

# Audio

\$1.25

HEYSER  
TESTS KEF'S 104

THE AUTHORITATIVE MAGAZINE ABOUT HIGH FIDELITY • DECEMBER 1979

47425 

**CHRISTMAS  
BUYING  
GUIDE:  
AUDIOPHILE  
RECORDS**

**THE INS  
AND OUTS  
OF TOROIDAL  
TRANSFORMERS**



NONE DO.



PIONEER Quartz-PLL  
ELECTRONIC FULL-AUTOMATIC PL-12

**UNDER LABORATORY CONDITIONS,  
FEW HIGH PRICED TURNTABLES  
SOUND AS GOOD AS THIS ONE.**



# UNDER REAL CONDITIONS,

For years, people have been selecting turntables based on specs obtained in a lab, without knowing what kind of sound they'll obtain in their homes.

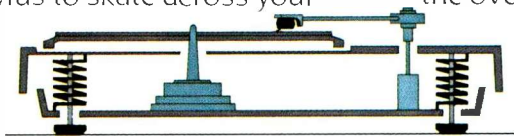
And while a few turntables today look as good as Pioneer's PL-630 on paper, you'd be hard pressed to find one that sounds as good in your living room.

## A SUSPENSION SYSTEM THAT ELIMINATES SHAKE, RATTLE & ROLL.

In your home, simply walking across the floor can cause the stylus to skate across your records.

And acoustic feedback can make even the most lively piece of music sound dull and lifeless.

Pioneer's PL-630, however, has a free floating suspension system that isolates the platter and tone arm from the rest of the turntable. So that while the base may vibrate, the platter and tone arm won't. Which means you don't have to tip-toe across the floor just to prevent vibration. And you can turn your music up loud enough to rattle the walls without fear of rattling the turntable.



When the base of the PL-630 vibrates, the platter and tone arm don't.

## A DIRECT DRIVE MOTOR THAT WON'T DETERIORATE WITH OLD AGE.

All DC direct drive motors start out to be incredibly accurate.

Unfortunately, they don't always stay that way.

After a while, the quality of sound could deteriorate because the motor is left exposed and free to collect dust and foreign objects.

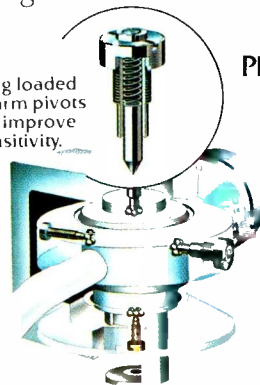
This is not the case with the PL-630. Unlike most of the competition, its motor is totally enclosed. Which means that the incredible wow and flutter figure of 0.025% will still be an incredible 0.025% years from now. And so will the 0.002% speed accuracy.

What's more, the electronic circuitry of this Quartz PLL Hall element system constantly monitors itself. When it senses the slightest deviation in speed, it corrects itself. By just switching the quartz "lock" on, you lock onto the correct speed, so you're assured of accurate platter speed at all times and under all conditions.

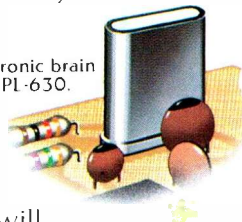
And because of its extremely high torque, the PL-630 reaches full platter speed in a mere third of a revolution.

But more importantly, it stops almost as quickly as it starts. Reverse current is fed into the drive system eliminating both excessive wear on the turntable and the need for a brake.

Spring loaded tone arm pivots help improve sensitivity.



The electronic brain of the PL-630.



## ONLY ONE THING COMES THROUGH THE TONE ARM. MUSIC.

The tone arm of the PL-630 rests on a massive die-cast aluminum base.

And while other tone arms may rest on a similar base few, if any, are mounted to it in a similar manner. Instead of piano wire or cheap plastic casings that vibrate, the PL-630's tone arm is gimbaled on spring mounted pivot bearings. This not only reduces tracking error due to tone arm pivot wear, but increases the overall performance of the turntable.

Which brings us to the magnesium headshell. It has far better acoustical properties than the headshell you'll find on most turntables. This new construction reduces the chances of hearing any howling or distortion.

## FEATURES OUR COMPETITORS PRETEND THEY'VE NEVER HEARD OF.

Our platter mat is concave so that even if your records are slightly warped, they'll sound like they aren't.

Our spindle is only 0.8 microns larger than most, but it can make a big difference in keeping your records perfectly centered.

And our massive platter is less vulnerable to fluctuations in speed than smaller platters that come with most turntables.

Even the way the platter is coupled to the motor is unique. It doesn't have bearings. It's precision machined to a tapered fit so that it's less likely to wobble.

And while you'll find a strobe on most direct drive turntables, you won't find one on the PL-630. Simply because there's no need for one. Instead, there's a pitch display that gives you visual confirmation of accurate speed.

You'll also find super sensitive controls that even shut off the power automatically when the tone arm comes to rest.

If you're beginning to get the idea that Pioneer's PL-630 would sound great in your home, we suggest you go to your nearest Pioneer dealer.

After all, you may not live in a sound room, but it doesn't mean your living room can't sound like one.

 **PIONEER**<sup>®</sup>  
We bring it back alive.



## THE PL-630.

Enter No. 39 on Reader Service Card

# WHAT PRODUCT

1. Prevents "record chatter" on your turntable?
2. Looks unimpressive?
3. Is very thin and gray?
4. Is more anti-static than similar products\*?

\*according to tests by the Swedish National Test Institute.

## ANSWER

### D'STAT<sup>®</sup>-II by Discwasher<sup>®</sup>

(A turntable mat for overlay or replacement on your existing equipment.)

D'STAT-II works; costs only \$7.95; and never wears out.

Give D'STAT-II a spin.



### D'STAT-II

At Discwasher dealers nationwide.

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December 1979

Vol. 63, No. 12

# Audio

"Successor to **RADIO**, Est. 1917"

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**About the Cover:** After making your list, and checking it twice, turn to our Christmas Buying Guide to Audiophile Records on page 52, compiled by Gary Stock. Photo: Photographic Illustrations, Philadelphia. Models: Robyn Hoch and Sam Kressin.



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the new  
OA-5A  
from  
Pickering

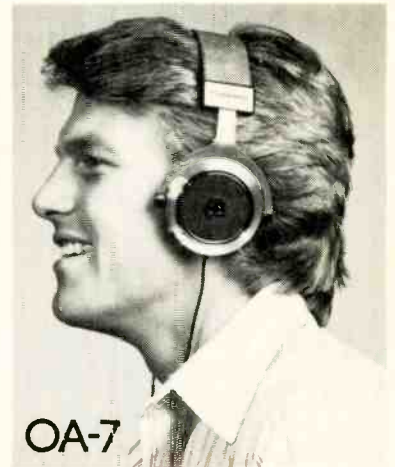


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With the introduction of the OA-5A Pickering adds a new dimension to an already great line of headphones. The OA-5A combines the dynamic performance of low mass, high energy samarium cobalt drivers found in our top-of-the-line stereophones, with the benefits of open-audio design, assuring an acoustically perfect listening environment and the ultimate in listening comfort... without isolating you from your surroundings. And the OA-5A delivers full range frequency response everywhere you go, because Pickering includes a special adapter plug for portables. Suggested retail for the Pickering OA-5A headphone is \$60. For further information write to Pickering and Co., 101 Sunnyside Blvd., Plainview, N.Y. 11803.



OA-3A



OA-7

 **PICKERING**

"for those who can hear the difference"

Above left is the Pickering OA-3A, an advanced headphone that delivers impressive sound quality. With adapter plug. Suggested retail \$45. Our finest example of open-audio design and engineering, the OA-7 has superb listening characteristics and featherlight wearing comfort. Suggested retail \$70.

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Dynaco helped create stereo hi-fi 25 years ago. We built a reputation based on rigorous yet simple designs that produced more sound than the industry had ever seen.

Now we've come back to do it again. With two new speakers that are far and away the best we've ever built. Each of these systems continues the Dynaco legend of simplicity and performance at a

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To sample that experience, take your favorite record album to your Dynaco dealer. Lean back and listen. You'll hear that Dynaco sounds better than ever. And the legend will continue. We have many new and exciting products coming your way.

# **dynaco**

We build them like we used to.

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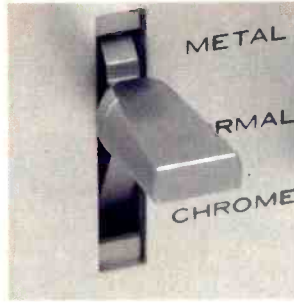
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# For \$450\*, you deserve more than just a switch.



There are other cassette decks at this price that can handle metal tape.

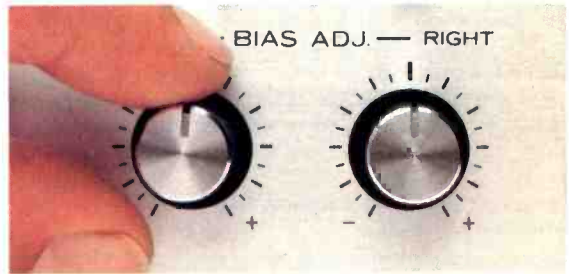
But only the new Kenwood KX-1060 can get the most out of every metal tape. And every other kind of tape as well. The reason is our simplified adjustable bias control with built-in oscillator that allows you to calibrate the deck to a specific tape for optimum results. It's one more "hands on" feature that really lets you get the most out of your deck.

And when it comes to performance, you'll appreciate the KX-1060 even more. The three ferrite heads have been designed for better playback sensitivity and remarkable frequency response (30-18,000 Hz  $\pm$ 3dB with chrome or metal tape).

To eliminate a common problem on other manufacturers' three head decks, we've increased our tape-to-head contact. This maintains constant output and high frequency response. At .045% (WRMS), wow and flutter has practically been engineered out. Signal-to-noise is an outstanding 65dB. Not to mention Kenwood's Double Dolby\*\* for true monitoring right off the tape for extreme accuracy in recording.

At Kenwood, we think that metal tape is the future of ultimate-quality recordings. With the KX-1060, you can take full advantage of any metal tape and get the very best performance possible.

See your Kenwood dealer and get your hands on one soon.



Simplified adjustable bias control with built-in oscillator lets you get optimum results with any kind or brand of tape.

 **KENWOOD®**

For the Kenwood dealer nearest you, see your Yellow Pages, or write Kenwood, P.O. Box 6213, Carson, CA 90749.

In Canada: Magnasonic Canada, Ltd.

\*Nationally advertised value.

Actual prices are established by Kenwood dealers.

\*\*Dolby is a trademark of Dolby Laboratories, Inc.



# Tape guide

Herman Burstein

## Tape Guide Policy

*Q. I am considering the purchase of brand X, brand Y, or brand Z tape deck. Please help me decide which one is best for my needs.—John Q. Public, Main St., U.S.A.*

*Q. I have about \$600 to spend on a tape deck. Please advise me which one is the best for the money.—Jane Q. Public, Elm St., U.S.A.*

A. It is again necessary for me to issue my periodic reminder that the policy of *Audio* prohibits The Tape Guide column from recommending specific brands and models of audio equipment (except in unusual cases where there is only one of a kind on the market).

The first step in making a purchase decision is to make oneself knowledgeable about the subject matter. One way to do so is by reading the equipment reviews of tape decks that appear in *Audio* and other periodicals. Consult the tape deck directory that appears annually in *Audio's* October issue to become familiar with the comparative features and specifications of the decks you are considering. Check with your audio store or library for a readable book on the subject of tape recording. LISTEN to the decks you are considering. Using a phono disc of good quality, notice how faithful a copy each of the tape decks can make and how faithfully they can reproduce inter-station FM noise. See what parts and service warranties come with the decks; find out how far it is to the nearest authorized service agency. Try to find out which tape decks come in least frequently for service relative to the number sold.

Armed with all this information, determine your priorities regarding specifications and special features. Consider the amount of money you can afford to spend and also *where* to spend it — i.e., look around for a store whose reputation you can trust and whose personnel seem both knowledgeable and helpful. Then decide which brand and model offers you the most value.

## Taping Multiple Turntables

*Q. I am looking for an uncomplicated method of connecting two turntables so that both are "live" simulta-*

*neously. The purpose is to be able to cross-fade stereo albums and record them with a tape deck. My aim is to imitate actual broadcast techniques, especially those of the "top forty" AM radio stations, and record the result on stereo tape. If I wanted to add microphones for the purpose of disc jockeying, to what component would they be properly connected?—Steven Cohen, Philadelphia, Penna.*

A. I think you are looking for a mixer that will, accept two turntables and several microphones. The output of the mixer would be fed to your tape deck. I suggest that you visit local audio dealers to find a mixer suitable for your needs.

## Erase Fader

*Q. Enclosed is a photocopy of the schematic for my tape deck. I want to install a potentiometer into the erase circuit to fade the erase head in or out. As I am not able to determine the necessary circuit for this modification, I wonder if you might be able to suggest such a circuit. I suspect that some form of L-pad or T-pad might be the answer, but I just don't know what values to use. — Ron Streicher, Elk Grove, Cal.*

A. I am sorry, but I cannot give you a specific answer because this would involve more time — to design and check out the required circuitry — than the Tape Guide is able to devote to one question. You might try putting a variable resistor in the path between the bias oscillator and the erase head. As a very rough guess, it should have a power rating of at least two watts, and its resistance should be in the area of 100 ohms. Keep in mind that as you diminish the amount of bias current taken by the erase head, you increase the bias current supplied to the record head, with a consequent decline in amount of treble signal recorded on the tape. Hence, as your letter recognizes, an L-pad arrangement would be better to present a constant load to the bias supply. Unless the pad presents a perfectly uniform impedance in conjunction with the erase head, you may still be changing the amount of bias going to the record head, although less than before. I do not know what value of L-pad to use. Check your ser-

vice manual regarding the impedance of your erase head at the bias frequency, and try an L-pad (if available) with the corresponding ohmic value. If the service manual does not give the impedance, consult the manufacturer.

All the above may be academic, however. For fade in and fade out the loss and/or gain in treble may be inconsequential, provided that bias to the record head is ultimately correct when erasing full strength. Hence, you might find a simple variable resistance quite satisfactory.

## Buzzing Tape

*Q. I have a problem with my tape deck. At 1 7/8 ips there is a sound resembling speaker buzzing on transients. This appears on the tape itself, and I am sure it is not the fault of my speakers.— Kenneth Karasek, Maple Heights, Ohio.*

A. The buzzing may be due to overloading the tape, i.e., excessive signal applied to the tape. At 1 7/8 ips there is a good deal of treble boost in the record amplifier (in order to overcome the great magnetic losses of high frequencies on the tape); this increases the tendency toward overloading. Try recording at a lower level.

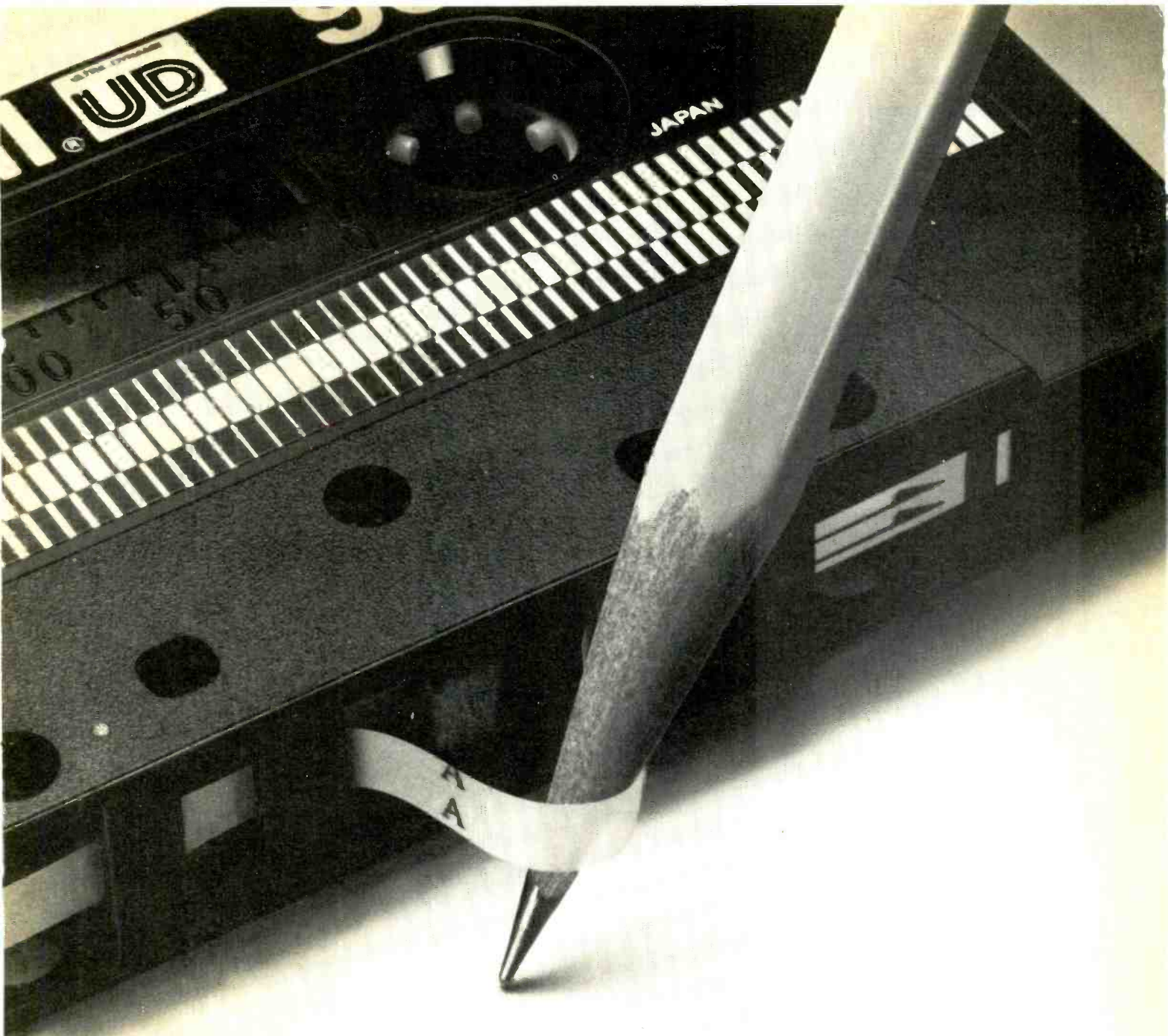
## Effects of Power Supply Fluctuations

*Q. I am stationed at a remote Air Force radar installation. Our power supply fluctuates between 59 and 63 Hz. Does this have any adverse effects on a Dual 1219, ReVox A-77, or Heathkit AR1500?—Anders Bastman, APO Seattle, Wash.*

A. The ReVox A-77 maintains correct speed independently of changes in line frequency. I doubt that changes of the magnitude you describe would have any significant effect on the Heathkit's performance. If the turntable has a synchronous motor, its speed would change with variations in line frequency.

---

If you have a problem or question on tape recording, write to Mr. Herman Burstein at AUDIO, 401 N. Broad Street, Philadelphia, PA 19108. All letters are answered. Please enclose a stamped, self-addressed envelope.



# We put more thought into our leader than most manufacturers put into their tape.

One of the reasons Maxell has such a great following is because of our leader.

It has a built-in non-abrasive head cleaner designed to remove the oxide residue other tapes leave behind, without damaging your tape heads.

It also points out what side of the tape you're on (A or B) as well as which direction the tape is traveling. So it's almost impossible to make a mistake.

It even gives you a five second cueing mark, so you can set your recording

levels without wasting tape. Or time.

Obviously, all the thought that went into our leader was designed to help you get more out of our tape.

So if you think our leader sounds impressive, wait till you hear what follows it.

**maxell**



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# Behind the scenes

Bert Whyte

Among the spate of technical papers presented at the 63rd convention of the Audio Engineering Society in Los Angeles was a provocative essay by Prof. J. Robert Ashley of the Univ. of Colorado at Denver entitled "On the Degradation of Symphonic Music Phonograph Recordings" (AES preprint 1513, A-2). Professor Ashley is no stranger to the pages of *Audio*, and his involvement with loudspeaker research has led to consultancy and design work in this area with the Koss Corp.

The essence of Prof. Ashley's paper is that he finds the majority of current phonograph recordings of symphonic music deplorably lacking in many of the sonic virtues that characterized the great recordings of yesteryear. He particularly criticizes the use of the newer concert halls for recording and the acoustic perspective presented through the recording technique of multi-track tape machines and multiple microphones. He points out that the mix-down of the multi-track tape to a two-channel master adds an extra quotient of distortion. He condemns the typical studio speaker used for

monitoring on the recording sessions, as well as the use of cutting amplifiers with excessive amounts of transient intermodulation distortion. He feels that unless these current recording techniques are reversed or modified, they will negate many of the virtues of the impending digital recorders.

Prof. Ashley's solution to all this is, first and foremost, to record the symphony orchestra in a great concert hall, use simple microphone techniques, eschew equalization and all other doctoring of the music signal, and use cutting amplifiers with no audible TIM. He singles out Carnegie Hall, Boston Symphony Hall, and some nineteenth century European halls as great recording halls, and ruefully he notes that "there are only a dozen or so of these great halls in the world." The professor has high regard for the early 1950s mono recordings of Toscanini in Carnegie Hall, and, in fact, he is particularly enamored of Carnegie Hall and its virtues as a recording hall.

Professor Ashley's observations are very timely, and in general I wholeheartedly agree with what he has to say. However, with all due respect, the

recording of symphonic music is far more complex, especially in the choice of recording venue, and the implementation of some of his ideas would be much more difficult than he may realize. Speaking as a recording engineer and producer of symphonic (more properly "classical") recordings, I want to particularly comment on recording halls and certain other aspects of recording technique.

It is not, however, my intention to throw brickbats at recording engineers who use multi-track/multi-mike techniques for classical recordings. I don't like this technique, and I prefer to use microphones and a microphone methodology employing the least number of microphones which will ensure a true stereophonic recording. Many of the engineers using the multi-mike approach are well aware of the compromises and shortcomings of this technique but are obliged to use it because of rigid company policy. I vividly remember the well-known director of a major record company telling me that he personally "prefers the simpler stereo microphoning techniques, but they are not commercial enough!"



# WHICH HIGH BIAS TAPE WINS WITH MAHLER'S FOURTH SYMPHONY?



Original manuscript sketch for the first movement of Gustav Mahler's Fourth Symphony. Courtesy of The Newberry Library, Chicago.

Choose eight measures of Mahler's Fourth that are really rich in the high frequencies. The type of passage that high bias tapes are designed for.

Record it on your favorite high bias cassette, using the Chrome/CrO<sub>2</sub> setting. Then again on MEMOREX HIGH BIAS.

Now play back the tapes.

We're convinced you'll have a new favorite.

MEMOREX HIGH BIAS is made with an exclusive ferrite crystal oxide formulation. No high bias tape delivers greater high frequency fidelity with less noise, plus truer response across the entire frequency range.

In short, you can't find a high bias cassette that gives you truer reproduction.

**MEMOREX**

Recording Tape and Accessories  
Is it live... or is it Memorex?



# Why JVC's new metal decks knock out your ears and not your wallet.



## Free tape.

Even though we knocked out the hi-fi world last year with the world's first true metal-compatible deck, we're not the only company that sells them now. So we've decided to stay one jump ahead by offering you SIX metal compatible models from \$299 to \$749.\* Each packed with a free Metafine C-46 metal particle cassette.

One reason we're doing this is because our metal-compatible, KD-Series decks perform so well with conventional tape, you might never get around to buying a metal tape!

But pop the Metafine cassette in and you'll hear the difference. Suddenly you've gained 6dB output level, 10dB signal-to-noise and at least 3000 Hz of high end. Even more with our computerized KD-A8!

## Features like Sen-Alloy™ and Super-ANRS even at \$299\*

Our key to metal tape performance is all in our heads. Super-hard, low-distortion Sen-Alloy heads different from any other manufacturer's. When we toss in our unique Super-ANRS noise reduction system that adds 10dB S/N at 5kHz and our

famous Multi-Peak recording indicators, you get a knock-out sound.

And all in decks starting at less than \$300.\*

## T-shirts and posters at your JVC dealers.

The arrival of a whole line of decks this good for prices this reasonable is worth celebrating. So we've outfitted participating



dealers with free posters and even some limited edition T-shirts, all with our knock-out Technical Knockout graphic.

Just walk in and ask to hear a comparison of conventional oxide performance versus metal

particle tape in a JVC KD-A3, A5, A6, or A8. (The three-head KD-A77 and two-color fluorescent meter A7 will be in the stores by December.)

Where do you go to hear for yourself just how much better metal sounds than oxide?

## Call 800-221-7502 and get knocked out.

That's the toll-free number that tells you where you'll find your nearest participating JVC dealer. (In New York, call 212-476-8300.) Drop in to see and hear the technical knock-outs, including the top-of-the-line KD-A8. It features B.E.S.T., the computerized bias/equalization/sensitivity tuning system that fine-tunes the deck to any tape ± 1/2dB, special "X-cut" heads that add another octave of bass (flat all the way down to 25Hz!), solenoid operation, Multi-Peak recording indicators, and a host of other audiophilia. All for just \$799.\*

Stop in and take advantage of the free metal tape with each deck, and free posters and T-shirts, while supplies last.

But stunning as JVC's new metal decks are, free offers like these won't last for long.

**Now you're ready for JVC.**



**JVC**  
US JVC CORP.

KD-A8 with B.E.S.T., KD-A3, KD-A5

Shown: KD-A8 with B.E.S.T., KD-A5, KD-A3.  
\*Suggested Retail Price.

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Get  
ready  
for a

TECHNICAL

KNOCKOUT



How does a poor engineer cope with that?

### Prime Acoustics

To me, the prime consideration in a classical music recording is the concert hall acoustics. Ideally, the hall should be large enough for the full expression of the most fortissimo music passages without overloading the hall, but not so large as to excite resonant and reflective modes that produce slap-back, flutter echo, and other acoustic anomalies. The reverberation period should fall within 1.7 to 2.2 S, and the decay should be smooth with no "shelving." The acoustics should lend warmth, airiness, and sonority to the instruments

of the orchestra, but not so much that inner detail is obscured. Orchestral balances should be such that one section does not overwhelm another . . . for example, trumpets and trombones should not acoustically "swamp" the first violins into inaudibility. Contrabassi and low percussion should have good projection, with solidity and weight, yet maintain good articulation. There are very few concert halls, indeed, that can meet such demanding criteria as I have just described. A limited amount of correction can be accomplished by microphone techniques in halls with acoustic anomalies, but frankly, I'd rather not undertake the recording if the hall is not first

rate. Since there are so few really good concert halls in existence, many engineers, including myself, make a sort of hobby of ferreting out good recording locales in the various cities we visit.

I should hasten to also point out that a great concert hall is not necessarily a great recording hall. Especially with older halls, the prime goal of the architects was an attractive edifice where a considerable number of people could enjoy listening to a concert in relative comfort. Recording was virtually unknown, and, for that matter, so was the science of acoustics. A good concert hall was a matter of happenstance. Naturally, a given hall gained a reputation as a good concert hall when the sound of the orchestra pleased the large number of people seated in the audience. Of course, the acoustic response of a hall changes when it is empty, and some of the old great halls become too reverberant for recording when they are empty. In the best of all possible worlds, no one could fault Professor Ashley's formula for the successful recording of symphonic music. But in the harsh realities of real-life symphonic recording, the recording engineer must cope with acoustic anomalies, which exist even in so-called good halls or, in many cases, admit the problems are insoluble, or worst of all . . . make a good recording of an inferior hall.

### Lore of Halls

Herewith, some lore about concert halls and symphonic recording locales that Prof. Ashley and you, dear reader, may find interesting:

Carnegie Hall, so beloved of Prof. Ashley, has been intermittently used for symphonic recording for many years, but has been on a steady decline for this purpose for some time now. It has all the desirable qualities previously noted. When empty, the reverberation period is about 1.7 S, and the decay is quite smooth. Why then the decline? For one thing, the hall is incredibly busy, in use almost every day. If you are going to record there, it will have to be after midnight when you start or very early in the daylight hours. Since few symphonic recordings can be accomplished in one day, you would have to dismantle your recording setup every day to make way for an evening concert, and reset the next day. The hall is also expensive in terms of rental and high fees for union stagehands who must move your recording equipment in and out of the hall, plus handle setup and breakdown of the orchestra. The major problem, however, is that Carnegie

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AD-6700



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TAPE SPEED

1 7/8 3 3/4



INPUT LEVEL

65

70

75

80

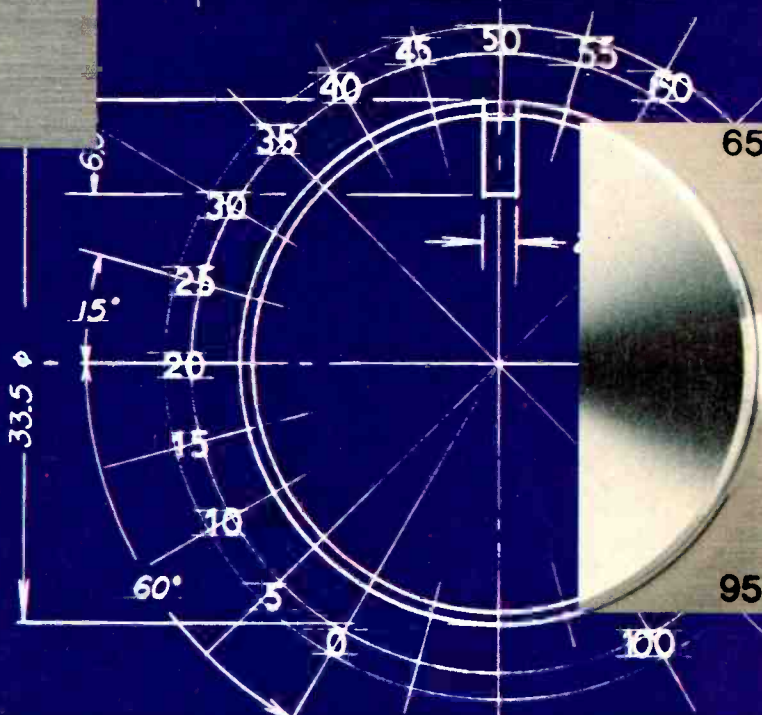
85

90

95

FeC

Fe<sub>2</sub>O<sub>3</sub>



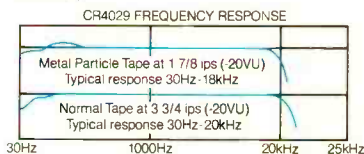
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**TWO SPEED OPERATION.**

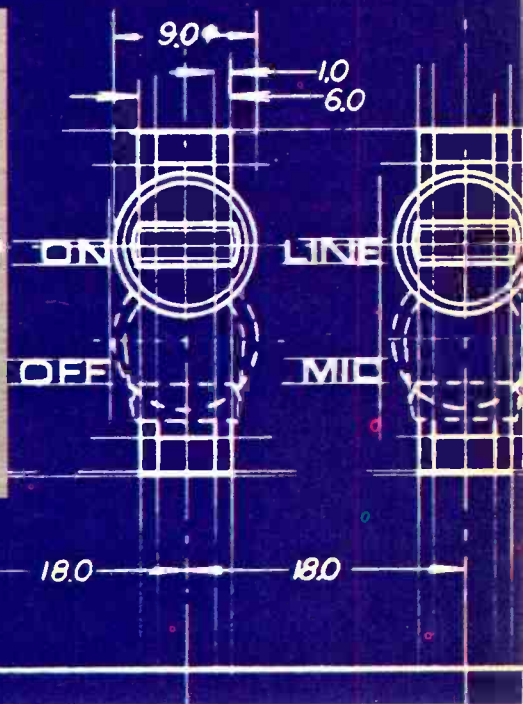
You can use the CR4029 at the standard 1 7/8 ips speed and you'll have outstanding recordings. But that's just the beginning. Switch to the new high-speed 3 3/4 ips and the CR4029 delivers an incredible 30Hz-20kHz ± 3 dB frequency response (using normal tape). What's more, recording at high speed drastically reduces wow and flutter and tape dropout. Off-the-air and off-the-disc recordings will astound you, and even surprise your friends who own reel to reel recorders. (Since a C90 cassette will record a full album at 3 3/4 ips, high speed recording is still economical.) But—there's more.

**METAL TAPE.** Another of the marvelous innovations is metal tape. Why has it become so important? Our chart shows why. Metal tape demonstrably improves frequency response. Combine it with the new high speed and you'll get a hard-to-believe 30Hz-25kHz ± 3 dB frequency response with virtual freedom from distortion. You'll also be able to record at higher levels. (With normal tape and standard speed, you have to record at lower levels to prevent tape saturation and consequent distortion.)



**THREE VHT/SENDUST HEADS WITH DUAL PROCESS DOLBY.** All this new technology requires new recording, playback and erase heads. So Fisher engineers came up with our new VHT heads. Made of a special micro-fine, high density particle formulation, they bring out the best potential of metal tape and high speed. Because the

BIAS TAPE SELECT EQUALIZE TAPE LIMITER INPUT MONITOR

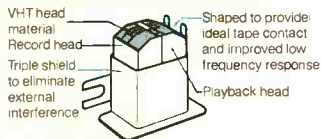


THREE HEAD SYSTEM WITH DUAL PROCESS DOLBY



CR4029 is a three-head design, each head can be optimized for a specific function. There's a wide 4  $\mu\text{m}$  gap VHT record head for the best possible signal-to-noise ratio. A narrow 1  $\mu\text{m}$  gap VHT playback head improves frequency response. And a Sendust alloy erase head overcomes the problem of hard-to-erase metal tape. The separate record and playback heads allow you to monitor as you record—an absolute must for serious record-

VHT RECORD AND PLAYBACK HEADS



ing. And Dual Process Dolby gives you the advantage of Dolby noise reduction in both the record/playback and off-the-tape monitoring mode.

**THE CR4029 HAS ALL THE OPTIONS.**

Why have only part of the new tape technology when you can have all of it? Using the CR4029 three head system you can use metal tape at the standard 1 7/8 ips speed, combining high performance with long play. Or use normal tape at the new 3 3/4 ips speed for both economy and superior performance. Or choose the ultimate: metal tape at high speed 3 3/4 ips, and exceed the expectations of the most critical enthusiasts.

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New guide for buying high fidelity equipment. Send \$2.00 with name and address for Fisher Handbook to: Fisher Corporation, Department H, 21314 Lassen Street, Chatsworth, California 91311.

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**SPECIFICATIONS:**

Motor	(1) DC-Servo	Frequency Response 1 7/8 ips
Drive System	(1) Capstan	FeCr Tape (± 3dB) 30Hz-16kHz
Number of Heads	3	Metal Tape (± 3dB) 30Hz-18kHz
Head Material	VHT/Sendust	Frequency Response 3 3/4 ips
Wow and Flutter		Normal Tape (± 3dB) 30Hz-20kHz
1 7/8 ips	0.06% WRMS	CrO <sub>2</sub> Tape (± 3dB) 30Hz-22kHz
3 3/4 ips	0.05% WRMS	FeCr Tape (± 3dB) 30Hz-22kHz
Signal-to-Noise Ratio (CCIR Weighted)		Metal Tape (± 3dB) 30Hz-25kHz
(Dolby Off)	52dB	Total Harmonic Distortion at OVU
(Dolby On)	62dB	1 7/8 ips 1.5%
Frequency Response 1 7/8 ips		3 3/4 ips 1.2%
Normal Tape (± 3dB)	30Hz-14kHz	Tape Selector Switch Norm., CrO <sub>2</sub> , FeCr, Metal
CrO <sub>2</sub> Tape (± 3dB)	30Hz-16kHz	Bias Fine Adjustment ± 20%

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Hall is noisy in terms of room rumble caused by the vibrations from heavy New York traffic and, worst of all, low and subsonic vibrations generated by the subway trains which pass underneath! Needless to say, many kinds of filters have been tried to cope with this noise, but most remove some of the extreme low-frequency content of the music as well, and this discourages their use. I well remember that just after the 1956 Hungarian uprising, maestro Antal Dorati conducted the refugee Philharmonica Hungarica orchestra in an evening concert in Carnegie Hall, and at midnight Bob Fine (of Mercury Records' "Olympian Series"

fame) and I began to record the orchestra. We were armed with a subway train schedule furnished by the city, and at that hour the trains ran 24 minutes apart. We stopped recording altogether during the passage of the trains, and this was some help in the rumble problem.

### Changes and Improvements

One of the best recording venues in the United States once was Orchestra Hall in Chicago. This is where Fine made the first of the Mercury "Olympian Series" recordings with the Chicago Symphony, and he was the first to use the Telefunken U-47 microphone

for this type of recording. While he was recording the orchestra monophonically, I was simultaneously making experimental stereo recordings of the group with a pair of U-47s in the omni pattern. Orchestra Hall was simply luscious for recording, with a reverberation time of about 1.9 S when empty. In 1965, a wealthy patron of the Chicago Symphony gave money to remodel the hall, and, in addition to new seats and other improvements, they modified the curved proscenium that swept from the ceiling down to the back of the stage. In the original configuration, the stage did not form a "room within a room" as in most halls, but was open and largely responsible for the great recording acoustics. The remodeling caused a disastrous reduction in the reverberation time of the hall, to a much too dry 0.9 S. Because of this, all the companies that recorded the Chicago Symphony began to record them in the nearby Shriners' Medinah Temple. This is a largish hall with a very deep stage, and, depending on the engineers involved, some quite fine recordings have been made there. Some years later, Orchestra Hall was further modified, and the reverberation time rose to 1.4 S... better, but still lacking. Now, it is well known that symphony orchestra players generally like to perform in their "home" hall and, if at all possible, record in it as well. Just recently, Deutsche Grammophon, who regularly record in the Chicago Symphony, tried a unique experiment. Wanting to satisfy the Chicago musicians, they spread heavy-gauge vinyl sheeting over all the seats in the hall. The seats, because of their upholstery, represented a considerable amount of acoustic absorption, and the vinyl sheeting reflected sufficient sound to lower the absorption in the hall and raise the reverberation time. Thus, the musicians were able to record in Orchestra Hall once more, and although I understand they do not always use this setup, it is a step in the right direction.

After having told this encouraging story about trying to cope with marginal recording acoustics, here is the other side of the coin... A well-known record company, which records in a famous concert hall, uses multi-mike, close-up recording (up to 32 mikes!) to the extent that they swamp the natural acoustics of the hall and, in fact, are forced to add artificial reverb!

So it takes all kinds, Prof. Ashley. Your recording utopia will probably never be realized in the real world, but let us both hope the clinically revealing sound of digital recording may change all that!



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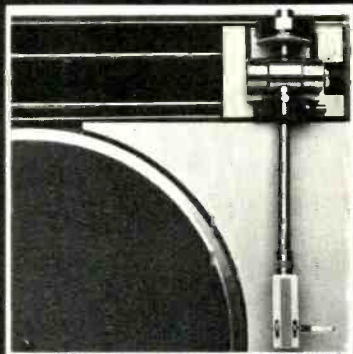
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# Audio etc.

Edward Tatnall Canby

NO NOISE! That's what we want today, speaking negatively. Noise is bugging us. We're spoiled by the digital system, which in both tape and disc brings us extremely close to TOTAL SILENCE in the absence of signal. That's what we want! But we can't get it — yet. At least not on discs. We are still living with the LP in our own consumer systems, as we are living with analog tape. We will for many a year, maybe. Ten years? That's Philips' casual estimate. *Ten years of LP noise?* How can we ever stand it?

Well, dbx says it has the answer. (And we can use it, as never before.) The dbx "noiseless" encoded disc! It's here — or rather, it is back and better. This system was launched once before, quite awhile ago, and nobody noticed very much. Wrong moment. This time is better and we will probably notice — we almost have to. For if you can't yet get noiseless audio via digital, the very next best way just has to be via electronic-type noise reduction. You reduce the noise without affecting the signal itself.

Or do you affect it? That's the vital question.

Well, this new dbx disc is astonishing. I can say that because I've heard it. Here you have no more than a plain old LP (specially cut and pressed) with the same dbx II circuit for coding that you already know from recent dbx consumer products (and compatible with them) — and it sounds, really, truly, almost like digital. SILENCE!

I'm wary of the word "total" in respect to any kind of silence — let's call this *audible* silence, palpable silence, the kind you almost feel, that makes you think the system is switched off. You hear — nothing. Except signal, when & if. We get this sort of silence out of the best component and pro equipment (and leave it turned on for

days by mistake). We have heard it, unbelievably, in demo after demo of the new prototype digital discs and the digital tape systems. All digital audio has it because silence is inherent in the system itself, which does not read noise. (Well, hardly ever.)

But do we get it in our new LP superdiscs, d-to-d or digital-derived? Nope. Not even on the best and/or most expensive. It may have been there in the original signal but the good old phono pickup and the LP surface convert that silence very efficiently into, at best, low noise.



There's only one way to achieve minimal noise on standard LP and that's via a scarce commodity called "TLC." Tender Loving Care. But folks, we really can't depend on TLC for our mini-noise! It's inhuman. It isn't fair. If the natural end state for milk is to be sour, then the natural tendency for the LP record is to be noisy. More Murphy subsets. We aren't in the dairy biz and we'll never, NEVER get *predictably* quiet LP discs via any sort of regulation, supervision or inspection, or even with TLC. Well, again, hardly ever. But that's not enough.

## Surface Silence

So let's examine the dbx offering and see what it might do to help — short of digital. Dbx is ready. The company is now a subsidiary of BSR (USA) Ltd., and it has a dynamic new boss-

man, Jerome E. Ruzicka, who is far from noise-free. He recently was with the Bose Corp. and now will talk your ear off with enthusiasm for the dbx "noiseless" disc, which is very much his baby. He was so excited at his press conference that he fairly sputtered, and a good many of us went right along with him. When, after his speech, that vaunted SILENCE finally hit our ears, it was indeed extraordinary. This was definitely the first time I had heard an LP pressing, played through a standard pickup, that actually compared for the ear with digital.

Especially in comparison with the same recording in an uncoded pressing.

Let's put it into figures, unofficial. I quote Bert Whyte and others to the effect that the limit in S/N for the LP (uncoded) is around 60 dB. Normal, smooth LP surfaces average very roughly around 45 dB below a hypothetical center point, the standard 0 dB level, if I read it correctly. But these

last numbers, even with engineering precision, are quite arbitrary because of the huge plus-or-minus factor. In practice, I would suggest, what with the usual swishes, rumbles, ticks, pops, mini-explosions (says my suffering ear), a better everyday average might be -30 dB with occasional violent peaks (say no more!) up to +15. "Noise louder than signal?" Of course. You hear it every day.

If I am right, the coded dbx LP disc plays back with an S/N that gets down into the -70 dB range. Extraordinary if true, and it surely accounts for what my ears did not hear. This does indeed compare favorably with digital specs. Philips says the S/N figure for its compact digital disc is -85 dB, and digital tape goes down astronomically beyond -90. No—not quite totally silent. But might as well be. If you stick your ear right into the speaker on silent pas-

# Yamaha decks the competition.



**TC-720.**  
The 3-head deck  
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If you like to get involved with your tape recording this is the deck for you. The bias rotary control and built-in pink noise generator allow you to fine-adjust the deck's high frequency response to best suit the particular tape you are using. The REC LEVEL ADJ controls and REC CAL switch allow you to further adjust the recording sensitivity for proper Dolby® NR tracking, resulting in very high signal-to-noise ratio and exceptionally clean sound. The TC-720 also has a unique built-in "rec time" echo facility. You can use this to add new dimensions of studio realism to tapes

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A switchable subsonic filter cuts out subsonic interference due to warped records, line hum, etc., and also safeguards your speakers during playback without altering

sound quality. The bar-graph peak level meters have a fast/slow switch to adjust the recovery time of the meters for maximum control over the material you are recording.

The 920B's sleek black cabinetry enhances the high-performance look of this studio quality deck. For maximum convenience an ingenious hinged panel conceals the less often used controls. Everything was done with striking esthetics and total performance in mind.

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sages (at your own risk), you just might hear something but you probably wouldn't. So in terms of achieved S/N via the LP record, dbx provides us with exactly what we want in the most negative abundance. This might very well hold us until the digital disc gets around, maybe within that 10 years or so. That could be important.

### Pay the Piper?

If dbx is this good, there must be a catch, a price to pay, whatever its value. That price is in the compression-expansion cycle, a treatment of the whole signal through some pretty fan-

cy circuit work. And right there I see a lot of leery faces and eyes looking askance. That sort of thing? "No-no! We hate noise but we want our audio pure and lovely, untouched by human hands. Or extra electronic circuits, thank you. We will even listen to all that NOISE (gritting our teeth) in order to preserve signal pristinity."

Or will we? It all depends.

The dbx system uses the long-familiar two-step type of noise reduction, via a pair of mirror-image circuits that code the signal before recording and then decode it in the playing, back to where it started, at the same time tak-

ing any subsequently added noise (uncoded) — say LP surfaces or tape hiss — right down along with it to far below "normal." Ideal result: Signal unchanged, noise reduced. It's a nice concept once you've got it straight in the mind (which isn't always easy, I've found). And there are many ways to design the double circuitry. The idea is, of course, best known today in the popular "Dolbyized" cassette as well as in Dolby professional equipment. Indeed the two systems, Dolby and dbx, fill very similar rival niches in audio usage, both professional and consumer. As we know, dbx even designed a plug-in replacement for Dolby A pro equipment—they are that close in type of function. Either one does its noise reducing very well when the two mirror-image circuits work as intended. But, of course, one system will not decode the other. There are profound differences.

Those differences are technical and do not belong here in detail. Yet the two systems' basic principles are important if we are to evaluate the "fi" of any sort of noise-reduced LP disc.

### History into Future

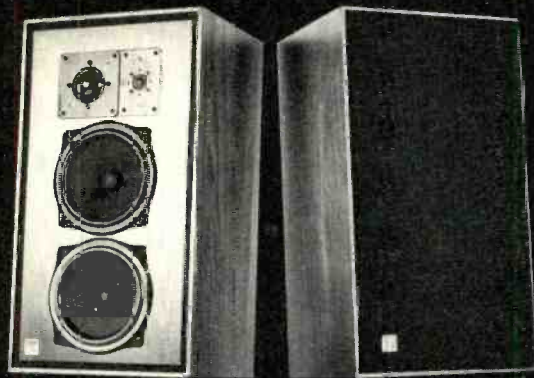
There could be a Dolby disc—there may be?—parallel to the familiar Dolby cassette. That would involve "Dolbyizing" the disc itself and playing it back through conventional Dolby B decode. Now there is, in fact, a dbx disc (let's not speak of "dbx-ing") and it works the same. The record is dbx II encoded in the production process and decoded in the playback through reverse dbx circuitry, added to your system in one form or another according to need. As simple as the cassette. Right here the Dolby/dbx similarity ends. And the differences begin.

I think I can see why there could be a dbx disc in our future and not a Dolby disc, though both are possible. The most profound difference between these systems is historical, which explains a lot.

Dbx is newer, goes further (-30 dB to Dolby's approximate -10 dB) and takes bigger risks, at least in theory, by boldly treating the whole signal. Dbx depends on the incredible accuracy of modern electronic design. Dolby, designed in an earlier time, most ingeniously avoids that risk, and that is why Dolby is still with us. A very neat and interesting comparison.

Dolby's circuit came out of the early 1960s in its original launching, which is a very long while ago in audio terms. To my mind Ray Dolby's thinking at that time had the real quality of genius, safety-pin type. It was simple, unerring, and to the point. Nobody

## The New ADS L810-II "radical improvements wouldn't have been possible..."\*



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\*As quoted from the May 1979 Complete Buyer's Guide To Stereo Hi-Fi Equipment.

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The machine for your machine.

\*In the unlikely event that any TDK cassette ever fails to perform due to a defect in materials or workmanship, simply return it to your local dealer or to TDK for a free replacement.

else thought of it. Dolby A, the original, and Dolby B, for consumers, each remain the same today in their operating parameters as they always have been—and interchangeable right down the line, old and new. The Dolby system is hellishly clever—it “solved” the problem of signal purity by simply leaving the signal untouched. All but a tiny fraction in the very low-level area. The ear’s masking ability, ignoring noise in the presence of louder signal, had been used before but this was an ingenious application. For most of the signal, Dolby was a non-circuit. And it gave

us that 10 dB. Not surprising that the pros went along in force! The idea still holds—*don’t tamper with my signal*. Not any more than you have to. So Dolby lives on.

But dbx can give us much more noise reduction via the two-stage approach—IF we accept treatment of the whole signal, complete. That’s the rub. Heads still shake at the thought. Signal purity! We like it better than ever. And dbx boldly grabs your entire audio signal, not only compresses it 2:1 across the board, 100-dB wide in the dynamics, but even adds pre-emphasis up at the top and de-emphasis in the

playback. That’s tampering, if you feel that way. But look at the results. Not merely all that noise reduction. A grandly widened range in the replaying, a full 100 dB instead of the safe average 50 dB or so of the usual LP. Dbx puts no more than 50 dB on the record, cuts narrower grooves closer together (thanks to much lower maximum excursion in the lows), and overall cuts out nearer the edge for cleaner inner-groove sound in the same playing time. That makes for new flexibility. The mechanical strains on the LP-groove system itself are neatly transferred to the more capable electronic area.

Dbx even goes back to the master tapes (or wide-dynamics d-to-d cutting) to find its 100 dB of dynamic range, often reduced for the standard LP cutting. Remastering. It’s a whole new version of the recording, maximized to take advantage of every favorable break provided by this code-decode procedure. Pretty good, eh? Solid thinking. But how about the signal quality?

I’ll give no specs, but the argument is straightforward. Since the mid-Sixties there have been enormous advances in audio electronics. We have learned to “treat” our audio signals, in whatever way, in many ways, with incredible precision and lack of distortion even in systems of great complexity. Our signals go in clean, travel through a million or so modifiers—and come out clean. Just compare amplifier specs of 20 years back and today. Look inside our audio gadgetry, already in wide hi-fi use. Study Peter Scheiber. It’s a new electronic world.

And thanks to transistors and then circuit boards and ICs, we can build enormously sophisticated circuits that still manage to be practical and reasonably cheap to produce. We know how to make them work not only with low distortion but with uncanny precision. Enough said.

### New-Era Cleanliness

So now, maybe, we can indeed grab the whole of a signal, put it through compression and re-expansion and more, and come out clean? Maybe not quite 100 percent. But close. Without any specs at all, that is the argument.

Dbx, you understand, comes straight out of this new era and has had the time to become highly knowledgeable in noise-related compression/expansion techniques. If I am right, then, the dbx II circuitry is a very sophisticated product of recent advanced thinking. It has to be. I think maybe I’d trust my best audio to it. Would you? You’ll have to decide.

# MAXELL MAKES A RECORD OFFER WORTH LISTENING TO.



Get one of these albums free when you buy 3 Maxell UD-XL cassettes.

Anyone who appreciates great music is sure to appreciate these special recordings.

Each contains selected cuts performed by some of the world’s greatest jazz, rock and classical musicians. And each has been specially selected under our supervision to bring out the

most in your equipment.

All you have to do to get one free is buy 3 UD-XL I 90 or 3 UD-XL II 90 cassettes.

That way, you’ll not only be getting some great tape, you’ll also be getting some great

music to listen to. Offer good at participating dealers while supplies last.



