knock-down drag-out patent litigations between the two firms. In fact, the Ultima IV uses a familiar ready-made IC which, we suspect, is the same one used by another manufacturer who also offers companders based upon this same working principle. Ultima IV's makers elected to provide four channels of companding rather than the two that the competition offers. So, if you own a 4-channel multi-track reel-to-reel machine and want to use this kind of noise-reduction technique, here's a handy compact unit that will do it all.

In listening tests we were impressed with the attack and release times designed into the Ultima IV. There were some instances of detectable "pumping" and "breathing," and—on the whole—we would say that these undesired effects were somewhat more severe than those we have encountered with dbx products designed to accomplish the same results. Still, under most musical listening conditions, we were able to accept these effects which occur, to some extent, with a linear compander that employs such extreme compression and expansion, and is not frequency-discriminating.

In the last analysis it's a matter of trade-offs. Are you willing to tolerate some audible companding effects which are not part of the program itself in return for being able to "contain" about 30 dB of extra dynamic range on a cassette deck, and about an equal amount of improvement in signal-to-noise? If the answer is "yes," you may want to look into the Ultima IV.

Individual Comment by N.E.: It was probably inevitable that the 2:1/1:2 type of compander would begin to appear under more than one brand-name inasmuch as its beneficial action—reducing noise, enhancing dynamic range, improving high-end response—is clearly demonstrable. Whether the Ultima IV is a clever "copy" of someone else's with enough variations to avoid patent infringement, I am not qualified to say, although—as Len points out—the general similarity of this device to others, including the use of the "bow-tie" diagram to explain its action, is fairly apparent. Be that as it may, from a user's standpoint, the Ultima IV is, as obviously was intended in its design, extremely simple to use even with its four-channel facilities. I suppose my one main criticism of the Ultima IV has to do with the "instructions" supplied with the unit. I prefer to believe that they were prepared in great haste and that a more detailed and better illustrated manual will be forthcoming.

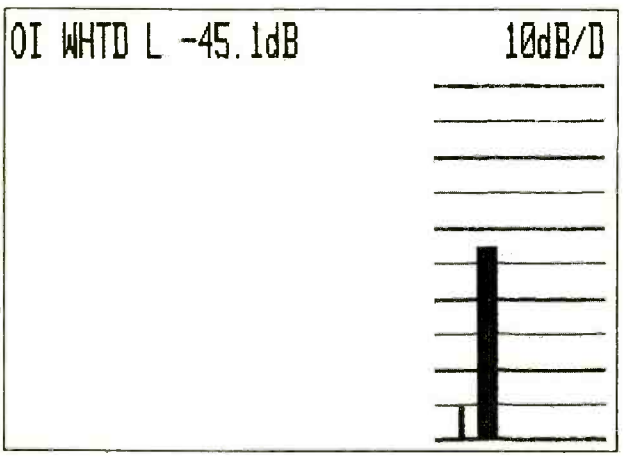

Fig. 5: Elec-Tec Ultima IV: Residual noise of cassette tape without noise reduction measured −45.1 dB below 0 dB record level.

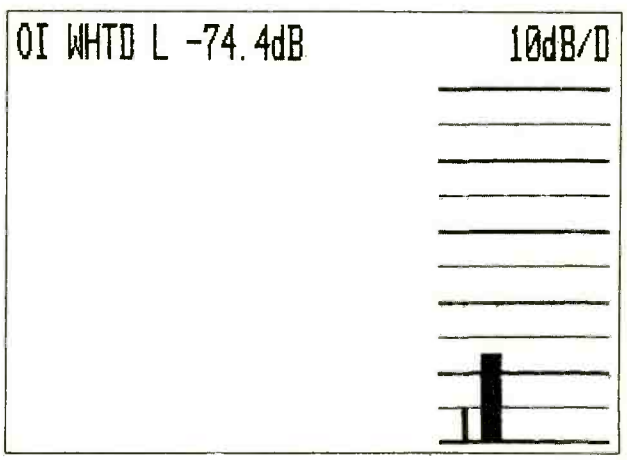

Fig. 6: Elec-Tec Ultima IV: Companding residual noise improved to −74.4 dB below 0 dB reference, or an improvement of 29.3 dB.

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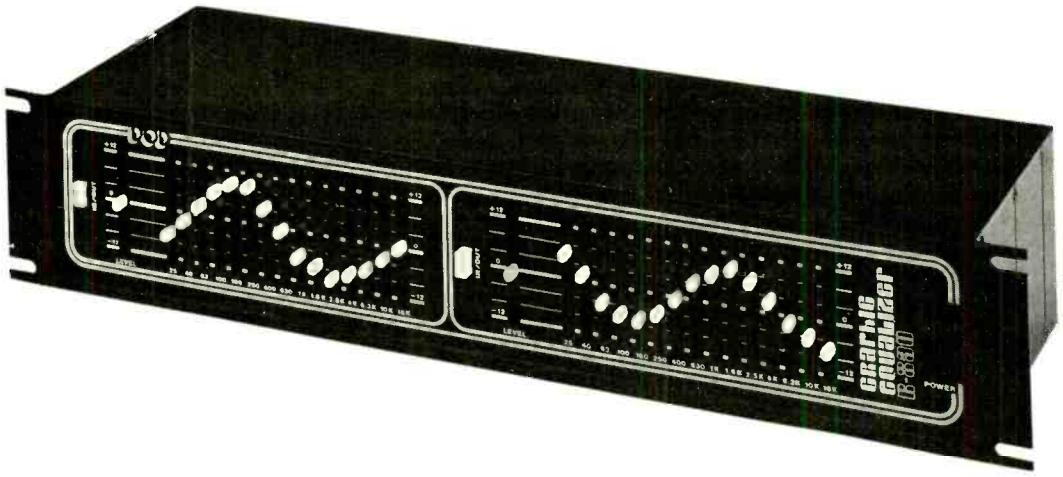
ELEC-TEC ULTIMA IV NOISE REDUCER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Input impedance	5 K unbalanced	Confirmed
Input level	+10 dB (3 V rms) max	3 volts
Input noise	90 dB below 1 volt	90 dB, "A" wtd
Input level, record	1 mV to 3 V rms	Confirmed
reproduce	1 mV to 1.5 V rms	Confirmed
Output impedance	50 ohms	Confirmed
Output level	+10 dB (3 V rms) into 1 K ohm load or greater	Confirmed
Frequency response	"±1 dB Hz to 100 kHz at .707 V rms in and out"	25 Hz to 90 kHz, −1 dB
Distortion	<0.25% THD	0.3% at 1 kHz 0.46% at 20 kHz 0.35% at 20 Hz
Phase shift	<2%	Confirmed
Crosstalk	>70 dB	72 dB at 1 kHz
Attack time	10 msec	Confirmed
Release time	0.25 msec	Confirmed
Power consumption	2 watts nominal	Confirmed

CIRCLE 1 ON READER SERVICE CARD

DOD Model R-830 Graphic Equalizer



General Description: The model R-830 by DOD Electronics Corp. is a dual 15-band graphic equalizer. Two groups of 15 frequency bands with slider controls are provided. Nominal frequency divisions are on ⅔-octave ISO centers, and the unit is rated to provide up to ±12 dB of boost or cut on each frequency center. In addition to the EQ sliders, each channel has its own master level slider and an EQ in/out button. These controls are all found on the front panel along with the device's AC power off/on switch. All sliders have center detents, and their markings are white against the panel's black matte finish. The end panels are fitted with right-angle projections for standard 19-inch rack-mounting.

Signal connections at the rear are ¼-inch phone jacks. Eight jacks are provided for balanced and unbalanced inputs and outputs on each channel. The unit's power cord uses a 3-prong (grounding) plug.

Test Results: Most of the published specs for the DOD R-830 were met or exceeded in our lab tests. Frequency response is not specified in terms of plus-or-

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minus dB but we did measure a span from below 20 Hz to beyond 20 kHz for the −1 dB points, which is very good indeed.

As may be seen in *Fig. 1*—which shows a spectrum analyzer series of plots, one for each maximum-cut and maximum-boost setting of the controls, stored on a storage 'scope—frequency spacing between adjacent band is very nearly uniform.

Intermediate degrees of boost and cut for a single band control are shown in *Fig. 2.* The slider control does not provide linear increments of boost or cut as one changes the setting by equal amounts, but with a little practice the user should be able to arrive at the desired boost or cut without having to refer to the calibration marks on the front panel.

