

Profile:  
**Phil Collins**

# MODERN RECORDING & MUSIC

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VOL. 6 NO. 8  
MAY 1981

## LEON RUSSELL "LIVE"

**Multi-Track Magic:  
Creativity in  
4-Track Production**

**LAB REPORTS:**

Bang & Olufsen "Beocord"  
8000 Cassette Recorder  
SAE P250 Power Amplifier  
Soundcraftsmen  
Equalizer

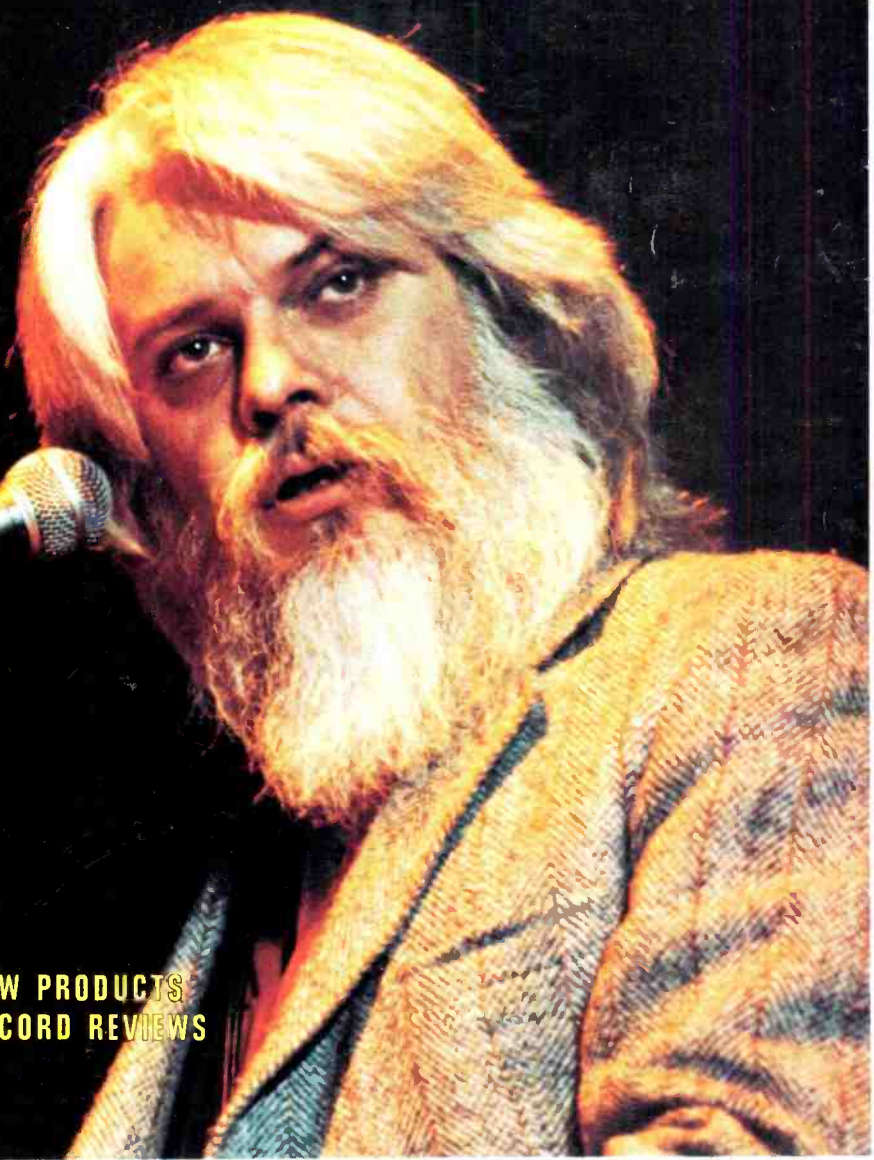
**LAB REPORT:**

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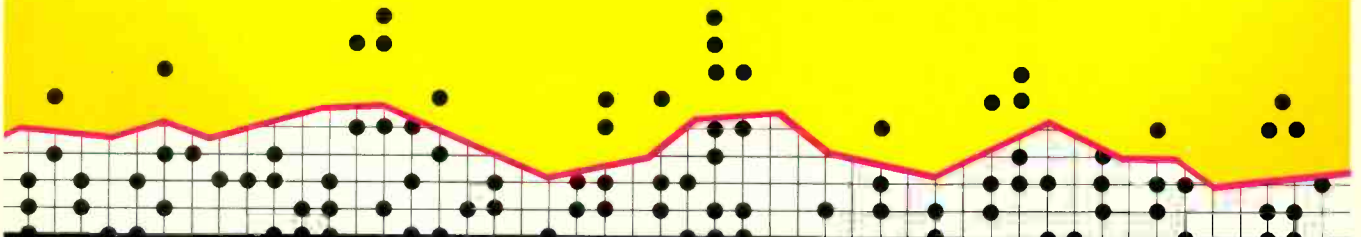
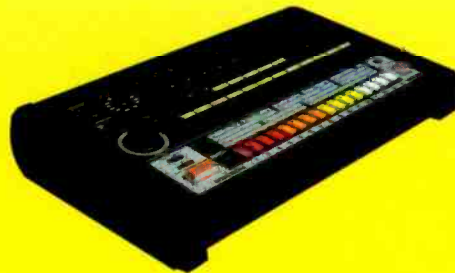
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# MODERN RECORDING & MUSIC

MAY 1981  
VOL. 6 NO. 8

## THE FEATURES

### MULTI-TRACK MAGIC: CREATIVE MULTI-TRACK RECORDING

By Craig Anderton **40**

Many home recordists have awakened to a demoralizing fact of life: their musical dreams far exceed their financial capabilities. Well, 4-trackers, take heart! Swami Anderton shows you that better use of imagination, and equipment on hand, can make your recording day a lot brighter at no cost to you.

### LEON RUSSELL "LIVE!"

By Bob Allen **48**  
From his start in Jerry Lee Lewis' road band in the early 1960's, Leon Russell has been associated with a diverse cross section of popular music. On tour with The Newgrass Revival, Russell talked with *MR&M* about his roles in the industry, the *eleven* studios he's built and his new audio/video mobile setup.

### PROFILE: PHIL COLLINS

By David Fricke **58**  
As lead singer and drummer extraordinaire with the group Genesis, Phil Collins established quite a name for himself. As a founding member of Brand X, Collins expanded this reputation. Now with his first solo LP, *Face Value*, Collins takes that reputation one step further.

#### COMING NEXT ISSUE!

*A Session with Rick Wakeman*  
*Profile: Ian Stewart*  
*Practical Electrical, Part III*

Cover Photo: Melodie McGuire  
Leon Russell Photos: Melodie McGuire  
Mobile Photos: Courtesy of Paradise Video  
Phil Collins Photos: Courtesy of Atlantic Records

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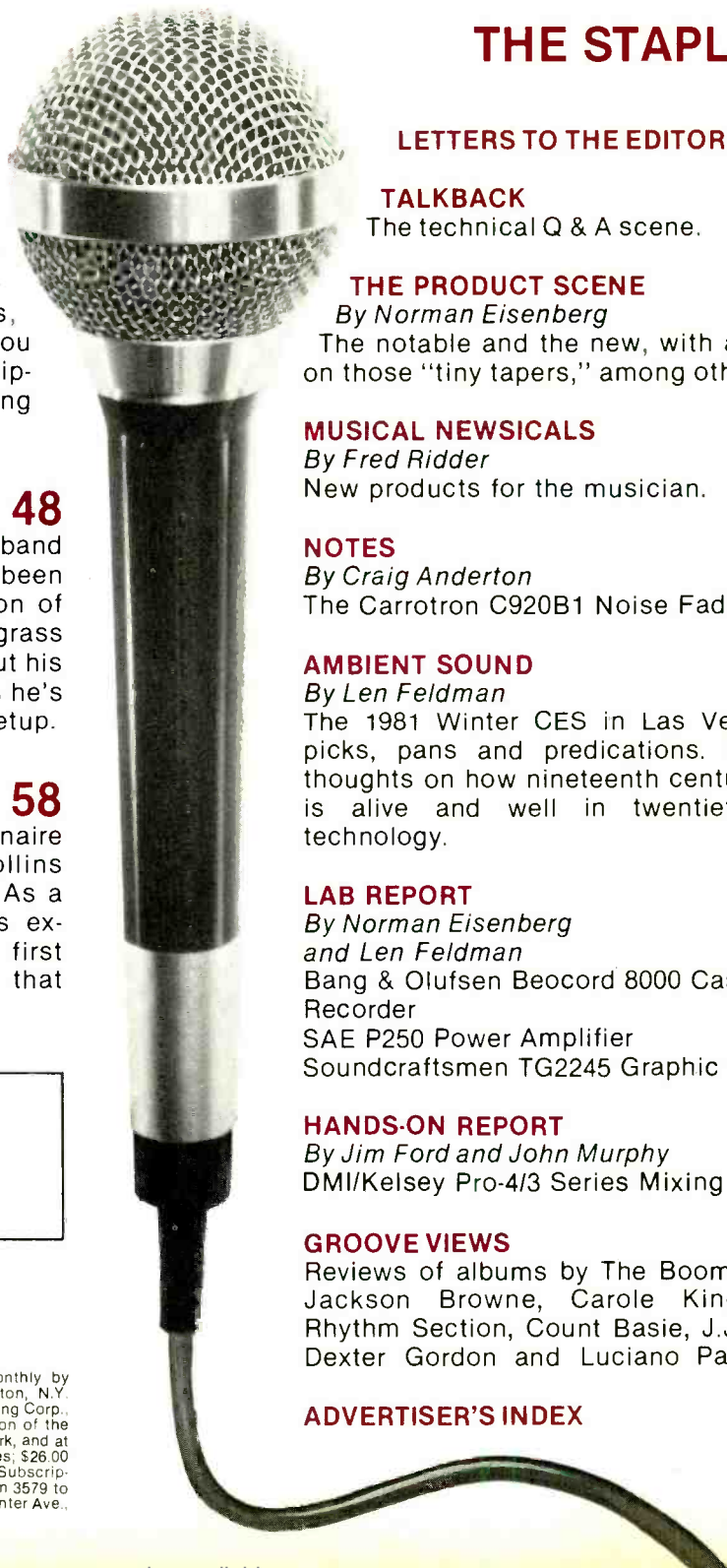
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# LETTERS TO THE EDITOR

## The Ultimate Limiter Letter

*What follows is a letter from Craig Anderton which he believes should answer many questions, some still unborn, on the article appearing in the November 1979 issue of Modern Recording and Music on PAIA's Dual Limiter.*

Those readers who follow the letters section of *MR&M* are aware that there is a controversy as to whether the limiter design in the 11/79 issue of *MR&M* distorts or not. Some people say it works fine, while others complain of distortion so severe that they find the unit unusable. In a previous issue, I mentioned that this was probably due to the application—if the limiter was used just to catch spikes and transients, the distortion would not be objectionable; but if it was used to do heavy limiting with program material, problems could arise.

Well, it appears that the reason why most readers built the thing was to do heavy limiting with program material...so I went back to the drawing board to see if I could come up with a modification that would satisfy these people. Here's the solution: change C11/C12 to 100 uF and R1/R2 to 33 Ohms. The limiter will now have a decay time of 1 second, more than enough to eliminate any buzzing or distortion; the tradeoff for this lack of distortion is that the attack time is now 3 ms (003. seconds) instead of 1 ms (fortunately this makes little—if any—difference in sound quality). Incidentally, PAIA Electronics is sending a post card to all registered limiter owners informing them of this modification.

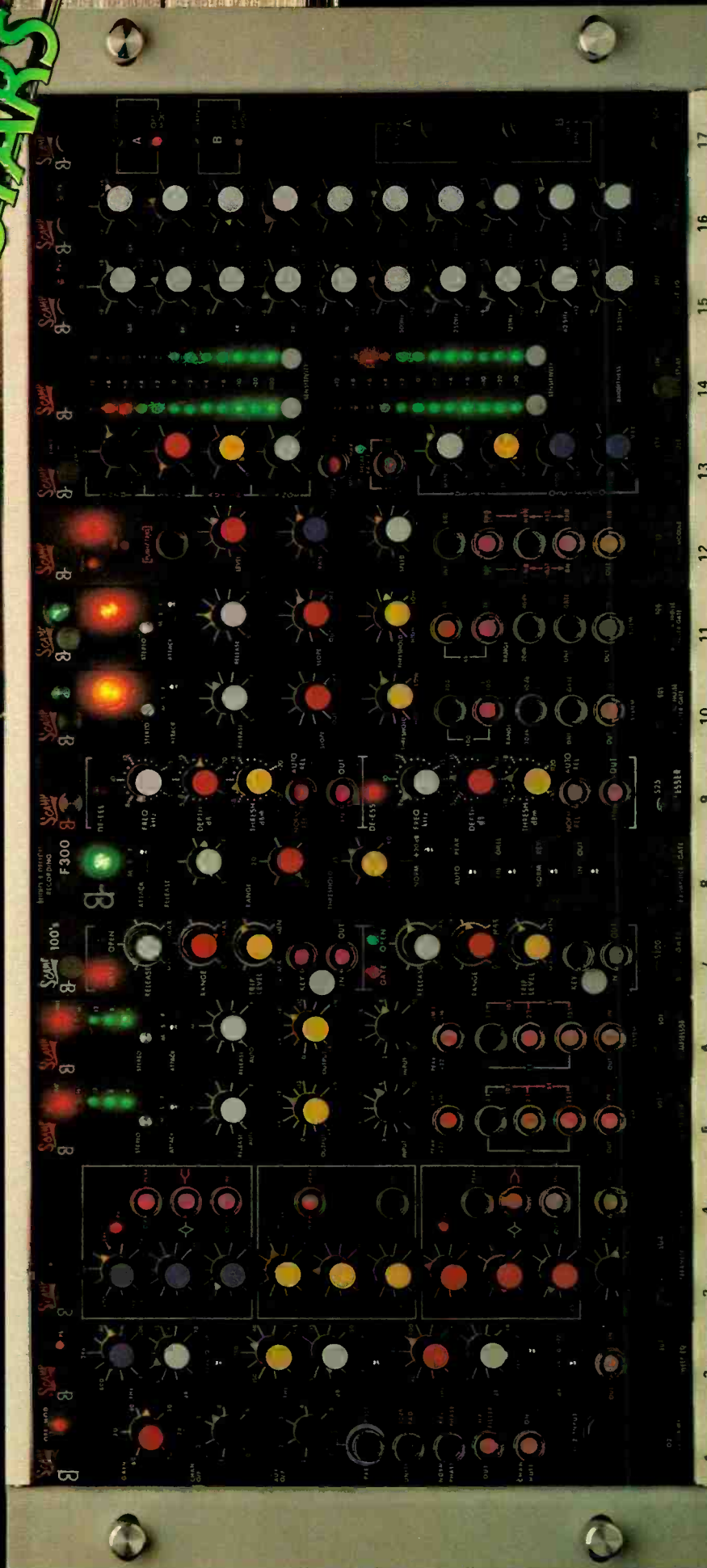
For those who just want a non-distorting limiter, perform the above changes and all will be well. If you'd like to know the reasoning behind these changes, read on.

The limiter circuitry performs its gain reduction by pumping a charge into C11/C12 until the output is reduced to the point specified by the limit control. If the input signal drops below the level specified by the limit control, the charge on C11/C12 leaks off through a 10 k resistor inside the 570 that connects to pins 1 and 16. In the limiter circuit, the attack time (charging time) of C11/C12 is determined by R1/R2, which is 100 Ohms. Charging a 10 uF capacitor (C11/C12) through a 100 Ohm resistor gives an attack time of 1 millisecond; discharging the same capacitor through a 10k resistor gives a decay time of 100 ms...and here is where the problem lies, since this decay time is not always sufficient to fully filter the audio signal appearing across C11/C12 into a nice, smooth DC voltage. Any audio voltages appearing at these capacitors modulate the limiter, thereby creating buzzing and distortion with certain types of input signals.

The same type of problem can occur with envelope followers, noise reduction units, compressors, and any other unit that depends on rectifying an AC signal and using the resulting DC signal to control something like a VCA or VCF. While increasing the filter cap value to 100 uF just about eliminates any audio ripple by increasing the decay time to 1 second, the attack time becomes slower as well. For this reason, we have to lower R1/R2 to 33 Ohms, yielding an attack time of 3 ms. Lowering these re-

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sistors to 10 Ohms could give a 1 ms attack time, but then we would be asking Q1 and Q2 to deliver lots of current when C11/C12 are fully discharged. Although 3 ms isn't as nice a spec as 1 ms, in actual practice I have not found a 3 ms attack time to be at all objectionable.

The fact that both the attack and decay times of the 570 are interdependent is the source of our particular problem. Fortunately, Signetics also recognizes that this is a problem, and has designed an improved compander called the 572. The 572 no longer has the on-board op amp of the 570, but in return you have individually programmable attack and decay times...this means that you can have a very fast attack time *and* a very slow decay time, which is the optimum choice for a limiter. With the 570, it's much harder to have your cake and eat it too—although the modification mentioned above comes close. Unfortunately, the 572 is not widely available, nor is it pin compatible with the 570. So, don't expect to just substitute one chip for the other; a new limiter design would be required.

Most of you are aware that I don't publish an article until the unit in ques-

tion has been used extensively in my own applications (the Hot Springs reverb, for example, was in use in my studio for over two years before it appeared in print), so it's fair to ask how come I didn't come up with this modification earlier. At the risk of making excuses, the problem was that I finished the limiter project just before I had to move and tear down my four track studio. I had built the limiter for a specific purpose—catching transients from electronic drums and limiting the resonance peaks of synthesizer filters—which meant that I never really got a chance to put complex sounds through the thing. The limiter worked fine for the applications I was using it for, it looked just great on a scope, and so I figured everything was all right. The initial reaction to the project was also highly favorable and so it never really occurred to me that there might be the need for a modification to the basic design.

Eventually, I got settled into my new place, but I was without a studio for about a year and a half as I went about the business of building my new super-duper mixing board, cutting cables, tweaking the tape deck, and the like.

About the same time I got the studio up and running, people started complaining in earnest about distortion when limiting program material. So, I went back into the studio, encountered the problem these other people were talking about, and immediately set out to come up with a modification that would increase the decay time.

Incidentally, I also got a letter from Ethan Winer from the Recording Center, Inc., saying that when the level indicating comparators change states, they could send spikes along the input line to the compressor, thereby creating buzzing. However, considering that the comparators are being fed at their inverting inputs (which are at virtual ground) through a 100 k resistor, the odds of any signals escaping from the op amp and working their way back to the compressor input—even if the output impedance of the previous stage is extremely high—are remote. I tried disconnecting and reconnecting the inputs to the comparators, and could neither hear nor measure any difference. However, in his letter Mr. Winer indicated that in his opinion, it could be possible for the comparators to contribute distortion to the circuit if the

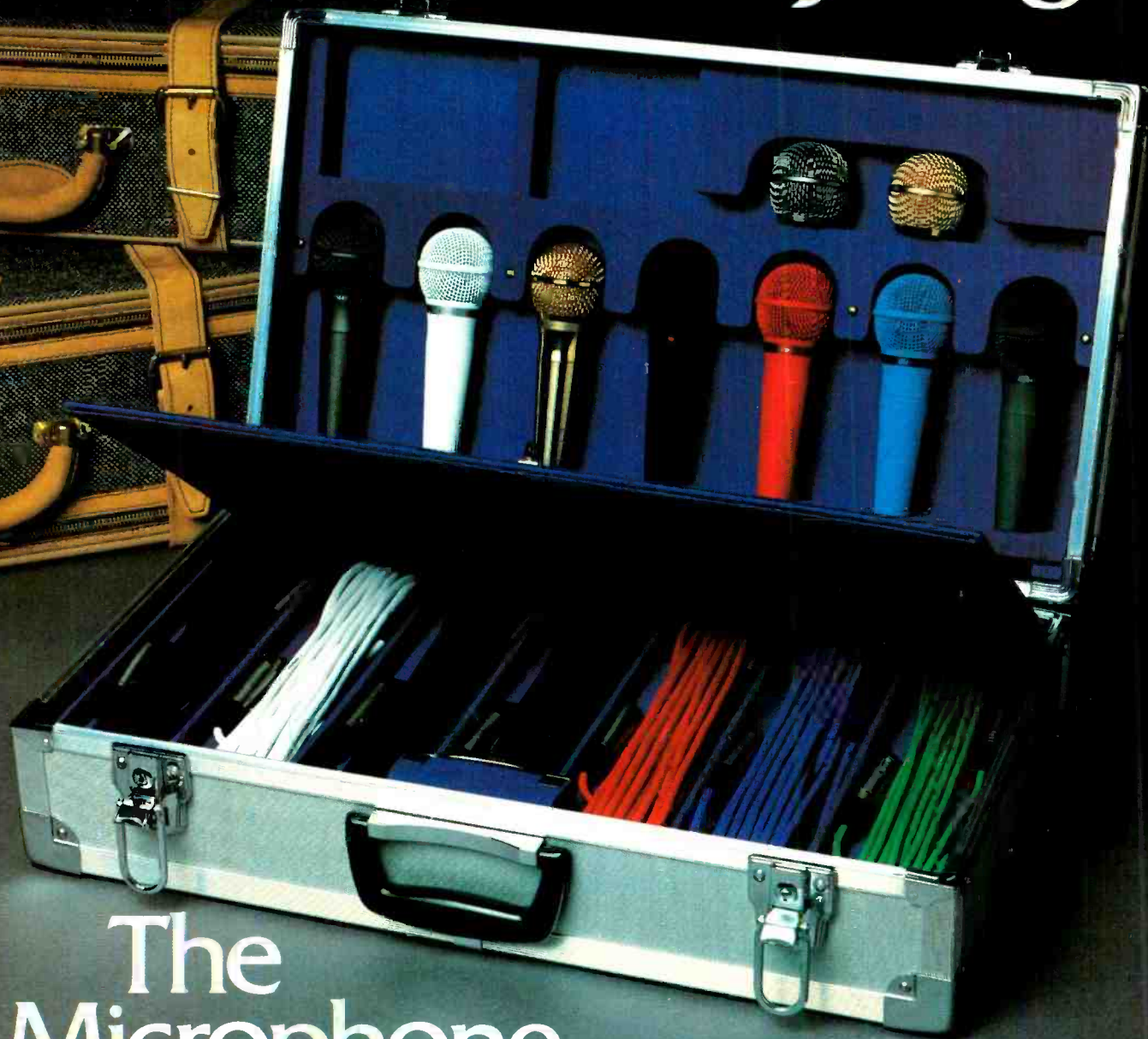
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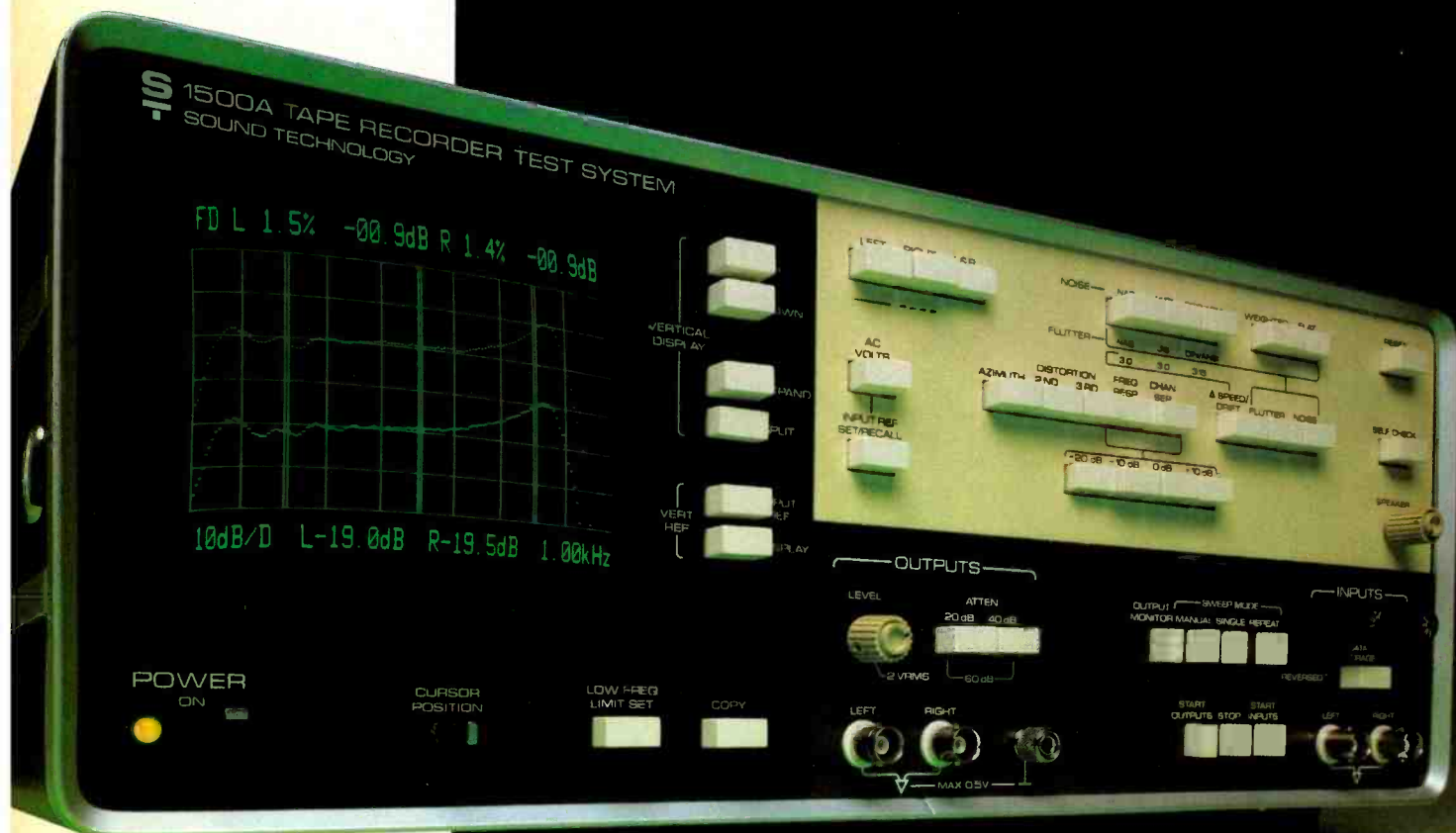
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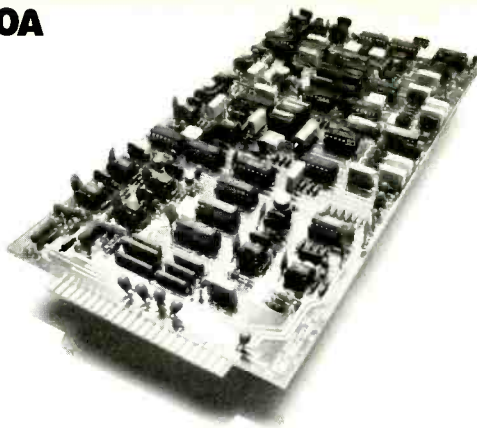


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unit feeding the limiter had a very high output impedance. Although I don't think this is the case based on experience with my equipment, I mention it anyway just in case some mysterious buzzing remains after performing the above-mentioned modification; you can always follow Mr. Winer's suggestion of disconnecting R21 and R22 to prevent the input signal from reaching the comparators. However, I'm virtually certain that the problems alluded to by the

readers of *MR&M* relate to the decay time of the circuit, not the comparator's changing states.

I apologize for taking so long to come up with this modification, but at least now the limiter is fully capable of satisfying those people who had complained about distortion...and that's what's important.

—Craig Anderton  
Contributing Editor  
*Modern Recording & Music*

## Build It Yourself and Save

Again, a letter to Mr. Craig Anderton! I enjoy reading your articles and breakdowns on equipment—thanks for the article on a Teac 3340 footswitch. All of my recording is done by myself and this should prove helpful.

Heretofore my gear was the 3340 (not an A model) which I had modified to improve the signal of the record head when in sync mode (per Montebello instructions) and yes, it was improved some. A dbx 155 unit was ordered from North Carolina and came right when I had some turnabouts in my life and has never really been set up.

It is my desire now to 1) get an 8-track recorder; 2) get a good sounding reverb for home monitoring; and 3) a simple mixer that I can pan or assign the 8 channels with.

My method with the 4-track was to get something on tape by going straight to the machine. Then the machine is taken to a studio and transferred to multi-track where real EQ, dolby and echo can be added—as can more music. In other words, the bare bones were cut at home. The most success I've had in this respect was about 7 years ago when I took the output of an Ovation electric gut string guitar and fed it (via Y cord) into both mic inputs of a Tandberg 3041 deck. When this clean flat signal was run through a studio board, the absence of noise was remarkable. And the Tandberg was much easier to transport.

Anyway, back to my queries. *Who* takes a decent reverb unit for home use? I've tried older Model Tapco's before Type 9 springs and found them a bit springy. I see ads for Intersound, Roland, Master Room, etc. All I ask for is a recommendation and perhaps a suggestion of a discount source. Help! Why would I need 2-channel operation for home practice tapes? As far as a board goes, all I need is something that can combine what's on the tape down to 2 channels with the ability to add a controlled amount of echo to selected tracks on mixdown.

Some EQ is fine, however my uses for this 8-track system will be primarily for practice tapes. Anytime that drums will be used they will be prerecorded to a click in a commercial studio, mixed and transferred to a mono tape and then onto the Tascam. The music will ultimately be all redone later in a commercial studio—I just need a way to hear it at home. If this request for a mixer recommendation is too vast, as I can under-

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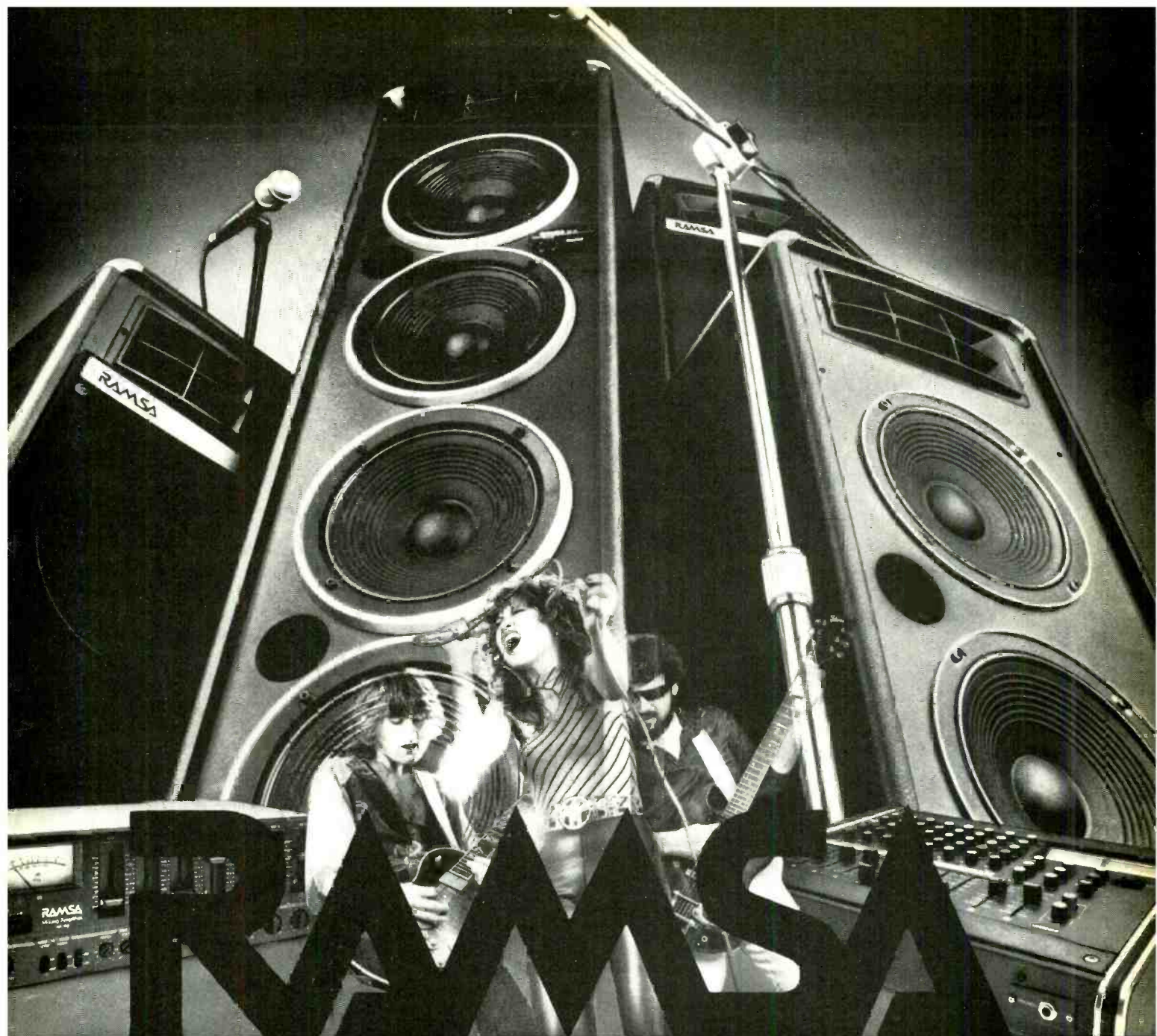
The MB-20 also gives you a buss/tape monitor mixer so you can listen to tape recorder playback while you're metering mixer output.

All of which makes the MB-20 the most versatile meter bridge around. Go ahead and drive something across it.

**TEAC**  
TEAC Production Products

© 1981 TEAC Corporation of America, 7733 Telegraph Road, Montebello, CA 90640.

CIRCLE 173 ON READER SERVICE CARD



## Maybe you're ready for Ramsa.

You get to the point where professional equipment makes a serious difference. Where anything less holds you back. And when that day comes, you're ready for Ramsa — the new sound reinforcement equipment from Panasonic Professional Audio Division.

With Ramsa, you can choose the system that works best for you with mixer-amps, mixers and line array speakers, all designed for fast setup, with a minimum of lines and clutter.

Take our extremely versatile mixer-amp (WA-140). In addition

to its two 60-watt channels (from 20Hz to 20kHz into 8 ohms with 0.3% THD), the WA-140 gives you a 4 mike mixer, 5 point equalizer, 2 phono and 2 aux inputs. Add the Ramsa line array speakers (WS-130 or 135) which resist burn-out even when you're really cooking.

There are also Ramsa line array speakers with built-in amps (WS-160 or 165). When hooked up to our portable mixer (WR-130), this system is versatile enough for both sound reinforcement and recording. And both speakers

employ horn drivers for wide dispersion and extended high frequency response.

Add Ramsa hand-calibrated unidirectional microphones with floating suspension and double windscreens to produce a sound that won't let you down.

So when you think you're ready for Ramsa, call 800-447-4700 (in Illinois, 800-322-4400) and audition the new name in sound reinforcement.

**Panasonic**  
PROFESSIONAL AUDIO DIVISION

CIRCLE 98 ON READER SERVICE CARD

stand, forget it.

Lastly, in your dealings with people using home multitrack equipment, what are the best discount sources for the Tascam 80-8? I have quotes coming in from Musicians Supply, Harvey's, Audio Services, Sound Ideas, and Recording Sound Co. My 4-track was bought from a hi-fi outfit that does not deal in Tascam.

Thanks for any help you can give—I figured if anyone had a comprehensive knowledge of what works well and where to get it, you would.

I have two suggestions for projects I'd like to see tackled: one is a footswitch for the 80-8 similar to the one for the 3340 for us solo people and secondly, an electric guitar accessory that would be switched in and out and would simulate *hand vibrato* at a predetermined rate. The intervals ideally would be one whole step, as most bends seem to be a whole step and occasionally there is the need for a half-step. An invention of this sort would facilitate the "human voice" perfectly regular vibrato on any note regardless of fingerboard position. A harmonizer sounds unearthly in trying this—also it is not subtle in its attack.

Thanks for your time and help. Keep up the good work.

—Mark Casstevens  
Nashville, TN

*And again, Mr. Anderton comes back with a quick reply:*

Re your problem...I think the ideal solution is to do it yourself, frankly. Get a copy of my *Electronics Projects for Musicians* book to learn the fundamentals, then get *Home Recording for Musicians* which has plans for a really good mono mixer, and then build the Hot Springs reverb I did in the October 1980 issue of *Modern Recording & Music*. You'll have a great sound at a low cost, which means you'll have enough money left over to build some special effects.

If you want to know about commercial equipment, listen to whatever you can and decide based on that knowledge. I didn't like the price/performance ratio of anything out there, which is why I ended up building mostly my own stuff...and suggest you do the same!

Oh yes, re your last comments: I do, in fact, have a vibrato adapter for guitar along the lines you describe. I don't

know when it will appear in print, though. Re the 80-8 footswitch: TEAC makes a footswitch for it that costs about \$25 in stores—you couldn't really build it for less, so you might as well buy in this case.

Hope the above information helps.

—Craig Anderton  
Contributing Editor  
*Modern Recording & Music*

## Rerun

We've received many requests for listings of recording and/or engineering schools in the California area. So we're rerunning a listing of California schools that we ran in our December (1980) issue. Let us remind you, though, that you must call or write to these schools for complete information on the types of programs they have, i.e. V.A. programs, state supported programs, etc. Our inclusion of any given school should not be construed as an endorsement for that school. This column is not a format for that. Our lists are really only beginning guidelines, and you should research much farther and more deeply. We may have omitted many schools from our lists, and cannot, because of space limitations,

# THE STATE-OF-THE-NEED



# AD 202

MULTI-MODE  
ANALOG DELAY

Four time-delay effects in one rugged, low-noise, affordable package.

Finally, a delay unit designed by you, to fit your needs, and your budget. With echo, doubling, chorus and flanging at the turn of a switch, the Ibanez AD-202 makes it easy for you to sound great.

The Ibanez AD 202 Multi-Mode Delay Unit — where the state-of-the-art meets the state-of-the-need.

**Ibanez**

For complete information concerning the AD202 and other Ibanez electronic products, send \$1.00 to:  
Ibanez Dept. M.R.

P.O. Box 469, Bensalem, PA 19020  
327 Broadway, Idaho Falls, ID 83401  
In Canada: 6355 Park Ave., Montreal, P.Q. H2V4H5

# The logic behind the Revox B77.

The logic is the logic which is built-in.

It's an ingenious and highly sophisticated system — much like the human nervous system — which controls the deck's functions.

You can push any button in any order with no chance of damaging your tapes. Our motion sensing system constantly feeds status reports to the logic circuitry which activates your commands in proper sequence.

The logic also permits full-function remote control, and an editing mode that keeps the playback circuitry live, even when the motors are stopped. You can make your splices right on-the-beat, and our built-in splicing block makes it easy.

The design and construction of the Revox B77 further guarantee smooth and accurate operation. To get the

long-life advantage of ferrite without static build-up or heat degradation, we use Revox's exclusive Revodur heads, made of metal to dispel heat and static, and vacuum-coated with permalloy for durability.

The B77 has a unique capstan motor that's monitored by a tacho head to precisely control speed and limit wow and flutter to professional studio standards.

Revox offers many options with the B77 including a full range of speed configurations from 15/16 IPS to 15 IPS, variable speed control, ¼ track record/playback and more.

All this professional quality is neatly engineered to fit in a deck you can carry. After all, if you own a machine this good, it's logical to take it with you.

Experience the B77 and the full line of Revox audio components at your franchised Revox dealer today.



## STUDER REVOX

Studer Revox America, Inc. 1425 Elm Hill Pike, Nashville, TN 37210, (615) 254-5651  
Offices: Los Angeles (213) 780-4234 / New York (212) 255-4462 In Canada: Studer Revox Canada, Ltd.

CIRCLE 31 ON READER SERVICE CARD

[www.americanradiohistory.com](http://www.americanradiohistory.com)

give you all the information on the schools we do list. So let us help you, but please hit the libraries, and recording schools themselves for more information on schools.

Music Recording School  
229 Shipley St.  
San Francisco, CA 94107  
(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  
2701 Fairview Rd.  
Costa Mesa, CA 92626  
(714) 556-5523/5629

Music Business Vocational Programs, established 1974. Accredited by Western Association of Schools and Colleges. Courses: 1) Music Business employee or 2) Instrument Repair. *Both 2 year Associates degree in Arts Vocational Program.*

Recording Institute of America, Inc., RIA Network. Modern Recording Techniques I & II; 10 week vocational program; meets at the following recording studios in California:

Santee/San Diego, CA  
Natural Sound (16-track)  
8951 Prospect Ave.  
Santee, CA 92071  
(714) 448-6000

AND

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

Sherwood Oaks Experimental College  
6358 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  
P.O. Box 8327  
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) 467-5656

AND

Laguna Beach location:  
301 Forest Ave., Suite 1A  
Laguna Beach, CA 92651  
(714) 497-1725

Established 1976. Courses in: Record Engineering, Recording Studio Maintenance Engineering, Record Production and Secretarial and Office Skills.

Institute of Audio/Video  
Engineering  
1831 Hyperion Ave.  
Hollywood, CA 90027  
(213) 666-3003

Courses in recording engineering, video engineering, concert sound reinforcement and maintenance, and record production.

College for Recording Arts  
665 Harrison St.  
San Francisco, CA  
(415) 481-6306

Accredited by the National Association of Trade and Technical Schools.