Maxell Corporation of America, 60 Oxford Drive, Moonachie, N.J. 07074.

Enter No. 26 on Reader Service Card

# INTRODUCING THE B&W 801. THE END OF THE BEGINNING.



**S**peaker design, as any engineer will tell you, traditionally involves compromises and trade-offs. Visions of perfection sacrificed to practical considerations.

But does it have to be this way?

B&W doesn't think so and they've designed the loudspeaker to prove it, the B&W 801.

## **No more compromises.**

With the 801, B&W engineers have broken with conventional design practices, not to mention conventional technology, to create a loudspeaker that surpasses, in every audible respect, the finest currently available.

The outstanding performance of the B&W 801 is directly traceable to a massive investment in research and development. From the computer models employed in its design to the laser interferometry used to measure

the behavior of its individual components, this landmark in loudspeaker technology represents an uncompromising commitment to excellence.

Critically matched drive units using new materials and fabrication techniques are employed throughout. A computer optimized, 4th-order crossover network maintains uniform sound pressure/frequency response and correct phase characteristics. In addition, a unique electronic overload protection device continually senses the voltage applied to each driver and if safe values are exceeded, cuts off the signal. A convenient reset button restores operation.

The striking two-part enclosure has been precisely matched to the individual drive units with a staggered, in-line driver configuration insuring wide horizontal dispersion and the time arrival correction needed to yield a coherent wavefront. Finally, the enclosure has been contoured to minimize secondary diffraction effects.

## **For the discerning few.**

To be sure, the 801 isn't for everyone. Both price and limited production effectively preclude widespread use. However, if you are unwilling to settle for anything less than a supremely accurate loudspeaker fully capable of recreating every nuance of the original performance, the B&W 801 is for you.

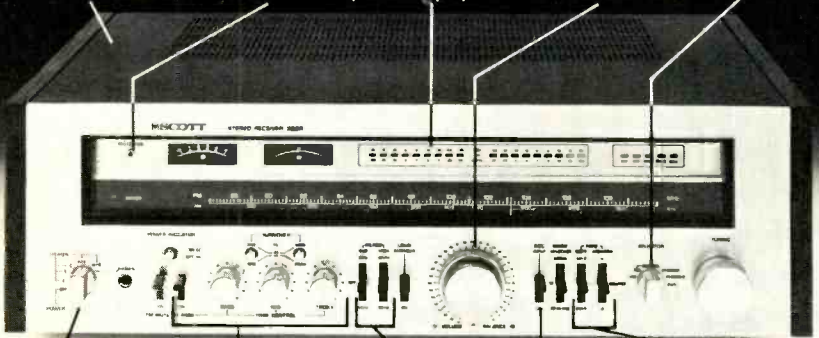
A visit to your B&W audio specialist will prove conclusively that the B&W 801 represents a quantum leap in loudspeaker technology—a singular end to the beginning.

For additional information write: Anglo American Audio Co., Inc., P.O. Box 653, Buffalo, N.Y. 14240. In Canada: Remcron Electronics Ltd.

## **B&W Loudspeakers. The next step up.**

# If you can find a receiver that does more.

DC configuration OCL power amplifier    Relay protection with LED    18 LED logarithmic power display    Logarithmic volume attenuator    2 phono inputs



Connections for 3 pair of speakers    Bass/midrange/treble tone controls with variable turn-over frequencies and by-pass    Twin position active subsonic and high filters    Front panel accessory switch    2 tape monitors with full tape copy capability

## Buy it.

Scott's new 390R is perhaps the most complete receiver ever made.

A professional control center for your entire sound system, the 390R delivers a full 120 watts per channel min. RMS, at 8 ohms from 20-20,000 Hz with no more than 0.03% THD. And it offers more options, features and flexibility than you'll find on most separates.

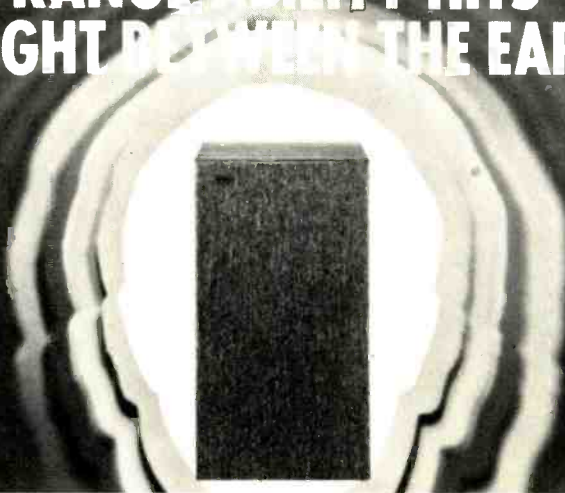
Compare the Scott 390R with any other receiver on the market today. If you can find one that does more... buy it.

For specifications on our complete line of audio components, contact your nearest Scott dealer, or write H.H. Scott, Inc., 20 Commerce Way, Dept. J.R., Woburn, MA 01801.

**SCOTT**  
The Name to listen to.  
Makers of high quality high fidelity equipment since 1947.

Enter No. 46 on Reader Service Card

## THE CELESTION DITTON 332. ITS RANGE-ABILITY HITS YOU RIGHT BETWEEN THE EARS.



From the incredible bravura of a diva's high C to the seemingly subliminal low E of a string bass. From the explosion of a faraway cannon to the fragile ting of a triangle floating across the room.

That's Range-ability<sup>®</sup> in the Celestion Ditton 332.

Celestion's Range-ability is also pure pronunciation at any volume—from a level barely perceptible to an overpowering 107dB. Through it all, the Ditton 332 maintains exceptional linearity, imaging, dynamic range and high efficiency.

Celestion manufactures each com-

ponent for its speakers. The result is an integrated acoustic suspension system of superbly efficient elements backed by over 55 years of speaker manufacturing craftsmanship.

Your pair of Ditton 332 cabinets will look as good as they sound. Finishes of oiled American walnut or elm are available.

Range-ability. Finally, listening becomes an experience.


celestion  
international 

Enter No. 8 on Reader Service Card

Of course, there are a few minor ancillary problems before this dbx disc can get through to us in the millions and save our noiseless souls. No new recording system will succeed without a very substantial software immediately available. By itself, the system is nothing. We know what Philips has in store for us in its digital baby disc—the best of Europe and the world. Do you remember the stacks of ready LPs that came from Columbia right at the beginning? What can a smallish outfit like dbx, not a record company at all, do on its own?

Well, quite a lot, it seems. Bossman Ruzicka understands the crucial aspect of available software and he is going to strenuous lengths. Dbx isn't about to buy out RCA or Columbia, but they're not going to toss you only a few tiny labels, take it or leave it. Instead, they are setting up an emergency ad hoc processing and distribution department at dbx that will do everything, almost anything, that might help a record label to get started and avoid the ominous problem of wasteful double inventory—a separate disc for each type, dbx and standard. There will be no double inventory. Dbx takes on the coded version, does the vital remastering from early-generation originals; dbx in effect buys the records from the label and distributes them. A big strain on the resources, but that seems to be the way they'll do it, for the present. It is a brilliant, brave, and positive approach. It may well work. Anything, anything that gets this product out on the market in quantity is good.

Needless to say, the decoding end of the process is right in dbx's alley. Most of the recent dbx components already can decode the new record, and there is a new Model 21, just for disc. Other decoding configurations, built into phono equipment, should follow according to need as with the Dolby cassette.

Now don't laugh. As of the first press conference some months ago, dbx had exactly 19 releases on its list of coded LPs and a few more under the hat. Not exactly a Schwann catalogful. But that very day they announced that Vanguard was on board and they have Vox-Turnabout, two important labels for a good start. Also smaller labels, plus their own audiophile specialty line, beginning with the work of Mark Levinson. The big companies are another story—they will act reluctant, you can bet. Even so, we should look carefully and listen with care to the dbx sound. It just might rescue us from LP noise for some years to come. Lovely idea. 

AUDIO • December 1979

# Same looks. More guts.



The speaker on the left is the best selling, most popular car stereo speaker ever. The Jensen Triaxial® 3-way speaker system.

The speaker on the right is the one that's replacing it. The new Jensen Series I Triax®. The one with even higher efficiency. More power. More guts.

Sure, they look alike. But the similarity ends there.

## Higher power handling.

Believe it. The new 6" x 9" Series I Triax is rated at 50 watts continuous average power, compared to 30 watts for the old Triaxial. Which means it'll take more power—more heat—and more abuse from high power car stereo units, without sacrificing musical accuracy at the expense of high volume levels.

Why can it take more power? Because of its new, larger oven-cured one inch voice coil. It offers 66% greater power handling for superior durability. And because the special piezoelectric solid state tweeter is virtually indestructible, yet sensitive to every musical nuance.

## The efficiency expert.

Like all of the new Jensen Series I speakers, the Triax is more efficient than ever, thanks to our special high compliance cones with Flexair® rim suspension, 4 Ohm impedance and new, more efficient motor structures. Which translates to very high efficiency that lets

## More improvements.

The Series I Triax features an improved, 20-ounce ceramic magnet structure for deep, well-defined bass. Also a new, rugged gasket for a tight acoustic seal. Black zinc chromate plating insures corrosion resistance.

We also designed it to be easier to install than the old Triaxial with the stud-mounted grille.

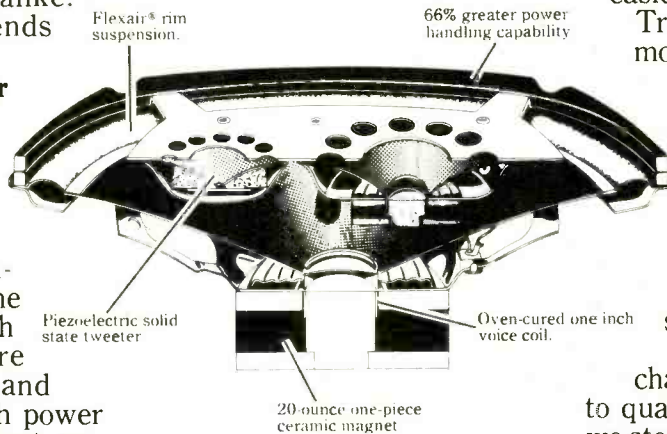
## Some things don't change.

There are some things we just couldn't improve. Like the idea of an individual woofer, tweeter and midrange balanced for accurate sound reproduction.

We also haven't changed our commitment to quality. And to back it up, we steadfastly support our full line of Jensen Series I speakers with an excellent one year limited warranty.

## "But they still look the same..."

You say you still can't see any difference between the old Triaxial on the left and the new Series I Triaxial on the right. Maybe not. But you sure will be able to hear the difference. And after all, that's the guts of the matter.



Jensen Series I speakers play louder with less power for smoother, distortion-free music in your car.

# JENSEN

## The thrill of being there.

4136 N. United Parkway  
Schiller Park, Illinois 60176

"Triaxial" and "Triax" are the registered trademarks identifying the patented 3-way speaker systems of Jensen Sound Laboratories. (U.S. Patent No. 4,122,315)

Enter No. 58 on Reader Service Card

# What's new

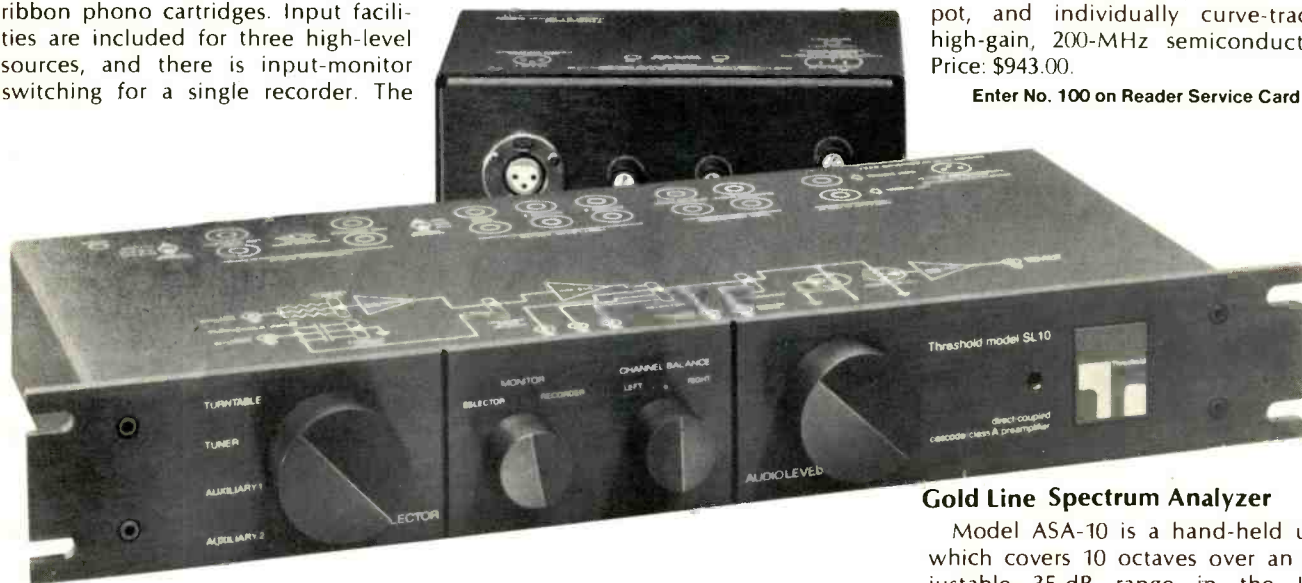
## Threshold Preamp

Model SL-10 has direct-coupled cascode, Class-A circuitry featuring switchable capacitance and impedance phono-cartridge loading and a pre-preamp stage for moving-coil or ribbon phono cartridges. Input facilities are included for three high-level sources, and there is input-monitor switching for a single recorder. The

low-level signal processing circuits are powered from a separate power supply module and operate with a total of 20,000  $\mu\text{F}$  of regulation. The two-unit

modular design makes use of Dale and Corning metal-film resistors; gold-plated connectors, circuit paths, and switch contacts; a Waters conductive-plastic, environmentally sealed dual pot, and individually curve-traced, high-gain, 200-MHz semiconductors. Price: \$943.00.

Enter No. 100 on Reader Service Card



## Gold Line Spectrum Analyzer

Model ASA-10 is a hand-held unit which covers 10 octaves over an adjustable 35-dB range in the LED readout display. Three response modes include fast, slow, and hold for easier analysis. Optional accessories include the PN-2 pink-noise generator, 45-PWN 45-rpm pink- and white-noise recording, and an adjustable mount. Prices: Kit, \$139.95; wired, \$199.95.

Enter No. 102 on Reader Service Card



## Sony Headphones

Model DR-6M folding stereo headphones have 50-cm diameter cone-type drivers with a specified sensitivity of 110 dB/mW and a frequency response of 20 Hz to 20 kHz. Rated output is 10 mW, with a maximum of 100 mW. The 12.35-ounce headphones are suited for monitoring while recording live performances or off-the-air. Price: \$58.00.

Enter No. 101 on Reader Service Card



### SAE Two Receiver

Model R9 is a 90-watt unit featuring digital FM and AM frequency readout, digitally synthesized quartz-locked tuning, and four-function fluorescent metering, which show AM signal strength, FM signal strength and multi-path, power output, and output level



at the tape-cut jacks. Other features include an external processor loop for noise-reduction or equalizer accessories, a varactor touch tuning control, an automatic scanning capability,

headphone output, three tone controls, and two-way tape dubbing. Price: \$800.00.

Enter No. 103 on Reader Service Card



### Bang & Olufsen Turntable

The Beogram 3400 features touch control buttons on a slanting front panel located outside the dustcover for greater convenience. An automatic sensor assures that the belt-driven turntable will operate only when a

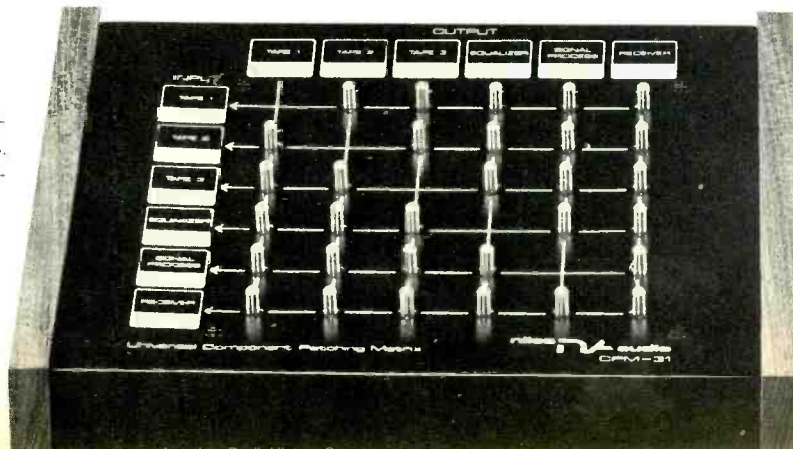
record is on the platter. Because of its patented suspension system, playing will not be affected even if the dustcover is slammed. The unit includes a low-mass tonearm and matched cartridge with elliptical naked diamond stylus. A special coating on the platter helps dissipate static electricity to prevent dust collection on records. Price: \$425.00.

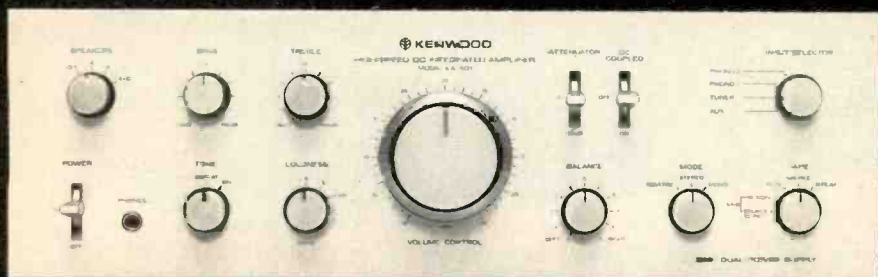
Enter No. 105 on Reader Service Card

### Niles Audio Patchbox

Model CPM-31 Universal Component Patching Matrix is a 5x5 input vs. output patch bay which provides almost any combination of switching, patching, dubbing, mixing, monitoring, and signal processing the user might ever require. Price: \$169.95.

Enter No. 104 on Reader Service Card





### Kenwood Amplifier

Model KA-60 is a high-speed d.c. integrated amplifier said to react instantaneously to transient signals without a time lag that causes spuri-

ous distortion or TIM. In addition, dual power supplies eliminate crosstalk on transients. It delivers 60 W rms/channel, both channels driven

into 8 ohms, from 20 Hz to 20 kHz, with THD less than 0.02 percent. Price: \$399.00.

Enter No. 63 on Reader Service Card

### Phase Linear Turntable

Model 8000 Series Two has a linear tracking tonearm that traces a record's grooves in the same way that the grooves are cut. This eliminates tracking error, prevents harmonic distortion, and lowers crosstalk and IM distortion. The linear motor, which drives

the tonearm directly, and an optical no-contact servo shut-off system enhance S/N to better than 78 dB. The platter drive system incorporates a Hall effect direct-drive motor with a Quartz PLL system. The motor's speed

precision is stated to be 0.002 percent, with wow and flutter less than 0.013 percent W rms. Price: \$749.95.

Enter No. 67 on Reader Service Card



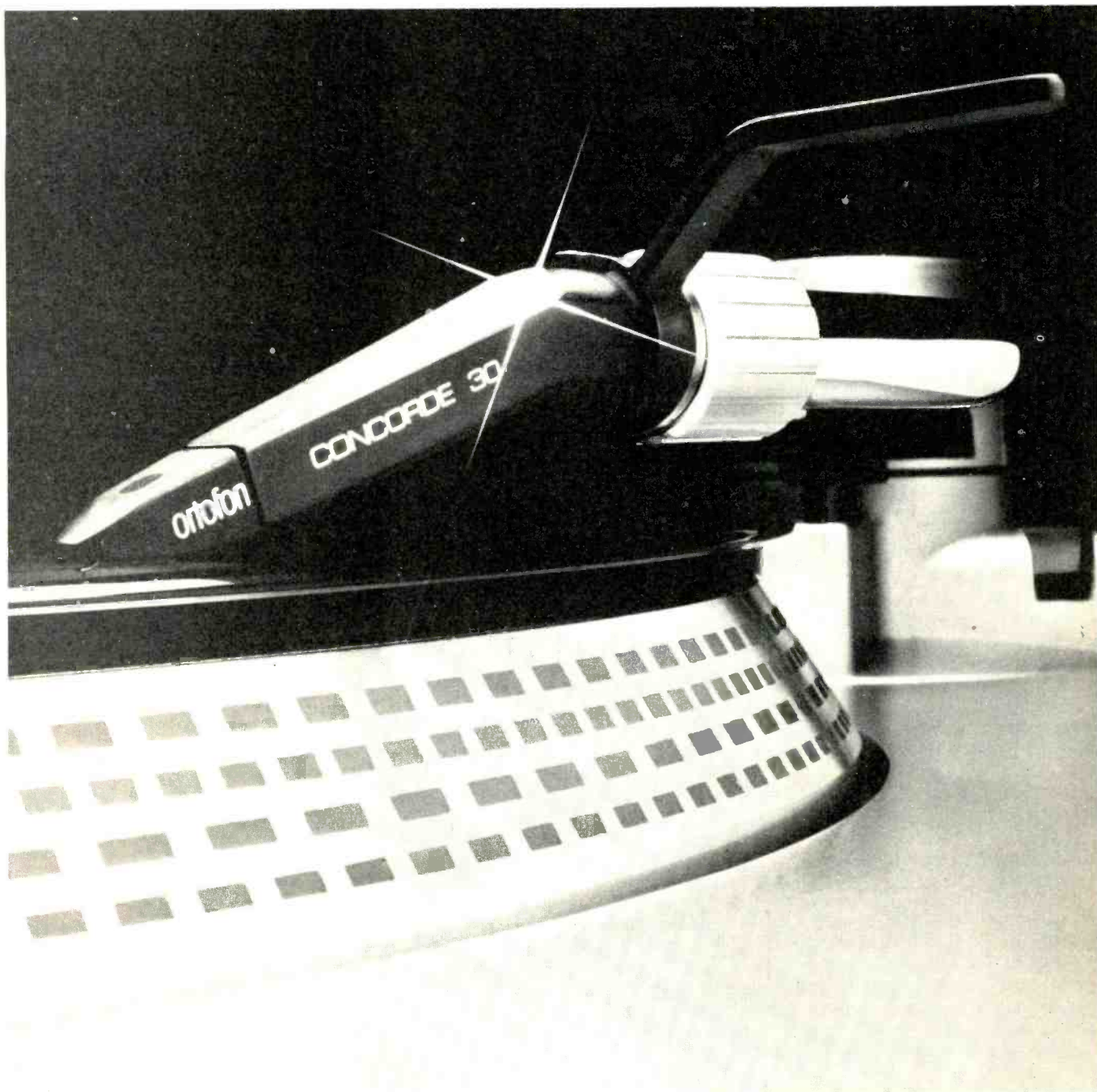
### Marantz Cassette Deck

Model SD9000 Compudeck, with metal tape capability, offers a choice of two memory functions that allow the user to program up to 19 selections. Features include three Sandust alloy heads, two d.c. motors, a double-Dolby system, and two-speed operation. At 3 1/4 ips, wow and flutter is specified at 0.33 percent rms; frequency response is 25 Hz to 20 kHz, ±3 dB, for normal tapes. Price: \$775.00.

Enter No. 108 on Reader Service Card







31

## LAUNCHING A NEW ERA IN THE REPRODUCTION OF MUSIC FROM RECORDS.

A strong claim, but true. The Concorde combines a cartridge and headshell in a single form, but weighs less than most headshells alone. The reduction in record wear and distortion, and the ability to track accurately despite warpage, pay incalculable dividends to music lovers.

Ortofon dealers are now ready to demonstrate the Concorde. It's worth a visit just to see and hear this remarkable cartridge that stands at the very frontier of music reproduction technology. For complete information write: Ortofon, 122 Dupont Street, Plainview, New York 11803.

Enter No. 34 on Reader Service Card

ortofon 

# Dear editor

## Twanks

Dear Editor:

Bob Gary's "Tweaking Your Turntable" has saved me money and extended the life of my ten-year-old turntable.

After reading his article in the May issue, I removed about three grams of excess trim, stylus guard and fingerlift from the pickup shell of my turntable. The results were immediately audible. For the first time, my Shure V-15 Type III cartridge tracked "ffff" passages flawlessly. I had been told that I shouldn't be using a high-compliance cartridge in a relatively high-mass arm. Now, with the help of Mr. Gary, I feel that I have alleviated that problem, and I am again more than happy with my equipment.

Incidentally, during the installation of my V-15 Type III cartridge, I broke the stylus shank. Thinking the unused diamond might still be of some value, I called Shure Brothers. They immediately replaced the damaged assembly free of charge. Shure Brothers not only makes a great product — they care about their customers.

Joseph Reese  
Chicago, Ill.

## Wideband Woodpecker

Dear Editor:

In the July, 1979, issue of *Audio*, Mr. Curtiss R. Schafer makes reference to a particular source of interference on the short-wave bands, and in the editorial reply you state that it "would be interesting" to receive comments from others regarding the interference.

As an active radio amateur (as well

as audiophile), I am quite familiar with the interference to which Mr. Schafer refers. For the past year-and-a-half or so, our friend the "Russian Woodpecker" has frequented the 20-meter ham band with his characteristic pulse-modulated signal which has earned him this nickname.

Contrary to what Mr. Schafer's friends' direction-finding equipment may indicate, however, the source of the interference is not within the U.S., but in the eastern part of the USSR. Believe me, if it were in Bremerton, Washington, as Mr. Schafer's friends indicate, I would know it; I live there.

According to intelligence reports, the offender is an "over-the-horizon" radar prototype which operates in the vicinity of 14 MHz. The pulsed waveform, however, is rich in harmonics, and the total radiated energy from the installation is so great that whenever the Woodpecker comes on the air, the whole world knows it.

Our State Department is aware of the Woodpecker and the trouble he is causing, but appears at this time to be powerless. The Soviets have not denied the existence of the Woodpecker, but have taken no steps to eliminate him, nor to move his frequency to one less likely to interfere with other communications.

Be assured, Mr. Schafer (and others concerned): If the U.S.A. or any other country wished to cause interference to programming in the international shortwave spectrum (3 to 30 MHz), they would do it selectively, not with a broad signal like that of the Woodpecker. It stands to reason that you

wouldn't interfere with your own signal (Voice of America, etc.) knowingly, but the Woodpecker not only clobbers VOA, but renders Radio Moscow unintelligible as well.

Patrick H. Bailey, K7KBN  
Bremerton, Wash.

## Somewhere, Over The Horizon...

In reference to Mr. Schafer's letter in your July '79 column, the "noise" he describes as staccato-like is generally accepted as sounding like machine-gun fire, and has been unofficially named "Ivan The Terrible." The "noise" usually occurs between 9 and 15 MHz with a bandwidth of 300 to 500 kHz wide (sometimes 1 MHz wide), but is not confined to the above parameters.

In December of 1976, the defense departments of Scandinavian countries found what the "noise" was. They called the U.S. Intelligence Agency and had their suspicions confirmed.

It was a Russian over-the-horizon radar system. The radar systems watch over the Canadian and U.S. missile bases, and also the attack paths to the Soviet Union. The system is still in the testing stages, with four powerful transmitters in the Kiev area.

The "noises" that Mr. Schafer's direction-finding friends found are the American over-the-horizon radar stations. What stage of use or building they are in I don't know, but one station is on the West Coast and the other the East Coast.

So Mr. Schafer can be assured that the FCC is not trying to block signals from European and Canadian stations

Howard T. Souther, retired Senior Vice President of Engineering/Manufacturing for the Koss Corp., died of a heart attack on September 11 at his home in Milwaukee, Wisconsin.

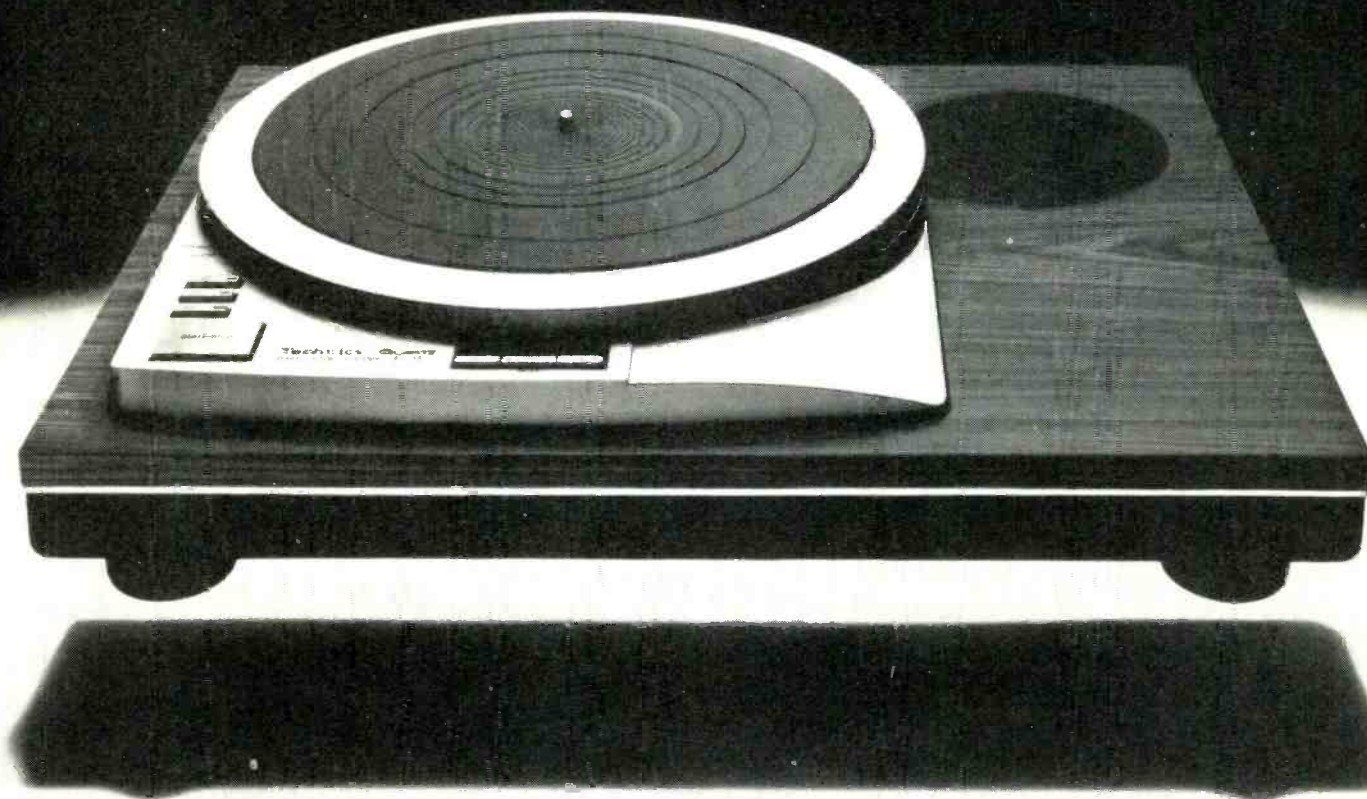
Mr. Souther, who was 69, received his degree in electrical engineering from the Univ. of Arizona. During a long association with the motion picture industry, he was a significant contributor to the improvement of sound quality. As a market director from 1949 to 1959, Souther helped make Electro-Voice a household name in the hi-fi field.



He had been employed by the Koss Corp. since 1967 and was responsible for the development of the world's first self-energized electrostatic stereo-telephone in 1968. His efforts in acoustics formed the basic groundwork for stereo-telephone test measurement, and in 1970 his electro-acoustical research led to the first dynamic element designed exclusively for use in stereo-phones.

Mr. Souther had remained active with Koss as a consultant since his 1975 retirement, and he developed a facility for the manufacture of transducers at Koss/Ireland in 1976.

The SP-15 has two things our best turntable doesn't have: Quartz-locked pitch control and a lower price.



You know what made the SP-10 MK2 our best turntable, and why so many radio stations use it: Wow and Flutter of 0.025% WRMS. Rumble of -78dB (DIN B). Speed accuracy within an astonishing 0.002%. And amazingly high torque for a start-up time of 0.25 second.

Yet for \$300 less,\* the SP-15 has exactly the same high degree of speed accuracy, the same wow and flutter and the same rumble as the SP-10 MK2 while delivering an incredible start-up time of 0.4 second.

Technics quartz-locked pitch control is pretty incredible, too. Unlike the pitch control in many other turntables, it lets you vary the speed with the unvarying accuracy of quartz. In precise 0.1% steps above or below any of the three standard speeds up to a maximum of  $\pm 9.9\%$ . What's more, the exact speed variation you choose is shown right up front in bright digital display. And with Technics you can lock the pitch at the pitch you choose.

Another reason you'll choose the Technics SP-15 is durability. It has an electronic brake that can stop the platter in 0.4 second, even though a tracking force of

2.2 lbs. (or the weight of 250 tonearms tracking at 2 grams) can't begin to slow the platter down. And to help minimize acoustic feedback, it has a heavy-duty aluminum diecast chassis plus a double-damped platter. And when you add the optional SH-15B2 base (shown with SP-15) you'll get the extra protection needed to cope with high volume levels.

There's also Technics SP-25, a two-speed version. With the same accuracy, quartz-locked pitch control ( $\pm 6\%$ ) and many of the great features of the SP-15.

The SP-15 with quartz-locked pitch control. It has the same phenomenal performance as the Technics turntables many FM stations use and discos abuse: MOTOR: Quartz-locked DC direct drive. SPEED:  $33\frac{1}{3}$ , 45 and 78 RPM. STARTING TORQUE: 3.0 kg-cm. START-UP TIME: 0.4 sec. (90° rotation at  $33\frac{1}{3}$  RPM). WOW AND FLUTTER: 0.025% WRMS. RUMBLE: -78dB (DIN B). PITCH ADJUSTMENT RANGE:  $\pm 9.9\%$ .

The SP-15. We added quartz-locked pitch control, we subtracted from the price.

\*Based on Technics recommended price for SP-10 MK2 and SP-15 (excluding bases).

**Technics**  
Professional Series

Enter No. 54 on Reader Service Card

# The weakest link in your hi-fi system isn't in your system.

You could spend thousands of dollars on your stereo system and still not hear its full musical potential. That's because all hi fi systems, even the most sophisticated, have one weak link — *the music source itself.*

Dynamic range (the difference between the loudest and quietest music passages) is one of the primary elements that creates the power and excitement of a live performance. Records (even digital and direct-to-disc), pre-recorded tapes and radio broadcasts sound lifeless in comparison because they're missing more than 1/3 of this vital dynamic range. But add a dbx Dynamic Range Expander to any system, large or small, and the missing dynamics are amazingly restored.

dbx offers three state-of-the-art expanders that let every

stereo system flex its musical muscles. The 1BX, 2BX, 3BX Dynamic Range Expanders provide as much as a 50% improvement in dynamic range, with the additional benefit of up to 20dB reduction of background noise. Any model will let you enjoy *all the music you never heard from your record and tape library.*

Don't let the weak link make your investment in a good stereo system worthless. Visit your nearest dbx dealer for a demonstration of the dbx dynamic range expander that best fits your budget. Experience all the emotional impact and realism that was missing from your music. Records, tapes and radio broadcasts never sounded so good.

dbx, Incorporated,  
71 Chapel St., Newton, MA 02459  
(617) 964-3210.

# dbx

## Making Good Sound Better



dbx is a registered trademark of dbx®, Inc.

Enter No. 11 on Reader Service Card

(they still come in strong as ever).

The information cited here was obtained from a report by the Spanish foreign radio service and a paper by Juan Sanches Belgan entitled "QRM of Ivan the Terrible." I have a taped copy of the program and am willing to share it with readers who would care to send me a blank tape and return postage.

Dan Wilczek  
27 Grant St.  
Auburn, N.Y. 13021

### Ivan, The Woodpecker

Dear Editor:

I suppose that every editor has to print a silly letter once in a while if only to help keep reader interest, but it has been a long time since I have read such stuff as the letter from Curtis R. Schafer in your July issue.

The "staccato-like" interference he mentions is known to amateur and other radio operators, to listeners, and to governments worldwide as the "Russian Woodpecker." It is believed to be a long-range radar system. It constantly moves about in frequency during operation, pausing usually for about 10 S at a time on any given center frequency.

There is no evidence whatever that it originates anywhere but within the USSR. Mr. Schafer can test this for himself by noting that the "loudspeaker" can be heard only when European BC stations (Careful! Not their overseas relays!) can be heard. And then usually near the highest frequency at which they are heard.

Rather than write to *Audio*, Mr. Schafer should write to the FCC, to his Congressman and Senators, and possibly to the State Department. His friends should take up another hobby than direction finding.

Clair J. Robinson  
Minneapolis, Minn.

### Recordists Wanted

Dear Editor:

I would like to hear from readers who are interested in forming a club specializing in recording the neglected, lesser-known, and in some cases unknown classical music repertoire. Operating expenses would be covered by members' subscriptions prior to recording sessions.

The Opera Rara Record Club of England functions in this manner, although they specialize in opera. It should be possible to carry over their success to symphonic music provided enough classical music lovers respond to this idea.

Alex F. Soave  
192 Central Park Rd.  
Plainview, N.Y. 11803

AUDIO • December 1979

All the features you'd expect from  
a 2-channel parametric equalizer.  
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A radical departure in circuit principles, Technics SH-9010 universal frequency equalizer offers the experienced technician and demanding audiophile the flexibility of a 2-channel parametric equalizer with five bands per channel.

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Incredible for the price? You're right. But what's even more incredible is that variable center frequency is just one of the SH-9010's advantages. Variable "Q" or bandwidth is another. With it you can broaden or narrow any frequency band,

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THD: 0.02%. FREQUENCY RESPONSE: 10 Hz—20 kHz (+0, -0.2 dB), 10 Hz—70 kHz (+0, -3 dB). GAIN:  $0 \pm 1$  dB. SN: 90 dB. BAND LEVEL CONTROL: +12 dB to -12 dB (5 elements x 2). CENTER FREQUENCY CONTROL: +1.6 oct. to -1.6 oct. BANDWIDTH (Q) CONTROL: 0.7 to 7.0. CENTER FREQUENCIES: 60 Hz (Variable 20 Hz ~ 180 Hz), 240 Hz (Variable 80 Hz ~ 720 Hz), 1 kHz (Variable 333 Hz ~ 3 kHz), 4 kHz (Variable 1.3 kHz ~ 12 kHz) and 16 kHz (Variable 5.3 kHz ~ 48 kHz). SUGGESTED RETAIL PRICE: \$560.00.\*

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# Audioclinic

Joseph Giovanelli

## Anti-Skating

*Q. As a collector of fine records, who wishes to keep them in excellent condition, I am concerned about reducing wear caused by the cartridge/stylus. Although my tracking force is set for one gram, and I have the anti-skating compensation set per the manufacturer's recommendations, I have read and heard many conflicting articles and stories about anti-skating. Please advise me how anti-skating can be set correctly with no uncertainties.—Name withheld.*

A. Anti-skating compensation can never be set with certainty. The exact amount of compensation required changes from instant to instant, depending on the modulation level on the disc at that given instant. Turntable speed has some influence, plus friction of the stylus as it travels in the grooves. Groove depth plays some part in the amount of friction. I use a system which is at least reasonable. I set the tracking force as prescribed and then take a recording blank, which has no grooves, and place it on the turntable. I place the tonearm on this disc, with the table turning, and next adjust the anti-skating force so that the arm does not move inward or outward. This will achieve the minimum setting. You may need to strike a compromise with some tonearms by making adjustments so that, at one point, the arm drifts in an outward direction. At other parts of the disc, such an arm may drift in an inward direction.

If you cannot obtain a recording blank, use the blank side of one of those plastic sheet Eva-Tone recordings which are often used as promotional materials. Place a standard blank under the thin, plastic sheet so that the tonearm will be at its proper height.

If you have a good test record and an oscilloscope, you can sometimes fine-tune your adjustment just a bit by adjusting the anti-skating compensation for symmetrical distortion on each channel.

## FM Reception Problems

*Q. I recently tried to replace my FM antenna with a TV/FM antenna, given to me by a friend. The idea was to gain outdoor reception for my television*

*set. The result was both terrible FM reception and a poor TV picture.*

*The FM antenna system includes a rotator. My tuner includes a switch which enables the user to hear multipath distortion. Turning the TV antenna did little for signal strength and nothing at all for the distortion.*

*I replaced the coaxial cable and 300-ohm matching transformers and double-checked my work. No change. I spent a lot for parts, including a signal splitter and coupler.*

*Could I have damaged the tuner? I fed the lead-in into a coupler; one output from the coupler fed a band splitter for the TV set, and the other coupler output fed the tuner.*

*The FM signal is now affected by foot traffic in the room where the tuner is housed, and sometimes I lose the station completely. I had none of these problems before this installation. Whom should I call, the repairman or an exorcist? —Bob Breeden, Forestville, Md.*

A. The fact that people moving about your listening room makes a difference to FM reception has to mean that the antenna is not feeding into the set.

The only antenna that you have right now is the piece of twin lead between the coupler and the tuner. The reason that signals come and go as people move around the room is that they absorb or add to the amount of signal reaching this small piece of cable.

Directly connect the lead-in 300-ohm cable (after the matching transformer) to your tuner—without using the coupler. If reception is still poor, I must suspect that one or both of your matching transformers is no good. If reception does become what you expect it should be, the coupler is probably defective. I say this because both the TV set and the tuner are affected, and the coupler is common to both.

These couplers usually work by virtue of the twin lead's being cut by the holding screws. If you fail to tighten these screws firmly, the cutting arrangement will not penetrate the insulation of the twin lead, and no contact will be made. This, in turn, will result in loss of signal.

There is always the possibility of strands of the coaxial cable shorting

out the signal. If the cable was soldered to the transformer terminals, it is possible that excessive heat melted the jacket of the center conductor, causing a short to the shield.

## Sound Quality Of "Picture Discs"

*Q. I have noticed that the sound quality of "picture discs" is not as good as the same music released on conventional discs. Why would the sound quality be poor just because it is a picture disc? —Bob Hoffman, Worth, Ill.*

A. The sound quality on a "picture disc" will not change just because there is a picture printed on it. What tends to change, however, is the amount of background noise which the disc will possess. The use of truly virgin vinyl material will yield a transparent record—not black. The black disc is made by adding lamp black to the vinyl mix before the disc is pressed. By being careful not to add too much lamp black, it is possible to maintain a reasonably good noise figure during pressing.

The process by which a picture is printed onto a disc, however, adds more impurities. These impurities will produce increased background noise. The sound quality, per se, will not change. Of course, if the background noise is high enough, some of the subtleties of high-frequency sound will be masked by this noise.

## Phono Cartridge Channel Balance

*Q. What is meant by "channel balance" in phono cartridges? —T.P.S. Filho, Rio De Janeiro, Brazil.*

A. By "channel balance" in a phono cartridge, we mean that we are discussing the difference in output from one channel of the cartridge to the other. The output voltage with an equal signal should be the same for each channel. Where there is a difference in output from one channel to the other, this difference is expressed in dB.

---

If you have a problem or question about audio, write to Mr. Joseph Giovanelli at AUDIO Magazine, 401 North Broad Street, Philadelphia, PA 19108. All letters are answered. Please enclose a stamped, self-addressed envelope.



An acknowledged world leader in loudspeaker design and engineering, KEF has developed a monitor-standard speaker system that is both small — only ¼-cubic foot in size—and truly “high” fidelity. While these objectives are not new, the Reference Series Model 101 speaker system represents the first time that both are available in one product.

The Model 101 is, therefore, ideal for use in locations where an accurate small speaker is required in keeping with the rest of a high quality audio system.

### System Design

Despite all the ingenious ideas that have been proposed by various speaker manufacturers over the years, the three basic parameters of Enclosure Volume, Bass Response and Efficiency are still related by unchanged physical laws. What is different is the thorough manner in which KEF engineers have, with the use of advanced technology, optimized the relationships between these parameters.

Starting with the premise that prospective Model 101 users will have substantial amplification available, KEF engineers achieved a response from this small enclosure of 90Hz–30kHz  $\pm$ 2dB (–10dB at 47Hz).

KEF's leadership in computer-aided digital analysis techniques enabled them to optimize the design of the drivers, crossover network and enclosure to achieve a Target Acoustic Response without repetitious trial and error experimentation. Much of this technology, which did not previously exist, has been applied to the design and production of a small high fidelity speaker system for the first time in the Model 101.

Once the desired prototype was completed, KEF applied the same unique computer-aided techniques developed for the production of the critically acclaimed Model 105, so that the sound quality originally achieved in the laboratory prototype will be available to every user.

In addition, the high standards of the computer-aided production and assembly procedures enable precision-matched pairs of stereo loudspeakers to now be offered. For example: every Model 101 driver is tested and matched to tolerances of better than 0.5dB, and crossover networks to tolerances of 0.1dB; each pair of drive units is matched not only to each other, but to the other components in the system as well.

### Loudspeaker Protection

The major problem with small, relatively less efficient loudspeakers is thermal overloading of the voice coils. KEF engineers have developed a unique self-powered electronic overload protection circuit, S-STOP (Steady State and Transient Overload Protector).

Musical peaks are generally of short duration, so tweeters can handle far in excess of their normal program rating. A similar situation exists with low frequencies and their effect on the bass unit. Consequently any form of fuse protection can reasonably limit the instantaneous peak handling ability of the system, yet fail to protect the system against a very high average power level. KEF's solution is to incorporate a protection circuit which takes into account the instantaneous power applied to each drive unit and also computes the length of time the signal is applied. The law under which it operates resembles very closely the temperature rise within the voice coil. A potentially damaging signal is immediately attenuated by about 30dB, and the full signal is automatically reconnected when it is safe to do so.

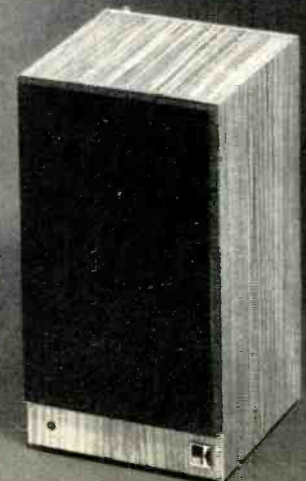
As a result, the Model 101, although only ¼-cubic foot in size, is fully protected against fault conditions when used with amplifiers of up to 100 watts per channel.

The Model 101 is obviously not your average “miniature” speaker system where the quality of sound or power handling capacity is compromised by the small size of the enclosure. Nor is it inexpensive. If you require a speaker system that is both small and truly high fidelity, visit your authorized KEF dealer for a thorough demonstration. For his name, write: KEF Electronics, Ltd., c/o Intratec, P.O. Box 17414, Dulles International Airport, Washington, DC 20041.



# KEF Reference Series Model 101:

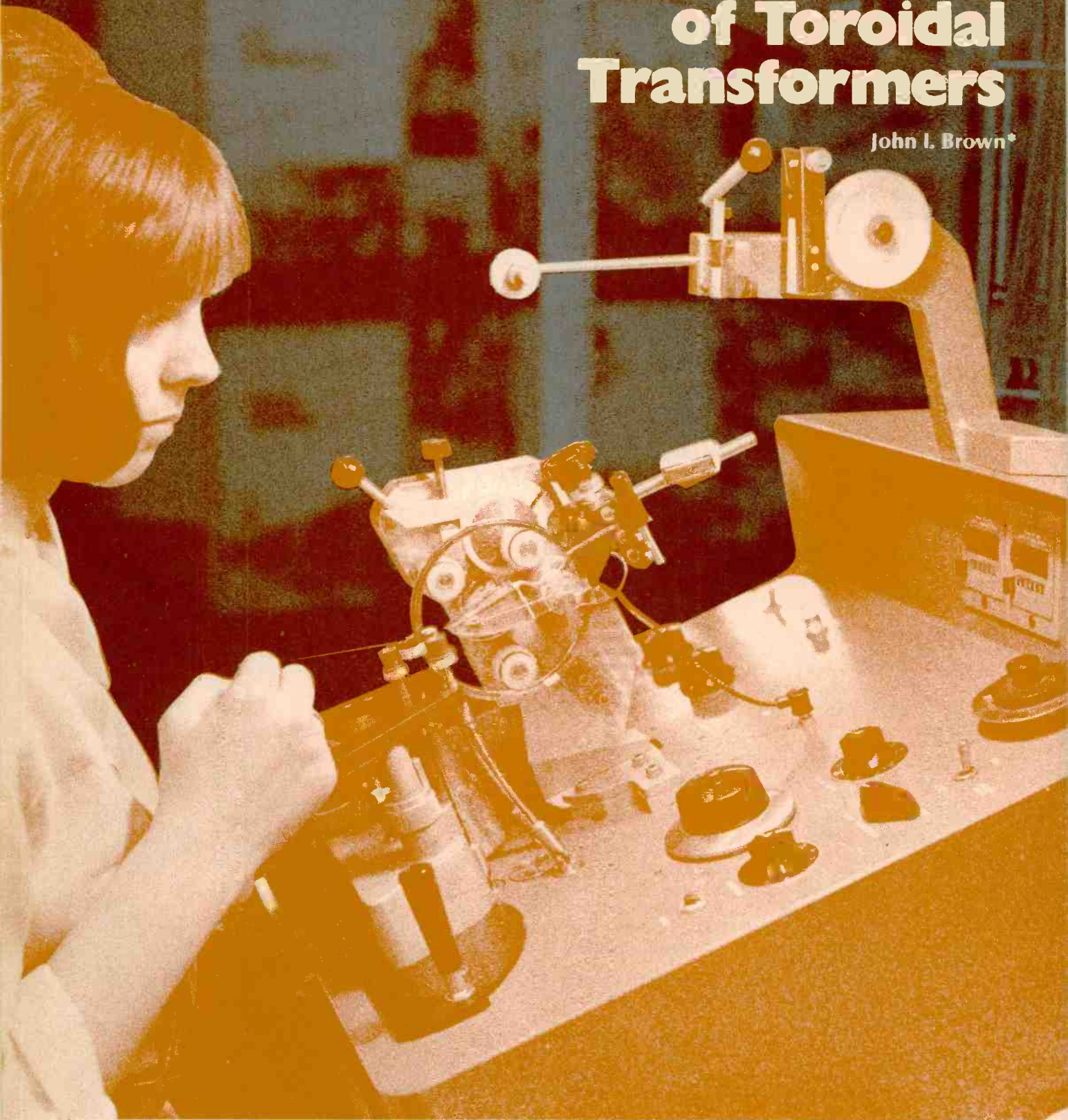
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# The Ins and Outs of Toroidal Transformers

John L. Brown\*





A problem common to all branches of electronics is the hum, both electrical and acoustic, which is generated by power transformers. Electrical hum is caused by stray magnetic flux leaking from the core and windings, and interacting with nearby conductors and components. Acoustic noise is caused by the laminations in the core literally being "flexed" by the magnetostrictive effect of the currents passing through the windings. An accident of design, because its inventor never had hum in mind, gives the toroidal transformer very considerable inherent advantages over other types of transformers when it comes to the suppression of hum despite the influences on audio design which seem to conspire to create a hum problem.