In *Fig. 3* we show what happens when the 400-Hz band control is set for maximum boost, and the 630-Hz slider is set for maximum cut. The lack of interaction here suggests it would be possible to establish a rather complex equalization curve with this instrument should such a curve be required.

We used our Sound Technology model 1500A test instrument to plot and to measure the range of one of the DOD R-830's band-controls simply because the test device can accurately read out amplitudes to the nearest 0.1 dB. As shown on the hard-copy video printout of *Fig. 4,* at 690 Hz (not quite on-center frequency for the 630 Hz band of the equalizer) we got a maximum boost reading of +13.5 dB and a maximum cut of −12.5 dB. This of course easily confirms the claimed ±12.5 dB range. Note that the "L" and "R" references shown in *Fig. 4* are to be ignored—they are there merely because our test instrument stores two sequential plots only by referring to one of them as L and to the other as R channel plots. In fact, the boost and cut plots shown here are both for the same channel of the equalizer.

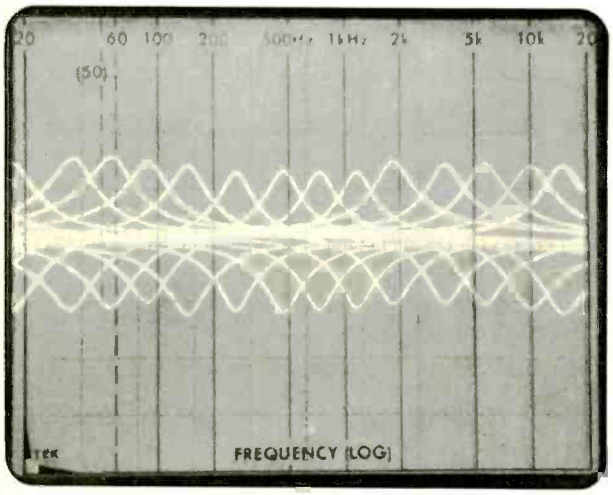

Fig. 1: DOD R-830: Multiple storage 'scope spectrum analyzer sweeps show total range of controls.

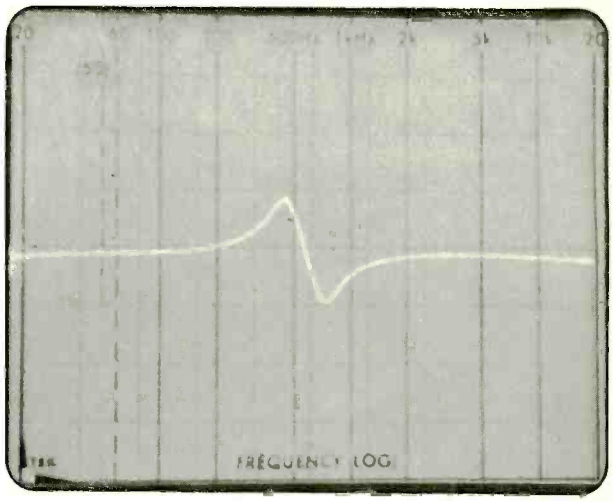

Fig. 2: DOD R-830: Range of a single band control on the unit.

With signal-to-noise readings as low as (or lower than) what you are likely to encounter in the rest of your sound system or signal lines, and with distortion readings that hover near the residual distortion levels of our test setup, there really is nothing to criticize in terms of the R-830's circuitry which, by the way, employs active-circuit filters or gyrators rather than hum-and-noise susceptible physical inductors.

General Info: Dimensions are 19 inches wide; 6½ inches deep; 3½ inches high. Weight is 10 pounds. Price is $299.95.

Individual Comment by L.F.: There are certain design features of graphic equalizers which I consider to be important when the device is to be used for pur-

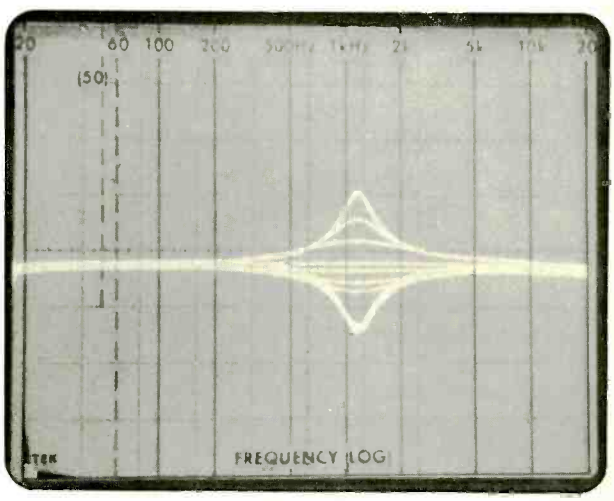

Fig. 3: DOD R-830: Response of R-830 when adjacent controls are set for maximum boost and cut.

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poses other than an elaborate home music system tone control. DOD Electronics Corp. has managed to incorporate some of them in its very attractively priced model R-830. In fact, after having tested and listened to it in use, I felt that it would be well worth its price (and then some) had it been a ten-band octave-by-octave equalizer instead of a 15-band ⅔-octave unit.

Having an overall input level control (and for each channel at that) is, I feel, an absolute necessity on any serious equalizer, and the R-830 does have that. Providing both balanced and unbalanced input and output facilities is another must which the R-830 provides. The device is so compact that the individual band controls end up being very close together (less than my "finger-width" apart), but since it is presumed that the user is not likely to change settings while a given program is in progress, I don't regard this as a serious limitation. Actually, even with the controls closely spaced, the excellent visibility of the markings, and the easy-to-feel center-detents for flat settings make it fairly simple to establish repeatable control settings.

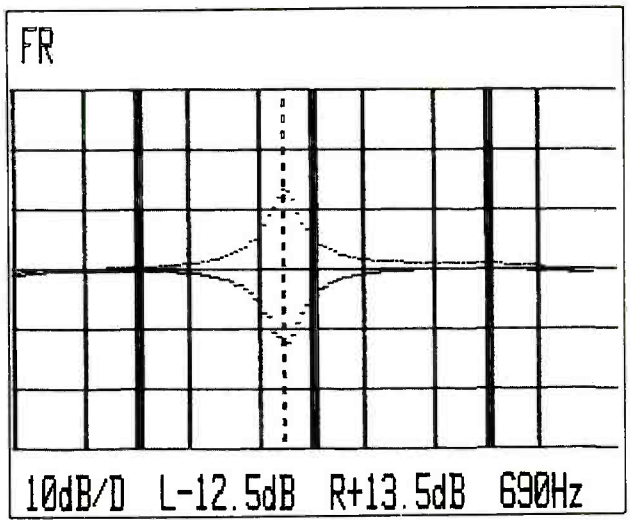

Fig. 4: DOD R-830: Twin plots of boost and cut show range of + 13.5 and − 12.5 dB for center frequency of 690 kHz.

Individual Comment by N.E.: The sliders on the R-830 are rather close to one another which makes this device a really "finger-tip" operated unit. On the other hand (no pun intended), the spacing of the sliders also makes it easy to shift adjacent sliders simultaneously and—with a little practice—by slightly different amounts so that you can "contour" faster than if the controls had been spaced farther apart.

The test results on the R-830 do tell the basic story. This is a straightforward and effective graphic equalizer which, at its relatively low price, is well worth consideration by anyone who wants to go beyond the octave-by-octave EQ format, but is not quite in need of ⅓-octave compensation facilities.

