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Audio

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INTERVIEW
GEORGE AUGSPURGER
LISTENING ROOMS
TIPS FROM A PRO

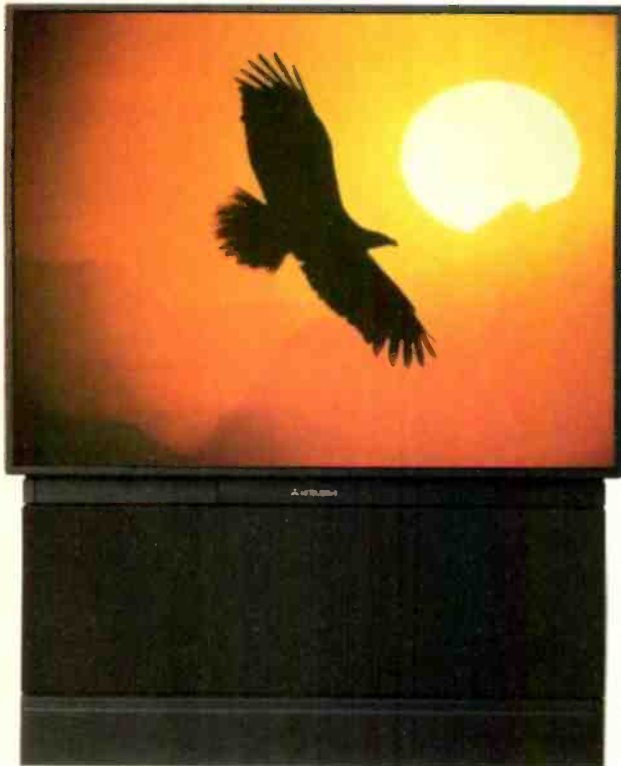
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TRULY FIRST-RATE
B & K PRO-10MC PREAMP



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The Mitsubishi
VS-5017S Big Screen
TV features a multi-
element, multi-
coated lens system,
high voltage stability
with less than 5%
overscan, peak white
automatic contrast
and two-dimensional
digital dynamic
comb filter.

That may sound deep. But it's only 22½"



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The biggest breakthrough came with the construction of a multi-element, multi-coated lens system that contains more elements than most competitive systems (7 vs 3 to 5), yet is considerably shorter.

The improved light path resulting from this innovative Mitsubishi lens system, in combination with new screen materials, delivers this television's impressive 800 lines of horizontal resolution with 390 foot-Lamberts peak brightness.

It also serves another important function, by eliminating a problem associated with any light beam that's projected onto a screen—a center hot spot.

It does this by distributing the light evenly across the entire screen, right out to the corners and edges.

As for all the other unique features of the VS-5017S (set forth a bit more technically on the opposite page), they perform such picture-enhancing functions as:

Sharpening of the screen image by improving light-to-dark transi-

tions and stabilizing the geometric distortion sometimes caused by very intense whites.

Continuously monitoring all of the small white peaks in order to prevent blooming.

More completely separating the black & white and color elements for truer color reproduction and less "cross talk" between those elements.

The result: An incredible big screen picture that feels like it's right on top of you.

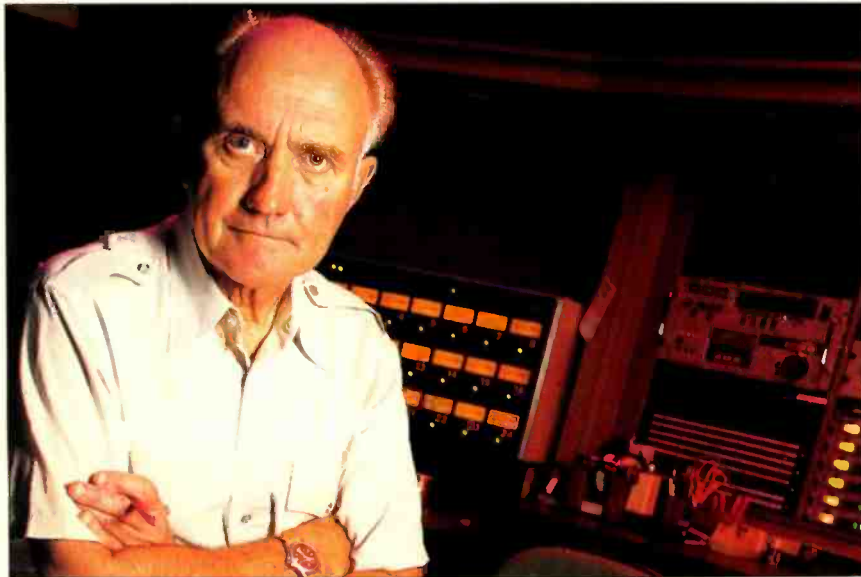
In a cabinet that isn't.

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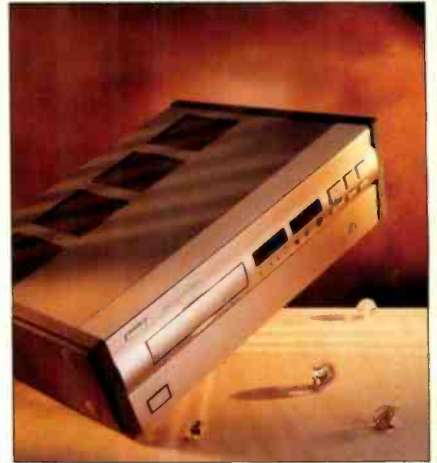
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VOL. 76, NO. 4



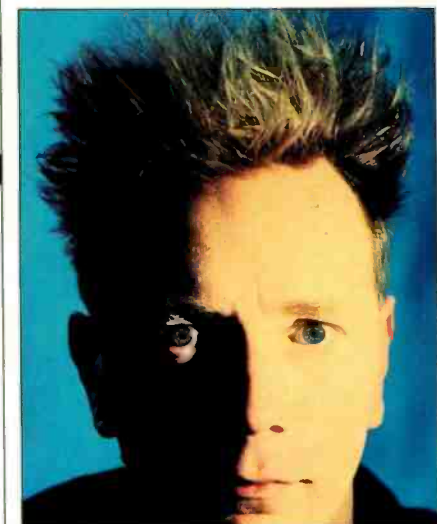
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Nº 30

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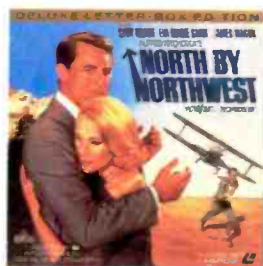
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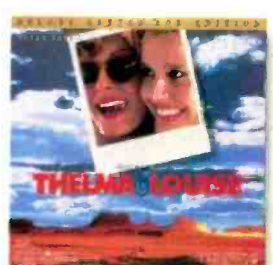
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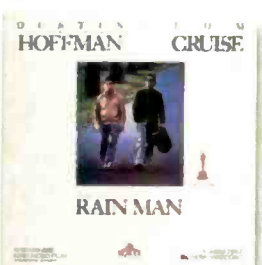
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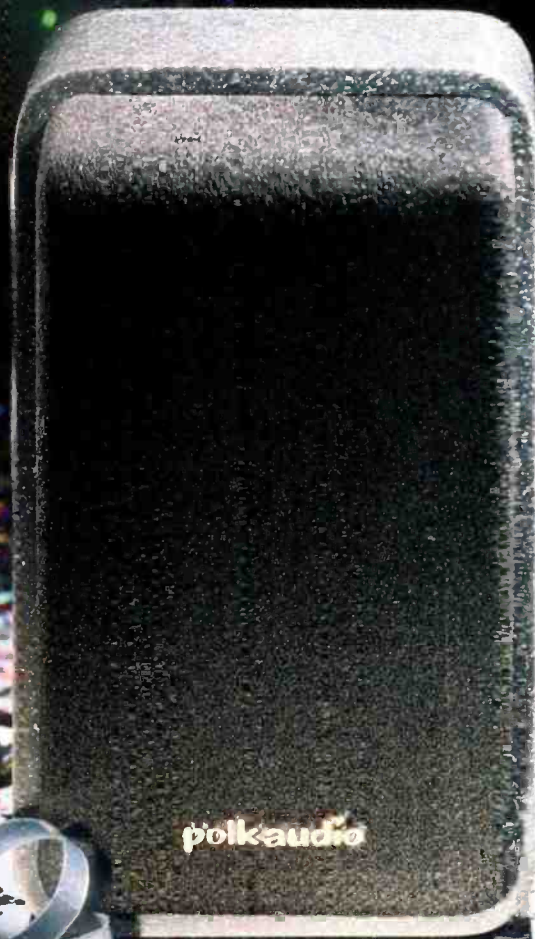
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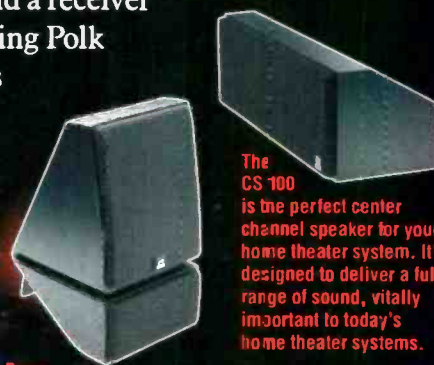
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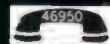
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Congressional Model Subwoofer