The introduction of veneer type laminates, synthetic surfaces, and constant changes in home furnishing fashions have meant that the industrial designer involved in the audio field had to produce equipment with less "battleship" and more "furniture" if his product was to be readily accepted as an integral part of the home. A typical example is the "slimline" trend where the height of the case has been considerably reduced, and trim good looks have become a marketing necessity. Any physical limitation, imposed by dimensional constraints, makes it that much more difficult for the designer to select a transformer and choose a site where it will not interfere with other circuits. The user has also demanded higher power from stereo amplifiers, with negligible noise, of course, and user requirements have also led to reduction in loudspeaker size with consequent lowering of efficiency so that higher power input is now needed to produce an equivalent sound level. This in turn requires a higher output from the amplifiers. The introduction of solid-state rectifier technology has also caused problems, as has the higher component packaging density brought about by component miniaturization and printed circuit techniques. The circuit engineer therefore faces a mounting difficulty, sooner or later, of what to do about the power transformer—that well-known generator of unwanted hum.

### Hum and Leaking Flux

The trouble with a transformer is, simply, that it depends on the creation and decay of an alternating magnetic flux field through its windings to perform its function in life. Any stray flux, leaking from the transformer, will in-

roduce an emf in any adjacent wiring or susceptible components and will cause hum at the a.c. line frequency. High-gain, high-impedance, low-signal-level circuitry is at greatest risk, which is why the old unwritten law of keeping the input circuitry as far away as possible from the power supply components always made good sense. In the days of tubes, if trouble from power transformer hum developed, then mu-metal screens (which attenuate magnetic flux), twisted pairs, screened leads, and hum-bucking windings could be employed if the transformer couldn't physically be moved to a position where it stopped being a nuisance. The smaller the equipment, though, the more difficult it becomes to find a satisfactory position. In certain instances, it is also necessary to use multiple mu-metal screens, which adds to the cost of the unit.

### The Gap

In the traditional wound-bobbin transformer, with E and I laminations stacked together to form a core, it is the air gap at the junction of the I across the three legs of the E that causes most of the trouble. The air in the gap has a high reluctance, or magnetic resistance, compared with the metal and the concentration of flux which results and radiates out into its surroundings.

The same effect, though to a lesser extent, occurs if the laminations have mounting holes or notches punched through them, because this imposes a localized concentration of the magnetic field and causes some of the flux to be spilled out. The answer to this problem is, obviously, "get rid of the air gap," and to this end, the C core type of construction is a definite improvement. However, even with the butting faces lapped, ground, and polished, a residual air gap remains, and so does some unwanted stray flux.

### Torus Concept

Theoretically, the ideal answer would appear to be to have a magnetic circuit without an air gap, and this can be achieved in practice using a ring or torus, wound from strip steel material rather like a tightly wound clockspring. Granted, with this system you can only wind one toroid at a time whereas you can multiple-wind bobbins, but a fair trade-off can be achieved, however, because you have to assemble the conventional core stack by hand from separate lamina-

tions. The mechanical construction of the toroidal core also has the inherent advantage that once it is wound, its magnetic properties can be measured before the windings are applied in the knowledge that they will remain constant throughout all subsequent operations. The windings are put on the core, using high speed machines, across the three outside faces and through the hole in the center so that they encompass the core. Impregnation, potting, and packaging in thermoplastic cases provide good protection from environmental hazards.

### Electrically Induced Hum

The pulsing magnetic field developed by an unscreened stacked-lamination type transformer can generate a flux leakage which extends completely through the entire spatial volume of a typical modern 100-watt amplifier. Where multiple channel amplifiers are involved, there is an additional problem of unequal demands for current which affect the regulation characteristics as the currents in the secondaries vary in sympathy with the different demands of each channel on the power supply. The use of separate secondary windings and rectifiers for each channel is desirable and, for the purist, two completely separate toroids can be mounted on top of each other and still be lower than a single stacked-lamination type.

The hum problem is not limited to low-level, high-gain stages, however, because it can also make itself a nuisance in the negative-feedback circuits of power amplifier stages. The combination of a "gapless" continuous magnetic circuit and the natural screening effect of the copper windings, which completely enclose the core of a toroid, give an 8:1 reduction in radiated field when compared with a stacked-lamination type as shown in the polar diagram (Fig. 1).

Where radiated magnetic fields are a problem, then the toroidal transformer is more likely to provide a solution without resorting to expensive mu-metal screening or completely reorganizing the circuit layout. Changing a layout might not have presented too many difficulties in a unit constructed with tagboards and discrete wiring because it was a relatively simple matter to reroute a couple of wires or move

•Chief Development Engineer,  
Avel-Lindberg Ltd.,  
South Kendon, Essex,  
England

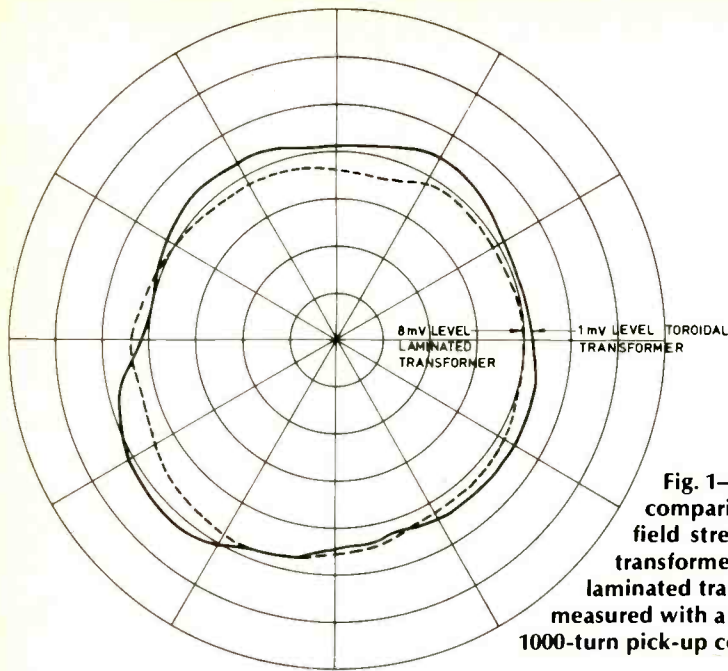


Fig. 1—A polar diagram comparing the radiated field strengths of a toroidal transformer (at 1 mV) and a laminated transformer (at 8 mV) measured with a standard 1000-turn pick-up coil.

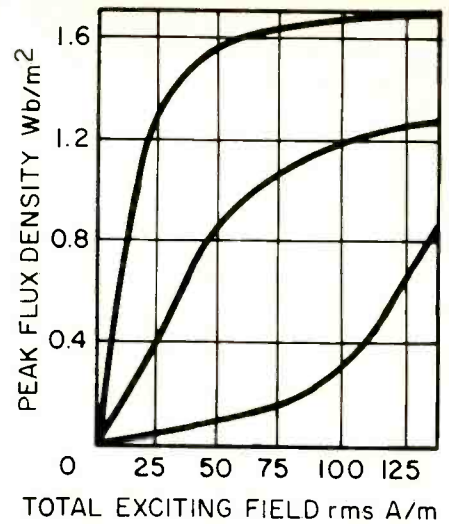
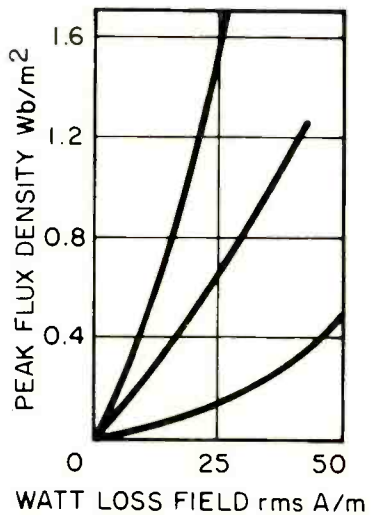


Fig. 3—Magnetic performance of grain-oriented steels is very dependent on grain direction.



some components around. If the circuitry is based on a printed circuit board, however, and hum is only detected at a late stage in the design, it can be an expensive business to modify a complex board layout. In this situation, toroids have often been used as a "last resort," before calling for radical design changes, and have proved entirely satisfactory.

### Acoustic Noise

The best known example of the noise generated by magnetostriction is probably the characteristic "ping" sent out from sonar devices used aboard ships for detecting submarines, fish shoals, or the depth of the sea bed. The current through the transducer causes the laminations to move and displace the medium in which it is mounted — water in the sonar example and air in the transformer example. In sonar it is a necessity; in audio equipment, however, it's the last thing you want from a transformer.

Advances or changes in circuit technology sometimes aggravate the problem of noise while trying to improve other features, e.g. high-voltage, low-current tube circuits with low-value filter capacitors (8 to 16  $\mu$ F) and high-resistance, high-tension windings operated at very low peak currents. The advent of low-voltage, high-current transistor circuitry, however, meant that very much larger (1,000  $\mu$ F) filter capacitors were needed for ripple reduction (smoothing), and these capacitors caused high peak currents to be developed. The general use of low-impedance silicon rectifiers, with large filter capacitors to smooth their d.c. supplies, resulted in the transformer current being in the form of large

Fig. 2—The physical advantages of toroid transformers are demonstrated in this photograph of a 90-VA toroid transformer compared with a similarly rated conventional transformer. The toroidal transformer is 1.8 in. H and 4.2 in. diameter, with a weight of 3 lbs.; the conventional transformer is 3½ in. H x 3½ in. L x 3½ in. W.



pulses with steep edges lasting only a fraction of each half-cycle of the a.c. supply. Typically, the secondary winding feeding the rectifiers of a power supply for a 100-watt audio amplifier delivers pulses in the order of 15-A peak and 2-mS duration at a pulse rate frequency of twice the supply frequency. The harmonics resulting from the sharp pulses begin in and extend well up into the audio range. In the case of a stacked and laminated transformer, the core can be clamped (but, of course, screw holes distort the field), and heavy impregnation helps a little to damp down the noise. The toroidal transformer, however, has a much higher core packing density and is almost a solid ring to start with because it is wound from strip under constant tension. It is capillary impregnated and then the copper windings are wound round the circumference, which in itself is a clamping operation, and also has a damping effect on any sound that is generated.

### Core Material

As a general rule the toroidal transformer is smaller and lighter than a stacked laminated type — of equivalent VA rating and function — mainly because the core material is used more effectively (Fig. 2). The strip is manufactured from grain-oriented silicon

steel (GOSS) and wound so that all the molecules in the metal point in the same direction as the flux. Any molecules out of this alignment increase the reluctance (magnetic resistance) and therefore progressively degrade the performance until, at 90 degrees out of phase, they reduce the effectiveness to that of ordinary mild steel. With a stacked-lamination core, it is possible that at least 40 percent of the total core area will be at 90 degrees to the required grain direction and another 40 percent will be effective only as a return flux path. A smaller transformer — and the savings can be in the region of 50 percent in volume and weight — means greater flexibility in the choice of mounting position and a greater probability of being able to site the transformer where it will not cause interference.

### Core Geometry

The use of strip steel as the core medium enables the transformer designer to produce a large number of variations in core sizes from a single strip width, and this gives more flexibility to the circuit designer who may require a different width-to-height geometry from the optimum two to one. If there is plenty of room for diameter and little height, then a three-to-one ratio could be used, and if space is at a premium then a ratio of 1.5 to 1 could be supplied. In the slimline-styled equipment, the toroid has the obvious

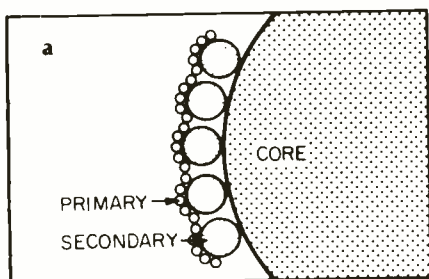
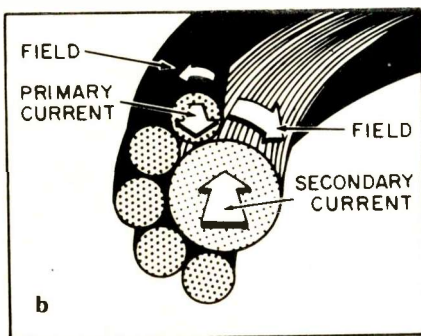


Fig. 4—Even distribution of the primary over the secondary in, a, ensures that the magnetic fields generated in the windings cancel, b.



Nominal Rating	20	20	130	130
Transformer Type	Toroid	Laminated	Toroid	Laminated
Radiated Field (mV) at 7.5 cm from center of transformer	1	7	—	—
Radiated Field (mV) at 11 cm from center of transformer	—	—	1	8
Radiated Field (mV) at contact with transformer	3	10	20	40
Magnetizing Current (mA)	3	36	10	110
Off-load Power Consumption (VA)	0.72	8.64	2.4	26
Iron Loss (W)	0.4	3	1.8	7.5
Copper Loss (W)	2	3	10	9
Total Losses (W)	2.4	6	11.8	16.5
Regulation (%)	10	10	8	7
Temp. Rise (°C)	40	40	45	45
Weight (g)	400	660	1500	3000
Length (mm)	70	70	95	84
Depth (mm)	70	50	95	90
Height (mm)	30	58	50	98

Table I—Comparison of Two Toroid vs. Two Laminated Transformers.

advantage of presenting a very low profile compared with a stacked type, but this is not the only area where the toroid scores because, in any equipment, single point fixing, coupled with low weight and a low center of gravity, helps the engineering.

### Efficiency

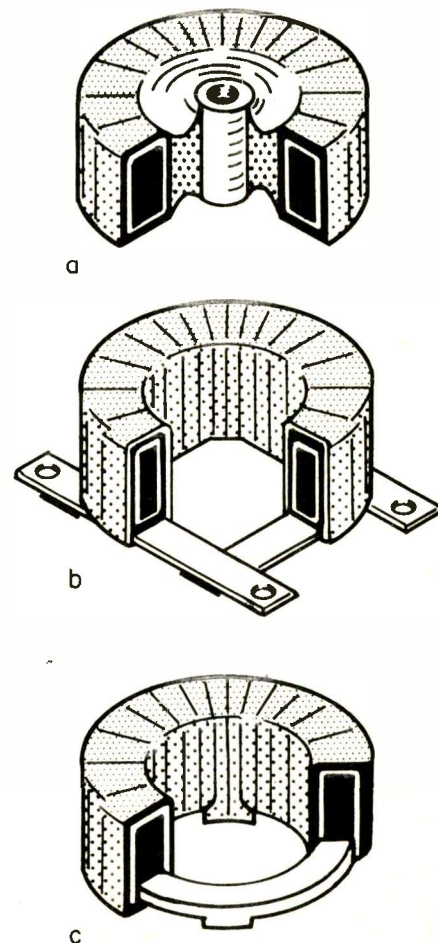
With full advantage being taken of all the grain orientation being in the preferred direction and having no air gap, the toroidal core can be operated at a flux density of 1.6 Tesla (16,000 Gauss) to 1.8 Tesla (18,000 Gauss), while a stacked-lamination transformer would be limited to the 1.2 Tesla (12,000 Gauss) to 1.4 Tesla (14,000 Gauss). This higher efficiency means that the alternatives of using less magnetic material or fewer turns are available to the designer. The iron losses are much less significant in a toroid because the reluctance is so low, and therefore it is often the required physical size that determines the core material, not the losses. The higher efficiency also means that there is less heat generated, and a value of 0.4 watts per square inch of surface area is a reasonable midrange target. The toroidal transformer designer can therefore trade off size against efficiency.

The toroid also saves power, and comparison between the low magnetizing current (which is being drawn the whole time the transformer is connected to the power supply, no matter if secondary current is being drawn or not) of a toroid and that of a laminated transformer amply demonstrates this point. Comparison between the other losses, which also consume power to no good effect, make quite interesting reading (see Table I).

### Mounting

The toroid might well have been designed originally with printed circuits in mind because the center hole fixing, the low center of gravity, and the PC

Fig. 5—Mounting methods for toroidal transformers.





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One of the critically acclaimed advances introduced in Shure's incomparable V15 Type IV phono cartridge is its revolutionary and unique distortion-reducing Hyperelliptical diamond stylus.

The Hyperelliptical stylus contacts the groove in a "footprint" that is narrower than both the Biradial (Elliptical) and the long-contact shapes such as the Hyperbolic. The performance features of this new tip geometry are now available to owners of M95ED or M95G cartridges by simply upgrading either with a Model N95HE Hyperelliptical stylus.

You'll find the cost extraordinarily low—but the difference in sound will be immediately apparent. The new stylus takes only seconds to install with a simple, no-tools procedure.

The Hyperelliptical stylus is also available in a brand new, ultra-flat frequency response, high trackability cartridge: the M95HE. Write for free brochure (AL600).

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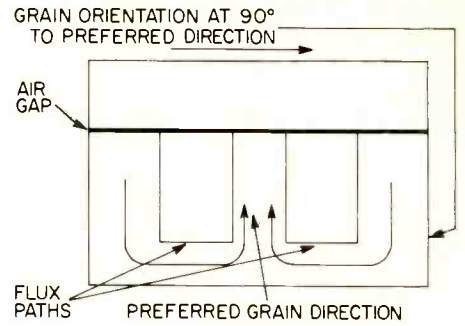
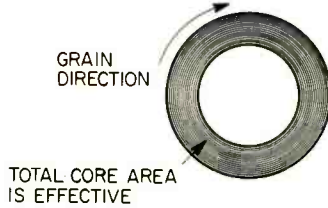


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**Fig. 6—Comparison between toroid core and laminated E and I core showing differences in grain direction.**



board compatible pins enable it to be mounted at the same time as the other major components and flow-soldered using standard production techniques. The availability of a library of entirely "standard" designs also gives the circuit designer the facility of having the "standard range" dimensions — pin layout, fixing drilling ordinates, and track constraints stored as macros in PC board computer-aided drafting systems. In this way the transformer details can be laid down simply by pressing a single key; the computer can also be programmed to take into account the various constraints regarding track widths and spacings to take the current involved.

**Summary**

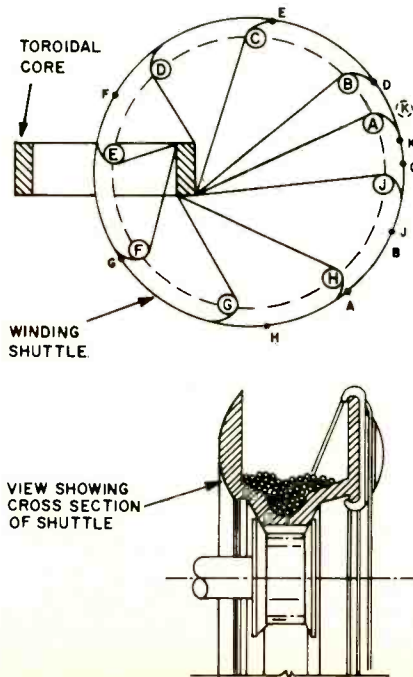
When presenting a summary of the technical advantages of toroidal transformers, there is a danger of establishing a credibility gap by overkill. There is a tendency for the uninitiated circuit designer to speculate "if they are that good, they must be expen-

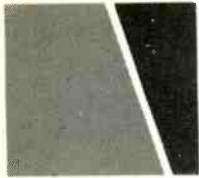
sive." The simple fact is that it is harder to make a comeback than to start from scratch.

The eight-to-one lower radiated field has been demonstrated, and the acoustic quietness is self-evident when the method of construction is investigated. A working flux density of 1.7 Tesla (17,000 Gauss) for the all-in-line grain-oriented toroid, as against 1.3 Tesla (13,000 Gauss) for a conventional transformer, is inherent in the design; as are iron losses of typically only 0.46 W/lb. (Fe) as against 1.25 W/lb. (Fe). The absence of the air gap means the toroid only requires a magnetizing current of one-tenth of that needed by a transformer with a gap. Center-hole, single-point mounting, coupled with the ability to mount the toroid directly onto a PC board, make the production engineer's life easier. The typically 50 percent lower weight and volume, with the lower height profile, must also contribute to easing the designer's ulcer when space is at a premium in high-component density equipment.

The toroid is certainly the oldest type of transformer; in fact, Faraday wound the first ever. But modern winding techniques coupled with advances in wire technology, especially in insulation, have enabled its manufacturers to produce a product of considerable benefit to contemporary circuit designers. The advantages, which stem largely from characteristics inherent in the toroidal construction, will commend the toroid to designers with transformer problems, and in their next project they are likely to specify a toroid as the prime choice as a matter of course. In the past, the toroid has suffered from its own negative feedback effect, where small quantity production kept costs up and the small numbers in use meant that the toroid did not warrant a very prominent place in the educational syllabus for electronic engineers. This educational gap meant that only the "enlightened" specified toroids and, because of the cost penalty, only when any other type would not do the job.

**Fig. 7—The winding process.**





# fact: professional studio technology comes to home hi-fi!



There is a new phono cartridge line that is the talk of the recording and broadcasting industries: the Shure SC39 Series. It is the first professionally optimized combination of true high fidelity performance, superb trackability, resistance to stylus damage under grueling conditions, and prolonged record life. These unique features make the SC39 ideal for high quality home applications as well.

## if you transfer discs to tape

Use the cartridge developed for professional recording studios. The SC39 Series has a special strengthened internal stylus-support wire and elastomer bearing to improve stability when professional backcuing and slip-cuing techniques are employed.

In addition, the SC39 offers a unique stylus tip *not available on any other cartridge*: the MĀSAR™ tip, designed for playing even delicate lacquer masters, without objectionable noise buildup or "cue-burn" damage. It even helps when playing discs with high surface noise, or 45 rpm records made from reprocessed, substandard vinyl or polystyrene.

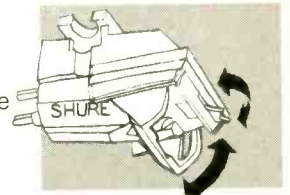


## if youngsters have access to your hi-fi

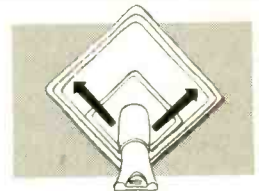


This cartridge also comes close to being "butterfinger-proof." Most stylus damage is caused either by dropping the cartridge or by pushing the stylus sideways against the edge of a record. To protect against this, the SC39 is equipped with two remarkable features. The first is the *Lever-Operated Stylus Guard*, which locks the stylus guard in safety position when not in use. With the flip of a thumb, the guard snaps up and the operating lever turns into a handy cueing aid.

In addition, the *SIDE-GUARD Stylus Deflector* protects the stylus shank from damage by withdrawing it safely into the cartridge body in response to sideways impacts.



Lever-Operated Stylus Guard

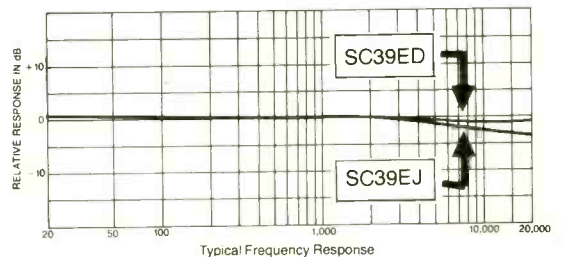


SIDE-GUARD Stylus Deflector

## if you prefer professional response

The transparent sound of the SC39 Series is due to its optimized professional response which is virtually flat through the upper mid-range, with a smooth and gentle rolloff at the highest frequencies. It is especially pleasant when used with loudspeakers that tend to exaggerate the high frequencies.

There are three models in the SC39 Series: SC39ED—Biradial (Elliptical) stylus for ¾ to 1½ gram tracking; SC39EJ—Biradial (Elliptical) stylus for 1½ to 3 gram tracking; and SC39B—Spherical stylus for 1½ to 3 gram tracking.



Send for brochure AL620.

# SC39 series professional phono cartridges... by



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# Picking at the Congress

Peter W. Mitchell

Americans buy about a billion dollars' worth of hi-fi components each year, and much of that hardware comes from the large manufacturers whose names everyone knows — Pioneer, Bose, Kenwood, Advent, etc. But one of the major trends in the audio industry is the proliferation of independent small companies, manufacturing a small number of products each of which represents a particularly thorough and thoughtful design effort by just one engineer or a small staff.

In the October and November issues of *Audio*, Bert Whyte described many of the exotic and innovative new products on display at last summer's CES, including some of the most advanced designs seen (and heard) at the Pick Congress. But there are so many companies designing new products these days, with so many exhibits both in the Pick and other hotels as well, that even the highly peripatetic Mr. Whyte was not able to cover them all, even in two months' worth of columns. So in the following paragraphs we will look at a few more of the provocative products seen last summer at the Pick; given the usual delays in starting up production of new designs, some of these components will just be arriving in retail stores when this issue gets to you. Being a dollar-conscious New England Yankee myself, I will concentrate mainly on products with non-exotic price tags, if only to show that a thoughtful and innovative design needn't cost as much as a new car. And rather than providing a laundry list of new products, I will focus on the ideas and concepts which stand behind them — new ideas worth knowing about and a few old ideas which deserve another look.

## Amplifiers

Discussions of new amplifiers often revolve around exotic technology — FETs, ring-emitter transistors, floating-bias output circuits, slew rates measured in hundreds of volts per microsecond, etc. But there is another school of amplifier design which suggests that while these improvements may be audible under idealized conditions, much larger differences in amplifier performance arise under typical

operating conditions which are not considered in the design lab. By rigorously analyzing amplifier misbehavior modes and thoughtfully applying non-exotic technology, a surprisingly clean and musical amplifier can be produced at reasonable cost.

As a trivial example, an "ideal" amplifier might have vanishingly small levels of transient intermodulation or slew-induced distortions (TIM and SID), obtained by making the amplifier have very fast response from d.c. to television frequencies. But in typical real-world audio systems, all of the signal energy found at infrasonic and ultrasonic frequencies consists of distortion and interference whose amplification and delivery to the speaker yields no benefit and may produce audible intermodulation products *within* the audible range. By designing and placing a minimum-phase, audio-bandpass filter ahead of the output stage, the designer can prevent a common real-world problem, eliminating a cause of unclear sound. At the same time this provides a gentle limit to the rise times in the input signal, thus ensuring that the output stage can never be driven beyond its slew-rate capability. The result is an amp which is free of TIM or SID without exotic and costly ultra-high-speed output devices.

A more serious set of real-world problems arises because amplifiers are *designed* to drive 8-ohm test resistors but are *used* to drive loudspeakers whose minimum impedance is usually lower than specified, partly reactive, and may become increasingly nonlinear at high volume levels. In a simple experiment to measure the current flowing through loudspeakers while they were reproducing music, I have observed current peaks of plus and minus eight amperes (i.e. 16 amps peak-to-peak) in simple drumbeats played by America's best-selling "8-ohm" loudspeaker. With "4-ohm" speakers, or two 8-ohm speakers wired in parallel, this current requirement might have doubled. Very few of today's amplifiers, regardless of their exotic technology, are designed to provide such output currents to the speakers. Furthermore the impedance of a typical loudspeaker is partly reac-

tive, i.e. inductive and capacitive as well as resistive, so currents and voltages tend not to be in phase. As a result, it is not uncommon to find an amplifier's protection circuit producing audible distortion at output levels lower than the amp's rated power. VI (voltage-current) limiters commonly work by feedback, altering the input signal in an attempt to keep the output within the prescribed "safe-area" bounds prescribed for the output transistors.

The object of this prelude is to suggest that audible differences among amplifiers under typical operating conditions often depend as much on the amplifier's interface with the loudspeaker as on conventional performance parameters such as the distortion and slew rate measured when driving a resistor on the test bench. By minimizing or eliminating the influence of protection circuits on the amplifier's sound, a remarkably high level of performance may be obtained from an amplifier with non-exotic specifications. It is possible, for example, that the notably fine sound of the MOS-FET power amplifiers which have been introduced by Hitachi and Hafler is not due only to the high speed of the MOS-FET; it probably is also due to the MOS-FET's negative thermal coefficient and consequent resistance to self-destruction, leading to circuit designs which require unusually little VI limiting for protection.

Two new amplifiers seen at the Pick Congress exemplify this design approach but use "conventional" bipolar transistors. One of these is from NAD, an international company which has a headquarters in London. NAD decides what products it wants to create and farms out their actual manufacture to specialized independent factories around the world (e.g., NAD amplifiers and tuners are assembled in Taiwan, their turntables are from England, and a moving-coil cartridge comes from Japan). They had the most incongruous display at the show: A simple-looking little \$175.00, 20-watt Model 3020 integrated amplifier driving the big Acoustic Research AR-9s. It didn't reach disco volume levels, of course, but its sound was clean, trans-

# At last a moving coil cartridge you can recommend to your best friend!



Model AT30E: \$125.00

## New AT30E Stereo Phono Cartridge with Vector-Aligned™ Dual Moving MicroCoils™ and user-replaceable Stylus

The subtle, yet unique characteristics of moving coil cartridges have had their admirers for years. A top-quality moving coil cartridge exhibits remarkable sonic clarity and transparency. This performance can be attributed to the very low mass, and low inductance of the tiny coils used to sense the stylus motion.

But until now, moving coil cartridge popularity has been limited by three major problems which seemed almost inherent to moving coil designs.

1) It seemed impossible to make a user-replaceable stylus assembly without compromising performance; 2) most moving coil cartridges exhibited relatively low tracking ability due to rather stiff cantilever mounting systems; and 3) output of the cartridge was below the level needed for commonly available amplifier inputs.



Introducing the new Audio-Technica AT30E and the end to all three problems! Our design approach is simple and

direct. Rather than locate the coils in the cartridge body, they are integral with the stylus assembly. If the stylus becomes worn or damaged, the *entire* moving system, coils and all, is simply unplugged and replaced, just like a moving magnet cartridge. Large, gold-plated connectors insure loss-free connections so vital at the low voltages generated by a good moving coil cartridge. The result is easy field replacement with no penalty in terms of performance.



Careful research indicated that good tracking and moving coil design were not incompatible. By controlling effective mass and utilizing a radial damping system similar to our famed Dual Magnet™ cartridges, we have achieved

excellent tracking ability throughout the audio range. Compliance is individually controlled during manufacture of each assembly to optimize performance. This extra step, impossible with most other designs, coupled with our unique radial damping ring, insures excellent tracking of the high-energy modulation found in many of the top-quality recordings now available.

Each coil is located in the ideal geometric relationship to reproduce "its" side of the record groove. This Vector-Aligned™ design assures excellent stereo separation, minimum moving mass, and the highest possible efficiency. It's a design concept which is exclusive to Audio-Technica, and a major contributor to the outstanding performance of the AT30E.

We can't take credit for solving the low output problem. The AT30E output is similar to many other fine moving coil cartridges. But an increasing number of amplifiers and receivers are featuring built-in "pre-amplifiers" or "head amplifiers" to accommodate moving coil cartridges directly. Thus the new systems buyer can make a cartridge choice based on sonic characteristics rather than on input compatibility.

In addition, Audio-Technica offers the Model AT630 Transformer for matching to conventional amplifier inputs.

The new Audio-Technica AT30E Dual Moving MicroCoil Stereo Phono Cartridge. With the introduction of this remarkable new design, every important barrier to full enjoyment of the moving coil listening experience has been removed. Progress in sound reproduction from Audio-Technica... a leader in advanced technology.



parent, and detailed at levels substantially higher than what we usually expect from a low-cost budget amp. I am reminded that Paul Klipsch used to remark that what the world needs is a good five-watt amplifier (to drive his high-efficiency Klipschorns); in our pursuit of the state of the art, we often neglect the needs of people whose bank accounts won't accommodate kilowatt amplifiers and whose neighbors won't tolerate wall-rattling volume levels. Stereo systems which produce only a modest quantity of sound need not be equally limited in quality. The NAD 3020's sonic performance probably can be credited to several factors — the use of large output transistors normally seen in 60-watt amplifiers, with voltage and current ratings sufficiently conservative that VI limiting never occurs in use; enough output current to drive even 2-ohm loads; a phono preamp which is unusually elaborate for a budget amp; a "soft clipping" circuit which minimizes power-supply buzz and even-order

maintain a large dynamic headroom with load impedances of 8-16 ohms, or set it to provide the lower voltages and larger currents required for high peak output into 2- to 4-ohm loads. Since listeners usually don't know the true impedance of their speakers, a VI comparator monitors the output voltage and current flow and activates a front-panel light to tell the user which way to set the transformer switch.

Apt also displayed a mockup of their Model 2 amplifier, a more exotic design which will be released next spring. It employs MOS-FETs (in multiples for large current capacity) and a Class-D switching power supply which eliminates the usual bulk of a large power transformer and filter capacitors. The Model 2, like the Model 1, is about the size of the Apt preamp and has a rated output of 200 watts/channel continuous and 800 watts/channel for transients! Normally MOS-FETs require a lot of heat-sinking because of their quiescent power dissipation (high idle current combined with the

## Loudspeakers

My attention was drawn to the H/H amplifiers by the speakers that they were driving at the Pick: The Dayton-Wright XG-10 full-range electrostatics. It is risky to judge loudspeakers on the basis of first impressions in a hotel-room show; any conclusions must perforce be tentative. But while the earlier Dayton-Wrights had generally struck me as sounding a bit hard, my first impression was that the reproduction of both vocals and instrumentals through the XG-10 was startlingly realistic and uncanned. Such quality doesn't come cheap of course, \$2,900.00 for a pair. But that doesn't seem exorbitant by the standards of today's exotic loudspeakers.

Having delivered my disclaimer about trusting first impressions at shows, I must now echo Bert Whyte's enthusiastic comments about the remarkably uncolored, wide-range sound of the Bowers & Wilkins 801 (\$2,500.00 per pair). In the carnival-like atmosphere of the show, the B & W rooms were a model of thoughtful attention to program material, room acoustics, and the aesthetic values of music. At any show one can always count on Allison Acoustics, too, for a similarly relaxed and civilized atmosphere with well-chosen music.

The principal trend visible in current speaker designs is the attention being paid to the control of reflected sounds that can bounce off the speaker's own cabinet or off nearby surfaces such as walls and floor. A decade ago at AR, Allison and Berkovitz discovered the irregular response that arises from the woofer's boundary reflections, and Allison Acoustics pioneered the increasingly popular column design with the woofer placed at the floor/wall intersection. But so far other manufacturers have not applied the same principles to smaller bookshelf speakers — in which the woofer ends up on the top or side of the cabinet, next to the wall, with the tweeter on the front. The new Allison Six is a particularly compact implementation of this approach, in the form of an 11-in. cube. Its spacious stereo sound field was not surprising, but its clean, deep bass output was — particularly when the Allison Electronic Subwoofer was used to dig into the recording and bring its bottom-octave bass up to audible levels.

There's a new speaker company formed every week or so, and one of the more promising is Boston Acoustics, founded by Andrew Petite and Frank Reed after they left Advent. Their first speaker, the A200, is quite un-Adventish in appearance and

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## The products of independent designers are worth examining because in some cases they will turn out to be the harbingers of new trends.

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harmonics when the amplifier clips, and a high IHF dynamic headroom factor.

The second amplifier which exemplifies these ideas is the Model 1 power amp designed by Tomlinson Holman and his colleagues at Apt Corp. It uses newly developed bipolar output transistors with an exceptional combination of ruggedness and speed, yielding high slew rates and very high peak output currents without the limitations imposed by VI limiting. This power amp is nearly the same size as the well-known Apt/Holman preamp and is rated at 100 watts/channel; with a dynamic headroom of 3 dB, it actually exceeds 200 watts/channel on musical transients into either 8- or 4-ohm load impedances and maintains strong output down to 2 ohms. Its power transformer has two sets of secondary taps which are selected by a rear panel switch; depending on the true impedance of his loudspeakers, the listener can set the transformer to supply the large voltage swings required to

high power-supply voltages required for large rated power output), which would make the compact size of the Apt 2 impossible. So the Model 2 doesn't use fixed power-supply voltages; instead an active "smart" supply is used, producing supply voltages which vary over a broad range to track the audio signal. The compact size of the celebrated Carver "magnetic" amplifier is based on a similar principle — forcing a supply voltage to track the audio input so that the quiescent dissipation is low at normal levels while a large voltage swing is generated on demand to accommodate loud passages and transients.

Currently all of the MOS-FET amps announced so far have names beginning with H: Hitachi, Hafler, Holman (Apt), and H/H Electric of Cambridge, England. H/H has developed a line of amps employing fewer or more of the devices to yield rated outputs of 60, 150, or 200 watts/channel, with the option of bridged mono operation to yield 250, 500, or 800 W respectively.



# Perfection for the Professional

Drawing upon their unequalled 30 year leadership in magnetic recording technology, Tandberg's TD 20A open reel tape recorder extends their traditionally superior level of performance to even further limits—to even beyond the present capabilities of today's magnetic recording tape! This is due to Tandberg's exclusive ACTILINEAR Recording System, which not only provides up to 20 dB headroom margin over existing tape, but is specifically designed to be used with the new high coercivity tapes that will appear in the market in the near future—including the soon-to-be-available metal particle tapes. No other quality open reel tape recorder can make this obsolescent-proof claim today.

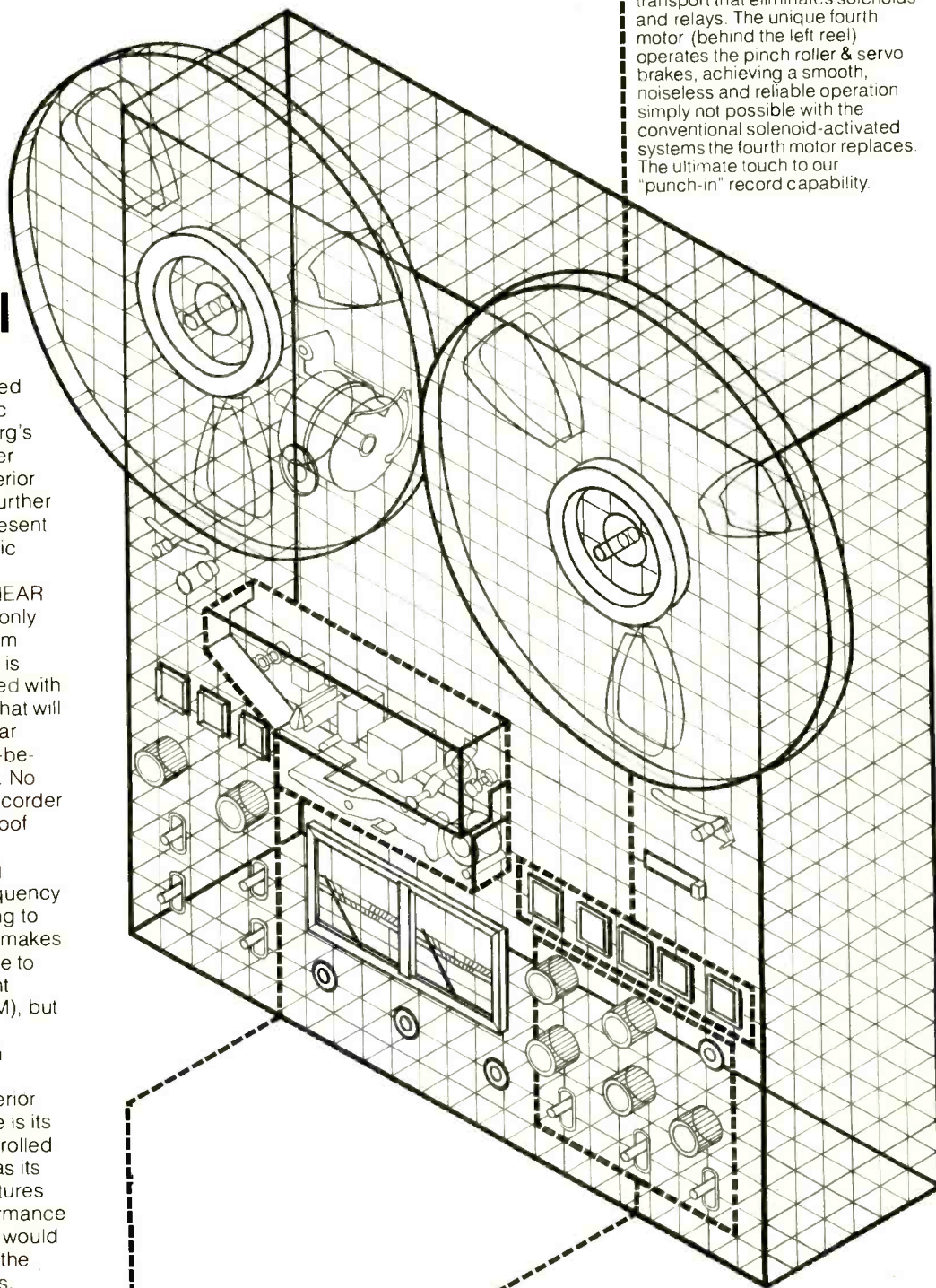
The ACTILINEAR Recording System's extremely linear frequency response ("ruler flat" according to some test reviewers) not only makes the TD 20A essentially immune to slow-rate limiting and transient intermodulation distortion (TIM), but also means better transient response and lower distortion overall.

Adding to the TD 20A's superior level of quality & performance is its unique PROM computer-controlled four-motor transport, as well as its many standard operating features that permit a degree of performance and control flexibility that you would expect only from Tandberg—the world leader in tape recorders.

Visit your authorized Tandberg dealer for a demonstration of the TD 20A. Check our *guaranteed minimum specifications* and rate them against any other manufacturer. Combined with the unsurpassed ease of operation & control, the TD 20A is probably more tape deck than you actually need. Isn't it the way things should be?

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**TANDBERG**



Tandberg's exclusive PROM computer-controlled four-motor transport that eliminates solenoids and relays. The unique fourth motor (behind the left reel) operates the pinch roller & servo brakes, achieving a smooth, noiseless and reliable operation simply not possible with the conventional solenoid-activated systems the fourth motor replaces. The ultimate touch to our "punch-in" record capability.

Tandberg's unique ACTILINEAR Recording System, offering up to 20 dB headroom margin over existing tape. And easily adjustable for use with the new high coercivity tapes to come, so your TD 20A is obsolescent-proof!

Still more features: Four line input mixer + Master gain control with pre-set, Self adjusting input amplifier, Front-panel bias adjustment, Mic sensitivity switch, Channel Sync & Sound-on-Sound, "Free" mode & Edit/Cue facilities, Infrared-controlled motion sensing device, Professional scrape-flutter filter, Separate power supplies for operational functions & audio functions, and Peak-reading equalized meters that have been graphically redesigned for easier reading.

Optional PCM infrared wireless remote control for an ease of operation that doesn't tie you down to the length of a cable. Plus automatic start & stop via a timer switch (optional).



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sound; in fact, it doesn't look like any of the more traditional Cambridge bookshelf speakers. It's a floor-standing unit, only a few inches thick, 1½ ft. wide and 3½ ft. tall, with its 10-in. woofer near the bottom behaving as if it were mounted at the floor/wall intersection and radiating uniformly into that 90-degree solid angle with all boundary reflections in phase with the woofer's direct output. The midrange and tweeter, flush-mounted in a very large front-panel area and more than a half-wavelength away from any cabinet edges, radiate rather uniformly into a 180-degree solid angle. As a result the speakers have a remarkably uniform tonal quality over a large listening area.

A couple of really small speakers drew a lot of attention at the Pick: The KEF 101 minis mounted in midair on slim poles (like microphone stands), and the Cizek KA-1 minis beautifully finished in Hawaiian koa wood with a companion common-bass subwoofer also finished in the same wood — a striking solution to the perennial problem of integrating hi-fi technology into a gracefully appointed living room.

#### Phono Cartridges

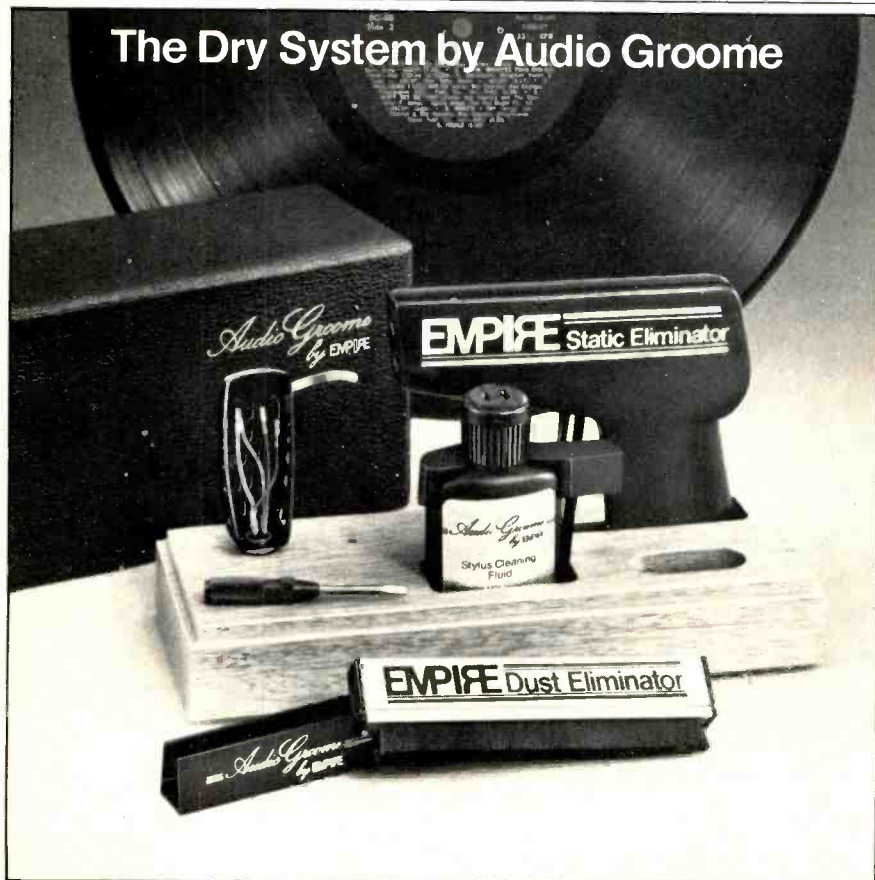
Historically there have been numerous obstacles to widespread accept-

ance of moving-coil pickups by American audiophiles — low output voltage (requiring the addition of a preamp or transformer), a typically massive cartridge body (implying low compliance and mediocre low-frequency tracking), a tipped-up high end with undamped ultrasonic ringing, styli that were not user-replaceable, and a retail price substantially higher than the better moving-magnet designs. Happily these obstacles are gradually becoming overcome, though not all in any one model. For example, new MC pickups from Adcom and NAD have joined the family of high-output-voltage models from Satin and Dynavector, feeding directly into the standard RIAA phono input without any step-up device (though, for the benefit of listeners who have already made that investment, the Adcoms are optionally available in low-voltage versions as well). Adcom's head, Newton Chanin, was previously an Ortofon executive, and the Adcom Crosscoils (so called because their coils are symmetrically wound on an X-shaped armature), will retail for around \$200.00. Adcom personnel conducted a showdown at the Pick, an on-the-spot comparison versus many of the best-known MC pickups from Fidelity Research, Denon, etc.

The Adcom and NAD pickups are made in Japan, in part because a high-output MC cartridge requires a large number of turns of extremely fine wire to form each coil — involving specialized techniques and equipment not widely available. The NAD 9000 costs only \$160.00 and has a total weight of 6 grams, less in both respects than some of today's moving-magnet pickups. The NAD has an internal electrical damping network which eliminates ultrasonic ringing and yields an unusually flat response. Meanwhile Satin has announced a new model in its popular 117 series, an MC pickup whose stylus assembly is user replaceable.

Yamaha and JVC have taken another approach to the problem of winding consistently good coils; instead of wire they employ tiny bits of IC substrate on which a delicate spiral conductive pattern has been photo-etched. One more aspect of cartridge design is receiving fresh attention: The cantilever bar which carries the stylus vibration up to the coil/magnet assembly. New MC pickups from Sony and Onkyo employ carbon fiber, Yamaha's MC-1 employs a beryllium rod, and Dynavector's Karat 100R has a solid ruby cantilever and a proportionally exotic price. A

## The Dry System by Audio Groome



## Record care that leaves behind clean sound, not chemicals.

Housed in a solid mahogany base with removable leatherette cover, the Dry System is a combination of Audio Groome products designed to prolong the life of your record collection. The position of each item within the package has been carefully considered so that when placed next to your turntable, the most frequently used are the most accessible.

1. Empire Static Eliminator: Millions of positive and negative ions are released to effectively neutralize the entire surface of the record. It stops dust before it starts.
2. Empire Dust Eliminator: Microbristles reach deep down into record grooves to lift dirt out with thousands of electrically conductive carbon fibres which neutralize the static charges that attract dust.
3. Empire Stylus Cleaning Kit: Built-up dirt on the stylus can disfigure the record grooves and ruin the stylus. Our special formula fluid and brush keeps your stylus free of dirt, helping to prolong record life.
4. Empire Universal Headshell: Many of today's audiophiles use more than one phono cartridge. This additional lightweight aluminum shell allows switching cartridges without constant remounting.
5. Empire Audiophile Screwdriver: The perfect tool for minor adjustments.

For complete information on Audio Groome accessories write to:  
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*Audio Groome by* EMPIRE

ADC has four Sound Shaper<sup>®</sup> frequency equalizers that will improve your sound system. No matter how good it is. And at a cost that's lots less than trading in your components.

ADC Sound Shapers will improve your speakers. By extending the true bass response, including the critical mid bass.

ADC Sound Shapers will improve the relationship between your cartridge and speakers. From one of partial incompatibility to total compatibility.

They'll also eliminate rumble (low frequency overload), tape hiss and record scratches.

And that only scratches the surface of what ADC Sound Shapers can do. For instance, the walls, carpeting and furniture of your listening room physically bounce sound around so that some spots have less sound than other spots.

Lots less. ADC Sound Shapers will bring these "dead" spots to life.

Perhaps best of all, though, is a Sound Shaper's ability to let you re-equalize what a recording engineer mixed. If a horn section is overwhelming a piccolo, for example, you just slide the appropriate frequency lever. Presto, more piccolo. You can also vanquish a voice. Or boost a tuba.

Sound Shapers segment the entire spectrum of sound. To let you re-shape a sound track to your personal musical preferences. It's all the control you've ever dreamed of but never dreamed possible.

To get into equalizers, start with our Sound Shaper One which operates in five frequency ranges. Or our Sound Shaper One Ten which gives you greater control by operating in ten frequency ranges.

For more professional equalizers, there's our Sound Shaper

Two Mk II which functions in twelve frequency ranges with a two-channel LED meter. And there's our new Sound Shaper Three *Paragraphic*<sup>™</sup> Equalizer.

It combines all the advantages of a graphic equalizer with all the advantages of a parametric equalizer. Twelve primary frequency controls per channel. Plus twenty-four ancillary control positions per channel. The Sound Shaper Three is the ultimate in controlling and creating with your stereo system.

Take the ultimate step up in sound, without trading in a thing.

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# HOW TO TRADE UP YOUR RECEIVER, TUNER, AMP, TURNTABLE, CARTRIDGE AND SPEAKERS WITHOUT TRADING IN A THING.



**ADC** **SOUND SHAPER<sup>®</sup>**  
A BSR COMPANY **FREQUENCY EQUALIZERS**

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## Consider what it would be like to own the new Dual 839 cassette deck.

The new Dual 839 is so different from all other cassette decks that, rather than list its many features, we'll guide you through them as if the 839 were in front of you.

First, the 839 is bi-directional. In record and playback, the tape reverses automatically and stops at the end of the second side. This doubles the length of every cassette. (Reversing can also continue indefinitely if desired.)