DOD R-830 GRAPHIC EQUALIZER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Frequency response	10 Hz to 40 kHz (no dB tolerance stated)	−1 dB, 17 Hz to 26 kHz
Total harmonic distortion	< 0.01%	
1 kHz (ref. 1 V)		0.003%
20 Hz (ref. 1 V)		0.0087%
20 kHz (ref. 1 V)		0.006% (no significant increase in THD to + 18 dB above 1 V input)
SMPTE-IM distortion	0.01%	0.0035% at 1 V
S/N ratio	95 dB	("A" wtd) 98 dB re: 1 V
Maximum output level		
balanced	20 dBm (10 V into 10 K)	Confirmed
unbalanced	17 dBm (5 V into 10 K)	Confirmed
Output impedance, bal/unbal	940/470 ohms	Confirmed
Input impedance, bal/unbal	66/33 K ohms	Confirmed
Maximum input level		
balanced	+ 20 dBm re: 0.775 V	Confirmed
unbalanced	same	Confirmed
EQ control range	± 12 dB	See Fig. 4
EQ center frequencies	15 bands on standard 2/3 octave ISO centers	25, 40, 63, 100, 160, 250, 400, 630 Hz, 1, 1.6, 2.5, 4, 6.3, 10, 16 kHz
Power requirements	105-125 VAC, 50/60 Hz, 2 W	Confirmed

CIRCLE 2 ON READER SERVICE CARD

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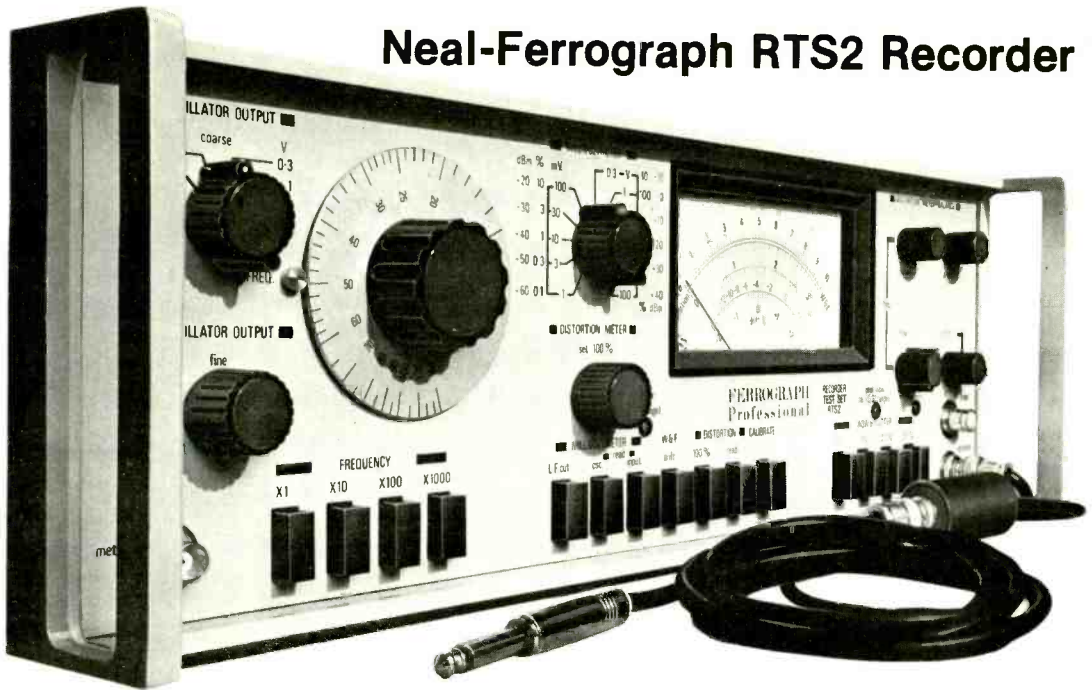
Neal-Ferrograph RTS2 Recorder Test Set



General Description: The model RTS2 from the British firm of Neal-Ferrograph and designated as a Recorder Test Set is a professional-grade instrument for measuring frequency response, drift, wow and flutter, distortion, signal-to-noise and gain. In use, the RTS2 is interfaced with a recorder, and appropriate portions of the device are activated by the user for specific tests and readouts.

The unit's front panel, which contains all operating controls and features, tells much of the story and should be studied carefully together with the owner's manual by anyone planning to use the RTS2. The group of controls toward the left handle the system's built-in oscillator, used for generating various test frequencies, and for adjusting the test signal levels. A multi-purpose meter occupies a prominent position on the panel; this is basically a millivoltmeter that can be switched to show actual volts of signal, percentages of distortion, wow-and-flutter, dB levels and percentages of drift. The meter also is used to calibrate the instrument. A series of knobs and push-button switches surrounding the meter handle its various functions. The device's power off/on switch, labeled "Supply," is found at the extreme right.

The panel also includes three twist-lock connectors for feeding test signals from the RTS2 into a recorder, feeding the results back into the RTS2 for metering and for optional feeding of the test results to an external oscilloscope. The rear of the device contains only a socket for inserting the AC power cord (a three-wire cable requiring a grounding plug) and a line fuse. The underside of the device contains a swing-down metal stand that permits angling the device for easy viewing. Alternately it may be placed completely horizontally on its four rubber feet. Styling is neat and efficient, with good legibility. The front is fitted with handles.

Input and output circuits are nominally unbalanced, but may be converted to balanced by an auxiliary unit.

Test Results: Published specifications for the RTS2 are grouped according to the various sections of the device and are detailed in the accompanying "Vital Statistics" table. As may be seen from this table, they all were either confirmed or bettered in our lab tests. The RTS2 is capable of performing the various test functions ascribed to it, albeit the procedures do take a fair amount of time. However, if one is willing to go through all the adjustments spelled out in the manual, highly accurate readings will be obtained. The RTS2 also appears to be very well built, and capable of withstanding the rigors of frequent use (and mis-use) in a typically small recording studio or service shop.

General Info: Dimensions are 17⅜ inches wide; 5⅝ inches high; 10 inches deep. Weight is 13 pounds. Price is $1475.

Individual Comment by L.F.: The single piece of test equipment recently purchased for my laboratory for measuring and calibrating tape recorders now sells for about $5500. It cost somewhat less when I bought it from Sound Technology some time ago (inflation, you know) but not that much less.

The Neal-Ferrograph RTS2 costs less than $1500. If you read the descriptive literature for each of these instruments you will find that both are used for pretty much the same measuring tasks. Both can measure, for instance, distortion. Both can measure wow-and-flutter. And so on. And though not specifically mentioned, the Neal-Ferrograph unit could be used to measure the frequency response of a tape deck at any recording level you choose, since it does contain a

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variable frequency audio oscillator that covers much more frequency range than you are ever likely to need in connection with tape-recording work.

So why would I spend more than three times as much for my Sound Technology 1500A as opposed to buying the lower-priced Neal-Ferrograph tester? There are some basic reasons. In my work, I have to test a great many tape decks, not to mention a great number of tapes. The Sound Technology device contains, and is operated by, a built-in microprocessor that can do in a few minutes what the Neal-Ferrograph takes more than an hour to do.

Furthermore, the results obtained with my costlier unit are likely to be a whole order of magnitude more accurate than the results I can obtain with the mechanical metering system of the Neal Ferrograph unit.

This still does not mean that everyone who owns a small (or even large) recording studio should rush out and plunk down $5000-plus for the fancy Sound Technology unit. In my view, not everyone needs to be able to check out a deck (or several decks) in a matter of minutes. Nor is it essential for everyone involved in deck alignment or testing to be able to read down to tenths of a dB, or tenths of a percent (or even lower) of drift.

So, if you are not in a great hurry, and you do not require the ultra-accuracy of something like the Sound Tech device, this model from Neal-Ferrograph—which is priced much lower—will provide yeoman service.

Individual Comment by N.E.: The method used in the RTS2 for making measurements is generally slow and requires patience and a step-by-step approach to doing things. The THD procedure is especially tedious, involving as it does successive and repetitive vernier adjustments of as many as four separate knobs. It reminds one of the way THD measurements were made some years ago in the B.C. (that's Before Computerization) era.

Nevertheless, when you do go through all of the routine prescribed, you will come up with results that are at least as accurate as (sometimes more so than) those claimed in the unit's specifications.