# The reverb that complements your music.



The image shows the Orban 111B Dual Spring Reverb unit, a black rack-mountable device. It features two channels, labeled 'LEFT CHANNEL' and 'RIGHT CHANNEL'. Each channel has a 'LIMITING THRESHOLD' knob with a 'FIXED' and 'FLOATING' position, and an 'ATTEN.' knob. The frequency response is controlled by three knobs: 'BASS' (0-20 dB), 'MIDRANGE' (0-20 dB), and 'TUNING kHz' (0.5-10 kHz). A 'BANDWIDTH' knob is also present. The Orban logo and 'DUAL REVERBERATION' are printed on the front panel.

The Orban 111B Dual Spring Reverb is ideal for small studios, because it offers the ideal combination of fully professional sound and affordable price: \$799. (suggested list). Orban's unique signal processing, flexible equalization, low noise, and heavy-duty construction make the difference. Unlike cheaper reverbs, the 111B is a reverb you'll want to live with after the honeymoon's over.

Judge for yourself. If you test the 111B the *right* way — in a *real* mixdown situation (*not* listening to the echo return *only*) — you'll find that the 111B's bright, clean sound *complements* the music, instead of muddying it as even higher-priced reverbs can do.

There are cheaper reverbs — with noise, flutter, "twang" sounds on transients, and questionable construction. There are more expensive reverbs — some of which are disappointing in "real world" situations. And there is the proven 111B — the right sound at the right price for the professional on a budget.

**orban** Orban Associates Inc., 645 Bryant St., San Francisco, CA 94105 (415) 957-1067

CIRCLE 100 ON READER SERVICE CARD



# new SM85 PRO TECH™ SOUND

**brings a new dimension  
to a hand-held  
condenser microphone**

This new high technology Shure microphone will change the way people think of condenser microphones. The SM85 is designed especially for on-stage, hand-held use. Its sound is unique—far more tailored to the special needs of the vocalist: sizzling highs and a shaped mid-range for superb vocal reproduction, and a gentle bass roll-off that minimizes handling noise and “boominess” associated with close-up use. Ultra-low distortion electronics make the SM85 highly immune to stray hum fields. An integral, dual-density foam windscreen provides built-in pop protection.

What's more, the SM85 Condenser Microphone must pass the same ruggedness and dependability tests required of Shure dynamic microphones. As a result, the SM85 sets a new standard of reliability for hand-held condenser microphones.

The SM85 is *extremely* lightweight, beautifully balanced—it feels good, looks good on-stage, on-camera, on-tour. Ask your dealer for a demonstration of the new SM85 PRO TECH Sound, or write us (ask for AL664) for full details.

**SM85**  
**Cardioid Condenser**  
**Hand-Held**  
**Professional Microphone**

The Sound of the Professionals.®



Shure Brothers Inc., 222 Hartrey Ave., Evanston, IL 60204  
In Canada: A. C. Simmonds & Sons Limited  
Manufacturers of high fidelity components,  
microphones, sound systems and related circuitry.  
CIRCLE 18 ON READER SERVICE CARD

get a grip on  
sound-  
with

**THE  
LAW**

Drum  
miking  
revolutionized

Patent applied for.

Forget those clumsy mike  
stands that never stay put.

**THE  
LAW**

Does it all better  
and it fits in palm  
of hand.

- Features Built-In Shock Mount.
- Also attaches cowbells & other percussion accessories to drum rim without any tools.

Endorsed by  
recording engineer

*Bruce Staple*  
of  
Sound Mixers, N.Y.C.



Available at:  
Martin Audio / New York City  
Audiotechniques / Stamford, Conn.

If not available at your  
dealer, send \$49.50 to



Trust the leader  
**LATIN PERCUSSION**

DEPT. MR 160 Belmont Ave.  
Garfield, N.J. 07026

## FX Effects

I am requesting the address of a company called FX Labs, in order to find out more about a product called the "Switcheroo" which was advertised in your Musical Newsicals section. The article on this device appeared in your October 1980 issue. Thank you.

—James S. West  
Lutz, FLA

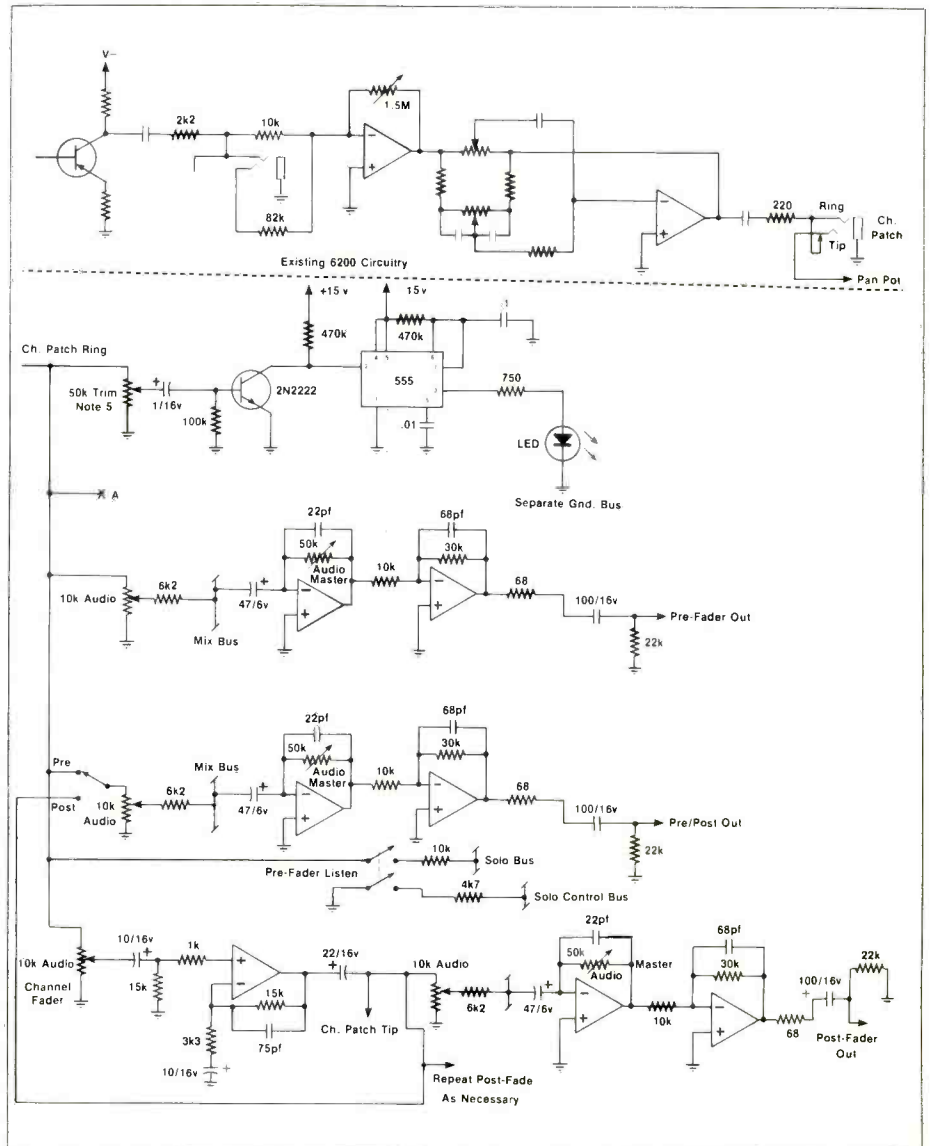
You can write to FX Labs, Inc. at P.O. Box 406, Fort Montgomery, N.Y. 10922. Their phone number is: (914) 466-5454. They are a relatively new company, started about two years ago.

## Corrections

In the Talkback column of our February 1981 issue, we printed a letter written by Ed Everest, called "Expansive Advice." With our reply we print-

ed a diagram of circuitry. We are making a few corrections on and modifications of that diagram. Check the new diagram and keep the following facts in mind: In the labelling of the 50 k pots, the ones that say 50 k Audio Master, the word "audio" is a term referring to the type of taper of the potentiometer, i.e., how the resistance changes with rotation—whether logarithmically increasing or decreasing, or directly increasing or decreasing. Actually, "50 k audio" should be thought of as one phrase, where the 50 k refers to the value, defining the extent of the taper, the type of which is "audio." "Master" refers to the function of the component in the circuit.

Rick Chinn is responsible for the corrections of labeling on the IC pins and any further corrections appearing in the following diagrams.





# THE MARK III BASS.

## CONSIDER THE ALTERNATIVES

Compare the Peavey Mark III Series Bass™ amp to any bass amp in the store or on the stage.

Compare the Mark III's advanced features such as DDT® compression, six-band graphic equalization, bi-amp capability, parametric EQ, Automix, and complete patch panel capability against the best.

Compare the Mark III's advanced electronic circuitry and dynamic range.

Compare the Mark III's record of performance and reliability.

You'll find exactly what leading professionals the world over have found. The Peavey Mark III Bass™ amp is in a class by itself. Anything else is second best.



**PEAVEY ELECTRONIC CORPORATION**  
711 A Street/Meridian, MS 39301

© 1981

CIRCLE 89 ON READER SERVICE CARD

# Quincy Jones... demands quality



Photographed at RECORD PLANT, Los Angeles, CA  
 "...I mix with AURATONE® 5C Super-Sound-Cubes® the little powerhouse speakers. They tell me exactly what will be in the grooves. You hear it all with AURATONE®!"

Join "Q" and other seasoned music world pros, top record company executives,



engineers, producers, and artists who lay it on the line with AURATONE®.

Durability, flat full-range response, amazing power handling, and portability have made AURATONE® 5C's the Record Industry's favorite

"mixdown monitors,"...for comparison and final mixes, auditioning, remotes, and reference standard speakers.

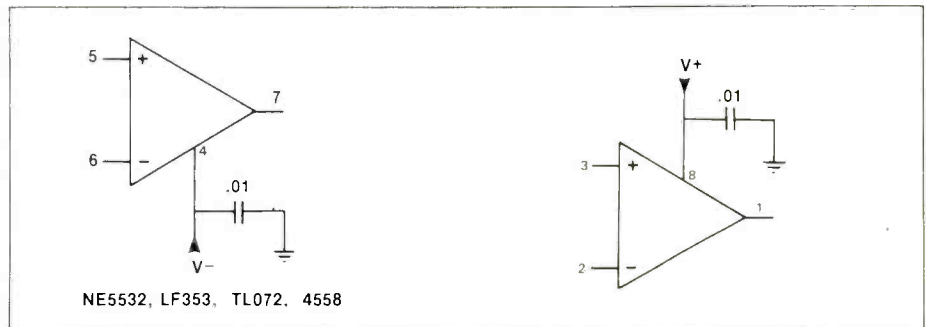
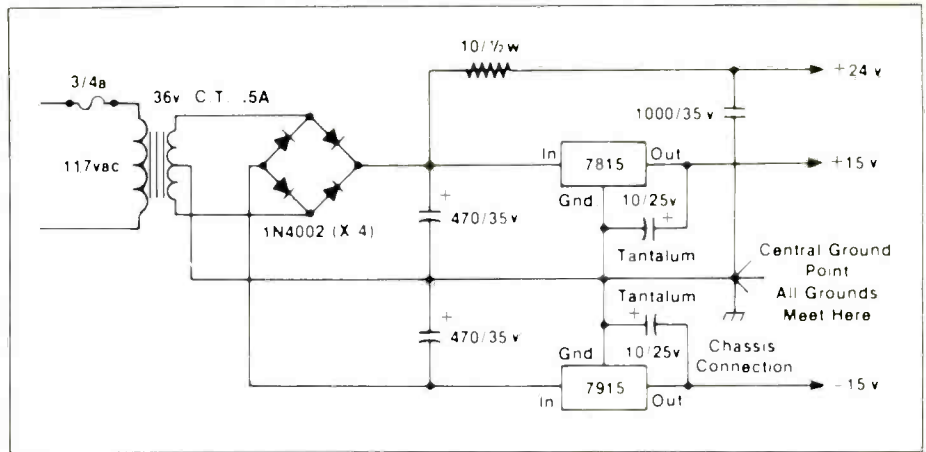
See your Dealer or order Factory Direct (30-day return privilege, one-year guarantee). \$75.00 per pair. Shipping and handling add: U.S.: \$5.00 pair; Foreign: \$15.00 pair. Calif. residents add sales tax.

Mail to: AURATONE  
 P.O. Box 698-R17, Coronado, CA 92118  
 Ship \_\_\_\_\_ pair 5 C's. Amount Enclosed \$ \_\_\_\_\_

Name (Please print) \_\_\_\_\_ Job Title \_\_\_\_\_ Date \_\_\_\_\_  
 Shipping Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Please send additional information.  
 CIRCLE 142 ON READER SERVICE CARD



## Now the Price is Right

On page 28 of our March issue, in the Product Scene column, we listed the prices of the Great British Spring with power supply, and with two outboard parametric equalizers. We were off by \$100 on each. The Great British Spring, a six spring reverb unit made by the Mike Shop of Elmont, N.Y., a division of Omnisound, costs \$599 (not \$499), when sold by itself with power supply, and when sold with two outboard parametric equalizers costs \$724 (not \$624).

## Grateful

I enjoy your magazine very much, and look forward to reading each issue cover to cover. The recent Grateful Dead article was both enlightening and entertaining. It made me feel good to see that there are still groups who feel. High technology, truckloads of equipment, etc., notwithstanding, what the audience hears is still the most important thing.

—Gabril C. Washburn  
 Central, S.C.

## Thank You

We received this letter, directed to Brian Roth.  
 Regarding your answer to Ron Vickery's letter in the December 1980

issue of MR&M, pg. 20, in the Talkback column, my rather old RCA battery manual has those rectangular 9 volt batteries rated at 0-8 MA for carbon-zinc and 0-30 for mercury. It must be more now, but I usually start to get apprehensive at about 15 mils.

As for the wiring of clips to a power supply, do remember that the red wire refers to the polarity as driven by the battery. If the toot toy's clip has a black wire coming from the male gadget, the driving clip will have to be negative on the female one—the red wire.

By the way, thanks for the report on the Tapco 7416. I was just using a 7224 last night and liked it very much.

—H.A. (Pee Wee) Paprocki  
 Rochester, NY

## Pix Mix-Up

In the Product Scene column of our April 1981 issue, pg. 30, we ran a photograph of the Heath crossover a bit too soon. Instead of running it with its proper copy, we placed it smack in the middle of the review of the Hall Engineering Test Signal Generator. So, that was not the Hall test signal generator, folks, as those of you with good eyes, or who were just alert, may have noticed.

# "TAMA MIKE STANDS? -- GR

— Dave Starobin, S

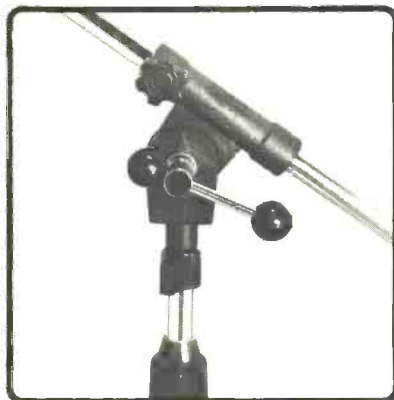


"We've used Tama drums and Titan hardware for some time now, and they've never let us down. The new line of Tama mike stands exhibits the same thought and attention to detail. Tama stands give us excellent isolation, easy and positive positioning and real stability. All I can say is, they're great!"

When you work with mike stands for a living, you begin to appreciate the fine points. Like extra thick natural rubber feet and boom washers for better isolation, nylon height adjustment bushings and extra-wide-stance legs. When you add up the fine points, they point to Tama.



Wide-stance legs for stability . . .  
soft rubber feet for good isolation.



The boom that stays put . . . adjusts  
easily . . . won't sag.

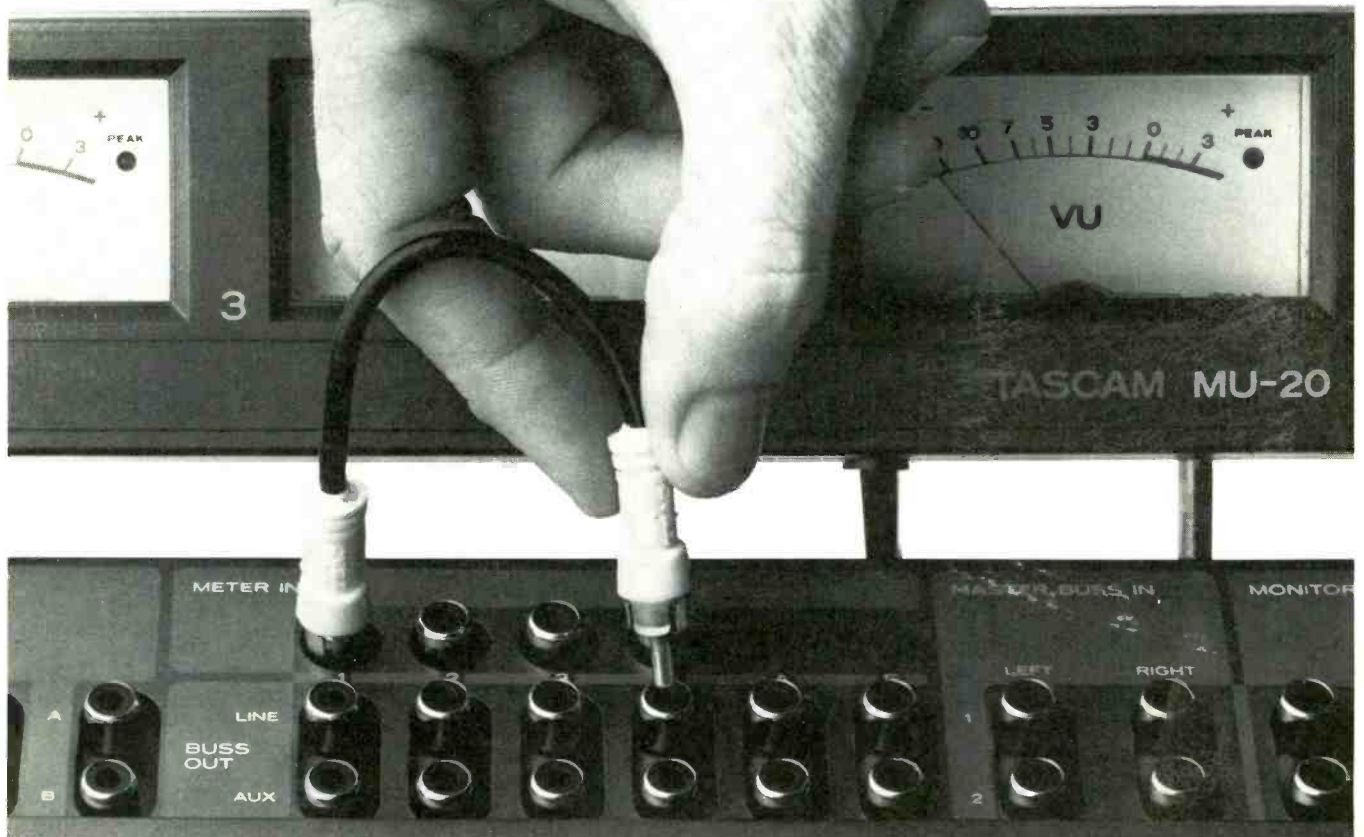


For more information about Tama mike stands send  
\$1.00 to: Tama Dept. J.M.R.  
P.O. Box 469, Bensalem, PA 19020 ●  
327 Broadway, Idaho Falls, ID 83401 ●  
In Canada: 6355 Park Ave., Montreal, P.Q. H2V4H5

CIRCLE 171 ON READER SERVICE CARD

[www.americanradiohistory.com](http://www.americanradiohistory.com)

# OUR NEW MANUAL MIXER ENDS MANDATORY BUSSING.



**Now nobody but you determines the routes your signals travel.**

The Tascam System 20 isn't your common everyday mixer.

We pulled all the switches (their logic is fixed and limited) and put in patch points all along the signal path.

You make the connections, so practically anything you want is possible.

When the job at hand changes from basics to overdubs to remix, you just change the way the System 20 works.

All this flexibility brings incredible quality, too. Since you do your own routing, you can take shortcuts.

Bypassing circuits you don't need, getting really clean signals.

The System 20 also ends your nightmares about needing an absolute fortune for a console with this kind of flexibility and quality. Now you can make the music you dream about at a price you can afford.

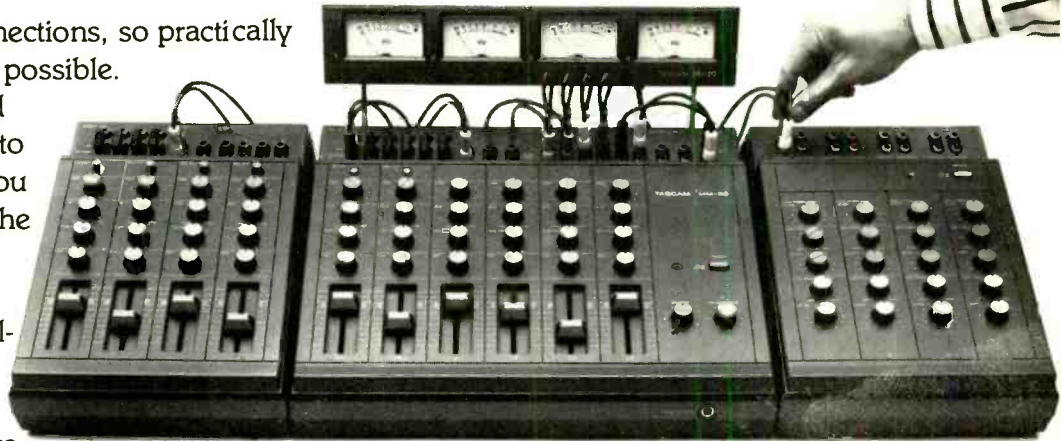
The System 20 centers around the MM20 Master Module. It's nothing less than professional. Four line inputs and two XLR transformer-isolated microphone inputs. Six output busses ready to change with the job. If you need three or even four effects busses you can just patch them in.

Next, for truly flexible sound shaping, there's the four-channel PE20 Parametric Equalizer. Low frequency range is continuously variable with sweep-type setting from 60 Hz to 1.5 kHz. Mid-range sweep control from 1.5 kHz to 8 kHz. And the high frequency is fixed at 10 kHz. Boost and cut for all three is  $\pm 12$  dB.

Then there's the MU20 Meter Unit. Ready to patch anywhere you need it. Like buss outputs or tape playback. And with its four VU-type averaging meters and peak LED's, you have the best of both metering worlds.

Like the rest of the System 20, there's nothing common about the 4 x 4 EX20 Microphone Expander either. Four transformer-isolated inputs with twelve patch points.

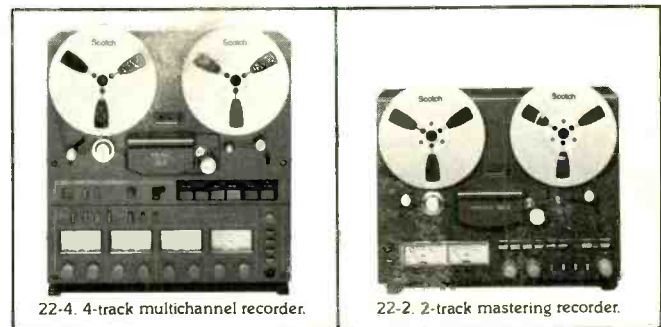
Once you plug into the economy of our manual mixer, you can save even more



by hooking up with Tascam's two new economical compact recorder/reproducers. Both give you 15 ips on 7" reels for 22-1/2 minutes of quality recording time.

You save in the long run, too. Because the System 20's modular design adds yet another dimension of flexibility. It grows right along with you. So when you're ready for 8-track, you just add another Master Module instead of an expensive new mixer.

Visit your Tascam dealer for a demonstration. Then you'll see exactly how the System 20 opens up new avenues of creativity.



**TASCAM** CREATIVE SERIES  
TEAC Production Products

# 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.

## TLC for Comp/Limiter

I recently purchased the complete facilities of an existing studio. My newly acquired equipment includes one Tascam Model 5 board, one Teac Model 2 board, one Harmon-Kardon Citation 12 power amplifier, one Teac/Tascam Series 70 8-track machine, one Teac A3340 machine for mixdowns, one Tapco 4400 reverb unit, a patchbay and two dbx Model 161 compressor/limiters.

What is the best way to set the threshold on the compressor/limiters? I have tried various settings and I'm not pleased with the sound I am getting. The units seem to be "clipping" the sound at times. It seems like after the threshold is passed, compression kicks in too suddenly. While on the subject, what is the best way to hook up the comp/limiters with the equipment I have described above?

—David Parrish  
President  
Parrish Productions  
Greenville, Tenn.

The threshold control setting of a dbx Model 161 depends on the unit's application. It can be used as a compressor or limiter. The threshold control determines the point at which com-

pression, or limiting, begins. The range of the threshold control is from 10 mV to 3 V. The lower the voltage setting, the sooner compression will begin.

The actual amount of gain reduction is a function of the threshold control and the compression ratio control. With a high threshold voltage setting and a high compression ratio setting (1:5 or greater), limiting of program material will occur; while, with a lower voltage threshold setting, strong compression will occur. Higher threshold settings result in lesser amounts of program material to be compressed and/or limited.

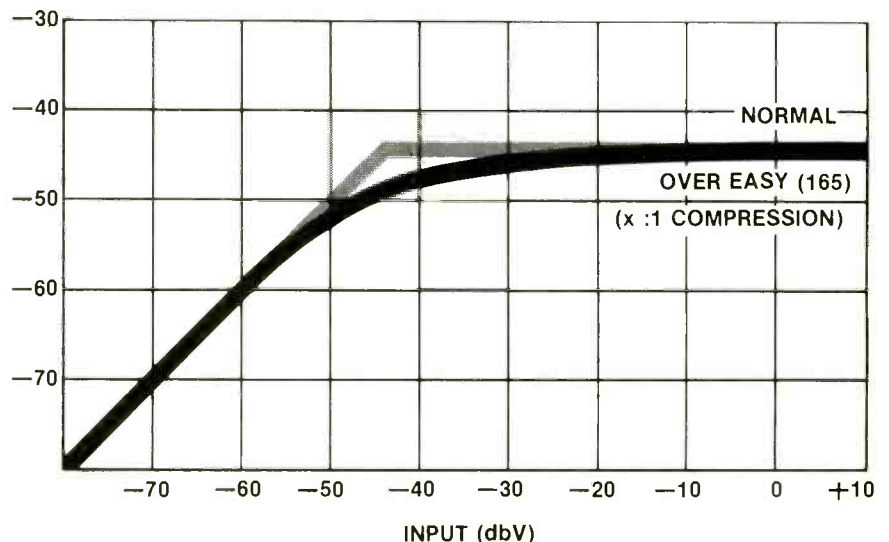
The output level control should be used to adjust output levels for a given threshold/compression setting.

The dbx 161 changes level based upon rates of program level change. Small program level changes result in slower attack rates (reaction time) than larger program level changes. For limiting applications, high threshold settings used with high compression rates can result in an abrupt change in gain once the threshold point has been

exceeded. The 161 is a very effective amplifier/speaker protection device when used this way. In recording applications this could result in the flattening of sound that you refer to as clipping. Please note "clipping" is a term commonly used to describe peak level distortion, not heavy peak compression. There is a limit to what can be smoothly processed by any compressor/limiter. By decreasing the amount of compression and lowering the threshold setting thus causing compression to take place sooner, audibly smoother results should be obtained.

The compression curve in the dbx Model 161, while essentially an industry standard, can also result in sharp program changes which are not always audibly smooth. This is why dbx, Inc., uses the "Over Easy"® compression curve in its Models 903, 163, 164 and 165. As can be seen in the comparison diagram, the point of threshold extends over a greater range. This results in smoother compression since level changes occur over a longer

OUTPUT (dbV)



"OVER EASY" COMPRESSION



period of time. While we believe the dbx Model 161 compressor/limiter is an excellent unit, you may prefer a dbx compressor/limiter incorporating the "Over Easy" compression curve. Experimentation here is the key.

As for recommended hook-up, we concur with Teac Corporation, the best place to connect a dbx 161 in your system is by patching it into any of the "Access" send and receive jacks on your boards when needed.

—Harold C. Cohen  
Customer Relations  
dbx, Inc.  
Newton, Mass.

### Designer's Choice

I have a pair of Peavey 112 International P.A. speakers. Although they are small (22" x 15" x 11"), they are very effective. However, they are not vented, which makes me feel that I'm not getting the low-end response that might be possible. The International has a Black Widow 12" speaker in it. My question is, wouldn't this speaker work better in a vented enclosure even if the enclosure is very small?

—Ron Garrett  
Amarillo, Texas

The Peavey 112 International is an extremely compact enclosure designed primarily for vocal sound reinforcement applications. Frequency response is 100 Hz to 14 kHz,  $\pm 3$  dB.

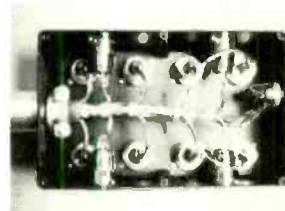
In the design of any speaker system, a choice must be made between efficiency and bandwidth; i.e., an increase in efficiency results in a narrowing of the bandwidth and vice versa. We opted for high efficiency in the 112 International. Thus, the 12-inch Black Widow woofer, because of its high efficiency, has an inherently high cut-off frequency (100 Hz).

It is true that proper venting of this box would lower the cut-off approximately  $\frac{1}{3}$ -octave to 80-85 Hz. However, additional equalization to further boost the low-end to typical sound reinforcement limits of 50-60 Hz would result in excessive speaker cone excursion causing distortion and probable speaker failure.

An infinite baffle (closed box) system has a slower roll-off rate than a vented system, making equalization below rated cut-off easier on both the amplifier and the woofer. Better con-

# CAVEAT EMPTOR. Let the buyer beware.

All multi-cable connectors are not created equal. Some of them may look alike on the surface, but a closer examination of the design and components will show a marked difference. A professional will know the difference; if not now, then in time to come. The Whirlwind Medusa will hold up under abusive day in and day out treatment.

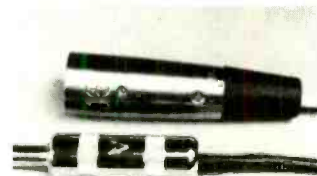


Medusa systems are available in five basic configurations, or with many custom options depending on your specific needs. Multi-pin connectors at either end permit quick connect and disconnect. Impedance matching line transformers can be included for greater line flexibility. Storage options include the Medusa Wheel and two different road cases.

We feel it's important to take a close look at the Medusa and at the competition. Look inside the junction box. How were the connections made? Do they look like they will withstand the kind of torture you will put them through? And what about the strain-relief? Our heavy duty wire mesh strain-reliefs are double reinforced and are at both ends. Check to see if the cables are color coded (by subgroup) on the sends and returns.

This could save you time and aggravation. Only Whirlwind uses cable custom made to our specifications by Belden for increased life and versatility. We individually hand stamp the plug ends for easy identification; We don't use wrapping which can come off. We've designed our Medusas with independent grounds to eliminate ground loops.

But we're not telling you all this to scare you. We feel confident in the way we design and build our products. Besides using the best possible cable and connectors, we back our Medusas with the Whirlwind full two year guarantee. That should ease your mind and let you concentrate on your music. So don't worry, beware and buy Whirlwind.



**whirlwind**

Whirlwind Music Inc.  
P.O. Box 1075  
Rochester, New York 14603

Shown above is the standard Medusa 15 with 100' cable, 12 mikes in, and 3 sends.

CIRCLE 110 ON READER SERVICE CARD

trol is also provided for the woofer below cut-off, improving mechanical power handling.

For these reasons, in this particular application, a closed box design enables much more efficient and extended equalization and performance below 100 Hz without the problems caused by excessive cone excursion.

—Mike O'Neill  
Design Engineer  
Peavey Electronics  
Meridian, Miss.

### Quirky Cable Question

I am in the process of enlarging my patch cord collection and was wondering if I could use TV-type coaxial cable, in particular, Belden 8259 RG-58 A/U for my cords? It is flexible, has a stranded center conductor and looks like heavy microphone cable. Will it work? If not, why? Please include more construction articles.

—David Simpson  
Keyser, West Va.

MR&M Technical Editor Brian Roth, the noted composer of the "Spaghetti

*Sonata, Or Understanding Cables and Connectors"* (Modern Recording, June 1977) took a moment out from his busy schedule to ponder your question. The things you must consider in addition to the sheer availability of the cable are the type of equipment with which you are working, the physical characteristics of the cable itself, and the kind of treatment the cable will face in use with your patch bay. (Let's face it, people at work in the studio don't always have time to be gentle with their equipment.)

The first standard by which to judge appropriate cable—your equipment—we cannot begin to explore since you do not delineate your setup. Keep in mind, however, that most professional equipment requires two-conductor, shielding cable. If you are working with Teac/Tascam or some other "semi-pro" equipment, you can squeak by with single-conductor, shielded cable. (Belden 8259 is single conductor.) This segues nicely into Brian's points about the cable itself.

Keep in mind that the cable may appear to be flexible, but will it withstand the rigors of continued studio use? Brian

feels that next to the cable used for on-stage applications, patch bay cords certainly have the most strenuous job required of a cable. TV cable is not really intended to flex that much on a continued basis, and its construction reflects this. Professional patch bay cables have a center strand especially designed for resilient flexibility. They sport a center conductor of what Brian termed "tinsel"—a woven strand of thread, cloth and very fine wires that will not snap or kink with strenuous use. Roth notes that these cables are very hard, if not downright impossible to solder, but that manufacturers usually equip them with metal terminations to remedy this problem.

The cable's capacitance is not really a factor in your choice since it is low for Belden 8259, as it is for most patch bay cables.

Basically, you must assess your equipment to see if it will function with one conductor cable, and then determine the type of handling the cords will have to endure. Consider, too, the life span you would require of them. Poor performance or frequent replacement is not cost effective, after all.

## FUTURE PERFORMANCE

Hinges on today's  
value



Watch for Biamp's 42 Series mixers. If you're looking for versatility as well as reliable performance without compromising your talents with a lack of features, then try a Biamp 42 Series mixer.

Shhhh! Take close note of the absence of noise and distortion expelled by the most advanced technology.

Listen. Hear the sibilance in the properly centered high EQ. Then check the full spectrum of precision control.

Get a Biamp "42 Series" mixer. Never before have you heard such fidelity combined with amazing value. Call or write us for more information.



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CIRCLE 147 ON READER SERVICE CARD

# IMMORTAL MUSIC SHOULDN'T BE KEPT ON MORTAL TAPE.



Good music never dies. Unfortunately, a lot of cassette tapes do.

At Maxell, we've designed our cassettes to be as enduring as your music. Unlike ordinary cassettes, they're made with special anti-jamming ribs that help prevent tape from sticking, stretching and tearing.

And our cassette shells are built to standards that are as much as 60% higher than the industry calls for.

So if you'd like to preserve your old favorites for the years to come, keep them in a safe place. On one of our cassettes.



IT'S WORTH IT.

## No Strings Attached

I saw Peter Gabriel at the Tower Theater recently and he was excellent. Beyond this fact, I couldn't help but notice his microphone. It had no wires whatsoever: he stuck it in his pocket, pulled it out, danced around, everything! It was splendid. I used to do sound for a local band and we fooled with snakes and a small board, but all the mics had wires—all over the place, too, it seemed! Maybe I've been out of

touch too long, but can you tell me a bit about mics of this sort?

—Mary Francis Shields  
Philadelphia, Penn.

Wireless microphones are becoming more and more fashionable because of technological and price breakthroughs which have made them more desirable and affordable to a larger spectrum of performers. On the financial front, it is possible today to buy a professional

quality wireless microphone system for several hundred dollars, not much more than a good quality standard microphone might cost. The main technological advance has been the development of circuitry which gives up to 100 dB of dynamic range and a greatly improved signal-to-noise ratio. The dynamic range figures for the best of these wireless microphones is equivalent to that of hard-wired (standard) microphones. The companion circuitry that has made this possible can best be compared to that used in the dbx product line. We have just been granted a government patent on this circuitry and feel that it will have a significant effect on this portion of the audio industry.

The improved figures for dynamic range and signal-to-noise have also served to open up the rock and roll market to wireless microphones. While the freedom of movement has long been a desired aspect of using wireless mics, this market and others had previously been prevented from using them because of audio limitations. Happily, that has been turned around.

At this time there are five kinds of wireless systems used in the industry. Unfortunately, the FCC has not opened up a specific band or frequency solely for wireless systems and so the various systems must operate in conjunction with and in between established frequencies.

The first system we shall explore is a low-band system which operates at a fixed frequency of 49 MHz. This is the least expensive system, but it occasionally suffers from random interference from other (higher powered) users hitting on the same frequency band. This system affords the least audio quality, but it is generally acceptable for some applications.

The next system operates on a commercial FM band at a frequency of 88-108 MHz. This is the lowest priced system to offer tunable operation which can eliminate the instance of random interference since, although this system uses a standard receiver, it allows you to tune in between the FM stations where no interference exists.

The next system also offers tunable operation, but utilizes a custom receiver which incorporates the special audio processing discussed earlier which gives the user 100 dB of signal-to-noise. Many rock groups, including most of the top touring bands, use this system.



# STAY TUNED.

There are dozens of tuners knocking around these days. But when it comes to standing up to the hard knocks of life on the road or in the studio, there's really only one—The ALPHATONE 3 from Imagineering Audio.

This one fell 14 stories from a hotel window. And when we plugged in to the ALPHATONE 3, it was still providing instant, accurate, hands-free tuning.

The ALPHATONE 3's footswitch feature and in-line patching means you can leave it plugged-in while you're playing.

So that you can silently check your tuning even in the middle of a song.



The unique ALPHATONE 3 displays notes alphabetically and indicates if they are sharp or flat.

The ALPHATONE 3 is totally unlike all other tuners which force you to memorize the numerical frequencies of each note.

So if you're looking for durability and simplicity, on the road or in the studio, pick up the ALPHATONE 3.

And be sure to stay tuned for future product developments.

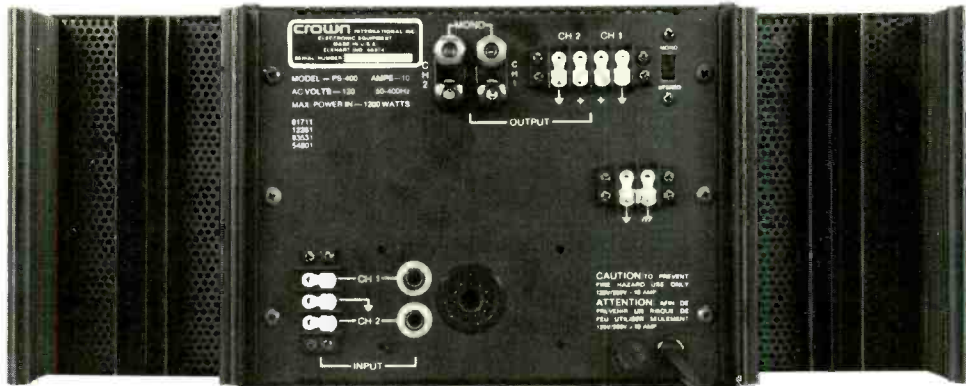
**IMAGINEERING  
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Contact us for the name of the Alphonator dealer nearest you:

5558 S.E. International Way, Milwaukie, Oregon 97222 (503) 653-5927 (800) 547-1731

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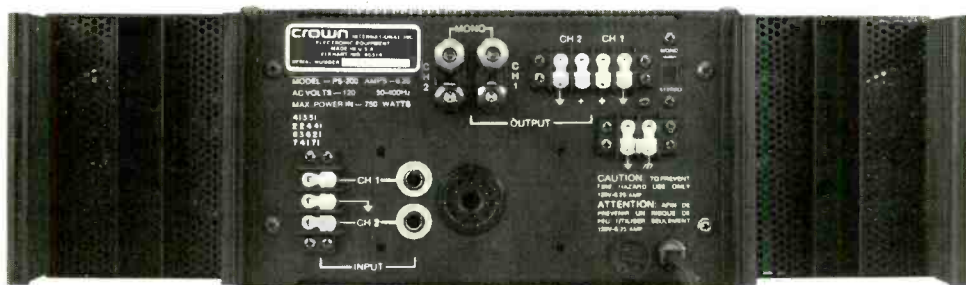
# NEW ALL-PRO AMPS BY CROWN



The thorough professionalism of the new Crown PS-200 and PS-400 two-channel power amps is most obvious on the back panel. Terminal strips. Phone jacks. Mono-stereo switch with binding posts positioned for quick conversion. Separate external and internal ground connections. Eleven-pin connector for low cost plug-in options.

Front panel convenience, too. Detented level controls. Unpadded output monitor. IOC™ distortion indicator. Signal presence indicator. Baked enamel finish. PS-200 rated (FTC) at 140 watts per channel into 4 ohms. PS-400 at 265 watts.

Both units with the exclusive Crown MULTI-MODE™ circuit for all-day reliable power that minimizes distortion at all listening levels. Send the coupon today for your free information package on Crown professional amps. Also includes information on the newly restyled Series II DC-300A and D-150A.