You'll notice there's no door between you and the cassette compartment. Just a shield over the tape heads that swivels away when you switch on. Insert a cassette and it will lock in precise alignment. That's Dual's Direct Load and Lock system. (A subtle but important touch: any slack in the tape is immediately taken up.)

Follow us carefully on this next one. Even when the tape is in motion, you can pull it out and replace it with another... and the previous mode resumes automatically. Useful? Well, if you're recording off the air and the tape nears the end at a crucial moment, you can have a new tape in place without missing a beat.

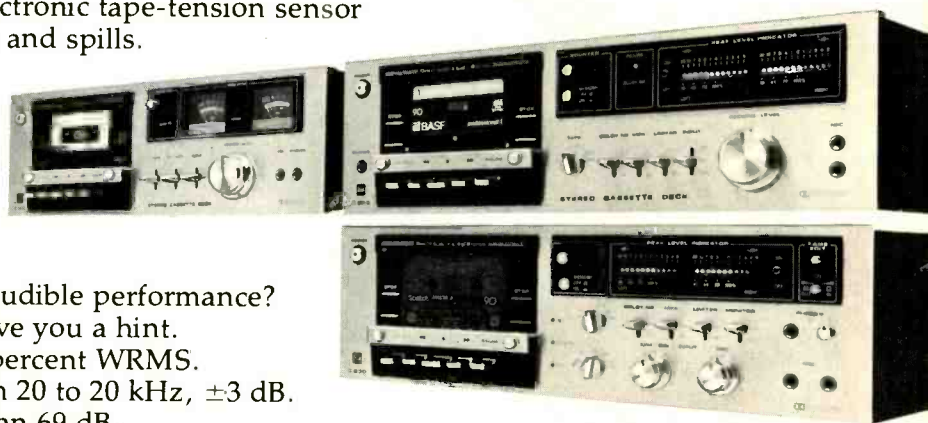
The 839 is just as innovative in playback. If a tape made on another deck is too sharp or too flat, or if you need to match pitch to a live instrument, no problem. Playback pitch can be varied over an eight percent range.

And previously recorded tapes with clicks, pops and disc jockey interruptions can be cleaned up electronically—smoothly and permanently. Dual's fade/edit control lets you do that with complete confidence, because it functions in playback.

Back to recording. The peak-level LED indicators react faster than any other metering system. And more accurately, because they're equalized. They read the full processed signal—including the high frequency boost other decks add but only Dual reads. No more risk of overloading a tape into distortion.

There's still more. Much more. Full metal record and playback. 6-way bias/equalization. Computer logic solenoid-activated controls. Switchable multiplex filter. Switchable limiter. Line and mic mixing. Two-way memory stop with automatic replay. Headphone level controls. And operation by external timer or optional wireless remote control.

Among the features you can't see are the two-motor, twin-capstan drive system and the electronic tape-tension sensor that guards against jams and spills.



What about the 839's audible performance? The specifications can give you a hint. Wow and flutter  $\pm 0.03$  percent WRMS. Frequency response from 20 to 20 kHz,  $\pm 3$  dB. Signal-to-noise better than 69 dB.

Of course, there's a price for all the 839 offers: \$850. If that seems to be more deck than you really need, there are three other new Dual cassette decks. They start at \$330, and they all feature the Direct Load and Lock system, DC servo motors, twin-belt drive systems, tape-motion sensor/protectors and equalized meters.

For complete details on all four Dual cassette decks, please write to us directly. United Audio, 120 So. Columbus Ave., Mt. Vernon, NY, 10553.

**Dual**®



CHRISTMAS BUYING GUIDE:

# AUDIOPHILE RECORDS

Gary Stock



Concerned about finding the perfect Christmas gift for your audiophile relative or friend? Confused and intimidated by that mass of knobs, switches, and wires? And you don't want to spend an arm and a leg on some exotic piece of gear and then find out that your friend already has two of them in his system? Quite a quandary, isn't it?

Well, there's an easy way out; buy your friend an audiophile record, like the ones we've been reviewing in our "Top of the Pile" column. That's where such records stay, you know, at the top of the pile—because they get played more than most others. And all you need to know, or find out, is a bit about your audiophile friend's musical taste, then read our Christmas Buying Guide to Audiophile Records, which follows, and buy that record your friend has been thinking about getting for himself.

Over the past 10 years, the audiophile record field has expanded from a handful of

gimmick-laden sound-effects discs to a new and respected position within the music industry. As a browse through the specialty section of any large record dealer will prove, many audiophile labels, despite their relatively modest size, are attracting world-class performing artists, top-flight production and technical talent, and the degree of technical backing necessary to acquire the finest equipment and ensure the highest level of manufacturing quality. Even more significant, all of this has occurred during a period when most observers agree that mainstream record sales have leveled off and creative energies at major commercial labels fallen to a low ebb. Clearly, the audiophile disc is fulfilling some keenly felt need—the need for a new generation of technically and musically sophisticated recordings comparable in sonic performance to the music systems on which they will be played.

In recognition of the specialty

disc's growing importance to the serious music listener, this Christmas Buying Guide to the audiophile record field has been assembled. It covers more than 50 record labels and nearly 700 recordings in a broad range of musical styles and recorded using a variety of methods.

Each of the company listings contains a brief description of the firm's offerings, recording techniques, and philosophy, as well as recommendations on one or more musical selections that will help prospective buyers "get a handle" on the company's musical and sonic tastes. Further information in the form of a flyer or catalog is available from virtually all of the companies through the addresses listed; except where noted, all will sell recordings via direct mail to customers in areas without a local dealer. In most cases, however, recordings are sold primarily through audio and record stores and should be purchased through such retail outlets.



*American Gramophone* (Precision Sound Marketing), 24310 2nd Place, Bothell, Wash. 98011.

American Gramophone is an Omaha, Nebraska, based company known for the popular **Fresh Aire** series, three discs featuring music in the jazz-rock vein composed by coproducer Chip Davis and performed by a group of Omaha musicians called Mannheim Steamroller. They've also recently released a direct-to-disc recording of classical piano pieces (**Sunken Cathedral**, American Gramophone AG 361) as played by the group's pianist, Jackson Berkey, bringing the total catalog to four selections. Both the members of the group and the producers are involved in commercial and industrial recording in the Omaha area.

The **Fresh Aire** albums use fairly conventional recording techniques, with an emphasis on slow, careful assembly of each piece using multi-track techniques. Each track is laid down using an electronically synthesized "click track" as its rhythmic basis (the click track is not dubbed onto the master tape, and hence is not heard on the record); recording a single album takes several months.

American Gramophone's discs are pressed by the American Wakefield company, on virgin vinyl, using an exceptionally slow cycling time and individual observation of each press.

**Recommended Selections:** "Chocolate Fudge" from **Fresh Aire I** (American Gramophone AG 355), "The Cricket" and "Toccatà" from **Fresh Aire III** (American Gramophone AG 365). In lieu of a click track, "The Cricket" uses a live, and very well-modulated, cricket, as a click track. The cricket's voice, however, remains on the final recording.

**Prices:** **Fresh Aire** series, \$13.95 per disc; **Sunken Cathedral**, \$14.95.



*Angel Records*, 1370 Ave. of the Americas, New York, N.Y. 10019.

Angel has entered the audiophile disc market in an unusual way, through the introduction of 45 rpm versions of about 30 classical recordings from their standard catalog, mastered at half-speed and pressed by Wakefield. These "Sonic Series" albums, as Angel calls them, were made from original master tapes recorded by Angel's affiliate EMI in Europe. On the average, the discs run only 12 to 13 minutes on a side, but the improvement in sound quality, in the view of most listeners, is marked enough to justify the inconvenience. Angel notes that EMI has begun to record in Europe using digital equipment and that future releases on the Sonic Series label may therefore be digitally mastered.

**Recommended Selections:** "The Great Gate of Kiev" from **Pictures at an Exhibition**, Philadelphia Orchestra, conducted by Riccardo Muti (Angel SS-45004), "Stars and Stripes Forever" from **U.S.A. — Olympic March**, Concert Arts Symphonic Band, conducted by Felix Slatkin (Angel SS-45016), side 2 of **The Pines of Rome**, London Symphony Orchestra conducted by Lamberto Gardelli (Angel SS-45005).

**Prices:** \$8.98 per disc.



*Audio Directions*, 1035 Draughon Ave., Nashville, Tenn. 37204.

Audio Directions is a fairly new company which thus far has two releases, a direct-to-disc album in the pop/country vein, **Doin' It My Way**, by Tracy Nelson, and a jazz album by Farrell Morris, **Bits of Percussion and Jazz**, which features performances by jazz notables Stan Getz and Ron Carter. The Morris disc was recorded digitally using the Sony PCM-1600 digital processor and industrial videocassette recorder combination.

Engineer Tom Semmes notes "there is no right or wrong way to make a given song" and adds that the recording philosophies of the two albums differed considerably. The Nelson disc was recorded with 15 to 20 microphones placed close to the instruments, while the Morris album used a

smaller number of mikes in a fairly open, live acoustic environment.

The company makes a point of using aged (two or three years old) master lacquers to prevent groove relaxation after cuttings; discs are pressed in the United States by Music Hall, on an imported virgin vinyl.

*Recommended Selections:* "Rosalinda" and "Some Day My Prince Will Come" from **Bits of Jazz and Percussion**, Farrell Morris (Audio Directions AD-102), "I Could Have Been Your Best Friend" from **Doin' It My Way**, Tracy Nelson (Audio Directions AD-101).

Prices: \$13.95 per disc.



Audio Source, 1185 Chess Dr., Foster City, Calif. 94404.

Known primarily as the importer for Monitor Audio speakers and various audio accessories, Audio Source has recently expanded into the specialty record business as well, bringing in about 250 albums, most in the classical and jazz veins, from various other countries. Included in their catalog are:

*Proprius* and *Lyricon* (Sweden) classical albums recorded by conventional means using simple microphone arrays,

*Three Blind Mice* (Japan) jazz selections conventionally recorded using high speed recorders and close microphone placement with minimal mix-down,

*Philips/Direct Cut* (Japan) jazz records made using classic direct-to-disc techniques,

*Audio Lab* (Japan) classical and jazz discs recorded by conventional means on-location in concert halls and clubs,

*Sarastro* (France) classical recordings made using microphones placed in an artificial head, combined with 45 rpm mastering speed, and dbx encoding on some discs (see section on dbx),

*Mercury Audio Check Series* (Japan) jazz and classical recordings made at 33 and 45 rpm on special vinyl mixes,

*East Wind* (Japan) jazz recordings made direct-to-disc at 45 rpm,

*Merlin* (England) classical and pop recordings made by conventional means with exceptionally rigorous standards of pressing quality,

## The Three Recording Methods

*Direct-to-disc* (also called direct-cut, direct-disc, direct-mastered) recordings route the musical signal (derived from the microphones, or sometimes from electronic instruments) almost directly to the cutting lathe which inscribes the master lacquer, without any form of tape recording interposed between the two. The process has the virtue of avoiding the signal degradation introduced by several generations of tape copies. However, each side of the disc, often including the short spaces between successive selections, must be recorded in one single extended "live" take, without any possibility of editing or overdubbing. This may bring a sense of excitement and immediacy to many recordings, but in some cases it also introduces an element of caution to the musical performances that would not be present if they were alterable.

Because there is no way of recopying the master lacquer after it has been cut using the direct-to-disc approach, only a limited number of discs (somewhere in the range of 20,000 to 100,000) can be made from any given performance. This has the effect of rendering many direct-to-disc albums "limited editions," with some degree of collector value.

*Digital* (also called PCM or direct-to-digital) recordings are made on a tape recorder, but a recorder that differs radically from older, conventional analog studio recorders, in that it operates by sampling and storing the musical signals in the form of binary-encoded numbers, the same "bits" — composed essentially of either pulses or silent spaces — that are the language of computers. Because the music is therefore recorded as an "on" or "off" signal, rather than as a magnetic pattern of continuously varying level, a digital recorder largely avoids the problems of tape noise, print-through, tape saturation, and wow-and-flutter that afflict conventional recorders. In fact, most digital recorders have specifications comparable to those of an am-

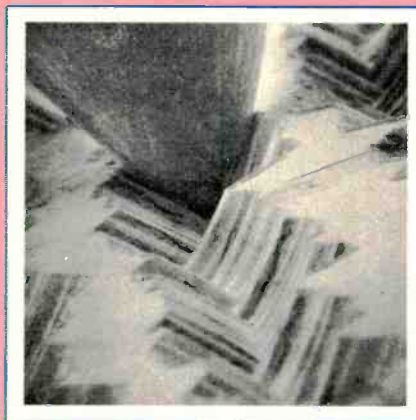
plifier or preamplifier, far superior to those of a conventional analog tape recorder.

Digital recordings offer the musicians and the producer the opportunity to overdub, edit, and complete a recording in several separate sessions, just as conventional tape recordings do. They also permit an infinite number of identical master lacquers and therefore records to be made from a given performance. And, depending on the particular model of digital recorder in use, they allow the master lacquer to be "half-speed" mastered — a process in which the master disc is cut while rotating at half of the intended playback speed and the musical signal fed to it lowered by an octave. This process, when done correctly, extends the bandwidth and reduces the distortion of the final recording.

*High-performance analog* (also called high-technology) recordings use conventional tape recorders, but depart in one of several ways from normal recording practice in order to

improve the sonic quality of the end product. Some eliminate all unnecessary intermediate stages — noise-reduction devices, equalizers, mixers, and dynamic-range compressors — from the recording chain; others operate the tape recorder at very high transport speeds in order to reduce distortion and extend bandwidth. The common factor linking these various measures is a desire on the part of the producer and engineer to maintain the sonic integrity of the musical signal to a greater degree than typical recording practice allows.

One other form of high-performance analog recording is the *remastered* recording, for which the original master tape of a disc in circulation is reprocessed and recut using exceptional care. The resulting master lacquer and final record, which is often produced using special vinyls and manufacturing processes, is usually markedly superior to the commercial version, although it is derived from the same master tape and contains the same performance.



Diamond stylus in a record groove, 1000X magnification.  
Photo: John L. Brown.



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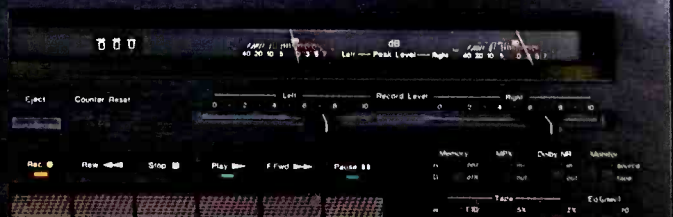
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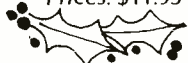
RCA Direct Mastering Series (Japan) two direct-to-disc 45 rpm recordings, one jazz and one classical, and

Additional recordings from *Opus 3* (Sweden) and *Nimbus* and *Accent* (Belgium).

All Audio Source imports are pressed on virgin vinyl and are said to reflect the traditionally high quality of European and Japanese production techniques. An unusually detailed catalog is available from Audio Source.

**Recommended Selections:** "Chopin Fantasia Impromptu" from **Music from Ingmar Bergman**, Kabi Lareti, pianist (Proprius 7829), "Moanin'" from **Night in Tunisia**, Art Blakey and the Jazz Messengers (Philips/Direct Cut RJD-4).

Prices: \$11.95 to \$17.50 per disc.



**Audio-Technica U.S.**, 33 Shiawassee Ave., Fairlawn, Ohio 44313.

Audio-Technica is a major importer of phono cartridges and audio accessories, but they have also undertaken a large-scale audiophile disc distribution program, which is credited with having done much to bring the specialty disc out of the shadows and into the public view. Through their Standardisc division, the company now distributes four labels for a total of about 55 titles. The labels are:

**Telarc (U.S.A.)**, which has produced eight highly acclaimed classical and jazz recordings. One, *The Great Organ at Methuen* with organist Michael Murray (Telarc 5036), was made using the direct-to-disc process. Seven others have been recorded using the Soundstream digital system, including **The Cleveland Symphonic Winds**, with Frederick Fennell conducting, playing selections from Holst, Handel and Bach (Telarc 5038), Malcolm Frager playing Chopin piano works (**Malcolm Frager-Chopin Piano Program**, Telarc 10040), and Mel Lewis and The Jazz Orchestra performing Thad Lewis selections (**Mel Lewis and The Jazz Orchestra-Thad Lewis Program**, Telarc 10044). Telarc's most recent release, **Tchaikovsky: 1812 Overture/Capriccio Italien**, performed by the Cincinnati Orchestra under Erich Kunzel (Telarc 10041), features actual cannon blasts having high-level fundamentals at frequencies well below 30 Hz. The album jacket comes with several warnings to the effect that the disc should initially be played at moderate volume in order to define a safe playback level.

RCA Japan has 16 recordings available in this country, most in the mainstream jazz vein. All have been recorded direct-to-disc, and most are at 45 rpm. Among them are two albums

featuring Lew Tabackin: **Trackin'** (RCA RDC-3) and **Vintage Tenor**, by Lew and the New Herd (RCA RDC-11), a well-received Vivaldi **Seasons** (RCA RDC-501/2), and a recording of Ikuyo Kamiya playing the Beethoven *Appassionata* on a Bosendorfer Imperial piano (RCA RDC-4).

**Umbrella Records (Canada)** recorded one of the earliest direct-to-disc rock albums, the hard-driving **Rough Trade: Live!** (Umbrella DD1); they now have a total of eight recordings, including the Toronto Chamber Orchestra performing selections of Mozart (Umbrella DD6) and Bach (Umbrella DD9), an album of ragtime music by an ensemble called Nexus (Umbrella DD2), and a brass recording by the Canadian Brass (Umbrella DD5). All of Umbrella's releases are direct-to-disc.

**Toshiba/EMI's** 22-album catalog is composed predominantly of large jazz groups recorded by the direct-to-disc process, and includes such titles as **Take the "A" Train** by the Big Band Jazz Ensemble (Toshiba EMI LF-95011) and **30 Years in 30 Minutes** by Eiji Katamura and the All Stars (Toshiba EMI LF-95012). Also available, however, are a number of rock recordings, three albums in the Latin vein, and an exceptionally transparent recording of the Chopin Nocturne in E Flat Major (**Jun Fukamachi at the Steinway**, Toshiba EMI LF-95001), among others.

**Recommended Selections:** "Spirit Levels" from **Acoustic Guitar**, Stefan Grossman with John Renbourn (Toshiba EMI EWLF-98001), "Just Friends" from **Big Band Jazz, Volume 1**, Rob McConnell and the Boss Brass (Umbrella DD4), "Finale" from **Chopin, Scherzo No. 2 and Piano Sonata No. 3**, Edward Auer (RCA RDC-7), "Polovetsian Dances" from **Stravinsky: The Firebird and Borodin: Overture and Polovetsian Dances**, Atlanta Symphony Orchestra and Chorus, Robert Shaw conducting (Telarc 10039).

Prices: \$15.95 to \$17.95 for single discs, \$23.95 to \$27.95 for double-record album sets.



**Century Records**, 6550 Sunset Blvd., Hollywood, Calif. 90028.

Two points immediately evident from an examination of Century's 17-disc catalog are the number of big band and jazz recording artists gathered under one roof and the diversity of recording techniques used. Featured artists include Benny Goodman, Buddy Rich, The Glenn Miller Orchestra, Woody Herman, and Les Brown and his Band of Renown. Ten of the discs, including 45-rpm disco singles

by Denise McCann and Tuxedo Junction, have been recorded direct-to-disc, four by conventional analog methods, and one — *Anita Kerr Performs Wonders* (Century CRD-1160), an album of Stevie Wonder songs — using Sony's PCM-1600 digital recording system.

Century frequently records on-location, using simple MS style microphone arrays when possible. A number of their direct-mastered recordings also employ a process called Direct Disc Phase II in which some vocal lines are transferred to the final lacquer master from previously recorded tapes. The company believes in rapid plating of the master lacquer (within six hours), and in a fairly thick, heavy disc (130 grams) made of virgin vinyl. Century's recordings are pressed in West Germany by Teldec.

**Recommended Selections:** "Sunrise" from **Fusion Is** by Barry Miles (Century CRDD-1070), "Birdland" from **Buddy Rich/Class of '78** (Century CRDD-1030), "Berceuse" and "Piece Heroique" from **Robert Candide at the Mormon Tabernacle Organ** (Century CRDD-1040).

Prices: Conventionally recorded albums, \$7.95; direct-to-disc and digital albums, \$14.95.



**Crystal Clear Records**, 648 Mission St., San Francisco, Calif. 94105.

Crystal Clear's catalog consists of about 25 records, all recorded direct-to-disc, featuring music in several genres — rock, classical, jazz, and easy listening. A number of well-known artists, including Virgil Fox, Peter Nero, Carlos Montoya, and Cal Tjader have recorded on the label, which also encompasses such unusual items as a direct-to-disc disco album (**Direct Disco**, Gino Dente, Crystal Clear CCS-5002) and a direct-to-disc Boston Pops album (**Capriccio Italien/Capriccio Espagnol**, Crystal Clear CCS-7003).

The company uses simple microphone arrays, often consisting of only two microphones, for many recordings. They are also among the first companies to have produced a live concert direct-to-disc, a recording by blues/folk guitarist Taj Mahal called **Live and Direct** (Crystal Clear CCX-5011). Their discs are pressed on white or transparent vinyl by Teldec of West Germany, and are exceptionally heavy (160 grams); the company feels that the carbon black used to color most records can increase surface noise. Crystal Clear is one of several companies interviewed for this article which expressed dissatisfaction with the sonic quality of current digital recordings,

noting an upper midrange harshness and lack of depth.

**Recommended Selections:** "Fanfare for the Common Man" from **Sonic Fireworks, Volume 1** by Richard Morris and the Atlanta Brass Ensemble (Crystal Clear CCS-7010), opening theme from "Also Sprach Zarathustra" from **Sonic Fireworks, Volume II**, by Richard Morris and the Atlanta Brass Ensemble (Crystal Clear CCS-7011).

Prices: \$16.98 per disc.



dbx, 71 Chapel St., Newton, Mass. 02195.

Dbx has adopted an unusual and ingenious approach to specialty record manufacture, one reliant on electronic rather than mechanical or chemical technology. They are distributing a catalog of about 20 discs (with more to be added soon) taken from a number of other labels — Desmar, Desto, Vox, Sine Qua Non, Chalfont, and Varese Sarabande among them — and remastering the discs on the dbx label in a dynamically compressed encoded format, in much the same way that a tape or broadcast might be dbx or Dolby encoded. A decoder, either the Model 21 (\$109) or any dbx Series II dynamic range expander, is then used to re-expand the dynamic range of the recorded signal after it has been preamplified by the phono-stage electronics. Effectively, therefore, both the disc and the first stages of the preamplifier are incorporated into a compression-expansion loop, which is said to reduce noise by as much as 30 dB. The concept was developed by dbx in the late Sixties, shelved for several years, and has now been put into production. The technique has several benefits aside from the dramatic reduction in disc surface noise; the level of pops and ticks is greatly reduced, as are the influences of turntable rumble and phono-stage hum and noise. In addition, since the peak recording level put on the disc is reduced, cartridge mistracking and phono-stage overload are virtually eliminated. Dbx has rapidly acquired backing for the encoded disc concept, as it is called, from a broad spectrum of other disc manufacturers, many of which will independently distribute dbx-encoded recordings. Direct-Disk Labs has already announced the availability of their entire catalog in the format, and Vanguard, Nautilus, Sarastro, and Musical Heritage Society all plan to offer releases using the approach. Encoded discs will display a gold dbx sticker on the album jacket.

The preliminary catalog of recordings to be distributed by dbx dealers

runs heavily to classical orchestral and instrumental releases, with a few light orchestral albums, and a jazz disc that is the first of several to be recorded to demonstrate the virtues of the encoded disc concept, **Mark Levinson Presents** (dbx RTS-1).

**Recommended Selections:** "The Pizzicato Polka" from **A Strauss Family Gala**, Johann Strauss Orchestra (dbx SS-3003), side one of **American Brass Band Journal Revisited**, Empire Brass Quartet and Friends, Frederick Fennell conducting (dbx SS-3004), "Rodeo" from **Aaron Copland: Billy the Kid; Rodeo; Fanfare for the Common Man**, Dallas Symphony Orchestra, Donald Johanos conducting (dbx SS-3007).

Prices: Silver Series (SS), \$8.00 per disc; Gold Series (GS), \$12.00 per disc.



Decibel Records, Post Box 631, Lexington, Mass. 02173.

Richard Burwen, a noted New England engineer and founder of Decibel, has coined the term "Indirect Disc" to describe the four recordings available from the firm. All of them were made using conventional analog recording equipment modified by Mr. Burwen and supplemented by his professional noise-reduction system and microphones and cutting-lathe electronics of his own design. The result, according to Burwen, is an analog master tape with a dynamic range of 110 dB.

The four discs cover a wide musical range as well. Included are a jazz piano recording, **This is the One**, by Dick Wellstood (Audiophile AP-120); an album of Dixieland jazz, **The East Bay City Jazz Band** (Celia BL-2A); a pipe-organ recording done in the enormous castle/home of an eccentric inventor, **The Hammond Castle Pipe Organ**, with Douglas Marshall (Decibel DB 4000), and a pop recording, **Misty**, by the Petty Trio.

**Recommended Selections:** "Pastorale in E Major" from **The Hammond Castle Pipe Organ**, Douglas Marshall, organist (Decibel DB 4000; this piece contains a sustained, accurately recorded 19-Hz pedal note), "Rose of Washington Square" and "Blues My Naughty Sweetie Gives to Me" from **The East Bay City Jazz Band** (Celia BL-2A).

Prices: \$15.00 per disc, order direct from address above.



Delos Records (Supersounds Ltd.), 2210 Wilshire Blvd., Santa Monica, Calif. 90403.

Delos is an American label that recently entered the audiophile disc

field with six digitally recorded albums, all in the classical genre; this is in addition to their existent catalog of 50 or so classical and film soundtrack albums, all recorded by conventional analog methods.

The digital releases were recorded with the Soundstream system, using a three-microphone array of Bruel and Kjaer instrumentation mikes and custom-built electronics. The discs were mastered at full speed by the JVC Cutting Center and are pressed by JVC in Japan, using an exceptionally hard virgin vinyl compound originally developed for CD-4 use. Among these first releases are three albums of impressionistic music performed on brass instruments and a sonically superb recording of various Liszt, Ravel, Debussy, and Griffiths works performed on a Bosendorfer Imperial Grand piano by Carol Rosenberger (**Water Music of the Impressionists**, Delos D/DMS3006). This disc contains several passages of 16-Hz fundamental. Delos is planning several additional recordings in Europe and the United States over the next year, again using digital equipment.

**Recommended Selections:** "Haydn Trumpet Concerto in E Flat Major" from **The Classic Trumpet Concerti of Haydn/Hummel**, Gerard Schwarz, trumpet (Delos D/DMS3001), side B of **The American Brass Quintet Plays Renaissance, Elizabethan, and Baroque Music** (Delos D/DMS3003).

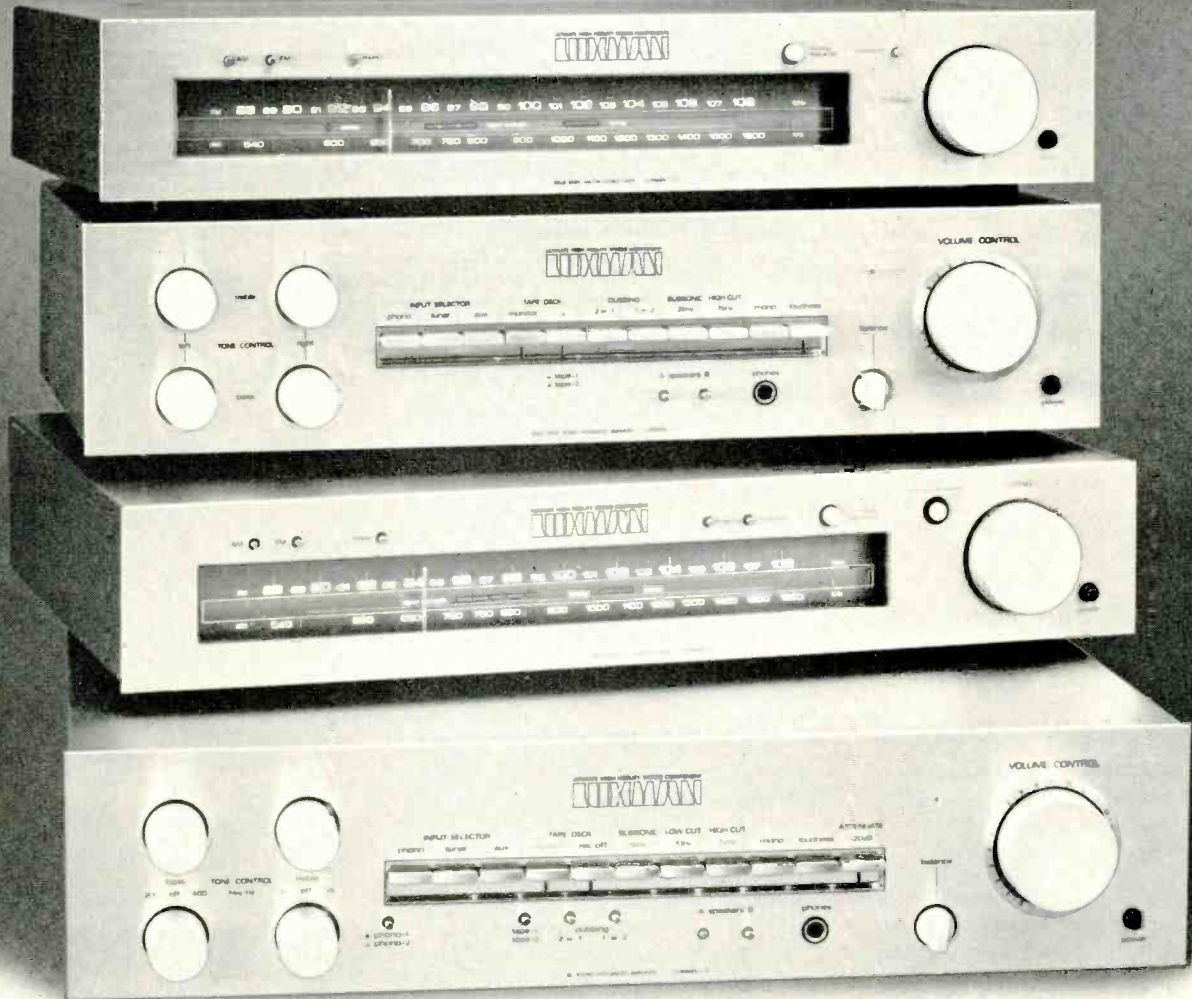
Prices: \$17.98 per disc.



Direct-Disk Labs, 16 Music Circle So., Nashville, Tenn. 37203.

Despite the name, Direct-Disk Labs is involved in all three types of contemporary recording, with a catalog of 17 albums, five recorded using the Soundstream digital system and about 15 direct-to-disc (several are available in both formats). They have also recently begun a program to offer high-quality remastered versions of well-known commercial albums and will be introducing about 25 discs of this type over the next year, including albums by Jackson Browne, Van Morrison, and Tower of Power. Their catalog of direct-to-disc and digital recordings includes jazz, country, bluegrass, and big band releases, many made using a proprietary microphone type called a pressure zone mike, which consists of a very small instrumentation microphone constructed with an integral reflective device, intended to achieve a high degree of sonic focus and balance. The company owns its own mastering facilities, plating equipment and pressing plant, and uses a virgin

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vinyl and temperature-controlled spring water for its pressing operations. Direct Disk's experiments indicate that very close tolerances for the pressing dies and a long cycle time are necessary to achieve and maintain consistent quality.

All Direct-Disk albums in the current catalog and all future releases, including those mastered direct-to-disc, are also available in dbx encoded format (see section on dbx). Direct-Disk will not sell albums by mail but will refer enquirers to their nearest dealer.

**Recommended Selections:** "Take Five" and "Blue Rondo" from **A Cut Above**, The New Dave Brubeck Quartet (Direct-Disk DD 106), "Foggy Mountain Breakdown" from **Neophonic String Band** (Direct-Disk DD 105), "You Needed Me" from **Lenny Breau with Chet Atkins** (Direct-Disk DD 112).

Prices: \$15.00 per disc.



Discwasher Records, 1407 No. Providence Rd., Columbia, Mo. 65201.

Discwasher is a large Missouri manufacturer of record care products which also imports, through their American Audioport subsidiary, the Stax and Denon lines of electronics, record-playing components, and stereophones. The close relationship between Denon and Discwasher grew out of an early agreement by which Discwasher imported and continues to import Denon's series of PCM (digitally recorded) discs. Denon was among the very first companies in the world to manufacture a digital recorder and begin offering commercial recordings using it. The present Discwasher catalog of Denon recordings lists about 100 albums, all produced using the system and some recorded with it as long ago as 1972. The discs, which are elaborately packaged with antistatic inner sleeves and beautifully photographed jacket illustrations, cover a broad musical range, from traditional jazz, as in **The 24th Street Band Jazz Fusion Rock** (Denon YX 7547), to chamber music (**Vivaldi: Six Sonatas for Flute and Harpsichord**, Denon OX 7005), to a recording of Beethoven's Ninth Symphony by the Czech Philharmonic Orch. (Denon OB 7333-4).

Discwasher is also the distributor for five digitally recorded discs, all made using the Soundstream system, on the Chalfont and Varese Sarabande labels, and three rock and jazz direct-to-disc recordings from the Canadian Kiras label. Discwasher has become directly involved in the audiophile-disc pro-

duction field, too, through their release on the Discwasher label of six recordings, all in the jazz or rock vein; three were recorded digitally using the Soundstream system, three direct-to-disc.

**Recommended Selections:** "I Hadn't Anyone Until You" from **The Good Life**, Paul Smith Quartet (Discwasher DR004-D), "Prague" (Symphony No. 38) from **W. A. Mozart, Symphony No. 38; Symphony No. 36**, NHK Symphony Orchestra conducted by Otmar Suitner (Denon OX 7156), "Sambandrea Swing" from **Note Smoking**, Louie Bellson & Explosion (Discwasher DR002-D).

Prices: \$15.00 per disc.



Mark Levinson Recordings, 55 Circular Dr., Hamden, Conn. 06514.

Mark Levinson is a New England manufacturer of esoteric electronics, tape recorders and speaker systems, but Mr. Levinson has also made seven recordings using the equipment manufactured by his firm, along with Bruel & Kjaer instrumentation microphones, and a decidedly "purist" recording philosophy. Levinson recordings use only two mikes, placed to maintain a natural-sounding stereo perspective, and are recorded at 30 ips without gain riding, noise reduction, compression, or equalization. The catalog includes a four-record set of organ recordings, **The Art of the Fugue** (Mark Levinson 5), a live jazz recording with an excellent sense of club ambience, **Jazz at Long Wharf** (Mark Levinson 7), and a rather avant-garde piece of percussion music, **A Life** (Mark Levinson 3).

**Recommended Selections:** "Chorale Preludes: Schubler Chorales" from **Choral** by The Battell Chapel Choir (Mark Levinson 1).

Prices: \$15.00 per disc.



Mobile Fidelity Sound Lab, Post Box 919, Chatsworth, Calif. 91311.

Mobile Fidelity's stock-in-trade is the remastering of well-known pop and jazz recordings into super-fidelity versions they call "Original Master Recordings." The discs in the Mobile Fidelity catalog hold precisely the same musical performances found in the major-label release (and the same jacket art with the MFSL logo superimposed), produced without any of the manufacturing shortcuts that often limit the quality of commercial discs.

Basically, the company selects well-recorded master tapes through an arrangement with the original label, cuts

new master lacquers at half speed, and then presses the disc with exceptional care on virgin vinyl. Other points of significance include special sleeves, jackets, stiffening boards and wrapping plastic, all designed to reduce the incidence of record warp and static formation. The approach offers the listener the musical sophistication of major popular and jazz performers, combined with a level of technical quality approaching that found on direct-to-disc and digitally recorded albums from less familiar artists.

Hence, Mobile Fidelity's catalog includes a number of pop "blockbusters" — Gordon Lightfoot's **Sundown** (Mobile Fidelity MFSL 1-018), George Benson's **Breezin'** (Mobile Fidelity MFSL 1-011), Al Stewart's **Year of the Cat** (Mobile Fidelity MFSL 1-009), the Grateful Dead's **American Beauty** (Mobile Fidelity MFSL 1-014) and others, for a total of about 20 titles. Recently remastered, and scheduled to become available before Christmas, are **Fly Like An Eagle**, by The Steve Miller Band (Mobile Fidelity MFSL 1-021) and **Manhattan Transfer Live** (Mobile Fidelity MFSL 1-022).

**Recommended Selections:** "Touch" from **Touch**, John Klemmer (Mobile Fidelity MFSL 1-006), "Rhiannon" from **Fleetwood Mac** (Mobile Fidelity MFSL 1-012), "Eclipse" and "Speak to Me" from **Dark Side of the Moon**, Pink Floyd (Mobile Fidelity MFSL 1-017).

Prices: \$14.95 for single discs.



Oneiric Records, P.O. Box 4576, Santa Barbara, Calif. 93103.

Oneiric's sole release to date, **Live One on the Wire**, by Jeff Campbell, has the distinction of being the first digitally recorded rock album, as well as one of the first examples of a "roll your own" digital production. Oneiric used Sony's consumer PCM-1 adaptor/videocassette recorder combination to record the album, mixing it down to two channels through a 24-channel console without overdubbing or editing. The disc was then mastered and processed by the JVC Cutting Center and pressed on virgin vinyl. Notable also on many tracks is the use of what are referred to as "rare guitars," collector's instruments from the early days of electric guitar manufacture. The album has a very clean, unstrained sound, proving that even a digital recording is not beyond the capabilities of a determined group.

**Recommended Selection:** "Live One on the Wire" from **Live One on the Wire**, Jeff Campbell (Oneiric 1).

Price: \$9.98, order direct from manufacturer.



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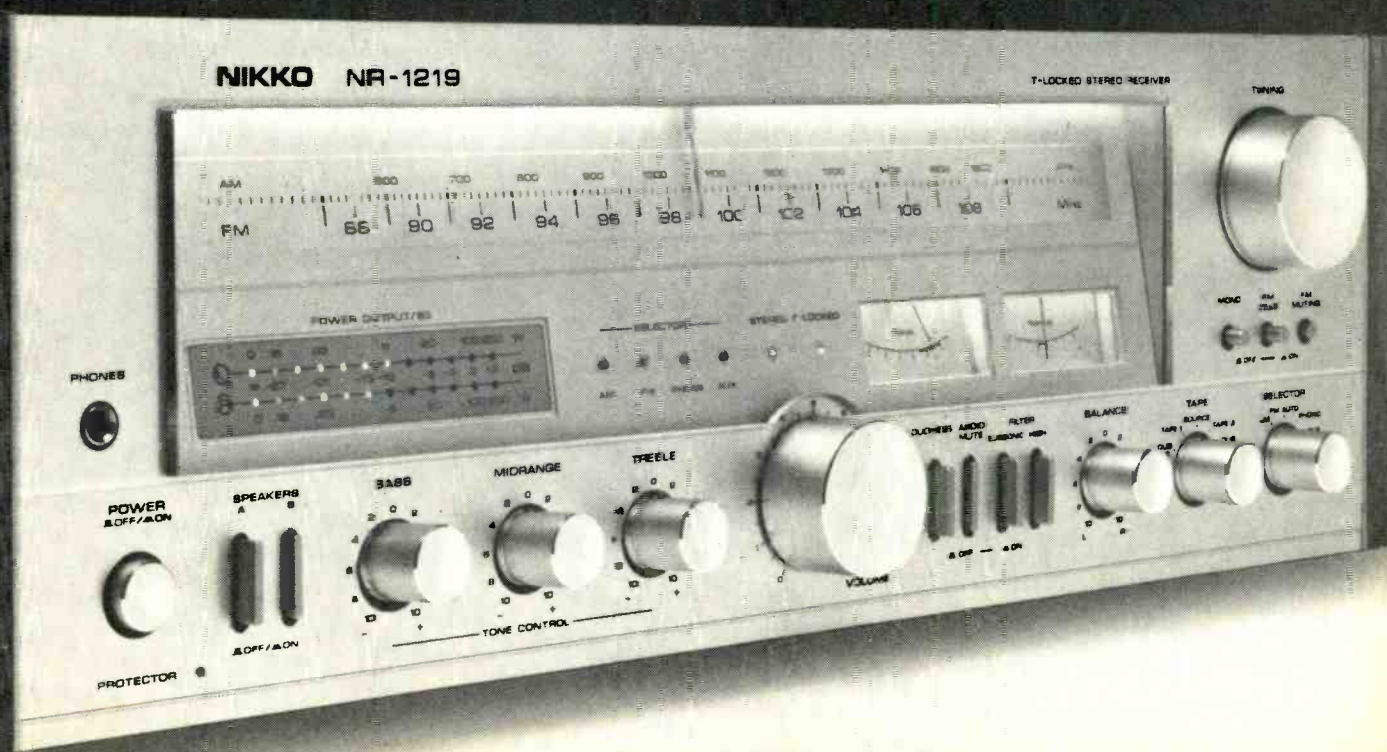
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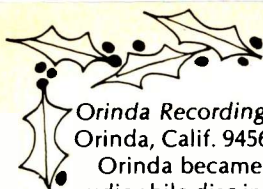
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## Nikko Audio

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Orinda Recording Corp., Post Box 808, Orinda, Calif. 94563.

Orinda became a major factor in the audiophile disc industry overnight, following the acclaim received by their first digital recording, **A Tribute to Ethel Waters**, with Diahann Carroll and the Duke Ellington Orchestra. The disc, which Orinda notes was the first digital pop album ever released in the United States, was well reviewed by numerous publications and went on to win a Grammy nomination.

Orinda has now released two additional digitally recorded discs, both made, like the Ethel Waters album, using the Soundstream system. They are **The Bee Gees Music**, a group of orchestral renditions of Bee Gees pop hits performed by the Glendale Symphony Orchestra, and a 12-in., 45-rpm single with two tracks from that album, **Staying Alive/Nights on Broadway**. The two newest recordings are among the first to be mixed down in digital form and to use overdubbing with a digital recorder. Orinda also has a direct-to-disc pop recording, **You're Something Special**, by Robert Goulet, and a conventionally recorded 7-in. disco single by Cynthia Black.

Producer Michael Phillips comments that multi-microphone techniques are used for most of Orinda's recordings; the company's digital discs have been half-speed mastered and processed by the JVC Cutting Center and are pressed by Award Records, an American firm, using a particularly hard formulation of virgin vinyl. Orinda does not have any direct-mail sales program, but will refer enquirers to their nearest dealer.

**Recommended Selections:** "After You've Gone" from **A Tribute to Ethel Waters**, Diahann Carroll and the Duke Ellington Orchestra (Orinda ORC-400), "Shadow Dancing" from **The Bee Gees Music**, The Glendale Symphony Orchestra and Sabu, conducted by Carmen Dragon (Orinda ORC-500).

Prices: \$8.98 per disc.



**Orion Marketing** (Nautilus Recordings), 761 Shell Beach Rd., Pismo Beach, Calif. 93449.

Orion Marketing acts as the national distributor for several independent audiophile disc labels, as well as its own Nautilus label. Included in the Orion catalog are:

**Coherent Sound** (U.S.A.) with one direct-to-disc jazz recording, **In My Pocket** by Victor Feldman (Coherent CSR-1001),

**JVC** (Japan) with three direct-to-disc jazz recordings, all featuring guitarist Lee Ritenour,

**East Wind** (Japan) with five direct-to-disc jazz recordings, including three of the jazz group The LA4 with guitarist Laurindo Almeida,

**Romar** (U.S.A.) with one folk recording, **Window Panes**, by Karen Gibbs (Romar R107), recorded conventionally and transferred to the Soundstream digital system for mastering as well as editing,

**Flying Disc** (Japan) with a single direct-to-disc jazz recording, **String Band**, featuring Ron Carter and Hank Jones (Flying Disc FD601),

**ASI** (U.S.A.), a known and established jazz label with one direct-to-disc jazz recording, **Natural Life** (ASI 5001),

**Trend** (U.S.A.) with three direct-to-disc jazz recordings, including the only existent direct-mastered album of oud music (the oud is a lute-like ancient Persian instrument usually played with an eagle feather), **The Art of the Oud**, John Bilezikjian (Trend TR-513), and

**Nautilus** (U.S.A.) with one direct-to-disc folk/rock recording, **First in Line**, by Randy Sharp (Nautilus NR1) and one digital folk recording, the well-received **Aspen Gold**, by the Kingston Trio (Nautilus NR2), as well as a conventionally recorded music-system test record (Nautilus NTR). Nautilus albums by John Klemmer and Tim Weisberg are expected to be available early in 1980.

The company is also preparing to introduce a series of half-speed remastered versions of popular rock and jazz recordings. The first disc in the series will be Heart's **Steamboat Annie**; albums by the Doobie Brothers and America may also be issued as part of the series, which will be expanded to about ten titles over the next year.

**Recommended Selections:** "Corcovado" from **The LA4 Volume 1: Pavane for Une Infante Defunte** (East Wind E10003), "Satin Doll" from **The Great Jazz Trio Direct from L.A.** (East Wind E10005), "Lovin' Arms" from **Window Panes**, Karen Gibbs (Romar R107), "Womanizer" and "For Old Times Sake" from **First in Line**, Randy Sharp (Nautilus NR1).

Prices: \$12.95 to \$16.50 per disc.



**Realtime Records**, 10391 Jefferson Blvd., Culver City, Calif. 90230.

Realtime Records is a California label in the interesting position of being associated with both M&K Sound Corp., a subwoofer manufacturer, and Jonas Miller Sound, a Beverly Hills retail dealership. The company can therefore lay claim to being one of the few high-fidelity firms involved with the entire audio chain of reproduction

— from studio microphone to home speaker output.

Realtime has a catalog of 13 discs; eleven, mostly in the jazz vein, were recorded direct-to-disc, and two used conventional analog techniques for a low-frequency demonstration record and a sampler of material from their direct-mastered products. An additional five or six albums, made using the Sony PCM-1600 professional digital recording system, are expected to be released by the end of this year. These were recorded in Europe this past Fall, and feature the Hungarica Philharmonica performing **The Nutcracker Suite**, **Romeo and Juliet**, and other works.

Realtime favors simple microphone setups placed close to the instruments being recorded, with mixing done passively to prevent low-frequency roll-off (the mixing consoles are flat to 1 or 2 Hz). Mastering is done with aged lacquers, which are then flown by courier to Teldec in West Germany for processing and pressing. The company plans additional digital recordings in the near future.

**Recommended Selections:** "Llorona" from **Flamenco Fever**, Felipe de la Rosa (Realtime RT-107), Fourth Movement of Beethoven's Ninth Symphony from **Ode to Joy**, The Los Angeles Camerata Orchestra and Chorus (Realtime RT-112).

Prices: \$15.00 per disc.



**Reference and Ambience Records** (Sumiko, Inc.), 3000 College Ave., Berkeley, Calif., 94705.

Sumiko is best known as the U.S. importer of Supex and Grace phono cartridges and Lustre tonearms. They also have a catalog of six recordings, primarily in the contemporary and dixieland jazz vein. All were made using conventional analog methods, and the majority with special PRP microphones developed by E. M. Long, Contributing Editor of this magazine who also served as co-recording engineer on several of the albums. The PRP microphones are said to provide the most natural-sounding stereo perspective for recordings made using distant two-microphone arrays, combined with the musical detail of closely spaced microphone setups. A two-channel Nagra recorder was used for most of the discs, which were mastered at half-speed, plated within 15 minutes of cutting, and pressed on virgin vinyl by the (American) Record Technology plant.

**Recommended Selection:** "Dinah" from **Sweet and Hot** (Ambience 70301).

Prices: \$13.00 per disc.

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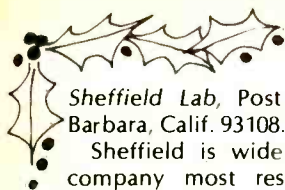
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Sheffield Lab, Post Box 5332, Santa Barbara, Calif. 93108.

Sheffield is widely viewed as the company most responsible for the popularization of the audiophile record, and especially the contemporary direct-to-disc recording. Two of the company's principals, Doug Sax and Lincoln Mayorga, had carried on experiments in this field from 1961 onward, and in 1968 they released the first modern direct-to-disc album, the now historic **Lincoln Mayorga and Distinguished Colleagues, Volume I** (mint copies are currently selling for \$500 to \$1,500).

The present catalog is composed of 10 titles in a variety of genres, all made using the direct-to-disc process. Included are two recordings of the Los Angeles Philharmonic Orchestra performing Prokofiev (**Prokofiev: Excerpts from Romeo and Juliet Ballet**, Sheffield Lab 8) and Wagner (**Wagner: Excerpts**, Sheffield Lab 7), an album of classical piano pieces (**Lincoln Mayorga: Pianist**, Sheffield Lab 4), three recordings of Harry James and his Big Band (**The King James Version**, Sheffield Lab 3, **Harry James. . . Comin' From a Good Place**, Sheffield Lab 6, and **Still Harry After All These Years**, Sheffield Lab 11), and several other jazz and pop albums. Sheffield will issue an eleventh album, **Now is the Time**, by Don Randi and Quest, a jazz sextet, (Sheffield Lab 12) by the end of this year. They also anticipate increasing the number of releases to four or five per year within the next several months as a result of expanded studio facilities.

Sheffield tends to favor simple microphone arrays, and even a single stereo microphone on some occasions, for most recordings. All of their later albums are recorded using cutting lathes, microphones, and cutting head amplifiers of their own design. Plating of master discs is done within one half-hour of cutting; discs are pressed on virgin vinyl, using an unusually long cycle time. Sheffield has no plans to become involved with digital recording. Doug Sax is candid in his dissatisfaction with current digital recordings, noting an absence of ambience in the high frequencies. "In its present form," he commented, "it is definitely something we will avoid."

**Recommended Selections:** "America" from **Lincoln Mayorga and Distinguished Colleagues, Volume III** (Sheffield Lab 1), "Cherokee" from **The King James Version**, Harry James and His Big Band (Sheffield Lab 3), "I've Got the Music in Me" from **I've Got the Music in Me: Thelma Houston and**

### Pressure Cooker (Sheffield Lab 2).

Prices: \$15.00 per disc.



Sonic Technology Corp., 3 Westchester Plaza, Elmsford, N.Y. 10523.

Sonic Technology is the originator of a record manufacturing technique called "direct pressing," which shortens the sequence of intermediate processing steps between the original tape and the final disc. The process employs two elements that differ from those used in conventional record-manufacturing operations. In the first step, the multi-channel master tape for a direct-pressed disc is not mixed down and transferred to a two-channel tape; rather, the mixdown levels and equalization are controlled by a computer as the multi-track tape feeds the cutting lathe directly. In the second step, the master lacquer is plated and processed conventionally and then used to press the final vinyl discs directly, rather than being used to make a metal mother and then a metal stamper. When it begins to degrade, after about 1,000 pressings, it is replaced by another metal master derived from another lacquer. The direct pressing process thereby avoids one tape-transfer stage and two metal-mold transfer stages (which Sonic Technology states add 3 to 5 dB of noise each). The end result, according to the company, is a sense of immediacy and aliveness very much like that of a direct-to-disc recording without the need for "one-shot only" caution on the part of the performers.