NEAL-FERROGRAPH RTS2 RECORDER TEST SET: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
	Variable Frequency Test Signal Generator	
Frequency ranges	15 Hz to 150 kHz, 4 ranges	Confirmed
Frequency response	±0.2 dB over entire range	±0.15 dB
Distortion:	Below 0.025% @ 1 kHz	0.025% @ 100 Hz; 0.01% @ 1 kHz;
	Below 0.08% 100 Hz-20 kHz	0.008% @ 20 kHz
Max out. level, open circuit	3.0 V	3.3 V
	Fixed Signal Generator for Wow/Drift Measurements	
Frequency	3 kHz (3.15 on Model RTS-2)	3000 Hz
Output level	350 mV	400 mV, fixed
Output impedance	220 ohms approx.	Confirmed
	Millivoltmeter	
Frequency response	±0.2 dB, 10 Hz to 150 kHz	Confirmed
Accuracy	±2% (full scale), 30 Hz to 20 kHz	±1.3%
Sensitivity (full scale)	1 mV to 100 V in 10 dB steps	Confirmed
Input impedance	2 Megohms	More than 2 M ohms
Indication	Average-reading, scaled in rms	Confirmed
	Distortion Meter	
Input signal frequency	400 Hz to 1100 Hz	400 Hz to 1150
Minimum reading capability	Less than 0.05%	0.006%
Bandwidth of HD measurement	15 Hz to 20 kHz	Confirmed
LF filter cut-off	N/A	−4 dB @ 400 Hz
	Wow and Flutter Meter	
Type of measurements	Peak W&F, Per DIN 45507	Confirmed
Input signal level required	75 mV	70 mV
Frequency accuracy required	±5%	N/A
Sensitivity, W&F readings	0.1%, 0.3% & 1% scales	Confirmed
Sensitivity, drift readings	±2.0% scale	Confirmed
Input impedance	50 K ohms	Confirmed
Drift accuracy	N/A	+0.2%

CIRCLE 3 ON READER SERVICE CARD

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NEI Model 321 Electronic Crossover

By John Murphy and Jim Ford

This month we are returning our attention to crossovers as we review the model 321 electronic crossover from NEI. This is basically a stereo two-way crossover, but it easily can be configured for use as a mono three-way frequency dividing system. The unit features continuously adjustable front panel crossover frequency tuning, as well as high- and low-frequency level controls for each channel. The NEI crossover is packaged in a single width (1¾ inch) rack-mounting black chassis with white graphics. The active electronic filters are 18-dB-per-octave Butterworth types.

General Description: As an electronic crossover, the primary application of the 321 is in multiamplified loudspeaker systems. In a stereo sound reinforcement system, for example, the main stereo outputs of the mixer (line level) would be routed to the two inputs of the crossover. The crossover's electronic filters would then split each of these full spectrum signals into two frequency bands ("High" and "Low") on either side of some dividing frequency referred to as the "crossover frequency." Thus, each channel of the crossover has a high-frequency output and a low-frequency output, making a total of four output signals from the unit. These four signals would then be routed to four power amplifiers (or more likely, two stereo power amplifiers) and the outputs of the power amplifiers routed to the appropriate high- and low-frequency loudspeaker subsystems for each channel.

The model 321 is priced at $299.

In order to use the 321 as a three-way mono crossover, the "Low" output of channel one could be patched into the input of channel two. The upper crossover frequency would be set using the tuning controls for channel one, while the lower crossover frequency would be set using the controls for channel two. The "High" output would be taken from channel one's high output, while the "Mid" and "Low" outputs would be taken from the high and low outputs of channel two, respectively. (For further discussion of crossovers and multiamplified loudspeaker systems, see the "Hands-On Reports" titled "An Overview of Crossovers, Parts I and II" in the August and September 1980 issues of *MR&M*).

Now let's go over the controls and connections on the 321. The main power on/off switch is at the far right on the front panel along with a red power pilot light. The remainder of the front panel is divided into two identical groups of controls, one set for each channel. At the far left of each control group is a red LED peak indicator which illuminates whenever the signal in that channel exceeds the maximum input level. The crossover frequency is set through the use of a rotary "frequency" control acting in conjunction with a push-button "range" switch. The frequency control is continuously adjustable and is labeled with eleven frequencies from 100 Hz to 1.6 kHz. Depressing the "range" button switches the range of the frequency control upward by a factor of ten (X10) so that the frequency control then will set the crossover anywhere over the range from 1 kHz to 16 kHz. To the right of the crossover tuning controls are a pair of output level controls, one each for the high- and low-frequency outputs. With the level controls set at maximum, the crossover then can provide unity gain from input to output. At the far right of each control group is a second push-button switch labeled "HF phase" which inverts the polarity of the high-frequency output signal when depressed. Although using the unit either with or without the high-frequency polarity reversal will result in an accurate summed frequency response, as you'll see below, inverting the high-frequency polarity results in somewhat better phase linearity. This is one of the characteristics of the third-order (18 dB/octave) Butterworth filter pair.

All input and output connections to the crossover are

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made at the rear of the unit. There are two connectors for each input and output, ¼-inch phone jacks for unbalanced signal connections and 3-pin XLR-type connectors for balanced signal connections. This allows the 321 to meet requirements for any combination of balanced or unbalanced input or output signals. Besides signal connections, the rear panel contains only an AC line fuse and the line cord.

As with many of the crossovers we see, the front panel crossover frequency tuning controls on the NEI unit are completely unguarded. Front panel crossover frequency adjustments are a nice convenience when initially setting the loudspeaker system's crossover point, but crossover frequency selection is normally made when the system is initially assembled and can be considered to be a permanent setting after that. It's our opinion that after the initial crossover frequency selection, unguarded front panel crossover frequency controls constitute nothing but a hazard to the high frequency loudspeaker components. The simple act of rotating the frequency control to a lower frequency, or just pushing the "range" switch could easily destroy all the diaphragms in an entire bank of high-frequency horn drivers. It's for this reason that we would prefer to see better "guarding" on crossover tuning controls. Adequate guarding could be provided by nothing more than a safety cover that could be fitted over the front panel controls to keep out the knob-twiddlers; but we think a better solution is either to make crossover tuning a screwdriver adjustment at the rear panel or even require the removal of the chassis cover to adjust the crossover frequency. This would prevent the casual adjustment of the loudspeaker system crossover frequency as if it were an EQ control.

Listening Test: In order to evaluate the sonic characteristics of the 321 we connected it into our reference listening system using a tape monitor loop on our stereo preamp. Since we wanted to hear how the unit would perform when its high- and low-frequency outputs were accurately summed (as they would be in a well-designed loudspeaker system) it was necessary to include our summing amplifier in the tape loop to combine the high and low outputs of the crossover. After interfacing the crossover with our system, we proceeded to listen to some high-quality discs while occasionally switching the crossover in and out of the listening chain. With the output level controls of the unit at their maximum setting, there was a slight drop in level (about 1 dB) when the crossover was switched into the chain. Other than this slight loss in level, we heard no changes when listening through the 321. The NEI crossover is virtually "transparent" to the audio signal, as any good crossover should be.

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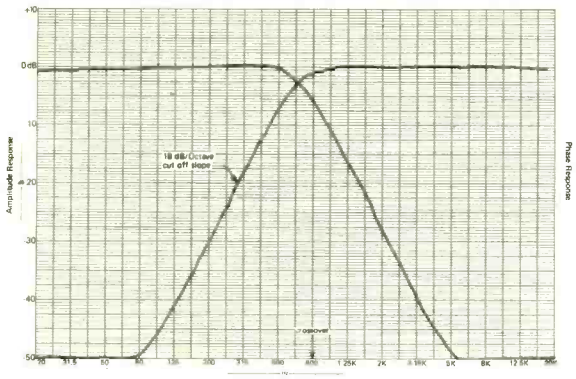
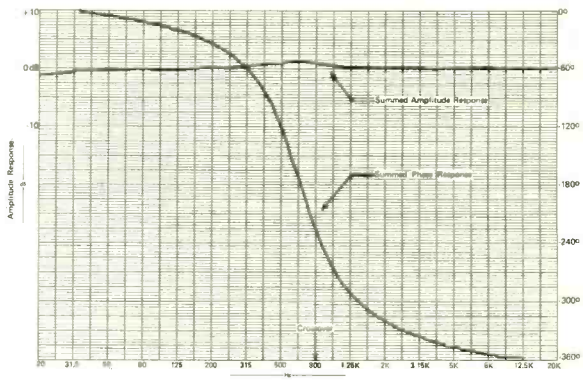


NEI 321: Amplitude and phase response of the summed output (high frequency invert switch "out.")



NEI 321: Amplitude and phase response of the summed output (high frequency invert switch "in.")

Lab Test: We put the 321 through our usual regimen of tests and the specific results are provided in the "Lab Test Summary" below.

The unit will accept input signal levels up to about +22 dBV before clipping and the output will go to about +20 dBV before clipping. This is more than an adequate drive level for modern power amplifiers.

The noise level at the channel one outputs was quite low (about −90 dBV), but the noise at the output of channel two was considerably higher at about −60 dBV. We observed that the noise was mostly power supply buzz, and upon peeking inside the chassis noticed that the unit's power supply is located on the same circuit board as the channel two electronics. In addition, we could see that the output leads for channel two are routed in close proximity to the power transformer on the way to the real panel output connectors. NEI confirmed to us that these are the probable causes of the elevated noise levels in the channel two outputs and that they are in the process of making an engineering change to reduce the noise levels in future production units.