Lowdown from Prof. Lirpa

Dear Editor:

This year I received a Christmas card and note from an old friend, Ivan Ivanovitch. You may remember him, the internationally renowned research mathematician who is currently teaching at the Hirsutic Institute for Paranormal and Chimerical Applied Technology. Knowing of my lifelong work in audio and related fields, Ivan wrote about a subwoofer that had been recently demonstrated at his campus. He also included a photo, very dark and almost devoid of significant detail, in which the subwoofer looked more like a model of a helical molecule than a speaker. Ivan described the demonstration as "Magna Cum Laude, the highest achievement in producing frequencies of the lowest order."

Believing this might be a significant invention, I made a phone call to Ivan. He invited me to spend the holidays to discuss old times and visit the factory, although my severely depleted travel budget necessitated restraint in this matter. Subsequent phone calls and letters yielded better photos and more information about the device, the Congressional Model Subwoofer, and its inventor, Hiram Diddle. Diddle, who is usually introduced as (and greeted by) "Hi Diddle," has certainly built a unique subwoofer system, as you can see from the accompanying Parts List. The factory is located in either Northern-Southern or Southern-Northern Kentucky; local opinion is divided. The facility lies between Sinkhole and Loophole, in a hollow that has been completely missed by modern civilization; both are the better for it.

Initial research was prompted when Diddle read about the Acoustic Wave Cannon in *Audio's* November 1991 is-

sue. (He works fast.) This brought to mind earlier experiments conducted by Mr. Diddle. One day, Clemmett Kermit Diddle, Hiram's cousin (several times removed, but he kept finding his way back), had set his transistor radio down in front of a length of pipe. Certain notes were emphasized, while others seemed to be missing. Hiram decided to find out why. Further research at a plumbing shop led to the conclusion that longer pipes produce lower tones. Had Hiram been a church-going man and had the local congregation been able to afford a pipe organ instead of an old upright piano, this knowledge would have come to light sooner.

If one pipe makes one note, would two pipes make two notes? Research proved this was the case. The radio was set between two pipes for the test, which successfully rediscovered the principles of making multi-toned whistles for steam locomotives.

It was remembered that a pipe long enough to enhance the bass notes really made a mess of the higher notes. After reading the article, Hiram understood that some type of audio filter would allow him to feed only the lowest notes to the device. He realized that this was beyond his ability and thus wrote to Prof. Linkwitz Moscovitz, director of the Applied Electron Usage Department at the Hirsutic Institute for Paranormal and Chimerical Applied Technology, which is two counties and three ridges away. Moscovitz quickly responded, asking for more details: "We can build you a filter. Do you want Chebyshev, Butterworth, or elliptical? How many poles? Send requirements and check."

Hiram wrote back that the pipe was round, not elliptical, and that he didn't

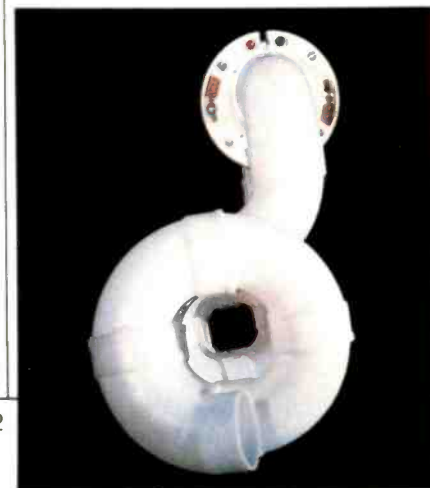
trust foreigners. But because Butterworth made a good pancake syrup, he wanted a Butterworth filter designed and built with four poles. Hiram noted that since four poles were enough to build a decent shed or barn, this would be adequate.

Professor Riley Lubiwitz, known for his moving lectures in the Applied Physics Department, immediately invited Hiram and Clem K. Diddle to demonstrate the device for his class. (This would mean one lecture fewer to prepare.) During the demonstration and following discussion, much information came to light.

Hiram's first model was built in a barn and had straight tubes. He then discovered that long straight tubes would not fit into his living room. Elbows were readily available, easier to carry, and could be used to build a shape that would fit. It is thought that the final design may have been inspired by a laundry detergent commercial, something about a White Tornado. Hiram is also reputed to be quite knowledgeable about the helical copper coils used in local enterprises. Drinking White Lightning and seeing white PVC pipe may also have had some influence.

The helical model was quickly built and tested. All observers were moved by the low notes. As you know, these frequencies produce more physical than auditory sensations. Several attendees were so impressed that they immediately placed orders with cash deposits.

Present at this first demonstration, as honored guest and unpaid creditor, was Claude William of Dunkenfield Plumbing and Supply. He is reportedly responsible for naming the invention:



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Chick Corea Elektric Band—Beneath The Mask (GRP) 426-866

Eric Clapton—24 Nights (Reprise/Duck) 430-249/390-245

Tears For Fears—Songs From The Big Chair (Mercury) 423-848

Seal (Sire/Warner Bros.) 425-827

Squeeze—Play (Reprise) 425-777

The Best Of Stevie Nicks (Modern) 425-694

Robyn Hitchcock & The Egyptians—Perspex Island (A&M) 425-645

Aaron Neville—Warm Your Heart (A&M) 425-611

Wynton Marsalis—Thick In The South, Vol. 1 (Columbia) 425-587

Sting—The Soul Cages (A&M) 424-440

Shabba Ranks—As Raw As Ever (Epic) 424-374

Dawn Upshaw—The Girl With Orange Lips (Elektra/Nonesuch) 424-275

PM Dawn—The Utopian Experience (Gee Street/Island) 430-207

Classic Rock's Greatest Hits

Allman Brothers Band—A Decade of Hits (Polydor) 430-439

Rod Stewart—Sing It Again Rod (Mercury) 423-822

The Moody Blues—Grt. Hits (Polydor) 423-756

Eric Clapton—Time Pieces (Polydor) 423-467

David Bowie—Changes-bowie (Rykodisc) 412-247

Roy Orbison—The All-Time Hits, Vols. 1 & 2 (CSP) 377-945

The Best Of The Doors (Elektra) 357-616/397-612

Divinyls (Virgin) 417-519

The Who—Who's Better, Who's Best (MCA) 376-657

Buddy Holly—From The Original Master Tapes (MCA) 348-110

The Byrds Greatest Hits (Columbia) 342-501

A Decade Of Steely Dan (MCA) 341-073

Elton John Greatest Hits (MCA) 319-541

Creedence Clearwater Revival—Chronicle—20 Grt. Hits (Fantasy) 308-049

The Jimi Hendrix Experience—Smash Hits (Reprise) 291-641

“The Commitments” (Sndtrk) (MCA) 429-753

James Taylor's Grt. Hits (Warner Bros.) 291-302

Best Of The Doobies (Warner Bros.) 291-278

The Steve Miller Band—Grt. Hits 1974-78 (Capitol) 290-171

Eagles—Their Grt. Hits, 1971-75 (Asylum) 287-003

Best Of ZZ Top (Warner Bros.) 279-620

Chicago—IX—Grt. Hits (Columbia) 260-638

Simon & Garfunkel's Grt. Hits (Columbia) 219-477

Bob Dylan's Greatest Hits, Vol. 2 (Columbia) 212-654/392-654

Bell Biv DeVoe—Wbbd-Bootcity (MCA) 429-217

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MORE SELECTIONS

Stevie Ray Vaughan And Double Trouble—The Sky Is Crying. Title cut; *Little Wing*, etc. (Epic) 429•258