MR5



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CIRCLE 104 ON READER SERVICE CARD



## TWO FOR THE ROAD

Because we understand that your performance depends a lot on our performance, we make microphones that can truly withstand the rigors of the road. The new Beyer M600 virtually puts an end to hum, pop and boom with its hum bucking coil, its built-in breath and "pop" filter and its 3-position frequency equalizer. The Beyer M400, which costs somewhat less than the M600, has many of the same features — with all the quality and durability that have become Beyer trademarks. Here are two microphones that can easily be mistaken for ribbons; they have all the warmth and quality. But are far more affordable. For a complete demonstration, see your Beyer dealer.

**Beyer**  
**Dynamic**

BEYER DYNAMIC, INC.

5-05 Burns Avenue, Hicksville, NY 11801  
(516) 935-8000 / In Canada, H. Roy Gray, Ltd.

The fourth fairly common system available today is a VHF system which operates on selected fixed frequencies between 150 and 216 MHz. This system utilizes business channels or unused TV channels. These systems are generally more expensive and also require a special receiver. This system is traditionally the one used most by professionals. These VHF systems are available from different manufacturers with varying levels of performance, i.e., not all incorporate the compansion circuitry.

A fifth system exists today, fairly esoteric in nature, used primarily by broadcasters. It is a UHF system which operates around 450 kHz or around 950 MHz. These are special units, quite expensive, which approach the best VHF systems in performance quality.

The advantage of a wireless system seems obvious: freedom of movement. I'd like to also offer the additional points for your consideration: freedom from electrical shock from faulty grounds; the elimination of unsightly cords and all the accompanying hassles; and, for electric guitarists, the elimination of spurious pickup of interference (from AM radio, etc.) and audio degradation that is common with long cable runs.

The feeling in the audio industry today is that with the improved specifications on wireless equipment due to the implementation of the new circuitry, and a growing public awareness of its possibilities, almost all audio applications currently using cords will eventually go wireless. Some of these uses are in practice today; others are just around the corner. Some worth noting here include: wireless headsets or in the ear monitors for both stage and studio musicians, increased wireless operation for a greater variety of musical instruments, and easier stage setups without the hassles of miles of cords (including stage to monitor board runs).

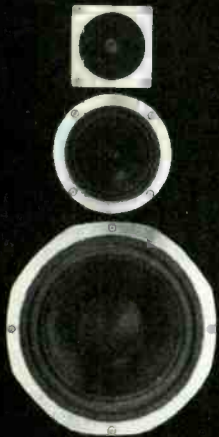
The technology necessary for wireless operation has been here for some time and, as we discussed earlier, is improving steadily. It is only a matter of time before the increasing public awareness of the diverse applications of this technology will allow others to experience the excitement you felt recently at the Tower Theater.

—John Nady  
President  
Nady Systems, Inc.  
Oakland, Ca.



## LISTEN UP

Now  
there is a studio monitor  
that is both powerful  
*and* precise —  
the Dahlquist DQM-9.



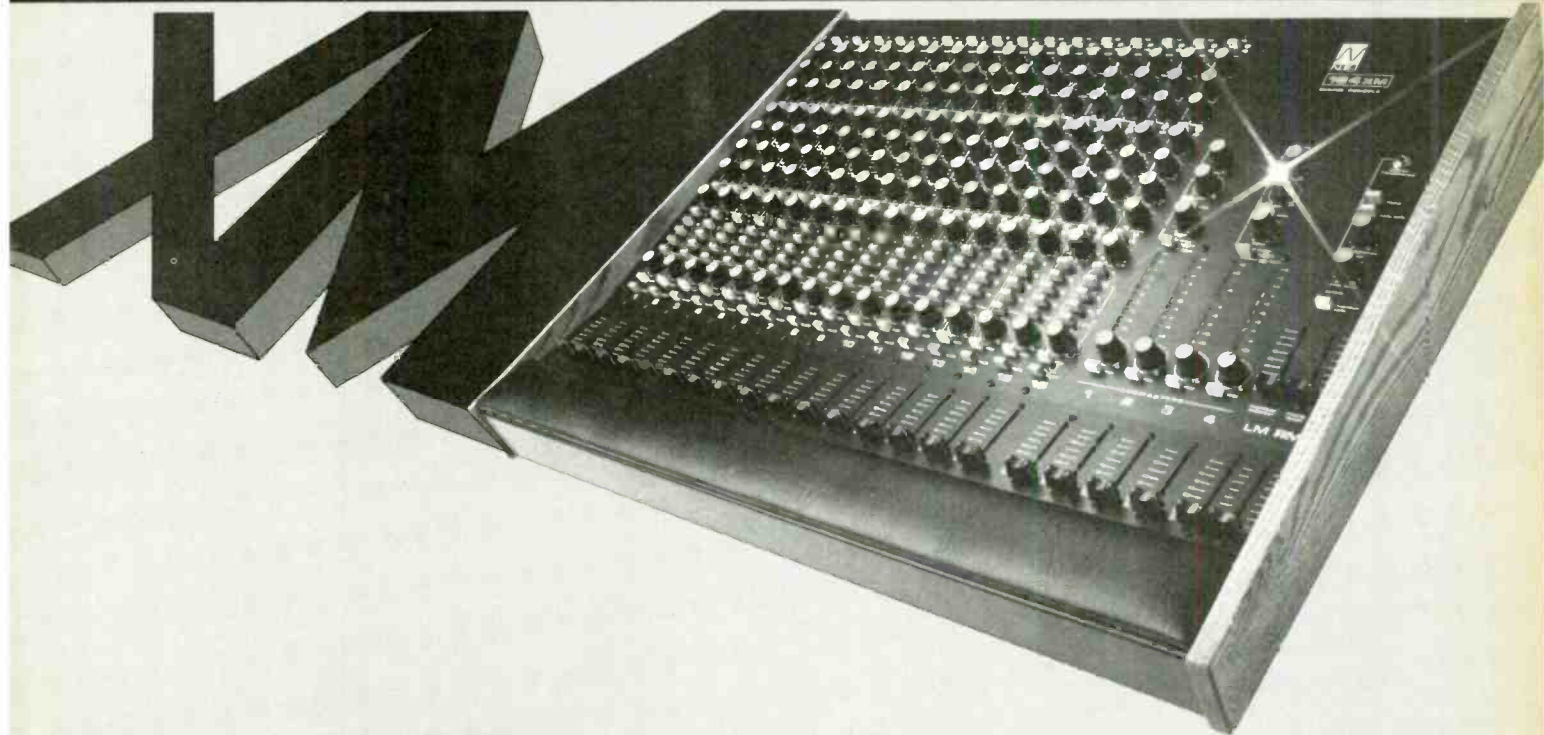
At last you can monitor at the high levels necessary to hear what's going on way down in the mix and still get flat spectral balance, depth and superb detail.

For full technical information on what makes the DQM-9 such a special studio monitor (for example, our precision German-made drivers with ribbon wire voice coils, and some very interesting enclosure techniques) please write to us at:

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The NEI 164XM professional mixing console.  
Engineering excellence.  
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# THE **PRODUCT** SCENE

By Norman Eisenberg

## NEW HITACHI SERIES

Top of the line in a new series of cassette recorders by Hitachi is the D-1100M. The r/p head is a combination type, with separate gaps for record and play in a single housing. IC logic control permits "feather touch" direct switching from one transport mode to another. A dual-capstan drive system is used. In addition to a "Unitorque" capstan motor, the deck has a DC reel motor. A built-in microcomputer handles automatic tape adjustments. The deck has metal tape capability, and uses dual 16-LED peak-hold meters.

Other models include the D-E95, the D-E55 and the D-E25. Features vary with each model.



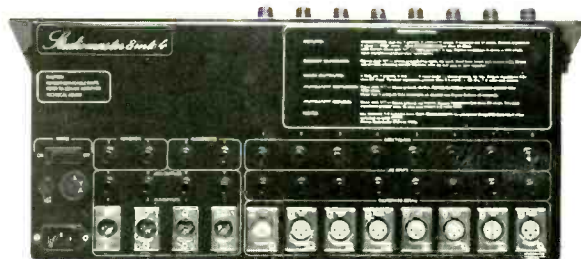
CIRCLE 1 ON READER SERVICE CARD

## HIGH POWER SPEAKER SWITCH

Four pairs of stereo loudspeakers may be driven from a single amplifier without overloading the amp's output stage, with the use of the new Russound MP-3 speaker amplifier switching device. Says Russound: "Each pair of speakers may be volume-controlled independently of the others, and without changing the load impedance seen by the amplifier." The MP-3 also provides input switching for two separate power amplifiers so that any loudspeaker pair may be driven from either of two signal sources. The MP-3 will accept power inputs from any commercially available amplifier and will drive loudspeakers of any nominal impedance in any combination up to a level of 70 watts music power per speaker.

CIRCLE 2 ON READER SERVICE CARD

## 8 IN., 4 OUT MIXER



From Studiomaster Inc. of Anaheim, California comes word of its new 8/4 mixer, capable of functioning as a board for recording and/or "live" performance work. Because of its four discrete outs, it also works as a monitor mixer or keyboard mixer.

The first four channels are set up to accept RIAA equalization so that the device will serve as a mixer in disco or nightclub applications. Featured are all new electronics (ICs) and edge connectors plus balanced inputs and phantom powering. Price is \$1495.

CIRCLE 3 ON READER SERVICE CARD

## NEW MICS FROM A-T

Audio-Technica's new model AT815 "shotgun" microphone is described as a unidirectional electret condenser unit designed specifically for long distance pickup. Priced at \$200, it was created for broadcasting and pro-sound reinforcement work, and is available only in retail outlets that specialize in that class of equipment.

For more general consumer use, A-T is offering the model AT817, a wide-range unidirectional electret condenser microphone designed more for the amateur. Its price is \$50 and it will be sold through a broad range of retail outlets.

CIRCLE 4 ON READER SERVICE CARD



## PASSIVE CROSSOVERS FROM COMMUNITY



From Community Light & Sound comes news of two new passive crossovers for use by anyone constructing his own two-way speaker systems. The two models are the 8816 for an 800 Hz crossover frequency and the 15816 for 1500 Hz. The units were designed for use with an 8-ohm low-frequency driver and a 16-ohm high frequency driver (an 8-ohm tweeter or compression driver may be used with the addition of a series resistor). The crossovers are 12 dB/octave parallel LC circuits constructed of non-saturating air-core inductors and non-inductive mylar capacitors, resulting in a power rating of 250 watts. The entire unit is securely potted in polyester resin reinforced with glass fiber for ruggedness and reliability. Electrical connections are made via a barrier strip on the front of the unit, and a 16-ohm "L" pad is furnished for remote mounting as a treble attenuator.

CIRCLE 5 ON READER SERVICE CARD

## HARRISON MR-2 CONSOLES

The MR-2 from Harrison Systems of Nashville, Tenn. is described as a "specialized" console. A full range of options and features, explains the manufacturer, allows the user to specialize the console to individual functional and budgeting needs. The system involves expansion frames and module update kits, as well as basic design and wiring techniques intended to minimize inefficiencies and maximize utility. Details are explained in literature from the manufacturer.

CIRCLE 6 ON READER SERVICE CARD

## DIGITAL CASSETTE RECORDER

Technics has announced the SV-P100, a PCM (pulse code modulation) processor and complete cassette tape-recording system in a single unit. Said to be simpler to operate than a standard open-reel deck, while also using less tape than two-track 15-ips recording, the SV-P100 "permits results higher in quality than any home recordist had ever before thought possible."

The device, styled as a compact table-top system, has its most often used controls arranged on a slanted console panel. In use, the new deck samples the incoming audio signal, converts it to a standard NTSC TV signal, and then records it on a VHS format video cassette. During playback, the signal is retrieved and entered into a memory circuit where various error compensations are performed. The resultant binary code then is converted back to an audio signal and passed through a low-pass filter which removes the pulse frequency. The resultant analogue audio signal then can be reproduced in the conventional way.

Making extensive use of advanced circuit techniques such as chips, the recorder has a built-in microcomputer that provides full logic control. Among operational features are an automatic open/close cassette holder; a fader adjustment, fast-forward, pause, search, stop, rewind, play, record, electronic editing, a jump option to skip unneeded portions in playback, a search function, a locate function, preset playback switching, cueing facility, terminals to permit digital dubbing, LCD tape counter and signal level indicators, front panel headphone and microphone jacks. Maximum recording time is two hours. The device uses a 14-bit linear quantizing rate.



CIRCLE 7 ON READER SERVICE CARD

## CERWIN-VEGA EQUALIZER

Cerwin-Vega's new model GE-3 is a stereo graphic equalizer that offers half-octave filter bandwidths for frequencies below 250 Hz and full octave filter bandwidths above 250 Hz. As a result the specified center frequencies for each channel are 31.5, 45, 63, 90, 125, 180, 250, 500, 1 K, 2 K, 4 K, 8 K and 16 KHz. The half-octave centers, says Cerwin-Vega, are designed to provide high resolution in the "critical low frequencies where EQ problems are likely to occur." Both un-



balanced and balanced inputs and outputs are provided, and are protected against damaging levels or loads. Powered by a dual-voltage supply (115 or 230 V AC), the GE-3 uses monolithic amplifiers. It is equipped with an active filter network—called GIC (for generalized impedance converter)—which uses operational ICs. The GIC circuitry simulates an RLC bandpass filter and is said to realize inductive characteristics without actually using an inductor. Each of the thirteen bands on two channels is rated for 12 dB boost or cut. Price is \$550.

CIRCLE 8 ON READER SERVICE CARD

## UHER SHOWS NEW MODELS

New versions of Uher open-reel portable tape recorders feature three heads with off-the-tape monitoring; easy-to-read peak-level meters; LED function indicators; integrated power supply at the mic socket for using condenser mics; meter illumination with automatic time switching; and fully electronic amplifier switching. Now known as the "Report Monitor," the new Uher series comes in three models. The model 4000 (\$1,189.50) is a half-track mono-only machine. The model 4200 (\$1,361.25) is a half-track machine with stereo. The model 4400 (\$1,361.25) is a quarter-track stereo machine. All Uher decks run at four speeds: 7½, 3¾, 1⅞, and 1⅝ inches-per-second. Uher's are now available through Walter Odemer Co., Inc. of Burbank, Ca.

CIRCLE 9 ON READER SERVICE CARD

## NEW MIXING BOARDS

From Dallas Music Industries (Hawthorne, N.J.) comes word of its new series of Kelsey Professional Mixing Boards. Thirty-seven models are offered in five new lines. Prices range from \$925 to \$20,280. All Kelsey boards are furnished with an aluminum reinforced fiberglass SMF ATA style road case.

The Pro-Club+3 Series is offered with six through twenty-four inputs. Features include stereo and mono operation, balanced and unbalanced inputs and outputs, shielded studio grade mic-input transformers, built-in reverb systems and two LED level arrays.

The Pro-4/3 Series is offered with twelve to twenty-four inputs, and features two true stereo submaster or four mono submaster operation at the touch of a button. Also included are stereo solo and mute, four LED level arrays, four sends, four-band EQ, long-throw faders, channel patching and external power supply.

The Stagemix+4 Series is a four-output stage monitor board, available with eight through twenty-four inputs.

The Pro-Tour 8/3 Series employs a modular format with eight through thirty-two inputs available. Among its many features is separate four-track mixdown.

The Soundprism Series is DMI's top-of-the-line modular format with eight through forty-eight inputs available. Features include fifteen main mix busses, four assignment sends, stereo zoom system, four returns and a lot more.

CIRCLE 10 ON READER SERVICE CARD

## FISHER DEBUTS NEW DECK

A bid for the serious cassette recordist is seen in the model DD450 cassette deck from Fisher. Using three heads and featuring direct capstan drive, the DD450 transport is "feather-touch" operated through solenoids. The drive motor itself is an 18-pole brushless, coreless DC servo motor, and its direct connection to the capstan obviates the need for brushes, pulleys and belts. A separate motor handles fast wind modes. Other features include metal tape capability, four-position bias and EQ selector, Dolby NR, bias fine adjust, fluorescent VU meters with a peak-hold system and more. Price is \$579.95.

CIRCLE 11 ON READER SERVICE CARD

## MXR PREAMP; OCTAVE EQ



Described as offering unparalleled control flexibility for a complex stereo system is the System Preamp II from MXR. Input sources can be routed and mixed independently, and two turntables may be selected independently since the unit contains two totally independent RIAA phono preamps. The device has 2-in to 2-output capability, with two signal processing loops that offer assignable locations. A mix control may be used for professional fades or tape blending.

Also new from MXR is the model 147 stereo octave equalizer. This is a 10-band per channel unit, with frequency bands spaced according to standard ISO centers. Also included is an infrasonic noise filter, switchable and independent of the EQ in/out switch. A front-panel switch enables the model 147 to be patched into a system before the tape deck to facilitate the making of equalized tapes.

CIRCLE 12 ON READER SERVICE CARD

## A LITTLE OF THIS AND THAT...

By one name or another—such as Sony's "Walkman" and "Pressman" or the KLH "Solo" or Infinity Sound's "Intimate Stereo"—a significant number of audio manufacturers have launched a new application of the versatile audio cassette. This time, in contrast to one major design trend which has cassette decks getting bigger and more complex, the new product format is quite petite and average weight of the entire deck is barely one pound. What's more, the units are small enough to

be slipped into a large-size pocket, looped onto your belt, or slung over a shoulder not unlike a camera. In addition to handling standard size audio cassettes at the 1 7/8 ips speed, some of these tiny tapers also can be fitted with an FM "cassette" that permits reception of stereo broadcasts. Hearing is via ultra lightweight headphones.

While obviously this particular product trend is of more direct interest to listeners who are on-the-move, it does have some implications for the recordist on-the-move. For one thing, it is possible to incorporate a record function in the basic format, and at this writing at least two firms—Sony and Aiwa—have announced this option. I have obtained a sample of the Sony Pressman, and can report that it does a job of stereo recording that seems considerably better than what you might expect from such a small format.

The other spinoff here is the rising interest in those almost "weightless" headphones. All of these cassette units are supplied with one headset, and most have provision for jacking in a second headset. Accordingly, some firms—not themselves offering the tape units—are offering the new type of headphone, among them (so far), Koss and Audio-Technica. With a suitable adaptor plug, these headphones can be jacked into a standard headphone output, and their sound is—in sum—worthy enough to recommend them for general in-the-field monitoring.

While on cassettes, by the way, I note that dbx is introducing prerecorded dbx-encoded cassettes, thus adding to and enhancing its earlier offerings of dbx-encoded discs. The new releases are being duplicated in real-time at In Sync Laboratories and will carry a retail list price of \$20 each. They may be played, as the dbx discs, through the dbx Type II noise-reduction system or decoder.

CIRCLE 13 ON READER SERVICE CARD

*The Musician's Manual* is the title of a new book compiled and edited by Mark E. Halloran, offered as "a presentation of the Beverly Hills Bar Association Barristers Committee for the Arts," and published by Hawthorn/Dutton, N.Y. In soft cover, it contains over 240 large-size pages that are loaded with information on getting started in the music business, demos, "live" performance tips, copyright information, relations with managers and agents and so on. Price is \$9.95.

CIRCLE 14 ON READER SERVICE CARD

# MUSICAL

# NEWSIGALS

## PERCUSSION INSTRUMENTS

One of the more interesting developments in drum design recently has been the line of Dragon Drums introduced at last summer's NAMM trade show in Chicago. Dragon Drum Ltd. has now announced the introduction of Dragonwood drums which share the same basic design as the original Dragon Drums but are constructed from 8-ply laminated wood rather than the seamless, transparent acrylic of the original models. The basic design of Dragon Drums and Dragonwoods is a much more compact design than traditional tom-toms giving drummers a considerably streamlined set-up. For example, six Dragon tom-toms will mount in two rows of three on top of a bass drum in roughly as much space as two conventional tom-toms. The new Dragonwoods are available in five natural wood finishes, all coated with polyurethane high-gloss varnish for durability.

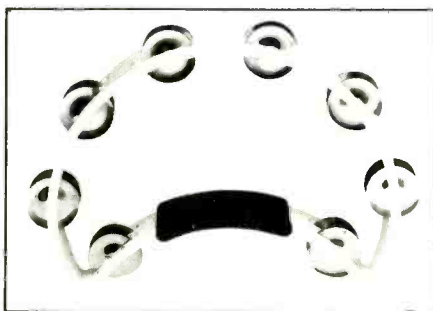
CIRCLE 18 ON READER SERVICE CARD

Star Instruments has branched out in its line of electronic percussion from electronic drums to what is perhaps most easily described as an electronic marimba. The new model is known as the Synare MP (for Mallet Percussion), and features a four-octave "keyboard" which may be transposed up or down an additional octave. The Synare MP is a polyphonic instrument capable of simultaneously producing up to eight notes; all eight notes may have the same voicing, or they may be divided into two individually-voiced groups of four notes each. In addition, the two voices may be doubled so that striking one key simultaneously produces two different voices or the keyboard may be operated in a split mode with one voicing in the lower two octaves and another in the top two octaves. The

Synare MP also has a four-note polyphonic sequencer built in which will store up to sixteen sequences of up to thirty-two notes each with or without their associated rhythm patterns. Sequencer playback may be transposed by any interval, and the keyboard is active even during sequence playback. The Synare MP is housed in two units, one housing the keyboard and the other housing the electronics, and is furnished with custom Calzone road cases.

CIRCLE 19 ON READER SERVICE CARD

One of the few true advances in percussion is the Rhythm Tech Tambourine. Rather than the traditional round design, the Rhythm Tech tambourine is shaped rather like a crescent moon with a padded hand grip on the



concave portion of the rim where it is near the center of gravity of the tambourine. The result of this design is greater control for the musician and less fatigue when playing the instrument. Additionally, the sixteen pairs of jingles are an improved design and are produced in Rhythm Tech's own factory for consistency and superior sound. The Rhythm Tech tambourine has already received acceptance by many of the industry's top percussionists, and in addition has been made a part of the permanent design collection of The Museum of Modern Art for its aesthetic as well as functional qualities.

CIRCLE 20 ON READER SERVICE CARD

Electro-Harmonix has expanded its line of compact, battery-operated electronic drums to include a half dozen different models which will mount on Roto-Tom stands or on conventional cymbal stands with the hardware furnished with the individual units. The line includes the SpaceDrum, which produces the familiar up- or down-sweeping synthesized drum sound with impact control of volume and pitch; the Super Space Drum, which adds modulation to the basic Space Drum sound; the Crashpad, which simulates snare, cymbal, surf and various explosive sounds with a triggered filter sweep of a white noise source; the Sonic Boomer, which has a wide, 7-octave pitch range plus widely variable resonance for an extraordinary range of effects; the Rolling Thunder for very low frequency percussion synthesis; and the Clap Track which produces hand-clap, cymbal and tambourine voicings with selectable slap-back echo.

CIRCLE 21 ON READER SERVICE CARD

## SYNTHESIZERS

The Prophet 5 Synthesizer now has a new baby brother according to a recent announcement from Sequential Circuits. The new model is known as the Pro-One and it brings a whole new level of features and performance to the realm of low cost (\$645) monophonic synthesizers. The Pro-One is a full-function unit with two VCOs with sawtooth, square and pulse waveshapes on both and triangle waves from one of the two; a 4-pole (24 dB per octave) VCF and a VCA both with independent ADSR envelope generators; and a built-in digital sequencer with two sequences totalling up to forty notes. The unit comes with a 3-octave (C to C) keyboard with pitch bend and modulation thumbwheels. Other capabilities of the Pro-One include an "automatic" glide mode which allows selective glide

between notes, single and double modulation capabilities, single and multiple triggering modes, repeat and drone modes and an arpeggiator. Another unusual aspect of the unit is its facilities for interface to the outside world, including an audio input with preamp and special gate generator, standard 1 Volt/octave control voltage inputs and outputs, gate input and output and an exclusive built-in digital interface to facilitate connection to most home computers.

CIRCLE 22 ON READER SERVICE CARD

Star Instruments, which until now has been known for its Synare electronic drums, has announced the first of what is to be a whole series of electronic wind instruments. The first of its new Synair line is the model 201, a two-octave, single-voice instrument with breath-controlled timbre and loudness. The 201 has a twenty-five note, F-to-F keyboard which may be transposed two octaves, and which has portamento and pitch bend functions. Sound source in the unit is a single VCO with square, pulse and sawtooth output waveforms. The single VCA and the VCF are both controlled by breath velocity—the harder you blow, the louder and brighter the sound is. The filter has four resonance settings which are controlled by two control keys on the unit. The Synair 201 is powered by a single 9-volt battery (rechargeable battery pack with charger/AC adapter is optionally available) and is made to connect to an amplification system, although a speaker module for self-contained use is also an option.

CIRCLE 23 ON READER SERVICE CARD

A new addition to the Korg line of synthesizers has been introduced by Unicord. The new model is the X927 Trident, an advanced, programmable, polyphonic synthesizer with split keyboard and triple layering capability.

The Korg Trident has three separate polyphonic sounds, namely strings, brass and polyphonic synthesizer, which may be used individually or simultaneously. The unusual aspect of the Trident is that its layering capability allows the musician to create one, two or three different sounds with a single key depression. Even more significantly, the use of layering does not reduce the number of polyphonic voices as it does on most other units with layering; the Trident is eight-note polyphonic regardless of whether each key controls one, two or three sounds. The unit has a five-octave (C to C) split keyboard with each of the three instrument sections assignable to either or both halves of the keyboard, and a four-way joystick to control pitch bend and "trill" function. The programmable synthesizer section of the instrument has sixteen user-programmable memories plus three piano presets which are selectable at the push of a button. Functionally the synth section boasts dual VCOs, 24 dB/octave VCFs with variable resonance, tracking and reverse/normal enveloping and full ADSR control per voice.

CIRCLE 24 ON READER SERVICE CARD

A relatively new name in synthesizers is SMS, a San Francisco company which just announced the introduction of its Voice 400 programmable lead synthesizer. The Voice 400 stores up to thirty-two user-programmed sounds which may be recalled and digitally displayed at will. The unit comes without keyboard but may be used with any source of 1 Volt/octave control voltages such as keyboards, string controllers, wind controllers, sequencers or acoustic instruments with pitch-to-voltage converters. For keyboard-oriented musicians who do not have a spare synth keyboard lying around, SMS does of course make a keyboard, the model 430 digital



keyboard with note assignment and built-in remote control. Functionally, the Voice 400 includes two VCOs with linear frequency modulation, continuous waveshaping, sub-octave and sync capability, a four-pole (24 dB/octave) multi-mode (HP, LP, BP) voltage controlled filter, two ADSR and one AR envelope generators and a comprehensive modulation section. Another unusual feature of the Voice 400 is the inclusion of an analog delay line in the unit which may be used for flanging, doubling or echo repeats; the delay line is fully programmable like all other functions, and additionally has an external input with mix control to allow delay processing of other instruments along with the synthesizer. The delay has a maximum delay of 2200 ms, or twice that as an option.

CIRCLE 25 ON READER SERVICE CARD

The latest from Multivox is the MX8100 Digital Sequencer from its Multivox Computer Basic Systems division. The MX8100 is a keyboard controlled sequencer aimed at "live" performance use since the keyboard is always active rather than being strictly for programmable sequences. The unit has a 480-note capacity, divided into four independent channels which may be accessed individually or in series as indicated by a series of LEDs. An LED array is also provided to display the amount of memory consumed. Sequence playback tempo is variable over a 20-to-1 range and has its own LED display. Portamento controls on the unit allow glide effects to be incorporated into programmed sequences. The unit also has a provision for transposing a sequence during playback simply by depressing a key on the keyboard. The MX8100 interfaces with most synthesizers on the market thanks to comprehensive and versatile control and gate inputs and outputs, and it may be synchronized with rhythm units or other sequences.

CIRCLE 26 ON READER SERVICE CARD



Oberheim Electronics has announced a new, updated version of its popular OB-X synthesizer known as the OB-Xa. The new model is an evolutionary development of the original OB-X and retains all of that unit's features while adding several worthwhile functions requested by professional musicians. Leading the list of updates is a split keyboard function with programmable split point and balance, allowing the musician to play one sound on the lower portion of the keyboard and another on the upper portion. Another requested function which has been added to the OB-Xa is a doubling mode which allows two sounds to be played with a single key. Other improvements include two-pole and four-pole filters, programmable transposition of either portion of the keyboard, an improved noise generator, an envelope generator for the filter, pitch modulation of VCO 2, a hold footswitch and a new bend and modulation assembly with an independent sine/sawtooth LFD. As befits its technical improvements, the Oberheim OB-Xa also received cosmetic improvements with exciting new graphics and solid walnut end panels.

CIRCLE 27 ON READER SERVICE CARD

### MUSICAL INSTRUMENT AMPLIFIERS

Multivox has a new line of amplifiers, the Multivox Contenders, whose first two models are lightweight, compact, 50-watt RMS models for guitar and bass. The guitar model is the P66 Contender amp with its 12-inch high-efficiency Multivox speaker. The P66 features controls for volume, bass, midrange, treble, distortion, reverb and master volume. The

bass model is the P64 Contender with a special design 15-inch speaker and controls for volume, bass, midrange, treble and master volume. Both models feature tongue and groove wooden construction covered with heavy duty naugahyde, oversized heatsinks for the power amplifier and circuit breakers for reliable protection.

CIRCLE 28 ON READER SERVICE CARD

### GUITARS

Taylor Guitars recently announced that its Model 855 12-string guitar (one of eleven 12-string models they offer!) has been improved to make its tone brighter, deeper and richer at any volume from a whisper to a roar. The 855, which has been considered one of the finest 12-strings available, now features choice Indian rosewood back and sides, a Sitka spruce top, an inlaid abalone rosette around the soundhole and an ebony fingerboard. The bridge is also made of ebony and is fitted with a compensated saddle for accurate intonation, while the nut is a brass and bone model. A standard feature of Taylor guitars which is unusual among acoustic guitars in general is a removable neck with twin adjustable truss rods for easy set-up and service. The neck itself is thin and wide with a low action making the Taylor 855 12-string as easy to play as many 6-string guitars.

CIRCLE 29 ON READER SERVICE CARD

A new name in premium quality electric guitars and basses is Veillette-Citron, distributed by Sundown Music. Veillette-Citron refers to its line as the "New Tradition" in the sense that it combines Old World craftsmanship

with New World technology. All the instruments utilize the finest woods shaped into perfectly balanced bodies. The designs feature excellent accessibility to the full length of the wide, high-fretted necks. Two-stage and exclusive three-stage humbucking pickups are used for a wide range of sounds. The newest addition to the line (which includes an 8-string bass along with conventional basses and guitars) is a maple bass with a single two-stage pickup and a push-pull staging selector switch built into the volume control.

CIRCLE 30 ON READER SERVICE CARD

### STANDS, CASES, ETC.

Keyboard players will be pleased to learn of two new stands from Unicord which are designed to hold a large variety of keyboard instruments. The Korg KST-1 and KST-2 Keyboard Stands are strong (600-pound capacity) yet lightweight (under 13 pounds) folding stands fabricated from 14-gauge square tubular steel. Rather than separate legs which must be attached, the Korg stands unfold and set up in seconds. Both models rest on non-skid, non-scratch feet with leveling adjusters. The KST-1 is 15½ inches deep and adjusts from 24½ inches to 38 inches in width, while the KST-2 is somewhat shallower at 12¾ inches deep but wider, with a 28½ inches to 45¾ inches range. Height on both models is 26½ inches.

CIRCLE 31 ON READER SERVICE CARD

Cases Incorporated is a protective packaging manufacturer who makes road cases under the Roadrunner name. The latest line of cases from Roadrunner is the Titan line of lightweight cases which are unique in that they are fabricated from .090 inch thick polyethylene plastic rather than the more common but less rugged vulcanized fiber material. Besides being inherently stronger, the plastic Titan material is some 50% thicker than the usual fiber. While Titan cases are not recommended for air or common carrier travel, they are much less expensive than heavy-duty road cases such as Roadrunner's A.T.A. (Air Transport Association) approved cases, and thus are an effective alternative for local and short-haul travel. Roadrunner's own line of A.T.A. cases are the only ones in the music industry which meet the A.T.A. Category 1 specifications according to Cases, Inc.

CIRCLE 32 ON READER SERVICE CARD



# ELECTRO HARMONIX SALE

The entire range of **ELECTRO-HARMONIX** devices is on sale now at **WHOLESALE PRICES** at leading music stores throughout the world. Now you can get the best sounds at the best prices. Shop around! If none of the stores in your area have these units on sale then you can buy them direct using the coupon below with a 10 day money back guarantee if the units don't blow you away.

MODEL	PRODUCT NAME	LIST	SALE	MODEL	PRODUCT NAME	LIST	SALE
0225	<b>SLAVE 200</b> Rackmount 200 Watt RMS Power/Slave Amp	\$399.00	<b>\$168.00</b>	7451	<b>DRM-15</b> E-H Digital Rhythm units with	\$229.00	<b>\$139.00</b>
0300	<b>VOCODER</b> 14 Matched Band Rack-mount Unit	799.00	<b>299.00</b>	7460	<b>DRM-32</b> 15 and 32 beats respectively. Programmed by the slickest, most soulful Motown and NYC R&B studio musicians in hundreds of session hours	299.00	<b>174.00</b>
0400	<b>MINISYNTHESIZER</b> 2 lbs., 5 octave range, full performance capabilities in a battery operated keyboard	249.00	<b>169.00</b>	7660	<b>MINI MIXER</b> Four mixable inputs	99.00	<b>74.00</b>
2001	<b>LPB-1</b> Power Booster Can boost your amp power up to 10 times. Make your small amp sound like a Marshall Stack	25.00	<b>18.50</b>	7700	<b>POLYCHORUS</b> With flanging, chorus, slapback echo modes and companding	275.95	<b>139.00</b>
1001	<b>LPB-2</b> Power Booster Same as LPB-1 but in a foot operated unit	33.50	<b>24.50</b>	7811	<b>MEMORY MAN</b> Stereo Echo/Chorus/Ambitron	269.00	<b>159.00</b>
1005	<b>SCREAMING TREE</b> Treble Booster Adds razor sharp bite that cuts	33.50	<b>24.50</b>	7850	<b>DELUXE MEMORY MAN</b> Echo with Chorus, Vibrato and Companding	349.00	<b>219.00</b>
1010	<b>SWITCHBLADE</b> Channel Selector instant switching between accessories or amp channels	21.50	<b>16.50</b>	7860	<b>ECHO 600</b> 600 millisecond delay — Echo/Chorus/Vibrato	399.00	<b>339.00</b>
1300	<b>RTG</b> Random Tone Generator Mellow random scientific music. Particularly effective with Memory Man echoes	89.00	<b>36.00</b>	7900	<b>MICROSYNTHESIZER</b> A sensational multiprocessor for guitar. Outsells all brands of guitar synthesizers in the world combined	299.00	<b>189.00</b>
2008	<b>MUFF FUZZ</b> Distortion Fuzz with edge	34.00	<b>23.50</b>	7950	<b>BASS MICROSYNTHESIZER</b> Designed specifically for bass guitar	299.00	<b>189.00</b>
2010	<b>5X</b> Junction Mixer Input/Output Mixer	14.00	<b>9.50</b>	8000	<b>GUITAR SYNTHESIZER</b> Used by Steve Howe of YES	1,495.00	<b>595.00</b>
3001	<b>CLONE THEORY</b> Chorus effect with Vibratflange. Sensational on bass guitar. A fluid orchestral effect	126.00	<b>79.50</b>	9203	<b>DOMINO THEORY</b> Sound sensitive light tube	49.95	<b>29.50</b>
3003	<b>BIG MUFF PI</b> Distortion Sweet violin-like sustaining sound used by Jimi Hendrix	58.00	<b>39.00</b>	9390	<b>3 PHASE LINER</b> Electronic Necklace	39.95	<b>19.00</b>
3004	<b>ATTACK EQUALIZER</b> Makes your Gibson-type guitar sound like a Fender Strat	89.95	<b>29.50</b>	9550	<b>CORONA CONCERT</b> Gas Flask	195.00	<b>79.00</b>
3053	<b>DELUXE BIG MUFF</b> Big Muff & Soul Preacher in one box	130.00	<b>89.00</b>	<b>ELECTRONIC DRUMS</b>			
3060	<b>GRAPHIC FUZZ</b> Noiseless, dynamically sensitive distortion combined with graphic EQ	139.00	<b>100.00</b>	5300	<b>SPACE DRUM</b> Popular disco effect now also used in Reggae	99.00	<b>59.00</b>
3075	<b>HOT TUBES</b> Vacuum tube overdrive simulator	94.00	<b>58.00</b>	5310	<b>PANIC BUTTON</b> Assortment of police siren sounds	89.00	<b>35.00</b>
3800	<b>VOLUME PEDAL</b> Great for tape reverse simulation	85.00	<b>59.50</b>	5320	<b>SONIC BOOMER</b> Tuneable drum over 10 octave range	89.00	<b>35.00</b>
4100	<b>DOCTOR Q</b> Envelope Follower—For involuted mellow funk lines	55.00	<b>33.75</b>	5330	<b>ROLLING THUNDER</b> Low frequency noise bursts	89.00	<b>35.00</b>
4250	<b>BASSBALLS</b> Twin Dynamic Envelope Follower For Bass Guitar	91.95	<b>39.95</b>	5350	<b>SUPER SPACE DRUM</b> Space drum with modulation capabilities used by the CLASH	129.00	<b>87.00</b>
4300	<b>SILENCER</b> Noise Gate/Line Noise Eliminator	79.00	<b>39.50</b>	5360	<b>CRASH PAD</b> Variety of pink noise sweeps	129.00	<b>87.00</b>
4500	<b>SOUL PREACHER</b> Sustainer/Compressor for long undistorted sustain	89.00	<b>49.50</b>	5370	<b>CLAP TRACK</b> Hand clapping drum with tape reverse options	149.00	<b>92.00</b>
4800	<b>SMALL STONE</b> Phase Shifter The #1 selling phase shifter in the world	79.00	<b>39.95</b>	5380	<b>SEQUENCER DRUM</b> 8 variable tones in a unique percussion controlled memory unit	199.00	<b>119.00</b>
4909	<b>AC/DC 9 VOLT BATTERY ELIMINATOR</b>	13.50	<b>10.50</b>	5385	<b>CLOCKWORKS</b> Controller & Percussion Brain	229.00	<b>119.00</b>
5100	<b>ELECTRIC MISTRESS</b> Flanger Shimmering comb filter sweeps	109.95	<b>69.75</b>	<b>Please ship at SALE price:</b> <span style="float: right;">MR-1</span> Model # _____ Product Name _____ Sale Price _____ _____ \$ _____ _____ \$ _____ <input type="checkbox"/> Visa <input type="checkbox"/> MasterCard <input type="checkbox"/> check total \$ _____ Card # _____ Expiration Date _____ Signature _____ Date _____ Name _____ Address _____ City _____ State _____ Zip _____			
5150	<b>DELUXE ELECTRIC MISTRESS</b> Flanger Used by Pink Floyd	129.00	<b>83.50</b>	<b>ELECTRO-HARMONIX</b> 27 W23 ST·NY·NY·10010			
5200	<b>ATTACK DECAY</b> Creates a variety of bowed and plucked sounds	199.00	<b>67.00</b>				
5800	<b>BAD STONE</b> Phase Shifter	99.95	<b>58.00</b>				
5950	<b>DELUXE OCTAVE MULTIPLEXER</b> Octave Divider Great for voice or guitar	199.00	<b>119.00</b>				
7100	<b>POLYPHASE</b> Studio phase shifter with envelope following mode	199.00	<b>139.00</b>				
7300	<b>GOLDEN THROAT II</b> Voice box with mouth tube	149.00	<b>109.00</b>				
7600	<b>10 BAND GRAPHIC EQUALIZER</b> with footswitch	123.95	<b>79.50</b>				

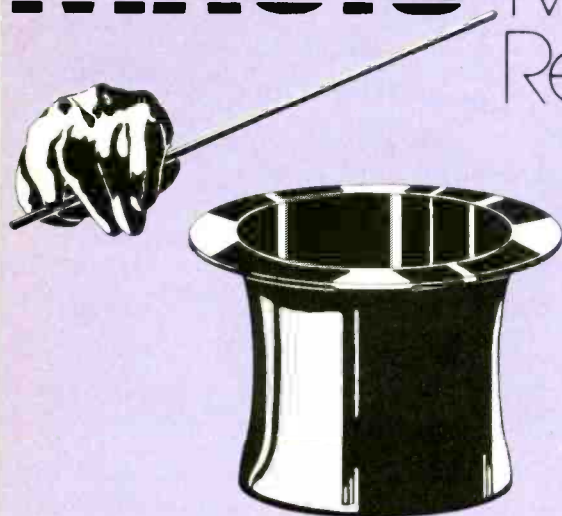
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# MULTI-TRACK MAGIC

## Creative Multi-Track Recording



By Craig Anderton

For most people involved in home recording, musical dreams must be tempered with economic reality. Fortunately, though, our imagination is not subject to financial restrictions; and better yet, use of our imagination can often alleviate the problems caused by lack of money.

Take 4-track recording, for example. While not as flexible as 8-, 16- and 24-track recording, the fact remains that professional quality tapes can be made on even the humblest four-track setup. But while it is an often stated fact that *Sgt. Peppers, Are You Experienced?* and many other tremendously popular albums were recorded in 4-track studios, this doesn't mean that simply going into a 4-track studio and twisting some knobs is going to produce music of the aforementioned quality. What you have to add to that studio is an accessory that is available to anyone at no cost, and yet is still lacking in even some of the best-equipped studios: *creativity*.