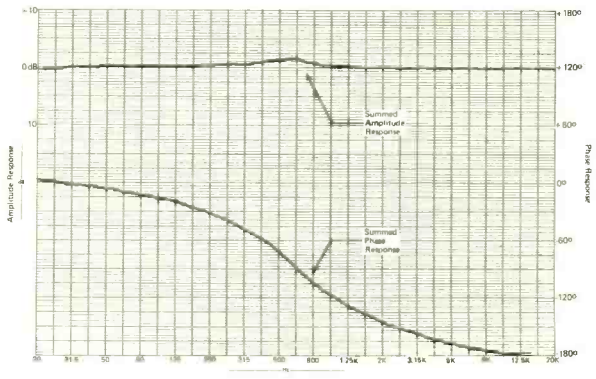
We found the total harmonic distortion (THD) through the crossover to be very low. Up to 10 kHz it was at (or below) the measurement limit of our distortion analyzer (.002%). At 20 kHz the distortion had increased to .02% because the test signal was approaching the slew rate limit of the electronics.

The 321 could be driven into hard slew limiting by a full level sine wave above 14.0 kHz (the unit's high frequency power bandwidth). The slew rate limit was observed to be 1.0 volts per microsecond which is consistent with the 14.0 kHz power bandwidth. Dividing the slew rate limit by the peak output voltage swing (11.4 volts) reveals a "normalized slew rate limit" of 0.088 volts per microsecond per volt. This is considerably lower than the minimum recommended value (0.5 volts per microsecond per volt) for freedom from slewing induced distortion.[1] The small signal bandwidth of the crossover was quite wide, extending from about 1 Hz to beyond 100 kHz.

Frequency response plots for the high and low outputs of channel one are provided at *Figure 1.* The front panel frequency controls were set for a crossover frequency of 800 Hz, but, as you can see, the actual crossover occurred closer to 630 Hz. This represents about a ⅓ octave error in frequency which would probably be acceptable in most applications.

Figure 2 shows the amplitude and phase characteristics that result when the high- and low-frequency outputs are summed. The summed amplitude response is flat with the minor exception of a gentle 1 dB rise at the crossover point. The phase response changes smoothly from 0° at the low frequency end of the spectrum to −360° at high frequencies. Similarly, *Figure 3* shows the amplitude and phase characteristics that result when the outputs are summed with the high frequency polarity invert switch depressed. The amplitude response is the same as before, but note that the polarity inversion reduced the total phase shift to −180° at high frequencies. Operating the crossover with the high-frequency invert button depressed will therefore provide the best phase characteristic in an accurately summed signal.

In the course of our testing, we noticed that the low frequency output of channel two has an inverted polarity compared to the input whereas channel one does not.



NEI 321: Separate amplitude response curves for the high and low outputs.

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This means that the low-frequency outputs have opposite polarity, which is not as things should be. When we mentioned this problem to NEI, they indicated that it was probably an assembly error in wiring the output connector in our test sample and that their quality control efforts have been stepped up recently in an attempt to eliminate such errors.

NEI's operating guide for the 321 provides a brief discussion of the advantages of multiamplification and provides system diagrams for the use of the crossover in both stereo two-way and mono three-way loudspeaker systems.

Conclusion: The model 321 electronic crossover from NEI was found to be a good unit with excellent summed response characteristics. We feel the unit could be improved through the use of some of the newer integrated circuit devices (with faster slewing rates), and, as with most crossovers on the market, we would like to see some form of "guarding" on the crossover frequency controls.

CIRCLE 48 ON READER SERVICE CARD

REFERENCE:

1. W.G. Jung, M.L. Stephens, C.C. Tood, "An Overview of SID and TIM, Part II," ***Audio* (July 1979), 38-47.**

LAB TEST SUMMARY

Note: O dBV is referenced to .775 Vrms

Input/Output Levels

Maximum input level before clipping: +21.8 dBV
Maximum output level before clipping: +20.3

Noise Performance

(20 kHz filter; unweighted; crossover point at 800 Hz; level controls at maximum; 600 ohm source impedance)

Noise at "High" output (CH1): −89.8 dBV
Noise at "Low" output (CH1): −93.4 dBV
Noise at "High" output (CH2): −62.3 dBV
Noise at "low" output (CH2): −58.0 dBV

Distortion Performance

(THD = +10 dBV output level)

Frequency	THD & Noise
100 Hz	.002% (at "Low" output)
500 Hz	.002% (at "Low" output)
2 kHz	.002% (at "High" output)
10 kHz	.004% (at "High" output)
20 kHz	.020% (at "High" output)

Small signal bandwidth: 1 Hz to 115 kHz (−3 dB)
High frequency power bandwidth: 14.0 kHz
Slew rate limit: 1.0 volt per microsecond
Normalized slew rate limit: 0.088 volts per microsecond per volt.

ALL YOU NEED IS EARS

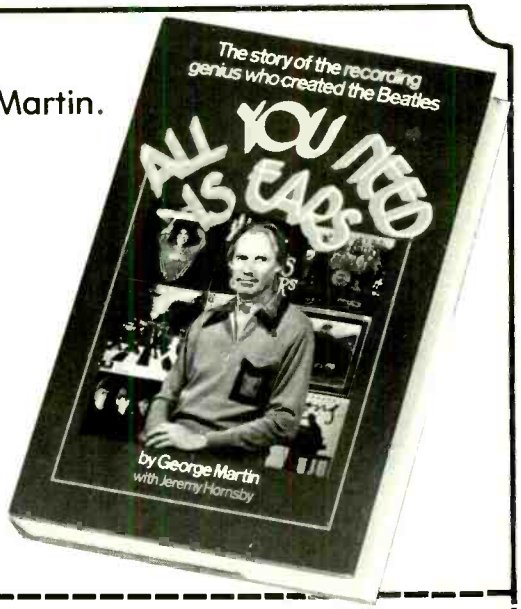
The memoirs of modern recording genius George Martin.

George Martin is the most famous producer in the music business. Working with such diverse stars as Judy Garland, the Bee Gees, Ella Fitzgerald, Cheap Trick, *and* The Beatles, he has constantly set new standards for the recording industry and redefined the relationship between artist and producer.

Now, in ALL YOU NEED IS EARS, Martin details his amazing career in the vanguard of modern recording. . . from the early days when wax was the medium, 78 was the speed, and an echo chamber was a small tiled room. . . to the advent of revolutionary digital reproduction. His vast experience makes him an expert commentator on fascinating backroom details like acoustics, arrangement, orchestration, microphone techniques, and more.

In addition, Martin offers an entertaining view of how he put together hit records, what it was like to be tapping The Beatles endless repertoire of songs, the hardship and excitement of forming his successful independent studio, AIR.

Lucid and absorbing, ALL YOU NEED IS EARS is nothing less than a personalized tour of the world of recorded sound.



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ROBERT HENSCHEN
NAT HENTOFF
JOE KLEE
STEVE ROW
STAN SOOCHER

POPULAR

THE KINKS: *One For The Road.* [Ray Davies, producer; Mike Moran, Arnie Rosenberg, Barry Ainesworth, Brooks Taylor, and Michael Ewaskow, engineers; mixed by Ray Davies at Konk Studios, London; recorded at Lowell, Mass., Syracuse, N.Y., North Dartmouth, Mass., Amherst, Mass., Providence, R.I., New Brunswick, N.J., Zurich, Switzerland, and Blue Rock Studios, New York.] Arista A2L 8401.

Performance: **It really got me**
Recording: **They really got it**

One For The Road, the Kink's third "live" album, is the first to combine sophisticated recording techniques with a basic performing band. *The Live Kinks* was recorded during the heyday of sixties' Beatlemania when the screams of the audience usually overwhelmed the power output of a rock group (compare with *Got Live If You Want It!* by the Rolling Stones and *The Beatles At The Hollywood Bowl).* The Kinks turned out an electrifying performance on *The Live Kinks,* but Ray Davies' lead vocals were often lost in the mix. The perky "live" record from the double set *Everybody's In Showbiz* in 1972 featured improved audio adroitness that zeroed in on a vaudevillian horn section sparring with Ray's punchdrunk reveries. *One For The Road,* however, continues the Kinks' invigorating response to the leaner arrangements of new wave music that they started last year with the irrepressible *Low Budget.*

THE KINKS: All the good times are right here.