Dire Straits—On Every Street (Warner Bros.) 428•359

The Vaughan Brothers—Family Style (Epic/Associated) 411•306

George Michael—Listen Without Prejudice, Vol. 1 (Columbia) 411•181

Brahms: The 3 Violin Sonatas. Pertman/ Barenboim (Sony Classical) 409•367

Larry Carlton—Collection (GRP) 407•825

Jane's Addiction—Ritual De Lo Habitual (Warner Bros.) 407•098

Harry Connick, Jr.—We Are In Love (Columbia) 406•645

Horowitz—The Last Recording (Sony Classical) 405•985

Damn Yankees (Warner Bros.) 405•886

Depeche Mode—Violator (Sire/Reprise) 405•423



The Very Best Of The Righteous Brothers—Unchained Melody (Verve) 423•772

Warrant—Cherry Pie (Columbia) 411•389

Public Enemy—Apocalypse 91. (Def Jam/ Columbia) 428•003

The Platters—Very Best (Mercury) 425•611

The Best Of Atlanta Rhythm Section (Polydor) 427•500

Rod Stewart—Downtown Train/Selections From The Storyteller Anthology (Warner Bros.) 425•322



Eddie Money—Grt. Hits: Sound Of Money (Columbia) 403•428

Scorpions—Crazy World (Mercury) 423•608

James Brown—CD Of JB (Polydor) 425•025

Blind Faith (Polydor) 423•673

The Allman Brothers Band—Brothers & Sisters (Polydor) 423•624

The Very Best Of The Everly Brothers (Warner Bros.) 372•912

"Pretty Woman" (Sndtrk) (EMI) 405•407



Ozzy Osbourne—Nc More Tears. (Epic/Associated) 428•128

DJ Jazzy Jeff & Fresh Prince—Homebase (Jive/RCA) 421•024

Marvin Gaye's Grt. Hits (Motown) 367•565

Joni Mitchell—Court And Spark (Asylum) 367•102

Traffic—John Barleycorn Must Die (Island) 364•935

Yes—Fragile (Atlantic) 351•957

The Rolling Stones—Slicky Fingers (Rolling Stones Rec.) 350•645

Van Morrison—Moondance (Warner Bros.) 349•803

The Doobie Brothers—Minute By Minute (Warner Bros.) 347•526

Motown's 25 #1 Hits From 25 Years (Motown) 319•996/399•998

The Best Of Carly Simon, Vol. 1 (Elektra) 291•856

Linda Ronstadt's Grt. Hits (Asylum) 286•740

Meat Loaf—Bat Out Of Hell (Epic) 279•133

Boston (Epic) 269•209

Bruce Springsteen—Born To Run (Columbia) 257•279

Jim Croce—Photographs & Memories—His Grt. Hits (Saja) 246•868

Billy Joel—Piano Man (Columbia) 239•863

R.E.M.—Out Of Time (Warner Bros.) 417•923

Bryan Adams—Waking Up The Neighbours. Can't Stop This Thing We Started, plus many more. (A&M) 429•779



David Sanborn—Another Hand (Elektra/Musicians) 423•103

The Police—Every Breath You Take—The Singles (A&M) 348•313

Kiri Te Kanawa—Verdi & Puccini (CBS Masterworks) 343•269

The Cars Greatest Hits (Elektra) 339•903

Best Of Elvis Costello & The Attractions (Columbia) 340•596

Bob Marley & The Wailers—Legend (Island) 337•857

U2—The Joshua Tree (Island) 354•449

Pretenders—The Singles (Sire) 362•541

Billy Joel—Grt. Hits, Vols. 1 & 2 (Columbia) 336•396/396•390

Tom Petty & The Heartbreakers—Damn The Torpedoes (MCA) 324•442

R.E.M.—Murmur (I.R.S.) 320•473

ZZ Top—Eliminator (Warner Bros.) 319•624

Foreigner—Records (Atlantic) 318•055

Squeeze—Singles 45's & Under (A&M) 317•974

Dan Fogelberg—Grt. Hits (Full Moon/Epic) 317•149

Wilson Phillips (SBK) 406•793



Harry Connick, Jr.—Blue Light, Red Light. Title cut, *Just Kiss Me*, more. (Capitol) 429•191

M.C. Hammer—Please Hammer Don't Hurt 'em (Capitol) 403•477

Fourplay (Warner Bros.) 428•334



Color Me Badd—C.M.B. I Wanna Sex You Up; I Adore Mi Amore; All 4 Love; Groove My Mind; Roll The Dice, more. (Giant/Reprise) 426•916

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According to Prof. I. Lirpa, his new invention will match a recording studio's climate and its olfactory ambience in the home.

"That thing *must* be the Congressional Model; it is as crooked as the last guy we elected"—referring to the Honorable Jack S. Fogbound, who stands on his record (to prevent its examination).

Hiram built, and Clem K. delivered, several units in the area. Receipt of orders from distant locations caused them to conduct a search for shipping containers, as boxes of proper size were not available locally. It was discovered that the device would fit quite nicely in an empty whiskey barrel. Barrels were readily available, since the local crop yields are quoted in gallons per acre. Hiram knew and was well known by several possible barrel suppliers nearby.

Unfortunately, no frequency response measurements were made by Prof. Lubiwitz during the demonstration. The most reliable report was filed by Miss Gran Detetons of the Music Department. She reported that the playing in the overture to *Phantom of the Opera* was impressive and suffered from no undue coloration or unevenness.

PARTS LIST

CONGRESSIONAL MODEL SUBWOOFER

PLASTICS

- 3-inch 90° Street elbows (U-Brand #03342 PVC); 32 required.
- 3-inch closet flanges (U-Brand #05903 PVC); two required.

DRIVER

- Cork gaskets (bulletin board or gasket cork); five required.
- 4-inch woofer (Radio Shack #40-1022A); one required.
- Binding posts (red/black, Radio Shack #274-661); two required.
- Self-tapping screws (1/2-inch #6); four required.

FLANGE HARDWARE

- Flat head bolts (1/4-20 x 1 1/4 inches); four required.
- Carriage bolts (1/4-20 x 1 inch); four required.
- Nuts (1/4-20); eight required.
- Washers (1/4 inch); 12 required.

Note: For the Councilman, a more modest model, substitute Styrene elbows for PVC, and use Styrene couplings to mate with the closet flanges. (The more rigid Congressional model requires no couplings.)

Desiring to measure and investigate this fine unit in my lab, I quickly placed an order for one Congressional Model Subwoofer. Estimated delivery time was two weeks. Six weeks later, after no delivery, I sent Mr. Diddle a follow-up letter expressing concern.

Today a reply arrived. The letter is on tablet paper, and the writing is an almost unreadable scrawl that doesn't even stay between the lines. Mr. Diddle says:

We have a problem with your order. The Congressional Model has been built and tested. When preparing the shipment, we discovered that the last whiskey barrels were not empty. Our entire staff is working on this problem night and day. If this was better whiskey or if we had more help, your order could have been shipped sooner.

As a devotee of scientific methods and founder of Lirpa Labs, my duty to science is clear: Visit the factory to make measurements. (As you may know, the Lirpa Labs motto is: *Psychoacoustics, Frequently More Psycho Than Acoustics.*) I will be gathering the required test equipment (including a snake and a plunger) while Irene, of Lirpa World Tours, sees to my travel arrangements. (The trip requires several transfers, each to successively smaller airports and more feeble aircraft. The last portion involves a rather long bus ride.) In due course, I will send you a full report of my findings so that all may share in this breakthrough technology

Prof. I. Lirpa
Parts Known and Jnknown

A New Weather Channel

Dear Editor:

As a lifelong concertgoer, I have long been aware of the influence that climatic conditions have on the sound of a concert. To some extent, that influence has been blunted by air-conditioned concert halls. However, the problem of adjusting the climate in the home so that it matches that of the recording studio has long seemed to me to be an insurmountable stumbling block in achieving total realism in sound reproduction.