Using 4 tracks wisely requires planning, know-how, effort and persistence. The purpose of this series of articles is to supply the know-how,

while your job is to supply the persistence and effort. We'll begin our series by describing some tricks that multiply the usefulness of any 4-track machine; in Part 2, we'll investigate how to use a companion 2-track machine to good advantage; and in Part 3, we'll discuss the added production complications caused by the use of these techniques.

One other note: we'll restrict ourselves to mono techniques for now. After you've gone 8 track, we can start talking about some really spectacular stereo effects.

### Basic 4-Track Tricks

The secret of layering lots of tracks in a four-track format involves "bouncing" (also called "ping-ponging"). The basic idea here is to take tracks already recorded on the machine and mix them down onto vacant tracks in the same machine. To clarify this process, let's look at some specific examples.

**(1) COMBINING THREE TRACKS into ONE:** Let's assume that you have recorded sounds on tracks 1, 2 and 4. You can monitor all these signals from

the playback head, send them to a mixer, and then send the mixer output to tape track 3 (see *Figure 1*). Thus, the first three recorded tracks will reside in premixed form in track 3. You may then erase tracks 1, 2 and 4 in order to add additional overdubs. This gives you, in effect, six tracks out of a 4-track recorder. Since the outer edges of tape tend to wear faster than the rest of the tape, most of the time you'll want to leave either track 2 or track 3 open and premix into one of these "inside" tracks; in the following examples, as in this example, we'll assume that you'll be premixing tracks onto track three.

**(2) RECORDING ALONG with the PREMIX:** As you feed tracks 1, 2 and 4 into the mixer for premixing onto track 3, you may as well use a spare mixer input to mix in another part. Since you'll probably be doing some level juggling on the three previously recorded tracks, this additional part should be something fairly simple (such as a percussion part, synthesizer drone or choral vocal part). By using this technique, you now have the first three tracks plus the overdub residing on track 3, giving a total of four parts on track 3. By recording over tracks 1, 2 and 4, you now have gotten seven tracks out of your 4 track.

**(3) ADDING SLAPBACK ECHO:** With this variation, you begin by recording two separate parts on any two tracks (say, tracks 1 and 2). Then, as in the previous examples, you monitor these tracks from their respective playback heads and bounce a mix of these two tracks over to track 3. Because you've monitored from the playback heads, track 3 will lag behind tracks 1 and 2 by a fraction of a second (if you want to be precise, the time difference will depend on the distance between the record and playback heads, as well as the tape speed). At 15 ips, this time difference will give a nice, tight, slapback echo. You then bounce tracks 1 and 2 over to track 4, mixing in a bit of the echo sound that was just recorded in track 3 (tracks 1, 2 and 3 should all be monitored from the playback head). This ambience effect is musically useful, and tends to give a cleaner sound than electronic delays. Note, however, that we cannot put three separate parts on track 4—two separate parts and the slapback echo effect are all that fit.



**(4) ADDING "INFINITE LAYERING":** When you need to get lots of tracks—and I mean *lots* of tracks—out of a four track, you have to do some unusual things like monitoring tracks in the sync mode. This brings us to an important point about bouncing: *a track in the sync mode cannot be bounced to an adjacent track.* For example, if track 1 is in sync then you can't bounce it over to track 2. But you can bounce it to track 3 or 4. Similarly, track 2 cannot bounce to 1 or 3; it must bounce to 4. Similar rules apply to tracks 3 and 4. The reason for this restriction is that there will always be a little leakage between channels in the record head stack. So, if the track you're bouncing picks up some sound from the track on which you're recording and tries to recirculate it, watch out; you've set up a feedback loop, and nasty oscillations can be the result. Pinned VU meters and sore eardrums can also result, but that's another story.

Another problem with infinite layering is that although we can generate many tracks using the following methods, we will also be generating some pretty lo-fi tracks, depending on the sync response of your particular deck. The sync mode usually has poorer high frequency response, an uneven low frequency response and higher noise levels. However, we can help compensate for these problems by recording tracks with enough high frequency boosting to offset the high frequency loss. If we boost the highs above and beyond the amount of boosting required to overcome the high frequency loss, we can even *cut* the highs on playback a bit to help reduce the tape hiss. Also, recording tracks as "hot" as possible when we know that they will be monitored in the "sync" mode can help keep the sound quality up.

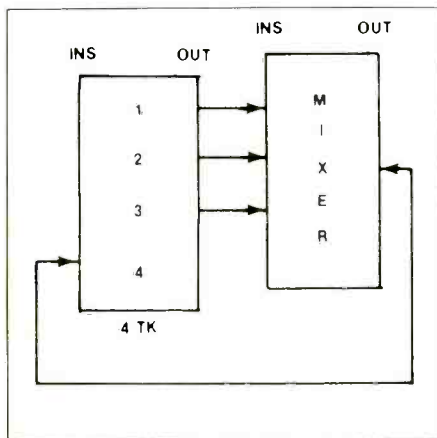


Figure 1

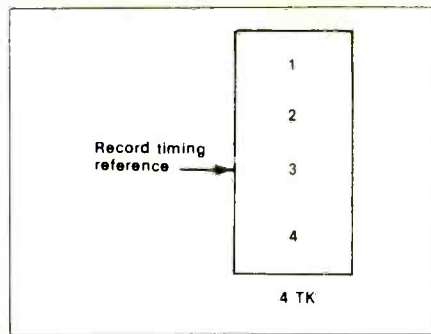


Figure 2 - Step 1

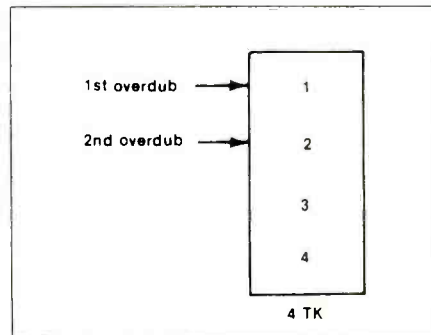


Figure 2 - Step 2

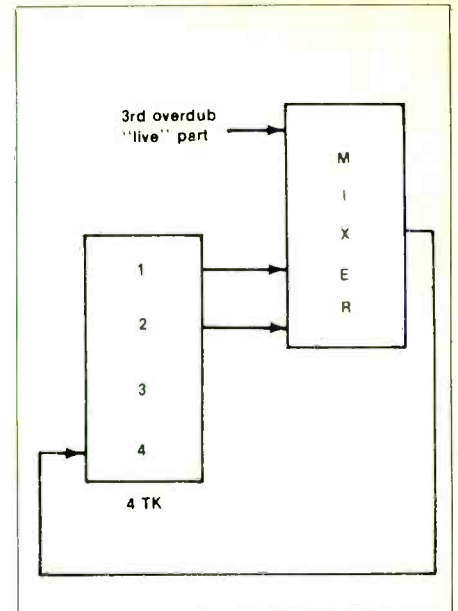


Figure 2 - Step 3

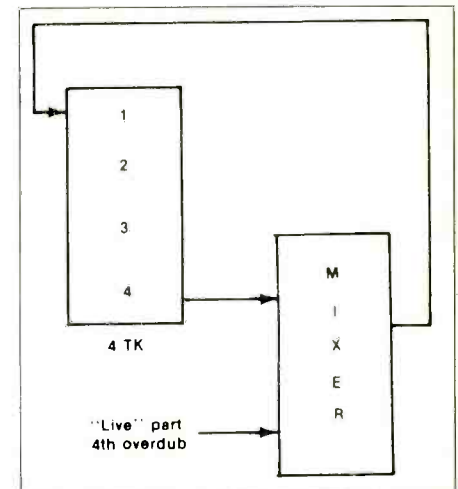


Figure 2 - Step 4

Now to infinite layering (see *Figure 2*). Let's suppose that you want to have a massive guitar sound and massive keyboard sound on a basic track. For instance, seven tracks of guitars and four tracks of keyboards. Sound impossible? Well, it isn't. Record your drum track or other timing reference on track 3 for Step 1. Next, while monitoring track 3 in the sync mode, record your first guitar part on track 1 and your second guitar part on track 2. Put tracks 1 and 2 in the sync mode and bounce them (along with a third guitar part played "live") onto track 4 (Step 3). Note that we've observed the rule about no bouncing into an adjacent track while in sync mode (we're bouncing 1 and 2 onto 4), and because we're monitoring in the sync mode, tracks 1 and 2 will stay in sync with the drum part on track 3.

Now we have three guitar parts on track 4. For Step 4, put track 4 in sync, play the fourth guitar part along with it and mix both of these onto track 1. Record the fifth guitar part on track 2 while monitoring track 1 in sync, then put tracks 1 and 2 in sync, mix in the sixth guitar part and bounce the whole mess over to 4 again. Finally, put track 4 in sync, mix in part number seven and bounce the combination over to track 1. We now have seven guitar tracks on track 1. If that's not a

massive enough guitar sound, you can continue this process of bouncing until you run out of patience, lose your sanity or the quality of sound turns to mud.

And what about adding the four keyboard parts? Simple. Record part 1 on track 2, mix track 2 (in sync) along with part 2 (done "live") onto track 4. Put track 4 in sync and mix it with part 3 (again done "live") back onto track 2 and, finally, put track 2 in sync, mix part 4 in "live" and send these back to track 4 again. You now have four keyboard parts on track 4, the drums on track 3 and seven guitar parts on track 1. You can then premix these onto track 2 (this time, monitor all three tracks off the playback heads to avoid oscillation and preserve higher fidelity).

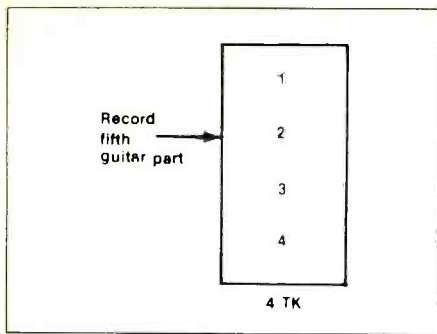


Figure 2 - Step 5

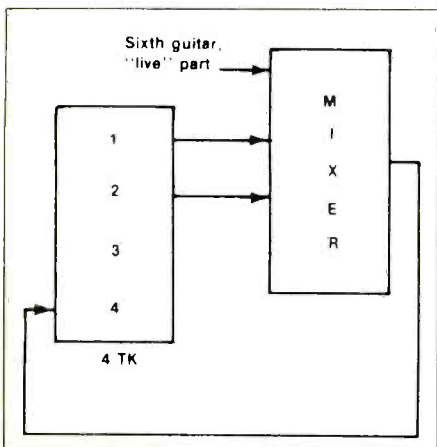


Figure 2 - Step 6

Are we finished yet? No, not at all. We can get really outrageous and begin the process all over again by bouncing tracks 3 and 4, in sync, back and forth onto track 1. For example, we can record something on track 3, bounce it with a new part onto track 1, bounce this track plus another "live" part back onto track 3 and continue going back and forth until we've built up a number of parts on track 3. We then can start the whole process over again with another bunch of parts by bouncing back and forth between tracks 4 and 1 until we have another group of layered tracks on track 4. And, we still have track 1 left over! This means that we can pre-mix tracks 2, 3 and 4 (from the playback heads) onto track 1 and end up with well over *twenty tracks* on track 1. Or, we can simply leave everything as is and keep track 1 open for additional overdubs. With these techniques, we literally can squeeze dozens of tracks out of our four-track recorder.

At this point, you might be wondering about the musicality of layering parts on this massive a scale. While this is something that you wouldn't want to do all the time, if you are creating choir effects, banks of

keyboards (string synthesis, anyone?) or percussion sections you might find that twenty tracks is a necessity, not a luxury. Again, the tips about keeping levels high to minimize noise and boosting the highs while recording apply in all these layering situations. Also, if you don't have noise reduction, by this time you'll wish you did.

Another point about layering we haven't mentioned yet is that you can choose to start layering at a relatively late point in the recording process. For example, suppose that you had recorded guitar, bass and drums on tracks 1-3, then bounced these over (monitoring off the playback head) with a "live" keyboard overdub to track 4. If you then wanted to add a vocal choir, you could bounce back and forth in sync between tracks 1 and 3 until you had the needed number of voices residing on, say, track 3. You would still have tracks 1 and 2 left over for something like a lead vocal and lead guitar part.

(5) **THE CHEAPO ECHO UNIT:** As you record a track, you can take a por-

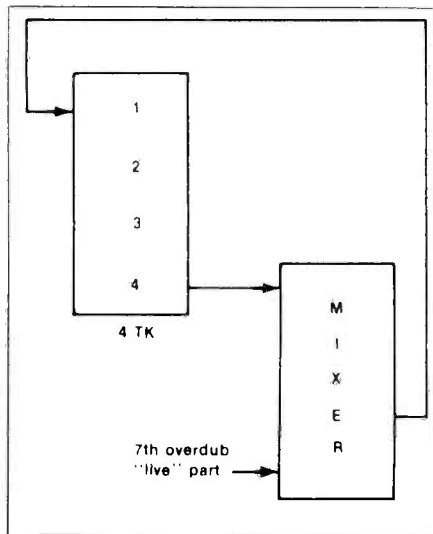


Figure 2 - Step 7

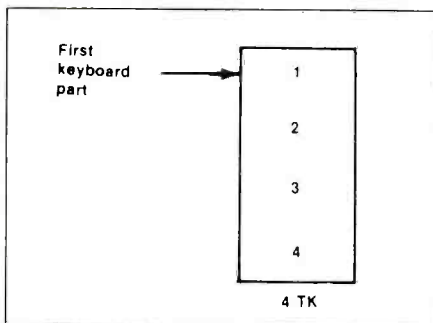


Figure 2 - Step 8

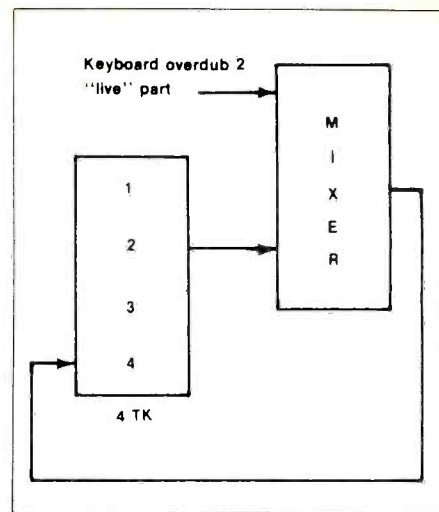


Figure 2 - Step 9

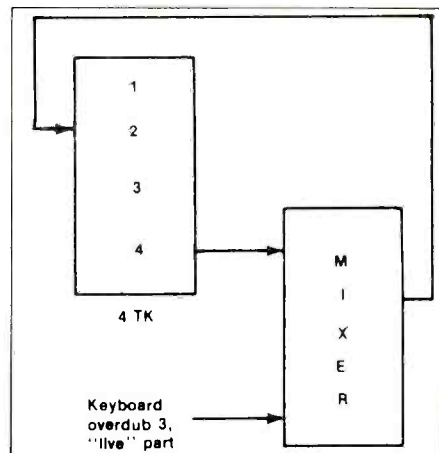


Figure 2 - Step 10

tion of the signal appearing on that track's playback head and mix it back in with the original signal. Regulating the mix of this signal determines the depth of the echo effect as well as the number of repeats.

However, a word of caution is in order. As in the case of any echo unit, we've set up a recirculating path (in other words, the echo comes off the playback head, gets recorded on the tape at the record head, passes by the play head again, returns to the record head and so on). With any system of this type, there is the possibility of feedback if you recirculate too much of the signal; so, mix it in very conservatively.

(6) **THE CHEAPO PROCESSED ECHO UNIT:** There's no reason why the echo signal mentioned above has to be fed straight into the mixer. Why not put it through a filter so that each echo becomes more and more filtered? Or

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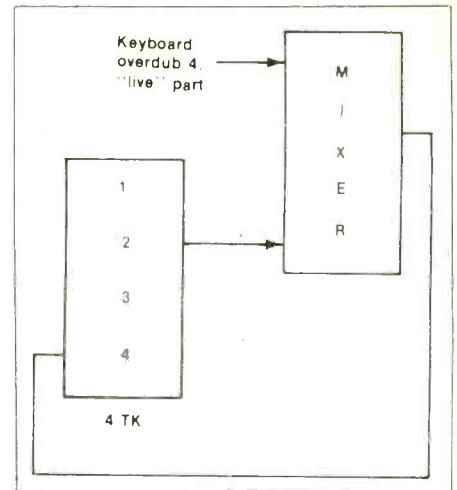


Figure 2 - Step 11

through a pitch transposer to create some Doppler effect echoes? But why am I simply telling you all these secrets? Go into the studio, warm up your four track, stick a bunch of stuff in the echo path and make note of the more interesting combinations for future reference.

(7) **ADDING AMBIENCE to PREMIXES the EASY WAY:** We need not restrict ourselves to adding echo to a single track; we can use the above techniques to dress up a premix as well. Taking our classic situation of pre-mixing tracks 1, 2 and 4 (from the playback heads) onto track 3, we can pick up some signal from track 3's playback head, run it through reverb or echo and then mix the reverb or echo output in at the same time as tracks 1, 2 and 4. The end result is a nice pre-delay effect (where the reverb kicks in a fraction of a second after the signal being reverberated) without having to spend a ton of bucks on some kind of analog or digital delay, or using another tape machine.

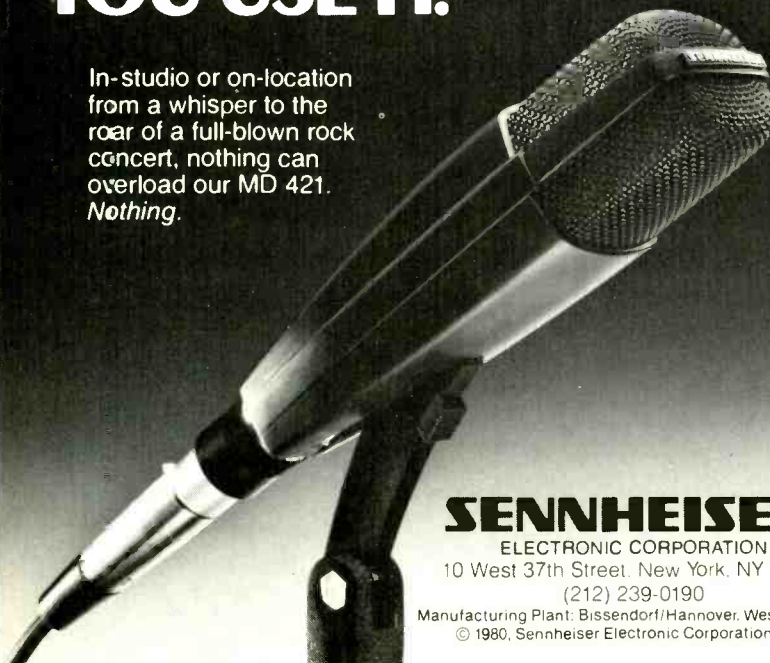
This concludes our cornucopia of tracks involving a single machine. As you can see, we've extended our 4 track to generate 24 tracks and beyond, got an echo unit for free, added pre-delay to our reverb system and a whole lot more—*just by using equipment already on hand.* Imagine what we could do with some extra tools, such as an extra tape deck...but that will have to wait until next month, when we get into part two of this series on four-track production tricks.



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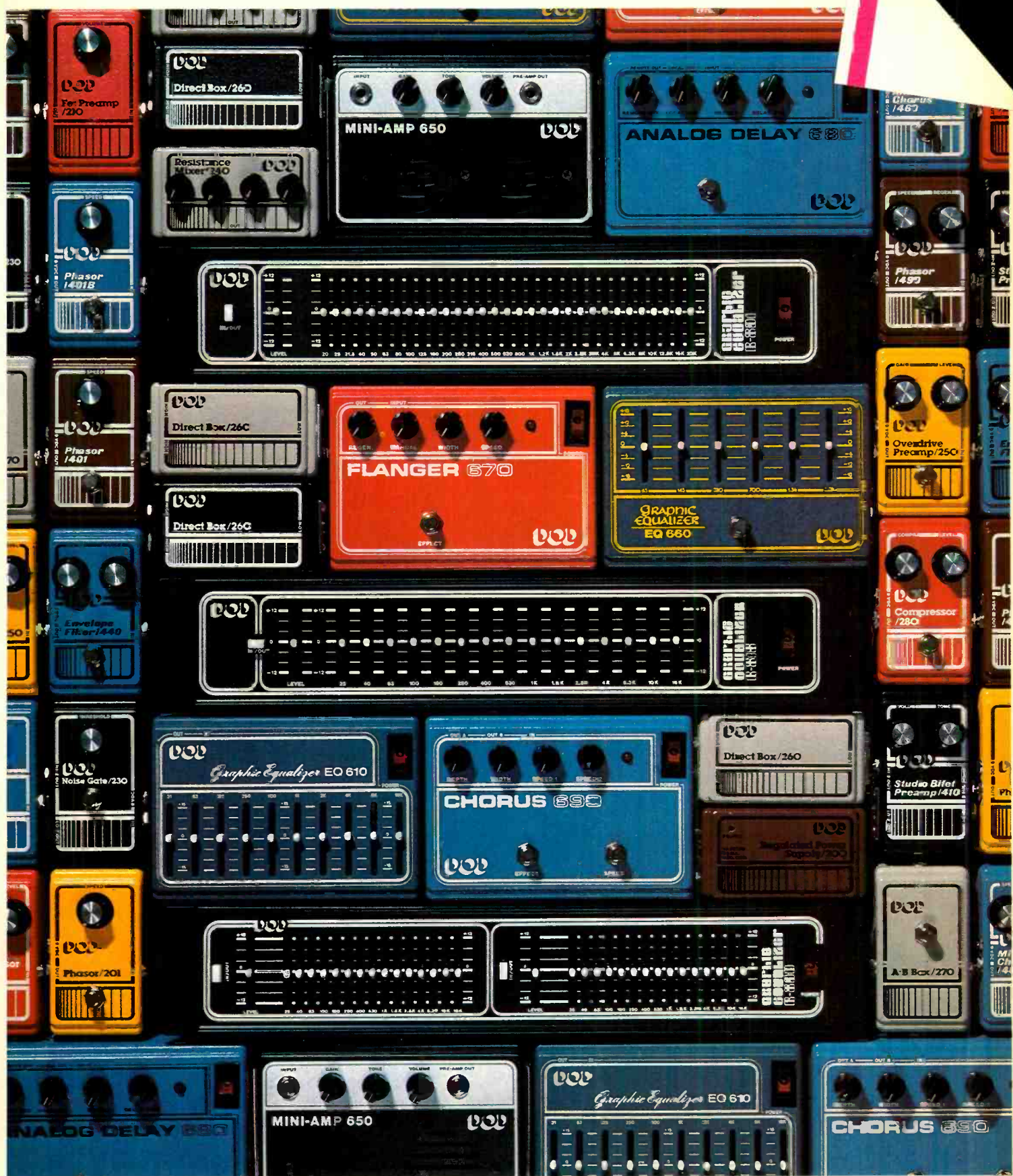
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# Leon Russell

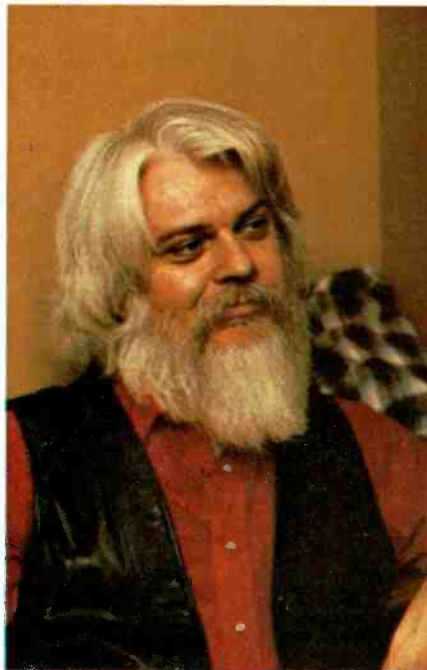
## "LIVE!"

by Bob Allen

Since Leon Russell first strayed from his early upbringing in classical music in the early 1950s and began playing in Oklahoma night clubs, he has had one of the most varied and fascinating careers in modern music.

Russell formed his own band at 14. A few years later he became a member of Jerry Lee Lewis' road band. By age 21, he had already relocated to the West Coast and established himself as a top-flight session piano player. In this capacity, he worked extensively with such producers as Phil Spector and Gary Paxton. He played on sessions with dozens of artists of the day, including The Righteous Brothers, Jan and Dean, Glen Campbell, Gary Lewis ("This Diamond Ring"), Ike and Tina Turner and The Byrds.

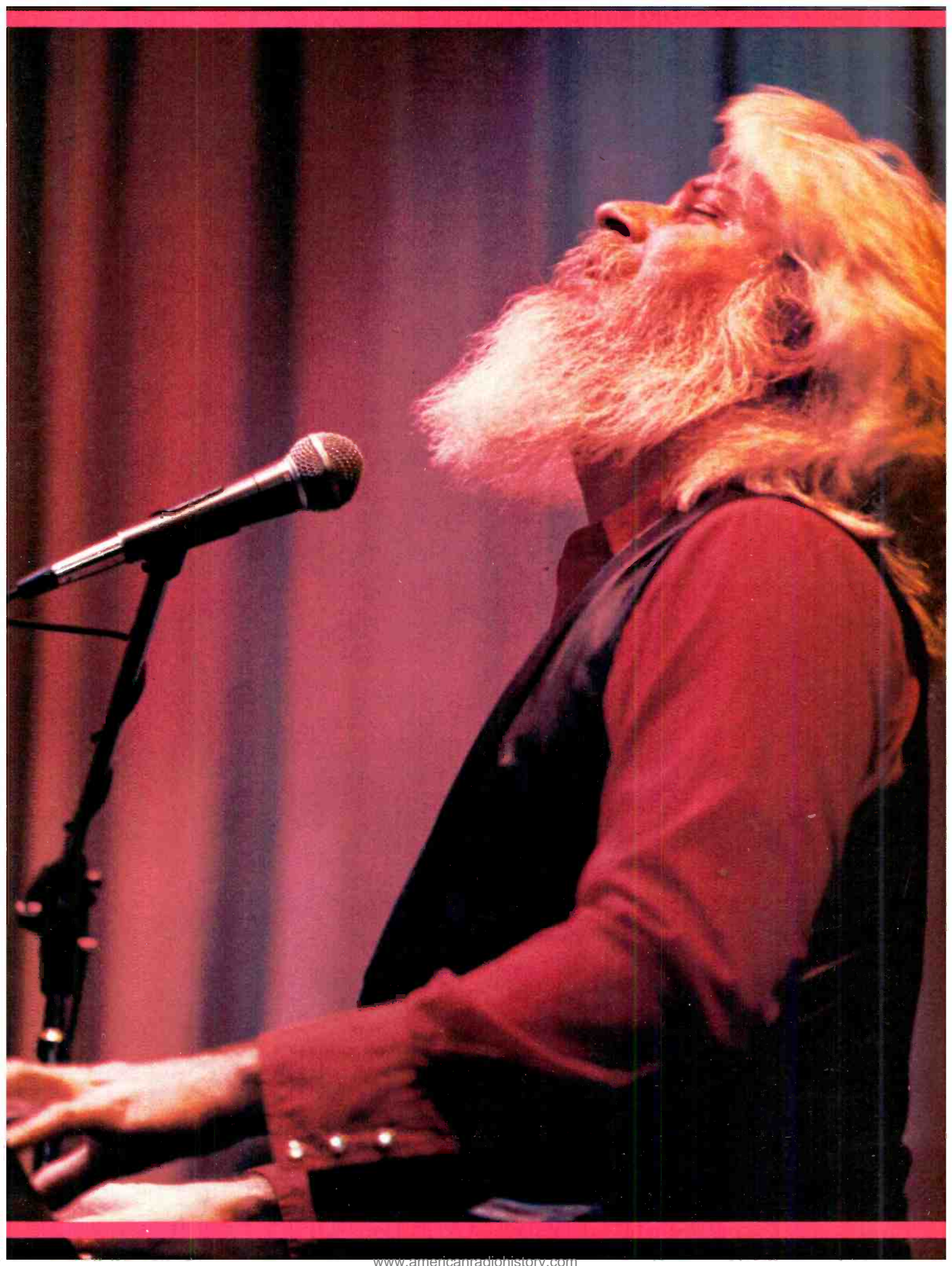
By the late 1960s, Russell had built the first of the eleven recording studios he has had over the years, and he began venturing into production; he first produced LPs for Joe Cocker and Delaney and Bonnie, among others. Throughout the 1970s, he continued to do session work and occasional arranging for such popular acts as The Rolling Stones,



George Harrison, Ringo Starr, B.B. King, Dave Mason, Steve Winwood and Nilsson. He also began flourishing as a songwriter; and over the years, he has written numerous hits for himself and for other artists. A few of these are: "Delta Lady" (Joe Cocker), "This Masquerade" (George Benson), "A Song For You" (Willie Nelson), and his own "Tight Rope," "Hummingbird" and "Goin' Back To Tulsa."

In 1970, Russell formed his own record label, Shelter, and built a recording complex in his native Oklahoma. Today, his Paradise record label is headquartered in Burbank, California. His present facilities there include three audio studios and one mobile video unit. All of his audio studios (two of which are mobile) have 40-track recording capability—which Russell helped pioneer five or six years ago. His mobile video unit is also one of a kind, having the capability of controlling by computer, seven Bosch-Fernseh video machines for editing, as well as multi-track capabilities for the initial recording.

Recently, Russell also began experimenting with a new musical com-



ination: When Modern Recording & Music recently spoke to him in Nashville, Tennessee, he was in the midst of a tour with *The Newgrass Revival*, a pro-

gressive, somewhat experimental, bluegrass ensemble, which was serving as his road band. Between shows, Russell spoke about this new musical

collaboration, his on-going experimentation with the mobile aspects of both audio and video recording and his own long career.

**Modern Recording & Music:** How did your association with *The Newgrass Revival* come about?

**Leon Russell:** They opened a show for me a couple of years ago, and I heard through a mutual friend that they had been playing one of my tunes. So they started opening regularly for me. We actually started playing together this past year. We did another two months of touring just before Christmas.

**MR&M:** Some of the songs you played tonight had some very unusual fusions of musical styles—like a bluegrass version of “Kansas City.”

**LR:** People have musical prejudices, and they often don't realize that there are many similar kinds of music that are normally thought of as being diverse. And a lot of times, we mix it up. People often don't really realize what the connections are. They don't really pick them up.

**MR&M:** How do you think a bluegrass traditionalist such as Bill Monroe would react to the type of material that you and *The Newgrass Revival* are playing?

**LR:** I don't know if Bill Monroe has seen this or not. I'm sure some of it would grate on his nerves a little bit! *(Laughs)* But I would think that he would like it more than not like it, because he's sort of a time player himself.

I think of bluegrass music as a European music, taking it as far back as you can go. It sort of fermented in the mountains (of the U.S.), but I can see Elizabethan bards and minstrels in there, too. And I like to put a little African influence in it as well, coming up from the other direction, South America, Brazil...

**MR&M:** There particularly seems to be a lot of stress in

your arrangements, which is especially evident on the interplay between your piano and electrified mandolin.

**LR:** Yeh. I like that. The mandolin, at least from Bill Monroe, has always sort of had the responsibility for the downbeats. And I'm playing the upbeats (on the piano).

**MR&M:** The group has such a full bottom sound to it that it was midway through the set before I realized that there were no drums on stage. It's hard to tell they're missing.

**LR:** Well, it's closer to being authentic that way—whatever that means. I mean, we were kind of excited about the idea that you could generate that much power and not have any drums. A lot of people, I think, all they can hear is the drums. And if the drums aren't turned up real loud, they don't know where the beat is. And it's probably time to change that for audiences.

**MR&M:** How do you manage to achieve such a full sound without drums?

**LR:** Everybody plays loud at the

same time! *(Laughs)* And everybody plays soft at the same time too!

**MR&M:** There was one percussion instrument on stage. What was that?

**LR:** I call it a cabasa. There's a Nigerian name for it [asuche], but it doesn't come to mind. Cabasa is a sort of South American name, I believe. Beaded gourd is what it is. [Thanks to the folks at Latin Percussion, Inc. for providing us with the right answers—*Ed.*]

**MR&M:** What about the Moog synthesizer? How does that fit into the overall sound?

**LR:** That's not normally part of *The Newgrass Revival*. It's Jim Price playing. We were going to have some horn players on this tour, but our horn player arrangements kind of fell out, and we lost a few guys. So he's playing synthesizer. We're going to add some more horns, so...*(Smiles)*...all you horn players, start comin' around!

**MR&M:** I couldn't help but notice that your show is heavily balanced away from your own original material.

You really mix it up: A Beatles medley, some old Hank Williams songs, a couple of Rolling Stones numbers, a little traditional bluegrass...But there weren't many of your own hits at all.

**LR:** There aren't a great number of my hits anyway! *(Laughs)* I don't know. There's a couple of them that come to mind (that I didn't play) that just don't have indigenous bluegrass connections. It sort of changes, really. We have our favorite ones that we play for a while, and then it changes.

In many ways, I hate being tagged as a writer, because I like to sing other people's songs. But when you get tagged as a writer, everybody expects you to sit





up there and just sing your own songs. But it's more fun for me to just sing whatever I want to.

**MR&M:** What model Yamaha is the piano that you play?

**LR:** It's a Yamaha CP-70. It has a grand [piano] sound to it that comes from the action. That's why they've got it laid down (designed) like that. I'm a grand piano player. I'm not a Hammond player and I'm not a synthesizer player. I play grand piano. And, some of the other ones (electric pianos) just don't have the right sort of precise, measured resistance that a grand piano has from all that gravity interlock, which is what they put in these. I think the sound is mostly electronic, but the way the hammer hits the strings, and the time from when I hit it to the time it hits the strings, feels like a grand. So I can use a lot more of my technique than I could on a Wurlitzer, for example.

**MR&M:** How long have you been using the CP-70?

**LR:** About three or four years.

**MR&M:** What did you use before that?

**LR:** I carried a Steinway around.

**MR&M:** That must have been more difficult.

**LR:** Yes. It's difficult to mic. It weighs a lot and it's hard to carry around. Now, it's a whole different thing. The Yamaha stays in tune much better.

**MR&R:** How much of your own equipment do you carry on the road?

**LR:** I take the Peavey amps. I didn't for a while, but really, they're the only ones that work well for me. Sometimes I have trouble finding them. I carry a piano too, but I don't use it on stage because it's tied into my mobile home. One thing I like about 'em (Yamahas) is that they're all quality-controlled, and they all play pretty much the same way. I think a lot of grand players are switching to them...I hate to say all this good stuff about 'em! (*Laughs*). Because they charge me too much money for 'em!

**MR&M:** So you actually drive yourself around the country in your own mobile home when you're on tour?

**LR:** That's right! I drive mah big rig from coast ta coast! (*Laughs*) I really enjoy travelling that way.

• • •

**MR&M:** Tell me something about the work you've been doing in the video field.

**LR:** We have a seven-camera mobile video truck that you can use to do a complete show on location. It has editing capabilities. And to go along with that, we have a Continental Trailways audio bus that has a Harrison console in the back of it. And we've done some experimentation to see if you can actually make records or dub down while you're going down the road.

One of the things about being on the road that is sort of boring for me is that you get to play a couple of hours and then the rest of the time there is not a lot happening. I'd like to do more experimentation with recording while I'm out on the road. I'm not utilizing that (audio) unit right now (on the current tour), but it's gonna be great! There's just a certain feeling about cutting a song in a truckstop in Arizona and overdubbing it in Georgia and so forth.

**MR&M:** I understand you do most of

your recording on a 40-track Stevens machine.

**LR:** Yeh, there's two of them on that (audio) bus. Those are the principal machines that I use when I'm working. If somebody wants something else, we've got 24-tracks, though. I bought my first (Stevens) almost six years ago. I had, I think, the second one ever made. Then I bought another one a couple of years ago. They work great for me. After I bought my first one, there weren't any of them around for years. And then, the producer, Roy Thomas Baker bought three or four. So there's a few people who have them.

People, for a long time, for years, wouldn't believe that they would work. They figured they had to be too noisy or the fidelity wouldn't be right. But everybody that actually came and used them said it recorded what they heard.

**MR&M:** They're very compact, aren't they?

**LR:** Yeh. I've got two of them sitting side by side, and they're slightly smaller than a Studer 24-track.

**MR&M:** What appeals to you most about having 40-track capability?

**LR:** Well, there's a lot of things I've learned from essentially having lived in the studio for the last 15 years—I've always had one in my house or right close. One thing that I found out

to be true is that if somebody walks in and puts a part on [tape] and then says, 'Well, I can do it better than that!' sometimes they can't. So I'm very reluctant to erase anything. That's what I like about that machine. If somebody wants to do a whole bunch of different performances, I can just go ahead and put 'em all on there or just pick out the ones that I like.

**MR&M:** Did you use your mobile units for recording your new LP?

**LR:** Yeh. It was recorded in a place called Perkins Palace in Pasadena, California. We made a deal with Pioneer; the "live" album will come out on videodisc. And they'll sell it at stores



where they have Pioneer videodiscs.

**MR&M:** You've made some other television shows with your video unit, haven't you?

**LR:** We made a couple of shows. We made one with J.J. Cale and one with Willie Nelson while he and I were recording the *One For The Road* LP. Although, when we did that, the mobile unit wasn't yet built, so we just shot with a bunch of cameras. We still haven't sold those, and I don't know if we're going to sell them. I was going to do a series of shows, but when I started playing with these guys [Newgrass Revival], I started renting out my video facility. I'm just going to rent it until I get through doing this.

The theory behind the way the mobile video thing is built is like a six-track video truck from an audio viewpoint. In television, normally a show is shot with three cameras, and they cut it and switch it while it is being done,

and then block it out. I built this thing to have what in audio would be the equivalent of six tracks. Therefore, you can simultaneously shoot it from six points of view, and then mix it down just like a record. And you can go over it again and again and get the exact mix that you want.

The idea is that—and, really, people have done it before—it is very similar to the starting days of multi-track in audio. But instead of having one audio recorder, there are six (video) machines.

**MR&M:** How did you first get started with video?

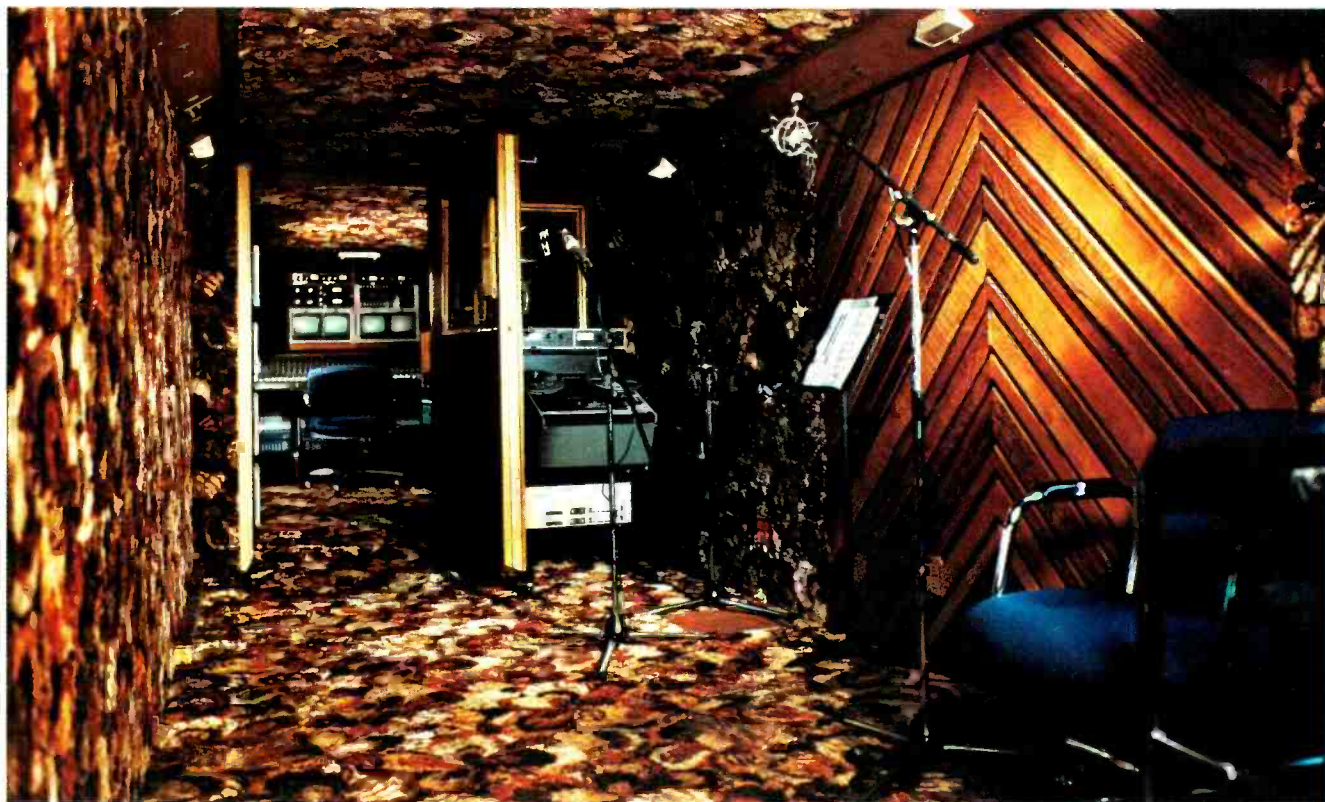
**LR:** I was always intrigued with [comedian] Ernie Kovacs and people like that, who did their own television shows. Kovacs was very big on the technology. Also, investing in video equipment just seemed a small amount of money to have that broad communication potential around the world.