Aside from an occasional keyboard part, the only real musical excess on *One For The Road* is Dave Davies' lead guitar playing. He spews out more sustained flash than on any other Kinks album and sounds as if he has been closely studying Eddie Van Halen's version of the Kinks' "You Really Got Me." This revitalizes songs like "Victoria" and "All Day And All Of The Night" that the band has played for years. " 'Til The End Of The Day," rearranged with generous doses of reggae, is less explosive than might be expected, though.

Still, Ray Davies remains the focus of attention. He teases and cajoles the audience, stops songs before they've had a chance to get off the ground, but in the end charms the audience into submission by singing about the little idiosyncracies that make us tragic, comic, and fallible all at the same time. Among Ray's British contemporaries, Pete Townshend would like to transcend this state through metaphysical lyrics while Mick Jagger would rather get laid than worry about it. Ray is more concerned with making it from one minute to the next. "I wish I could fly," he sings in "Superman," "but I can't even swim."

Sheer variety of subjects and excellence of lyrics assure Ray a place among not only the most revered rock tunesmiths of our time, but also among the finest popular songwriters of musical history. And he's a priceless performer to boot. The Kinks ask in their early classic, "Where have all the good times gone?" But they really know the answer: the good times are right here on *One For The Road.* *S.S.*

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TOT ROCKET & THE TWINS: ***Reduced/ Fun Fades Fast in the U.S.A.*** [Andrew Halbreich, Ron Spitzer, Lou Farace, and Robert Poss, producers; Bill Hudak and Bernie Evans, engineers; recorded at Reel Dream Studios, Bloomfield, Connecticut.] Whiplash Records.

Performance: **Frenetic**
Recording: **Clean, crisp, and charged**

What happens when you take a bunch of musicians and give them a few hundred dollars? They head for the nearest studio. What happens if the studio is inexpensive and well-equipped and the musicians energetically cohesive and dynamic? They put out a high-powered, well-formed explosive disc like this one, more than worthy of their name. Tot Rocket? They could pass for a Saturn V!

Like such groups as Blotto and the Units, Tot Rocket and the Twins has gone through an increasingly popular method of improving their fame and fortune, to say nothing of their status. That method, often called D.I.Y. (for do-it-yourself), consists of taking the bull by the horns and producing your own record, or records, which is exactly what Tot Rocket and the Twins have done. And when they say they did it themselves, they really mean that they did it themselves, with only a little help (well, maybe a lot of help) from a couple of engineers. Aside from playing, the entire band was involved in the production of the single, a project that cost them a measly $600 (which is a bargain at twice the price).

Tot Rocket and the Twins could use a little assistance in packaging, though. The hot, frenzied rock 'n' roll that comprises this single comes in a poorly printed smeary blue sleeve that looks like it just came off a Mattel Home Print Set that was missing one of its "D" batteries. It's only on the turntable that this dinky little single takes on a life of its own. The "A" side, "Reduced," is a sizzler that pales only in comparison to the "B" side, "Fun Fades Fast in the U.S.A." A full album of Tot Rocket might just be too intense to handle, but it will certainly be noticeable. Just look for the cover that was printed with a rubber stamp and some crayons. M.D.

HAROLD BUDD/BRIAN ENO: ***Ambient 2: The Plateaux of Mirror.*** [Brian Eno, producer; Bob Lanois, Danny Lanois and others, engineers; recor-

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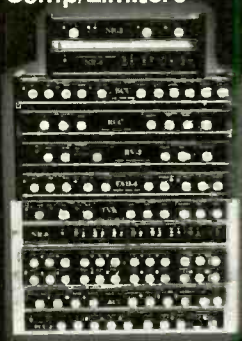

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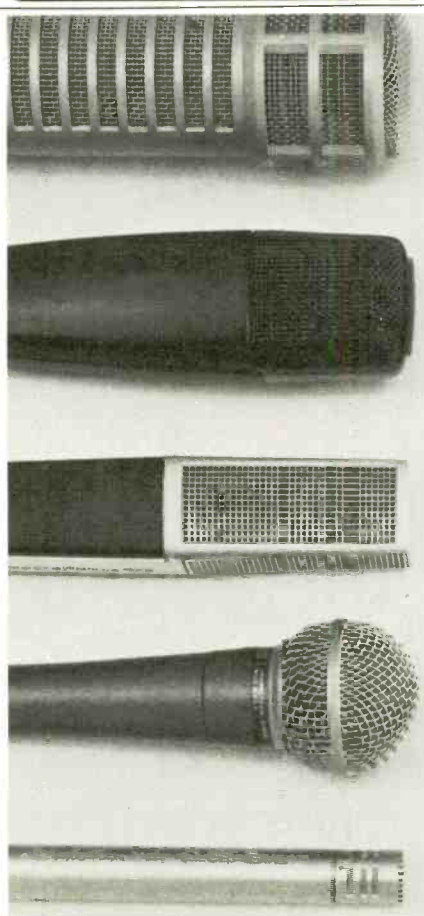

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ded at Grant Avenue Studio, Ontario, Canada.] Jem EGS 202.

JON HASSELL/BRIAN ENO: *Fourth World Vol. 1: Possible Musics.* [Brian Eno, producer; Michael Jay, engineer; Pete Sobol, assistant engineer; recorded at Celestial Sounds, New York, except "Griot," recorded in concert at the Art Gallery of Ontario, Toronto.] Jem EGS 107.

Performances: **Bizarre**
Recordings: **Smooth and masterful**

Although he gets second billing on these albums, Brian Eno is clearly the major force behind both of them. And an odd force he is, too. Having been involved for many years in what most people would feel free to describe as experimental music, Eno is not about to abandon his creative inroads into obscurity merely because he has become involved with mere commercial ventures (i.e., Devo, et al). He is still much a man on the creative fringes, a master of the unusual and occasional champion of the weird. Here indeed is an artist with an ambiguous reputation.

This is not to say that these two albums are bad or, for that matter, very good. They are simply *different*, and strikingly so. Basically, these are not albums that can be called or classified as good or bad, in part because they are so different that there is very little to judge them by.

The two albums are certainly very good in a technical way. Both albums reveal that there has been a quite deliberate and precise manipulation of sound, most of which can be credited to Eno in his capacity as producer and also as a contributor. In fact, on *Ambient 2*, the credits list Harold Budd for acoustic and electric piano, while Eno is listed for "other instruments and treatments." Eno is also responsible for "treatments" on one cut of the *Fourth World* album.

What are the "treatments," you may ask? Well, for example, *Ambient 2* is a soft and very somnolent record that consists almost entirely of continuous piano solos with different amounts of echo and reverb applied to differentiate one tune from another. To this, Eno occasionally adds some synthesized sci-fi sounds (a good portion of this album could be used as the soundtrack of *It Came From Planet X). Fourth World* is pretty much the same, though with

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much less of that *Star Trek* quality. Both albums seem to show the influence of the individual musician on Eno than the reverse.

There may be little doubt that Eno is strange, but if this is the kind of music you like, then these are two very good albums. They don't work as the ultimate attempt to be refreshingly original but if you like Eno, then this collection of "Eno noise" is a must. Otherwise, stick to Devo.

M.D.

CHICAGO: *XIV.* [Tom Dowd, producer; Michael Carnevale, engineer; Bill Freesh, Karat Faye, Ricky Delena, assistant engineers; recorded and mixed at the Record Plant, Los Angeles, Ca.] Columbia FC 36517.

Performance: **Still energetic after all these years**
Recording: **Bright, snappy**

Chicago is one of those bands critics love to hate. But after 12 years, Chicago continues to churn along, making a few personnel changes along the way, keeping the same basic approach to contemporary music. For Chicago, it's probably a matter of laughing all the way to the bank.

And now it's the 80s, and still Chicago commits music to vinyl. What kind of music? Much the same as it always has been playing, but one might detect here slight additional embellishment—the electric guitar.

Always an element in the band's brand of jazz-rock music, but never a featured instrument, the guitar on Chicago XIV is surprisingly prominent. In fact, the group has decided to name Chris Pinnick separately from the other seven members on the credits, as if to call attention to someone who deserves singling out for helping change the sound of the band. The horns are still there, but long-time Chicago fans likely will take notice of the harder, more flamboyant guitar licks present on the album.