Now, however, with the development of the Lirpa Climatic Equivalentizer (or

whatever the current name is), that problem barely exists. The real problem is obtaining information about the process and the associated equipment. Since the news was initially leaked, there has been what amounts to a news blackout.

Need'ess to say, I am very anxious for further information. Can't you break this silence and provide us with data? For example, is there any truth to the stories that the system experiences a nervous breakdown whenever it tries to adjust the listening room atmosphere to recordings spliced together from a variety of takes made at widely varying intervals?

Paul A. Alter
Hyattsville, Md.

Editor's Note: Indeed, a veil of secrecy has shrouded Prof. Lirpa's latest project since the initial news leak. But *Audio's* network of cracked news gatherers has dug up some info. We have confirmed the nervous breakdown problem (Lirpa prefers the term "crisis"), but the Professor has wisely directed the unit's nervous energy toward discrete circuits that produce real cigarette smoke and the odor of bourbon—further matching the home environment to that of the recording studio. Despite these improvements, there are some obstacles with which the Climatic Equivalentizer cannot cope. For instance, recordings utilizing drum machines cause the component to shut down, and it automatically mutes during the Yoko Ono songs on John Lennon's *Double Fantasy* album. Such safeguards will no doubt increase its value.

Now it can be told that the main reason for the delay in the unit's release is one of incompatibility. Lirpa discovered, to his considerable chagrin, that proper operation of his new gear required an extra stage not included in most preamplifiers. Instead of the usual processor loop offered on most preamps, the Equivalentizer must be connected to an aptly named Loopy Processor circuit. Finding the cost of retrofitting to be insurmountable, Lirpa had a crisis of his own and went into a self-destructive tailspin, smoking and drinking and listening to mid-fi. We intend to keep you posted, but don't hold your breath.—J.W.

WHAT'S NEW



Audio-Technica Microphone

The AT822 OnePoint X/Y stereo condenser microphone has 170° coverage, a 101-dB dynamic range, and a maximum input rating of 125 dB SPL. Frequency response is rated flat from 30 Hz to 20 kHz. The standard cord terminates in two mini plugs threaded inside a pair of adaptors for phone plugs; a mike cable

terminating in a single, stereo mini plug, compatible with most portable DAT recorders, is available. Battery life is rated at over 1,000 hours of intermittent use with an AA battery. The mike features a windscreens and switchable low-cut filter, and it comes with a shoe-mount adaptor for video cameras. Price: \$499.

For literature, circle No. 102



Krell CD Player

Krell's first drawer-loading, one-piece CD player, the CD-1, uses a one-bit D/A converter and discrete, buffered electronics on a four-layer, glass-epoxy circuit board. The multi-layer board provides separate circuit planes for ground and for

d.c. power, with unusually wide circuit traces for each. Both balanced and unbalanced analog outputs are provided, as are both electrical and optical digital outputs. The optical output is normally a Toslink type, but the AT&T type is available. Price: \$2,850. For literature, circle No. 101



Specialty Sound Component Platform

Rubber shock absorbers at the ends of its four suspension chains let the TTCD II hanging platform isolate critical audio components, such as turntables, from footsteps and other vibration sources. Adjustment knobs can be used to level the platform for proper record tracking. The platform is 21½ inches wide, 10 inches high, and 16 inches deep, and it can be suspended up to 5 feet below most ceilings. Price: \$79.95.

For literature, circle No. 100



MTX Soundcraftsmen Preamplifier

All signal switching in the P100 is handled by C-MOS circuits placed near the input and output jacks for low noise and crosstalk. Circuitry uses discrete components. The sealed, precision-tapered volume control has a full 300° of rotation to make fine

adjustments easier. The tone controls have turnover frequencies of 50 Hz and 10 kHz, minimizing their effect on the midrange. Other facilities include MM phono and three high-level inputs plus a tape loop, and both switched and unswitched a.c. outlets. Price: \$359.95.

For literature, circle No. 103



Audio Alchemy D/A Converter

The Digital Decoding Engine v1.0 uses one-bit, Pulse Density Modulation (PDM) D/A converter

technology. Digital signals from the selectable optical or coaxial inputs are routed both to the decoder and to a buffered coaxial output for parallel feeds to digital recorders and other components. Digital data is

also available via a standard inter-IC sound (I²S) bus connector for use with future digital-domain processors. Frequency response is rated as ±0.2 dB from 20 Hz to 20 kHz, THD + N is -90 dB, S/N is 100 dBA, dynamic range is 93 dB, and linearity is within ±1.5 dB at -100 dB. Price: \$449.

For literature, circle No. 104

LOOK FOR A WEDGE AND A SPLASH,
AND FIND THE HIDDEN PLEASURE
IN REFRESHING SEAGRAM'S GIN.

Got it?
Now head for
the 19th hole.



TAPE GUIDE

HERMAN BURSTEIN

Dolby NR Wobble

Q. I seem to have a problem with the Dolby circuit of my cassette deck. Whenever I make a tape of a mono record with Dolby NR on and listen to playback through 'phones, the sound wobbles slightly from side to side. This happens with both Dolby B and C NR. However, when I make such a recording without NR, the sound does not wobble. I have taken my deck to two repair shops, and both told me there was nothing wrong with it. Would this problem be solved if I upgraded to a better deck? Or is this simply a phenomenon that occurs in all decks?

—Mark Bean, Montgomery, Ala.
A. I can say for sure that the phenomenon you describe does not occur in all decks. Feeding a mono source into my deck and listening through headphones, I could not duplicate the wobble you experience with either Dolby B or C NR. Voices and instruments remained centered. If your problem occurs only with Dolby NR on,

the cause has to be in the Dolby circuit, quite likely due to mistracking.

If your deck works well in all other respects, I suggest that you live with it until another problem comes up. Then evaluate whether to put the cost of repair toward a better deck. In the meantime, if your system has a mono/stereo switch, set the switch to mono mode.

The Squeak from Nowhere

Q. I was recently recording a CD onto tape. Suddenly, out of nowhere, a rather loud squeaking noise came from the cassette deck. At first I thought it might have been the tape itself, but I was wrong. I stopped the tape, re-played it, and heard the same squeaking noise. After waiting a while, I resumed recording. It went fine for about 10 minutes, and then the squeaking resumed. What's wrong?—George Lin, Cincinnati, Ohio

A. If a squeak occurs at the same portion of the tape, the culprit has to be

the tape. If the squeak occurs only with one particular cassette or one brand of cassette, the fault also lies with the tape. The cause might be insufficient lubricant in the tape coating.

Sometimes the cause of squeak is either the material of the cassette's pressure pad or the amount of pressure it applies. Excessive tension of the supply reel and/or take-up reel can also be responsible; as a deck warms up, things like reel tension tend to change somewhat. Or the cassette may not operate properly as it warms up. Hence a deck and cassette may initially operate satisfactorily but may manifest a problem after a while. Try to find brands and/or types of tape that work well. If none does, your deck apparently requires service. **A**

If you have a problem or question on tape recording, write to Mr. Herman Burstein at AUDIO, 1633 Broadway, New York, N.Y. 10019. All letters are answered. Please enclose a stamped, self-addressed envelope.

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we've been making music.

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They also utilize Yamaha's exclusive Multi-layer Microcell Tweeter. A new design that

YAMAHA

Fuzzy LP Sound: Distortion or Dirt?

Regarding your answer to the question about distortion on LPs in the September 1991 issue, I would like to add that I use Last liquid on really bad spots. Many a second-hand LP can be an important addition to your collection if it is washed properly. The stylus itself must be kept free of deposits, too, so it is very important to keep the records as clean as possible.—R. D. Streeter, San Francisco, Cal.

Quartz-Locked Motor Problem

Q. My cassette deck has a quartz-locked motor. When the equipment is first turned on, I have to press "Play" or "Play/Record" several times before the motor starts. The quartz-lock display fades in and out during this process. Once the motor starts, I can listen or record a tape without interruption. What is wrong? Why should the problem disappear after a time?

Another factor I neglected to mention is that, even after the motor is

warmed up and running, the quartz-lock display is dimmer than it is when the drive mechanism is stopped. Fast forward and rewind work fine. I want to fix the problem myself, if possible. Otherwise, if my situation is hopeless, I will throw the machine out.—Paul Dixon, Milwaukee, Wisc.