**MR&M:** As far as audio recording goes, do you find that there is a great deal of difference between "live" and studio recording?

**LR:** For me, I do a whole different thing when I'm performing in front of an audience. I sing a whole different way. I have a different mental attitude. This new record we have coming out is "live," and I think it's better, in terms of the singing, than a lot of albums I've done. It's the idea of having to make it right and you only have one chance. You can't fix it in the mix or anything. I like that structure a lot.

**MR&M:** Back in your early days, how did you happen to make the transition from session man to producer?

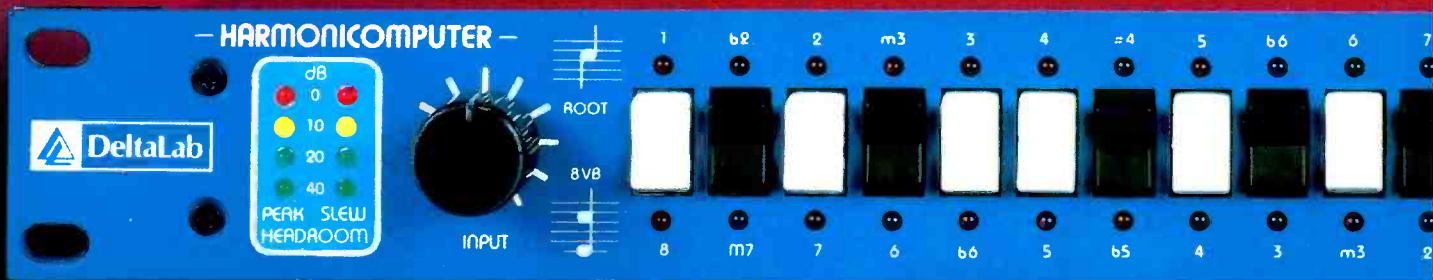
**LR:** A guy called Gary Paxton (who did "Alley Oop," and is now an eminently successful writer/producer/artist, working predominantly in gospel music in Nashville) was very instrumental in inspiring me to make





# DL-5, HARMONICOMPUTER™ Performer Series





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The performing musician, up to now, has been faced with the dilemma of using less-than-ideal pitch-shifting devices to create various harmonic effects. Except for the very expensive devices, the typical pitch-shifter suffers from horrible sonic artifacts. DeltaLab solves this problem with the DL-5 HARMONICOMPUTER™. The DL-5 uses advanced digital techniques to eliminate the typical splice-glitch associated with the pitch-shifting process. Also, our new steel and aluminum chassis, glass epoxy P.C. boards and quality construction result in a road-worthy unit that is second to none. As such,

the DL-5 carries on the tradition of superior sonic quality and reliability that has made DeltaLab a common name in recording studios throughout the world.

### IN THE STUDIO

The DL-5 HARMONICOMPUTER, provides high quality pitch-shifting suitable for the recording studio while being extremely simple to operate. The unique front panel consists of an arrangement of rocker switches set up to simulate a keyboard. This configuration allows the user to control the desired harmony in common musical intervals. The recording engineer has the option of disabling the keyboard control and using the fine tune control as a full two-octave continuously variable sweep pitch control.

A feedback control, which recirculates the harmony, is used to create chords and/or an arpeggio effect. This becomes even more impressive when used with an external delay such as the DL-4 TIME LINE™. A full vibrato control is provided to give the musician or recording engineer the flexibility to create new dimensions in natural sounding harmony. The HARMONICOMPUTER is, then, an effective tool for the studio boasting a virtually distortion free 20-15kHz bandwidth and 90 dB dynamic range — in a compact package with the same rugged construction common to all DeltaLab products.

### WHAT ?

The DL-5 HARMONICOMPUTER is a high quality pitch-shifting processor designed for the professional musician in live performance as well as the recording studio. Now the performing musician can achieve the kind of performance previously expected from only the

# DL-5, HARMONICOMPUTER™ Performer Series



costliest of studio quality pitch-shifting devices. The DL-5 features the same full bandwidth, low distortion, dynamic range and construction techniques that you have come to expect in DeltaLab products. The HARMONICOMPUTER features ease of operation which instantly instills confidence and encourages impromptu experimentation.

## WHY ?

Even the existing costly high quality pitch-shifting devices leave much to be desired as a tool for the musician. By contrast, the DL-5 has been designed much like a musical instrument to provide ease of understanding and operation. Harmonies can be selected via the DL-5's keyboard for any common musical interval within its  $\pm$  one-octave range. DeltaLab has not ignored other applications of pitch-shifting; by a flick of a switch, the keyboard is disabled and the fine tune control becomes a full range variable pitch-shift control. The DL-5 fills the need for a truly comprehensive harmonizing device for both the musician and studio engineer, without compromise.

## WHERE ?

The HARMONICOMPUTER is equally intended for on stage use during live performances as well as studio applications where sonic quality is of prime importance. Its ease of operation and sonic quality are second to none. The DL-5 can produce a very natural sounding harmony or it can be used to create amazing special effects; coupled with an external delay unit, such as the DL-4 TIME LINE, effects can be created that are beyond imagination.

## HOW ?

DeltaLab's advanced technology has once again been applied in the design of a new product. Our digital encoding system, regarded by the professional industry as audibly superior, has been carefully implemented in this design. Special multiplying techniques have been integrated into the encoder/decoder to allow the DL-5 to accurately process pitch-shifted signals. These new multiplying encoder/decoders coupled with innovative multiplexing techniques totally eliminate the typical splice-glitch. The result is a clean sounding harmonizing unit that is **not** plagued with unnecessary side effects.

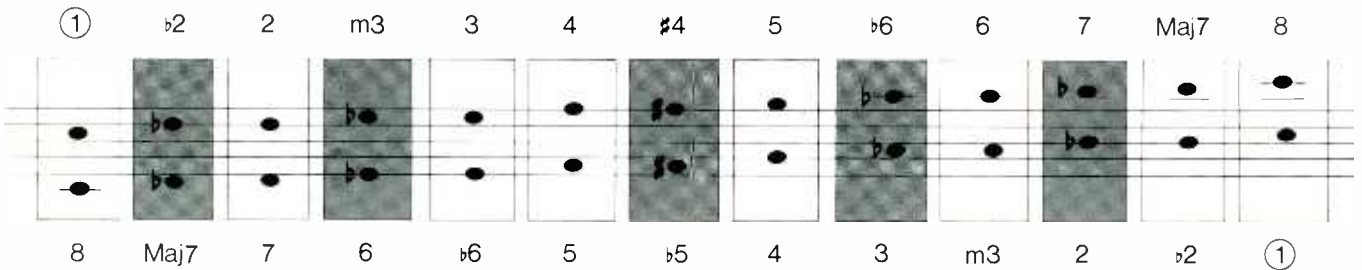
## WHO ?

In digital audio, experience counts. Our equipment is found in the best "world-class" studios, as well as on stage with the world's finest performers. In fact, with its proven performance record, our DL-4 TIME LINE is one of the most sought after digital effects devices. We maintain an active R & D program and are constantly advancing the state-of-the-art in digital audio. Thus, the DL-5 has been designed to fill the need for an easy to use, high quality pitch-shifting processor with the benefits of DeltaLab's expertise.

## WHEN ?

Digital audio is not a trivial issue. DeltaLab is committed to producing a thoroughly researched, field proven design **before** it is brought to the market place. Our commitment to quality assures you that the unit you purchase today is ready to perform and will deliver reliable high quality audio for years to come. It is with this commitment that the HARMONICOMPUTER was conceived.

# “Getting Around The Keyboard”



The keyboard consists of 13 rocker switches (8 white and 5 black) to represent a full octave. For descriptive purposes each white switch is represented by a note from the C-major scale. The black keys represent the ½ tones between the notes of the scale. Each of the rocker switches can toggle either up or down. By depressing each white switch in the up direction, the harmony produced by the DL-5 will **increase** in a major scale-like fashion. Similarly, by depressing each white switch in the down direction, the harmony will **decrease** in major scale-like fashion.

Depressing either the left most switch in the up position, or the right most switch in the down position, results in no pitch-shift. These positions are referred to as the root. Depressing each switch in succession results in harmony which increases or decreases in a chromatic (½ tone) scale-like fashion.

It should be noted that “ups” and “downs” of each switch are identified by the most commonly used musical intervals. These intervals are referenced to the root. In each case, depressing a switch from up to down and vice-versa results in an octave difference. For example; up a minor third (m3) is exactly one octave higher than down a sixth (6).

When using the feedback control, depressing certain switches will yield musical chords or effects. Recirculating a minor third (m3) will yield a diminished chord; a third (3) will yield an augmented chord. Other combinations will give interesting results although not related to simple harmony. The fine tune control can be used to precisely tune or tailor a particular setting or to allow harmonies that are in the “cracks” (between notes).

## Specifications\*

Frequency Response	20 to 15kHz (α no pitch-shift <sup>(1)</sup> )	
+1, -3 dB		
Dynamic Range		
A-Weighted	90 dB min	
C-Weighted (broadband)	85 dB min	
Headroom above 0 dB	6 dB	
Inputs	<b>Hi Level</b>	<b>Low Level</b>
Unbalanced (Phone)	0 to 18 dBm	-20 to 0 dBm
Impedance	47K ohm	
Outputs		
Unbalanced (Phone)	Up to 18 dBm	
Impedance	50 ohms	
Pitch-Shift		
Full Range	± 1 octave min	
Fine Tune	± ½ tone min	
External Pitch Control <sup>(2)</sup>	Each ½ tone increases/decreases by 0.083 volts	
Octave Lower	+ 1 Volt	
Null (No Pitch-Shift)	+ 2 Volts	
Octave Higher	+ 3 Volts	
Time Base Processor		
Vibrato Width	0 to maximum depth	
Vibrato Speed	0.1 Hz to 10 Hz	
Feedback	Recirculates pitch-shifted signal 0 to almost unity	
Size	1¾ x 19 x 10 in (4.45 x 48.3 x 25.4 cm)	
Shipping Weight	12 lbs (5.5 kg)	

(1) Frequency Response varies accordingly with % of pitch-shift within 20 to 15kHz.

(2) External control jack is located on rear panel. When used, all pitch-shift controls on the front panel, including vibrato, are automatically disabled.

\*Manufacturer reserves the right to make improvements without notice or obligation; therefore, all specifications are subject to change without notice.

## A Word About Audio to Digital Converters

DeltaLab's patented ADM (adaptive delta modulation) encoding technique is unique in the world of digital audio. Unlike other forms of audio-to-digital conversion, our system was engineered exclusively for audio. Our minimum phase-shift circuitry insures the most natural sound quality and totally eliminates the “sounds digital” reproduction often heard in PCM systems which require the use of sharp anti-aliasing filters.



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records. Some of the first sessions I ever played were for him. I mean, I'd made some records back in Tulsa, but I never was really serious about it until that time. It was just inspiring to see the guy (Paxton) working. He was rapid and he had a lot of ideas and a lot of execution. He'd do ten projects in a week. It was fun to watch him.

**MR&M:** Do you feel that production has gotten simpler or more difficult over the years?

**LR:** I don't know. That's one of the things I like about Nashville. Here, I can walk into any number of studios with any number of musicians and it would be great music, just right now, because they do it every day. That's the whole secret, I guess. It's really hard, on this modern equipment, to mess it up. In terms of distortion, for instance, there's so much room that you've really got to not be paying attention to make bad recordings. Whereas ten years ago, that was not

the case. You had to work at it to get it to sound presentable. So...as far as I'm concerned, the technology has made it easier.

**MR&M:** What other facilities do you have in Burbank?

**LR:** Well, we've got Studio C, which is the ground studio, the Continental bus with the Harrison console and then there's studio B, which is a small video stage. I'm also building a 40-track API console into a 22-foot Bobtail truck.

**MR&M:** Do you rent that equipment out?

**LR:** We've just started renting it out in the past couple of weeks. I've built eleven studios in my life, and this is really the first one—with the possible exception of the Shelter studio in Tulsa, which was sort of a commercial studio—that I've ever had that was open to the public. I've always avoided it, because I wanted it free for my own use, to experiment or whatever. So that might get to be a problem. But it's a

very costly proposition to have that stuff just sitting there. It has to be used at least 12 hours a day, just to break even.

**MR&M:** Why didn't you bring one of your mobile units with you on this tour?

**LR:** Well, we're really not making enough money this time to do it. Because it's expensive. In order to do it, you've got to mobilize about twenty people in addition to the twelve or fourteen who are out here now. There's just not enough money to do that. If we have a hit record, we probably will bring it.

**MR&M:** It seems as if, stylistically, your new show with *The Newgrass Revival* is sort of a big change for you.

**LR:** I've been playing what I'm playing now for the last couple of years. I don't know. I never pay much attention to styles. I always do certain styles at different times, really. And this is what I'm doing right now.

Whatever's fun!



# Profile:



by David Fricke

The music world knows Phil Collins best as the drummer and vocalist for the English progressive rock ensemble Genesis. It also knows Collins as a founding member of and part-time drummer with the late, great fusionists Brand X. Furthermore, Collins has gained a reputation as an experienced sessioneer whose eclectic list of credits includes former Genesis mates Peter Gabriel and Steve Hackett, American bard Elliott Murphy, Brian Eno and Robert Fripp, jock-rockers Thin Lizzy and most recently, avant-garde folk singer-guitarist John Martyn. The world might know the 30-year-old Collins as a child actor and model who played the Artful Dodger in a London production of *Oliver Twist* and hit the big screen as a crowd extra in *A Hard Day's Night* ("I was one of the few people who got paid to see the Beatles," he cracks).

But the Phil Collins heard on his debut solo album *Face Value* on Atlantic is none of the above. Produced by Collins and engineered by Hugh Padgham (who will also do the

honors on the next Genesis LP), *Face Value* is a tour de soul in which Collins fuses hard-boiled funk, R&B cool, Eno-esque daring and rock & roll heart in ten new originals (plus a jazzed-up take of Genesis' "Behind the Lines" and the Beatles' "Tomorrow Never Knows"), many of which he wrote in the aftermath of his traumatic divorce two years ago. He recorded much of the album at home by himself, but also called on such super session help as the Earth Wind & Fire horns, Eric Clapton, Genesis guitarist Daryl Stuermer, bassist Alphonso Johnson, violinist L. Shankar and arranger Arif Mardin.

Truer to Genesis in spirit than execution, *Face Value* is really Phil Collins taken at just that—face value. "I'm sure there are people who are expecting either a Genesis album or a Brand X album," concedes the diminutive but hyperactive Collins, holding court dressed in his jogging suit in a swank Manhattan hotel room. "All I can say is, if they don't like the album, then they really don't like what I do with Genesis."



**Modern Recording & Music:** Your debut as a solo artist is certainly full of surprises. There is a strong R&B element, funk bits like the new arrangement of "Behind the Lines," and the atmospheric Eno-like quality of the recording. In fact, it certainly doesn't sound like a Genesis solo album, compared to Tony or Mike's.

**Phil Collins:** I think the trouble with Mike and Tony's albums—although I really didn't get into Tony's too much—is that you could see right off that it was a solo album syndrome; that polarizes what they do. You could see with Tony's album what he puts into the band; the same with Mike's. And in a way, you can see an element of what I put into the band on mine.

But with me, it's the black funk side, the R&B element. I consider that the strongest things I've ever done with the band [Genesis] to be things like "Los Endos" and "Wot Gorilla," some of the more fusion things, although there isn't much fusion on my album. "Hand in Hand" is about as close as it gets.

**MR&M:** There is a fusion element there, but not in the strict jazz-rock sense.

**PC:** I see it—if categories are necessary—as a black R&B album. I actually cut it with Mike Reece in L.A. I was having a lot of trouble getting it to sound on record the way it sounded on tape. The blokes I used in England didn't see where I was coming from. They were doing too much to the tape, whereas the tape was great flat.

So in the end, I just rang up Mike Reece. I checked out all the album covers by R&B artists I liked, found out he was common to all the records I liked and said, "He's the man I want."

**MR&M:** There is also a certain mood, an atmosphere of understated drama, an earthy quality to the album. This is in contrast to the "typical" Genesis sound.

**PC:** I'm very proud of the way this album was done. I've got an eight-track studio at home. During the course of making my own tapes for demo purposes, I had also done a Brand X album—we did a track called "Soho" at my house. We transferred that track from eight track to twenty-four and it worked.

I thought, "Hang on," and went back to my demos and re-did a couple of things. In fact, everything on my album was recorded there first. I did all the keyboards myself at home along with a

drum machine. When I got into the studio, I took off all the drum machine patterns and re-did them with acoustic instruments so it sounded warmer, not so wooden. But I kept all the keyboard sections. On "Hand in Hand," all the piano, drum machine and synthesizer parts were done at home. On "I Missed Again," the piano was done at home. "Thunder and Lightning" started off being done at home, but I replaced those original home parts with studio takes because the studio material sounded better.

**MR&M:** How great was the temptation to simply do the album at home all by yourself?

**PC:** That's what I wanted to do originally. But of course, when you start with an eight-track and start mixing down to two, you start losing quality. Although the Beatles and George Martin knew how to do it, I didn't. I figured, cut your losses. Keep it at eight tracks and just overdub another sixteen on a twenty-four track.

**MR&M:** So you really preserve that living room intimacy but with sharp studio clarity.

**PC:** Yeah, you get the basic feel. The foundations are emotion and spirit, being in the right place at the right time. Even in the mixing stages, we took my limiters from my eight track into the studio and used them. We used the MXR delay and my home mic. Forget all about the good shit. We went with the basic stuff.

**MR&M:** I find it rather unusual that as someone who is a drummer you would use a drum machine so much.

**PC:** Well, I'm rather surprised myself. I don't like drum machines to sound like drum machines. When Genesis was in Japan, Roland came up to us and showed us these drum machines. They were the first three off the production line. Tony wanted one, Mike wanted one, and I said, "I don't want one; I'm a drummer." But Tony said, "Why not get one to see what it's like? If you don't like it, the band can have it." So I took it home and there realized what it could do.

Take "If Living is Easy," for instance. That is so slow that you couldn't get a drummer to play that slow. I first did it on the drum machine, and it was peculiar because I tried to re-do that part in the studio and couldn't get it the same tempo. It was either a little slow or a little too fast.

And because you're playing along with the drum machine, you leave a lot

of gaps because the drum machine fills them. Also, when you take the drum machine out, it's an incredibly spacious part. I like playing with the drum machine because it's helped me simplify my playing. It's made me more solid.

**MR&M:** Did you use the same drum kit on your solo album that you usually use in the studio with Genesis?

**PC:** Well, on the *Duke* album, I used two kits, two Premier kits. One was a concert tom kit and the other was a double-headed kit. They each had eight toms. But on various tracks, sometimes I'll use four toms, sometimes six, sometimes eight. I've made a deliberate attempt to change drum kits and the sizes of kits from track to track.

On my album, ninety-nine percent of the material was the black concert tom kit. The Brand X sessions, I used the double-headed kit. For the album I just did with John Martyn, I used the double-headed kit because they're rounder headed. But on some sessions, where you need to be a bit harder, the concert tom kit is what I use.

**MR&M:** What about the eight-track machine you used at home for the solo LP?

**PC:** It's a Brenell and the desk mixer I used is a sixteen-in and eight-out Allen & Heath.

**MR&M:** Did you pick it up specifically for home use?

**PC:** Yes, the machine is a one-inch eight track, one of the better eight-tracks around.

**MR&M:** Did you keep any of the vocals you recorded at home or were they all re-done in the twenty-four track studio?

**PC:** I re-did all the vocals, but I used the same mic, a Beyer [M] 88, for everything, I think. There was one track where I nearly used the home vocals, but to get on all the keyboards I wanted once the track got past the demo stage, I needed all the tracks I'd used for vocals. I didn't want to mix it down, so I just had two stereo Prophets, stereo Fender [Rhodes], stereo piano and drum machine.

**MR&M:** In addition to recording at home, you used the Townhouse studio in London and Village Recorder in Los Angeles. How much recording was done in L.A.?

**PC:** That was the horns and vocals. Stephen Bishop did his vocal thing there. The horns and Daryl Stuermer's guitar also were done there. The vocals were actually split down the middle bet-

ween England and L.A. I did lots of versions of vocals in different places.

I just did it when I felt like it. "In the Air Tonight" was done in England, "The Roof is Leaking" was done in England, too. I had a bash at nearly everything there, I think. But there were some things I couldn't do in England simply because I hadn't written the words yet. I just did lots of versions and just picked the best one. Like, "I Missed Again," I did that in America. And I brought the Beyer M88 with me.

**MR&M:** Having finished the album, is there anything on it that you wish you had done differently?

**PC:** It's best the way it is. There was one thing on it I was of two minds about. That was the track "You Know What I Mean." For ages, it just lived on its own with piano and voice and to some people it was stronger that way. But then I asked Arif Mardin to do a string arrangement for it and he came up with a lovely string arrangement. I was so taken with it, with having natural strings on the album, that I was tempted to use it.

**MR&M:** That arrangement is actually quite dramatic without sounding overbearing.

**PC:** Right. You're almost expecting the drums and bass to come in with the chorus and they don't. I think it's stronger because of that. But I think if I had the time over again, I might have left the strings off, lovely as they are. Maybe it would have been more personal as piano and voice.

**MR&M:** How did your mixing sessions differ from those you do with Genesis?

**PC:** On my album, we did lots and lots of fast mixes because the project was basically my way of rebelling against all those things I don't like. With Genesis, however, with three people or with any band, when you're mixing a song you've got three people to satisfy as well as the producer. By the time you get around to the end of the day, you've heard the song so many bloody times you can't face it anymore. You just want to get it mixed. Consequently, that becomes *the* mix, the definitive version of that song. I don't like that. What we did with my album was meticulously mix everything once. Then Hugh and I went back and did three or four of another, two more mixes of the same tune, and so on. By the time we were finished we would have two or three reels of 1/4-inch tape of

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**"I've never felt like the poor boy in the band, but now I really do feel like I've proven myself, that I've proved my ideas are worthwhile."**

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every song. Then we just chose the best one.

Also, with my album, I put the voice on very early, so there was always space for the voice and everything else had to fit in with the voice. With Genesis, the voice has to fit on top of this huge arrangement; it can work, but it sounds like I'm on the other side of the fence. Because there's no singer in Genesis when we rehearse, we get this huge sound and the vocals come in, sort of like, "Hello in there, is there any room for me?" I feel—theoretically and ideally—that is wrong. So I tried here to do it the way I believe is right.

**MR&M:** Genesis has co-produced its recent albums with engineer David Hentschel. But how did it feel wearing both the producer's and the artist's hats on your own album?

**PC:** I enjoyed it because to me it wasn't really producing an album. It was just me taking my music, my thing, one stage further. I felt very embarrassed about the word "producer" because I feel it was more like directing. That's really what I did with all the players that came in—and sometimes it caused friction.

John Giblin [bassist on four of the tracks] is a very good friend of mine, and because of that he thought he could come in and play whatever he wanted. But I had my idea of what I wanted and I told him. In the end, some tracks he didn't get together at all. Even the horn parts, I'd hum the parts on a cassette tape, give it to the horn section. They would come in the next day and play them. Daryl I let loose because I didn't really know what I wanted from guitar.

There were very few points on my album when there was more than one person in the studio. "Behind the Lines" was done as a trio. Me, Daryl and [bassist] Alphonso [Johnson] did it as a group. And the horns were done as

a section. But everything else was done one-piece, although it doesn't sound like that.

**MR&M:** Have you tried any other production? Would you like to do more?

**PC:** The son of the owner of my local pub has a punk band which I let use my studio. I produced three or four tracks for them to flog around as demos. Simon Townshend's band On The Air asked me to produce their album, but when they asked I didn't have the time. In addition, John Martyn's asked me to produce his next album.

**MR&M:** How would you approach producing?

**PC:** All you gotta do is believe in what the bloke is doing, to be able to tell the artist, "I know you can do better." It's more of a coaching thing.

**MR&M:** How do you think the experience of making your solo album will be reflected in future Genesis records?

**PC:** Actually, there has been a difference in the last year. There's been a lot of water under the bridge with these last two Genesis albums. The sound isn't all that different, but the attitudes are.

Like "Turn It On Again" on *Duke*. Originally, it was a slower, straight 4/4 beat, but I said, "No, no." I speeded it up, added some accents. And it took me a long time to convince Tony and Mike that it should be that fast.

Now, with the way my album sounds, without saying anything, Tony—for example—has more respect for what I say. If I say something like, "No, that doesn't sound good" or "That third chord there doesn't sound right," instead of saying, "What's wrong with it?" he'll say, "Yeah, maybe you're right, let's change it."

I've never felt like the poor boy in the band, but now I really do feel like I've proven myself, that I've proved my ideas are worthwhile.



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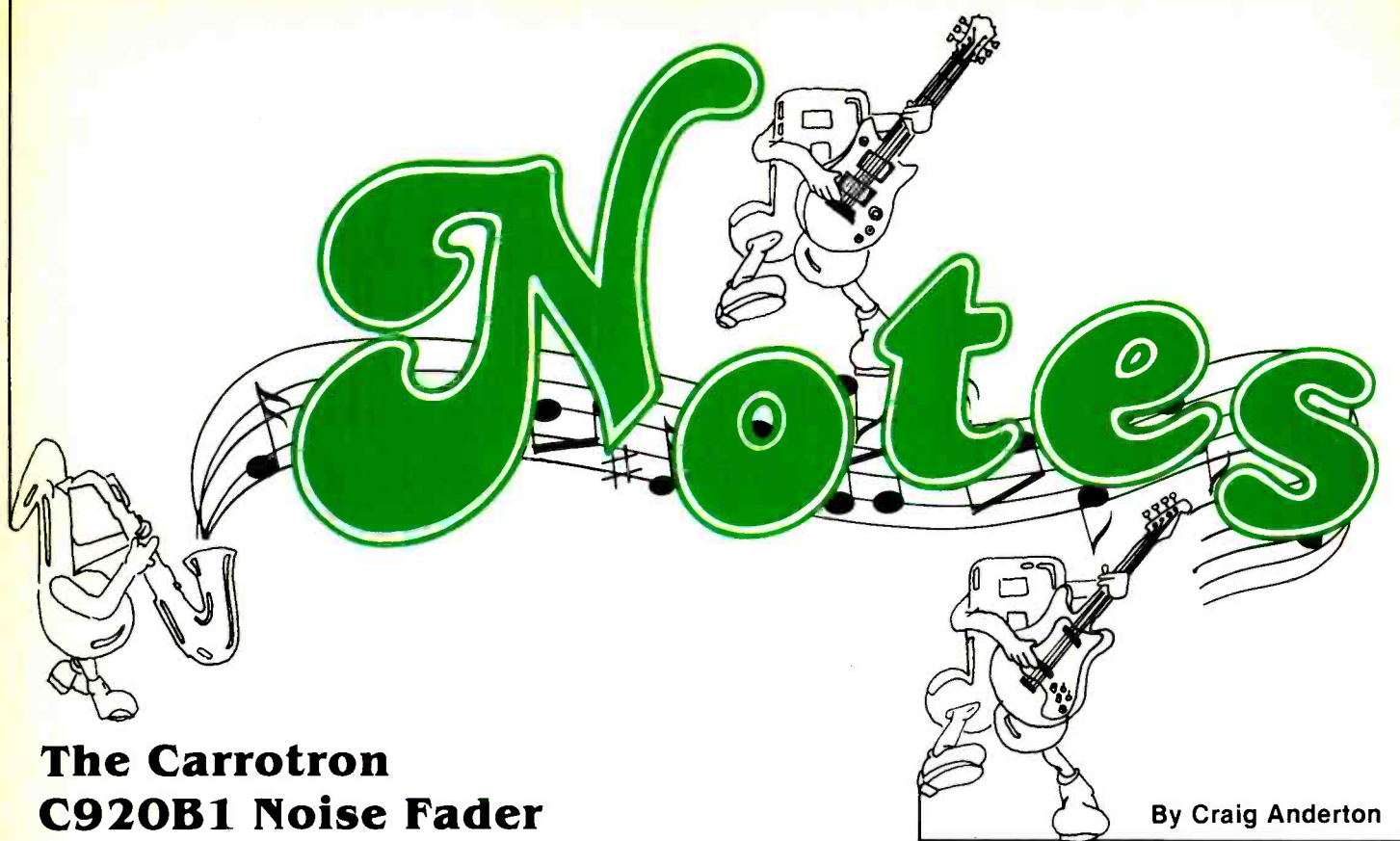
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## The Carrotron C920B1 Noise Fader

By Craig Anderton

Noise gates have been around for quite some time in recording studios; they not only help cut down on noise, but can also produce special effects. Now performing musicians are also getting turned on to noise gates in order to help quiet overly noisy effects, or to silence the cumulative noise that results from putting a number of effects in series. However, noise gates are unfortunately not panaceas, and have their own quirks and problems; as a result, there have been several attempts to improve the basic noise gate circuitry. One of the more recent results of these efforts is the Carrotron C920B1 Noise Fader. Before we get into what makes this unit different from the traditional noise gate, though, we need to briefly review how noise gates work in general.

**BASIC NOISE GATE THEORY.** A noise gate comprises two separate circuit blocks (see *Figure 1*). One block is a variation on the amplifier; this particular type of amplifier is designed so that it can be electronically squelched if desired, thereby preventing a signal from reaching the output. Thus, the amp is like a gate in that it can either pass a signal when the “gate” is open, or prevent the signal from passing when the “gate” is closed.

The second circuit block is a level-sensitive trigger that tells the gate when to open and when to close. If the signal appearing at the input of this trigger circuit exceeds a certain user-selectable reference voltage (or threshold), then the trigger tells the gate to open. Should the signal drop below this threshold, then the gate closes. In practice, the threshold is set just above the noise level (see *Figure 2*). As

a result, when the signal only consists of hiss, the gate is closed and the signal going through the amp is muted. As soon as you start playing and your instrument's signal exceeds this threshold, the gate turns on and lets the signal through.

This all sounds good in theory, but in practice, there are quite a few snags. These include:

- Noise gates work best on signals that don't have too much noise to begin with. For example, if there's only a tiny bit of hiss on a signal, no problem—just set the threshold, and when the gate cuts off, the instrument signal will be at such a low volume that this gating action won't affect the sound of the instrument much. But consider what happens when the hiss is prominent: if you set the threshold high enough to eliminate the hiss, you're also eliminating a large portion of the sound as well. Consider a decaying guitar string, as shown in *Figure 3*. With lots of hiss, you're losing much of the string's decay when the gate closes.

- Chattering. This occurs because not all signals decay in a nice, uniform way. For example, the amplitude of a guitar string changes radically towards the end of its decay, which means that it may cross over the threshold more than once before it fades out (see *Figure 4*). This rapid opening and closing of the gate causes “chattering” problems. Some gates minimize chattering by adding a bit of decay time, so that the gate doesn't close instantly but instead closes over a period of several hundred milliseconds. This reduces, but does not eliminate, the problem.

- The noise is not removed, just masked. In other words, if you've got a noisy signal, the noise gate will not make it

any quieter—it will merely remove the noise when you're not playing. While this is an improvement, the results are not as dramatic as you would obtain with a double-ended type of noise reduction system (dbx or Dolby).

The important thing to remember about all noise gates is that they are not miracle workers; they are tools. A noise gate can turn a slightly hissy signal into a well-behaved, quiet sounding signal, or remove the noise floor from a tape channel with relative ease. But, feed it a really noisy signal, and it will have a hard time deciding which part of the signal is noise and which part isn't.

So much for noise gates—now for a look at the Noise Fader.



**WHAT IS IT?** The Carrotron Noise Fader is an extremely compact (4.25 x 2.25 x 1.25 inch) box that includes one control (for setting the threshold), one footswitch (for cutting the unit in and out of the signal path), and two jacks (not surprisingly, one input and one output). Power is provided by a single 9 Volt battery, which should last for quite a while since the current consumption is approximately 2 mA.

Mechanically speaking, the enclosure is your typical cast aluminum box, and is definitely sturdy enough to provide excellent protection for the innards. The knob isn't recessed, but then again, you can't have everything.

Unscrewing four Phillips head screws from the bottom plate exposes the electronics, which are held in place by a wide and thick rubber band that slips underneath the pot and over the circuit board. My first reaction was that this was a pretty flaky way to do things, but first impressions can be deceiving, after checking into the subject a little further, I was satisfied that the circuit board wasn't going to go anywhere, and that there was no way an accidental short or other problem could occur. Besides, this type of mounting helps keep the costs down.

The circuit board itself is pretty packed—there's one op amp, eight transistors, several tantalum capacitors, and mostly metal film (as opposed to carbon comp) resistors. The jacks are of the enclosed type, the footswitch is heavy-duty, and the pot is adequate for the task at hand. My only complaint was that the footswitch was not securely fastened in the unit sent for evaluation; a little pliers action fixed that up. Considering that most products these days seem to

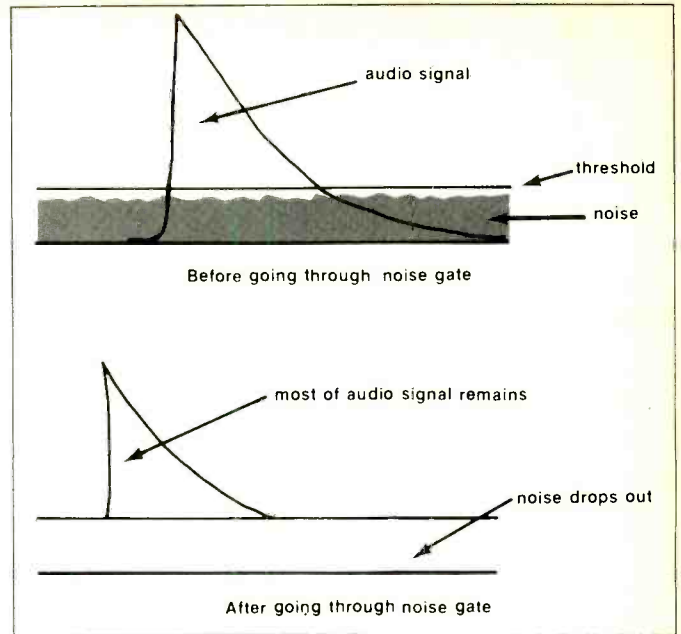


Figure 2

need some kind of tweaking before they perform up to spec, I didn't consider this much of a problem.

**HOW the NOISE FADER WORKS.** The difference between a traditional noise gate and the noise fader is as follows. Below the threshold, instead of shutting off like a normal noise gate, the Noise Fader tracks the input signal and accelerates the rate at which the signal decays (see *Figure 5*). This is sometimes called "downward expansion," and the result is that the audio signal is never cut off abruptly—it always fades out in a smooth and controlled manner. In addition to giving a more natural sound, this fade out action also eliminates the possibility of noise gate "chatter."

I measured the rate of downward expansion with the threshold control up halfway. The Fader would put out about as much signal as you put into it for most signal levels; however, at low levels, this response changes rapidly to give the fading effect (see chart below).

Input signal	Output signal
100 mV	80 mV
50 mV	35 mV
20 mV	9 mV
10 mV	2 mV
6 mV	too small for accurate measurement

**EVALUATING the NOISE FADER.** I tried the noise fader under a variety of circumstances, and also compared it with a more standard type of noise gate for reference. Since I don't have any commercial noise gates for comparison, I used the one presented in the upcoming revised edition of my book *Electronic Projects for Musicians*. This is an optoisolator based design that has a slight decay time, thereby overcoming some of the problems associated with "text-book" noise gates.

The first thing I found out when operating the Noise Fader is that the threshold setting is *crucial*, and setting its proper position is nowhere near as obvious as setting the

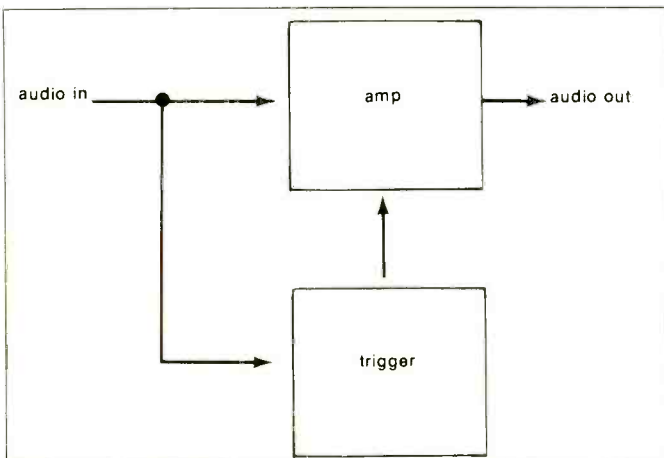


Figure 1

threshold with a conventional noise gate. There is a "sweet spot" on the threshold control that's different for different applications, and this spot must be found by experimentation. There are many ways to set the threshold that initially sound right (i.e., they get rid of the noise), but to find the exact right setting—one that follows the instrument dynamics faithfully as well as eliminates noise—takes a little more work.

For example, let's suppose you have a hissy guitar signal—perhaps from running the guitar through a compressor or flanger. With the threshold all the way counterclockwise, there is no noise reduction action. Slowly turning the threshold clockwise starts making the noise disappear, until at some point the noise is gone completely. However, this is not necessarily the optimum setting. Striking a chord and rapidly muting the strings produces a kind of "noise hangover" where you hear the hiss gently decaying in the absence of any guitar signal. Turning the control a little further clockwise minimizes this hangover, but...if you turn the control too far clockwise, there will be a noticeable attack time if you suddenly hit a sharp chord. So, somewhere in between where the noise appears to go away and where the attack time starts to suffer is the optimum setting. This setting will vary depending on your application as well as the type of signal that you're putting through the noise fader.



**APPLYING the NOISE FADER:** Keeping the above caveats in mind, I tried a number of different tests with the Noise Fader to see what it could, and could not, do. Here are the results:

- **Test with compressors, fuzzes, and other hissy effects:** The Noise Fader does very well under these conditions, and can easily tame hissy effects. Compressors shut up, fuzzes sound quieter without losing too much sustain, and phasers/flangers become much more well-behaved. Also, compared to a noise gate, there was no chatter problem as a note hit the end of its decay. This is usually a significant problem when

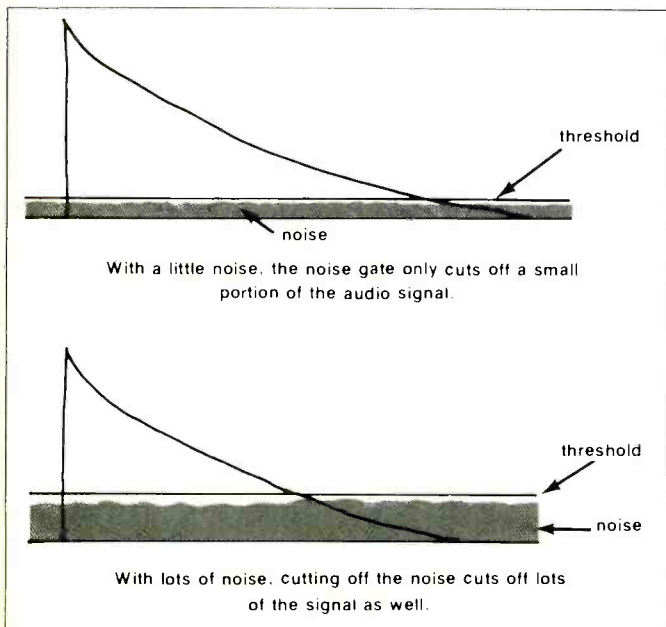


Figure 3

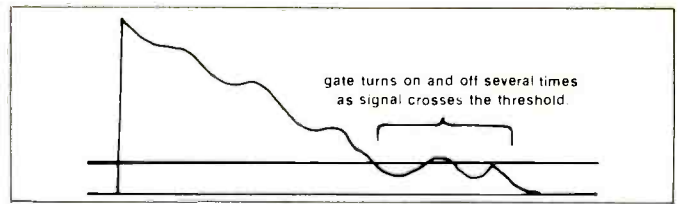


Figure 4

trying to quiet down effects with a standard noise gate.

- **Test during mixdown of tapes in a +4 dBm studio:** Forget it. The Noise Fader can handle a maximum peak signal of about 6 V p-p, not enough headroom for high level studios. This device is clearly designed more for onstage musical purposes.

- **Test with string synthesizer:** This particular string synthesizer uses multiple analog delays to achieve chorusing effects, which not only produces some very rich sounds but also produces those clock glitches and other pieces of garbage we've come to expect from multi-chip analog delay systems. Adding the Noise Fader at the instrument's output helped greatly, especially when turning the threshold just a little bit clockwise past the "sweet spot." This made the decay of the Fader track the decay of the instrument just about perfectly, although there was a *just* noticeable bit of attack lag.

- **Test with extremely noisy signals:** I knew that like most noise gates, the Noise Fader would fail this test; but I was curious as to exactly how it would fail. As it turned out, either the threshold couldn't be turned clockwise enough to get rid of the interfering signal, or if it could get rid of the signal, the attack time was too long.