The record also is the group's first digitally-recorded album, and it marks the first time the group has been produced by Tom Dowd, who also has done production work for Cream and Rod Stewart, among others.

With all this "newness" attendant to the release, one wonders whether the material and the sound also will reflect a newness, compared with the band's 13 earlier releases. In some cases it does, and in some it doesn't. The addition of a first-rate guitarist already has been mentioned as a plus, and the digital recording has produced a clean sound.

But the material is uneven. Hard rock and ballads are mixed in with one purely political statement ("The American Dream"). The lyrics won't bowl anyone over, and some are given a self-proclaimed importance that is annoying. Some of the melody lines are interesting, and some of the arrangements are quite good, but the material as a whole does not represent much of a break from the work that has preceded it.

The sound also must be reviewed carefully. With all the things that are going on per track, the sound tends to become dense, and listeners should beware of occasionally high-treble brightness. If you usually keep your treble control all the way up, and your noise filter off, some of the tracks are going to sound uncomfortably brilliant, almost hissingly shrill. This is the case with "Hold On," for example, and "Thunder and Lightning." Separation generally is clean, although emphasis on some instruments drops off when it shouldn't in some tracks.

The album contains 10 tracks, and a couple of prominent guest musicians—Mark Goldenberg of the Cretones and David "Hawk" Wolinski of Rufus. The horn section provides the right jazz and R&B base for the selections, and the vocals are tight, even if they sometimes include forced pronunciation. Many of the instrumental breaks are quite good, although at least one recalls earlier lines by the James Gang, for example.

The overall sound reflects energy and invigorated purpose, as if the players still are glad to be doing what they do. A few tracks can become good singles, and "Thunder and Lightning" likely will become really big among local show bands. For the uncritical listener, the album will provide some interesting, even impressive, listening. For the more critical listener, the album sounds like music one is inexplicably drawn to, in much the same way one was drawn to early records by Yes or more recent records by Triumph or Boston.

The record is layered, textured and melodic, bright and shiny, building to an intensity that draws the listener along. The most cynical might call this manipulation; the least cynical, magnetism. I'd prefer to think that the

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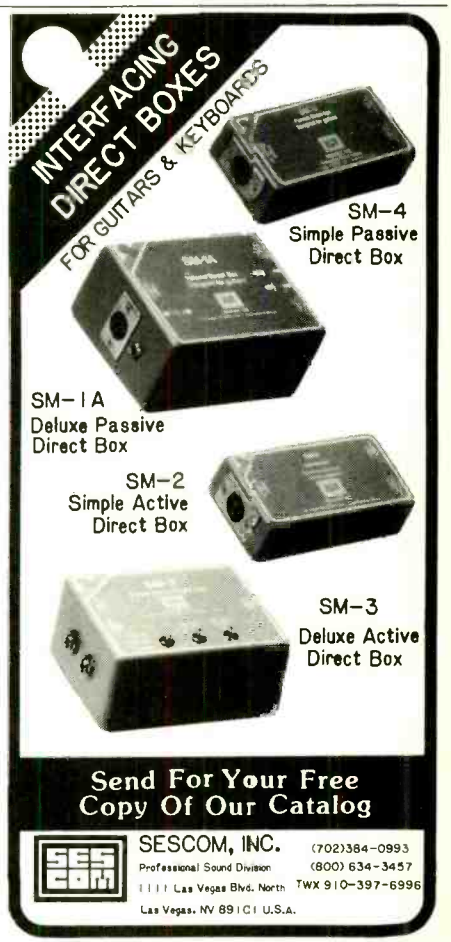

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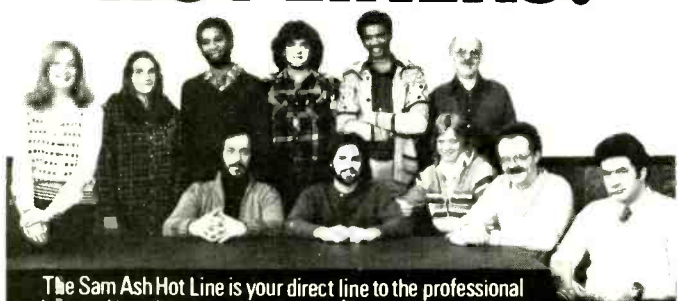

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attraction of the album is somewhere in between the two.

Guitarist Pinnick is undoubtedly a fine addition to the group, and percussionist Laudir deOliveira and drummer Danny Seraphine are in outstanding form. If future albums could reach a better balance between the electric guitar and the obvious talent of the horn section, and if the material avoided triteness, critics might find more to love, and less to hate, about Chicago.

S.R.

JAZZ

BUSTER WILLIAMS: ***Dreams Come True.*** [Vic Chirumbolo, producer; Lew Horowitz, engineer; recorded at CBS 54th St., Studios, New York, N.Y., 1978-1980.] Buddah BDS 5278.

Performance: **Melodic bassist's basis**
Recording: **Clean and clear—24 tracks ahead**

Buster Williams is not the first to attempt to make the bass into a melody instrument. Jimmy Blanton was making early experiments in that direction back in the 40s during his days with Duke Ellington's orchestra. That Williams is more successful than Blanton has less to do with the melodic qualities of the instrument than it does with the gaping hole left in the rhythm section when the bassist goes into his melody bag. Even in the 1940s, their hey-day, the Duke Ellington band had their problems in the rhythm section. First of all, the drummer, Sonny Greer, was a stomp drummer in an era where to be in was to swing lightly off the drums the way Jo Jones was doing with Count Basie's band. Another problem was that Duke Ellington's main axe was his orchestra and that left the rhythm section minus a piano man as often as not. Other bassists solved the problem in other ways. Slam Stewart always surrounded himself with pianists who played percussively, of which Errol Garner is a prime example. Oscar Pettiford, by the time he joined Duke Ellington's orchestra a generation after Blanton, found a second bass player to lean on so that his solos had a full accompaniment. Buster Williams' solution is similar but he lays down his own rhythm track on

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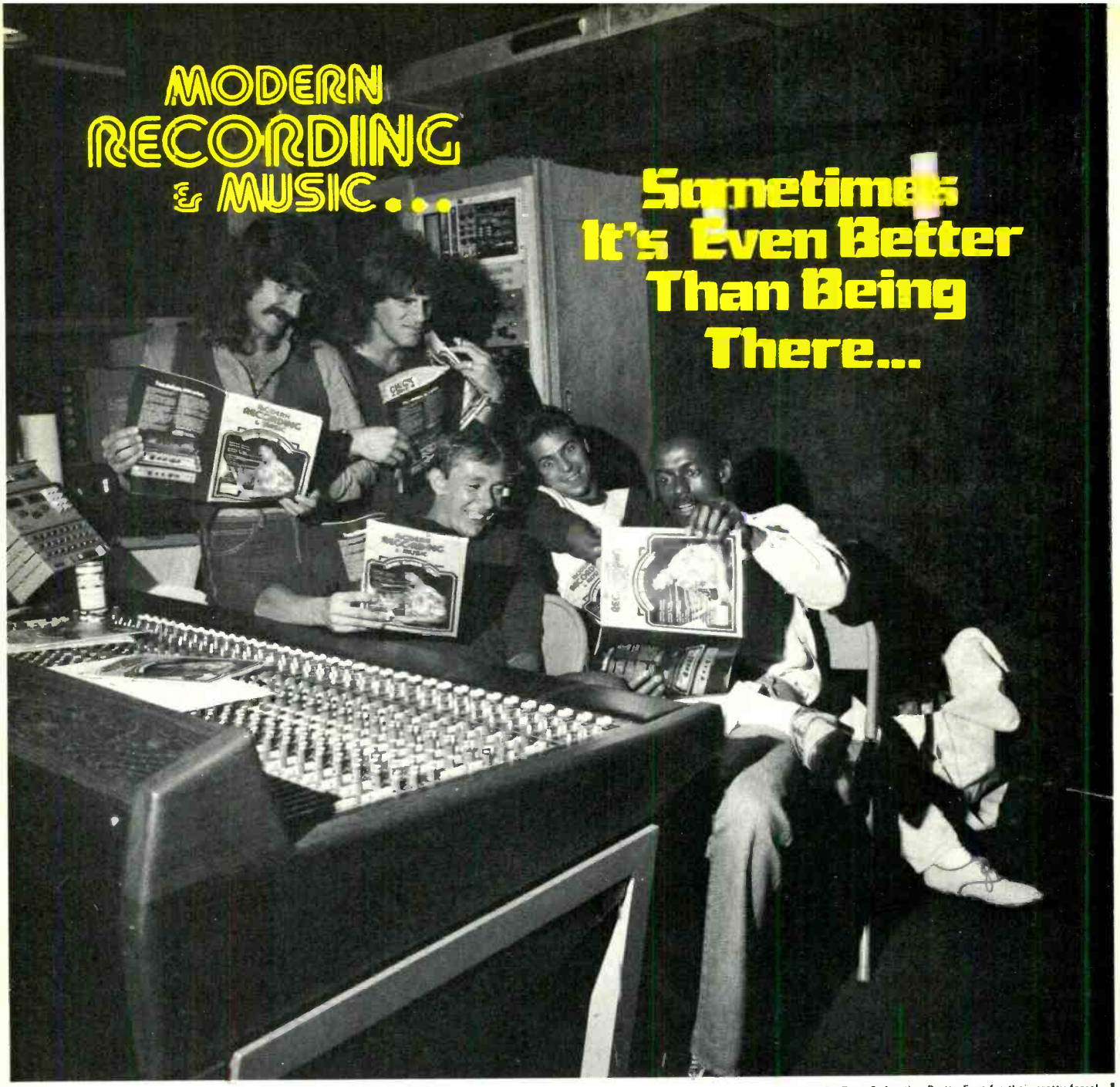