A. Whether we are talking about a cassette recorder or a phonograph, the problems are the same. There could be many reasons why your motor does not start to turn immediately. Perhaps the motor needs some lubrication, or there may be drag from some other cause. Either problem can keep the motor from turning until a little heat builds up. A motor that is prevented from running will draw excessive current, which could lower the voltage. This reduced voltage could affect the brightness of the display.

It may be that the motor is mechanically okay, but the voltage applied to it is low. After a warm-up, the motor can turn just a bit easier, and so it begins to

run. Once up to speed, the lower voltage will be sufficient to keep it running at proper speed.

Maybe the crystal that controls the oscillator frequency is "lazy." It may take a few presses of the play button to set it oscillating.

Perhaps the IC which includes the oscillator is defective. If it draws too much current, it could produce a low voltage and prevent the motor from running as it should. This also will affect the brightness of the display. When the motor is stopped, the voltage returns to normal, and the display brightens. When it runs, the display dims.

Power-supply problems can also be a factor. These could include anything from a bad regulator or pass transistor to defective resistors. **A**

If you have a problem or question about audio, write to Mr. Joseph Giovanelli at AUDIO Magazine, 1633 Broadway, New York, N.Y. 10019. All letters are answered. Please enclose a stamped, self-addressed envelope.

uses a remarkably light yet rigid microcell diaphragm material. Creating a tweeter that recovers and responds virtually instantly to any audio signal.

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BACKFIELD IN MOTION



Illustration: Teresa Anderko

Before I put down for posterity more of the natural principles that govern binaural recordings made for headphones, I must rise to a most unexpected honor—what else may I call it? One of those "10 best" things that in a hundred other situations I blissfully ignore. The 10 Best Gladioli for 1992? The 10 Best Heifers, Milch Kine, Movies, Soaps, Hockey Players, Goats, the 10 Best Glow-worms at the Annual Firefly Competition? Let 'em pass. But, er, ah, ahem, when it comes to BEING a 10-best, the situation is different.

It seems I have been included amongst those considered for the 10 Best Audio Journalists title, as of the present fleeting moment. And this after 45 years! Better late than never. The list comes from a lively West Coast sheet called, suitably, *L.A. Audio File*, a bulletin for the Los Angeles audio community. It arrived just in time for the Winter CES, a few months back, where I hope it papered tables and floors in all directions. Lovely! I rejoice in fame. Thank you, *Audio File*.

On the other hand, and with all due respect, I find myself a bit uncomfortable in that to my mind there are other top-grade journalistic craftsmen here in our *Audio* stable—my friends, for

instance, Len Feldman and Ivan Berger (I could go on and on . . .) are in my book definitely CRITICS. Critics in the real meaning of that word. I have a benign suspicion that I was considered because I deal in opinions, whereas my colleagues, as usual, deal with the facts. They don't qualify? Could be, and no offense since the thought is common enough. But the fact is (to give you my opinion) that we all here, in our different ways, are forever evaluating as hard as we can, whether about a Mozart performance or a new-model amp. Thanks again, *Audio File*. I accept on behalf of the rest of us.

Binaural recording has appeared in this column in long-wave form, recurring every seven to 10 years, hopefully to capture a new generation of *Audio* readers. No—not just a repeat! As I said in 1982, the boss isn't going to pay me for a repeat run. An update and recap—put it that way. I've uncovered the typed manuscript of the September 1982 binaural summing-up, and I recommend it to all who are intrigued. Notably the gnat that buzzed into my ear, binaurally, whereupon I automatically slapped it and almost broke a finger on the 'phones. The recording of a Florida swamp at night,

discussed in that column, was in turn inspired by an earlier piece, in the December 1974 issue, a wavelength before. So it goes. And so we continue in 1992.

My point last month—that a binaural complement to present-day coincident stereo recording, even as little as an inch or so of separation (Rule 3), could give a quite false reading, as to stereo (loudspeaker) effect through the usual monitor 'phones on many a "location" pickup—needs further elucidation. Once again, via 'phones the difference between mono (no separation of channels) and even as little as an inch of separation (numerous present stereo setups) is astonishing. A real binaural effect, instantly distinguished from mono. All those who use two-channel 'phones for any purpose should take this phenomenon into account. I should add that if you are miking for both loudspeaker and 'phone "stereo"—Walkman-type listening—you have here an interesting new possibility: With coincident separation of the microphone elements, carefully managed, you may find you can optimize your sound both for stereo speakers and for stereo 'phones, and quite differently too. The speakers will not "hear" the very slight phase separations, as is the intent in coincident systems; on the other hand, the 'phones will easily pick up the inch-or-so separation as real binaural sound. Try it. You'll hear what I mean.

To continue, I've discussed the widest and narrowest two-mike spread for binaural—from about 3 feet maximum down to an inch minimum. In later and more versatile experiments, thanks to JVC's headphones with built-in mikes and an easily portable battery recorder, I discovered some startling binaural laws, absolutely inviolable—though newcomers, pro or amateur, are still violating them. All goes to show that you tamper with nature's sonic receptors at your own risk—but if you are creative, maybe to your own advantage. Take Rule 6, which was the very first thing that JVC taught me when I took myself and equipment outdoors and started walking, and it was perhaps the most basic rule of all: *You cannot record motion of the recorder, and/or the person with it. There is never any movement at all on your part, as*

Two Reasons To Trade In Your Speakers Now!



The new Bose Acoustimass-5 Series II speaker system includes Direct/Reflecting cube speaker arrays and a hideaway Acoustimass bass module (not shown).

1 The Bose Acoustimass-5 Series II speaker system. Technology that sets a new standard for purer sound with even smaller size.

The Acoustimass-5 Series II speaker system uses Bose patented Acoustimass speaker technology

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— Julian Hirsch, *Stereo Review*, September 1991

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There are startling binaural laws, absolutely inviolable, so tamper with nature's sonic receptors at your own risk.

you listen to the 'phone playback later on. How many experimenters have yet to understand this!

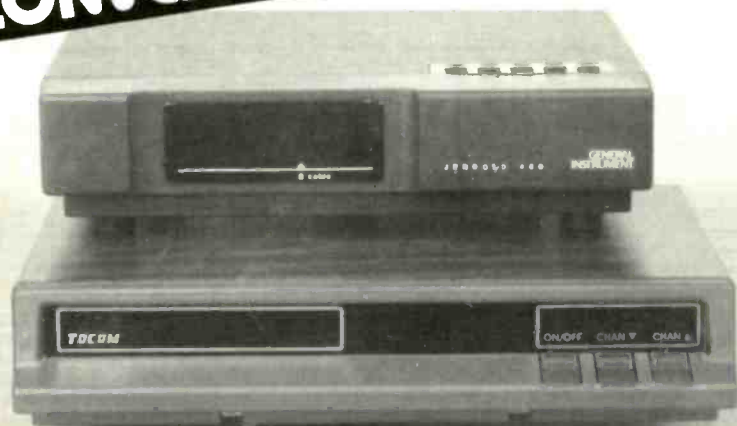
You start walking, say, down a gravel road, your feet going crunch, crunch, quite audibly. In the flesh, in reality, you move along, easily enough. We all do it every day. In the playback, even if perfectly reproduced, you stand stock still and raise your feet, one after the other, pounding the same spot. *No motion!* It's uncanny. The rest of the world moves around or past you; you yourself are rigidly fixed. Not a thing you can do about it.

The rule applies, of course, to other motions—sit down and in playback the chair may move up to meet your bottom, but you are still frozen in place. You may turn your head (with mikes on it) or turn a dummy head—*there is no motion*. Again, the outside world moves around, quite persuasively. It seems very realistic, in playback, until something illogical happens.

I quickly ran into—or rather, heard and recorded—a splendid example of this. A jet plane zoomed overhead on a radio beam that seems to lie directly above my house, northeast to southwest. The planes go straight, as the jet trails often show. A curve, even a slight one, is very rare and, even then, slow and slight, gradual not sudden. At 500+ mph? A sudden curve would be unthinkable. Yet as I walked across my lawn, I absentmindedly turned my head, with mikes, to one side to look at something or other, a minor motion having to do with eyes, not ears. Imagine my astonishment to find that in the headphone playback the very realistic jet plane moved sedately overhead, exactly as it had in reality—until suddenly it made an instant right-angle turn. It was the same story: I had moved, but the recording kept me in place and had moved the sonic environment instead.