Thus far, there are two records in the Sonic Technology series, both direct-pressed. One is a jazz-rock version of Vivaldi's "The Seasons" and the other a group of Copland pieces, including selections from the ballets "Rodeo" and "Billy the Kid," and "Fanfare for the Common Man."

**Recommended Selection:** "Hoe-down" from **Rodeo, Fanfare for the Common Man, Billy the Kid**, The Dallas Symphony Orchestra (Sonic Technology STC-200).

Prices: \$15.00 per disc.



Sound 80 Records, 2709 East 25th St., Minneapolis, Minn. 55406.

Sound 80 is a large Minneapolis recording studio that participated in the "shakedown cruise" for 3M's 2-track and 24-track digital recording systems, and was therefore one of the first studios to have use of the equipment. They've recorded two albums using the 3M 2-track machine—an acclaimed performance by the St. Paul

Chamber Orchestra of Copland's "Appalachian Spring" and Ives' "Three Places in New England," and a jazz album by a Minneapolis jazz ensemble called **Flim and the B.B.s**. The third album on the Sound 80 label, **Schubert's Symphony No. 5 in B Flat Major**, performed again by the St. Paul Chamber Orchestra (Sound 80 DTD-102), was made via the direct-to-disc process.

All three discs were mastered in-house by Sound 80 using a Scully cutting lathe, then plated within 48 hours, and pressed on virgin vinyl by the Wakefield organization.

**Recommended Selections:** "View from Seventh Heaven" from **Flim and the B.B.s** (Sound 80 DLR-102), "Appalachian Spring" from **Aaron Copland: Appalachian Spring/Charles Ives: Three Places in New England**, The St. Paul Chamber Orchestra, Dennis Russell Davies conducting (Sound 80 DLR-101).

Prices: \$10.95 per disc (\$12.50 post-paid if sold direct).



2000 B.C. Records, 15313 Via de las Olas, Pacific Palisades, Calif. 90272.

**California Smoker**, 2000 B.C.'s sole release to date, was among the first rock albums made using the Soundstream digital recording system. The album features a group of Los Angeles session musicians playing in an intriguingly eclectic style, recorded in a single studio take using multiple microphones. It is half-speed mastered and pressed on a white virgin vinyl.

**Recommended Selection:** "Fantasy" from **California Smoker**, various musicians (2000 B.C. D2D Chapter 1).

Price: \$13.95.



Xanadu Records, 3242 Irwin Ave., Kingsbridge, N.Y. 10463.

Xanadu specializes in contemporary and historical jazz recordings, usually involving acoustic instruments; as such the label has attracted some noted jazz performers — Al Cohn, Barry Harris and Sam Most among them — and amassed a catalog of about 75 titles. Xanadu has recently ventured into direct-to-disc recording with an album of flute music by jazz flutists Sam Most and Joe Farrell called **Flute Talk**. The album, which was made with several microphones in a rather "live" acoustic environment, is almost entirely improvisational and was recorded without rehearsal.

**Recommended Selections:** "Kim" and "Samba to Remember You By" from **Flute Talk**, Sam Most and Joe Farrell (Xandau X 3001).

Prices: \$12.00 per disc.



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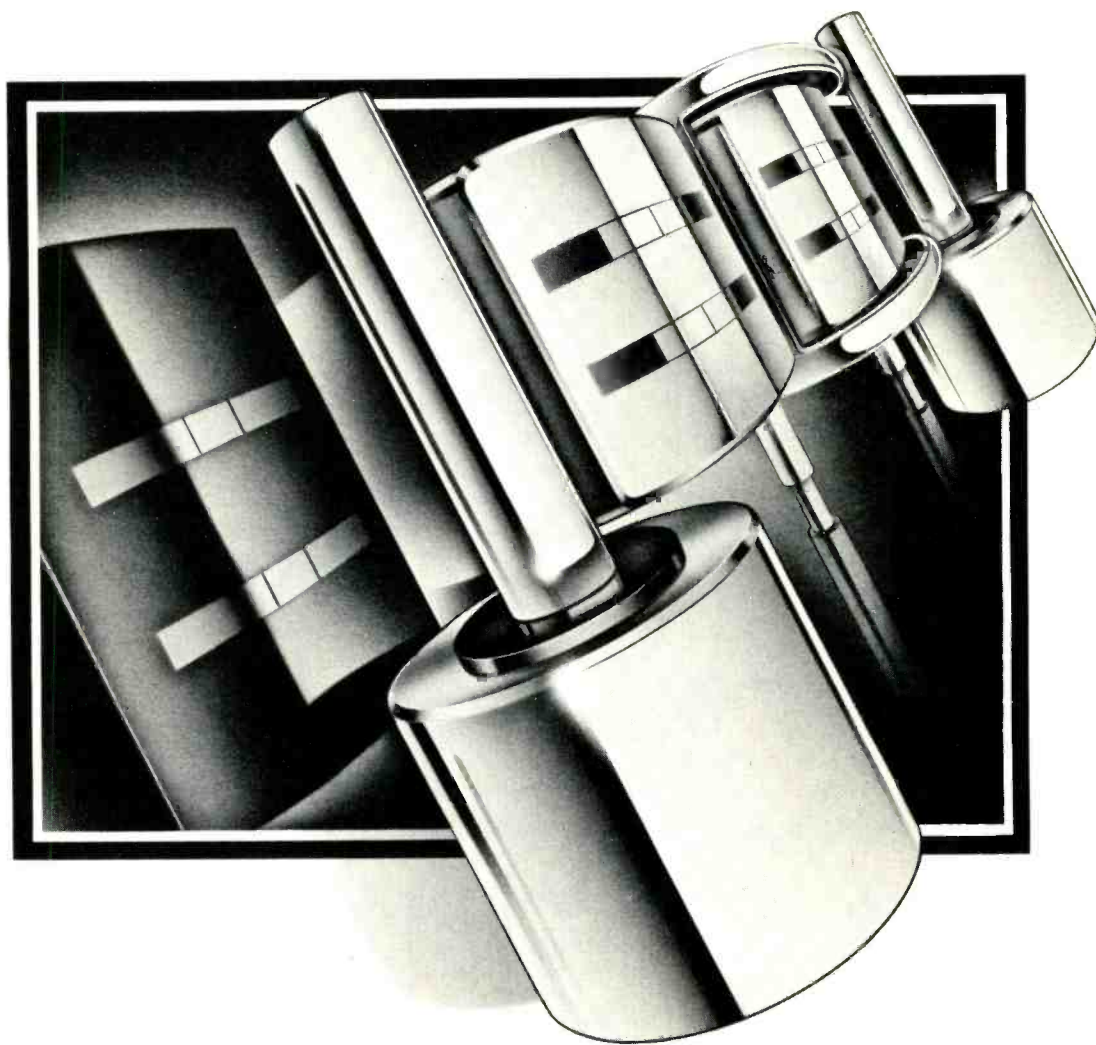
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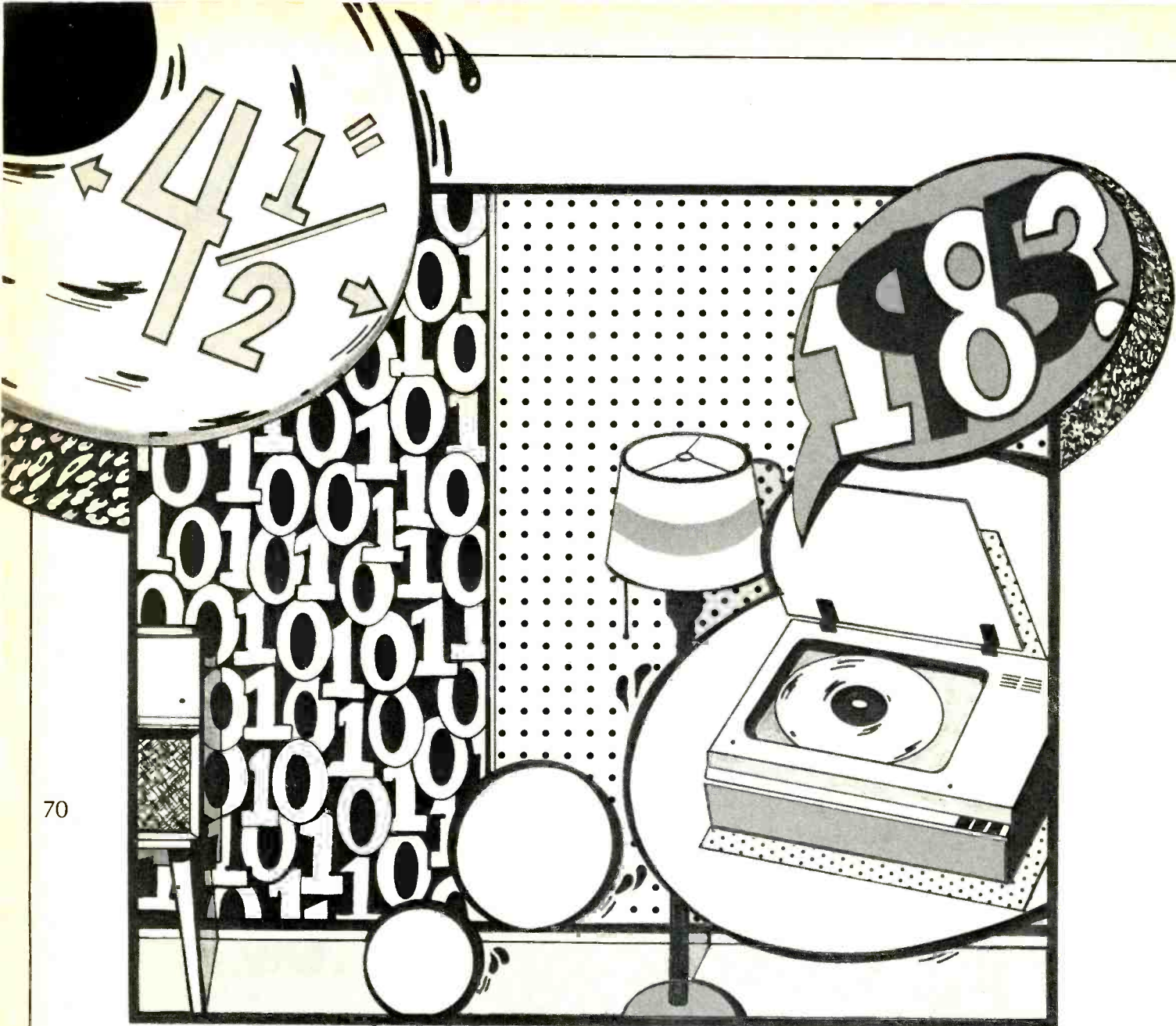
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# THE X-SERIES.





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# DIGITAL RECORDING: STATE

Allow me to prophesy an event in your future, if I may be so presumptuous. If you are genuinely interested in the reproduction of music, and living in any population center larger than 500 people, there will be a very special and unquestionably memorable day in your life in the next few years. Some time between now and 1985, you will walk into an audio salon and ask to hear a digital audio disc system. The salesman will oblige; he will show you a disc player that may be as small as a cigar box or as large as a transcription turntable. In it, or perhaps on it, he will place a disc. The disc will probably be either an odd matte black or a rainbow-splashed opalescent silver. It may be as small as 4½ in. or as large as 12.

Those details are not important, except to those who have designed the equipment.

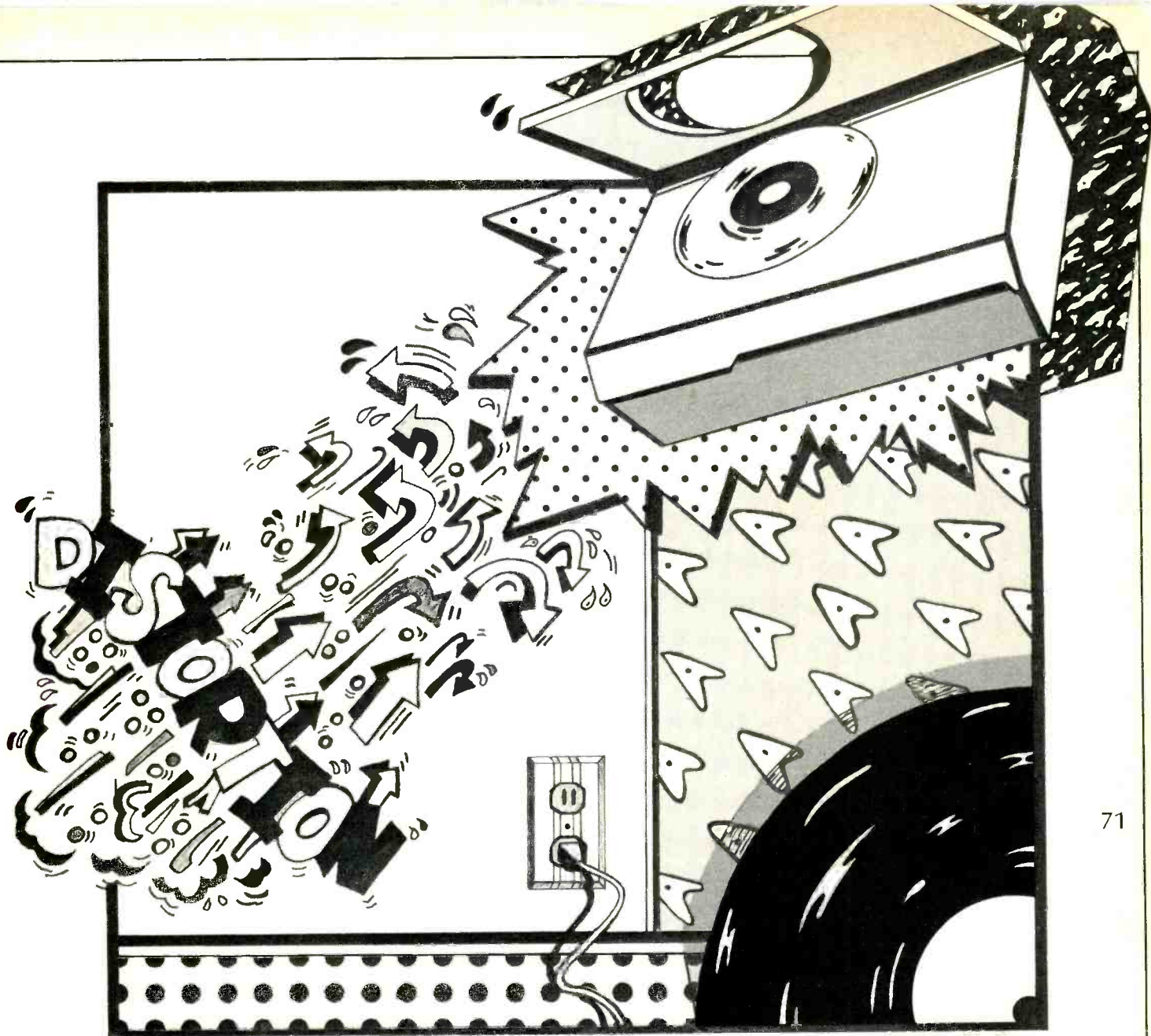
What is important is that this first audition of a digital disc system will change forever your perception of the home music system's capacity to recreate reality. It will transport you to a new world of sonic excellence and demonstrate an immediacy, vibrance, and aliveness that no conventional long-playing record could ever truly match. By comparison with the vivid, sharply defined tonal colors of the digital disc, even the direct-to-disc and digitally mastered LP records, which have recently set the recording industry on its ear, will seem slightly pallid and drawn.

I have not sold my soul to Mephistopheles in exchange for the gift of prescience. I'm able to predict this sort of event with a fair amount of confidence because I've seen the products in question — the players, the discs — and heard the superb sound quality they produce. These devices exist now. The units the press has heard are prototypes, but all are technical *faits accomplis*. Only the decision to initiate their manufacture stands between them and the showroom shelf.

## PCM Basic Theory

The extraordinary sound quality of the digital disc players is a result of their use of the pulse code modulation (PCM) encoding system, an informa-





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Gary Stock

tion storage method in which musical signals are handled and stored in the form of long groups of numbers. In a PCM device, such as a digital tape recorder or a digital disc system, the conventional audio signal has been converted into a string of binary numbers — "0"s and "1"s, as it were. This is done by sampling the musical waveform at frequent intervals (usually in the range of 40,000 to 55,000 times per second), measuring the level of each of these samples, converting that level to a binary number — the "0"s and "1"s, and storing that number as pulses and silent spaces on tape or indirectly on the surface of a disc. In order to reconstruct the original music, therefore, one need only be able to

distinguish between pulses and silent spots, and know how frequently the original signal was sampled (the sampling rate). This rate is controlled by a highly accurate electronic "clock" in both the recording and playback phases, so small variations in, say, the digital recorder's transport mechanism or the disc player's platter speed have no effect on the precise rate at which the tape or disc's digital signal is reassembled into a conventional analog output, and therefore have no effect on the music. The musical signal is also immune to most other sources of incidental noise and distortion in the recording and playback chain, since only pulses and silent sections of fixed amplitude are being stored and recalled.

The wow-and-flutter specifications of the prototype digital disc systems are therefore unmeasurably low, and the theoretical distortion, dynamic range, and bandwidth specifications significantly better than could be achieved by any analog method.

A short list of the requirements for a practical digital disc is a sobering document to contemplate, however. In order to fall within the price range necessary to ensure accessibility to the general public, the disc cannot cost very much more than a conventional LP record. It must be able to be mastered and manufactured at high speed and be fabricated of an inexpensive material. It must be durable, resistant to our increasingly noxious

Fig. 1—Matsushita/  
Panasonic Visc-o-Pac  
player and discs.



atmosphere, and fairly simple to use and to store. A little basic arithmetic tells us that with 50,000 binary numbers per second of playing time, an hour of recorded music will require the disc to store some 180 million separate groups of numbers, an information density far higher than that of a conventional record.

Surprisingly, despite these stringent requirements, three separate methods of putting a PCM-encoded signal on a disc (and getting it off again) have been developed. All meet the basic criteria we have set, in their own individual ways. They are:

#### The Mechanical Approach: Visc-o-Pac

Matsushita, parent company of Panasonic, has developed the player system closest in principle to the classic stylus and groove of the phonograph record. Their Visc-o-Pac system uses a minute diamond stylus tip, bonded directly to a piezo-ceramic "chip," to play an extremely narrow groove in a 9-in. vinyl disc. The groove is vertically modulated, i.e. it has hills and valleys over which the stylus rides. Tracking these grooves with a stylus force of only a few milligrams, the stylus transmits variations in pressure caused by the pattern of hills and dales to the piezo-electric element, which generates an output voltage proportional to the vertical modula-

tion of the groove. The hills and valleys, in effect, represent the "0"s and "1"s of our binary number groups.

Visc-o-Pac is much more complex than any conventional turntable, despite its straightforward theory of operation. Its "tonearm," if it can be called that, tracks radially from the innermost grooves outward, moving at a constant velocity. The arm is driven by a servomechanism, since no free-pivoting arm could track such a narrow, shallow groove at such low pressures unassisted. The disc revolves at a speed varying from 300 to 700 rpm, depending on the position of the stylus, the objective being to maintain a constant relative speed even though the radius being touched by the stylus changes.

The disc itself is enclosed in a two-sided plastic case that is automatically removed from the surface to be played when the disc is put in the player. It has a playing time of two hours (one hour per side), and a life of at least 1,000 plays. The stylus assembly, like the stylus of a normal phono cartridge, is replaced by the user at intervals of 1,000 hours or so. Much of the Visc-o-Pac technology is derived from Matsushita's efforts in the consumer videodisc field. In fact, the Visc-o-Pac player is primarily intended for videodisc playback, with digital audio to be a secondary function. Matsushita has committed to this simple system, one

reliant upon proven technology, in an effort to keep the price of the basic player within the reach of the non-audiophile videodisc customer. A retail price under \$500.00, with discs costing about 50 percent more than contemporary LPs, is projected by company spokesmen. The projected price of the PCM adaptor is \$250.00.

#### The Capacitive Approach: VHD/AHD

As its name suggests, JVC's prototype Video High Density/Audio High Density (VHD/AHD) digital disc player is fundamentally a videodisc player that may be equipped, via an out-board PCM adaptor, to play audio-only discs. VHD/AHD uses a stylus (of sorts) in contact with the surface of a 12-in. disc, but the stylus is used as an electrode, rather than a mechanical sensing element. The broad pentagonal "footprint" of the stylus tracks along rows of wide, oval-shaped depressions called "signal pits" that are molded into the disc surface; the arm is guided by servomechanisms that monitor the stylus' position using dual rows of slender tracking pits that run at right angles to the signal pits. The JVC disc is made of a vinyl-based plastic that is electrically conductive. The electrode/stylus moving over the surface of the disc acts as one plate of a capacitor, the disc surface itself as the other plate. The pits therefore continuously modulate this capacitance, causing a carrier tone to be frequency modulated. Once demodulated, this modulation signal comprises the digital information that contains the music. Due to the broad stylus "footprint," VHD/AHD discs have a lifespan of at least 54,000 plays; stylus life is 2,000 hours or so. The discs turn at 900 rpm and have a playing time of two hours, one hour per side. They are enclosed in a dust-tight sleeve. Sliding the sleeve into the player's front panel extracts the disc for play; inserting it again removes the disc.

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Fig. 2—JVC Video High Density/Audio High Density player.

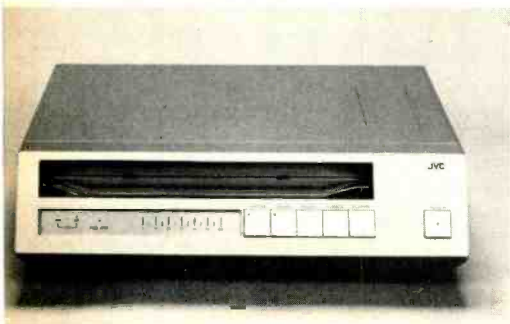


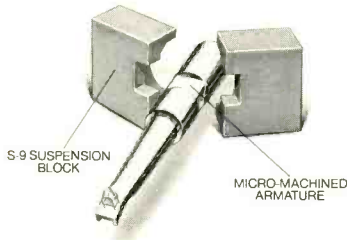
Fig. 3—Philips Compact-Disc player.



Fig. 4—Sony DAD-1X player.



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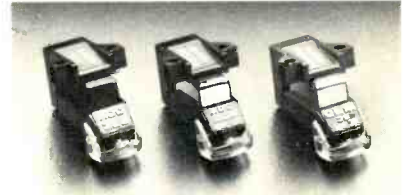
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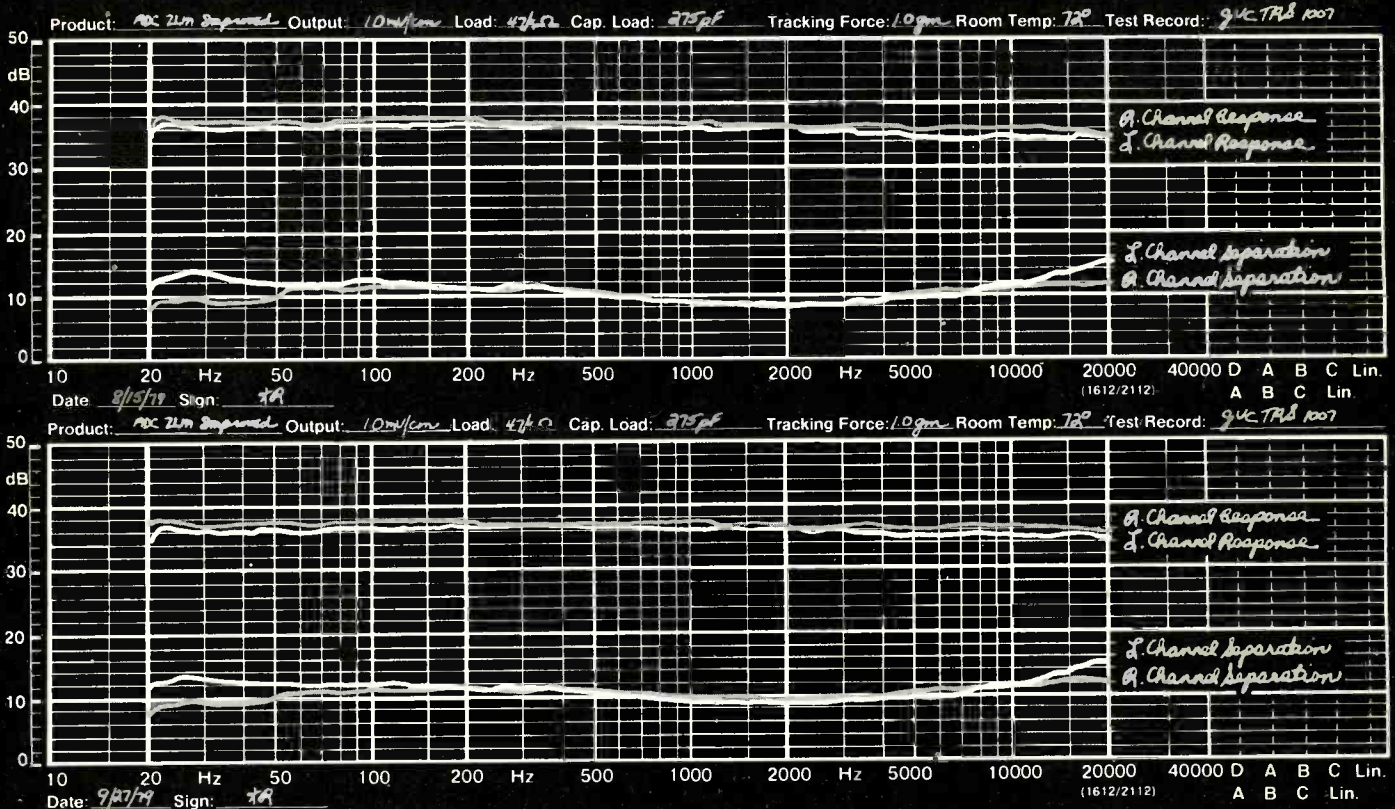
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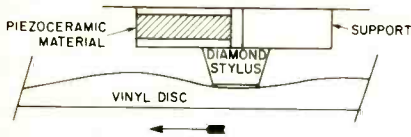
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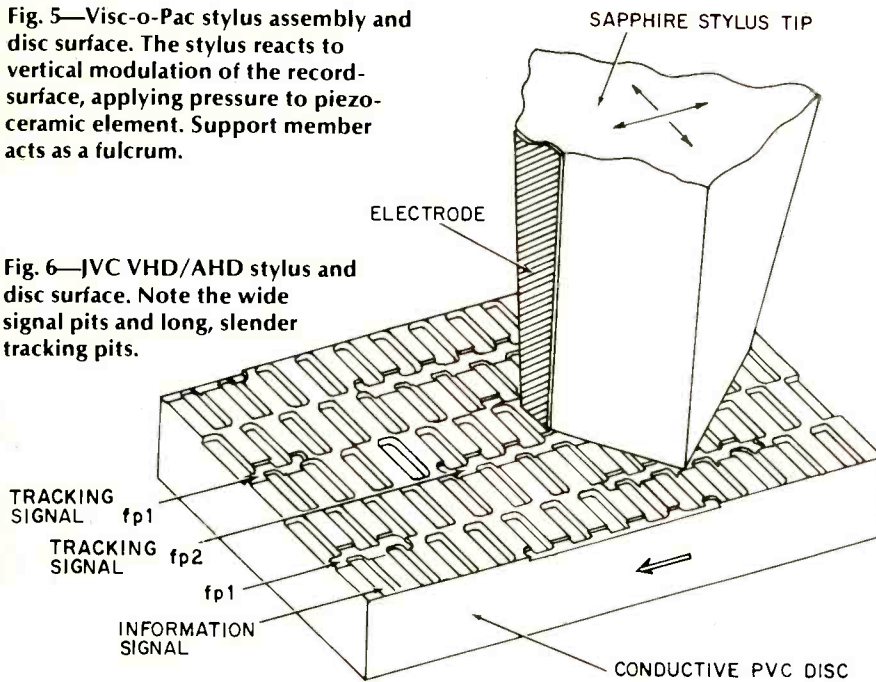
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**Fig. 5—Visc-o-Pac stylus assembly and disc surface. The stylus reacts to vertical modulation of the record surface, applying pressure to piezoceramic element. Support member acts as a fulcrum.**

**Fig. 6—JVC VHD/AHD stylus and disc surface. Note the wide signal pits and long, slender tracking pits.**



JVC also endeavors to offer their basic player at a moderate price — perhaps under \$600.00, although the optional PCM adaptor will add considerably to that sum. Other options include a random access unit for rapid access to any point on the disc and a video-oriented "Trick-play Unit" for such picture special effects as stop-frame and slow motion.

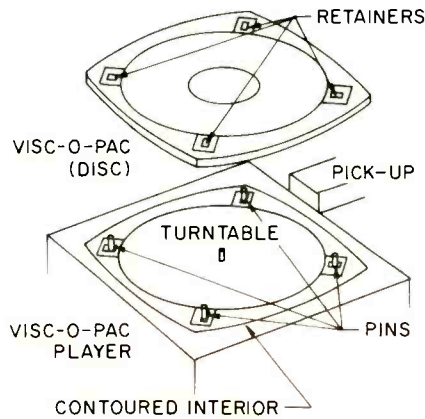
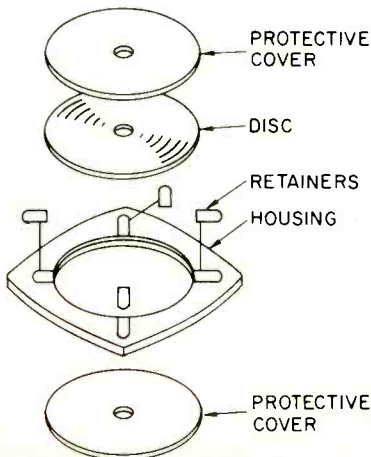
### The Optical Approach: Compact Disc and DAD-1X

The third and most complex approach to storage of PCM information in disc form is the laser-read optical system, represented here by two prototype players — the Philips Compact Disc and the Sony DAD-1X — whose

operating characteristics have been described publicly in some detail.

The Compact Disc is by far the smallest of the digital disc players demonstrated thus far. The dimensions of the player are approximately 10x7x3 ins., about the size of a portable cassette recorder (the dimensions have not been formally released; what I've indicated is derived from my examination of the unit at its demonstration). The discs are a brilliant silver, and only 4½-in. in diameter, smaller than a doughnut 45-rpm record.

**Fig. 7—Visc-o-Pac protective cover. Cover is automatically removed after insertion into player.**

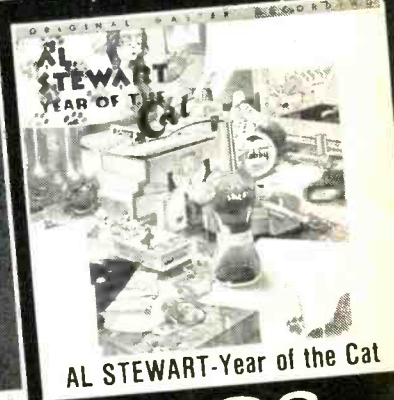
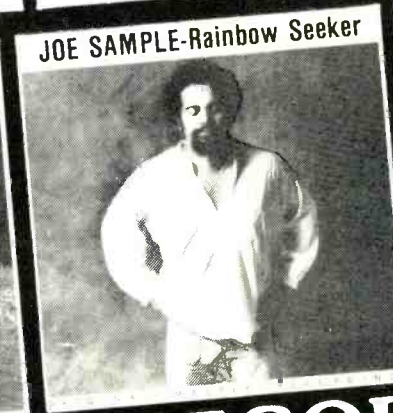
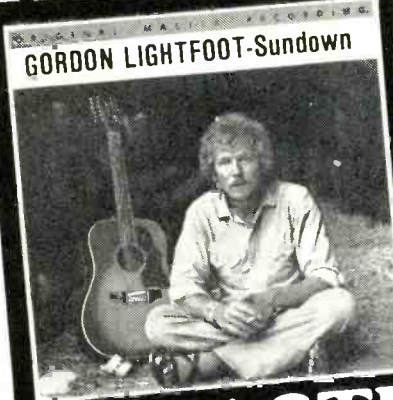
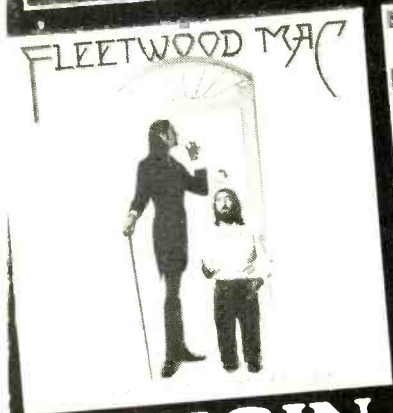
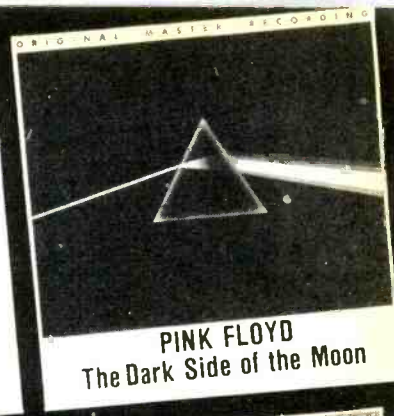
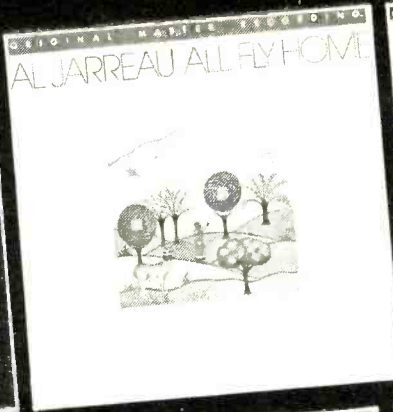


The Compact Disc's scanning element is a byproduct of Philips' videodisc research. It is a miniature, low-power laser element that reads the disc radially from below, the laser moving from inner radius to outer. The focus and lateral position of the laser are maintained by multiple servomechanisms. The beam of the laser is focused in a tiny spot on the disc's reflective, aluminum-plated center layer, which is impressed with a spiral track composed of millions of tiny pits. The light beam from the laser is reflected by the aluminum surface and its brightness continuously modulated by the pattern of the pits. This reflected light beam passes through a series of mirrors and prisms to a photodiode that converts the light into a modulated electrical signal, which in turn is decoded into the PCM audio signal, as well as tracking information to control the laser elements' servomechanisms and program-indexing information that can be displayed on the front panel as letters or numbers on an alphanumeric display. In the Philips system, a black space on the disc represents a binary "0," while a pit represents a binary "1."

There is no physical contact between the disc and the laser; both, therefore, are theoretically wear-free. Also, since the laser beam is focused on the center layer of the disc rather than its surface, dust and imperfections on the surface are out of focus and should not substantially affect the scanning process. The disc speed changes from 500 to 215 rpm as the laser element moves outward; the intent, as with the Visc-o-Pac, being a constant relative speed over the entire radius of the disc. Playing time is one hour, with one side only recorded, although recording on both sides is technically feasible.

Philips projects a cost for the Compact Disc system "comparable to the cost of a good conventional record-player," in their terms, and most observers interpret this to mean a price under \$500.00 for the player.

Sony's DAD-1X also uses a beam from a low-power laser, focused from beneath on the reflective center layer of a pitted plastic disc. As with the Philips, in the DAD-1X the modulated light reflected from the disc is carried through an arrangement of mirrors and prisms to an optical detector system, which converts the modulations into a PCM-encoded musical signal. But the disc itself is different. Unlike Philips, Sony may well offer a single player as a combined videodisc and digital audio disc player, and since video recordings require even higher infor-



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Fig. 8—Cross-section of the laser element and disc surface of Philips Compact Disc system. The Sony laser element is fairly similar.

mation density than digital audio recordings, the 12-in. disc diameter Sony has adopted provides 2½ hours of playing time on one side of the disc, as against one hour of video playing time. Intriguingly, Sony says that it is technically feasible to encode both sides of their disc, which would yield a total of five hours of playing time from

a single double-sided disc! A reference signal is recorded between selections on the Sony disc, and the player has the capacity to automatically locate a particular program. As with the Philips (and all other optical systems demonstrated thus far), the DAD-1X's laser element and disc surface are non-contacting and therefore not subject to wear.

Sony has announced no projected price for their player or discs, and no target introduction date. They describe the unit as a prototype, demonstrated primarily to solicit commentary on the optimal design for final production.

### The Compatibility Question

The manufacturers of most systems demonstrated (which also include Pioneer and Mitsubishi with optical disc systems and RCA with a possible capacitive system) make at least a pretense of saying that they will market a proprietary system in the early '80s. Most everyone agrees, though, that the simultaneous introduction of several incompatible digital disc systems, each in limited quantity and with a limited software catalog, would probably result in a marketing catastrophe at least on the scale of the quadrasonic

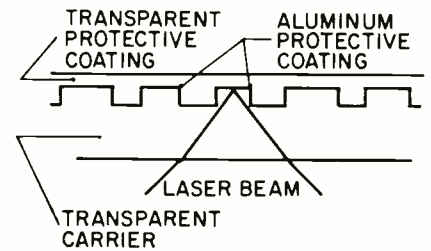


Fig. 9—Cross-section of Philips compact-disc, showing pits and transparent surface layer. Sony's disc is similar.

disaster of the early '70s. The Japanese government has requested that a common standard be set for digital audio discs, and about 30 manufacturers have taken part in standards committee meetings seeking to compromise on a single disc system. No one in Japan or outside of it is legally bound to a doctrine of one unified system, but most observers feel that some degree of consensus will be reached, at least among the Japanese manufacturers, in the next few years.

The whole story of the corporate politics surrounding the videodisc and digital audio disc standards questions is an extremely involved one, both volatile and complex. The important point to bear in mind is that the products we have examined are all in the prototype stage, and most likely substantial changes will take place in many cases before they reach the market. It is possible that some of the companies in question will abandon one technical format in favor of another, so as to share the costs of software development and licensing with other companies, acquire greater marketing strength through alliance, and thereby improve the chances of a given system being accepted by the public. Probably more than one system will reach the market; whether two or more can coexist is another question. Unlike the LP versus 45 struggle of the '50s, no armistice-style compromise wherein a single player can be used with two different disc formats seems likely or even practical.

It is also not likely that you will throw away your record collection and turntable on the same day you buy your digital disc player. It will take many years for the catalog of available digital programs to near the size of the immense analog library we now enjoy. Philips, for instance, forecasts a 10-year period of parallel use of analog and digital systems. The quaint, fussy device we call the phonograph will be around for quite a while. But even though its period will not soon end, the era of the digital disc will soon begin. **A**

Table 1 — Comparative Specifications of Four Prototype Digital Audio Disc Systems.

Disc System	Matsushita (Panasonic) Visc-o-Pac	JVC Video High Density/Audio High Density	Philips Compact Disc	Sony DAD-1X
Scanning Format	Mechanical	Capacitive	Optical	Optical
Playing Time	2 hours (1 hour per side)	2 hours (1 hour per side)	1 hour (recorded one side only)	2½ hours (recorded one side only)
Disc Diameter	9 inch (225 mm)	12 inch (305 mm)	4½ inch (115 mm)	12-inch (305 mm)
Number of Channels	2	2	2 to 4 <sup>2</sup>	2
Frequency Response	20 to 20 kHz ±1 dB	1 to 20 kHz ±0.5 dB	20 to 20 kHz	2 to 20 kHz ±0.25 dB
Dynamic Range	>85 dB	>90 dB	≥85 dB	>95 dB
Distortion	<0.1 percent	<0.05 percent	<0.05 percent	<0.03 percent
Disc Lifespan	>1,000 plays	>54,000 plays	Infinite	Infinite
Stylus Lifespan	>1,000 hours	>2,000 hours	Infinite (no stylus)	Infinite (no stylus)
Revolving Speed	300 to 700 rpm <sup>1</sup>	900 rpm	215 to 500 rpm <sup>1</sup>	450 rpm
Bit Format	14 bit	14 bit	14 bit	16 bit
Track Pitch (Spacing)	2.3 μM (micrometers)	1.4 μM	1.66 μM	1.3 μM

Notes: <sup>1</sup>Speed varies dependent upon position of scanning element.

<sup>2</sup>Playing time 45 minutes in four-channel mode.

# The Universal Expander

Dynamic range limiting during the production of records (and of FM broadcasts) has long been a source of irritation for music lovers. As playback equipment improves, the limitations of most program material become more and more obvious. The vast majority of records are produced with the lowest common denominator in mind—a system that is restricted in its ability to recreate natural dynamic range.

With the introduction of the Dynamic Expander, MXR's Consumer Products Group has achieved its goal of providing a signal expansion technique for all types of music compatible with the finest audiophile equipment available.

**Enter the typical dynamic range expander:** While dynamics are restored, a series of disturbing side effects becomes apparent. Because typical expanders cannot distinguish scratches, ticks, pops, and rumble from music, these noises trigger the expansion circuitry. More importantly, because most existing expanders have a fixed value release time, they seem to 'pump' with some music, and hiss or 'breathe' with other kinds of music.

In most cases these drawbacks have outweighed the advantages of expansion for the critical listener.

**Enter MXR's Dynamic Expander:** a linear signal processor with up to 8 dB upward expansion (restoring musical peaks) and as much as 21 dB downward expansion (reducing noise). MXR has solved the problem of 'breathing and pumping' by providing a variable release-time control that tailors the response characteristics of the expander to the program material.

A sophisticated level detection circuit discriminates between music and unwanted information such as

rumble and scratches. To monitor gain changes, a unique LED display accurately indicates the expander's effect on the signal whether in or out of the circuit. A level control adjusts the detector's sensitivity to optimize the expansion for varying signal levels, and additional controls provide in/out bypass switching and versatile taping facilities.

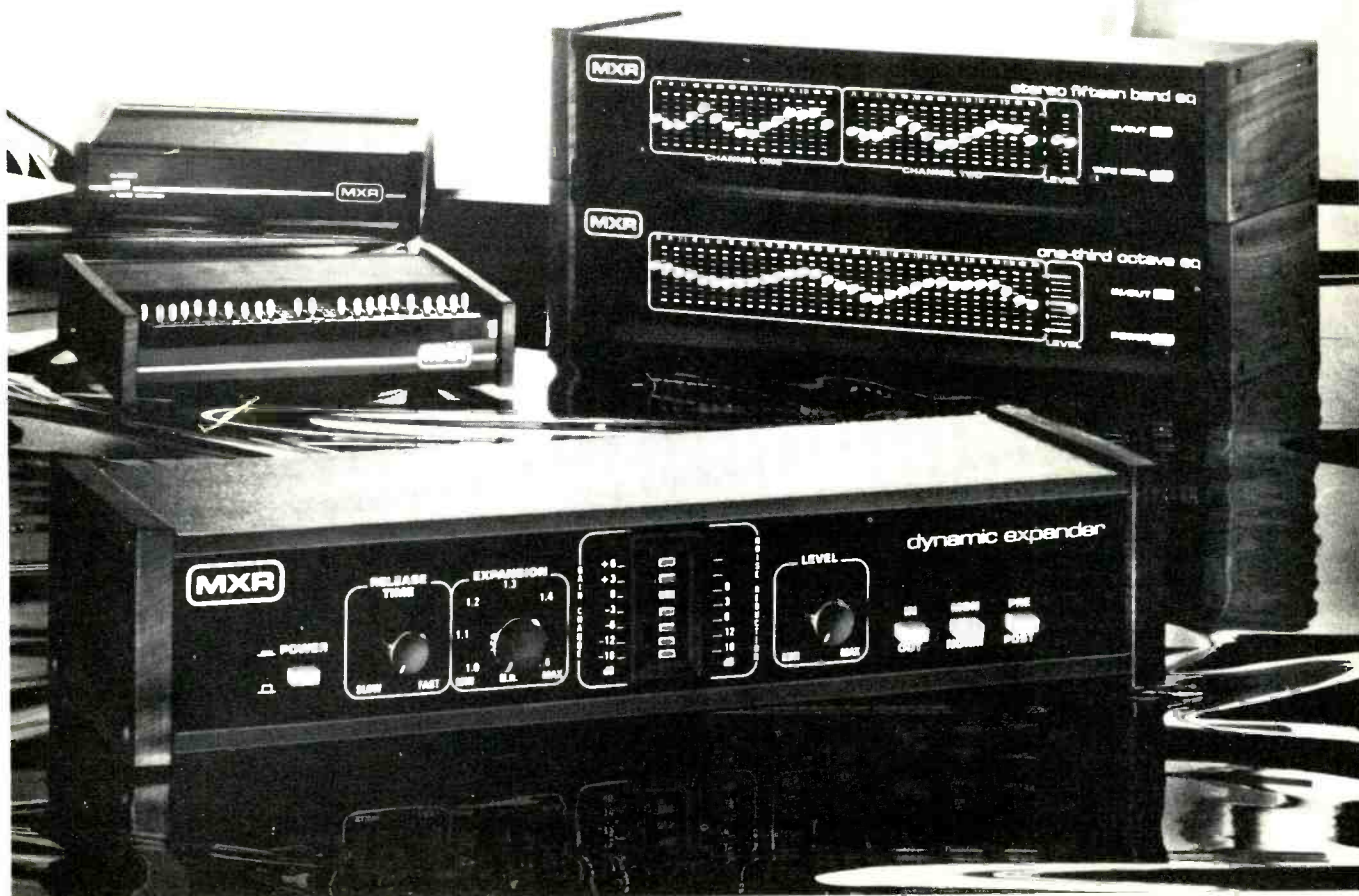
The MXR Dynamic Expander preserves the bandwidth, stereo image, and spectral balance of the original signal even after processing. Dynamic range expansion that is musically natural will restore the excitement and nuance that makes live music so emotionally satisfying, and will let you rediscover your cherished recordings.

Harnessing innovative technology and sophisticated production techniques, MXR continues its commitment to the music lover.

**The expanding universe** of signal-enhancing equipment from MXR's Consumer Products Group gives demanding music listeners maximum performance from their playback systems regardless of room acoustics or program deficiencies. The MXR Comander allows you to maintain the dynamic range of source material through open reel or cassette tape decks. Environmental equalization is easily achieved with your choice of stereo 10 band (full octave), stereo 15 band (two-third octave) or professional one-third octave equalizers all built to the exacting performance specs for which MXR is famous. See your MXR dealer.

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**MXR** Consumer Products Group



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# Equipment profiles

## TEAC Model C-1 Cassette Deck



### Manufacturer's Specifications

**Motors:** 3; 1 PLL d.c. servo-controlled dual capstan, 2 d.c. coreless reel.

**Heads:** 3.

**Wow and Flutter:** 0.04 percent.

**Frequency Response:** 30 to 18,000 Hz,  $\pm 3$  dB, with CrO<sub>2</sub> and FeCr; 30 to

16,000 Hz,  $\pm 3$  dB, with FeO.

**Signal-to-Noise Ratio:** 60 dB with FeCr (without Dolby).

**Inputs:** 2 lines, 50 kilohms; 2 mikes, 600 ohms.

**Output:** 0.3 V at 50 kilohms line, 1 mW at 8 ohms for phones.

**Features:** Jacks for external dbx encoder-decoder, 2 bias-equalization plug-in cards.

**Dimensions:** 19 in. (48.26 cm) x 6½ in. (16.51 cm) x 13¾ in. (35.24 cm).

**Weight:** 32 lbs. (70.4 kg).

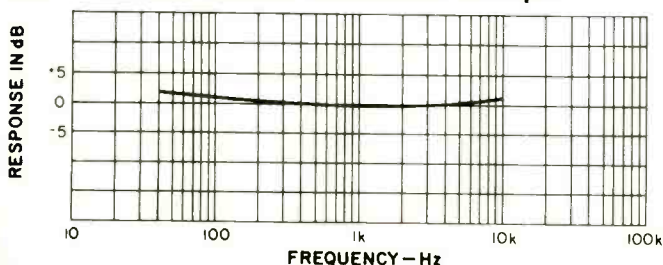
**Price:** \$1,350.00.

There is no official or even commonly accepted set of standards for a professional cassette deck. However, most engineers would stipulate variable bias, equalization and speed, with provision for azimuth head adjustment, off-tape monitoring plus the state-of-the-art parameters in respect to frequency response, signal-to-noise ratio, and so on. TEAC's impressive-looking Model C-1 does not have facilities for external head adjustment, but it certainly has some outstanding features with an excellent overall performance and should at least qualify as "nearly professional." Bias and equalization adjustments are provided on plug-in cards and, normally, two are included: One for cobalt and the other for CrO<sub>2</sub>.

Other tapes — ferric and FeCr — are handled by a pair of three-position bias and equalization switches.

The deck is rather larger than average, measuring just under 14 in. deep, 6½ in. high, and 19 in. wide (yes, it can be rack-mounted). The front panel has the usual satin-silver finish, contrasting with a neat black sub-panel containing the cassette compartment and the associated tape-transport controls. A complex LSI logic system is employed with three motors and two capstans — the drive motor being servo-controlled. The *On-Off* switch, timer button, headphone jack, and variable speed control are located on the left of the cassette compartment. To the right, under the VU meters, are three rotary controls. Number one and number two are the input controls for left and right channels which, although ganged together, can be moved independently if desired. The third control governs the output. On the extreme right is a vertical row of six three-position slide switches. At the top is the source-monitor switch, the center position bypassing the aforementioned output control. Number two switches in the Dolby system or connects an external dbx system, and number three is the mike-line selector with a 20-dB attenuation position. The next switch, number four, works in con-

Fig. 1 — Playback response from standard test tape.





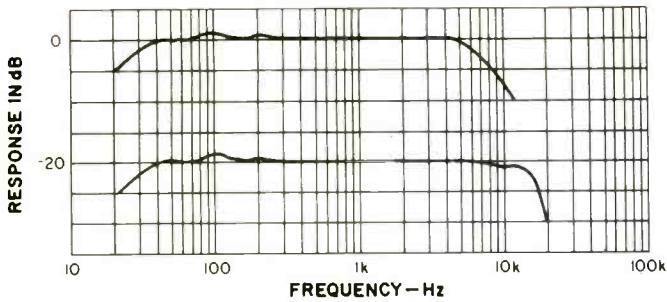


Fig. 2 — Record-replay response with BASF Studio tape.