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TWO RESOUNDING TRIBUTES— TO DJANGO AND DUKE

By Nat Hentoff

Pour Django, with guitarists Boulou and Elios Ferré, is not only the year's nonpareil guitar album, but it's also one of the three or four most ardently imaginative sets of any kind of jazz. Boulou (28) and Elios (23) are the sons of French gypsy guitarist Pierre Matelot Ferret, a sideman on many of Django Reinhardt's sessions. This set is a tribute to Django, so far the only truly original non-American jazz musician. But it is not a sentimental tribute in which these youngsters try to recreate the colors and cadences of Django's time. These two players listen ahead, as they look affectionately back, and so this is by no means a period piece.

Without a rhythm section, and without any overdubbing, the gypsy brothers generate a powerfully flowing swing that, in modern terms, resembles Django's. Also like him, but very much in their own ways, Boulou and Elios play with both grace and fire, extraordinary sensitivity to dynamics, and an inherent sense of lyrical improvisatory structure that makes real the cliche that the best jazz performers actually do compose as they improvise. Boulou and Elios abound in logically exciting surprises. As for technique, theirs is prodigious, but they never waste it on empty virtuosity.

The engineering on this SteepleChase set is magnificent—so full and deep is the sound that you forget you're listening to a recording. I have no reservation in predicting that this album will last as long as there is jazz.

One of Norman Granz's current projects is designing a number of vivid appreciations of Duke Ellington. There is a *Song Book* series with Sarah Vaughan, and diverse other packages. So far, the most notable of the latter is *"A Celebration of Duke"*—with four distinctively different ensembles. There is Quadrant (Joe Pass, Milt Jackson, Ray Brown, Mickey Roker); a Clark Terry quintet; a Zoot Sims quartet; and Sarah, with just pianist Mike Wofford and guitarist Joe Pass.

Unlike most "all-star" anthologies, this set coheres. Not only because Ellington's music links it all together, but also because, in their various ways, all of these performers so respect and understand Duke that they actually do pay tribute to him rather than just take his songs as a springboard for showcasing themselves. That is, for these dates, they have immersed themselves in the Ellington spirit. Not imitatively, but rather appreciatively.

On Zoot's tracks, by the way, he reveals his growing authority on soprano saxophone, an instrument that underlines his fundamental lyricism. Clark Terry, always an Ellington aficionado and a former Duke sideman, plays more compellingly here than in quite a while. The Quadrant combo sounds like one man with eight hands, it's so together. And Sarah, with this spare a background, has to stretch herself—and does so with exultant ease.

The sound is first-rate on all the tracks although, as in a number of Granz's sets, I'd prefer a touch more presence all around. But that is really of no import when the music is as variegatedly satisfying as it is on this celebration.

BOULOU and ELIOS FERRE: *Pour Django.* [Nils Winther, producer; Stig Kreutzfeldt, Thomas Brekning, engineers.] SteepleChase Records. (Distributed in America by Rounder Records, 186 Willow Avenue, Somerville, Mass. 02144.)

ZOOT SIMS, SARAH VAUGHAN, CLARK TERRY, QUADRANT: *"A Celebration of Duke."* [Norman Granz, proucer; Dennis Sands, Steve Williams, Bob Simpson, engineers.] Pablo 2312-119.

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double bass before he overdubs his piccolo bass solos on top of it. I should mention that a piccolo bass is somewhere halfway between a cello and a double bass, giving Williams' improvisations a full robust sound yet more clarity than the average bass soloist is able to command.

The rest of the band is excellently chosen, with Eddie Henderson's trumpet and flugelhorn particularly outstanding. Here is a player who is clearly rooted in early (melodic) Miles Davis and in the tradition of the great Clifford Brown as carried forward by Freddy Hubbard. I've raved about Eddie in the past and I hope it will always be my pleasure to do so. He is one of the consistently enjoyable players who never lets you down. I think the same can be said of pianist Kenny Barron whose full-blown, two-fisted comping seems particularly suited to Buster's artistry. I hope that some day they get together for a duet album along the lines of the Jimmy Blanton/Duke Ellington duets. I haven't always been a fan of Hubert Laws although at his best, as he is here, the man can play some tasty music. Hank Crawford is another player that I've never been a particular fan of, but used intelligently and sparsely as he is here, his bluesy alto sax fills the spaces left for it in Onaje's arrangements with a friendly, folksy feeling.

Here and there on this record are strings, a vocal group and all the jazz soloists mentioned above in solo contexts or making up an ensemble around which everything moves. Although all forces work together well when they want to, I hope I may be forgiven if I favor the traditional Buster Williams with rhythm section of "Ain't Misbehavin'." Nevertheless, I love it all and if you enjoy good melodic playing from a virtuoso of the double bass and piccolo bass, you will too.

J.K.

ALAN PRICE: ***Rising Sun.*** [Bones Howe and Alan Price, producers; Bones Howe, engineer; recorded at Wally Heider Recording, Hollywood, Ca.] Jet/CBS NJZ 36510.

Performance: **Partly cloudy**
Recording: **Overcast but clearing**

When Alan Price is on, he's really on. But lately there's no distinguishing him from the mass of still-struggling singer-songwriters. Amazingly, Price is closing in on two decades' worth of music making and he's still largely unknown to the American public. This album, unfortunately, won't be the one to break him.

Some of you may remotely remember this man's association with the angry young Animals of England (called The Alan Price Set before Eric Burdon catapulted to top billing in the mid-60's and Price left the group with a long illness). Others may know about his comeback success with the award-winning original score for *O, Lucky Man!* And avid record collectors shouldn't have missed his 1974 *meisterwork* for Warner Bros., *Between Today And Yesterday.* A couple of years ago, Price overcame what was an apparent case of stagefright to deliver an awkward, but moving, tour of cabaret performances.

But his recent recorded work is splotched with disheartening attempts to sound more accessible, as on "I'm Coming Back," "Perfect Lady," and "Music In The City" from this package. Price is trying too hard to display the range of his songwriting craft, and often ignoring his art. Even the old vaudeville song and dance style that he once used so marvelously is now reduced to "Mr. Sunbeam," a dumb filler that lacks believability.

"The House of The Rising Sun" opens this album on a nostalgic note—strains of Price playing organ on The Animals' historic version in '65. This particular rendition by the song's composer is fair to good; if Price's vocal lacks immediacy, Ray Pizzi picks up the slack on his alto sax solo. The LP's other highlights provide minor surprises: a funny rock tune a la Randy Newman called "Wake Up!" and a classic Price ballad in "I Have Tried."

The other cuts don't really warrant intense scrutiny, although a couple of them might work for some other vocalist. The problem with *Rising Sun* is that Price is foisting the big production, and almost filppant variety, on both himself and soundman Bones Howe. Howe does no more than an adequate job on tunes that give him little cause for excitement. Only "I Have Tried," with its layers of voice and Mike Melvoin synthesizers, is an engineering standout. For the rest of *Rising Sun,* the inspiration seems rather dimly contrived.

R.H.

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