If you walk past another person, the playback has you stamping up and down *in situ*, getting nowhere at all, while the other person moves backwards past you. Why? I do not have the expertise to know why. Your ears do not *learn* these contradictions; they are built-in responses gone haywire in a new sonic environment. Never forget that our receptors were perfected a good many million years ago and are

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The limited space in receivers prevents the use of heavy duty, high-current, high-voltage power supplies found in the best separate components. Consequently, the performance of receivers is compromised for their questionable advantage of all-in-one convenience.

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Many of Adcom's components have been favorably compared to other components costing two and three times more. The GTP-400 with GFA-535 is a combination that promises to keep faith with this tradition of offering superb performance at a reasonable cost.

The price of these Adcom separates is close to that of an ordinary receiver. But no receiver will deliver the wide dynamic range and musical satisfaction of an Adcom system.

Ask your Adcom dealer for a demonstration of these affordable separates. You'll never listen to a common receiver again.

*Power output, watts/channel, continuous both channels driven into 8 ohms, 20 Hz - 20 kHz <0.09% THD.

ADCOM[®]
details you can hear

Many experimenters have yet to understand that you cannot record motion of the recorder and/or the person with it.

not easily changed—we have to use imagination, as when looking at a black-and-white photograph, reading meaning into a partial signal, one dimension entirely absent, all colors absent. Don't think there is any sort of recording, visual or aural, that isn't subject to such curious responses! Stereo too.


I did ponder a lot on Rule 6, the rule of non-movement. Could it be the lack of eye coordination? Normally we tie in the sights and the sounds for a common orientation; this allows us to perceive not only our own motions but the objective motions of everything around us. We correct for jet planes overhead,

so that they do not make right-angle turns. And the same for all else. (But what of blind people, especially those who have been sightless from birth and thus have no intelligent response to help them cope?)

Yet, as some may remember, I did get a start on this mystery. I deliberately made a binaural recording in which I "talked" my way, via the mikes on my head, straight across my lawn, noting a bulldozer working loudly at some distance, maybe a quarter-mile away, in a specific direction. It was approximately southwest, at an angle off to my right, as I noted on the tape. Then I deliberately made a right-angle turn (and said so), putting the bulldozer suddenly off to the very far right of my walking track. In the flesh, of course, it was just a bulldozer, still in the same spot, as I turned the corner, down there to the southwest (I live on a hill).

The next day I played that tape into my 'phones as I walked the exact same route, coached by the recorded voice. In the flesh, there was no bulldozer—it had departed. All else was the same. Lo! When I turned the same corner, as the tape played, *seeing the same scene*, there was the bulldozer—and it *stayed put* as I turned. Bulldozers don't jump right angles either, and this one didn't in playback. Does that begin to answer the riddle presented by Rule 6?

There were no camcorders in those days. Maybe somebody with a good one, and two channels of sound, two microphone "ears" to match the visible picture, could devise some further experiments to see if you bring not only the sound (binaural) to your playback 'phones but also a good representation of the simultaneous *visuals*, Rule 6 can be overcome.

P.S. Around 1954 I applied for a patent on this idea, that binaural 'phone sound would "project" forward onto a movie screen if you put mikes on your camera. The patent people just laughed and cited preposterous precedents in the 1880s having nothing to do with the case (except legally) to prove me wrong. No patent. But I *did* hear the sound out front, coming from those people who talked on the screen. Wishful thinking? It probably was. But that's what makes the world go 'round, right? 

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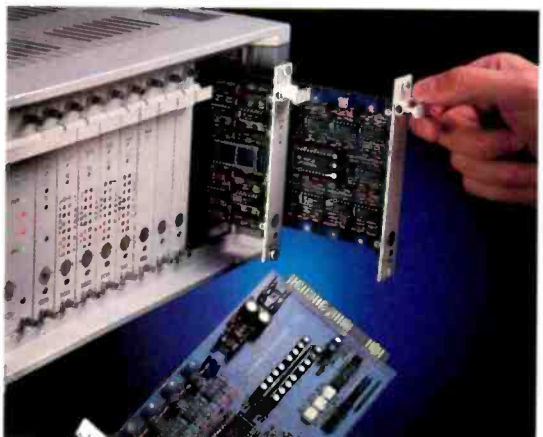


No Boundaries.

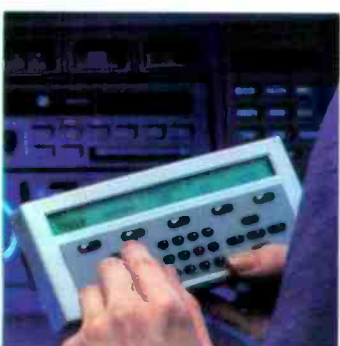
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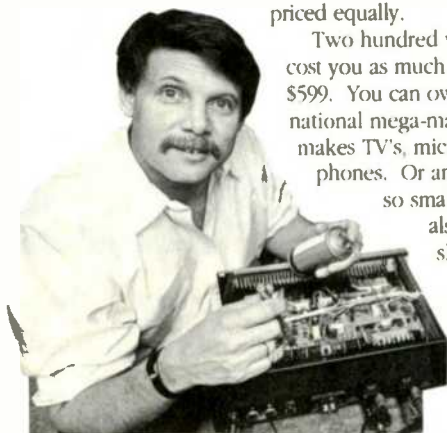
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HOW MUCH SHOULD A GOOD AMPLIFIER COST?

Reflections on the esoteric myths and economic realities of power amplifier design, by Bob Carver.

Thumb through *Audio's* Annual Equipment Directory and you'll see vivid proof that all power amplifiers are neither created equal nor priced equally.



Two hundred watts per channel can cost you as much as \$8,400 or as little as \$599. You can own an amp from a multinational mega-manufacturer who also makes TV's, microwaves and cellular phones. Or an amp from a company so small that the designer is also the assembler and shipping clerk.

Can it be that amplifiers are sonically equal? Some seem to have muscular power reserves far beyond their FTC-rated output. Others sound great until they're challenged by a dynamic passage and then sound like a Buick hitting a row of garbage cans. Some are (to indulge in audiophile jargon) so "fluid" that you practically need a drop cloth under them. Others seem to sound harsh, "metallic" and brittle at any output level.

A casual comparison of perceived sound quality versus price tags may lead to an erroneous conclusion: that an amplifier must be *expensive* to sound good.

The truth is a bit more complicated: Cosmetic glitz aside, an amplifier's cost is primarily determined by its power supply.¹ In other words, within reason, you generally do get what you pay for when you buy a conventional amp design. But the key word here is "conventional."

My decidedly *un*-conventional Magnetic Field Power Supply is capable of outperforming conventional power supplies of the same size. Result: A significantly better power amplifier value for you.

Let me explain.

NO MAGIC. JUST FOUR CRITICAL QUANTITATIVE FACTORS.

When I fervently state that "*the sound of an amplifier need not be related to its price.*" you might think we're veering off into the land of

Snake Oil and Gimmicks. Quite the contrary.

I and other members of the scientific audio community know that just four factors determine the sonic characteristics of an amplifier:

1. *Current output*
2. *Voltage output*
3. *Power output*
4. *Transfer function* as evidenced by the interrelationship of frequency response and output impedance.

These factors transcend the usual trivial debates over tubes vs. solid state, MOS-FETs vs. bi-polar, Class A vs. AB, silver Leitz wiring vs. copper, gold-plated front panels, WonderCaps and my favorite: hand-ground-open transistors filled with a proprietary crystalline substance that stops ringing (honest, I'm not kidding!). An amp can have any combination of these entertaining variables (plus special bricks stacked on top) and yes, sound wonderful...provided it ALSO has high current, voltage and power output and the correct output impedance.

Thus the Four Factors explain why expensive amplifiers generally sound better than cheap amplifiers. But also why that doesn't necessarily have to be the case.