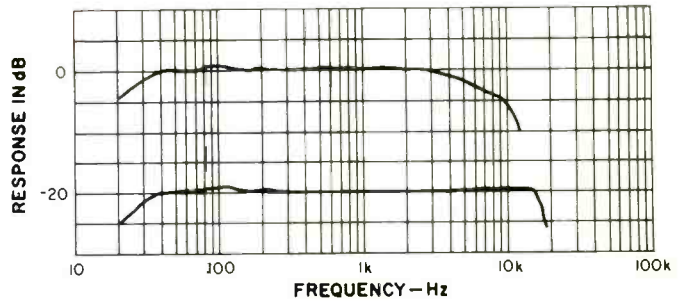


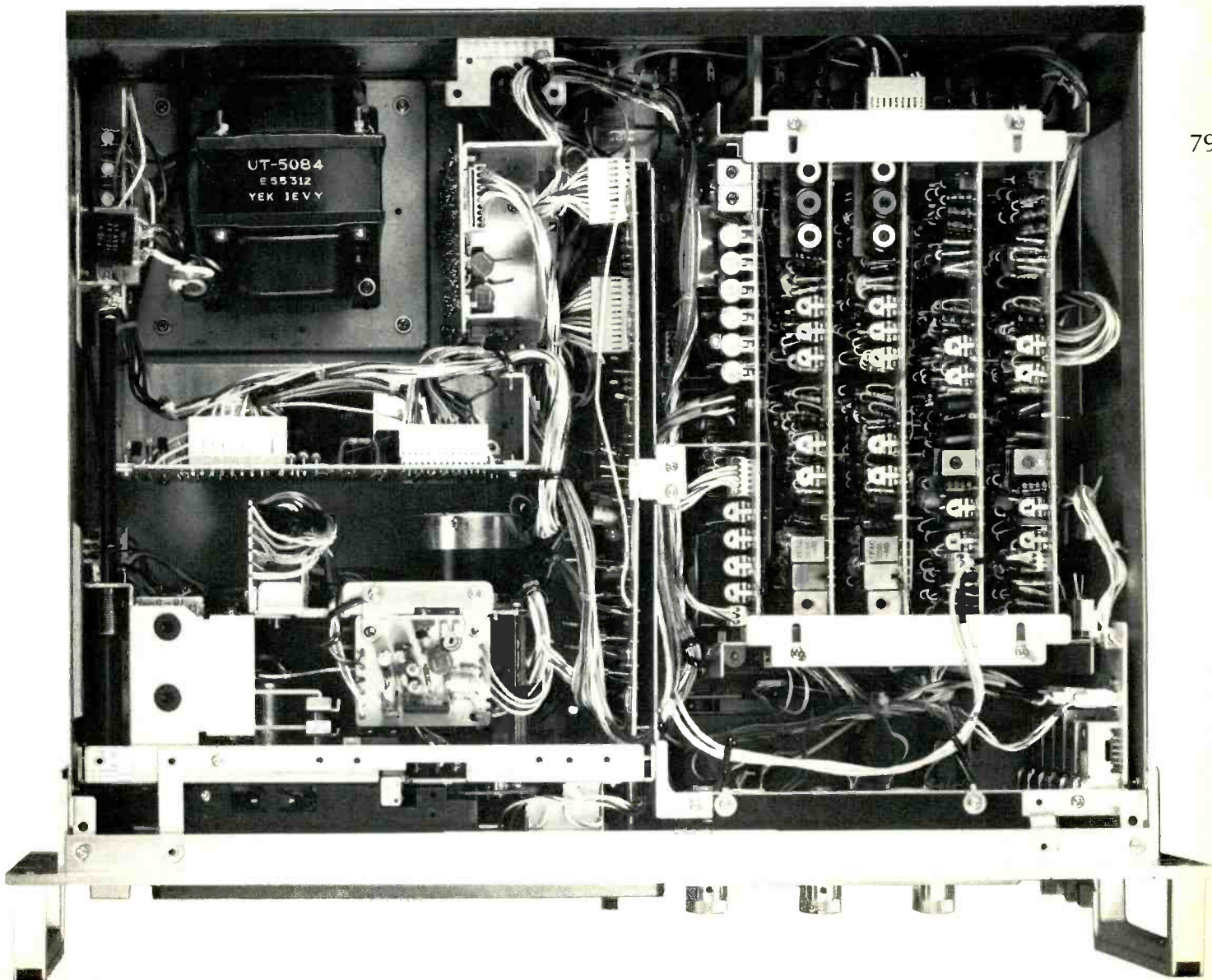
Fig. 3 — Record-replay response with Maxell UD XL-II tape.

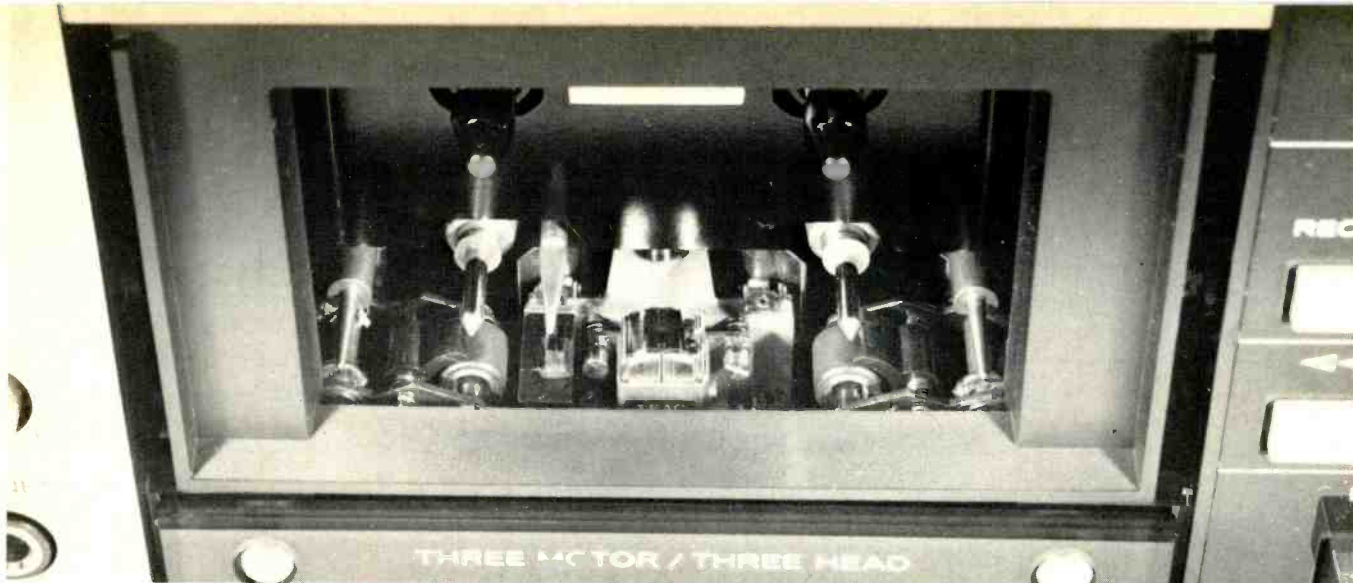
junction with the digital tape counter to initiate automatic rewind when the tape reaches the end — either in the play or record modes. Switches five and six are the bias and equalization selectors mentioned earlier, and they are marked *Normal*, *FeCr*, and *CrO<sub>2</sub>/Option* — which last refers to the plug-in board. The two VU meters are calibrated for peak readings with the 0 VU indicating a flux density of 200 nWb/m, the Dolby level. I ought to mention that one of the controls on the sub-panel is the *Record Muting* switch which discon-

nects the recording input signal from the heads, leaving the erase head functioning to clean the tape. Input and output sockets — including a pair of microphone jacks (standard 1/4-in. types) — are at the rear.

### Measurements

Figure 1 shows the playback response from a standard test tape, and Fig. 2 shows the record-playback response with BASF Studio tape which has a “normal” 120- $\mu$ S equaliza-





tion. The upper -3 dB point was at 16.8 kHz, with an extended low end free from "fringing." Next, a CrO<sub>2</sub> cassette was tested, a Maxell UD XL-II "chrome substitute." As can be seen in Fig. 3, the high-frequency response was extended to 18 kHz. While the plug-in card was switched in for this tape, it was possible to adjust the controls for the flattest response. The third tape to be checked out was a Sony FeCr-46 which (see Fig. 4) had the widest response with the -3 dB frequency point at an amazing 22 kHz!

Distortion at 1 kHz is shown in Fig. 5. Note that the ferric tape, the BASF Studio, has the greatest headroom at +7.6 dB, against +4.5 dB for the UD XL-II and +5.2 dB for the FeCr-46. Figure 6 shows distortion versus frequency, and here the differences are not so marked.

Signal to noise came out at 61 dB for the Studio and 60 dB for the FeCr-46 and UD XL-II (ref. 3 percent THD) with the Dolby system adding 8 to 10 dB. Input required for 0 VU was 72 mV, the output then being approximately 800 mV. Microphone sensitivity was 0.25 mV with a handling capacity of 50 mV, increasing to 500 mV with the attenuator switched in. With the input switch in the microphone position and the control in its maximum position, signal to noise decreased by some 11 dB. The Dolby system tracked down to -40 dB with an error of less than 1.5 dB.

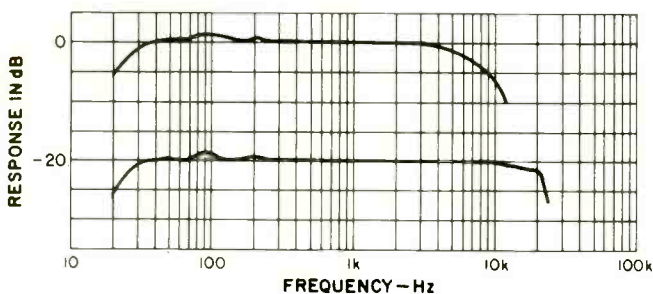


Fig. 4 — Record-replay response with Sony FeCr tape.

Fig. 5 — Distortion at 1 kHz with three tapes.

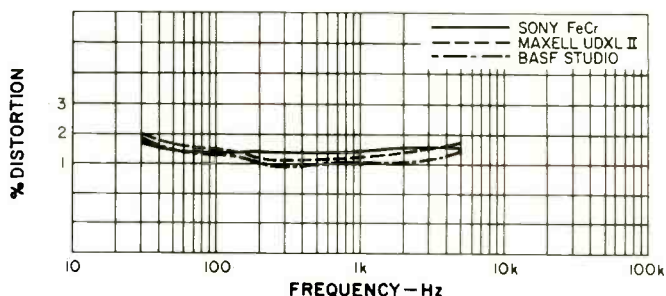
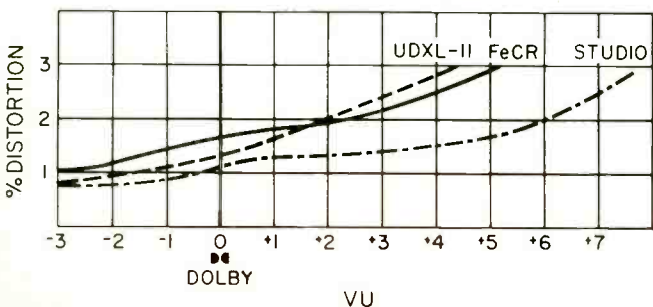


Fig. 6 — Distortion vs. frequency with three tapes.

Wow and flutter measured 0.04 percent (DIN 45 507), and the speed control gave a variation of +10 and -7 percent. Rewind time for a C-90 cassette was 75 S.

### Use and Listening Tests

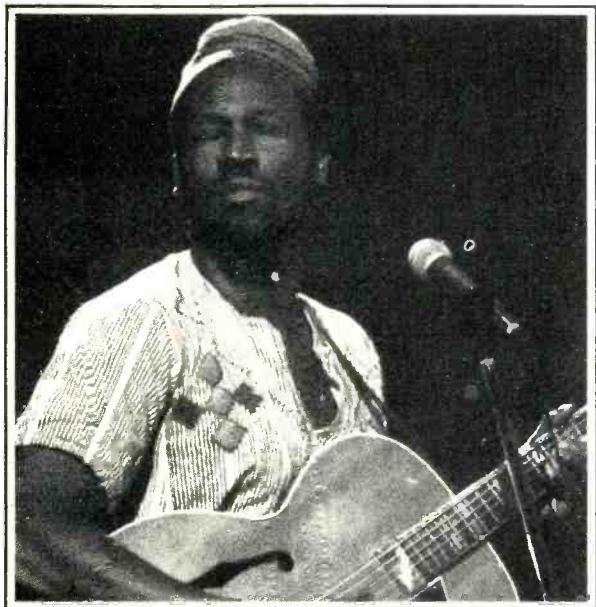
Logic controls are really a delight to use, and those on the C-1 proved to be no exception. The VU meters with their fast rise time and peak indicator capability gave a more accurate reading than most, but I did miss the convenience of a peak limiter. The deck was used to make a number of recordings at the local college where a well-known soprano, Maria Niles, was rehearsing. As a matter of interest, the microphone used was a Sennheiser Profipower with a Nakamichi Model 1000 condenser type for the piano. I found the ganged input controls a mixed blessing; the piano levels remained more or less constant, but occasionally the soprano tended to get close to the microphone and the control had to be backed off a little — which meant using both hands on the controls! This dual arrangement, however, does permit instant fades, and, when you return to the correct level position for channel number 1, number 2 is also bound to be right!

The plug-in cards will appeal to both the professional user and discriminating audio enthusiast since they not only guarantee optimum performance from any current tape, but extra cards will presumably be available for new formulations. (I understand complete conversion kits can now be obtained to suit metal-particle tapes.) The outboard dbx noise-reduction unit mentioned earlier (TEAC Model RX-8) is recommended for the professional recordist; it can increase the dynamic range by adding 10 dB to the saturation point and 30 dB to the noise reduction. In other words, recordings can be made with a total range of 100 dB!

George W. Tillet

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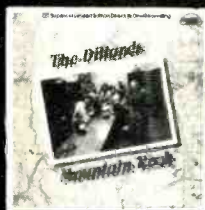
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**ADC  
Model 1700DD  
Semi-Automatic,  
Quartz-Lock Turntable**



**Manufacturer's Specifications**

**Type:** Two speed.

**Motor Type:** Quartz-reference, phase-locked loop, direct drive.

**Variable Pitch:** Six percent range.

**Wow and Flutter:** Less than 0.03 W rms.

**Rumble:** -70 dB DIN "B."

**Drift:** 0 percent.

**Tracking Error:** Less than 0.5 degrees per inch.

**Dimensions:** 18.5 in. (47 cm) W  
x 15 in. (38.1 cm) D x 6 in. (15.24 cm) H  
including dust cover.

**Price:** \$279.95.

The ADC 1700DD is an attractively priced, quartz-lock turntable with some features usually reserved for more expensive models. For instance, the tonearm is a straight, aluminum, low-mass type with a tiny plug-in headshell made of carbon fiber. The bearings are highly polished instrument types, with a cradle suspension similar to that used on the sophisticated and expensive ADC LMF-1 which costs almost as much as this turntable! The connector pins are silver plated, and the shell is locked firmly to the arm by a screw.

Length of the arm is just under 9½ inches from pivot to stylus — rather longer than average. A calibrated counterweight is at the rear, and the tracking force adjustment range is from 0 to 3.5 grams. The arm is mounted on a plate which is suspended from the top panel, and further acoustic isolation is provided by the four large, spring-loaded feet at the base of the unit. This base, by the way, has neat rounded corners and is molded from a high-density plastic material — a design feature which is becoming more common these days. On the left-hand side is a variable speed control, and just behind it is a strobe plus a push-button switch for disconnecting the quartz lock (unlocking it — if you prefer). To the right of the speed control are two windows which display the speed (33 or 45 rpm). When the lock is on, the words "quartz lock" are also shown; when the lock is off and the variable control is operative, only the numbers 33 or 45 are visible. It must be emphasized that there is no continuous digital readout.

Over on the right-hand side, there is a light indicating that the power is switched on, and at the extreme right there is a three-position switch for Off, 33, and 45 rpm. A long cue lever is mounted near the arm base, and in front of it, next to the arm rest, is the anti-skating dial. The motor is servo-controlled, and the die-cast aluminum platter is dynamically balanced. It weighs 2.3 lbs, and its soft rubber mat is treated with an anti-static material.

**Laboratory and Use Tests**

For test purposes, a Stanton 881S phono cartridge was mounted in the shell, and tracking force set to 1 gram with the anti-skating dial set at 1.25. The first test was for wow and flutter, and the combined figure came out at 0.045 percent using the DIN 45-507 standard. Rumble measured -63 dB (ARLL), somewhat better than the -70 dB DIN B figure claimed (as a rule, DIN B is roughly equivalent to the ARLL figure plus 9 dB). Tracking error was significantly better than 0.5 degrees per inch, and the tracking force calibration error was negligible. The anti-skating dial matched the tracking force quite well, and optimum results were obtained when the anti-skating dial was set about 20 percent higher than the tracking force.

Both lateral and vertical bearing friction was insignificant (the figures quoted are 5 and 7 milligrams). Arm resonance with the 881S was at 10 Hz with a rise of 4.5 Hz with the cartridge brush lifted so it was well clear of the record. With

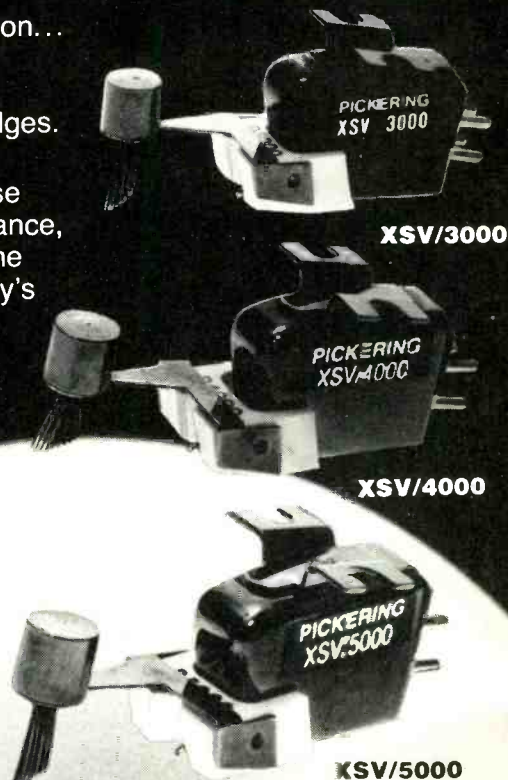
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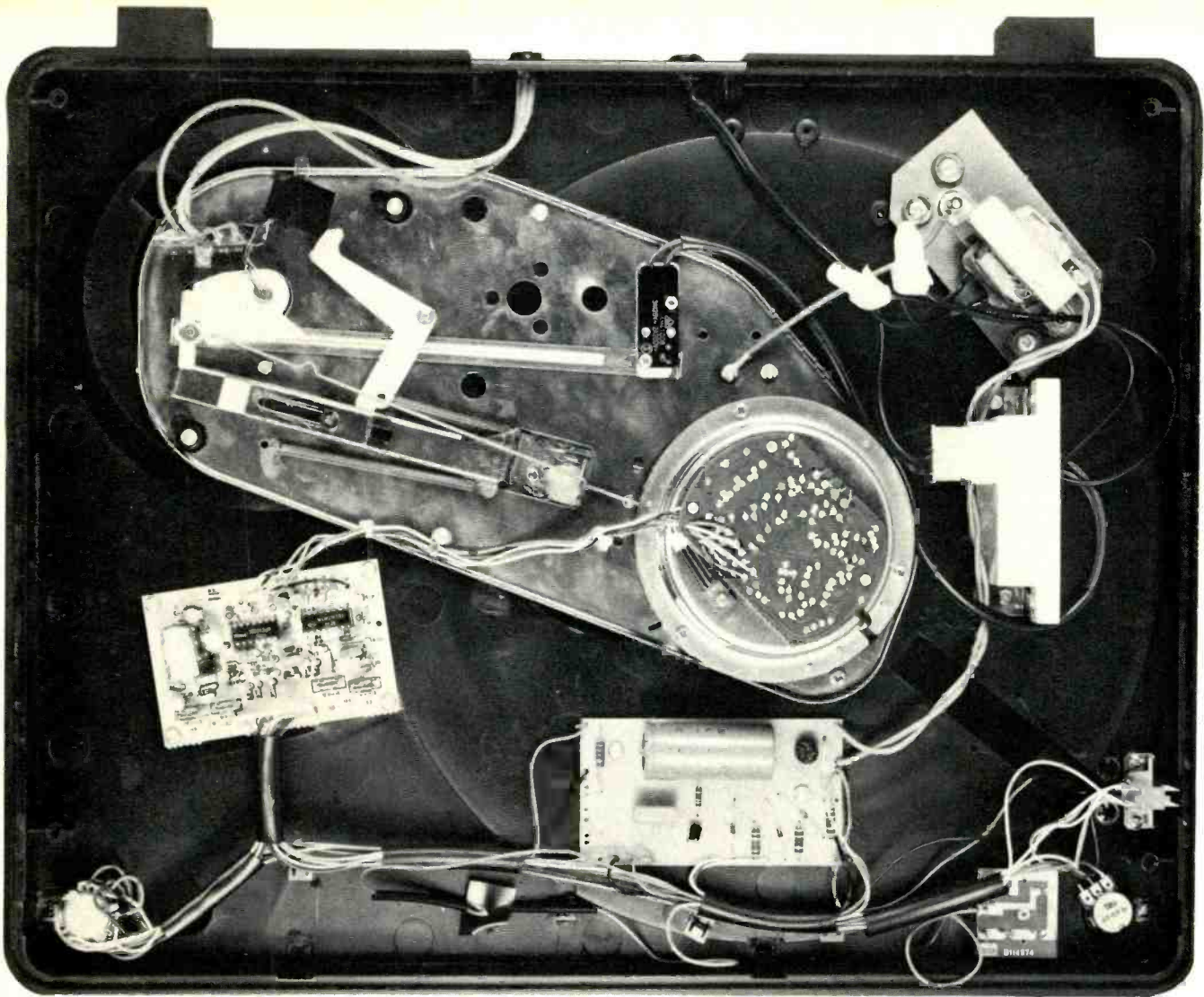
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the brush down, the rise was reduced by 2 dB and, in any case, 10 Hz is outside the "warp zone." As claimed, the time taken to reach full speed was two-thirds of a revolution, while the arm return cycle took approximately 4 seconds. The speed control had a range of +7 percent and -4.8 percent which is more than adequate.

As the arm is moved to the record, the turntable starts automatically, and the cue lever can then be used to lower the cartridge. If the right-hand control (the one labelled 33, 45, and Off) is in the Off position, the stylus can be placed in

the desired position before switching the motor on. At the end of the record, the arm is returned to its rest. The cue control is nicely damped, and I was pleased to note that there is the minimum of backlash. Although the tracking force was set to 1 gram, I must confess I initially thought this was a little optimistic. This was not the case at all, and I found that the 881S tracked all bands of the Shure Era III "torture test" record with ease. All-in-all, the ADC is a nicely styled, well-made turntable with a good performance. At today's prices, it is a bargain!

George W. Tillett

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# How to get an honest 30Hz from a 1.25 cubic foot speaker system.

The story behind the new KLH Computer Controlled Loudspeakers.™

With the introduction of acoustic suspension more than 20 years ago, the loudspeaker industry took an impressive step forward. This technology allowed speaker manufacturers to achieve full-range frequency response in a cabinet substantially smaller than any previous full-range loudspeaker.

Since then, breakthroughs have come and gone in the industry. But none that has significantly reduced the size of a true, full-range system.

The reason is actually quite simple. Accurate bass reproduction requires a woofer to displace a large volume of air. In a small system with a small woofer, the woofer cone must therefore travel a long way to reproduce the lower frequencies.

Although a small woofer is perfectly adequate most of the time, occasional high level, low frequency signals can drive the cone well beyond its intended excursion, causing severe overload distortion.

To avoid this, it has been necessary to attenuate lower frequencies in smaller systems. Which is why small speakers have always had compromised bass.

## The KLH Analog Bass Computer.™\*

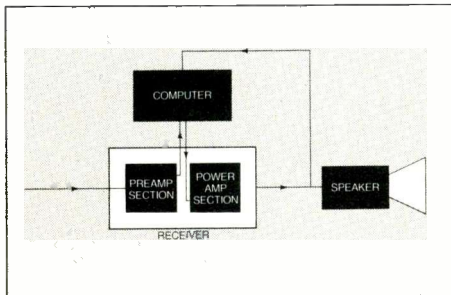
To solve this problem, we developed a completely new approach — computer control.

We designed a separate component, the KLH Analog Bass Computer, as an integral part of the entire speaker system. This component sits next to the receiver or amplifier and constantly monitors its output. The computer derives an electronic analog of cone motion, and controls the woofer at the precise instant at which overload distortion would otherwise occur.

With this kind of accurate, reliable control, our designers were free to extract the optimum theoretical performance for any given cabinet size. And develop a line of loudspeakers that can deliver extended bass response in cabi-

nets that are substantially smaller than ever before possible.

The KLH-1 is one example. From a 1.25 cubic foot cabinet, it delivers bass to 30 Hz (-3dB) at 105 dB s.p.l. with absolutely no possibility of overload distortion.



## Beyond the Computer.

Since the Analog Bass Computer and the speakers must be designed as a single, integrated system, we started from scratch with the objective of optimizing our new technology.

To achieve the widest possible

bandwidth with acceptable efficiency, we employed sixth-order equalized systems. Combined with the Analog Bass Computer, these systems provide a -3dB point equal to conventional acoustic suspension systems of at least four times their volume.

In keeping with our objectives, we also refused to compromise other elements of the design.

For our cones, we selected polypropylene, a material first developed for use in studio monitors by BBC engineers. The movement of polypropylene reflects the electrical signal more faithfully than either paper or bextrene. The result is a remarkably clear, transparent, uncolored midrange.

For our speaker baskets, we used die-cast aluminum rather than stamped steel.

And we used massive magnet assemblies, optimized for the sixth-order design.

## Three Applications.

Finally, we applied all we had learned to accomplish three distinct objectives.

Our first objective was to produce a speaker that raises the absolute level of low-frequency response in a cabinet that is still practical for the home environment. The new KLH-1 does exactly that. It delivers flat bass to 30 Hz (-3dB) from a floor standing unit just 11" x 30½" x 10¼". At a price per pair of \$1100\*\* including Analog Bass Computer.

Our second objective was to provide the best possible combination of price and performance. Our solution is the KLH-2. At \$660\*\* per pair with computer, the KLH-2 can deliver flat bass to 38 Hz (-3dB) at 102 dB s.p.l.

from a cabinet that measures 10¼" x 21" x 8½".

Our third and final objective was to design a moderately priced speaker with performance equal to or better than anything near the cost, in a cabinet one fourth the size. This is the KLH-3. It measures 8½" x 12½" x 6", delivers bass to 40 Hz (-3dB) at 95 dB s.p.l. and costs \$450\*\* per pair including computer.

The new line of KLH Computer Controlled Loudspeakers.



Listen to them.

For more information, call toll-free 800-225-6042 (in Mass. 1-800-532-9566). Or write KLH Research and Development Corp., 145 University Avenue, Westwood, MA 02090. In Canada: The Pringle Group, Ontario.

# KLH

\*Patent applied for.

\*\*Manufacturer's suggested retail price.

Enter No. 21 on Reader Service Card

## KEF 104aB Loudspeaker System



### Manufacturer's Specifications

**Frequency Range:** 30 to 40,000 Hz.

**Nominal Impedance:** 8 ohms.

**Dividing Frequencies:** 45 Hz, acoustically coupled; 3,000 Hz, electrical cut-off slope 18 dB per octave.

**Acoustic Contour Control:** Three position  $\pm 2$  dB, centered on 1,500 Hz.

**Sensitivity:** 12.5 watts into nominal 8 ohms produces 96 dB at one meter and 400 Hz in anechoic conditions.

**Continuous Power Rating:** 20 volts (50 watts) from 100 Hz to 2,500 Hz, reducing to 8 volts (8 watts) above 3,000 Hz.

**Dimensions:** 63 cm (24.8 in.) x 33 cm (13 in.) x 26 cm (10.2 in.).

**Weight:** 15.8 kg (35 lbs.).

**Price:** \$425.00 each.

It is probably fair to say that most loudspeaker manufacturers now have access to computers or at least know what a computer can do. It is also fair to say that most loudspeaker manufacturers now know something about phase response and have at least a passing acquaintance with the phrase "time domain." But there had to be someone who was first; there had to be a manufacturer who, without prior advertising hoopla or pressure from their competition, borrowed an expensive computer to analyze the time domain and phase performance of their product, then laid out good money to buy a computer to assist in further design improvements on that product. KEF Electronics Ltd. in Kent, England was that company. However, KEF never blew horns or beat drums over what they did, so most persons not on the inside of this business are not aware of the mild revolution KEF started.

One of the first of KEF's commercial loudspeaker systems to benefit from computer analysis was their Model 104, which was introduced in 1973. KEF now has a number of computer-assisted-design loudspeaker systems in their inventory, but they recently upgraded the 104 with a new crossover design (using digital analysis techniques, of

course). The system utilizes a new crossover circuit which KEF calls an acoustic Butterworth (aB) filter network, and the system is accordingly identified as the Model 104 aB.

The 104 aB uses two active drivers and a passive radiator. A 330-mm by 229-mm (13x9 in.) passive radiator is acoustically coupled with a 203-mm (8-in.) driver at frequencies below 45 Hz. The 203-mm driver crosses over at 3 kHz to a tweeter which carries the top end up to beyond 20 kHz.

The crossover network is unusual in two respects: (1) it is a third-order network with an asymptotic 18-dB-per-octave attenuation rate, and (2) it incorporates the driver-reflected impedances in its design. It does not, in other words, draw values from some handbook under the presumption that the loudspeaker which is to be connected to the network is a pure resistor.

The system is relatively small, measuring 630 x 330 x 260 mm (24.8 x 13 x 10.2 in.) and can be shelf mounted. But at a weight of 15.8 kg (35 lbs.), this system should have a sturdy shelf. To avoid overemphasis of the lower frequencies, KEF advises raising the cabinet by at least 200 mm (7.9 in.) above the floor.





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Earphones are made for ears. Yours. That's why the Beyer DT 440 has sound so natural and is so light and comfortable you don't even know it's there, even after many hours.

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There's no great weight suspended from your head, and your ears never get squeezed.

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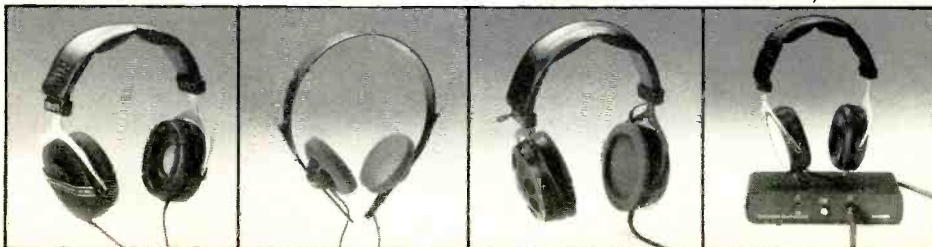
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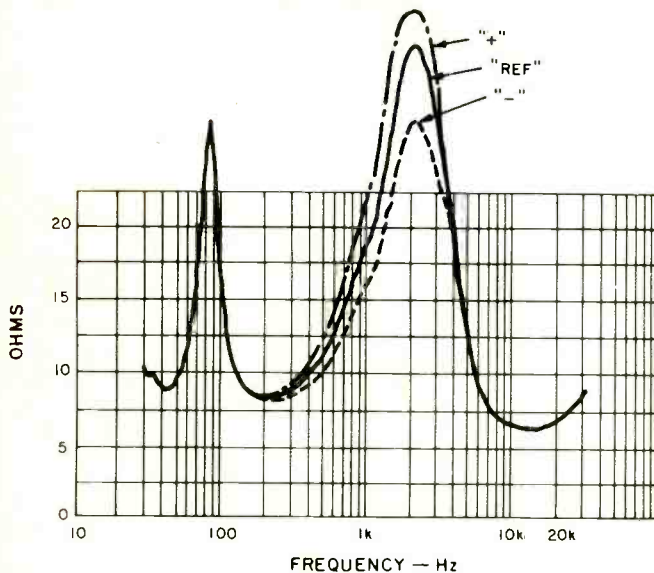


Fig. 1—Magnitude of impedance for each of the three equalizer settings.

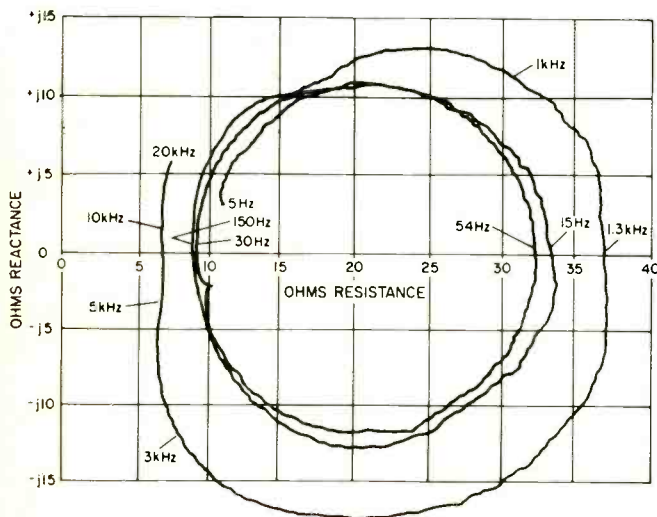


Fig. 2—Complex impedance plot for reference equalizer setting.

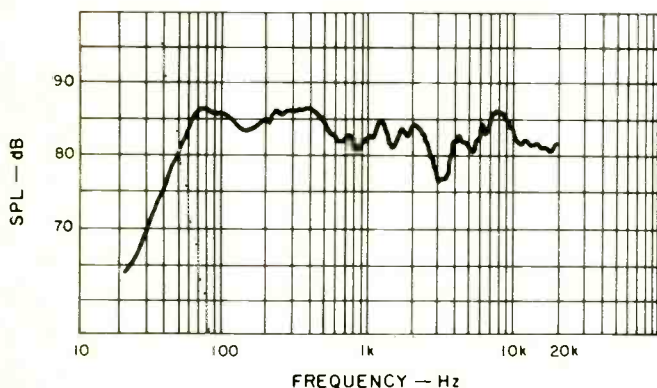


Fig. 3—One-meter axial anechoic frequency amplitude response for a constant voltage drive level corresponding to one average watt into 8 ohms.

Electrical connection to the system is made either by a two-pin DIN connector, using the cable supplied with each speaker, or via 4-mm sockets. Since most American power amplifiers will not accept the connector which is attached to the cable, it is necessary to use the 4-mm sockets. Unfortunately it is not possible to make good electrical contact without the aid of plugs, known commonly as "banana plugs." And since the spacing between these sockets is 35 mm, rather than the more conventional 20-mm spacing of American plugs, it will require the purchase and connection of additional connectors. Terminal polarity is indicated by small positive and negative symbols molded in the plastic receptacle holding the sockets, and the choice of basic black-on-black renders the sockets extremely difficult to identify. This appears quite out of keeping with the rest of the KEF design philosophy, particularly since the same receptacle holds a high-contrast label which tells the user that he has a KEF 104aB, the impedance, and the serial number, and I feel that the installer, perhaps crawling around on hands and knees with a flashlight in his teeth, would much rather see the polarity identification in high contrast, particularly if he's concerned with true acoustic polarity.

The foam grille is readily removed (and replaced) to reveal a three-position acoustic equalizer switch and the protective fuse for the high-frequency driver. The manufacturer thoughtfully provides spare fuses, which are a variety somewhat smaller in physical size than conventional fuses used in domestic loudspeakers.

KEF supplies a very thorough user's manual with each loudspeaker. Other than the possible difficulty with electrical connection to which I referred, even a totally nontechnical user should be able to follow the instructions to get proper performance from this loudspeaker system.

### Technical Measurements

The magnitude of terminal impedance for each of the three equalizer settings is shown in Fig. 1. The lowest value of impedance occurs around 10 kHz and measures slightly over 6 ohms, while the highest value of impedance measures nearly 37 ohms and occurs around 1.3 kHz. While this impedance excursion is of little or no concern for the quality of sound from the KEF 104aB when driven from a low-impedance source, it does suggest that care should be taken in choosing speaker connecting wire so that the line drop will not influence tonal balance. Too small a speaker wire, such as 22 gauge, would cause a frequency response boost at 1.3 kHz relative to 10 kHz. For example, eight meters of 22 gauge cause a 1 dB response variation. Larger size wire should be used for the KEF 104aB.

The low-frequency resonance impedance rise at 54 Hz seems reasonable, while the amplitude measurement, which only extends down to 20 Hz, shows a minimum around 30 Hz with an indication of rising impedance at frequencies below 20 Hz. Figure 2 is the complex impedance plot of the KEF 104aB for the reference equalizer position and for a frequency range from 5 Hz to 20 kHz. The reason for the lower frequency impedance rise is now evident; there are two bass resonance impedance peaks, one at 15 Hz and the other at 54 Hz.

The 15-Hz resonance peak is the cause of an unfortunate difficulty in the listening test (which is always performed prior to laboratory measurements). This lower frequency resonance peak, associated with the passive radiator acoustic design of this system, lies in the region of resonance for many phonograph cartridge and arm combinations. Certain types of record warp can excite this resonance, with the result that the KEF woofer will literally drive itself wild on frequencies which it cannot reproduce. The result is an unacceptable distortion when the program content consists of strong low-



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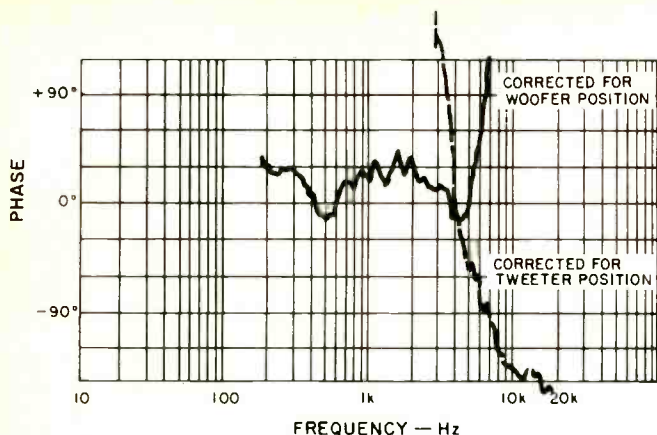


Fig. 4—One-meter axial phase response corrected for acoustic position of woofer and tweeter.

frequency tones plus record warp. The bass response literally turns to pure mud with increasing playback sound levels. The problem is the interaction of program content, record warp, arm-cartridge combination, and KEF subsonic resonance. The solution which I used to eliminate this problem is discussed in the listening test.

Another potential impedance problem is associated with the substantial phase angle at around 3 kHz. With a phase angle nearly 60 degrees lagging, the KEF 104aB can place a reactive drive-angle demand on amplifiers which are driven near their peak power capability on strong upper register material, such as female vocal or brass. Only the better quality amplifiers should be used with this speaker to get the response it is capable of delivering at high sound levels.

The axial one-meter anechoic amplitude response is shown in Fig. 3 for a drive level corresponding to one average watt into 8 ohms resistance. The reference equalizer position is used for this measurement. Low frequency response extends down to about 60 Hz and then falls off at a slope of around 15 dB per octave below this frequency. The response is generally smooth through most of the range with a mild dip around 3 kHz and an overall fall-off of about 3 dB per decade with increasing frequency. The top end goes right on out to the 20-kHz limit of this test with no sign of cutoff, indicating a good, crisp response.

The measured anechoic phase response is shown in Fig. 4. Since the signals from the woofer and tweeter do not arrive simultaneously at the one-meter microphone location, the phase measurement is shown for the corrected arrival time of these components. The woofer is essentially in phase with the electrical drive. This means that a positive-going voltage applied to the positive-marked speaker terminal produces a positive sound pressure at the listening location when the air-path time delay is taken into account. The tweeter has an

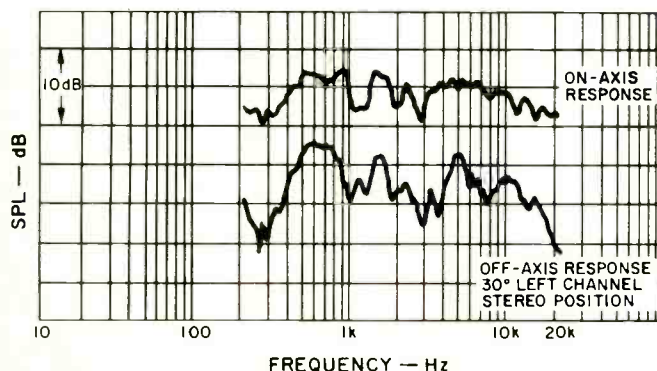


Fig. 5—Three-meter room response.

opposing polarity; positive voltage produces a pressure decrease. The actual phase crossover occurs around 7 kHz.

The three-meter room response is shown in Fig. 5. In this measurement the speaker is placed against a back wall and raised 400 mm off a carpeted floor. The microphone is positioned in a conventional listening location, three meters in front of the speaker and one meter above the floor. Figure 5 is the frequency spectrum of the first 13 milliseconds of sound which arrives at the listener's location. The measurement shows two listening positions relative to the speaker, directly in front of the speaker (upper curve) and with the speaker in a left-channel stereo position (lower curve). The responses are separated by 10 dB for clarity of presentation. With the exception of a response dip near 300 Hz, the KEF 104aB measures almost as well in this room response as it does under anechoic conditions.

In the earlier listening test I definitely preferred the equalizer on the KEF 104aB set to its "plus" position, rather than the "reference" position. I also preferred the KEF being rotated toward the listening position (as KEF recommends), for clarity of response and balance. In addition, I conducted my listening evaluation with experimental setups placing the KEFs in front of heavy drapes which could be opened to reveal an acoustically hard back wall or closed to give a moderate acoustic damping. I preferred the balance when the KEF's were placed 400 mm (15.75 in.) off the floor and against the acoustically absorbing back wall. Figure 6 is the response for the left-stereo channel speaker as measured directly where I sat during most of the listening tests. This even includes the effect of the chair in which I sat, but does not include myself as an acoustically intruding body. All three equalizer responses are shown in Fig. 6, and the comparison

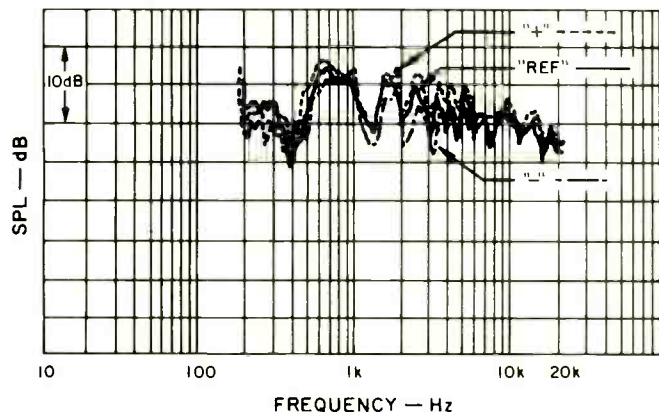


Fig. 6—Measured three-meter response in the actual stereo-left channel listening position for each of the three KEF equalizer settings.

with Fig. 5 is interesting. The 300-Hz dip is gone when drapes are used as absorbing material, and the positive equalizer position definitely gives the best overall response. In most other respects, there is general agreement in these two three-meter room tests.

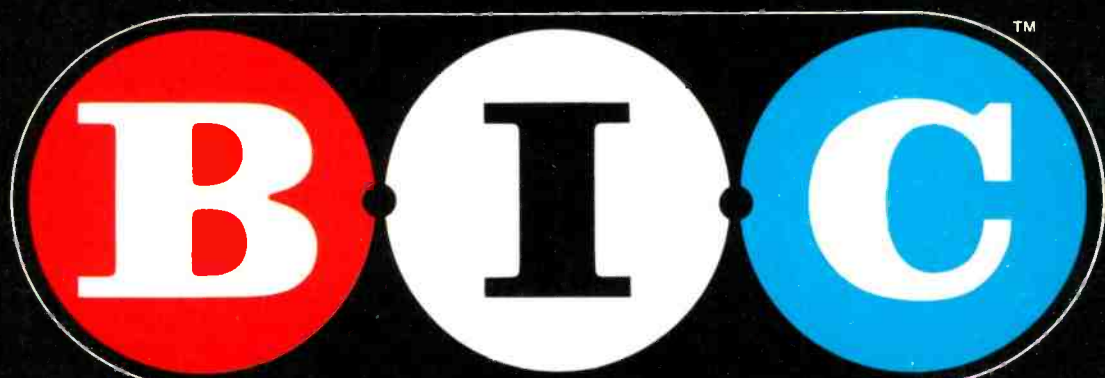
I concluded from these measurements and the listening test that the KEF 104aB has an excellent response for early sound if placed against an acoustically dead wall and rotated toward the listening area.

The overall horizontal and vertical directivity patterns of the KEF are indicated in the polar energy responses of Figs. 7 and 8 respectively. All frequencies from 20 Hz to 20 kHz are uniformly weighted, and the net sound energy for this whole range is plotted as a function of listening position relative to the frontal axis of the speaker. Little can be said of the polar energy responses of this system other than that they are darn

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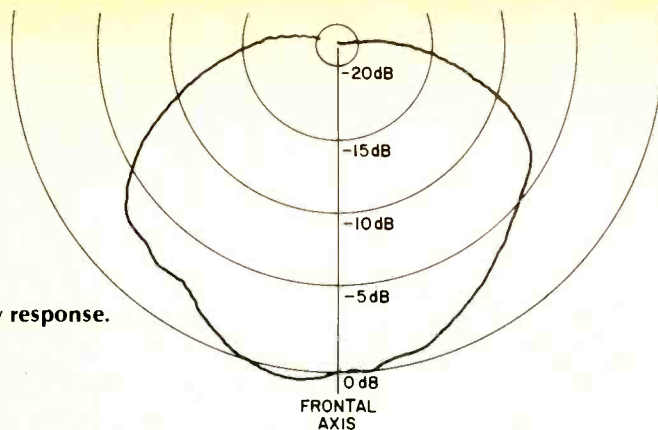


Fig. 7—Horizontal polar energy response.

good. There is enough energy radiated to the sides and upward that this speaker should not be placed adjacent to objects which could scatter sound back into the listening area, such as lamps or overhanging shelves.

Harmonic distortion for the tones  $E_1$  (41.2 Hz),  $A_2$  (110 Hz), and  $A_4$  (440 Hz) is shown in Fig. 9. Low-frequency power handling, as with 41.2 Hz, is definitely a tough job for the KEF 104, as it cannot handle truly high-energy, low-frequency signals. However, 440 Hz is handled like a champ, with residual distortion well below that of many of the best speakers I have tested. In addition, 110 Hz is also quite good, with the KEF running out of steam at about 30 watts average with distortion products still below one percent.

The intermodulation on 440 Hz caused by simultaneous excitation by 41.2 Hz is plotted in Fig. 10, and this intermodulation test is startlingly good. Up to 10 average watts, the intermodulation on 440 Hz is almost purely amplitude modulation, with phase modulation appearing above 30 average watts. The substantial difference between the IM and 41.2-Hz harmonic distortion implies that the passive radiator may be the culprit and that the active woofer is a very clean driver. In any case, the modulation of upper musical material by kickdrum and percussive bass is quite low. This implies that

Fig. 9—Harmonic distortion for the tones  $E_1$  (41.2 Hz),  $A_2$  (110 Hz), and  $A_4$  (440 Hz).

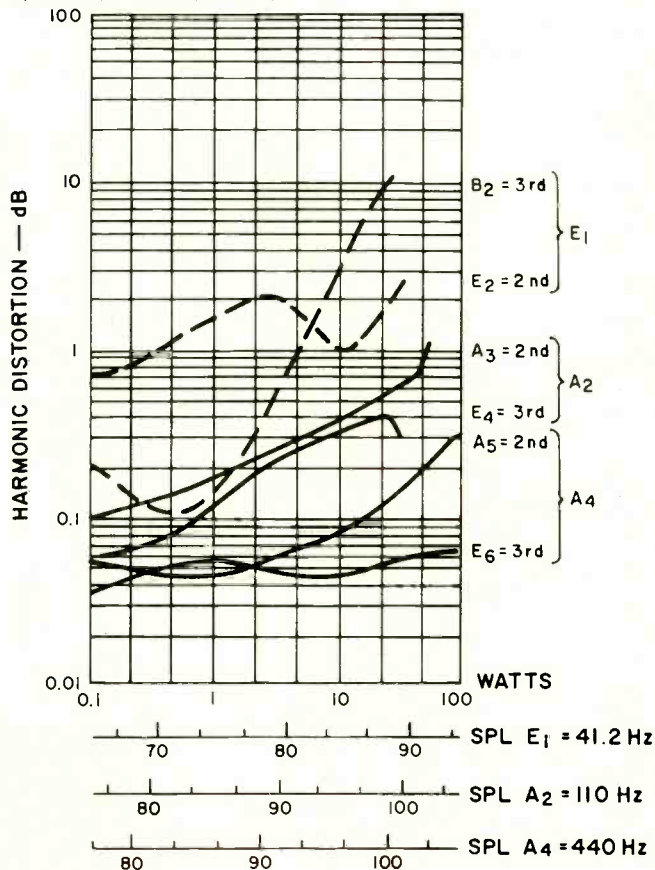
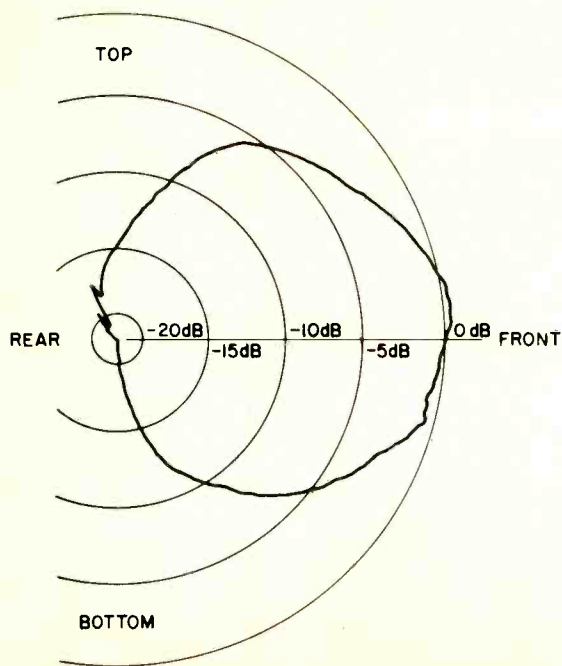


Fig. 8—Vertical polar energy response.



stereo imaging should not jump around with changes in low-frequency content.

The acoustic transfer gain of the KEF 104aB remains uniform at low average powers and begins to decrease above 10 average watts for pure tones of 262 Hz (middle C) and 110 Hz ( $A_2$ ). This implies that stereo lateralization of solo instruments should remain independent of sound intensity for all levels below about 96 dB SPL, but begin migrating toward center stage for higher sound levels. The timbre of solo instruments should also remain essentially independent of sound intensity up to this sound level.

The crescendo test, where low-level single musical tones are checked for change in sound level when wide-band incoherent noise is suddenly superimposed, shows that the KEF hangs in there pretty well up to combined peak levels of around 105 dB. This implies that the stereo location of woodwinds, for example, will not jump kangaroo fashion when the brass lets go triple forte. This 105 dB, by the way, is the instantaneous peak, which can be readily achieved when

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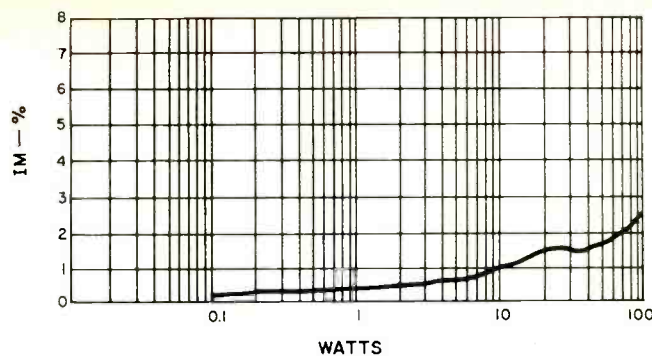


Fig. 10—Intermodulation distortion of  $A_1(440 \text{ Hz})$  by  $E_1(41.2 \text{ Hz})$  mixed one to one.

listening to a clean direct-to-disc recording at brisk but not window-shattering levels. While the KEF is good, a high intensity studio monitor it is not.