- **Test with tape echo unit:** Some of the older tape echo units can double as white noise generators; and the Noise Fader really helped clean things up. I've usually found noise gates to not work satisfactorily with echo units, since the abrupt cutoff as the echo signal passes below threshold detracts from the echo effect. However, the Fader's tracking action solved this problem and really made a substantial improvement in the overall sound. Of course, the

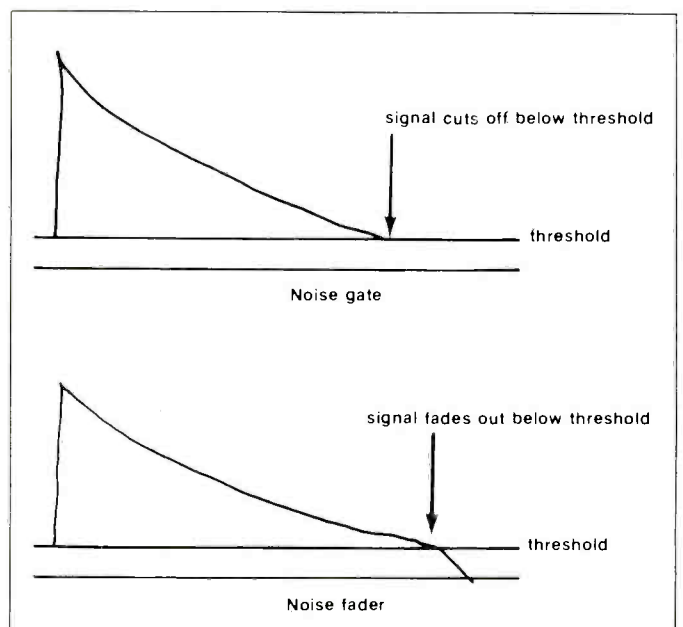
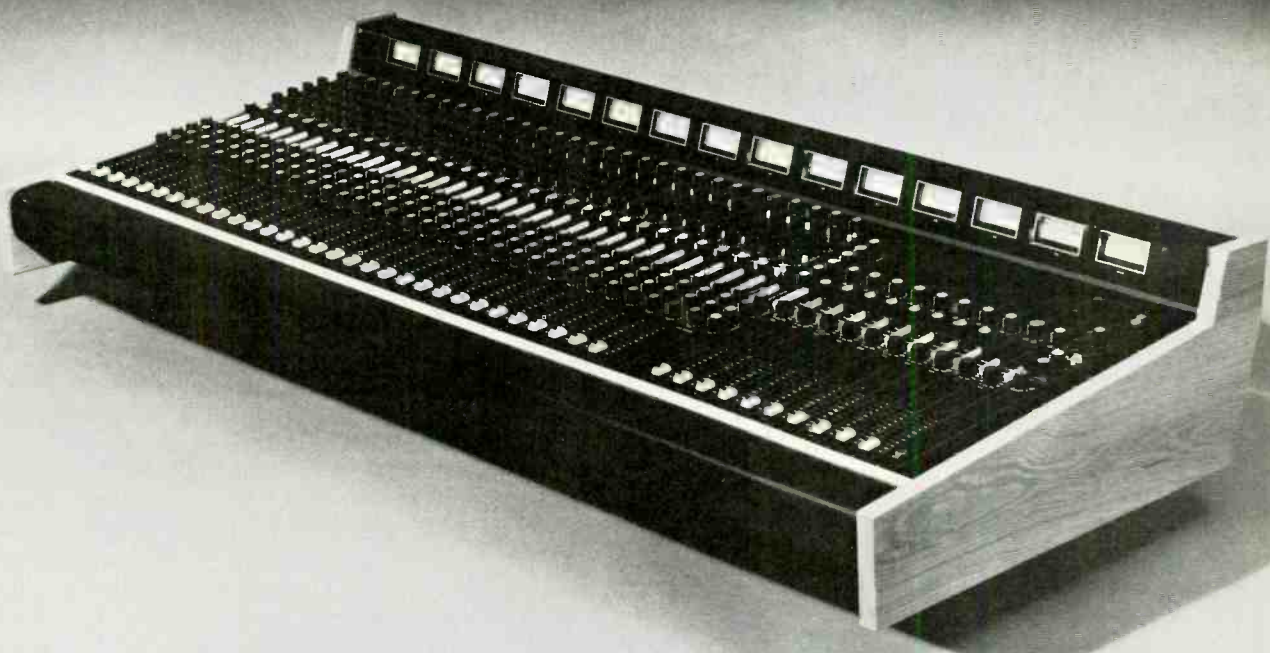


Figure 5

his's who  
you we  
ech



## *A Reputation Is Earned...*

Since its inception Audioarts Engineering has been dedicated to the design and manufacture of truly professional audio processing equipment. We build products with a degree of technical and physical quality rarely seen in the industry. Our aim is to provide the working professional with the tools he needs to create his finest work. The year 1981 will mark the introduction of our 8-buss, 8000 Series of reinforcement, stage monitor, and recording studio consoles. It also marks the debut of our Model 44 Console, a moderately priced 4-buss recording and reinforcement mixer. The big news, however, will be our Wheatstone Project: a new line of advanced design consoles intended to satisfy the needs of more demanding, more complex systems applications.

As always, we will continue to provide a complete line of rackmount signal processing equipment: equalizers, electronic crossovers, feedback suppressors, and compressor/limiters. These products, along with our mixing consoles, are currently in use by top professionals throughout the country. Our reputation is earned; but we aren't stopping here . . .

Stage Monitor, Reinforcement and Recording Consoles  
Model 1200 Compressor/Limiter  
Model 1400 Parametric Electronic Crossover  
Model 1500 Feedback Suppressor  
Model 2100A Tuneable Electronic Crossover  
Model 4100 Parametric Equalizer/Preamp  
Model 4200A Stereo Parametric Equalizer  
Model 5200A Stereo Mixer/Preamplifier



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still there whenever you were playing; but when they weren't, the hiss was gone. If you're a disgruntled tape unit owner, this might just be the device you're looking for (try adding some pre-emphasis/de-emphasis as well and your echo will sing).

**OVERALL EVALUATION.** One of the big questions, of course, is how the Fader compares to a noise gate. I compared the Noise Fader extensively with my noise gate, and because of the inherent decay time of the opto-isolator used in my design, the noise gate and noise fader gave almost equivalent performance in many, but certainly not all, applications. I would think that any noise gate with an adjustable decay time would also stand its own against the noise fader—much of the time.

But, much of the time isn't all of the time. In several instances, the Noise Fader gave markedly better performance; in particular, for quieting guitar effects the Noise Fader gave more natural, and more predictable, decay characteristics. And while I could get my noise gate to chatter, I never heard any kind of chatter coming from the Noise Fader at any time.



It seems to me that musicians who have instruments with inherent noise problems (I don't want to mention any brand names, but there is a certain very popular guitar that is highly prone to picking up electrical interference, and a certain keyboard that really needs much better shielding) would find the Noise Fader most useful. Sure, a noise gate

also gets rid of noise; but to me, the sound of the Fader is more natural. And for taming effects, the Noise Fader does an excellent job.

Its drawbacks are those shared by any device that tries to remove noise after-the-fact. It won't eliminate noise, only help mask it; cutting in different effects along the signal path may force an alteration of the threshold control; extremely noisy signals won't be helped much at all; and so on. Also, sometimes it's hard to tell when the effect is in and when it is out (although that's preferable to having a current-hogging indicator LED...give me long battery life any day).

Overall, though, the Noise Fader is a useful addition to a musician's bag of tricks. It's not a glamorous effect—it won't make your guitar sound like it's from Mars or anything—but if you're tired of being hissed at by your equipment, this is one of the better solutions available to the performing musician.

**Carrotron C920B1 Noise Fader at a Glance:**

- List price: \$159.95
- Input impedance: 3 megOhms
- Output impedance: 300 Ohms
- Equivalent input noise: -110 dBV
- THD: less than 0.1% @ 1 KHz (0 dBV in)
- Current consumption: 2 mA
- Frequency response: ±1 dB, 20 Hz - 20 KHz
- Attack time: 1 ms max with threshold set for proper tracking
- Release time: Variable, depending on threshold setting
- Maximum attenuation: 24 dB
- Threshold range: -20 to -70 dBV

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tape. Or solo one or several monitor channels. You can listen to a performer's headphone cue, hear the echo buss, add external signal processing to the monitor or tape. You'll easily satisfy your musicians, your producer and yourself, with an amazing amount of flexibility and control.



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And the Model 15SL does all this very quietly. The mic preamps are all discrete FETs (not chips) for lower noise and distortion. The power supply is housed separately for remote mounting to keep heat and hum away from the amplifiers. Mic input S/N is greater than 76dB (1 channel, WTD). And overall distortion (Mic In to Line Out) is 0.03% THD @ 1,000Hz.

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# Ambient Sound

BY LEN FELDMAN

## Closing The Patent Office—Again?

I believe it was back around 1840, or thereabouts, that a group of congressmen in this country introduced a bill into the legislature that would have cut off funds allocated to the U.S. Patent Office. Why continue to support that office, reasoned the legislators, if there is nothing left to invent? After all, we have the steam engine, the telegraph machine and so forth, so why waste money on a bunch of people examining ideas for inventions that aren't likely to benefit anyone anyway?

To listen to some of my friends in the audio industry, you would think that nothing has been learned since the middle of the eighteenth century about technological progress and how it always manages to build upon what has come before. I've heard it said that amplifiers have reached such a state of perfection that there is no longer any reason to further improve amplifier circuitry. And now that digital recordings are just around the corner, we have reached the ultimate in music program sources and there is no reason to experiment any further. And as far as the imperfections of loudspeakers and other transducers are concerned, we can always compensate for those imperfections with a good equalizer if we have to (though whether that equalizer should be a parametric or a graphic type remains a matter of some debate).

What prompts me to bring up this rather ludicrous moment in our nation's history is a big, black box prototype of a device that I spotted at the recently held Winter Consumer Electronics Show in Las Vegas. The black box was billed as a "solid" recorder, by which the manufacturer, Onkyo, did *not* mean that it was a solid-state, or transistorized recorder (which, of course, it was), but rather that it was a recorder which uses no moving storage medium such as tape or disc. Yes, this Onkyo recorder contained who-knows-how-many megabytes of solid-state memory "chips" which can store an undisclosed number of millions of binary-encoded num-

bers which, in turn, correspond to analog waveforms of music!

For all of our advanced technological capability, in order to keep the price of this prototype down to reasonable levels, the enormous storage capacity of the "solid memory" within this recorder was only able to store *ten seconds* worth of actual music! As the sign accompanying the device explained, however, as technology advances, it may someday be possible to build a solid recorder, with no moving parts, that would be able to record and store more practical and useful amounts of music programming. Besides obliterating the highly profitable magnetic tape industry, can you imagine all of the other industrial upheavals that such a revolution in sound recording would produce?

But you don't have to probe that far into the future to find products and technology that can change the way we pursue our careers and the way in which audio is stored and reproduced. Although the Winter CES was predominantly a video oriented event, there were enough items of interest to audio enthusiasts to fill several of these columns. There was, for example, an effective demonstration of the new Dolby C noise reduction which we discussed in this column a couple of months ago. Our first report concerning Dolby C was derived strictly from written material supplied by Dolby Labs. Now, we are in a position to tell you that Dolby C is an extremely effective noise reduction system which sounds perfectly compatible when played back using Dolby B decoding circuitry and even sounds acceptable when listened to on a playback deck having no noise reduction decoding circuitry at all. (Dolby does not claim that this procedure offers compatibility, and they are right.)

The WCES also afforded an opportunity to get a briefing on what has got to be the most sophisticated

(not to mention highest priced) cassette deck in the world. As you might have guessed, the deck is by Nakamichi, whose Model 1000 deck introduced in the early 1970s served as a reference cassette deck until the introduction of metal particle tape a couple of years ago. The new model, appropriately named the 1000ZXL, will probably serve as a new reference deck against which other decks will be compared during the decade of the eighties. Its many innovative features will be reported on in next month's "Lab Reports," so we won't dwell upon them here, except to say that if you want to see how a microcomputer can intelligently be mated to a piece of audio equipment, this is the deck to examine. As for my recommending it for purchase, that's not my purpose here. Far be it from me to tell you to spend \$3800 (the suggested retail price) on a cassette deck!

I discussed a new equalizer/analyzer made by dbx, Inc. some months ago in this column. I've anxiously been waiting to get my hands on one of these remarkable units, and it looks as though I am about to have my wish fulfilled. You will recall that this is the equalizer/analyzer (model 20/20) that, with the aid of a supplied microphone, pink-noise generator and a microprocessor controlled program, actually analyzes the pink noise reaching the microphone (placed in the listener's favorite position) and electronically adjusts the 10-band octave equalizer for "flat" system response. We'll have a lot more to say about this fusion of electronics and computer technology in our "Lab Report" dealing with this item, too. The important point here is that, after introducing the item a full seven months ago in Chicago, in June of 1980, the model 20/20 is finally ready for delivery to dbx dealers and, I suspect, to the many customers who have had it on back-order since it was originally shown to attendees of the Summer CES in mid 1980. Unfortunately, the ravages of inflation have caused dbx to raise the price of the model 20/20 to an even \$1500 (suggested retail) from an earlier hoped-for price which was somewhat lower.

### **Cassette, Cassette, Deck, Deck**

How would you like to be able to dub the music from one cassette onto another without having to own two decks or borrow a second deck from a friend? Well, now you can, with Optonica's new RT-6605 cassette deck, also seen for the first time at the Las Vegas CES last January. The new deck actually sports *two* cassette compartments; one for recording and the other for playback. The machine lends itself to tape duplication which is accomplished simply by popping a recorded cassette into the playback compartment of the deck and a blank tape into the second recording compartment. It is possible to edit as you re-record.

Optonica's main purpose in devising this instrument

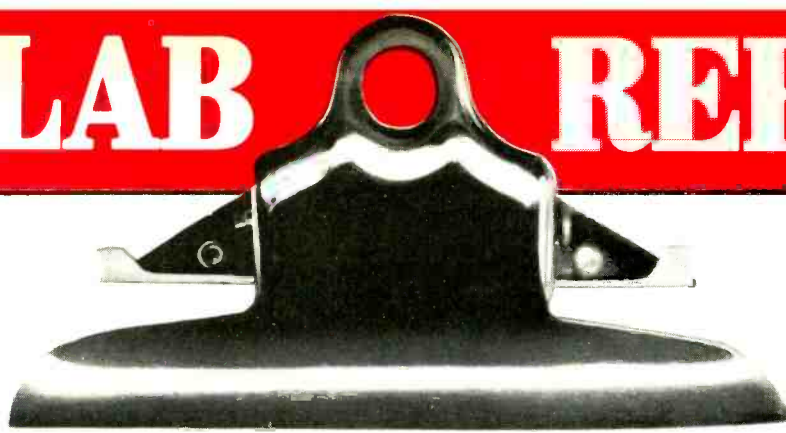
was not, ostensibly, to encourage tape dubbing (though some software producers at the show weren't too happy about the fact that this configuration might encourage music pirating). Rather, the two-compartment machine offers a solution for the age old problem in cassette deck design relating to the differences between an "optimum" record head and an optimum playback head, and the difficulty of positioning separate record and playback heads along the confined openings of the standard "compact cassette" package which was really never intended to accommodate three-head configurations.

### **Audio Fledglings**

If you want to find future audio success stories, all you have to do is visit the exhibitors who frequent the Jockey Club at the Las Vegas Winter CES or the Pick-Congress Hotel during Summer CES in Chicago. Of the more than 130 exhibitors who showed up at the Jockey Club for the 1981 winter event, some will make it big, some will disappear and some will struggle along without becoming significantly bigger or smaller. Here's my own personal abbreviated list of such exhibitors who, I think, are bound for bigger things in the future. In the field of audio electronics are Apt Corporation, Carver Corporation, Threshold Corp., Bedini Electronics, Micro-Tech (MTI) Inc. and Zeff Advanced Products Co. (Zapco). As usual, there were too many new and older speaker companies and an inadequate listening environment in which to judge and select the winning speakers of years to come. Certainly a winner in the company-naming sweepstakes had to be "The Last Factory" (in which LAST stands for Liquid Archival Sound Treatment, a record preservative which this company developed). As for companies whose fortunes have turned, we were quite surprised to find Marantz exhibiting at the Jockey Club (instead of in the main convention center where they had held forth in previous years) and even more surprised to find B.I.C./Avnet Corporation ensconced in another small room at the same Jockey Club. Another company that surprised us by their presence in the lesser location was Empire, who formerly took space in the main center. It is, of course, possible that these and many other companies who elected to exhibit on a smaller scale were simply responding to current economic conditions, but that didn't seem to prevent other companies from quickly stepping in and renting the more visible and prestigious exhibit spaces abandoned by those companies trying to economize.

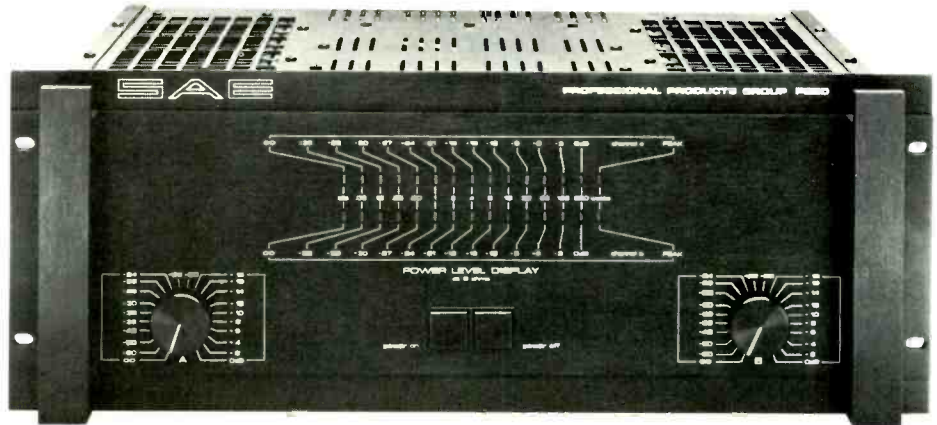
As for my predictions of which companies are going to make it big in the years ahead, remember, these predictions were made in Las Vegas by an audio enthusiast who should have left the blackjack tables and slot machines alone.





NORMAN EISENBERG AND LEN FELDMAN

## SAE P250 Power Amplifier



**General Description:** The model P250 from SAE is a stereo power amplifier offered for professional use. Its power output per channel is rated, at less than 0.05 percent THD, at 250 watts into 8-ohm loads; 375 watts into 4-ohm loads; and 500 watts into 2-ohm loads. The amplifier has switchable high and low pass filtering, with the switches located inside the amplifier housing on one of the circuit boards. Also on this circuit board is provision for an electronic crossover with slopes of 6, 12, 18 or 24 dB per octave. To complete the crossover option, the user must add two ICs and capacitors which are not supplied but must be obtained from the factory or an SAE service center. This conversion, advises SAE, should be done at the factory or service center.

The front panel contains an elaborate power readout system consisting of 15 LEDs for each channel. Each LED is labeled for power in watts and in corresponding dB levels with reference to an 8-ohm load. Each channel also has its own level control—a stepped type with markings from zero dB to “infinity.” Centered on the panel are two push-switches for power on and power off. The ends of the panel have the requisite holes for standard rack-mounting and two handles.

Input connectors at the rear include ¼-inch phone jacks for high-impedance, unbalanced inputs; and XLR connectors for low-impedance, balanced inputs. In addition to these inputs for left and right channels, a third set of inputs may be used for automatic mono bridging. In this mode, the rated output power becomes 500 watts

for an 8-ohm load, 750 watts for a 4-ohm load; 1000 watts for a 2-ohm load. Rated distortion in this application is 0.1 percent for the 8-ohm and 4-ohm loads; 0.2 percent for the 2-ohm load. When the amplifier is used in the mono bridged mode, the control for channel A handles the signal levels.

Outputs are 5-way binding posts, one red and black pair for each channel. For mono output, the two farthest-spaced posts (both red) are used. A 15-amp fuse, and the AC power cord, fitted with a three-prong (grounding) plug, complete the rear picture. The P250 has no cooling fan, although the manufacturer advises that for 2-ohm operation, or where high ambient temperatures are encountered, the operator use SAE's model F105 forced air cooling system.

Among the internal features of the P250 are a low hum-field toroidal power supply, built-in speaker protection and true complementary symmetry circuitry from input to output.

**Test Results:** In our lab tests, the P250 easily met or exceeded its published specifications. At no time during the tests did we require special cooling for the amplifier. We did check the 2-ohm output rating to confirm that it was significantly higher than the claimed 500 watts per channel before reaching the 0.05 percent distortion level.

Of all the measurements made on the P250, perhaps the one that gives the closest correlation with perceived sound quality is the twin-tone IM measurement. For



SAE P250: Rear panel layout.

this test we used a newly acquired BPI model 6000A IM Distortion Analyzer, which delivers pairs of tones in the high-frequency region spaced 1 kHz apart. The difference frequency between these tones, produced by the amplifier being tested, is measured by the instrument directly, and we report this as the so-called CCIF IM distortion (in this case, it was an almost unmeasurable 0.0068 percent!). Other IM components generated within the audio band (at or below 20 kHz) are observed on a spectrum analyzer and then calculated as a net percentage. The twin tones producing the "worst case" results are shown in the 'scope photo of Fig. 1, where only one minor blip may be seen slightly to the left of the two reference tones. This form of IM distortion measurement is known as the IHF IM method, and in this instance it worked out to a very, very low 0.0224 percent.

*Note:* The amplifier is shipped with its high and low pass filters in the circuit, thus providing an overall frequency response, within -3 dB, from 30 Hz to 20 kHz. The specifications state that with the filters out, response extends to 0.5 Hz at the low end, and to 170 kHz

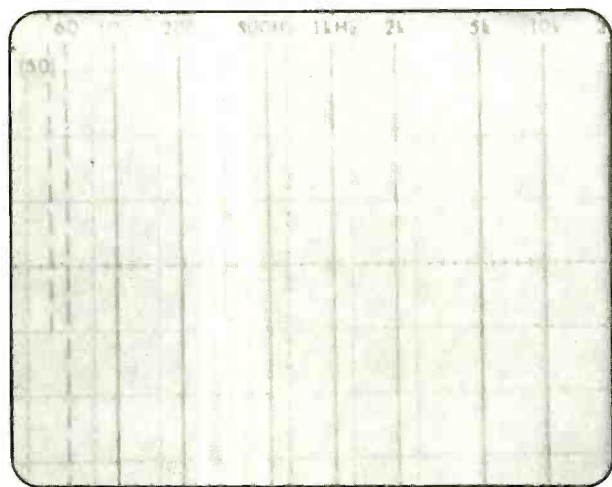


Fig. 1: SAE P250: Spectrum analysis of twin-tone IM measurement.

at the high end—but this particular item was not tested for this report because of difficulty of entry into the amplifier (see "Comments," below).

**General Info:** Dimensions are 19 inches wide; 7 inches high, 15 inches deep. Weight is 47 pounds. Price is \$1,200.

**Joint Comment by N.E. and L.F.:** Once again, we both see eye to eye on a product. Since SAE is involved in both high-fidelity and pro-audio product manufacturing, we expected to find the best of each design philosophy in the P250 amplifier. We were not disappointed. Power output was consistently higher, and distortion always lower, than specified. Combined with this "brute force" power and ultra-low distortion levels are the virtues of ruggedness and reliability, not to mention a very nicely worked-out power-output metering system, and the neat trick of automatically converting to mono bridged operation merely by jacking a signal source into either the mono XLR socket or the ¼-inch mono phone jack.

The options for changing the filters, and for using the internal electronic crossover facility, also are nice to have—but this brings us to our one critical comment on the unit. Unfortunately, neither of our test samples was supplied with a regular owner's manual. (This has happened to us often enough to make us wonder if some manufacturers do not bother about owner's manuals until the day they are ready to ship first production units, at which time they mimeograph a couple of hastily written pages and call them a "temporary owner's manual.") Be that as it may, we suggest that SAE check the text of this "temporary manual" before committing the same words to the permanent manual. As now written, the instructions tell us that, in order to switch the built-in filters, it is only necessary to "first remove the top cover of amplifier." As far as we could tell, there is no simple "top cover" but rather a complex wrap which would have required the removal of countless screws to get inside. Much as we would have liked to see the response extend from 0.5 Hz to 170 kHz, we decided to leave well enough alone, and take SAE's word that the filters can be turned off once you can get into the amplifier. Surely, however, the designers could have worked out an easier entry to the amplifier—especially since access also is needed if the user wants to make use of the electronic crossover option (although the user is discouraged in the present instructions from making this conversion himself—another possible point of confusion in the manual?).

Aside from these discrepancies between the printed

word and the physical reality of the amplifier, we did indeed like the P250. Even with the filters in, our listening tests confirmed that this is a fine-sounding amplifier, perfectly able to handle the demanding

dynamics and sharp transients in the program material we fed into it. And it certainly has the "work-horse" type of construction you'd associate with a pro-grade amplifier.

SAE P250 POWER AMPLIFIER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Continuous power for rated THD, 1 kHz		
8 ohms	250 watts	263 watts
4 ohms	375 watts	408 watts
THD at rated output, 1 kHz, 8 ohms	0.05%	0.035%
4 ohms	0.05%	0.037%
20 Hz, 8 ohms	NA	0.15%
20 kHz, 8 ohms	NA	0.13%
IM distortion, rated output, SMPTE	NA	0.08%
CCIF	NA	0.0068%
IHF	NA	0.0224%
Frequency response, 1 watt output*	- 3 dB, 35 Hz to 20 kHz	- 3 dB, 30 Hz to 20 kHz
S/N ratio re: 1 watt, "A" wtd, IHF	NA	93 dB
S/N ratio re: rated output, "A" wtd	100 dB	113 dB
Dynamic headroom, IHF	NA	1.5 dB
Damping factor at 50 Hz	NA	92
IHF input sensitivity	NA	0.1 V
Input sensitivity re: rated output	2.24 V	1.58 V
Slew rate (volts/microsecond)	20	20
Power consumption: idling; maximum	NA; NA	100; 1300 watts

\* Filters "in"

CIRCLE 15 ON READER SERVICE CARD

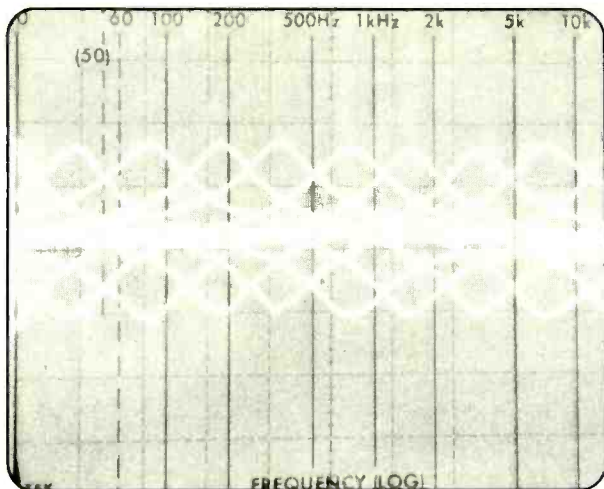
## Soundcraftsmen TG2245 Graphic Equalizer



**General Description:** The Soundcraftsmen TG2245 is a dual-channel octave-band equalizer with separate and identical controls and switching facilities for each channel or section, so that either channel may be operated independently of the other. Each channel, or section, provides ten octaves of equalization handled by sliders with frequency centers of 30, 60, 120, 240, 480, 960, 1920, 3840, 7680 and 15,360 Hz. In addition to these sliders, each channel has a zero-gain adjust slider and its associated LED indicator.

Also on the front panel, for each channel or section, are six signal-processing and routing switches. There also are convenience-jacks for line-in and line-out signal patching. These are duplicates of the rear-panel jacks, more of which presently. Centered between the front-panel jacks is the device's AC power off/on switch.

The switches found here are labeled EQ defeat; Pre-EQ Loop; Loop/Monitor; Subsonic; Shelving Lo; Shelving Hi. The EQ Defeat switch enables the incoming signal to bypass the equalizer. The Pre-EQ Loop switch and the Loop/Monitor switch—used in conjunction with rear-panel signal connectors—permit the use of an external processor or tape recorder between the TG2245's own line inputs and its equalizer section, and also enable equalization by the TG2245 to be applied ahead of (or following) a tape recorder or signal processor. The remaining three switches operate their respective filters at a 12 dB-per-octave rate. The subsonic filter begins taking effect below 20 Hz (down 3 dB at 15 Hz). The low-shelving filter rolloff is down 3 dB at 100 Hz. The high-shelving rolloff is 3 dB down at 10 kHz. Again, as with the EQ sliders and the zero-gain adjustments, these



**Fig. 1: Soundcraftsmen TG2245: Multiple sweeps show control range for all ten octave controls.**

switches and the circuitry they handle are completely independent for each channel or section of the TG2245.

Zero gain is adjusted on the zero-gain slider when the upper and lower LEDs glow with the same intensity with a signal applied to the equalizer. This technique permits adjusting for constant loudness levels, with or without EQ switched in, and facilitates equalizing across the audio band without changing the level of the signal being processed.

The rear of the TG2245 contains eight ¼-inch phone jacks consisting of line-in, line-out, loop/monitor-in and loop/monitor-out for each section of the equalizer. These jacks, as well as the extra line jacks on the front panel, may be used for balanced or unbalanced operation, depending on what kind of phone-plug is used and how it is wired. Instructions are spelled out in the owner's manual and a handy diagram is printed on the back panel for easy reference. So too is a block diagram showing signal paths between the jacks and the functional groups of one channel of the TG2245. Note that the rear and front panel line-out jacks are wired in parallel so that identical outputs are available from both at the same time. The rear and front line-in jacks, however, are wired so that either, but not both, may be used at a given time (inserting a plug into the front-panel line-in jack will defeat the rear-panel line-in jack).

As with other Soundcraftsmen equalizers, the TG2245 is supplied with a frequency test record and several "Computone" charts for plotting EQ and switch settings. The device may be fitted into a standard 19-inch rack, or placed on any convenient surface. Four plastic "feet" are supplied and optional walnut-veneer end panels are available. The unit's AC power cord is fitted with a three-prong (grounding) plug.

**Test Results:** Published specifications for the Soundcraftsmen TG2245 were confirmed or bettered in our lab

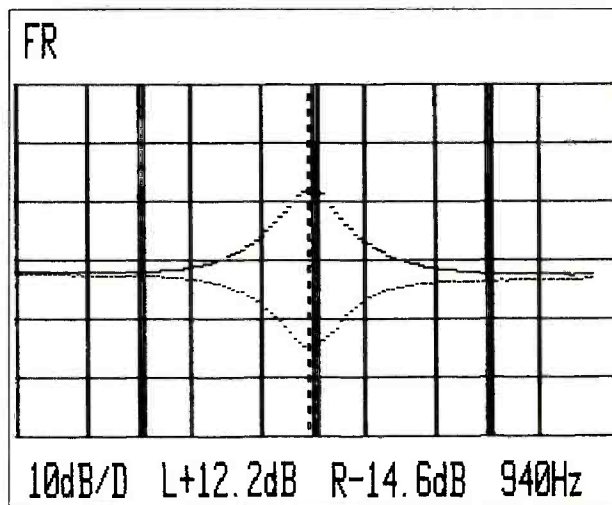
tests, and the device impressed us thoroughly as being accurate, reliable and convenient to use. Especially commendable is the zero-balance system, accurate to within its claimed tolerance of only 0.1 dB. Center frequencies for the ten equalizing filters also were highly accurate. These filters are synthesized, using "gyrator" circuits rather than actual inductors.

A multiple sweep from 20 Hz to 20 kHz, obtained with the aid of a spectrum analyzer and a storage 'scope, is shown in *Figure 1*. In *Fig. 2* we present a "close-up" view of the boost and cut action of a single octave-band control. Among other things, these results confirm the avowed design effort behind this equalizer to maintain a moderate Q in order to avoid the problems associated with the steeper slopes of higher-Q filters. With the TG2245, the filter bandwidth is fairly broad, with the -3 dB points being a full octave removed from the center frequency.

The action of the low and high shelving filters is shown in *Figs. 3* and *4*. The upper trace in each case is the response with the filters turned off (and all controls centered), while filter action is superimposed and depicted as the "R" trace for each figure. The slight shelving which appears to be present at the high end was caused by our instrumentation and not by the TG2245 under test. Frequency response, measured independently, was well within the  $\pm 0.5$  dB tolerance from 20 Hz to 20 kHz as specified.

**General Info:** Dimensions are 19 inches wide; 3½ inches high; 17 inches deep. Weight is 18 pounds. Price is \$399.

**Joint Comment by L.F. and N.E.:** We share the same favorable view of this product. Soundcraftsmen's products are no strangers to us; we have in the past re-



**Fig. 2: Soundcraftsmen TG2245: Detail of boost and cut range for octave-control of unit (960 Hz center frequency control).**

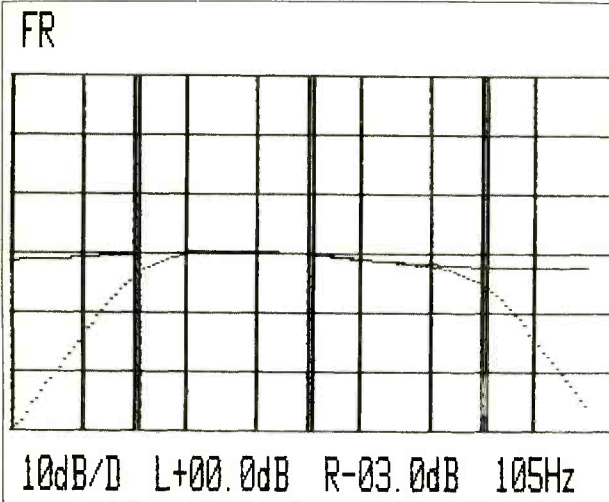


Fig. 3: Soundcraftsmen TG2245: Lo-shelf filter response (R curve) relative to flat response shows -3 dB point at 105 Hz.

viewed several of their units—here and elsewhere. Our high regard for this manufacturer's products remains unchanged after examining the TG2245. The manufacturer describes the unit as a pro model, and the "Pro" appellation is well-deserved. In addition to its low distortion and accurate response capabilities, the unit has several worthwhile features of genuine value to the user. One is the zero-gain control and its LED indicators, a setup that makes it easy to adjust for constant loudness levels with and without EQ switched in. Another is the inclusion of separate subsonic and shelving filters, which free the lowest and highest octave-band controls to do a job of true equalization instead of wasting them for filtering action. Yet another is the relatively broad bandwidth (moderate Q) of the individual octave-band

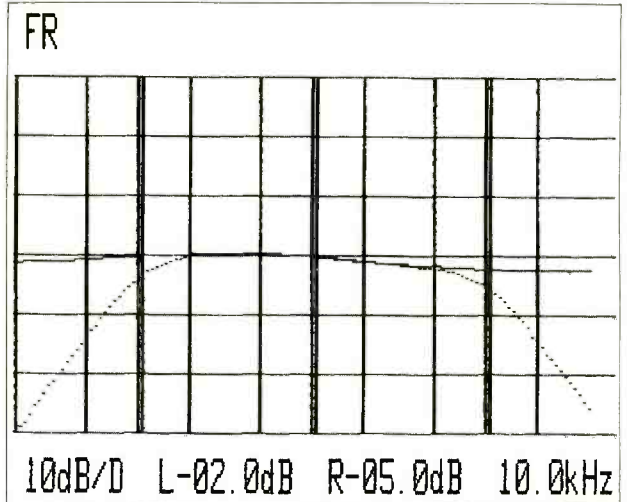


Fig. 4: Soundcraftsmen TG2245: Hi-shelf filter response (R curve) relative to flat response shows -3 dB point (-5 dB re: -2 dB at 10 kHz).

filters. Then there is the versatile jack arrangement—with the external in-and-out loop, and the pre- and post-EQ capability for that external loop—not to mention the convenient extra jacks on the front panel, plus the fact that inputs and outputs can be used as balanced or unbalanced. Finally, of course, is the fact that all equalizing, filtering, and switching are completely separate and independent between the unit's two channels. And all this comes at a modest price on today's market. All in all, the TG2245 provides the advantages of hi-fi specifications and the clean sound associated with them, together with the practical features needed in professional equalization applications. It should find favor with those involved in radio and TV production, sound-reinforcement and, of course, recording work.

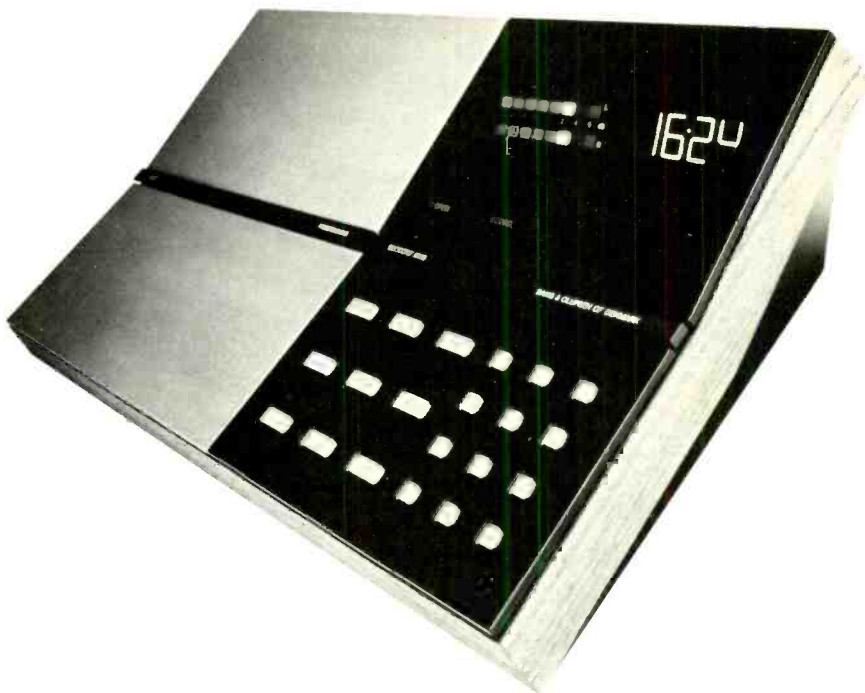
#### SOUNDCRAFTSMEN TG2245 EQUALIZER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Input impedance	47 K ohms	Confirmed
Maximum input/output	+22 dBm/10 V	Confirmed
Signal-to-noise ratio	-92 dBm	-95 dBm ("A" wt'd)
Gain control range	-12 to +6 dB	Confirmed
Frequency response	20 Hz to 20 kHz, $\pm 0.5$ dB	See Figs. 3 & 4
Output impedance	600 ohm/bal; 300 ohm unbal.	Confirmed
Distortion	Less than 0.01%, 20 Hz-20 kHz	0.0057 @ 1 kHz 0.01 @ 20 Hz & 20 kHz
Filter bandwidth	1-octave @ -3 dB, 8 dB boost/cut	Confirmed
Center frequencies (Hz)	30, 60, 120, 240, 480, 960 1.92 K, 3.84 K, 7.68 K, 15.36 K	Confirmed
Octave control range	$\pm 12$ dB (others set to flat) $\pm 16$ dB (others set to max.)	Confirmed
Gain/Cut capability	+22 dB/-28 dB	Confirmed
Sub-sonic filter	-3 dB @ 15 Hz, 12 dB/oct.	Confirmed
Lo-shelf filter	-3 dB @ 100 Hz, 12 dB/oct.	See Fig. 3
Hi-shelf filter	-3 dB @ 10 kHz, 12 dB/oct.	See Fig. 4
Channel separation:	Greater than 80 dB	Confirmed
Power consumption	Less than 15 W	9 Watts

CIRCLE 16 ON READER SERVICE CARD



## Bang & Olufsen "Beocord" 8000 Cassette Recorder



**General Description:** The Beocord 8000 is a cassette tape deck whose built-in microprocessor and electronic clock-timer system make it possible to pre-program the machine for automatic start and stop, in either record or play modes, within any 24-hour period. The system also functions to provide random access to different recorded sections of a tape. Tape indexing is done in real time, and the actual time of day is always available (assuming it was punched in correctly when setting up the deck). The system also enables the recordist to have a tape return automatically to the beginning of the last recorded segment of a tape.

Calibration of a cassette is also handled by the microcomputer system. One button is used for metal-particle tape; another button for the oxide formulations. In addition to this option it also is possible to adjust for optimum input recording levels for oxide and metal tapes by observing the peak signal indications on the deck's meter, prior to running the tape.

The Beocord 8000 is a two-head cassette machine. The cassette compartment, together with various controls, is found under a large swing-up cover on the left upper portion of the sloping top panel. This area is designated by B&O as the "Programming Section." The cover is raised by pressing either end of a long bar just below it. One end of this bar is labeled "Programming" and the other end—labeled "Eject"—will raise the lid and the cassette platform too. To the left of the cassette area is a slider for headphone output level adjustment (independent of line-level output). To the right are pushbuttons for timer start, timer stop, "rec open" and time-set. The record-open switch must be pressed as the first step in recording. The time-set button is used to set the built-in clock, and—once time has been entered—to

recall the time. Also in this section are the controls for Dolby NR and the two-position tape-selector. At the right are two additional slider controls for adjusting recording level separately on each channel.

To the right of the programming section, and sharing space with it on the upper slope of the deck's top panel, is the display section. Basically, this consists of the twin segmented bar-graph signal meters and the digital readout of the electronic clock-timer. Signal levels are shown as peak values in real-time. Each channel uses eight LEDs which operate in record and in playback modes. The scale runs from -20 to +6.