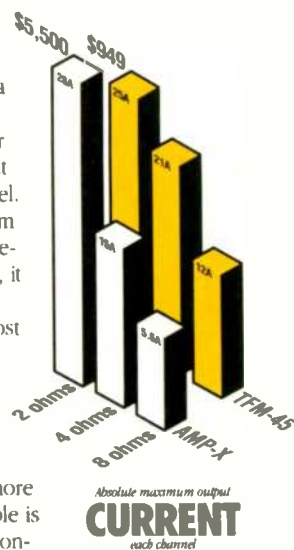
FACTORS 1-3: THE POWER SUPPLY BEHIND THE SOUND

An amplifier's power supply produces current and voltage. A preponderance of one without the other is meaningless.² To maximize SIMULTANEOUS current and voltage output using traditional design approaches costs serious

money. For example, we recently tested a competitor's \$2,000 amplifier that was rated at 20 watts/channel. Believe me, from a parts and materials standpoint, it was worth \$2,000, with most of that money being spent on an amazingly rugged power supply. Another more extreme example is my own ultra-conventional Silver

Seven Tube amplifier design. Its "money-is-no-object" power supply helps set the price of a pair of S-7's at around \$20,000.00.

Now, since it is universally agreed among amplifier designers that current/voltage/power output directly affects the sound of an amplifier,



Absolute maximum output
CURRENT
each channel

and since good traditional power supplies are costly, price and sonic quality ARE often closely related.

But what if there was a way around the economic constraints of conventional, inefficient power supplies? What if there was a power supply that could

deliver awesome simultaneous current and voltage into real-world speaker impedances without shocking your pocketbook?

That's just what my patented Magnetic Field Power Supply does. Without gimmicks, mysticism or loss of bass response. Simply put, a Magnetic Field Power Supply uses progressively more of each line voltage swing as amplifier power demand increases. It's just plain more efficient. How and why this works is explained in our new White Paper called "The Magnetic Field Story Parts I, II & III" which you can get free by calling 1-800-443-CAVR.

Right now, let's consider the tangible benefits. The series of comparison charts in this ad shows how my Magnetic Field Power Supply successfully challenges the previously hard-and-fast rule that high-performance power supplies must be expensive.

Amp X is a highly-respected solid state design rated at 200 watts into 8 ohms. It cost \$5,500. My TFM-45 is rated at **375 watts per channel both channels driven into 8 ohms 20-20KHz with less than 0.1% THD.** It has a suggested retail of \$949.

Even more impressive is this same sort of comparison chart with the TFM-45 vs. other amplifiers in its own price range. In deference to how utterly

we trounce similarly-priced, conventional competition, we've confined those charts to our new White Paper.

To summarize: Magnetic Field Power Supply technology allows reasonably-priced power amplifier designs to deliver simultaneous



TFM-45; 375 watts RMS/ch. into 8Ω 20-20kHz with no more than 0.5% THD (\$949 sugg. retail.) and TFM-15; 100 watts RMS/ch. into 8Ω 20-20kHz with no more than 0.1% THD (\$399 suggested retail).

current and voltage levels previously only found in extremely expensive "esoteric" designs. Or to look at it another way, in a given price range (say \$900-\$1,000), Carver simply gives you far more for your money.

FACTOR 4: TRANSFER FUNCTION

Consider two hypothetical amplifiers with identical power supplies. Same power rating; same gain, etc. Yet they still sound different when powering identical speakers through identical cables.

Why? A fourth quantifiable factor is at work. One that, unlike power supply output, is totally independent of economic constraints.

I've left Factor 4 (transfer function/frequency response/damping) until last intentionally. Because until an amplifier can deliver sufficient power with simultaneous current and voltage (Factors 1-3), transfer function is immaterial.

Frankly, I'm guilty of not making this fully clear in the past. Some readers may have gotten the impression that by magically adjusting some arcane parameter called transfer function, one could somehow cause a cheap amp to sound like an expensive one. Nothing could be further from the truth. If there's no guts (power supply), there's no glory (optimized transfer function).

By transfer function, I mean the effect an amplifier's output impedance has on real world frequency response. I don't mean the flat, "DC to light" Rated Full Power Bandwidth found in column H of *Audio's* Equipment Directory, which is measured using a resistor as a load. Rather, I'm referring to the frequency response curve that occurs when an amplifier and speaker cables interact with a specific speaker.

As distinctive as a fingerprint, this curve determines the "sound" of each amplifier design. Its warmth or harshness. The quality of the bass. The definition of its upper registers. Even the configuration of the stereo "sound stage" it can create.

My engineering department and I are capable of making one amplifier design sound like

another amplifier design to within 99 parts out of 100 (a null of 40dB). For example, we've used Transfer Function Calibration to closely emulate the sonic characteristics of my reference Silver Seven in our TFM-45 and TFM-42 solid state designs. In other cases we've used the process to simply adjust the sound of an amplifier to have pleasant but unique sonic characteristics: in general, a warm "tube" sound with rich, rolling bass and soft yet detailed treble (such as our TFM-22/25, S-7t and TFM-15). Either way, we use painstaking measurement and adjustment processes to finetune output impedance, frequency response. Not magic.

And, needless to say, we start with highly capable power amplifier designs before the Transfer Function Modification process.

ARE YOU INTRIGUED...OR THREATENED?

My Transfer Function Calibrated power amplifiers have suggested retail prices of from \$399 to \$1,000. That I even dare to suggest they can sound as good as designs in the \$2,000 to \$6,000 price range has not endeared me with some audiophiles or underground magazine writers.

That's a real shame, because I have absolutely nothing but respect for well-made, high-ticket conventional amplifiers. Like Rolexes and Lamborghinis, they are a joy to own if you can afford them. But just as a Rolex doesn't tell time any better than the inexpensive watch I'm wearing right now, good sound does not necessarily have to be costly.

If this concept intrigues you, please visit a Carver dealer soon. Bring demo material you're familiar with and be willing to do some critical listening. Compare my designs to competition costing about the same amount as well as to more expensive models.

Your ears alone should be the final arbiter. I feel confident that you will join the tens of thousands of audiophiles who have gotten the best possible value by owning Carver.

Bob Carver

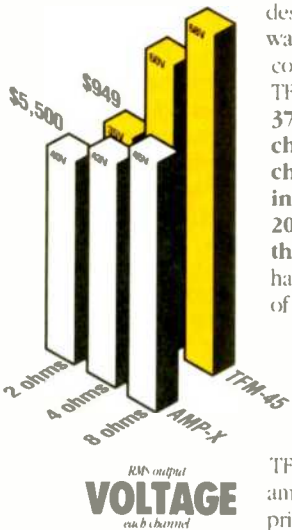
Bob Carver, President



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¹ My definition of cosmetic glitz is any part of an amplifier whose sole audio contribution is to cause one's friends to go, "Ooooo!!" when they see one's new purchase. My own Silver Seven amplifier's hand-rubbed piano lacquer and solid granite surfaces meet this definition.

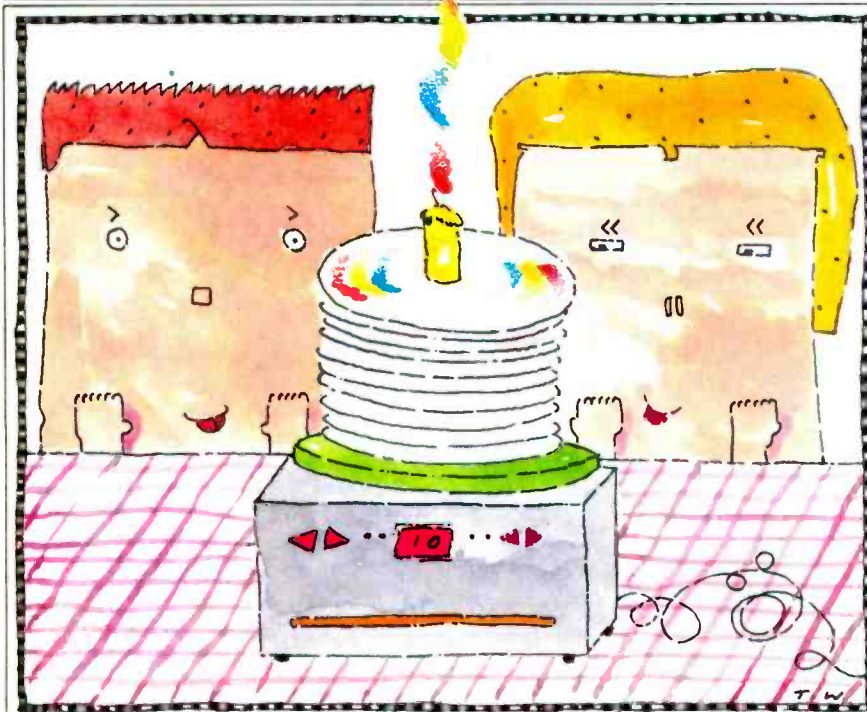
² Since power (watts) equals voltage times current, the same wattage can represent significantly different combinations of voltage and current — and thus very different performance into the same load.