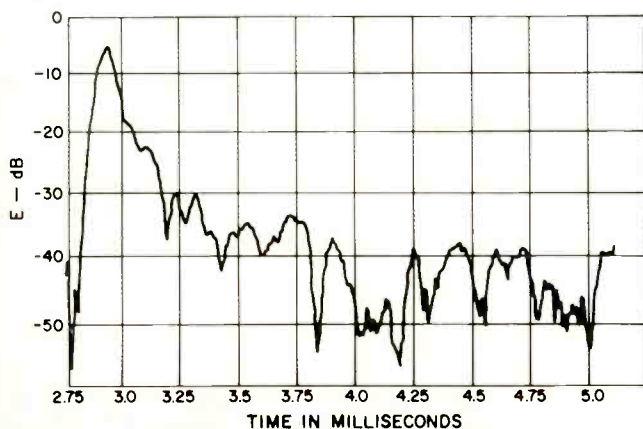
The one-meter axial energy-time curve is shown in Fig. 11. This is the envelope of the response of the speaker to a perfect band-limited impulse. The first sound at 2.84 milliseconds is due to the tweeter, with the woofer signal arriving at 3.15 milliseconds. The exponential die-off from 2.84 to around 3.25 milliseconds is due to the tweeter. After some small diffraction bumps, the residual tail of the impulse response stays more than 30 dB below the peak tweeter signal. This is quite a good transient response.

### Listening Test

After considerable experimentation with placement of the speakers, I decided that the most realistic sound, to my ears, was obtained with the speakers placed against a heavily draped wall and angled toward the listening area. These speakers need to be raised off the floor to minimize bass dominance, and I chose to mount them on cloth-covered cinder blocks which elevated them 400 mm. I also preferred the positive equalizer setting on the KEF 104 for more natural realism of most program material.

The KEF 104aB does not have super-low-frequency response and could benefit from the services of a subwoofer. At the beginning of the listening test I found a curious effect on certain organ and strong kickdrum recordings that I knew from experience were clean. As the sound level was raised on playback, a stage would be reached where the bass turned to pure mud. But this did not happen on all such records. When I removed the grille on the speakers I found that the offending records were causing the woofer and passive radiator to undergo violent low-frequency excursions. The problem was record pinch warps which created 10 to 15 Hz damped oscillations in the tonearm-cartridge combination and which in turn excited the loudspeaker excursions. I had not run into

Fig. 11—One-meter axial energy-time response.



this problem before, even on vented loudspeaker systems, and it appeared to be associated with the 15-Hz resonance in the KEF. Switching in the rumble filter will eliminate this problem, but I do not like what most rumble filters do to low-frequency program content. I commented on this problem to our Kindly Editor at homebase, who sent me a DiscTraker for evaluation to see if it would help. The DiscTraker solved the problem completely and most impressively. This little gadget, made by Discwasher, Inc. of Columbia, Missouri, is a small dashpot which attaches to the cartridge and damps vertical cartridge motion. The results were startling, both to the visual motion of the woofer and the audible effect. I have several records with pretty bad warps which I use to test loudspeakers for susceptibility to warp. One of these was totally unplayable at any level on the KEF 104aB without the damper and completely acceptable (except for pitch wobble) when the DiscTraker was installed.

The KEF 104aB is not a highly efficient loudspeaker and takes a moderate amount of amplifier power to reproduce sound at a brisk level. But what it lacks in efficiency, it makes up in clean sound. The KEF 104aB took the full peak capability of a Marantz 510 amplifier on drum snaps on the M&K Ed Graham *Hot Sticks* record (RT-106) without evidencing any audible strain. The only time I was able to run out of loudspeaker was on super-low bass from the famous E flat drum on Telarc's Fennell and the Cleveland Symphonic Winds version of Holst's *Suite No. 1* (5038).

The KEF 104aB is one of the few loudspeakers which can reproduce a piano reasonably well. It still won't fool you into believing a real piano is being played in the room, but this speaker, in my opinion, does one of the best jobs around. It also does an excellent job in reproducing solo male and female vocals. Piano and vocals are, I believe, the very toughest items to reproduce.

Massed choral groups, for some reason, did not fare as well with this speaker. In fact, the female voices on a clean Beethoven 9th recording (M&K RT-112) sounded screechy to me. I also found some difficulty with stereo depth on some program material, although lateralization was usually excellent on all material.

The 104aB has good spectral balance from the lower mid-range to the extreme top end. It is an accurate reproducer that intrudes very little on the sound. If you have a heavily draped or extremely large listening room, the KEF 104aB may not be able to provide the high intensity sound which some listeners like, but for most situations and listeners, I suspect that this system is quite adequate. The KEF 104aB is not a disco speaker and cannot provide heavy driving bass, nor would pipe organ aficionados fall in love with its performance.

However, and despite whatever negative comments I have made, the KEF 104aB is a speaker I can definitely recommend for accurate reproduction at moderate sound levels.

Richard C. Heyser

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# European records

John S. Wright

I concluded my last record column in the June issue by promising to update on the advent of digital recordings. Of course, in this I refer to records that are in fact analog but derived from digital master tapes. Among the advantages claimed over normal tape-recording practices are more linear frequency response and improved signal-to-noise ratio and reduced distortion, all without need of separate noise reduction. How successful this new development proves is considerably influenced by the number of "bits" and the "sampling rate"—technical matters adequately explained in other pages of this journal and not a matter for investigation here. Nevertheless, beside the difficulty of editing digital tapes, which has to be differently handled, it is the considered opinion of many experts that both sampling rates and bits (for which yet there are no firm standards) need to be increased over that of first-generation equipment if the full advantages of this medium are to be realized. At best, digital master tapes are claimed to enable conventional records to be manufactured with the quality of direct-to-disc.

The very first digital record to be released in England was a recording of Willi Boskovsky's **New Year's Day Concert in Vienna** on the Decca label (D 147D2). This live recording of the frivolous waltzes, polkas, marches, etc. by Johann Strauss and the like is very much a counterpart of the earlier analog recording issued in 1976 (SXL 6740), over which I enthused in the Christmas issue of that year. Not surprisingly, therefore, the musical content is most similar, as is the audience participation in the spirit of the occasion. The disc-pressing quality is excellent and leads to speculation as to whether special care had been taken for this dual historic occasion, being the first digital recording from Decca and the Silver Anniversary for the Concert. Orchestral presentation is exceptionally well detailed, especially in the clarity of the bass, but the string tone is edgy sometimes to the point of being uncomfortable. More so than in the earlier disc, a contrast of acoustics presents itself between those of the orchestra and the audience, as though they were recorded at different locations. Without direct comparison to a version derived identically but using

analog tape, it is impossible to say whether these minor reservations are due to the specific microphone techniques employed or whether it is that digital recording reveals not only all that is best in the engineering.

Two other releases swiftly follow in Decca's digital format, the first a selection of music by Mendelssohn including his *Italian Symphony*, *Fingal's Cave*, and the overture *Calm Sea and Prosperous Voyage* (SXDL 7500). Again, this is an altogether clear and clean presentation, though not overwhelmingly different from any of the best from Decca. The third release, Mahler's *Symphony No. 4* (SXDL 7501), contains the finest attributes of the other digital recordings and to my taste has the best balance of them all. Conducted by Zubin Mehta, the Israel Philharmonic Orchestra gives the work a freshness considerably enhanced by the clarity of the recording.

EMI has not in the meantime been complacent over the possible advantages of digital recording and has entered into a licensing agreement under which MCI will manufacture digital tape-recording equipment based upon technology developed by EMI's Central Research Laboratories. Future joint projects under the licensing agreement will include the manufacture of an editing system as well as multi-channel digital tape recorders. Obviously, the editing of digital tapes is still a problem, one which Decca seems to have solved. We await with interest releases by EMI of digitally originated material.

At this writing I understand they are about to issue a popular music record, 12 in. in diameter but revolving at 45 rpm (12 DIG 1001). So, yet again, we will have another potential improvement in the chain which will further the difficulty of differentiating when improvements are attributable to digital technology. Certainly it superficially appears that in digital form, recording techniques are more ruthlessly exposed, and this in itself should motivate companies to achieve more convincing results.

Not to be left out, the independents have also entered the field of digital work. Bob Auger (an independent re-

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Zubin Mehta

ording engineer) undertook the mastering of Reinhold Gliere's *Symphony No. 3* which was sent to Nimbus Records (an independent recording company) which cut and pressed the discs (PCM 500/1) for Unicorn Records (independent record producers). While I have not yet had the opportunity to hear this, reactions from colleagues have been favorable—although it seems a pity that Unicorn could not select a more significant musical item for their first digital release.

### Standard Discs

Without any apparent need for such new technology, Philips continues to dependably provide unparalleled recordings, especially of chamber music. Without any doubt the best discs to be mentioned here come under this category, and not the least is the boxed set of Chopin *Nocturnes* played by Claudio Arrau (6747 485). With the piano set in a spacious and ambient acoustic and against a virtually silent background, the soloist savors every inner detail of the music, rather than merely concentrating upon the melody line. Christoph Eschenbach, however, takes a far more aggressive approach in his rendition of Beethoven's *Sonatas*, the *Moonlight* and *Pathétique* (EMI ASD 3695). Whether this suits the works or not must be a matter of personal preference, but the recording amply complements this approach by being clinically clear yet with sufficient bloom.

Some years ago, Paul Tortelier recorded the Bach *Cello Suites* for EMI. They are still available on SLS 798 (three discs) and are fresh, inspiring, and as fine a recording as we have ever had on this label. I recall at the time some music critic damning the set as being "over-resonant." What rubbish! However, if he did not like the Tortelier on those grounds, he is going to hate the new Maurice Gendron recording issued on Philips (6770 005), since this could perhaps be so described. For myself, I love this type of presentation where the recording environment becomes as important a part of the musical experience as does the performance proper. I have heard it said that Philips engineers sometimes enhance this effect by dubbing in the additional acoustic of a local church. Whether this is so or not, and whether it applies to this recording, is immaterial to the results, which I applaud. Gendron's playing is more sober than Tortelier's, especially in the dance movements where Tortelier can become almost jaunty. Of the two recordings, I would choose both.

Staying with Bach, the Decca team, in association with Sun Life, makes sensible use of the stereo stage in a new recording—sung in English—of the *St. Matthew Passion* (D 139D 4). Sir David Willcocks conducts the Bach Choir and Thames Chamber Orchestra in a full-scale production, in contrast to the more intimate performances so currently fashionable. The soloist lineup includes Robert Tear, John Shirley-Quirk, and Felicity Lott. That having been stated, the musical standards are set, and it remains a matter of contention as to whether such music is translatable from the German to the more grandiose style. The separation between orchestra sections and orchestra to choir is not overtly exaggerated, but as one might expect of Decca, the soloists are comparatively close.

The distinctive voice of Dame Janet Baker heralds a selection of late seventeenth and eighteenth century music in a selection named *Arie Amorose* on Philips (9500 557). Such popular items as *Plaisir d'amour* are sung with a fully scored accompaniment played by the Academy of St. Martin-in-the-Fields, as opposed to the more traditional parlor piano. The equally distinctive voice of Victoria de Los Angeles is accompanied by the equally revered Gerald Moore in a live concert recording from the Festival Hall on EMI (ASD 3656). One side is devoted to a selection of Spanish songs for which she is so justifiably famous, and the audience warms to the occasion. This memorable recording bears a natural stage setting, only marred by evidence of coloration in the applause.

Also recorded live on tour is a double album of Julian Bream and John Williams playing a varied but popular selection (also including Spanish music) on RCA (RL 25198). Considering the practical difficulties of such a venture where two locations were involved, it is remarkable that without placing the microphones too close, the balance remains constant. Perhaps,

though, this is just another way of saying that the original acoustic was masked? Julian Bream, this time playing lute music of the *Dances of Dowland*, appears as a reissue from RCA (BL 12610). Despite a very close recording, where no correct volume setting can be found, at least not one that resembles a lute, the music still lives through the ages.

Two recordings appear in rapid succession of Smetana's *Ma Vlast* (*My Country*). The Paavo Berglund version on HMV SLS 5151 is smooth, warm and deliberate; not an impressive sound with a tendency towards sourness in the treble. The alternative, however, is a good Decca sound with Walter Weller conducting the Israel Philharmonic Orchestra (D 108D 2). This reading is more onward-going with the recording rich yet detailed and suiting the music.

Two recordings of Elgar's *Enigma Variations* are also worth noting. I have come to expect excellent results when Brian Couzens records the Scottish National Orchestra conducted by Sir Alexander Gibson for RCA. This latest release (RL 25206), though, is a disappointment. I fear some fault in the processing, for the review sample was undercut — presenting a poor signal-to-noise ratio with a somewhat screaming top. The Philips version (7300 642) with Neville Marriner conducting the Concertgebouw Orchestra is coupled with *Pomp & Circumstance Marches Nos. 1, 2 and 4*. All this is excellent, full-blooded, and exciting, and the usual air and ambience associated with the Concertgebouw are tailor-made for the *Enigma Variations*.

Fans of the Philip Jones Brass Ensemble should not miss their latest release entitled *Baroque Brass* (ZRG 898). Up to the usual exceptionally high standards, the music is not as

Paul Tortelier



stodgy as its title may suggest. Also referring back to Paul Tortelier, his recording of the Dvorak *Cello Concerto* (HMV ASD 3652) is super, except for the fact that as soloist he not only dominates musically, but the engineers have also placed him too far forward. Equally luscious but unfussy is another recording of Zubin Mehta with the Israel Philharmonic playing Schubert's *Symphonies Nos. 1 and 2* on Decca (SXL 6892). The warmth of platform resonances makes this a pleasurable and untiring experience.

Tchaikovsky symphonies again deserve new interpretations. Riccardo Muti conducts the Philharmonia Orchestra in a version of the *Fifth*, on EMI (ASD 3717). It is an immediate if not profound rendition, exhilarating with forward brass but, for me, not on par with the Haitink version. Conducting the Concertgebouw, however, Bernard Haitink gives of his best on the Philips release of *Symphony No. 2 (Little Russian)* (9500 444). The expected spacious sound is accompanied by extraordinary bass impact.

Turning exclusively to chamber music, four recordings require special mention. The little-known Tchaikovsky *Piano Trio in A minor Op. 50* is played by the Yuval Trio in a most endearing manner with a close "in-the-room" format (CBS 76698). The Quartetto Italiano yet again provides exemplary performances of Schubert *Quartets Nos. 10 and 13* with the professional polish always provided for them by Philips (9500 078).

Alfred Brendel provides a truly outstanding recording with members of the Cleveland Quartet of Schubert's most popular quintet *The Trout*, also on Philips (7300 648). A rather close recording but excellent nevertheless; a high cutting level does not make this too easy to track. Having more than the usual Philips recording distance, the Beaux Arts Trio provides Haydn's *Trios in C, D and F minor; No. 36 in E Flat* (9500 472). None should be missed!

Continuing with Haydn and the parallel series running between Marriner and the Academy, versus Colin Davis and the Concertgebouw; the former have released *No. 31 (Horn Signal)* and *No. 73 (The Hunt)* as 7300 674 from Philips, while the Davis contribution is *No. 100 (Military)* and *No. 104 (London)* on 9500 510. Both are in the vein of their series, with the Marriner lighter textured. I am glad that I do not have to opt for one series or the other, being both different yet inseparable in my collection.

Dukas' *Sorcerer's Apprentice* is always a good seller, and David Zinman

conducting the Rotterdam Philharmonic has coupled this to some of the few other orchestral works of that composer (7300 677). It is not the blockbuster of a recording that we had from Walter Weller but nevertheless is intrinsically well-detailed with very deep bass in places. Weller has, though, concurrently conducted the incidental music to Grieg's *Peer Gynt* in a recording that I very much liked for its openness and impact — Decca SXL 6901.

As though everything should happen in pairs, there are also two recent releases of Holst's *The Planets*. The HMV recording (ASD 3649) is intended to commemorate Sir Adrian Boult's 90th birthday with his conducting the London Philharmonic Orchestra. Sir Adrian conducted the first performance of this work in 1918 and received a copy of the score inscribed: "This copy is the property of Adrian Boult who first caused the Planets to shine in public and thereby earned the gratitude of Gustav Holst." Unfortunately a 24-Hz signal seems implanted throughout the end of the second side. It is claimed that the organ at the Kingsway Hall emits a steady drone while it is activated, and presumably the tone was not switched off or filtered out.

Nevertheless, rumor has it that EMI also took this down on digital tape, although editing facilities were not available in time for its issue; so perhaps we shall have cause to refer to it more properly in future. An alternative issue arrived from Decca with Sir Georg Solti giving a full-impact, fast interpretation (SET 628). The sleeve shows Sir Georg conducting pointedly with a "they went that-way" gesture, which coincidentally illustrates the interpretation. The recording is more than adequate with more than apparent dynamic range; it is impressive yet without undue closeness.

Space does not allow for the full review the last recording deserves. Benjamin Britten's opera *Peter Grimes* is arguably the single most significant item he wrote and is certainly one of the few masterpieces of modern English music (Philips 7699 089). For those who know nothing of the work, it is pointless commencing a dissertation here. For those who do, I can only recommend this as the best "staged" rather than "contrived" presentation I can imagine given the confines of conventional two-channel stereo. The depth of feeling contained in the music is transmitted to the listener in a manner which is spectacular without his realizing it. Surely this is the epitome of success? A

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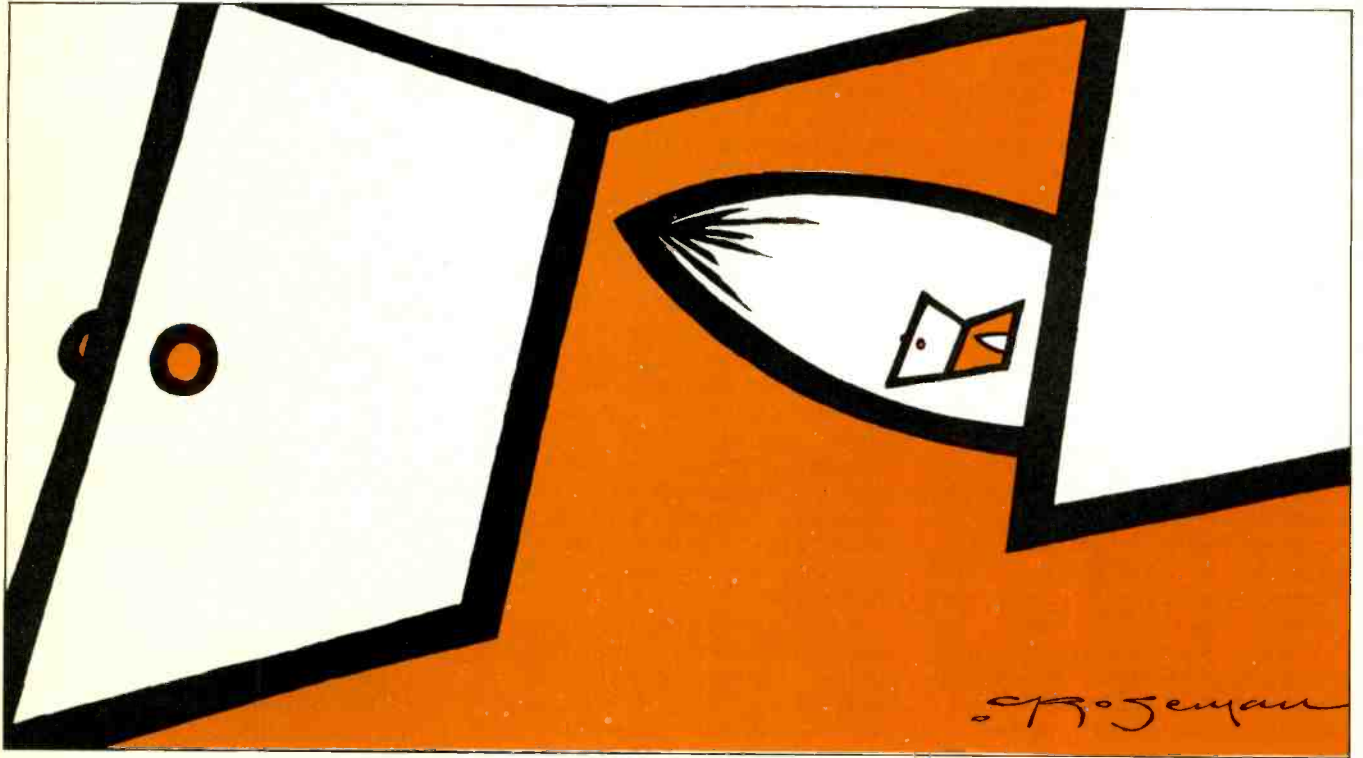


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Jon Tiven

Michael Tearson

# The column



**In Through the Out Door:** Led Zeppelin

Swan Song SS 16002, stereo, \$8.98.

As time stretched out between Led Zeppelin albums, at one point speculation was rife that when their album came, it would be a double. Yet the album Zep did put out has two such cohesive yet different sides that they could almost have come from completely different albums.

Here's a thought. How many double albums have received the criticism that with editing they would have been brilliant single albums? This is one of the latter.

Side one is the snappy song side, side two is the "progressive," more stretched-out side. Both are purest Zeppelin. And each is somewhat of a surprise and for different reasons.

The most important element of Led Zeppelin's albums is always their BIG sound. Cavernous. When the material is up to the size of the sound, the results can be immortal — *Dazed and Confused*, *Stairway to Heaven*, *Kashmir*. When the song isn't up to it, it can feel leaden and even confused, but

still BIG. Much of **Presence**, the previous studio album, felt that way.

Side one of **In Through the Out Door** is just the most accessible album side that Zep has put together, at least since **Physical Graffiti** and maybe longer. It contains four songs, and I emphasize songs. Perhaps it is enlightening that although they ultimately did not play the gig, Led Zeppelin offered to play at the memorial concert for Lowell George of Little Feat. There is a genuine hint of his influence in these songs' quirky rhythms and sometimes goofy lyrics, things the late, lamented Feat was especially known for.

It all opens very ponderously with moody mellotrons before *In the Evening* erupts into a smashing rocker with a minor-key melody that gives the song some of the Middle Eastern drive of a *Kashmir*. Going from that riff into the chorus' major key is a thrill each time around. A little Richard piano line kicks off *South Bound Saurez*, a flat-out rock and roll song. *Fool in the Rain* is the unexpected one. As it starts, it has a loping, circular tune that

is catchy as hell. Robert Plant gets a real chance to sing here, what with an uncommonly uncluttered arrangement for Zeppelin and his voice mixed unusually forward. Abruptly with the blast of a police whistle, it takes off into a jam that for all the world sounds most like the old Pigpen-era Grateful Dead wailing on the riff of *Turn On Your Lovelight* so long ago. Then finally it's back to the opening theme. The first time I heard it on the radio I had to pull over to the side of the New Jersey road. Then, of all things, the side closes with *Hot Dog*, a hot rockabilly number. Four great songs in a row. A revelation.

The prevalence of the keyboards of John Paul Jones throughout the first side is a big surprise that will continue through the second. It is as unexpected and as strong in its way as the sudden adoption of sweeping keys was for The Who on **Who's Next**, another giant.

Side two opens with the album's big, sprawling epic-length piece, *Carouselambra*. I find it a mighty driver, but diffuse and lacking focus.

Plant's voice is buried so far beneath the keys that what he is singing is totally indecipherable, and for me the song suffers because of it. One of my best friends, one with uncommonly sharp ears, has told me that just lately he has to hear the next one, the near-ballad *All My Love*, at least once a day. It has a lovely melody for a Zeppelin tune, and Plant gives it his best Al Green/Otis Redding pleading shot.

The finale, *I'm Gonna Crawl*, opens with a movie theme sweep thing before it evolves into a slow, nightclubby 12-bar blues that actually does crawl for about a minute and a half too long.

Yes, I much prefer side one.

**Out Door** does have the BIG Led Zeppelin sound, and it requires loud volume to hear it right. The sonic relationships just don't properly gel at low volume — there is that much dimension in the sound. Yet the sound of the album is not what makes it come alive. The magic moments aren't magical because the record sounds great, but because the song carries you on out.

Now some of the fans are saying that this Zeppelin album doesn't rock like Zep is supposed to. Hooey! **In Through the Out Door** is a real smart album to enter the '80s with. It really tries to reach out to people on the song level and meet them somewhere in the middle. Unlike **Presence**, it does not project stubbornness at all.

Some of these songs are going to be radio staples for at least the next 10 years or more. And I for one don't think they are going to get tired. Quite to the contrary, I expect **Out Door** to wear very well with time. M.T.

Sound: B+

Performance: A-

**In Through the Out Door:** Led Zeppelin

**Swan Song SS 16002**, stereo, \$8.98.

Without question this is THE brilliant rock album of the Seventies, easily the most powerful music Zeppelin's put down since their second album, and demonstrates most ably that you don't have to sound like anybody else in order to make your mark in the music industry. Each member of this group has his own personal stamp impressed firmly upon each groove, making an unmistakable sound that has yet to be duplicated. Certainly no drummer could be mistaken for John Bonham, who proves time and again that strength and steadiness in good measure are 75 percent of what it takes. John Paul Jones, who was content merely to play bass on **Presence**, fully earns his keep as a keyboardist/arranger this time around, using tricks he's kept in the bag since he was The

Stones' conductor on **Satanic Majesty's Request**. And speaking of **Satanic Majesty**, the good old demonologist himself, Mr. Jimmy Page, turns in some fine performances himself on **Out Door**, whether he is conducting the band through bizarre timings (a la *Achilles Last Stand*) or strictly playing the session guitarist (most notably on *I'm Gonna Crawl*). Robert Plant is his own inimitable self, the screaming mimi of heavy metal who, this time around, gets a heavy dose of delay to soup up the pipes and whose remarkable range is hardly affected by the passage of time. Where their last album, **Presence**, sounded like a deliberate attempt to be abrasive and uncharming, **In Through the Out Door** is Led Zeppelin's most soothing document without any power loss.

Unable to use Jimmy Page's computerized home studio since it was still being debugged, the foursome journeyed to Stockholm's Polar Music, most famed for Abba's use of the place. The sonic transformation of the band is immediately evident in Jones' keyboards, which are used much more than rhythm guitars on the album. Although nothing could really alter the sound of Bonzo's drums, Plant's vocals aren't quite so shrill as usual, gravitating towards an almost mellow quality (particularly on the new *Stairway to Heaven* entitled *All My Love*). Page's approach to guitar on this album is nothing short of ear-bending; on the first track and several others he demonstrates a new technique of playing distortion-free the sloppiest leads known to man. On *Hot Dog* Pagey lets loose with a solo that is so off-time in places one wonders how he let it slip by, particularly when the *Hello Mary Lou Gubye Heart* progression isn't a difficult bunch of changes to grope with. Yet throughout the album, his layers of guitar create a structure that no other guitarist has ever duplicated or even attempted to work toward. Perhaps he isn't anymore the solo virtuoso that the first two Zeppelin albums showed him to be, but his approach to guitar is far more challenging than practically anyone else in rock—he leaves the show-off stuff to Jeff Beck and Ritchie Blackmore.

But **In Through the Out Door** isn't just a handbook for guitarists: There are plenty of lessons in song structure, and besides there are a few fine tunes that you can sing along to. But beware, this isn't a simple record at all—it's a very imposing album to listen to, and that's about as strong a recommendation as any. J.T.

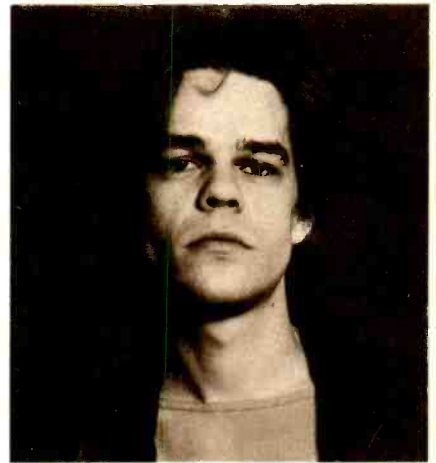
Sound: A+

Performance: A+

**In Style:** David Johansen  
**Blue Sky JZ 36082**, stereo, \$7.98.

This dude cannot sing. I mean, as long as he's on a track that's rocking fast he can scream and bluff his way through a tune like *She*, but as soon as the pace slows the Jaggeresque trappings of his voice fall away and The King of Staten Island takes over. Some of his slower tunes are okay, but they just blow the David Jo facade — you'd swear he was lisping when he sings "I luv you" in *Big City*. But the guy simply has a very limited voice, like a five-note range and a patented delivery that only works in very few situations, and unfortunately there aren't enough hard rockers here to keep his silliness in check.

On the more positive side, there's a tune called *Melody* which sounds like



a rewrite of The Four Tops' *Bernadette* where David's voice skirts the edge of his vocal precipice but manages to carry the tune. I'd love to hear a real black voice work with the tune, but you can't have everything — at least he's found a second milieu in which he can work.

The first album by David Johansen had a pretty horrible sound to it, while this one is far more listenable on a strictly sonic basis, as he's got a real band behind him and Mick Ronson handling production chores. Ronson does a fine job with the strings on *Melody*, and the disco cut, *Swaheto Woman*, doesn't ever bother me. The title cut is the best rocker, mainly because back-up vocals help mask David Jo's delivery — it's just tiring to here his voice so naked, so upfront on a whole album. In The New York Dolls at least there were other personalities in the group, David wasn't so far out front, and there was an abundance of humor....I think the humor is what I miss more than anything. J.T.

Sound: B+

Performance: B

**Repeat When Necessary:** Dave Edmunds

**Swan Song SS 8507**, stereo, \$7.98.

Dave Edmunds' third Swan Song album is an end-to-end rocker. When the artist is not much of a songwriter like Dave, selection of material is that much more crucial, and he's gathered some dandy tunes together here, none very well known at all before. There is *Girls Talk*, a wonderful Elvis Costello song that has already been a runaway hit in England. *Crawling through the Wreckage* is a Graham Parker thing never recorded before. From there out, it is obscure city. "B. Murray" wrote or co-wrote several, including *Creature from the Black Lagoon*. "H. DeVito" (from Emmylou Harris' Hot Band?) wrote two, *Sweet Little Lisa* on which Albert Lee plays hot guest country lead guitar and *Queen of Hearts* complete with an Everly Brothers feel.

The band is the redoubtable Rockpile with Edmunds on guitars and piano, Nick Lowe on bass, guitarist Terry Williams, and drummer Billy Bremner.

**Repeat When Necessary**, a rock & roll album with lots of style. Great fun.

M.T.

Sound: B+

Performance: B+

**The Long Run:** The Eagles  
**Asylum 5E-508**, stereo, \$8.98.

The cover makes it look like the album should have been called **The Last Run**, with its hearse-like frontispiece and casket shots on the inside, and let me assure you that the music isn't much more uplifting. The single, *Heartache Tonight*, a basic blues shuffle that needed collaborators such as Bob Seger and J. D. Souther, is fairly decent but totally unspectacular, and one wonders whether each co-author supplied one chord. It's probably the best track on the album.

One must give credit to Joe Walsh for integrity. While Don Henley and Glenn Frey spent the entire album rewriting their past hits, Joe Walsh maintains his roots by simply recutting *In the City*, a track off his last solo album, rather than trying to disguise it as something new. What I'd really like to hear is an album of Neil Young and Jackson Browne songs by Don Henley and Glenn Frey, respectively, which undoubtedly would be indistinguishable from the originals.

Of course, one must not neglect The Eagles' fine choice of subject matter, the casting couch (*King of Hollywood*), footwear (*Those Shoes*), and social commentary (*The Disco Strangler*). These fellows must be intellectuals,



probably why they're so contemptuous of society. They even satirize/attack "New Wave" music on *The Greeks Don't Want No Freaks*, a thinly veiled rewrite of *Big Boy Pete*.

**The Long Run** has been touted as The Eagles' return to "real rock 'n' roll." I think The Rolling Stones, Dave Edmunds, and Chuck Berry need not worry about being dethroned, although Chicago and Three Dog Night might have some trouble maintaining their reputations.

J.T.

Sound: B

Performance: F+

**Get The Knack:** The Knack  
**Capitol SO-11948**, stereo, \$7.98.

This year's winner. By now it is no surprise that The Knack has absolutely conquered America as an instantaneous out-of-the-box smasher. And small wonder why.

Their cover stares at you, four black-and-white faces chisled out of pictures of the mod era of the '60s. Are they British? American? Can't tell from the cover. On the back the pose is even more Beatlesque, black trousers, white shirts, thin black ties, all matching. Black on white and in color. Perfect, deft packaging.

The music backs it up. Twelve compact pop songs bulging with the fish-hooks to pull you in. *My Sharona* is the natural lead cut, and it's already a #1 single. There is a cover of Buddy Holly's *Heartbeat*, a good one, too, and 10 more originals. *Good Girls Don't (But I Do)* is irresistible. *Let Me Out*, *Frustrated*, and *She's So Selfish* are all bashers with plenty of style.

*Your Number or Your Name* shows exquisite song sense. And that's only a few.

The group's centerpiece is Doug Feiger who is their singer/guitarist/songwriter-lyricist (sometimes collaborating with lead guitarist Berton Avarre). Feiger is also photographically a ringer for the younger Pete Townshend. Bruce Gary and Prescott Niles, the rhythm section, complete the group. By the way, they are American.

The Knack had the exquisite fortune to employ Mike Chapman as producer. Chapman, currently hot with several artists, most notably Blondie, reportedly brought in the completed album for \$18,000 recording cost. Conservatively, \$100,000 is a reasonable average cost for an album these days with some superstars going to many times that figure. What this means is that the band had the songs down cold before they even got to the studio. No expensive rehearsing in the studio here. Clearly the album employs a minimum of overdubbing and assorted studio wizardry. The punch comes from solid performance and material combined with a no-nonsense producer who loves to bash out the songs real quick, one after another.

Thus, The Knack is a perfect blend of talent, production and marketing. Add just enough luck to cover appearing at the perfect moment, just in the knick of time, and you have a phenomenon called The Knack, this year's surprise smash hit band.

Do they have another album this good in them? Tune in again next year when . . .

M.T.

Sound: B+

Performance: A

**Clout**  
**Epic 35617**, stereo, \$7.98.

What we have is a brunette Abba sounding so much like their Swedish counterparts my only surprise is that they haven't had a hit in America yet. The first tune on the album, *Substitute*, is as close to a perfect hit single as groups get these days. If Clout's version doesn't go Top Twenty by the end of this year, somebody will make a hit of it—it's that good. The rest of the album isn't quite so inspiring but *Feel My Need* and that overworked Russ Ballard tune, *Since You Been Gone*, get a good treatment. Chances are that FM will ignore this completely, so in case *Substitute* doesn't make it, be sure you pick up a copy of the single or album of said tune because it surely should be.

J.T.

Sound: B+

Performance: B





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The Bone Fone stereo is covered with a sleeve made of Lycra Spandex—the same material used to make expensive swim suits, so it's easily washable. You simply remove the sleeve, dip it in soapy water, rinse and let the sleeve dry. It's just that easy. The entire system is also protected against damage from moisture and sweat making it ideal for jogging or bicycling.

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**Bread and Roses:** Various artists. **Fantasy F-79009**, stereo, two discs, \$13.98.

The performances on this double album come from a three-day 1977 festival held to raise funds to stage concerts for "people in limited environments" such as hospitals, mental health facilities, convalescent homes for the elderly, and prisons. So, too, go proceeds from the recording.

The album is a magnificent collection of musical snapshots. Twenty artists are represented, each in a superb performance of a signature song. Buffy Sainte-Marie offers *The Universal Soldier*, Dave van Ronk has *Swinging on a Star*, the late Malvina Reynolds sings *Little Boxes*, followed by Pete Seeger with *Sailing Down My Golden River*. The John Herald Band's own *Ramblin' Jack Elliott* is followed by Jack himself doing *San Francisco Bay Blues*. Tom Paxton's classic *Last Thing on My Mind* is a treat, as is Joan Baez singing a new Phil Ochs' *There But for Fortune*. Jackson Browne in duet with David Lindley is a magical combination, and the performance of *For Everyman* is all it could be. Some of the others well represented are Jesse Colin Young, Richie Havens, Mickey Newbury, Dan Hicks, and Hoyt Axton (the only one inexplicably represented with two songs).

It must have been an amazing weekend; the intensity of the performances attests to that. As I've hinted above, the sequencing of the album is superb, thoughtful, caring, the technical aspects excellent.

**Bread and Roses** is a wonderful album. True, it seems somehow anachronistic, a frozen amber image of some simpler time, of the "heyday of the golden folkies." What an embarrassing way to say that I love the album. M.T.

Sound: A- Performance/Presentation: A

**Priority:** The Pointer Sisters **Planet P-9003**, stereo, \$7.98.

Remember the theory about the strictest parents breeding the most rebellious kids? Well, it might be just because the Rev. Pointer banned all but gospel music in his household that his daughters' new album, **Priority**, makes such an attempt to rock with a vengeance. The choice of cover tunes includes such modern classics as Graham Parker's *Turned Up Too Late*, a Bob Seger song called *All Your Love*, Ian Hunter's *Who Do You Love*, The Stones' *Happy*, *The Shape I'm In* by Robbie Robertson, and Springsteen's *The Fever*.

Following their commercial success with *Fire*, the last selection would seem like a sure bet, but this version is a real sleeper. The vocal isn't gruff enough nor the instruments particularly noticeable, and there are no rough edges or rhythmic jolts that could make this song happen. *Who Do You Love* is a more likely candidate with a powerful lead vocal by June and a strong instrumental track, especially in its drum sound. June delivers the most effective tunes on this LP, performing *The Shape I'm In* in a spunky version identical to The Band's, and a nearly note-for-note recreation of Parker's *Turned Up Too Late* which substitutes only her smooth delivery for his anguished tone.



The arrangements of the songs on this album remain virtually unchanged from the original versions, and the girls don't employ much of their usual unison singing, formerly their personal stamp. The change from harmonic to individual singing leads me to believe that solo careers are in the near future for the three Pointers who haven't yet followed in the footsteps of their independent (and now hit-making) sister Bonnie. For a producer known for his lush concoctions (such as Nilsson's *Without You*), Richard Perry does a pretty good job making The Pointers a Real Rock LP. I only wish they hadn't chosen to cover *Happy*, a tune whose original version was a sloppy masterpiece, which loses some of its messiness, and thereby its impact, in this incarnation. Sally Young

Sound: B+ Performance: A

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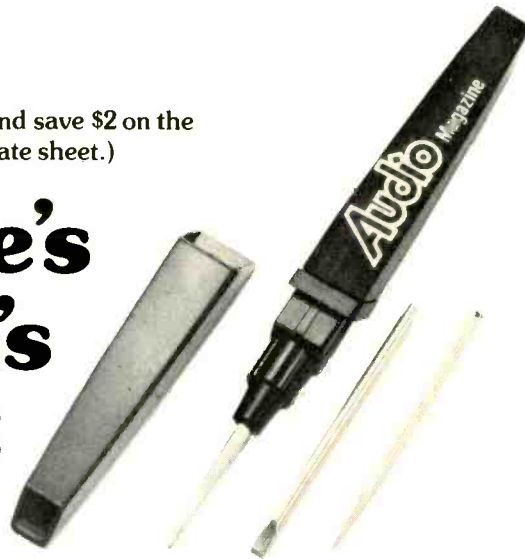
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**Euclid Beach Band**

**Cleveland/Epic JE 35619, stereo, \$7.98.**

About a year ago I heard a great Beach Boys sendup on the radio called *No Surf in Cleveland*. It had every production trademark of the Wilson Brothers down to a "T" but actually was *good*, as opposed to something like Billy Falcon doing Bruce Springsteen or Tim Curry impersonating David Bowie. Anyhow, many moons later

the group whose satire I had enjoyed so much has released an album which, I'm afraid, does them a grave injustice. They would have been better off living in obscurity with a mysterious reputation than foisting a recording of this quality on the public. The group, which essentially is vocalist Pete Hewlett and guitarist/songwriter Richard Reising, isn't what you'd call talented songwriters or arrangers, so the rest of the album resembles a meek parody of their producer, Eric Carmen, set to the most mundane arrangements imaginable. Eric throws them a few of his discarded tunes, but even those can't save this bunch from sounding like an AM radio programmer's nightmare. Being able to turn a cliché is a talent, but direction is also important. I hope they will retire gracefully until they write another song that is at least as amusing as *No Surf in Cleveland*, which should not be that difficult. *J. T.*

Sound: C Performance: D+

**Hammer: Jan Hammer Group  
Asylum 6E-232, stereo, \$7.98.**

Aside from an astoundingly tacky t & a cover, Jan Hammer's umpteenth album finds him moving in an exciting

direction with a combo that seems intent on making the listener forget he's a jazzier at heart. With an ex-member of the "Beatlemania" cast, Glenn Burt-nick, fronting the band as lead singer and rhythm guitarist, Hammer's latest direction is what might be called your basic Foreigner/Yes progressive rock format. The interesting thing is that the lead instrument is Hammer's synthesizer, which more often than not plays what sound like guitar lines rather than your typical keyboard runs — the months he spent on the road duetting with Jeff Beck finally paid off. With a little work, Hammer could be to the Eighties what Cream was to the Seventies, or something like that, but there are some basic mistakes.

First off, Jan shouldn't sing — he's a mediocre croaker if there ever was one, and Burtnick's got not only a fine range but a pleasing tone. Second, he either needs to dump his rhythm section or get a producer to make them sound more "rock" if he's going to continue in this direction, because they're not heavy when they need to be. Thirdly, lame covers of tunes like *Oh Pretty Woman* are ill-advised when they don't suit Burtnick's pipes, and besides, it's not exactly an obscure song.

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**Rockit:** Chuck Berry  
**Atco SD 38-118**, stereo, \$7.98.

Although it is rumored that Chuck Berry is in jail charged with tax evasion, the truth of the matter is that he's in the slammer for grand fraud—he's been posing as himself for years when any fool can tell that the Chuck Berry they've been passing off as The Real Thang isn't the same man who cut *Thirty Days* however many years ago. The records released under the name of Chuck Berry for the past 10 years have all been horrendous impeachments of Chuck Berry's legendary status, and **Rockit** is only a slight—very slight—improvement over its predecessors. Originally it was to have been produced by Dave Edmunds, then Keith Richard, but finally the project was laid in the hands of this same self-impostor, Chuck Berry. The result is a fairly dull album with one track that stands out, *Oh What A Thrill*, which is redeemed by a hot piano by Johnny Johnson. Whoever heard of a Chuck Berry album whose only value lay in a piano track—this can't be the real Chuck Berry! Maybe when he gets out of the can, he'll be able to come across with something more interesting. J.T.

Overall, Hammer as a group shows a lot of promise if they can refine what they do a little more because there really isn't anybody attempting this sort of thing. With a slightly more streamlined approach, they could actually

blaze new trails in rock music. They have to open up the group a bit more, but the writing and performing talent are there. J.T.

Sound: C-                      Performance: B

Sound: C+                      Performance: D+

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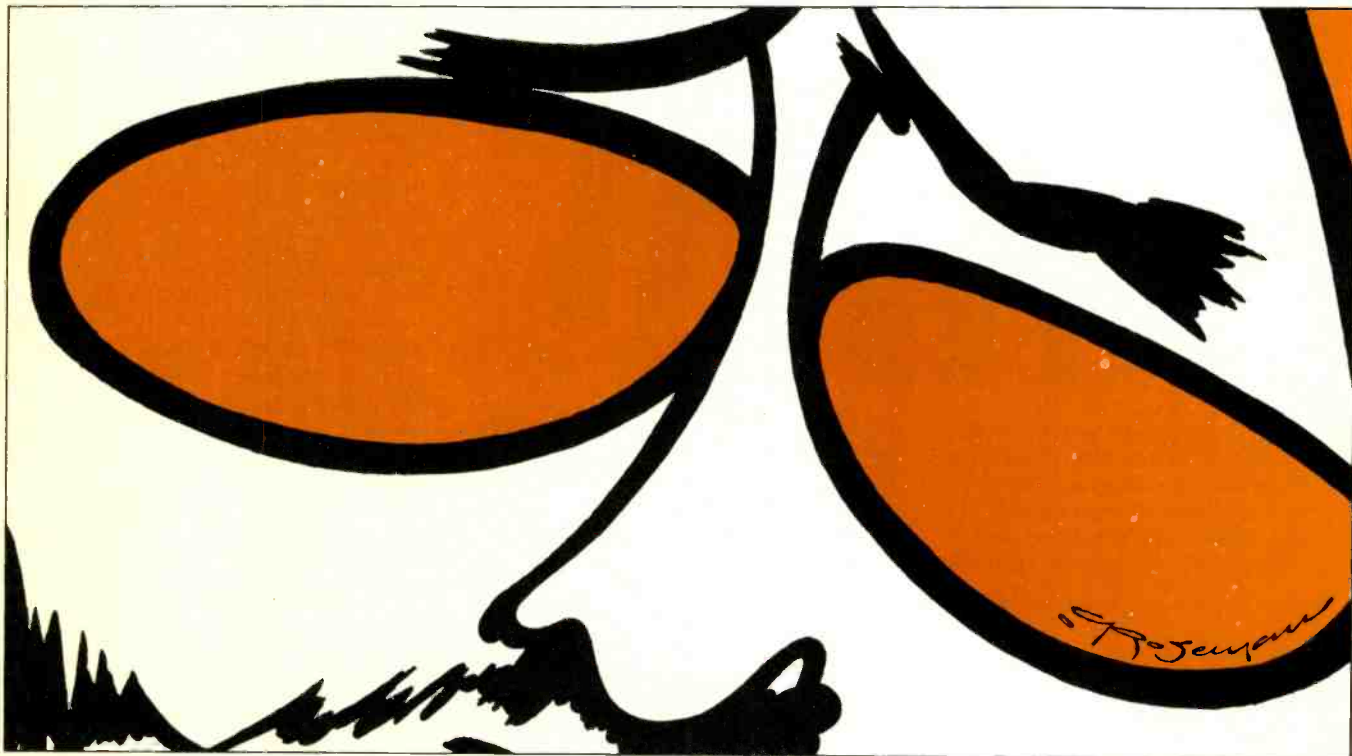
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# Jazz & blues



**Barney Kessel Plays Kessel**  
Concord CJ-9, stereo, \$7.98.

**Poor Butterfly:** Barney Kessel, Herb Ellis

Concord CJ-34, stereo, \$7.98.

**Soaring:** Barney Kessel

Concord CJ-33, stereo, \$7.98.

Concord is a mainstream, independent jazz label that turns out albums of consistent quality; its artist roster is made up of a coterie of swing-oriented West Coast musicians who came of age in the modern jazz era — musicians such as the highly regarded guitarist Barney Kessel. Kessel, considered one of the master technicians on contemporary jazz guitar, absorbed the teachings of the late Charlie Christian, and plays an extroverted, happy kind of modern/mainstream jazz in an entirely natural manner. Although he is seldom heard functioning only as a rhythm guitarist today, it should not be forgotten that he first came to the attention of the jazz world in the rhythm section of the Charlie Parker Dial sessions in 1947 (along with Doda Marmorosa, Red Callender, and Don

Lamond), feeding chords at the most telling points behind the soloists on such bop classics as *Carvin' the Bird*, *Stupendous*, and *Relaxin' at Camarillo*.

Kessel was first recorded with his own groups by Contemporary in the '50s and is now being sensitively recorded by Carl Jefferson's Concord engineers (the clarity of reproduction on the Concord releases is first rate). The result is a group of fine Kessel releases that this reviewer has just discovered. The three albums covered here should be of interest to aspiring guitarists as well as to the lay lover of jazz guitar. The **Barney Plays Kessel** LP, devoted to original Kessel compositions, gains considerably from the presence of ex-Woody Herman tenorman Herbie Steward, vibist Vic Feldman, and pianist Jimmy Rowles. Not only do these musicians spark Kessel into some particularly alert and adroit playing, but they also lend depth and variety to the harmonic textures, as well as permitting opportunities for creative exploration and close-knit group interplay. Steward solos in a forceful and buoy-

ant manner; Feldman spins out sinuous melodic lines, while drummer Jake Hanna, with bassist Chuck Domanico and Milt Holland on piano, provides a firm underpinning.

The Kessel-Herb Ellis set is not as consistently compelling. The playing, though faultless, is more predictable. With only a rhythmic accompaniment (Hanna again on drums; Monty Budwig, bass), there is less harmonic scope. Both guitarists are in excellent form, however; their contrasting styles are showcased on a beautifully executed *Poor Butterfly*, and a downhome *Blueberry Hill* shows their funky side. Kessel's cascading solo-line technique, vivid imagination, and splendid sense of swing are to the fore on the **Soaring** LP. Again teamed with Hanna and Budwig, the trio's sense of musical kinship is strongly evident as they rework a fine group of standards including *You Go to My Head*, *Get Out of Town*, and *Star Eyes*. The frequent duets of the guitarist with bassist Budwig are particularly empathetic, and sometimes drummer Hanna adds a third

voice, as well as rhythmic counterpoint. As mentioned before, the Concord releases are well recorded and well balanced.

John Lissner

**Plays Kessel**

Sound: A+ Performance: A

**Kessel/Ellis**

Sound: A+ Performance: A-

**Soaring**

Sound: A+ Performance: A+

**I Wanna Play For You:** Stanley Clarke  
Columbia KZ235680, two discs, stereo,  
\$11.98.

Stanley Clarke doesn't want to play for you, he wants to posture for you, make funny sounds for you, pander to you and make lots of money from you. Clarke's latest is a two-record assemblage of live and studio tracks that sound like justifiably discarded outtakes. Unfortunately, lower instincts prevailed. **I Wanna Play . . .** is an inconsistent pastiche of tunes that tries to please everybody. He covers rock with *Rock 'n' Roll Jelly*, undanceable disco in the title tune and *Just a Feeling*, and some perfunctory fusion in live performances of *School Days* and *Quiet Afternoons*. His *Blues for Mingus* is an embarrassingly unconscious parody, and *The Streets of Philadelphia* will go down as another joke on that city. Clarke's corny sentimentality would make his most puerile fan blush.



Stanley Clarke's writing has rarely been memorable, but here even his playing can't pull him through. In his shameless attempts at crowd-pleasing, he goes for the "big" effect. His playing consists of aimless flurries, bending slides, synthesized vocals, and those same safe trebly runs we've all come to expect. He leads his sidemen through pointless exchanges, and in

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return they offer him no support. Whether he's playing with all-star sidemen like Jeff Beck, George Duke, Stan Getz and Freddie Hubbard, or with his faceless performing unit, it all sounds like they're just putting in time.

The lack of concern that permeates Clarke's music also extends into his production. The clear definition and brilliance that have marked his previous efforts are absent here. In its place is a thin and brittle recording lacking bottom and presence. Clarke may have the greatest collections of Alembic basses in the world, but it doesn't mean a thing if you don't play them.

John Diliberto

Sound: C- Performance: F

**The Legendary Hoagy Carmichael:**  
Hoagy Carmichael and others.

RCA CPL 1-3370 (e), electronic stereo,  
\$8.98.