The digital readout provides, in addition to the correct time, tape location in minutes and seconds and the actual elapsed time for every operating mode. Calibration and mode data also are shown by means of various combinations of dots and line-symbols, including one symbol for an incorrect entry into the computer. There are eleven such "codes" which are illustrated and explained in the owner's manual.

Below the display section is the control section. This area contains nine large, and twelve smaller, keys. The former group is used to initiate various commands; the buttons in the latter group provide numbered instructions for timing. Thus, the large keys govern the functions of: standby; record; memory on; memory off; stop; return; normal forward; fast-forward; rewind. The smaller keys are numbered from 0 through 9, with two added keys for "go" and for "CE" (clear entry).

Line-level signals are fed to and taken from the Beocord 8000 by means of the European-DIN socket located at the deck's rear. However, B & O supplies the requisite cable adaptor pre-soldered to a generous length of standard signal cable whose other four ends

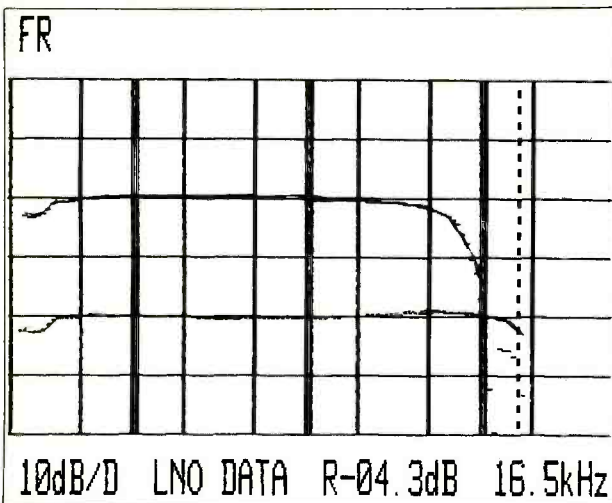


Fig. 1a: Beocord 8000: Frequency response at 0 dB and -20 dB record level (using Maxell UD-XL-IS tape).

are fitted with color-coded plugs for insertion into standard U.S. phono jacks for tape feed (record) and tape playback. Associated with the DIN socket is a toggle switch with DIN and LINE positions.

An additional DIN socket on the lower front apron of the deck accepts microphone inputs. This connection must be made using a suitable 5-pin DIN plug wired as per instructions. This same socket also may be used for feeding an auxiliary (approximately line-level) signal into the model 8000, as, for instance, in copying a tape directly from another deck. For this purpose, there is a small switch next to this input. Also near this input is the stereo headphone output, a standard 1/4-inch jack.

While the headphone output level is adjustable via the slider on the top panel, the DIN/line output levels, one for each channel, are screwdriver adjustments found on the underside of the unit.

The Beocord 8000 has no separate power on/off switch. Operating voltage is applied when the line-cord at the rear is plugged into an AC outlet. However, all this does is activate the clock until the operator actually initiates some tape-deck function.

The Beocord 8000 is styled in what might be called "Danish Modern." The top panel slopes toward the user in two angular attitudes, presenting a look of brushed white chrome and black matte. During use the readout section is illuminated in red and green. The front and sides are trimmed with rosewood strips. The deck is designed for installation on a flat horizontal surface.

**Test Results:** The Beocord 8000 clearly made its best performance showing when used with metal tape, especially in terms of high-end response and in signal-to-noise. Distortion was almost the same with metal as with normal-bias tape. The same could be said for headroom, although the normal-bias tape actually yielded one dB higher headroom. Our lab measurements pretty much confirmed published specs for the

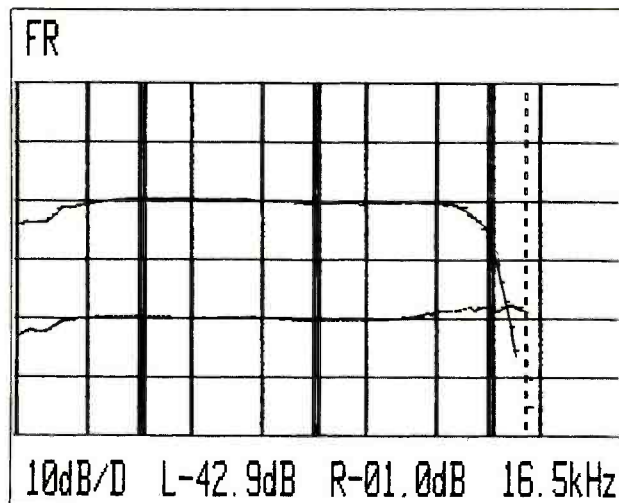


Fig. 1b: Beocord 8000: Frequency response at 0 dB and -20 dB record level (using Maxell UD-XL-IIS tape).

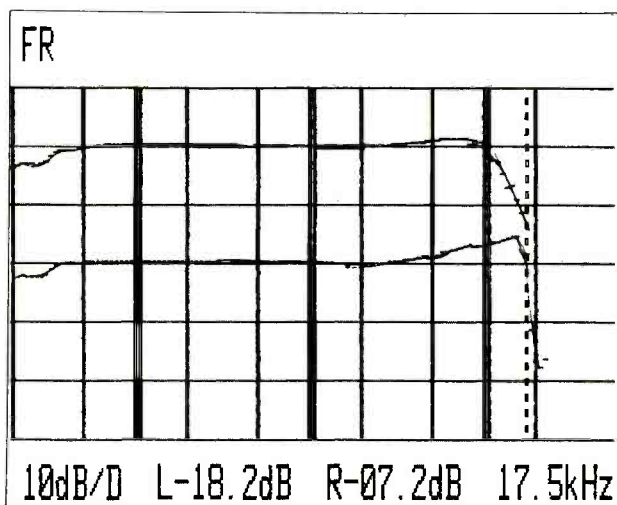


Fig. 1c: Beocord 8000: Frequency response at 0 dB and -20 dB record level (using Fuji metal tape).

unit, although it might be mentioned that the specs seemed relatively "conservative" for a deck priced as high as this one.

In Fig. 1 (A, B and C), we show the response at 0 dB and at -20 dB record levels for each of the three types of recording tape used in our tests (Maxell UD-XL-IS for normal bias ferric-oxide; Maxell UD-XL-IIS for high-bias, cobalt-ferric; and Fuji Metal for metal-bias). While response with the metal tape was best, it exceeded that of the high-bias tape by only 0.5 kHz at the high end.

Wow-and-flutter results were much better than claimed by B & O, measuring only 0.034% WRMS. Speed accuracy also was excellent, with average readings over the first two minutes of tape motion of only -0.149 percent (see Figs. 4 and 6).

Third-order harmonic distortion readings are shown in Fig. 2 (A, B and C). The results show HD at various

recording levels up to about +10 dB, relative to the 0-dB reference level which, on this machine, corresponds to 200 nWb/m. Surprisingly, the self-calibration of the deck was such that we ended up with a bit more headroom with the ferric-oxide than with the metal tape sample. Despite this, however, best S/N was obtained with metal tape, as may be seen in Fig. 3 (A, B and C). In these displays, the "L" figure (and the left "noise bar") show results without Dolby noise-reduction, while the "R" figure and the right-most noise bar in the graph show results with Dolby switched on. All readings are weighted, using the CCIR/ARM method.

Playback-only response, shown in Fig. 5, was measured with a special wide-band frequency response test cassette produced by Standard Tape Laboratory, Inc. for use with our Sound Technology model 1500A Tape Recorder Test System.

**General Info:** Dimensions are 20 $\frac{1}{8}$  inches wide; 5 $\frac{1}{8}$  inches high; 11 $\frac{1}{8}$  inches deep. Weight is 16.5 pounds. Price is \$995.

**Individual Comment by L.F.:** There are those of us who prefer oil pressure gauges, battery charge indicating meters, tachometers and coolant thermometers in our cars. Others of us are content to simply step on the gas pedal and the brake, and have only some indicator lights come on when something goes wrong under the hood. If you belong in the latter category, you probably will love the Beocord 8000. It follows B & O's tradition of elegant and uncluttered external design. It also is as totally automated a cassette deck as I have ever encountered.

As explained, most operating modes of the deck can be initiated at the touch of a button (or two). Tapes can be individually calibrated—in terms of operating parameters such as bias, equalization and sensitivity, and also in terms of program timing. The deck has

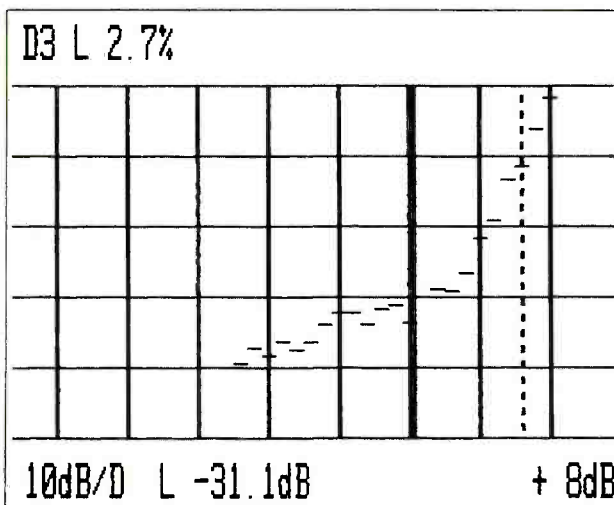


Fig. 2a: Beocord 8000: Third-order distortion versus record level (Maxell UD-XL-IS tape).

music-locating options, and a real-time clock with relative timing indications, all digitally displayed. There also is a series of symbols (such as "Cs" facing backwards, forwards, upwards or downwards) all of them designed to "communicate" with the user. I would imagine that, after a couple of days, the user would become familiar with the symbols. If one follows the owner's manual, however, operation of the machine is not all that complicated. Just do things "by the book" and do not try to outguess B & O regarding the uses of the numerous touch-buttons on the deck's front panel.

I cannot express quite as much enthusiasm for the deck's lab measurements as I can for its industrial design. To be sure, the tapes we used did give results that were consistent with claims made by B & O, but those claims seem extremely conservative for a cassette deck costing nearly \$1000.

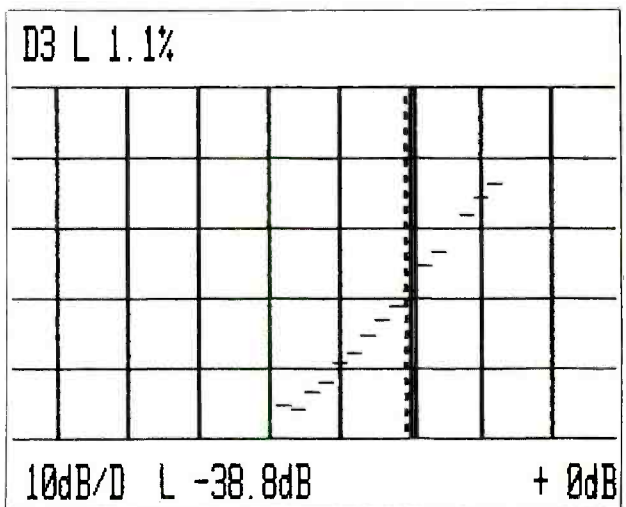


Fig. 2b: Beocord 8000: Third-order distortion versus record level (Maxell UD-XL-IIS tape).

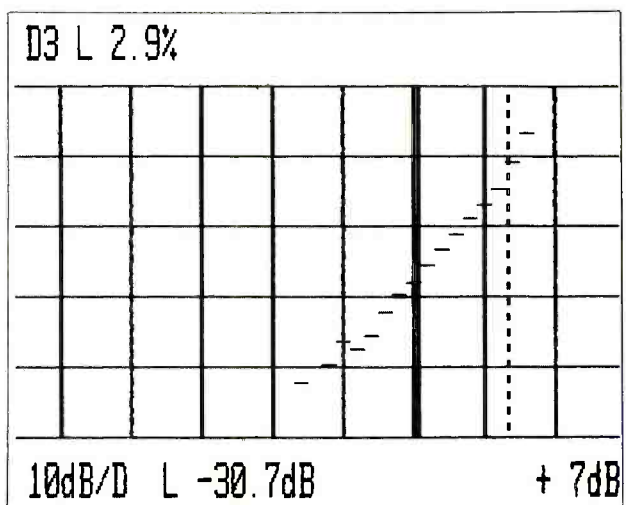


Fig. 2c: Beocord 8000: Third-order distortion versus record level (Fuji metal tape).

NS WHTD L -51.7dB R -61.2dB 10dB/D

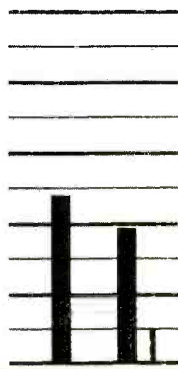


Fig. 3a: Signal-to-noise ratio with (R) and without (L) Dolby, referred to 3% distortion (max) recording level (Maxell UD-XL-IS tape).

NS WHTD L -55.6dB R -64.4dB 10dB/D

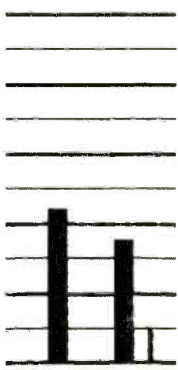


Fig. 3b: Beocord 8000: Signal-to-noise ratio with (R) and without (L) Dolby, referred to 3% distortion (max) recording level (Maxell UD-XL-IIS tape).

NS WHTD L -59.9dB R -69.5dB 10dB/D

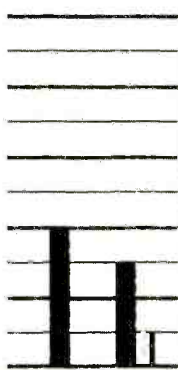


Fig. 3c: Beocord 8000: Same as figures 3a and 3b, but using Fuji metal tape.

FS0.10%

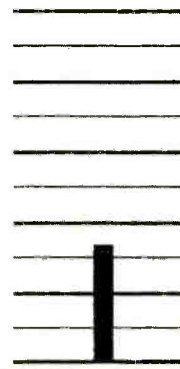


Fig. 4: Beocord 8000: Read-out of flutter on unit. Figure displayed is WRMS.

A professional recordist probably will not find this unit too appealing. On the other hand, the music lover who doesn't want to be bothered with technical details, and who just wants to record music easily and with a fair amount of automation, likely will fall in love with the Beocord 8000. The measured performance of the unit does indicate its ability to provide recordings that will satisfy the serious music lover, if not the fussy technological audio purist who is as much concerned with the numbers as with the sound.

**Individual Comment by N.E.:** In terms of "specs as such," the Beocord 8000 falls a bit short of the extreme high-end Hz-marks made by some of its similarly priced contemporaries. Knowing this company, I am fairly certain this is a deliberate design decision made in the interest of achieving that precarious balance of performance characteristics involving distortion, bias and signal-to-noise. What is optimal for one design approach is not always deemed best by another group, and apparently the parameters involved have been carefully adjusted to achieve what B & O feels is best suited for this deck. Also related to tape sound is tape motion which, in this deck, is very steady and accurate. Especially noteworthy is that firm low-end portion of the playback response which does indicate excellent tape-to-head contact and a minimizing of another potential area of "bump distortion."

Numbers notwithstanding, the Beocord 8000 is a very good-sounding tape machine, both with commercially recorded tapes, and when playing back tapes recorded on it from other sources. I was not aware of any lack in the highs. I found the Dolby NR, albeit simplified here, suitably effective. I also liked the separate headphone output, with its ample signal level under the control of its own adjustment.

The real-time tape counter and the associated options for presetting start and stop times could prove of value in many recording or playback applications. There is something nice about being able to see actual

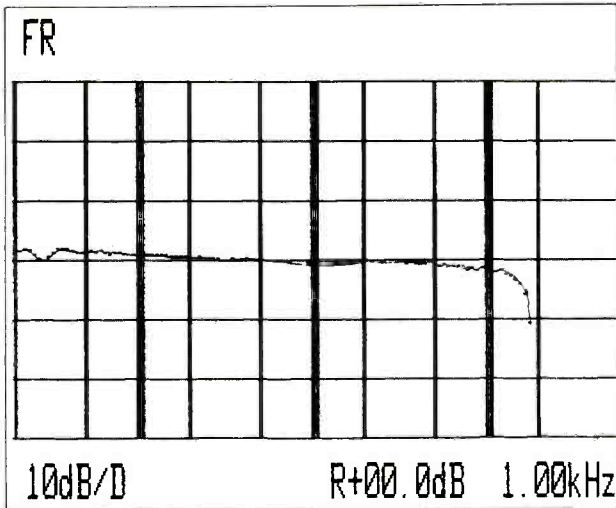


Fig. 5: Beocord 8000: Frequency response, playback only.

elapsed time of a cassette in motion and then, at the touch of a button, also get the time of day. Apropos of this feature, by the way, there is an error in the owner's manual—on page 12 the word “not” was obviously omitted in the sentence: “If your Beocord accidentally (*sic*) becomes disconnected from your line voltage, the recorder will show the time display when reconnected.” It will *not* show the time of day unless you reset the clock.

Whether or not the Beocord 8000 is a “pro” class machine depends on your definition of “pro.” To me, the major single drawback in this regard is its two-head configuration which, of course, means you cannot monitor off the tape while recording. You cannot, for

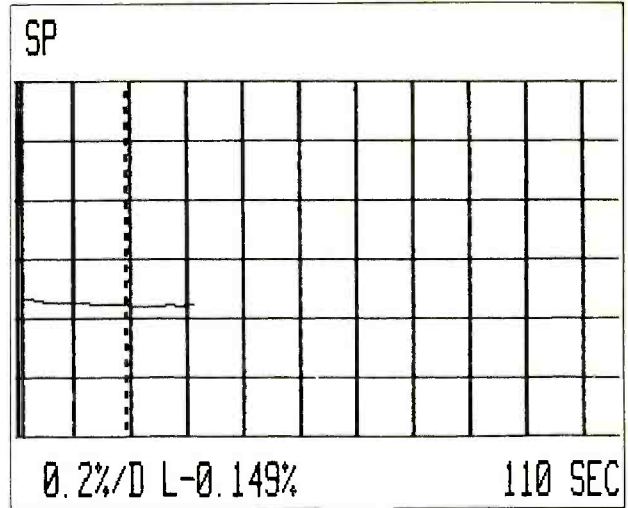


Fig. 6: Beocord 8000: Tape speed accuracy.

that matter, deliberately fool around with bias and EQ variations since these parameters are determined for you by the built-in computer. There are some who would say that the computer will make for more professional-sounding tapes than you can, but admittedly it's a matter of viewpoint.

The deck has a limited fast-button facility between normal play and the fast-wind modes, but flying-start recording or overdubbing is not possible. In fact, if you try it, the display will flash an incorrect-entry signal.

Summing up, the Beocord seems like less of an audio-man's “recording tool” and more of a deluxe “sound-and-music machine” for the well-heeled buyer who doesn't mind exposing himself to some rudimentary computerese.

#### B & O 8000 CASSETTE RECORDER: Vital Statistics

PERFORMANCE CHARACTERISTIC	MANUFACTURER'S SPEC	LAB MEASUREMENT
Frequency response, normal tape	NA	± 3 dB, 20 Hz-16 kHz
high-bias tape	± 2.5 dB, 30 Hz - 16 kHz	± 3 dB, 20 Hz-16.5 kHz
metal tape	± 2.5 dB, 30 Hz to 16 kHz	± 3 dB, 20 Hz-17 kHz
3rd-order HD at 0 dB record level		
normal; high-bias; metal tape	NA; NA; NA	0.3%; 0.75%; 0.34%
Record level for 3% THD (0 dB = 200 nWb/m)		
normal; high-bias; metal tape	NA; NA; NA	+ 8; + 3; + 7 dB
S/N ratio, Dolby off		
normal; high-bias; metal tape	56; 58; 61 dB	51.7; 55.6; 59.9 dB
S/N ratio, Dolby on		
normal; high-bias; metal tape	63; 65; 68 dB	61.2; 64.4; 69.5 dB
Wow-and-flutter (WRMS)	< 0.1%	0.034%
Speed accuracy	< ± 1%	- 0.149%
Mic input sensitivity	0.1 mV	0.1 mV
Line input sensitivity	120 mV	15/278 mV
Line output level	800 mV	774 mV
Headphone output level	9 V, 56 ohms	9 V, 56 ohms
Fast-wind time, C-60	70 seconds	66 seconds
Bias frequency	96 kHz	confirmed
Power consumption	45 watts	confirmed

CIRCLE 17 ON READER SERVICE CARD



# DMI/Kelsey Pro-4/3 Series Mixer

By John Murphy and Jim Ford

One of the latest additions to the Kelsey line of mixers from Dallas Music Industries, Inc. is the Pro-4/3 Series. Although we are reviewing the twelve-channel version of this mixer, we expect that our comments will be applicable to the sixteen- and twenty-four channel models as well.

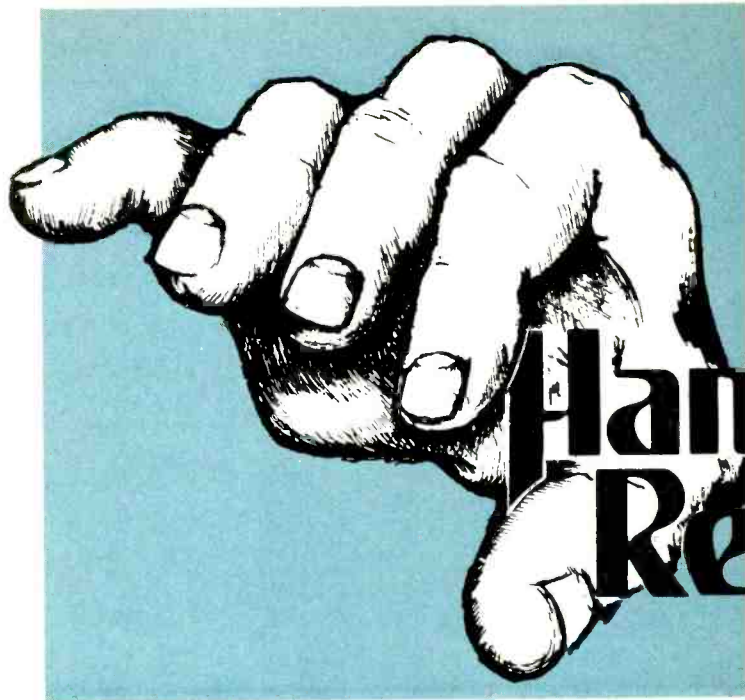
The Pro-4/3 is organized in a conventional manner with all the controls for each input channel arranged in-line above the channel fader. Some of the mixer's features include: input channel muting; soloing and patching facilities; four-band fixed frequency channel EQ; two pre-fader sends; and two post-fader sends. The output section can be switched between two modes of operation. In the "Sub" mode the mixer functions as a stereo output unit with two stereo sub-groups available. Switching to the "Four-track" output mode converts the board to mono operation and makes four sub-groups available to the operator.

As with all the Kelsey mixers, the Pro-4/3 is supplied with a rugged fiberglass roadcase. The twelve-channel version is priced at \$2,800 while the sixteen- and twenty-four channel versions are priced at \$3,400 and \$4,600 respectively.

**General Description:** The Pro-4/3 Series mixers are intended to be used as sound reinforcement mixers in either stereo or mono sound systems. However, the unit has sufficient outputs available for mono, two-track or four-track recording of a "live" performance. There is enough control over both input and output signal levels to allow interfacing with practically any of the usual outboard components.

The mixer's chassis is wedge shaped with a sloping face which provides good access to all controls. In most applications, the mixer can remain seated in the bottom portion of the roadcase while in use as the case doesn't obstruct access to any controls or connections. The unit's power supply is housed in a separate small enclosure which fits beside the mixer in the roadcase. Now let's go over the input channel controls and connections.

All of the channel signal connections are made on the rear panel directly behind the channel control strip. The transformer balanced microphone inputs are by way of 3-pin XLR-type connectors. The line input and channel



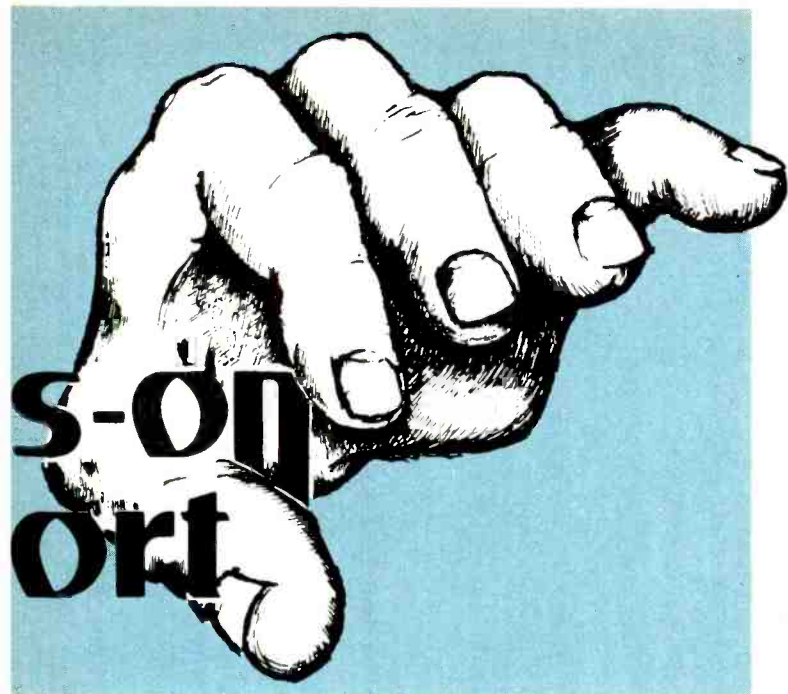
line output ("direct" output) employ 1/4-inch phone jacks as do the "send" and "return" for the channel patch point.

At the top of each input channel strip, there is an input gain control with a pair of LEDs which indicate signal level status. The gain control affects both the microphone and line input signals. The LEDs are labeled "OK" and "Hi" and are colored yellow and red respectively. There are three indicator states: both off, "OK" illuminated, and "Hi" illuminated. When setting the channel gain control, the objective is to illuminate the "OK" LED but not the "Hi" LED. This will insure that the signal level is in the range for the best signal-to-noise ratio. Monitoring the signal level at three points in the signal chain insures that any channel overload condition will be indicated.

Below the gain control is a group of three pushbuttons. The first is labeled "Mute" and when depressed silently removes the channel signal from the output mix. The muted signal remains available for soloing and patching. The other two pushbuttons are for assigning the channel's signal to the output mix. Next in line is the channel pan pot used either for panning across the stereo output (when in the "Sub" mode) or for assigning the signal between sub-groups three and four (when in the "4 track" mode).

The EQ section is next in line and consists of four rotary controls. The high- and low-frequency bands (7 kHz and 60 Hz) provide a shelving type response curve, whereas the two middle bands (250 Hz and 1.5 kHz) have a broad peak/dip characteristic. It is worth noting that the 7 kHz EQ affects frequencies down to 100 Hz and below.

The Pro-4/3 has four auxiliary sends with two of these taken pre fader and EQ, and two post fader and EQ. The send levels are controlled by four rotary controls located



above the channel fader. These aux sends would normally be used for reverb/effects sends, monitor mixes, etc. The channel's signal can be soloed into the board's headphone monitoring system by depressing the solo button (locking type) located above the channel's linear fader.

The rightmost quarter of the mixer's face makes up the master control section. Located at the uppermost portion are four line arrays of LEDs which serve as master level indicators. These meters can be switched to indicate levels for three different groups of signals including all four aux sends, the solo signal, the main output signals and the two "return" signals. Each meter consists of ten LEDs calibrated from  $-24$  dBV to  $+12$  dBV. The meters are peak reading with a very fast rise time and a slow release to aid visual comprehension.

Located below the meter arrays are level and pan controls for each of two return signals. The returns are usually used in conjunction with the sends to add reverb or effects into the output mix. However, the returns could also be used to add a tape playback into the mix. When the return solo is engaged, returns one and two are placed in the left and right earphones respectively.

The headphone monitoring system is designed to drive headphones of 600 ohm or higher impedance. A stereo  $\frac{1}{4}$ -inch phone jack is provided on the top panel along with a headphone level control. Since only soloed signals are heard through the headphone monitor, the board is equipped with a group of three "master solo" switches. These allow the operator to audition signals at the stereo submasters, the main left and right outputs, or the main mono output.

The master level controls for the four aux sends are located above the main output faders along with two solo switches which allow the sends to be auditioned in pairs.

There are five main output signals from the mixer: stereo sub-group one; stereo sub-group two; left main;

right main; and mono main. Depressing the board's output mode switch converts the board to mono operation with four mono sub-groups. The main output signals then become sub-groups one through four and mono main. Channel assignment to the four sub-groups is via the channel's two assign pushbuttons for groups one and two and the pan pot for groups three and four.

All of the master input/output signal connections are made at the rear of the master control section. Five of the output signals are provided on both 3-pin XLR connectors (balanced) and  $\frac{1}{4}$ -inch phone jacks (unbalanced). These are: mono main; left main; right main; pre one; and pre two. All other connections are on  $\frac{1}{4}$ -inch phone jacks. The mono, left and right main outputs also have duplicate 600 ohm outputs as well as stacking inputs.

**Listening/Handling Test:** In order to get a feel for the operation of the mixer we interfaced it with an eight-channel multi-track recorder and played one of our multi-track master tapes back through it. In the "Sub" (stereo) mode, operation of the assign pushbuttons is straightforward. Depressing either "assign 1" or "assign 2" directs the signal to the corresponding stereo submaster in the master control section. If neither channel assign button is depressed, then the channel signal goes directly to the main stereo faders bypassing the two stereo sub-groups. In either case, the stereo balance selected at the channel pan-pot is maintained. This true stereo sub-grouping is quite a nice feature.

As an example of how the stereo sub-groups might be used, consider the case where a group uses multiple microphones on the drum set, has multiple vocal microphones and has several other instrument inputs as well. Here it might be convenient to assign all of the drum mics to sub-group one and all of the vocal mics to sub-group two. The individual drum and vocal mics could be panned as desired and mixed as groups using the individual channel faders. The sub-group faders would then provide level control for the complete drum group and the vocal group. The other instruments would not be assigned to either sub-group and would go directly from the channel fader to the main left and right faders.

With the Pro-4/3 in the "four track" (mono) mode, the operation of the assign controls is changed so that the pan-pot is used in assigning to groups three and four. If

either of the assign buttons is depressed, then assignment can only be made to either or both groups one and two. Assignment to groups three and four can only be made when neither assign button is depressed. Panning left assigns the channel signal to group three; panning right assigns the signal to group four. We found this capability of the mixer to operate in either a stereo or mono output mode to be a very attractive feature.

Before we finish discussing the operational aspects of the mixer, we'd like to make a comment about the signal level indicators. The two-LED channel signal level indicators were found to be a very nice improvement over the usual "peak" indicators which indicate only an overload or near overload condition. The additional "OK" indicator makes it much easier to properly set the channel input gain control and monitor channel signal levels. As for the four LED array output level indicators, they were found to provide a very useful indication of signal peak levels. We especially liked the fact that they were calibrated with a "dBV" scale.

We performed our usual listening test on the unit by interfacing it with our reference listening system and listening through it. In a brief A/B test where we could alternately listen through the mixer and then bypass it, we heard no significant degradation of audio quality when listening through the unit.

**Lab Test:** With the Kelsey board on the test bench, we performed our standard series of lab tests; the detailed results are provided in the "Lab Test Summary" below. Both the mic and line input sensitivities were found to be more than adequate for the intended applications. Overload thresholds for both inputs were quite high. Output signal levels were as indicated on the LED arrays with the maximum output level before clipping at +21 dBV. Although the mixer's noise levels are not as low as most of the other mixers we've tested, the noise will probably not be bothersome in most applications. The unit's total harmonic distortion (THD) was low across the entire audio spectrum and never exceeded .03%. At 3 volts per microsecond, the unit was not "fast" enough to meet the Jung criteria for freedom from slewing induced distortion (normalized slew rate limit of at least 0.5 volts per microsecond per volt).<sup>1</sup>

The owner's manual supplied with the mixer did a good job of describing the unit's controls and contained a very good applications section. The manual also included a good amount of service information (including schematic and parts placement diagrams).

**Conclusion:** The Kelsey Pro-4/3 Series mixer from Dallas Music Industries, Inc. was found to be a good sound reinforcement mixer. The only significant drawback we found was its somewhat higher than average output noise levels. However, we were especially pleased with signal level indicators.

### References

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

## LAB TEST SUMMARY

(Note: 0 dBV = .775 Vrms)

### Input Levels

#### Mic Input:

Minimum input level for "0 dBV" level indication with input channel trim and fader at maximum (submaster and stereo masters at nominal settings): -80 dBV

Maximum mic input level before clipping: +7.5 dBV

#### Line Input:

Minimum input level for "0 dBV" level indication with input channel trim and fader at maximum: -46.2 dBV

Maximum line input level before clipping: greater than +34 dBV

### Output Levels

(at main stereo output)

For "0 dBV" level indication: 0 dBV

Maximum output level before clipping: +21.2 dBV

### Noise Performance

(Note: 20 kHz Bandwidth, unweighted, 150 ohm source impedance)

Equivalent Input Noise: -109.1 dBV

With all faders at minimum settings noise at the output is: -82.6 dBV

Raising the main faders to a nominal setting, output noise is: -70.0 dBV

As above, but raising the submaster faders to a nominal setting, output noise is: -67.6 dBV

As above, but setting one input channel for a -40 mic input with the channel fader at nominal, output noise is: -61.5 dBV

With four channels set as above, output noise is: -53.4 dBV

With twelve channels set as above, output noise is: -50.5 dBV

### Distortion Performance

(THD plus noise at +10 dBV output level)

Frequency	THD & Noise
100 Hz	.028%
500 Hz	.028%
2 kHz	.014%
10 kHz	.018%
20 kHz	.018%

Frequency Response: ±1 dB 20-20 kHz

Bandwidth (-3 dB points): 6 Hz to 33.0 kHz

Slew Rate Limit: 3.0 volts per microsecond

Normalized Slew Rate Limit: 0.24 volts per microsecond per volt.





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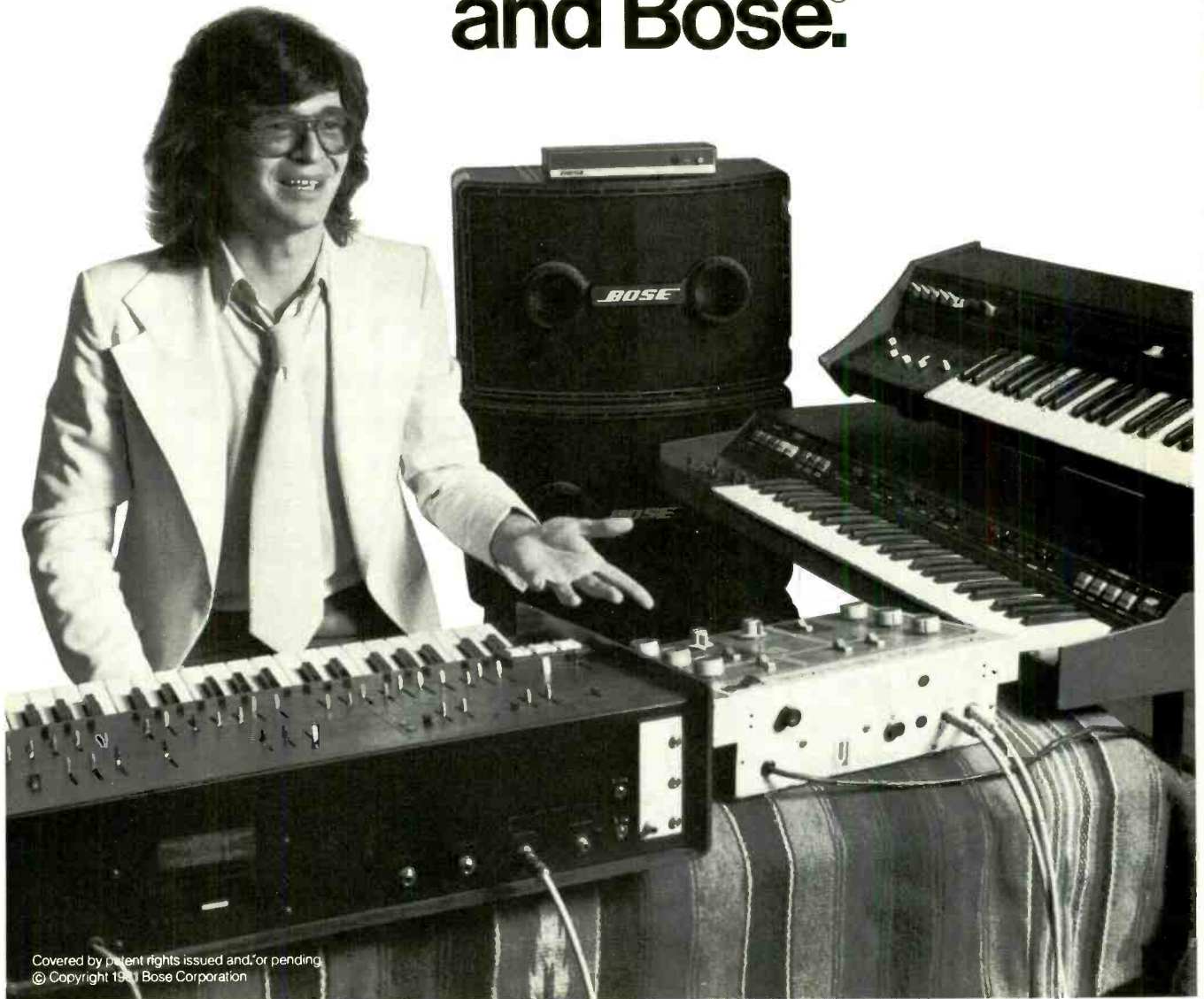
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# GROOVE VIEWS

Reviewed By:  
MIKE DEREVLANY  
ELLEN ZOE GOLDEN  
NAT HENTOFF  
JOE KLEE  
STEVE ROW  
NORMAN WEINSTEIN

## POPULAR

**THE BOOMTOWN RATS:** *Mondo Bongo*. [Tony Visconti and The Boomtown Rats, producers; Tim Winter and Chris Porter, engineers; Gordon Fordyce, cutting engineer; recorded at Ibiza Sound Studios, London, England.] Columbia JC 37062.

Performance: **More bust than boom**  
Recording: **Darling, but cluttered**

We learned from the Boomtown Rats' last album, *The Fine Art of Surfacing*, that the group was no longer minimalist. That fact accepted, it's easier to swallow the extravagant orchestration and elaborate production techniques that show up incessantly on *Mondo Bongo*. The main problem with the new record though, is that while the

Boomtown Rats bring out some interesting new concepts, there is just too much glut.

The album's first cut, "Mood Mambo," gives no indication of the disappointments to follow. The song is quite original, with an African tight-skinned bongo bouncing all over it. Lead singer Bob Geldof recites a '50s-type beatnik rap, and the unusual muffled production provides an effective dryness.

The rest of side one is quite useless, as *art for art's sake* seems to be the rule of thumb. Although the building wall of sound on "This Is My Room" makes good use of hissing electronics, restful keyboards, and a conglomeration of echoes and muffled grindings, this song, plus the catchy, but busy "Go Man Go," and the bland "Straight Up," find Geldof sounding very much like Bryan Ferry or early David Bowie. And what use do we have for a ska-tinged "Under Their Thumb...Is Under My Thumb," which of course, is Mick Jagger and Keith Richards' "Under My Thumb" with some new lyrics and a different beat?

Side two fares better, though, if only on the strength of a few well-constructed arrangements. The dissonant drumbeat of this side's opener, "Please Don't Go," is played at a different tempo than the horn and Geldof's speaking/singing.