I've been anticipating a Hoagy Carmichael retrospective anthology for some years now, and this is a good start.

The album is split nearly evenly between Carmichael singing his own songs and interpretations by others. Hoagy never had the world's greatest voice, but he has a wonderful way with phrasing. He knows well how to make the words work for him.

Ultimately it is the songs which make the set important, and Hoagy Carmichael's are great examples of American song. There is still lots more that deserves reconsideration and anthologizing.

Carmichael, the songwriter, is a master of telling the story from a perspective not his own. His songs are not necessarily autobiographical. As example take *Lazy Bones*, represented here by a 1958 Kay Starr recording that is not nearly as sensational as the song itself.

Some highlights are the two versions each of *Star Dust* and *Georgia on My Mind*. *Star Dust* is included with the immortal 1940 Tommy Dorsey Orchestra version with Frank Sinatra and a delightful 1933 Carmichael solo recording. For *Georgia*, there is the terrific 1939 Ethel Waters version and Carmichael's own 1930 recording featuring the great Bix Beiderbecke. The album would have been incomplete without the 1932 Mildred Bailey *Rockin' Chair*.

The album's sound is somewhat noisier than I expected it would be, even with the age of the recordings, the oldest of which dates from 1927 with most from the '30s. That (e) in the album's serial number indicates the dread specter of electronic rechannel-

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ing, but there is no indication of what was rechanneled.

The enclosed booklet has lots of photos and Richard M. Sudhalter's notes. I wish Mr. Sudhalter had said a bit more about the selections contained, but his essay does shed considerable light on the character of Hoagy Carmichael.

The album is a welcome and long overdue reintroduction to a premier songman. *Michael Tearson*

Sound: C-

Packaging: B

**Lenox Avenue Breakdown:** Arthur Blythe

**Columbia JC 35638**, stereo, \$7.98.

Until recently, Arthur Blythe's alto was only known to followers of New York's loft jazz scene and the avant-garde, where he is still called Black Arthur by a few. He's played in the bands of Horace Tapscott, Chico Hamilton, and Gil Evans, in addition to almost everyone else on the scene. **Lenox Avenue Breakdown** is his first record for a major after two releases on India Navigation and Adelphi.

In spite of having a major label contract, Blythe has not gone the route of selling out to commercial tastes. At the same time, he's made one of the most uplifting and danceable albums of the year. **Lenox Avenue Breakdown** abounds with a rhythmic earthiness that comes from the beat of life and not some prefabricated orgasmic ritual. The bottom is a fluid dance orchestrated by Jack DeJohnette's multi-accented drumming and the melodic bass of Cecil McBee. Coloration and texture is added by percussionist Guilermo Franco, tuba player Bob Stewart, and the jagged guitar chordings of James "Blood" Ulmer.

But the highlights of the album are found in the playing of Arthur Blythe and flautist James Newton. Blythe has composed a highly melodic album from which his improvisations expand. He glides and bounces over the shifting changes of DeJohnette with lyrical deftness. James Newton is a kindred spirit. His solos grow out of Blythe's. On the title track Blythe concludes a furious run with a long, sustained note that he stretches to its hardest and softest limits. Newton's subsequent solo seems to materialize right out of this sustain, as if Blythe gave birth to it.

From the funk of *Down San Diego Way* to the Middle Eastern mystery of *Odessa*, Blythe and his unit create music that is spontaneous and joyful, creative and accessible. The crisp and buoyant recording highlights the balanced arranging that Blythe has put into **Lenox Avenue Breakdown**.

*John Diliberto*

Sound: B+

Performance: A-

**Central Avenue:** Wardell Gray

**Prestige P-24062**, mono, two discs, \$8.98.

Wardell Gray is one of the forgotten men of the be-bop movement, a tenor saxophonist who blended influences of both Lester Young and Charlie Parker. Indeed, as one can hear on this Prestige double-set, he sounded like a more robust version of Young. Gray served an apprenticeship in the reed section of Earl Hines' band from 1943-45, then settled in Los Angeles, becoming an active figure on the West Coast bop jazz scene, playing in clubs along Central Avenue in the Watts black ghetto, hitting the road intermittently with Benny Goodman (1948-49) and with Count Basie (1948; 1950-51). Gray died in 1955 while playing a gig in Las Vegas. His body was found on the desert, apparently tossed out of a car; the cause of his death was never determined.

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The Prestige re-issue covers small-group recordings he made while touring with Goodman and Basie, a recording of a live date in a Los Angeles club; two other sessions are studio dates from later years, one as a leader of a group of West Coast musicians and the other as a sideman with vibist Teddy Charles. The high point of the album, a 1949 session with the Charlie Parker rhythm section — Al Haig piano, Tommy Potter bass, and Roy Haynes drums — is notable for performances of a blues titled *Twisted*, a swinging *Southside*, and a ballad performance of Billie Holiday's *Easy Living*. Another fine ballad from the session, *Sweet Lorraine*, displays Gray's immaculate tone to great advantage. The four items from the Teddy Charles date, recorded in Detroit with a local rhythm section, lack some of the fire of the Haig-Potter-Haynes pieces, yet Gray rides through numbers like *A Sinner Kissed an Angel*, *Greyhound* (another blues), *Treadin'*, and *Blue Gray*, confidently and authoritatively.

As can be heard on his work in this collection, Wardell Gray possessed all the qualities that should have ranked him with the top players of the modern jazz era, a rich melodic conception, a full and consistent tone, an unrivalled sense of swing, and a seamless continuity of expression. Yet despite these assets, he was repeatedly passed over by a jazz public seeking more sensational and superficially exciting performers.

Of the remaining selections in the Gray double-set, the most notable is the live August 27, 1950 blowing session from the Hula Hut in Los Angeles which features trumpeter Clark Terry, Gray's associate in the Basie band of the time; tenor man Dexter Gordon, and altoist Sonny Criss. The session evolves into some broiling, hard-swinging choruses on Parker's *Scraple from the Apple* and Denzil Best's *Move*. The taped session has a reasonable sound, considering the vintage of the recording, the noisy audience, and the number of players on one mike. The mono sound quality of the re-issued studio sessions ranges from good to adequate.

John Lissner

Sound: C- Performance: A-

**A Tribute to Cannonball:** Don Byas and Bud Powell  
Columbia JC-35755, stereo, \$7.98.

Columbia's Contemporary Jazz Masters series is starting to unearth a number of previously unreleased sessions; the exceptional performances on this release, recorded in Paris in 1961, co-

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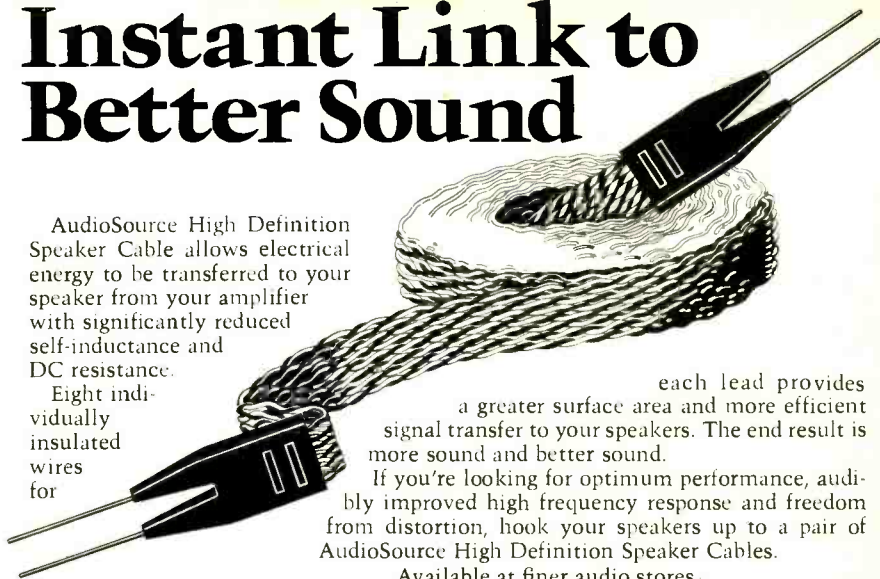
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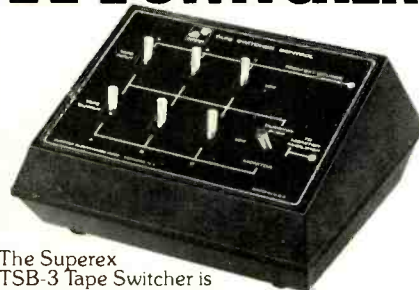
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feature Byas, one of the major figures on tenor sax, and Powell, the genius of bop piano; accompanists are trumpeter Idrees Sulieman, drummer Kenny Clarke, and the excellent French bassist Pierre Michelot. Byas, admired by swing men and modernists alike, was an early expatriate jazz musician, arriving in Paris in 1946; Powell went to Paris in 1959. Byas found himself the patriarch of the large, Paris-based American jazz community and organized many dates, including this one. On this album, Byas and Powell offer us consummate musicianship, prodigious technical displays, and impressive rapport.

On uptempo tunes like *Cherokee*, *Good Bait* and *Jeannine*, Byas reveals his big, forceful sound, unlimited ideas, and his adaption of modern jazz techniques to what is a basically swing style. The slow ballads like *Jackie*, *My Little Cat* and a particularly lyrical *All the Things You Are* showcase the scope of Byas' virtuosity — his melodic inventiveness and keen harmonic sense. Powell, apparently fully recovered from various and lengthy sieges in mental hospitals, is in top form, ripping through the fast tunes with an energetic and compulsive attack. Slowed down and supporting Byas on Benny Golson's haunting *I Remember Clifford*, the pianist and saxophonist offer sensitive, delicate music, with Byas' long solo, a shimmering, legato line of breathtaking beauty.

John Lissner

Sound: A-

Performance: A+

### Divine Love: Leo Smith

ECM ECM-1-1143, stereo, \$8.98.

Leo Smith is one of the more cerebral musicians from the Association for the Advancement of Creative Musicians (AACM), but he has never gone in for the humor or screaming anger that characterizes much of the AACM work. Instead, with people like Anthony Braxton and with his own group, New Dalti Ahkri, he journeys in an area of spatial improvisation in which silence is as important as the sounds it envelops. Dissonance is not unheard of in his music; more often he'll be probing inside a soft and ethereal tonal palette. This is an area of gentle warmth and subtle mysticism.

The side-long *Divine Love* opens with ritualistic percussion and Dwight Andrews' arid alto flute playing across the gentle shimmerings of vibraphonist Bobby Naughton. The piece evolves through several phases in a dreamlike state of movement. The musicians seem to pass through each other in their interplay. Long, sustained lines

are pierced by Smith's muted trumpet while Naughton and Andrews undulate about each other. When it is over, there's a feeling of having been someplace new and peaceful.

*Spirituals: The Language of Love* follows the same improvisational concepts. Here the textures are darker due to the addition of Charlie Haden's bass and the use of bass clarinet and tenor sax by Andrews. Where *Divine Love* was light and airy, *Spirituals* is an ominously stalking tune. Haden's bass is an irregular pulse accompanied by a skittering of trumpet and vibes and a rumbling bass-clarinet and tenor. Naughton's marimba sounds as if it comes from a voodoo nightmare.

The remaining piece, *Tastalun*, employs a scoring concept that Smith calls "Ahkreation." This translates into the only emotionally unsatisfying piece on the album. Smith scores it for the muted trumpets of Lester Bowie, Kenny Wheeler, and himself. He fabricates a convoluted surface of suspended phrases between bubbling rivulets of sound, which makes for some nice sonics, but never seems to get beyond their initial premise.

*Divine Love* is an entrancing album that furthers ECM Records' commitment to the more cerebral aspects of the avant-garde. There is a transparency and openness of sound that allow Smith's performances to take a natural shape once they enter your sound system. And that shape is an uncharted world of mysterious sounds.

John Diliberto

Sound: A Performance: A-

### Gonna Be a Live One in Here Tonight!

Luther Allison  
Rumble RR 1001, stereo, \$8.98.

At times it's seemed that the greatest obstacle bluesman Luther Allison faced on the road to recognition was his own startling versatility. Record producers were all too quick to seize on the Arkansas-born guitarist's ease at adapting to different genres, and the result was a series of uneven albums on Gordy before he dropped out of public view. Rumble, a new label, has avoided questionable production concepts by questioning Luther in performance in a small Illinois club, a solution obvious to anyone who's seen this young blues master in concert.

*Gonna Be a Live One in Here Tonight!* is the Luther Allison album for which his fans have been waiting. This set reaffirms Luther's status as one of Chicago's finest blues guitarists, a dazzling technician with a lyrical touch and the surest grasp of dynamics since B.B. King, who's been a major  
AUDIO • December 1979

influence on his work. In fact, Luther covers two of B.B.'s standards, but with more gusto and abandon than the veteran bluesman usually brings to the stage these days.

The album's only flaw, and a minor one at that, is a shortage of original material. Of Luther's own songs on this disc (*You're Gonna Need Me* is credited to him, but Albert King claimed its authorship when he cut it over ten years ago), *Movin' On Up* is a remake of his old One-derful 45, and *Strokes* is nothing more than a warm-up instrumental. The remaining original, *Cat Blues* (as in Caterpillar Tractor

Co., which has a major plant near the club), is perhaps the album's strongest track. A revealing look at the pressures on a musician to get a "regular" job, this slow blues features some blistering guitar work and draws an enthusiastic response from an audience that must contain a number of Caterpillar employees.

The extremely satisfying record is well worth the effort of tracking down. If you can't find it locally, write to Rumble Records at P.O. Box 84, Peoria, Ill. 61650.

Roy Greenberg

Sound: B- Performance: A-

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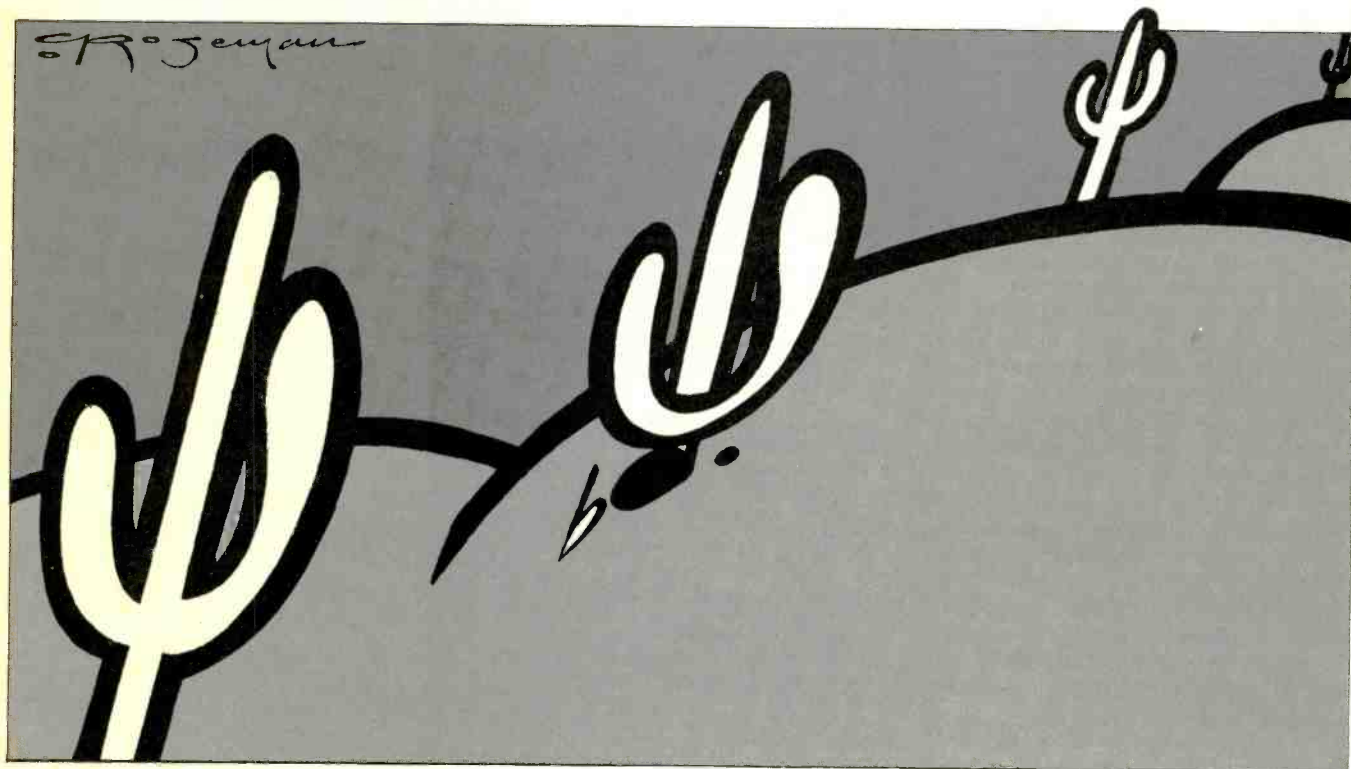
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# Folk bag



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**You Gotta Let All the Girls Know You're a Cowboy:** Jim Silvers  
CMH 6228, stereo, \$7.98.

While Nashville continues its push toward commercial-pop respectability and Austin bumps around aimlessly in search of a new savior, along comes a California-based singer-songwriter to breathe some fresh air into the stagnant country-music scene.

Jim Silvers establishes his musical credentials in the opening, *Cannonball Yodel*, an Elton Britt specialty in which Silvers just rears back and lets go over a bluegrass-with-synthesized-orchestra backdrop. He also proves himself adept at rockabilly (*My, My, My*) and "straight" country (*Each Season Changes You*—a tearful duet with Rebecca Burns—and Ernest Tubb's *Waltz Across Texas*), sung with authority and flair.

But Silvers' original compositions are, more than anything else, what set him apart from country music's popballadeers and progressives alike. If it's possible to judge a man by his lyrics,

Jim Silvers must be a bit on the demented side. *Paul's Saloon* outlines the temptations, pleasures, and wages of sin in humorously graphic detail. The title cut is a tongue-in-cheek lesson in how to convince people you're an outlaw. *I Wanna See Las Vegas* (with sturdy fiddling by Brantley Kearns) is unquestionably the first bluegrass song ever to mention Wayne Newton, Mitzi Gaynor, and Shecky Greene! On the other hand, a novelty called *Goodbye California (Hello Illinois)*—with good Dobro by veteran San Francisco multi-instrumentalist Fred Sokolow plus Roger Bush's inimitable slapping bass—has the earmarks of a bluegrass standard. But the album's big barroom crowd-pleaser should prove to be *Old Faithful* (preceded by *Katy Daly*, which is listed neither on the cover nor the label), a catchy singalong ditty which is *not* about the famous geyser.

Though the music is hardly slick, it would have had more immediacy with slicker production, specifically a more

spatial mix with brighter sound. (CMH Records, Inc., P. O. Box 39439, Los Angeles, Cal. 90039.) *Tom Bingham*

Sound: C+

Performance: A-

**Travelin' Lady Rides Again:** Rosalie Sorrels  
Philo PH 1049, stereo, \$7.98.

Sometimes a Rosalie Sorrels album soars. Sometimes it only hovers. This one soars.

Ever one of the most personal of singers and one of the most difficult to pin down, on *Travelin' Lady Rides Again* she's almost a country Lady Day singing blues. Surely Rosalie's voice is the bluest it has ever sounded on record.

The album opens with a wrenching remake of the lady's theme song *Travelin' Lady*. Then it's Mayne Smith's wacky *I Like It*, Susannah Clark's sad *We Were Kinda Crazy Then*, Sylvia Tyson's *Trucker's Cafe* which is purest prototype, and the inevitable Bruce

Phillips song *Going Away* as a low-down blues.

The other side opens with a diverse pair of Phillips songs, then Peter Rowan's tender storysong *Feather Ben*, the traditional *Bad Girl's Lament* done a cappella and a sure show-stopper after all these years, and finally another remake, one of Rosalie's most remarkable songs, *Postcard from India*.

The sidemen are all exemplary with special nods to Madcat Ruth for harmonica, Winnie Winston again for steel guitars, and Jeff Gutcheon again for piano.

Rosalie Sorrels is one of the toughest ladies I know and nobody sings like her. She sings extra well when she gets pushed like her musicians do here. As I said at the top, this is one of the really great Rosalie Sorrels albums. The last words on the album, the words at the close of *Postcard from India*, say it: "Keep on rocking!/It's a beautiful boat."

Michael Tearson

Sound: B Performance: A

**Wind in the Mountains:** Raintree  
**Green Mountain GMS 1071**, stereo, \$5.50.

Raintree is yet another highly promising eclectic-bluegrass band from New England (Amherst, Mass., to be exact). Like the majority of Northern bands, their picking abilities exceed their vocal talents, though their singing is, for the most part, unobjectionable. Husky-voiced Debbie Fish is their strongest lead, and she also has a fine ear for harmony (note Reno and Smiley's *Country Boy Rock and Roll*, among others). Nick Plakias sounds more comfortable on the folk-styled title cut (which he also wrote) than on the straight bluegrass material. Bob Green's singing is not only shaky and perceptibly off-key, but awkwardly phrased; fortunately, he's only featured on two songs.

In any case, the album is well worth recommending for the band's energetic picking alone. Bob Green is an uncommonly versatile mandolinist, whose mastery of a number of styles—among them Jesse McReynolds-style cross-picking (*On the Ocean*), old-fashioned chord tremolos (title tune), dexterous adaptations of fiddle tunes (*Medley #1*), and a progressivist leaning toward Sam Bush (*I Miss You*)—is matched by his infectious enthusiasm. Nick Plakias' flatpicking is clean, supple, and intelligent. Jim Heffernan, who is split between Dobro and banjo chores, is especially creative on the former instrument (hear *The Cuckoo* and *Medley #1*). In order to keep pickers this spirited from flying off the

handle, a firm, steady bottom line providing both uncluttered harmonic support and a rhythmic lift is needed; Debbie Fish's fat-toned bass supplies just that.

*Bud's Bounce/Panhandle Rag* doesn't swing as flexibly as the band undoubtedly intended. Otherwise, Raintree impresses as a talented instrumental quartet which, with more work on their singing, should make a substantial impact on the Northern bluegrass scene.

It would have been nice to be able to hear Plakias' rhythm guitar under the vocals, while Fish's bass should also have been brought up somewhat. (Green Mountain Records, Inc., Garvey Hill, Northfield, Vt. 05663.)

Tom Bingham

Sound: B- Performance: B

**Fiddlin' Arthur Smith & His Dixieliners, Vols. 1 and 2**  
**County 546, 547**, mono, \$5.98 each.

The late Arthur Smith (not to be confused with the veteran guitarist/multi-instrumentalist/producer of the same name) was the fiddle superstar of the 1930s. Almost single-handedly, he provided the bridge between the old-time breakdown styles which dominated country music in the '20s and today's bluegrass and country fiddling.

A good deal of Smith's renown came from his amazing agility at a rapid clip; note *Goin' to Town*, *Straw Breakdown*, and *Lost Train Blues* on Volume 1, plus *Indian Creek*, *Fiddler's Dream*, and *Smith's Rag* on Volume 2. More influential, though, was his smoothing out of the various rough edges which characterized the many local and regional Southeastern fiddle styles prevalent up to that time. Yet, while he transcended old-time fiddling, he was clearly rooted in it, altering it through the incorporation of raggy blues, an occasional dollop of swing fiddling, and a great deal of his own personal innovation.

His bowing had a remarkably even flow, while his fingering was worthy of the reverence his peers showered upon him. (This is not to say he was always so awesomely perfect as some observers have claimed; the man *did* make mistakes, just very few of them.) His variations were far more adventurous than those of virtually any country fiddler before him. He was also a very emotional musician, with a vehemence to his playing that sounded as if he were trying to rid himself of some personal demon.

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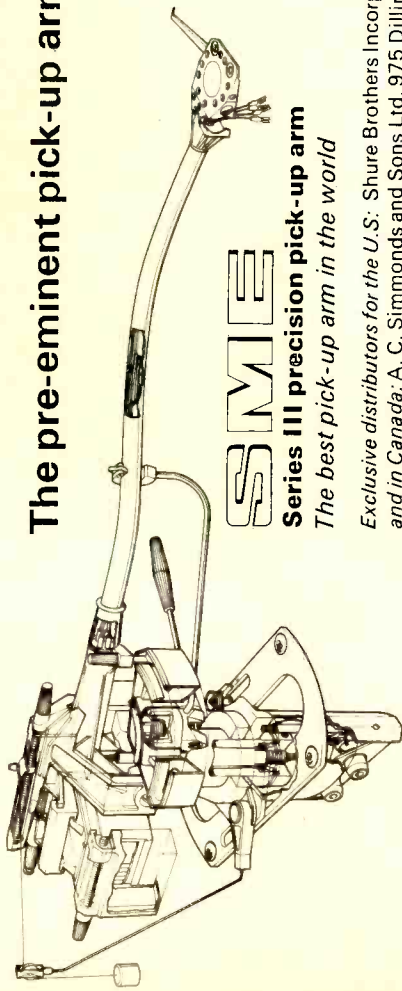
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Goodman's bands) added a jumping, propulsive drive. Several samples of Smith's likable vocal style are included, as well as a tantalizing glimpse of his unusual clawhammer banjo picking (*I'm Bound to Ride*, on Volume 1).

Both volumes are essential items for fiddle fans. Volume 1 may have a slight edge, though Smith's most famous tune, *Blackberry Blossom*, appears on Volume 2. You can't go wrong with either. (Country Records, P.O. Box 191, Floyd, Va. 24091.)

Tom Bingham

Performance: A

**For Foul Day and Fair:** Cilla Fisher & Artie Trezise

**Folk-Legacy FSS-69**, stereo, \$7.98.

Cilla Fisher and Artie Trezise are the sister and brother-in-law of the great Scottish singer-writer Archie Fisher. One often expects more than is justified from relatives of the renowned, but the Trezises succeed admirably on their own merit.

Their repertoire consists largely of traditional Scots folk songs, given just enough contemporary flavor to communicate with the "general" folk audience without alienating hard-core traditionalists. Several of the songs—including *The Bothy Lads*, *Billy Taylor* (a sea ballad with a familiar plot but an unexpected ending), and *The Maid Gaed Tae the Mill* (a bawdy narrative with a tune similar to *When Johnny Comes Marching Home*)—have the potential to become perennial favorites on this side of the Atlantic. To be sure, they require a few words of explanation to cut through some substantial cultural and language difficulties. On the other hand, Fisher and Trezise's clear, unaffected Scottish accents only add to the authentic charm of their material.

Both Fisher and Trezise have distinctive vocal personalities. Fisher has a hearty middle-range voice, spiked with an expressive quaver. She's especially effective on jaunty, dance-rhythmed tunes, among them *The Jolly Beggar*, *Laird O' the Dainty Doonby*, and *The Shepherd Lad*. She can also sing a convincing love ballad, as *False Lover Won Back* illustrates. Trezise has an instantly identifiable voice, which might be described as a tenacious tenor. His leads on the duets (such as *Rhynie and The First Time*) are as sensitive as they are vigorous. His guitar backing is uncomplicated, stylish, and complementary.

Ironically, the one cut which doesn't live up to the rest is Cilla's rendering

of her brother Archie's *The Final Trawl*. Somehow, she fails to capture the empathic perceptiveness of Ed Trickett's interpretation (on Bok, Muir, and Trickett's *The Ways of Man*, Folk-Legacy FSL-68). But this is the only blemish to an otherwise exquisite record, which is certain to please anyone who loves Scottish ballad singing.

As with many other Folk-Legacy recordings, the voices ring loud and true while the accompaniment is, as a rule, relegated well into the background. I don't doubt this is an aesthetic decision by producer Sandy Paton, rather than a faulty mix. There are, however, occasional mildly disturbing distortions on Trezise's vocal track. (Folk-Legacy Records, Inc., Sharon, Conn. 06069.)

Tom Bingham

Sound: B-

Performance: A-

**Bend In the River:** McPeak Brothers County 771, stereo, \$7.98.

While most of the attention in the bluegrass world, over the past several years, has been given to virtuoso instrumentalists, the McPeak Brothers have been quietly carving their niche as bluegrass' finest vocal trio. Dewey McPeak handles most of the leads in a voice steeped in traditional bluegrass, yet polished with enough soft-edged understatement to appeal to the newgrass audience as well. Larry McPeak's resourceful tenor vocals are adroitly sung, while Mike McPeak's baritone tastefully rounds out the harmonies. Listen, for example, to *Shelly's Winter Love* and *Barbara Allen*, which contain some of the finest bluegrass trio singing in recent memory. Dewey is also a nimble Scruggs picker, though the bulk of the album's considerable instrumental interest (hear the title track and *Steel Rails*) comes from fiddler Jim Buchanan, mandolinist/fiddler Ricky Simpkins, and dobro ace Jerry Douglas. Though the choice of material isn't quite as consistent as on the brothers' last album (*McPeak Brothers*, County 764), *Bend In the River* should please anyone who loves good bluegrass harmony. (County Records, P.O. Box 191, Floyd, VA 24091.)

Tom Bingham

Sound: B

Performance: A-

**40 Polkas and Waltzes:** Frankie Yankovic

**Polka City 381**, rechanneled stereo, two discs, \$6.99.

One of the benefits of growing up in a multi-ethnic, three-generation,

working-class household was exposure to a marvelous variety of music at an early age. From my accordion-playing Polish grandfather came a love for polka music, which I later disowned as a Beatle-era teenager, only to return to it when I realized I was exploring everyone's ethnic culture but my own.

Back in the days of my original pre-teen polka enthusiasm, Frank Yankovic was unquestionably the number one polka star in the nation, and he's managed to retain a great deal of his popularity to this day. The son of Slovenian immigrant parents, Yankovic developed a highly personal sound intended to reach across ethnic boundaries. Thus, he was able to extend his artistry beyond Cleveland's sizable Slovenian community to appeal to European-Americans from all backgrounds.

Part of his popularity lay in the range of his repertoire, as illustrated on this reissue of some of his early material (no years are given, but it probably dates back to the late '40s and early '50s). Alongside such Yankovic staples as *Just Because*, *Blue Skirt Waltz*, and *Tick Tock Polka* (all of which crossed over onto the pop charts, a feat virtually unheard of in American ethnic music today), this set includes traditional-style Slovenian polkas (*The Page Polka*, *Ohio Polka*, and *Shandy Polka*), several more polkas in a less strictly ethnic vein, sentimental and sometimes downright schmaltzy waltzes, vocal novelties which sound unbearably corny today, and even a few Italian tunes. They're all performed using Yankovic's distinctive blend of two accordions, two Solovoxes (an outmoded keyboard instrument capable of only one note at a time; the two are played in harmony), piano, bass, and four-string rhythm banjo, a tonal combination which has never been successfully duplicated.

The 40 tracks in this collection are by no means of equal musical value. Indeed, at times the album swings rather wildly between the classic and the wholly forgettable. But the best tracks are choice stuff, and the majority are listenable at the very least. Frankie Yankovic was at his peak when these sides were made. While he's still a first-rate live entertainer, there's a freshness to much of this early music that his recordings of the past several years simply can't begin to match.

The "stereo" consists of separating the bass line from the rest of the ensemble. The sound as a whole is quite constricted, mostly due to the original recordings, I don't doubt, though there was probably some extra

compression to fit 10 tracks on a side. (Polka City, 7625 Bush Lake Road, Edina, Minn. 55435.) *Tom Bingham*

Sound: C- Performance: C to A-

#### Buell Kazee

**June Appal JA 009**, mono, \$7.98.

Buell Kazee was one of the well-known rural recording artists of the 1920s whose influence proved to be especially crucial to the "folk boom" of the early '60s. His repertoire and vocal approach—Kazee sang archaic modal ballads in a polished voice which showed his formal training, yet without ever losing sight of his authentic Kentucky mountain origins—greatly affected Joan Baez and countless lesser balladeers, while his rapid, intricate banjo frailing inspired many urban musicians during the revival.

Unlike many early blues and country giants who were "rediscovered" in the '50s and '60s, Kazee remained in possession of his musical faculties almost until his death in 1976, at age 76. This album, compiled from private and concert tapes recorded primarily between 1965 and 1972, is more than merely an overdue tribute to an artist whose reputation among folk cognoscenti far outstripped his familiarity to the public at large. It is, more significantly, a peerless example of authentic traditional Appalachian music at its very finest.


Kazee's sure, precise singing is virtually unmatched on both mountain variants of classic British ballads (*The Lady Gay*, *Black Jack Davy*) and such purely American ballads as *The Roving Cowboy* and *The Orphan Girl*. The listener's overall impression is that of a serious, dignified artist well aware of his role as a preserver and transmitter of an invaluable, yet disappearing tradition. Still, he was no self-conscious academician, faithfully noting down every semiquaver, flatted note, and deviation from printed texts. This music was originally meant to be entertainment, and Kazee was as much, perhaps even more, an entertainer as he was a performing folklorist.

Thus, the material on this album encompasses the full range of traditional mountain entertainment music, including humorous songs (*Sporting Bachelors*), white blues (*Look Up, Look Down That Lonesome Road*), railroad songs (*Steel A-Going Down*), hymns (*O, Thou in Whose Presence*), and an instrumental (*Banjo Medley*). His performances on all these are of the same high quality he brought to his ballads. Special attention should

also be given to the full-voiced, melismatic drama of Rev. Kazee's *a cappella* hymn-singing.

Sound varies depending on the circumstances of recording, but it is never less than acceptable. (June Appal Recordings, Box 743, Whitesburg, Ky. 41858.) *Tom Bingham*


Sound: C to B Performance: A



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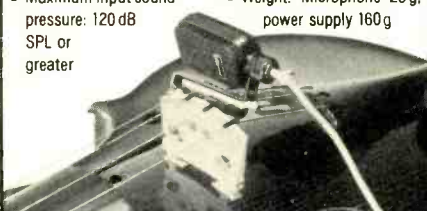
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# Top of the pile

**Sonic Fireworks, Vols. I & II.** Music for organ, brass and percussion. Richard Morris and the Atlanta Brass Ensemble. **Crystal Clear CCS-7010/7011**, stereo, \$16.98 each.

During the 1979 Summer Consumer Electronics Show, advance copies of **Sonic Fireworks** were to be heard in the demo rooms of those manufacturers intent on showing off bass response and overall cleanliness of sound. Since the show, final European pressings have arrived for review.

We have come to expect of Crystal Clear unyielding attention to sonic details, and these albums of organ and brass music are no exception. Richard Morris plays the Ruffatti instrument in the Cathedral of Christ the King in Atlanta and is supported by the twelve-man Atlanta Brass Ensemble. You will recall that the instrument played by Virgil Fox in the two Crystal Clear records issued two years ago was also a Ruffatti. While the Fox recordings presented a close-in pickup of the organ in a relatively absorptive environment, the present recordings present the bright Ruffatti sound at a greater distance in a far more reverberant environment. The main problem faced by the Crystal Clear engineers in these recordings was to establish a proper musical balance between the organ, the brass ensemble, and the room itself — with only a pair of microphones. They have succeeded admirably, capturing both wide-frequency and dynamic ranges in a detailed stereophonic panorama. There is absolutely no trace of rough edge on even the loudest brass passages, a common failing in recordings of this kind. The direct-to-disc process, along with Crystal Clear's attention to low-distortion electronics and sensible disc recording levels, no doubt contributes to this.

Four sides of organ and brass is a lot of one genre of music. Some of the selections are gratuitous, such as the first 45 seconds or so of *Also Sprach Zarathustra* (the well-worn 2001 part) and the Mouret *Fanfare* music from the "Masterpiece Theater" episodes

on public television. The works which come off best are those that draw naturally on the sonorities of these special musical resources, such as those of the French organists Widor, Dupre, and Gigout, who understood so well the interaction between the acoustics of large churches and musical structure itself.

The playing is accurate and competent but tends to be a bit studied. In many ways, the performances of similar works by E. Power Biggs, even with the usual excesses of Columbia's engineering, come across with more musical verve and flair. In terms of sound, however, there is no contest; these discs take all honors in the organ-and-brass category.

Now for the complaints. With the careful attention given the discs themselves, it is a pity that Crystal Clear gives us album liners containing so little information. Records such as these deserve double-fold albums with competent program notes and thorough technical information. Instead, we are provided with only minimal information about the recording activities themselves, along with some of the most amateurish and inaccurate program notes I've come across. (Examples: St. Bartholomew's Church is on New York's Park Avenue, not Fifth Avenue; Copland's *Fanfare for the Common Man* was incorporated into his *Third Symphony*, not his second; Sir Arthur Bliss died in 1975, but the notes indicate he is still alive.) There is no reason why these records, or any other first-class audiophile product, should not consistently meet the highest industry standards in all aspects of production. These minor points aside, the discs are thoroughly recommended for their sonic values.

*John M. Eargle*

**Times Gettin' Tougher Than Tough:** Charlie Musselwhite  
**Crystal Clear CCS 5005**, stereo, direct-to-disc, \$16.99.

A new Charlie Musselwhite album is usually ample justification for blues

fans to dance in the streets. Musselwhite is a blues harp player of breathtaking inventiveness, and each of his albums has documented his growing success at extending the limitations of the instrument by building upon innovations pioneered by the legendary Little Walter Jacobs.

**Times Gettin' Tougher Than Tough** is his first album in several years, but is



**Charlie Musselwhite**

unfortunately disappointing. His harp work is still flowing and lyrical, as always, but at times here, it's, well, feeble. Not only are his solos unadventurous, but they lack the customary verve and joyful exuberance that are his trademarks. He seems to be blowing his instrument with unusual restraint, perhaps because he felt there were difficulties in capturing the wide-



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ly varying dynamics of amplified blues harp in the direct-to-disc process.

Blues is typically a music of improvisation, thereby ensuring a measure of emotional conviction on the part of performing bluesmen. While some of this quality is inevitably lost in the studio, a sense of involvement and spontaneity is crucial for the music to retain its integrity and impact. Compared to such earlier Musselwhite albums as **Takin' My Time** on Arhoolie or **Leave the Blues to Us** on Capitol, that boasted supercharged arrangements which provided a launching pad for exploratory soloing and group interplay, this set seems stiff and unconvincing. I suspect that part of the problem can be traced to repeatedly rehearsing the material in order to efficiently utilize the direct-to-disc format, which calls for cutting an entire album side in one sitting without a chance to overdub or erase at a later time.

Musselwhite has cut 3 of the 6 tunes on this album before (*Sloppy Drunk* is a disguised remake of *Skinny Woman*) all to better effect. His band of San Francisco Bay area musicians is larger than in past outings, and with sidemen lining up to take a break, the ostensible band leader plays less harp than usual. He's consequently thrust into the role of featured vocalist, and since he is at best a merely adequate singer, he tends to get overwhelmed by his band's brass section.

On the plus side, this is the best recorded album yet by Musselwhite and for that matter sets a standard for fidelity unprecedented in blues recording, a field notorious for the production of poorly recorded albums. The disc has a clarity that allows for each instrument to be heard separately and distinctly, due to the state-of-the-art approach to recording. There's also a striking absence of ambient noise. If, however, like most blues fans, you subscribe to the Southside Johnny Lyon school of audio fidelity ("It ain't how the grooves sound, but what's in 'em"), then this probably seems like a dubious achievement.

True Musselwhite fans will want this one regardless of any negative comments; others are sternly advised to first hear his albums for Arhoolie, Capitol, and Cherry Red. *Roy Greenberg*

Recording: A Performance: B- Pressing: A

**Rachmaninoff** (C-4001, 2, 3, 4): Piano Concertos Nos. 1-4 and other works; Jean-Philippe Collard, piano; Orch. du Capitole de Toulouse, Michel Plasson, cond.

**Liszt** (C-4005): Organ Works; Lionel Rogg.

**Bartok** (C-4006): Sonata, Out of Doors, Roumanian Folk Dances, Hungarian Peasant Dances, Six Dances in Bulgarian Rhythms; Michel Beroff, piano.

**Chopin** (C-4007): Barcarolle in F#, Etude in C#, Ballade No. 1 in G, Five Mazurkas; Ivan Moravec, piano.

**Roussel** (C-4008): Psalm 80, Bacchus et Ariane Suite No. 2; John Mitchinson, tenor; Chorus of Stephen Caillat; Orch. de Paris, Serge Baudo, cond.

**Honegger** (C-4011): Pacific 231, Rugby, A Christmas Cantata; Chorus and Orch. National de l'O.R.T.F., Jean Martinon, cond.

**Debussy and Ravel** (C-4013): Various Works; Ivan Moravec, piano.

**In-Sync Laboratories**, chromium-dioxide cassettes, Dolby B N-R, \$10.98. (390 West End Ave., New York, N.Y. 10024.)

Audiophiles now have another source of high-quality audio material besides direct discs, digital discs, and Barclay-Crocker open-reel tapes. This new source is in the form of the Super Chrome Cassette series from In-Sync Laboratories. "Pre-recorded cassettes?" That's what I said. I must admit I was a bit skeptical when these cassettes arrived for review but after sampling a few selections I quickly changed my opinion. These cassettes have a frequency response, dynamic range, distortion, and noise levels that are superior to most commercial discs and nearly equal to that of the best direct-disc and digital recordings. The credit for this technical excellence belongs to Mr. Julius Konins, President of Cassette Productions, Inc., where these cassettes were duplicated. Mr. Konins was an early pioneer in the field of high-speed duplication and in recent years has concentrated his efforts on cassette duplication.

Mr. Konins attributes the improvement over previously available cassettes to the following factors:

1. The duplication master is copied directly from the original tape whenever possible. This eliminates any noise or distortion that would be caused by using an intermediary copy. When the duplication copy wears out, a new copy will be made from the original tape.

2. The duplication copy is made at 15 ips, instead of the usual 7.5 ips. This proved to be the most significant factor in reducing audible distortion.

3. The exclusive use of second-generation chromium-dioxide tape (either DuPont or BASF Crolyn II). First-generation CrO<sub>2</sub>, while having improved frequency response capability, also had about twice as much distortion as ferric oxide tapes. Crolyn II, however, has

distortion levels equal to the best ferrics.

4. The use of Dolby B and 70 $\mu$ S equalization.

5. A great deal of Tender Loving Care and careful quality control. All the duplicating equipment is carefully maintained and kept to a 1-dB tolerance. All cassettes are given an audio check before being shipped, an expensive and time consuming procedure that is reflected in the price of the In-Sync cassettes.

I had the opportunity to visit Mr. Konins' production facilities in Upper Saddle River, N.J., where I was very im-

pressed by the conscientious staff and the custom-made duplicating equipment. While there, I was allowed to compare randomly selected production samples directly with the 15-ips duplication master. In most cases, there was virtually no difference, and when a difference was heard, it was mostly due to a slight change in tonal balance rather than any increase in noise or distortion.

Getting down to specifics, I found the best sounding tapes to be those featuring solo piano works as performed by Ivan Moravec (C-4007, C-4013). I attribute this to the fact that the

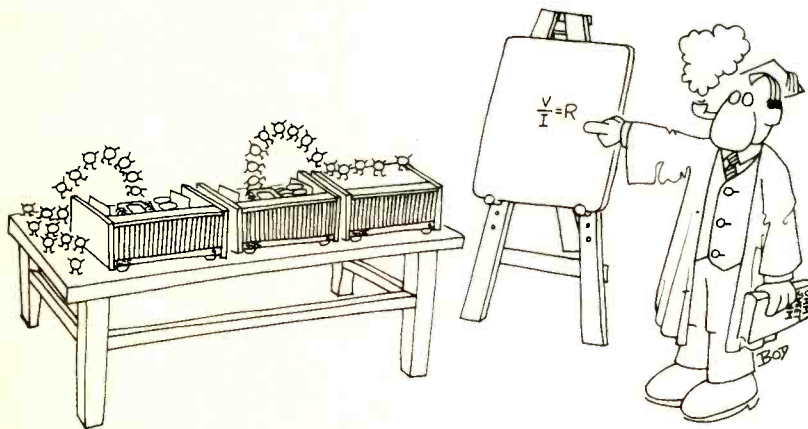
duplication masters were copied directly from the Connoisseur Society original tapes. Ivan Moravec is also one of the finest pianists of our time, and these classic recordings, made in the late 1960s, have long been praised for their sonic qualities in their disc form. The remainder of the tapes reviewed, licensed from EMI/Pathe, do not have the transparency of the Moravec recordings, which is most likely the result of the extra copying process involved in the licensing agreement. Of the EMI/Pathe tapes, the best was that which featured music of Roussel (C-4008). It had a spectacular sound with wide dynamic range and featured music not often heard in the U.S.

The Rachmaninoff Piano Concerti (C4001-C4004), while featuring brilliant pianistic pyrotechnics by Jean-Philippe Collard and excellent piano sound, also have the somewhat coarse-textured playing of the Toulouse Orchestra.

A word of caution: These cassettes should not be played back on an ordinary cassette deck. To do so would be like playing the finest direct or digital disc with a \$1.98 crystal cartridge. The flux levels are so high they will overload the heads and/or electronics of the average machine as well as the early versions of a highly touted, expensive Japanese cassette deck. For this review, I used a Technics RS-M85 deck which proved more than equal to the challenge presented by these cassettes. This deck features a new Sendust head capable of withstanding high flux levels without saturation, low-noise electronics, and a special Quartz-locked drive mechanism that produces super-low wow and flutter. The unit also features peak-reading meters that allowed me to read flux levels 8 dB above 0 VU, and these In-Sync cassettes had them bouncing at their maximum a good part of the time.

The last thing I did before writing this review was to listen to several current Advent, DGG, London, and Philips cassettes. These cassettes were all made on equipment that represented a breakthrough in technology several years ago. They all sounded fine, but the In-Sync cassettes were better, with wider dynamic range and lower noise. Only the Advent cassettes use chrome tape and 70 $\mu$ S equalization, but their average signal level was 3 to 5 dB lower than the In-Sync cassettes.

Finally, as good as new cassettes are now, Mr. Konics assures me that even better cassettes will be possible in the future when metal-particle tape becomes available in duplicator quantities. I can hardly wait. *Charles P. Repka*



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# Classical reviews

Edward Tatnall Canby



**Beethoven: Sonatas for Violin and Piano.** Itzhak Perlman, Vladimir Ashkenazy. **London CS 7012**, stereo, \$7.98.

The somewhat intimidating close-up faces of these two young jet-star performers is almost enough to drive you away, unless (as London must figure) you like your macho! What happens in the living room when players like these, accustomed to "projecting" to large audiences, play music at you from a few feet?

It's OK, though sometimes a bit jarring. Beethoven, after all, is often a bit jarring himself. The ensemble is good but not as good as it can be among those who habitually play together over a lifetime. One senses two strong personalities, as well as that third power, Beethoven the composer. All this is common to most "celebrity" records and you may judge your own reaction accordingly.

The violin, Perlman, has a curiously nasal tone, a bit of cold in the head, and his vibrato is faster than the norm. I didn't too much like the resulting slightly whining effect. The piano is the leading element, as Beethoven surely intended, and the "ash can" dishes it out beautifully, with a very

slight touch of a rock beat, vital but not entirely elegant. Again—why not? It's Beethoven. All in all, these two will not leave you bored. Much too strong for that! Two musical powerhouses.

Sound: B Recording: A- Surfaces: B+

**Handel: The Sonatas for Flute (complete).** Paula Robison; Kenneth Cooper, harpsichord, Timothy Eddy, cello continuo. **Vanguard VSD 71229/30**, 2 discs, stereo, \$15.96.

This is surely the richest, creamiest performance of these noble sonatas in all recent time; perhaps it is just as well that most audio people will enjoy the sound without having to worry about the prolific added ornamentation, played by both flute and harpsichord (the cello just plays the harmonic bass line as written). To this day, most performers merely perform the printed notes and many will be bewildered by all this extra elaboration. But definitely, it was Handel's idea — ad lib, and no two performances alike. The ornamentation is like the enamel on a well-built piece of "kit" furniture. Paint to taste, tastefully.

It just so happens that both of these two performers, Paula Robison and Kenneth Cooper, have the ability to improvise, quite easily, in the Handelian manner. (Too many contemporary players are rigidly stuck to the printed notes and can never add a thing of their own devising.) So a collaboration was inevitable and it works like a charm, both players favoring a rather lush and complex — but quite proper — style. They are indeed a team and the music is an excellent cooperation, nor should we denigrate the excellent and steady accompanying cello foundation from Timothy Eddy that helps keep the whole together.

There is only one anachronism, and few will object — the flute is decidedly a modern one, with that gorgeous, big sound-of-the-angels that we admire so widely in virtuosi such as Jean-Paul Rampaal. The old flute, to match the harpsichord, would have only finger holes and a simple key or two and its sound would be more breathy and hissy, with less volume, especially on the low notes.

Sound: B+ Recording: A Surfaces: B+

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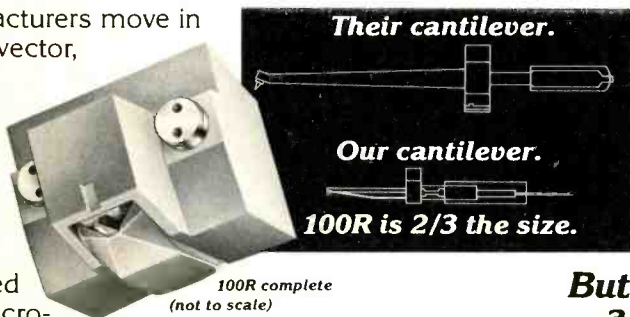
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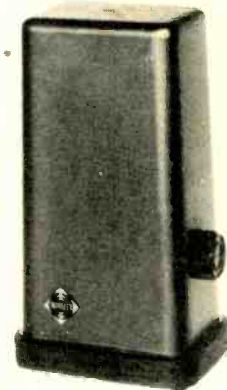
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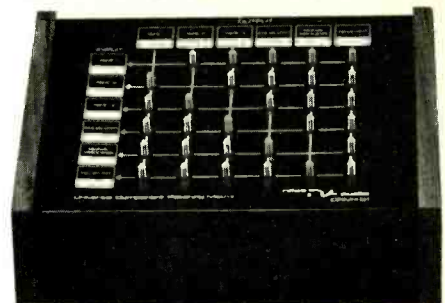
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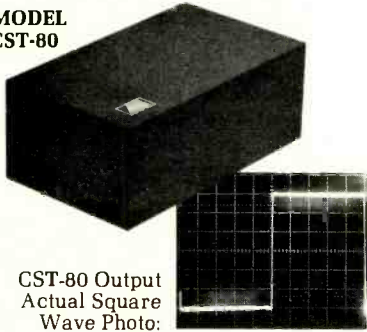
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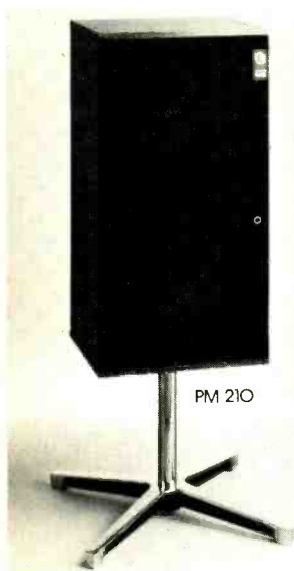
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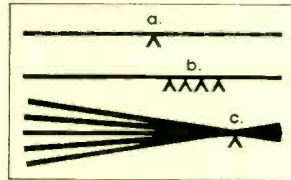
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