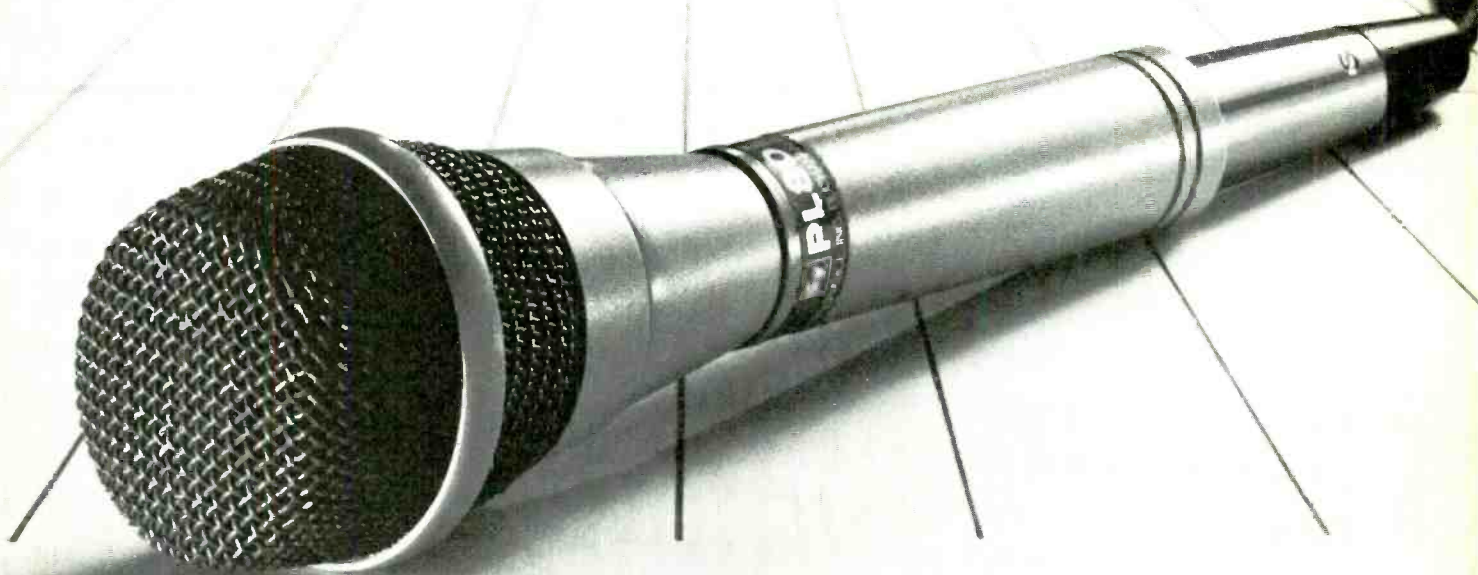
This whole jungle angle is one the Boomtown Rats work with very well. A reggae number, "Banana Republic," bases its creepy, mysterious jungle-night illusion on the tight-skin drum rolls that come in on the intro and peek



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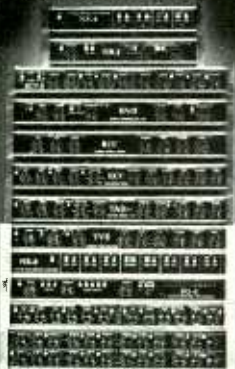


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in and out of the entire tune. The interesting vocal effect of the chorus comes from the overlapping of one jerking bass voice and the high-pitched backups. Each voice is distinct, yet the pacing is matched quite closely.

Out of the forest and on to physical pain, "Hurt Hurts" utilizes an echo effect on the vocal while milking the drum sound to the hilt. As Geldof sings the line "It hurts," the words twang off in the background; when he sings "Hurt hurts," sharp piano chords accent the downbeat of the drum. The result is memorable.

It's clear that the Boomtown Rats can put together some very complex orchestration, and when it's good, it's very, very good. But much of the material on *Mondo Bongo* is cluttered and imitative ("The Elephant's Graveyard" is a great Elvis Costello impersonation) and this inconsistency is the main reason dust tends to collect on records such as this one. **E.Z.G.**

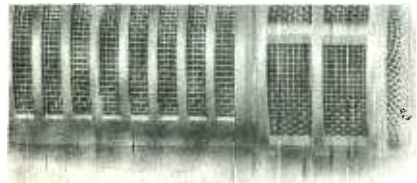
**JACKSON BROWNE: *Hold Out.*** [Jackson Browne, Greg Ladanyi, producers; Greg Ladanyi, engineer; recorded at The Sound Factory and Record One, Los Angeles, Ca.] Asylum 5E-511.

Performance: **Bright major key effort**  
Recording: **Crisp and bright**

Love does strange things to people, and it sure has worked a number on Jackson Browne, that quintessential Los Angeles folk-rocker who always could be counted on for a deeply poignant lyric or two, even if he couldn't fashion too many different melodies for his words. This latest studio release, his first in more than two years, has a hard sheen to it that is almost uncharacteristic, compared with some of the mellowness that has gone before. The mood has shifted from minor key to major key, and there is a lot less looking down, hands in pocket, toeing designs in the dirt here.

The release, clearly from the heart, seems aimed for the heart of the pop charts, too, and you can find a half-dozen cuts on the radio playlist these days. The record has drawn its share of criticism, too, for being perhaps the shallowest of all Browne works.

But as a recording, this album is a gem. Browne's positive approach to his material is evident throughout; his voice is in fine form and leads the other



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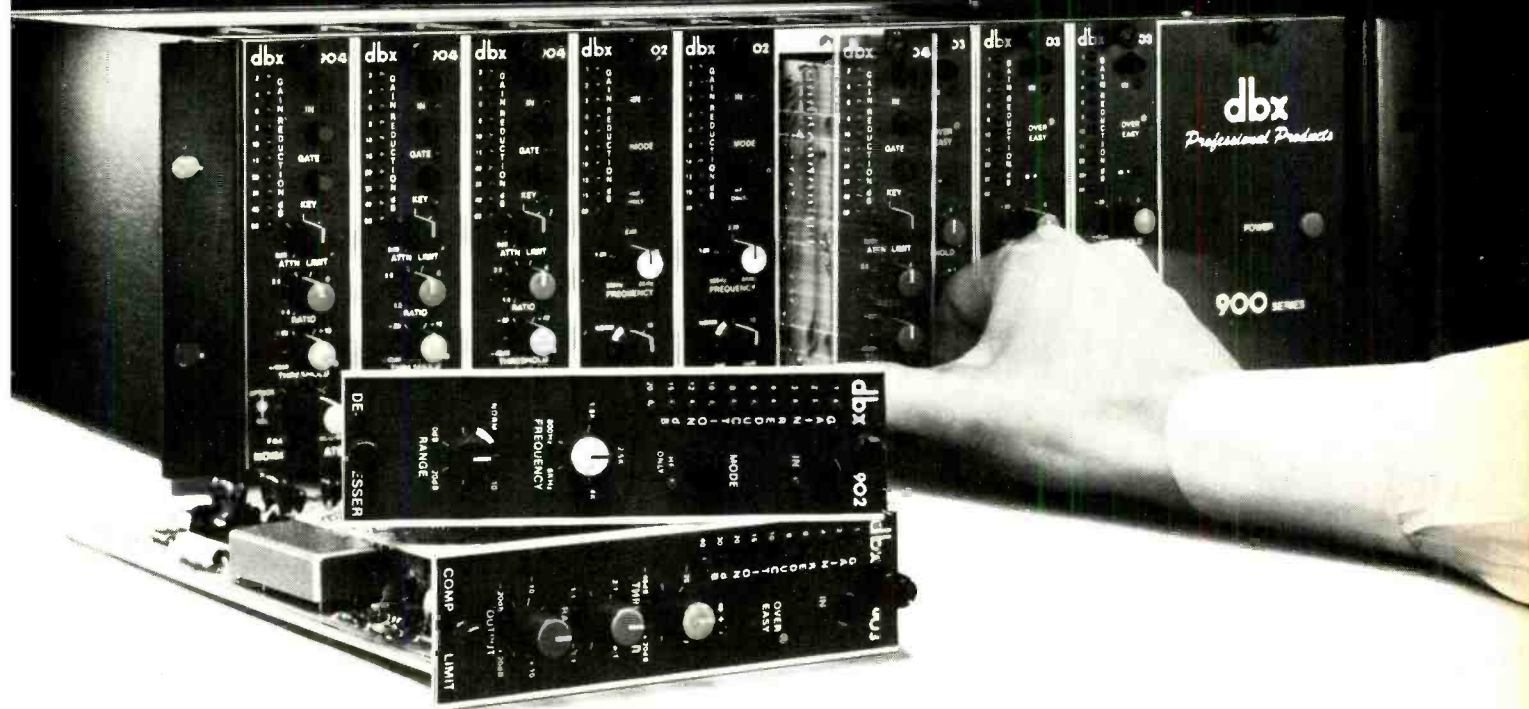
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musicians without faltering; the instrumental tracks are rich and highly interesting.

The "typical" Browne song (moody, sensitive, intense) on this album is "Of Missing Persons," his tribute to the late Lowell George, written to George's daughter. David Lindley's lap steel zings out of one channel, while the percussion subtly underpins the foundations of the song in the other channel. Browne and his piano come from the center, and he is joined by Rosemary Butler on the choruses. Not a note is lost anywhere, and the instrumental bridge near the end, built on Lindley's guitar and Browne's piano, is simply fine musical sound.

The same sort of care is evident on the up-tempo cuts—"Boulevard" and "Disco Apocalypse," for example, or the eight-minute finale, "Hold On Hold Out," certainly the album's most curious track. It is a song that Bruce Springsteen might have written from the bottom of a beer mug, and yet it has some incredibly banal lyrics. Its positive attitude could cause the song to be mistaken for a born-again anthem, and it closes with embarrassingly simply spoken lyrics (almost as if to say, "Gosh-gulp-I love you"). The string synthesizer adds a slightly corny sound to the material, and yet the tracks are very well recorded.

Browne's solos generally are strong and out-front, and the multiple vocals (Rosemary Butler again) are well balanced. Again, the piano (this time by Craig Doerge) and lap steel guitar are featured prominently and help carry the song. And Russ Kunkel shows here, as he does throughout the album, why he is one of the most sought-after session drummers.

The ensemble sound is fresh and alive here, with Kunkel on drums, Bob Glaub on bass, Craig Doerge on synthesizer and electric keyboards, Lindley on guitars, Bill Payne on organ and synthesizer and Rick Marotta adding some drumming—all blend well into a tightly knit sound. Browne's duets with Ms. Butler are at times stunning, although too often they tend to sound bunched together, rather than being separated into channels.

Despite its flaws, *Hold Out* is quite an interesting document in the career of one of the giants in contemporary music. The grayness or muted colors of his earlier works seem to have given way to musical rainbows here, and even if the colors are expressed in occa-

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sionally primitive hues, they deserve our attention. Something new may be on Jackson Browne's musical horizon.

S.R.

**ATLANTA RHYTHM SECTION:** *The Boys From Doraville.* [Buddy Buie, producer; Rodney Mills, associate producer; Rodney Mills, engineer; Billy Wendt, Gregory M. Quesnel, Rick Maxwell, assistant engineers; recorded at Studio One, Doraville, Georgia.] Polydor PD-1-6285.

Performance: **Same as before**  
Recording: **Flattering and well-crafted.**

You won't find too much departure from their usual on this album. ARS has a very definite style, a sound that is unmistakably theirs, and they stick to it consistently. Not that this is necessarily a terrible thing, since ARS is a fine group, in fact, probably the best covering their particular musical territory.

Getting the album off to a good start is "Cocaine Charlie," a poignant little tune with ARS' typically dynamite guitar work, clean vocals, and generally



**ATLANTA RHYTHM SECTION:** Probably the best covering their musical territory.

smooth sound. This is clearly the most striking tune on the album, and it's obvious that it received a lot of special attention in its creation. "Next Year's Rock and Roll" isn't quite as energetic as "Cocaine Charlie," but it is nonetheless an amusing musical com-

ment on the new wave phenomenon. Two quasi-love songs, "I Ain't Much" and "Putting My Faith in Love," fill up the rest of the side.

Side two is the laid-back side, with a haunting acoustically-oriented song, "Pedestal," and the western-style "Rough Edges" and its unhurried steel guitar. Along with these is another amusing comment about music, "Strictly R&R."

ARS' studio work has always been enhanced by a good producer, Buddy Buie. Their thoroughly dynamic "live" performances indicate that Buie tends to be a mellowing influence on the sound ARS put down on wax. Whether or not this is particularly good for the kind of music ARS makes is debatable. At least their albums are always clean and very listenable and this one is no exception.

M.D.

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**CAROLE KING:** *Pearls.* [Mark Hallman and Carole King, producers; Chet Himes, engineer; James Tuttle, assistant engineer; recorded and mixed at Pecan Street Studios, Austin, TX, January 1980.] Capitol S00-12073.

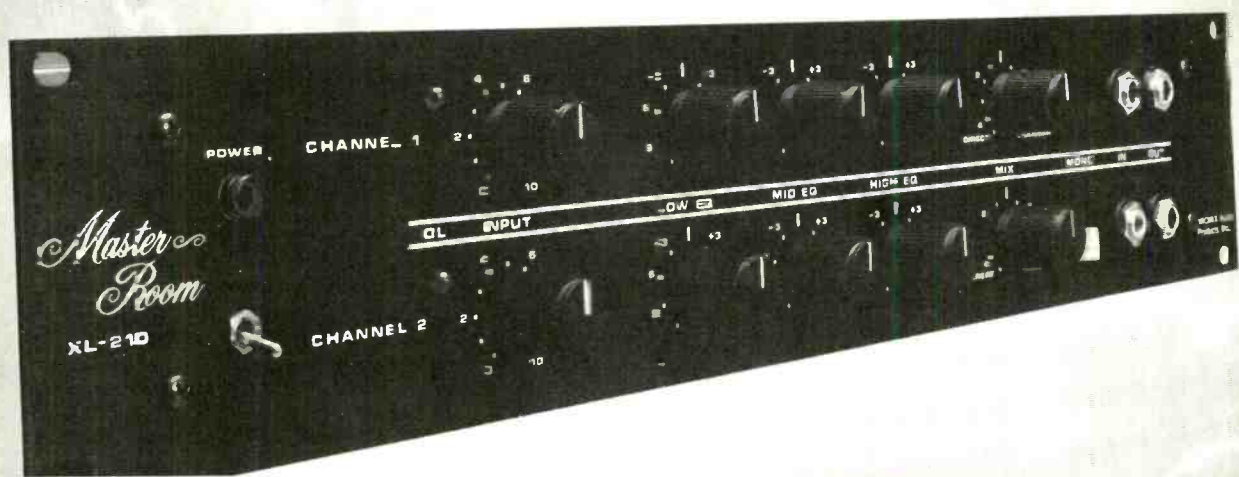
Performance: **As fresh as ever**  
Recording: **Very good**

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came staples for the likes of Little Eva, the Chiffons, the Righteous Brothers, Maxine Brown, the Drifters and DeeDee Sharp. One cut here, "Locomotion," came around five different times, as did another King-Goffin classic, "Hey Girl."

King and her guitarist, Mark Hallman, have produced a finely crafted testament to the durability of those King-Goffin songs. These aren't reproductions of earlier arrangements; for the most part, they are fresh, sometimes even surprising.



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A case in point is the arrangement here of "Wasn't Born to Follow." On this album, the song begins with a banjo line and easily moves into a slightly country-and-western arrangement. Compare this with the arrangement of the same song on King's first album, while she and Danny Kortchmar were members of a trio known as The City. That begins with the characteristic King piano line and is sung in a more stately, anthem-like version. The song later was recorded by the Byrds in an arrangement closer to the one we hear on the 1980 release.

Another interesting contrast is "Snow Queen" as sung on *The City* album more than a decade ago and on *Pearls*. While the instrumental arrangements are very similar, one can detect a grittier vocal approach to the song in the current release, while the chorus in the earlier version sounds as if it belongs to the Phil Spector "wall of sound" family.

But the best comparison comes on "Hi De Ho," which became a hit for Blood, Sweat and Tears. Twelve years ago, on *The City* album, the song began with a gospel piano and chorus, and a

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primitive-sounding violin was used for instrumental embellishment. This time around, the song begins right off with singing, the piano is understated, the chorus is prominent, and a wonderfully rollicking horn section is added. And the horns gradually move from one channel to the other, in parade-like fashion, during their brief break.

The personnel backing up King do a fine job throughout the album. Hallman plays guitar, Steve Meader is the drummer, Charles Larkey, who later married King, plays bass (just as he did 12 years ago on *The City* album) and Reese Wynans provides keyboard accompaniment. Other guitar work comes from Eric Johnson, while Richard Hardy is featured on some sax and flute solos, Miguel Rivera plays percussion, Christopher Cross has a guest shot on rhythm guitar on three cuts, and Mark Maniscalco plays banjo. The album also makes use of some string players from the Austin Symphony and features background vocals by members of the Walker-Ford Singers of San Antonio.

As a recording, the sound is as bright as the arrangements. Only a few times does the sound tend toward shrillness or too much treble. The balance between lead vocals and instrumental accompaniment is struck nicely, and the chorus tracks are crisply done, particularly the brief echoed and staggered overdubbing on "Goin' Back," and the a cappella opening to "Chains."

This is King's 12th album, but it is far removed from the usual "greatest hits" packages that one usually finds. "Up on the Roof" and "Go Away Little Girl" aren't included, for example. These are old musical friends that have been taken out of storage, dusted off and injected with new life for a new generation of listeners. S.R.

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**DEXTER GORDON: Gotham City.** [Michael Cuscuna and Jim Fishel, producers; Don Puluse, engineer; Ken Robinson and Bill Messina, assistant engineers; recorded at CBS Recording Studios, New York, N.Y.] Columbia JC 36853.

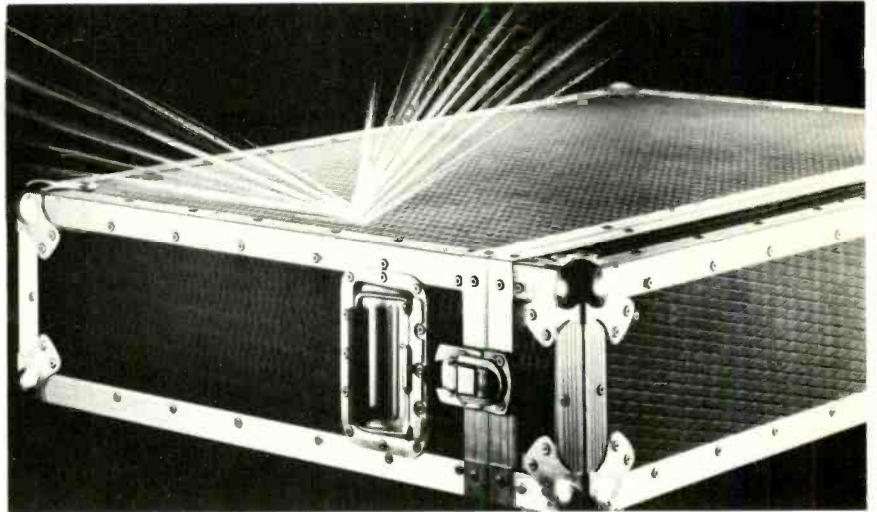
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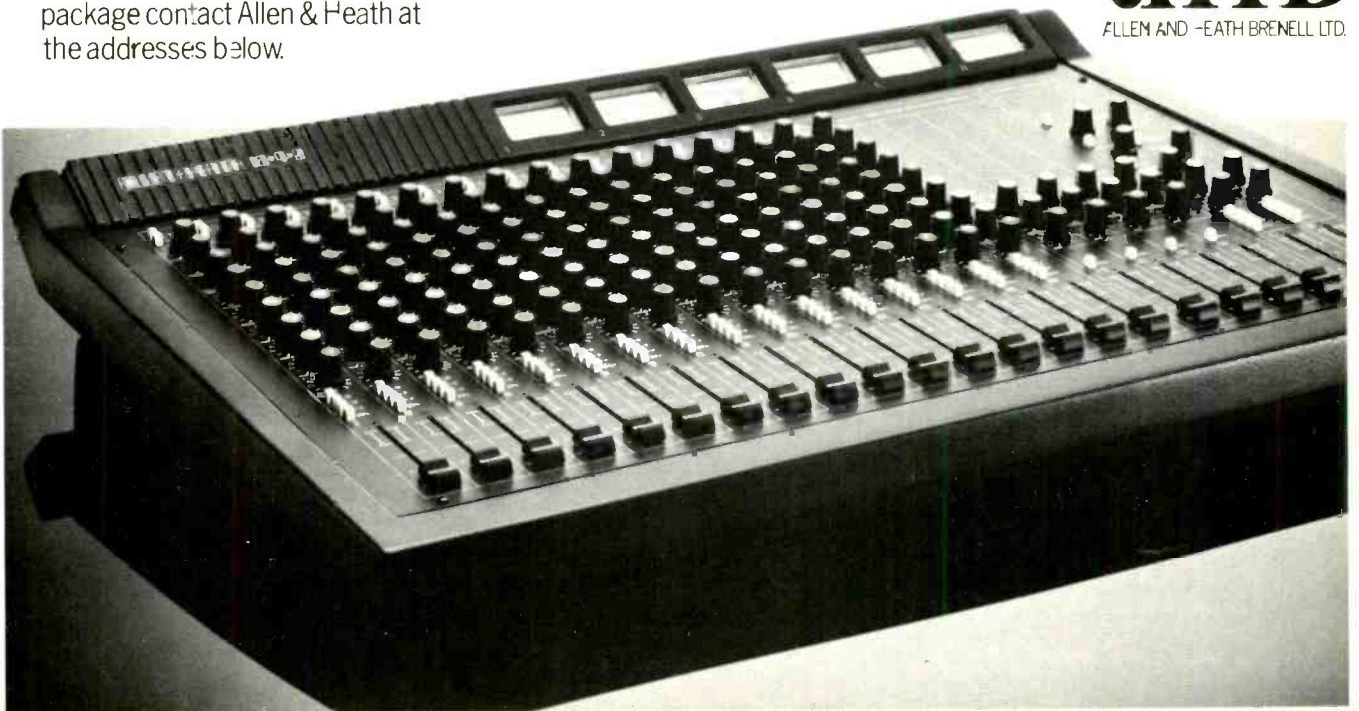
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## CLASSIC COUNT BASIE AND (AT LAST) A NEW FULL-SCALE J.J.

By Nat Hentoff

Columbia Records merits hosannas for making available again, in its Jazz Odyssey series, long unavailable sets that are essential to any collection. For instance, *Blues by Basie*, a continually compelling series of performances by the big band; Count and the rhythm section; and a Basie octet. In addition, there are some of Jimmy Rushing's most haunting vocals ("How Long Blues," "Gonna Move to the Outskirts of Town," and that real collector's item, "Harvard Blues," with lyrics by the most urbane of all writers on jazz, George Frazier).

Throughout—especially, of course, on the quartet sides—the Count's piano is a ceaseless marvel of lucidity and economy, recalling Dizzy Gillespie's remark, "It's taken me all my life to learn what not to play." And a number of these performances, both big band and small combo, should instruct younger listeners in the myriad, subtle marvels of Jo Jones' drumming. And that leads to the vivid reminder that no big band has ever swung as floatingly as the Basie ensemble of the late 1930s. This is an album that can never become dated, for the music still soars and penetrates.

The re-engaging makes for clean grooves and does not distort the original sounds which were, by the way, well recorded.

J.J. Johnson was the first trombonist to be fully conversant with bop (or modern jazz), and he has influenced just about every trombonist since. In recent years, he has only been skimpily represented on recordings; but now, in *Concepts in Blue* (Pablo), J.J. has produced, written,

and performed in the most exhilarating album of his career.

To begin with, J.J.'s tone is more open and full than I can ever remember hearing it, and that goes with a new emotional directness. Indeed, he plays with an almost shouting exuberance. Then there is, as J.J. puts it in the notes, the "wonderful ambience" of the date. Each member of this 9-piece band (which sounds considerably larger) was clearly stimulated by his colleagues and by J.J.'s charts. The ensemble playing is both exultant and crisply precise, let alone deeply swinging.

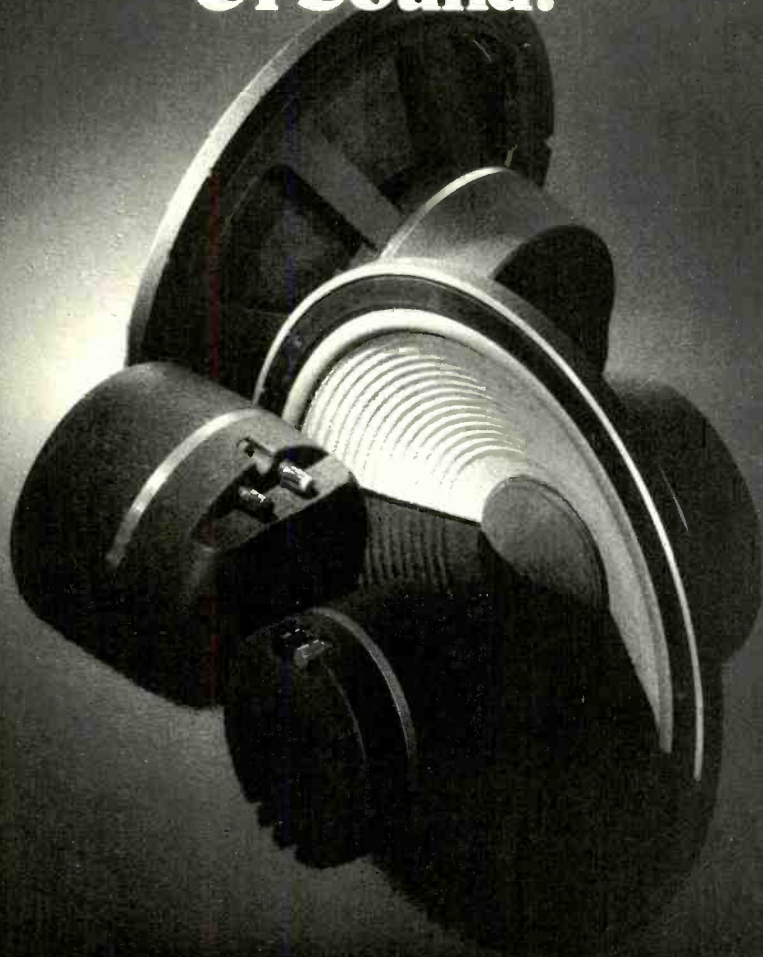
In addition to J.J., moreover, the soloists stretch themselves as seldom before on record—most notably Clark Terry on trumpet and fluegelhorn and Ernie Watts on tenor and alto saxophones. In fact, this may well be Terry's most inventive work on record in many years. *Concepts in Blue* was one of those rare dates when everything fitted just right—and more.

The engineering captures the excitement of the extraordinary interplay in all its exuberant fullness. In sum, the sound is more "live" than on most on-location dates.

**COUNT BASIE: *Blues By Basie*.** [George Avakian, original producer; Mort Goode, producer for Jazz Odyssey series; Arthur Kendy and Frank Abbey, re-engineers.] Columbia Jazz Odyssey PC 36824.

**J.J. JOHNSON: *Concepts in Blue*.** [J.J. Johnson, producer; Dennis Sands, engineer.] Pablo 2312-123.

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*Gotham City* is a recording that draws upon the talent of two of the greatest jazzmen of our time: Dexter Gordon and Art Blakey. These two are survivors in the best sense of the term. Survivors of the forties bop scene excesses, of the dope scene, of endless club and recording company scams. They have maintained their musical roots in bop while continuing to take in the work of players half their age. In Gordon's case, even a twenty year exile in Europe didn't remove him from the mainstream of our jazz history. He sounds fresher than ever on this date which reunites him with Blakey, his companion in the

Billy Eckstine Band of 1944.

Spotlighting the sheer drive of Gordon and Blakey shouldn't cause listeners to slight the other stellar performers on this session. Cedar Walton provides some tasteful and energetic solo work on piano while Percy Heath plays bass with his usual precision and swing. Woody Shaw sits in on one cut and does some shining and aggressive trumpet work and George Benson adds some color to two songs. This is nothing less than a dream band doing what they do best.

And there's no mistaking that this is—1981 be damned—a *hard* bop band.

Music like this could have been wafting out the doors of New York's *Birdland* three decades ago. Side one opens with "Hi-Fly," a swinging romp with brilliant solo work by Gordon. His speed and melodic inventiveness are nothing short of breathtaking. Blakey propels the tune along with his forceful cymbal play. On this cut Walton, Heath, and Benson sound slightly indecisive, conservative, overwhelmed by the sheer energy created by the "old men" of this group. Side one closes with "A Nightingale Sang in Berkeley Square," a ballad once recorded by Gordon's old pal, Bud Powell. It is fascinating to compare Powell's treatment of the tune (available on a two record reissue entitled *The Genius of Bud Powell* on Verve) with Gordon's. Powell runs through the melody with his usual sizzling attack in a little under four minutes. Gordon's version lyrically penetrates each phrase with a painstaking musical intelligence. He gets *inside* the melody and mines it, wrings phrases of subtle and shimmering beauty from an unremarkable song and makes the song last twice as long as Powell. A *tour de force* of romantic ballad making.

Side two opens with a rousing counterpoint to the muted tones that close the first side. "The Blues Walk (Loose Walk)" begins with a thunderous blast of joy from the trumpet of Shaw and Gordon's tenor sax. Walton and Heath join in the fray at a manic clip while Blakey sounds like Lincoln Center couldn't contain his furious drumming. Everything clicks: this is the most polished cut of the album. "Gotham City," the title cut, continues along the same groove. Shaw sits this one out (how I wish Shaw had contributed to every tune!) and Benson contributes his only inspired guitar solo of the session. Columbia could have released a ten-record set of these guys jamming and I'd still be screaming for more. Consummate playing. I dare you to listen to Gordon's wicked little quote from "Stranger in Paradise" in the midst of a classic bop solo and not smile in amazement.

Michael Cuscuna's production is extremely clear and well balanced. I appreciate his handling of Blakey's drums. It's an easy matter to let Blakey's sound totally overwhelm the final mix and Cuscuna had the good sense to give Blakey's instrument just enough presence. Gordon's sound is

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handled with the care I've come to expect from previous Gordon/Cuscuna recordings. Richard Avedon's cover photography is strikingly apt: Dexter Gordon, his horn in hand, peering into the soul of his audience. N.W.

### ARNETT COBB: *Arnett Cobb Is Back.*

[Gus P. Statiras, producer; engineer not listed; recorded at Downtown Sound Studio, New York, N.Y., June 27, 1978.] Progressive 7037.

Performance: **Typical Texas tenor**

Recording: **Not spectacular, but not bad either**

One thing that bothers me about this recording is that a lot of it sounds kind of familiar and sure enough when I looked up the most recent recording of Arnett Cobb that I'd reviewed prior to this one (*The Wild Man From Texas*, October 1979), I found that "Flyin' Home" was on it and so was "I Don't Stand A Ghost Of A Chance With You," but that's Arnett Cobb for you. He's dependable. You more or less know what to expect in the way of repertoire and in the style of tenor that jazz critics refer to as Texas style. You used to hear it in players like Herschel Evans and Illinois Jacquet. You still hear it in players like Buddy Tate on a particularly good night and from Arnett Cobb.

Arnett hasn't lacked for exposure since his re-emergence at one of George Wein's Newport Jazz Festivals. He's been heard from on record on several labels besides Progressive and he has been featured at clubs in town and at various concerts. If he sounds better than usual here charge it up to the outstanding rhythm section: pianist Derek Smith, bassist George Mraz and drummer Billy Hart. Also a lot of credit goes to Gus Statiras who runs pretty loose sessions and generally gives the players a chance to be themselves rather than gimmicking up the sessions with a commercial hook. And tunes like Don Redman's "Cherry" are heard infrequently enough to make up for the commonplace quality of yet another "Flyin' Home" and another "Sweet Georgia Brown." I must admit that "Georgia Brown" is such a favorite tune of mine I don't even mind that it's been done to death by every tenor saxophone player from Bud Freeman to Rahsaan Roland Kirk.

In his liner notes Ira Gittler talks about cutting high school to hear Arnett Cobb at the Strand Theatre. My memory goes back to the time that Arnett and Lionel Hampton came over to the Civic Opera House in Chicago to sit in at *Jazz At The Philharmonic* concert, only to be hauled before the local union board the next day and fined for jamming!!!

Somehow I can't quite get with the title, *Arnett Cobb Is Back*. If Arnett was away at all, he's certainly been back since 1977 when he laid it out at the Newport In New York festivities.

And why isn't the engineer listed? It's a good serviceable recording job—nobody should be ashamed to own up to it. Nor should Gus Statiras be unwilling to give credit where credit's due. He's always been careful to list engineering credit before. So who did it? Own up you guys! Hank? Fred? Come on. Fess up. J.K.

## CLASSICAL

**CLEMENTI: *Three Sonatas.*** Vladimir Horowitz, pianist. [No producer or engineer listed; recorded in October 1954.] RCA ARM 1-3689.

**BEETHOVEN: *Concerto No. 5 in E Flat for Piano and Orchestra, "The Emperor."*** Vladimir Horowitz, pianist. The RCA Symphony Orchestra, Fritz Reiner, cond. [No producer or engineer listed; recorded April 26, 1952, New York, N.Y.] RCA ARM 1-3690.

Performances: **Horowitz master plus Reiner precision equals genius**  
Recordings: **Early LP quality**

Enter the latest volumes in what RCA calls the Horowitz Collection. They have been careful not to promise any kind of complete reissue program but they've already put out such milestones as Mussorgsky's *Pictures At An Exhibition*, the Prokofiev and Barber Sonatas and three volumes of Chopin as well as the famous Brahms "Concerto No. 2 in B Flat" with Toscanini and the NBC Symphony, so there's some hope.

When one considers the Horowitz career as a recording artist it is stag-

gering to realize that he made his first recordings for Victor in March of 1928 (see RCA LM-2993, *The Young Horowitz*) and he's still recording for them more than half a century later.

His 1954 recordings of the Clementi Sonatas are important for even more than the reason that it is fine music made by a fine musician. It is shocking to realize how little of Muzio Clementi there is on LP today. Among the major artists recording for major companies only Phillippe Entremont has recorded Clementi's piano music to any extent. This is even more regrettable when one counts the numerous recordings of Beethoven's "Emperor" (including two by Rubinstein; a third by Rubinstein is out of the catalog at present because it is a mono recording). This is not to suggest that Clementi's piano sonatas are on a par with Beethoven's massive work for piano and orchestra but each, in its own way, place and time is equally deserving of space in your (and my) record collection and relative time (if not equal time) on the turntable.

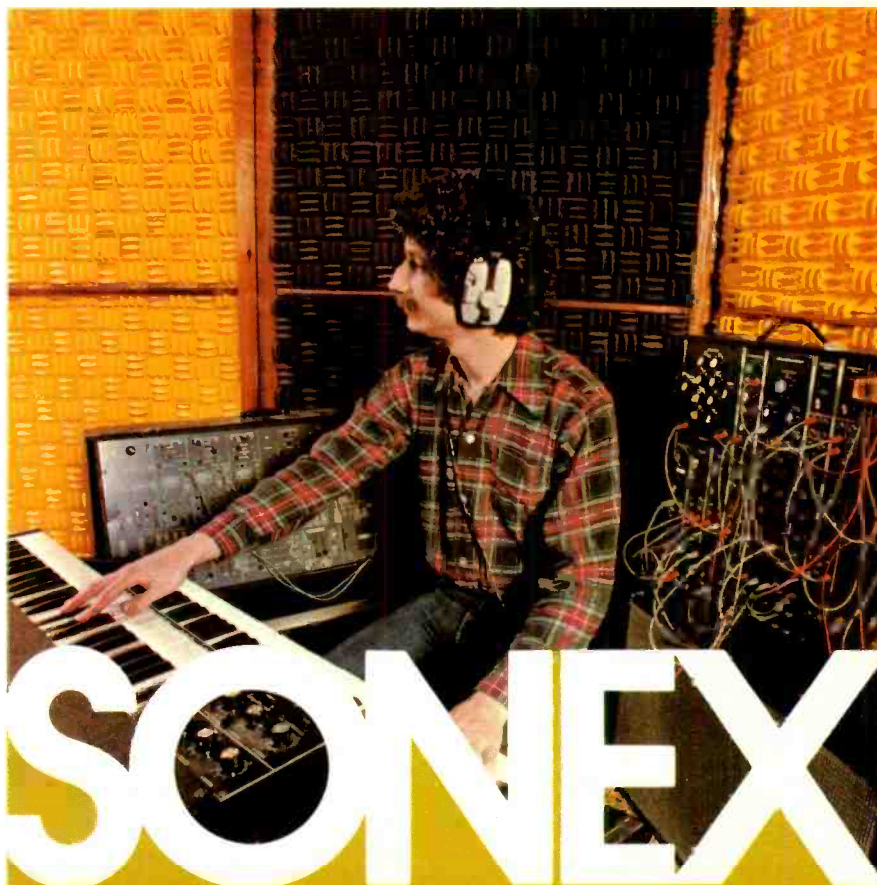
Yet I am sure that, except for those Horowitz fanatics who *must* have *everything* the man ever played, the sales of the Beethoven will far outnumber those of the Clementi. The more the pity because there are other sources from which we can sample Beethoven's E Flat Concerto going all the way from the low-fi 1942 recording by Artur Schnabel accompanied by Frederick Stock and the Chicago Symphony Orchestra to the ultra-digitalis of the latest offering by Lupu and Mehta and the Israelis. To be sure, Horowitz's recording of the "Emperor" is a valid one, a desirable one and, if your view of the music tends toward the dramatic rather than the romantic, probably the best of all possible choices. What Vladimir Horowitz does well he probably does better than anyone else in the world. Those who prefer a more romantic Beethoven can always hang onto their copies of the Schnabel recordings or opt for one another of the performances by Rubinstein. If you're into the grand orchestral concept of Beethoven's piano concerti this is the one for you. True Toscanini is not there but Dr. Fritz Reiner was, in that day at least, certainly the number two man if you wanted a large scale performance of a work from the classic repertoire. The RCA Orchestra is made up of a lot of freelancers liberally spiced with first

chair men from the NBC Symphony Orchestra and the Metropolitan Opera Orchestras. If this is your Beethoven then buy it, unless you already have a copy that hasn't been scratched to death by the needles of time, because you won't find a better version anywhere. But at least check out the Clementi Sonatas if your local library or classical FM station has a copy. You'll be surprised how much fine music was written by composers other than the three B's. J.K.

**LUCIANO PAVAROTTI:** *Verismo Arias*. [Ray Minshull, producer; James Lock and Michael Mailes, engineers; recorded in Walthamstow Town Hall, London, England, June 1979.] London LDR 10020.

Performance: **A tenor at the crossroads**  
Recording: **Superbly digital**

According to *Grove's Dictionary of Music and Musicians*, verismo is "a



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term used to classify Italian opera of a sensational, supposedly 'realistic' kind including the works of Mascagni, Leoncavallo, Puccini, Giordano, etc." According to London Records, it seems to mean anything that Luciano hasn't already recorded for London Records. Otherwise how could we have arias from Boito's *Mefistofole* and Meyerbeer's *L'africana* on a record labeled *Verismo Arias*. If anything unites these arias, it is less something in common with any certain style of composition than it is a connection with Enrico Caruso. Caruso did not record all of these arias but, with one exception, they were in his repertoire. And such rarities as "Amor ti vieta" from Giordano's *Fedora* and the two tenor arias from Boito's *Mefistofole* were among Caruso's earliest recordings. "O Paradiso" from *L'africana* may well owe its survival in the repertoire to Caruso's famous recording.

There is nothing wrong with the way Pavarotti sings these arias but his is definitely a voice in transition. His early career was built heavily on his top notes. Now that he is in his forties he has no reason to expect his upper register to be the shimmering glory that it was ten, even five, years ago. The voice is deepening, as did Caruso's voice, and so is the dramatic ability, as was also true of Caruso. Back when he was doing the lyric roles he would never have dreamed of tackling something as heroic as "O Paradiso" or even the arias from *Mefistofole*. Today, he has not only recorded the arias from Boito's version of the Faust legend but London Records has just "leaked" news of a forthcoming complete recording of *Mefistofole* with Pavarotti in the tenor role. Doing a role in the recording studio is one thing. Doing it on the stage is something else. The tricks that the engineers can perform to help a voice are too well known to need further comment here. The moment of truth will come for Pavarotti when he attempts the role of Radames in Verdi's *Aida*. I've heard rumors of this happening any time from 1981 to 1985 with the location for the debut rumored to be San Francisco, Berlin or London. That's where they're going to separate the men from the boys. Of course he'll record the role and that will come off marvelously. How marvelously it comes off in the house will determine whether he will join the ranks of the tenor robusto (Caruso, Martinelli, Tucker, etc.) or will be just another

lyric tenor out of his element getting by, as Jussi Bjorling did, with the beauty of the voice but without the power and heft to make the voice really ring.

Digital recordings, unless you know where and when the sales are, generally cost twice the price of analog recordings. For this you do get somewhat increased frequency response and, at least in the case of the example at hand, the quietest surfaces imaginable. London has always made a fetish of their fidelity and this is a superb example of the state of the art.

The orchestra responds well both under the direction of Oliviero De Fabritis (the conductor of London/Pavarotti's forthcoming *Mefistofole*) and Riccardo Chailly (the conductor of London/Pavarotti's latest *William Tell*). Chailly conducts only on the three excerpts from Giordano's *Andrea Chenier*, giving speculation to the possibility of a complete *Chenier* on London with Pavarotti and Chailly. That wouldn't be a bad idea as Giordano's idealistic poet is a role that Pavarotti seems to wear well. If he is not so splendid as Vasco Di Gamma in "O Paradiso" one must remember that no one can quite live up to the image that Caruso left us with on that one. All in all, a fine record, and a joy to find a Pavarotti recording with all new cuts on it—no repackaging from previous LPs.

The liner notes are a bit much however. The idea of Pavarotti on Pavarotti is a bit self-indulgent and ego-trippy when it is handled well. I'm afraid that Gerald Fitzgerald is not the most tasteful of editors of whatever interview sources were used for Pavarotti's quotes on life, voice, Caruso and superstardom. I seem to remember some of the quotes from a filmed feature that was used to fill up part of an intermission during a 1979 telecast concert that Pavarotti gave with Mehta and the New York Philharmonic. I think maybe Johnny Carson would have done a more human, if not better, job of portraying the man, who is obviously likeable, and the artist, who now stands at the crossroads between being written off before he's fifty and the possibility of a continuing career.

The next few years will be trying and telling years for Luciano Pavarotti. Myself, I hope he makes it. He deserves to in return for all the pleasure he's given us thus far. J.K.

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