BEHIND THE SCENES

BERT WHYTE

10 YEARS AFTER



This year marks the 10th anniversary of the introduction of the digital Compact Disc, although the players and discs did not appear in the United States until 1983. Banners on the covers of the July, August, and September 1983 issues of *Audio* heralded the first reviews of Compact Discs. Colleague John Eargle and I reviewed the first CD releases from London, Philips, Deutsche Grammophon, Telarc, CBS, Denon, and Delos. Eargle used an NEC CD-803 player, and I used a Sony CDP-101. These were quite straightforward, very basic players, typical of the units being sold at that time. The discs themselves were a mixed bag—some were from digital masters, others were analog-to-digital transfers.

We lauded some discs, while others elicited quite negative responses. With this new format, our principal concern was the sonic quality of the CD. It must be noted that John Eargle and I had been making digital recordings since 1977, so we were very familiar with the particular parameters of digital sound, the wide frequency response and, especially, the wide dynamic range and high S/N of the digital tape masters. We were anxious to find out if CDs preserved these parameters.

In auditioning those initial CDs, we were aware that our first-generation players had 90-dB "brick-wall" filters that could be excited into producing some nasty sonic artifacts. We had to carefully differentiate between those anomalies and the thin, shrill, overly bright string sound that was more a result of utilizing inappropriate mikes, placing the mikes too close to the instruments, and feeding them through mixing consoles with noisy analog circuitry. In addition, we made particular note of internal balances in the orchestra as well as its placement in the recording venue. The common practice of multi-miking could greatly compress the acoustic perspective.

Of course, the early CD slogan of "Perfect Sound, Forever" was seized upon by the vinyl-brigade digiphobes, who gleefully ascribed any shrillness or other sonic anomaly to an inherent defect of digital audio. They made profound statements that digital technology was thrust on the market prematurely and that it needed much higher sampling rates and more bits to avoid "clinical sterility" and "truncated ambience and reverberant decay."

Even today, the digiphobes still insist that digital sound is "cold," that it "lacks warmth and body" because re-

verberant "tails" of music "disappear" prematurely. Dither signals to address any such problem had been added to the inputs of digital recorders as far back as 1982 (and probably before that time). In any case, as Eargle recently pointed out in the January issue, there is inherent self-noise in microphones and recording consoles that is, in essence, "unintentional" dither. Thus, even on the earliest CDs, the normal reverberation period of the recording hall was preserved.

Of those first CDs, I was impressed with a digitally mastered release from Telarc that featured Stravinsky's *The Firebird*, with Robert Shaw conducting the Atlanta Symphony Orchestra and Chorus (CD-80039). As I noted in my review in the July 1983 issue:

Telarc's bass drum is heard with great impact. The other end of this dynamic range can be equally thrilling. There is a string diminuendo, just before the French horn entrance signalling the beginning of the finale, which reaches its pianissimo level against a background of total silence. Jack Renner's simple but effective microphone placement gives us a ravishing string tone without a trace of edginess—it can be done!

I was less than thrilled by the Shostakovich *Symphony No. 5 in D Minor* with Leonard Bernstein conducting the New York Philharmonic (CBS CD-35854). This recording had been mastered on a 32-track digital recorder from 3M. In my review, I remarked, "The overall sound lacks cohesion and at times is jumbled and amorphous . . . it is ultimately the strident high strings which mar this recording."

John Eargle liked Dvořák's *Symphony No. 9* with Vaclav Neumann conducting the Czech Philharmonic Orchestra on Denon/Supraphon (C37-7002). This too was digitally mastered. Eargle stated, ". . . the sound is gorgeous. Listen for the natural buzz in the muted strings in the largo second movement. Nothing could be more accurate." But he wasn't too happy with the digitally mastered disc of Beethoven's *Symphony No. 5* and Schubert's *Symphony No. 8* with Lorin Maazel conducting the Vienna Philharmonic Orchestra (CBS/Sony CD-36711). As Eargle observed, "The balance be-

Illustration: Thomas Waters

T H E V E R D I C T I S I N

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Two relatively new trends have created a universal need for sub-woofers—

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Why This Ad Is Making The Other Loudspeaker Company Nervous.

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Audio Hall of Fame member, Henry Kloss

All Cambridge SoundWorks products are designed by our co-founder and chairman, Henry Kloss, who created the dominant speakers of the '50s (AR), '60s (KLH) and '70s (Advent). Our high performance, high-value speakers and systems are all manufactured in our factory in Newton, Massachusetts.

Ensemble II performance for half the Bose price.

Ensemble® II is the latest version of the subwoofer-satellite speakers *Audio* magazine said "may be the best value in the world." Unlike the Bose® system, it uses two-way satellite speakers and acoustic suspension subwoofers (with 35% more cone area). It can sound identical to our original Ensemble system.

Audio experts on call 365 days a year.

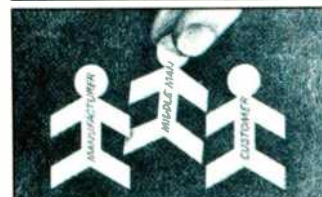
Our helpful, knowledgeable audio experts (not clerks) are on duty for *advice*, hook-up information or orders, 8AM-midnight, *every* day, including holidays. They don't know the meaning of the phrase "hard sell." A customer wrote "The quality of your product is matched by your attitude towards your customers."

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Our full-color catalog is loaded with systems and components from top name brands, including our own. Our systems deliver a lot of performance for the money, especially our Dolby Surround systems, which we feel are the best values in the country. For your free catalog, call 1-800-AKA-HIFI, 24 hours a day.



Playing very early CDs on modern equipment showed me how both players and discs have improved in a decade.

tween direct and reverberant sound is not quite real, and the Beethoven in particular sounds edgy in tutti passages. . . . Overall, the recording is adequate for what it is, but the launching of CD deserves better."

In the August 1983 issue, I commented most favorably on Glenn Gould's performance of Bach's *Goldberg Variations* (CBS/Sony 38DC 35). I pointed out how fitting it was that Gould had been able to make a new digital recording of this work before his death in September 1982. The recording was thrilling music-making, and I stated, ". . . here at last is a piano recording without any compression of dynamics. If you want to play this at



realistic 'in the room' levels, be careful! Gould plays some huge triple-fortissimo chords of crushing sonority."

In general, Eargle and I found that the first CDs were quite pleasing—in spite of a few that had overly bright, high strings. For the most part, it was very rewarding to listen to music with full dynamic expression and lovely pianissimo sections unsullied by noise.

As you might expect, record companies are duly noting the 10th anniversary of CD with several promotions and special recordings. As I was writing this, Federal Express delivered a set of 10th Anniversary Limited Edition Commemorative Discs from Sony Music Entertainment. Included was Billy Joel's *52nd Street*, which was transferred from a 1978 analog multi-track master. It was the very first CD released by Sony Music in Japan, in October 1982. Bruce Springsteen's *Born To Run*, which was transferred from a 1975 analog multi-track master, was also included, and the Glenn Gould *Goldberg Variations* completed the set. All these CDs were digitally remastered using Sony's new 20-bit technology.

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A major problem in the earliest days of CD was the scarcity of product. With only one CD plant in Japan and another in Hanover, Germany, supply could not keep up with the demand for discs, which exceeded even the most wildly optimistic projections. Imagine, many major artists had initial pressings of just a few thousand discs for worldwide distribution!

Now there are more than 80 CD plants around the world—in such unlikely places as a suburb of Prague and near Moscow. Most of these plants use equipment from Philips, and all follow the protocols of the Sony/Philips "red book"—the "bible" for CD manufacturing. Supposedly, this ensures that CDs pressed all around the world will be of the same quality. Manufacturing costs vary, however. A CD with booklet and jewel case runs about \$1.30 to \$1.50 in the U.S.; with cheaper labor in some foreign plants, the cost can be significantly less.

You may have heard stories purporting that CDs will not last forever. Some CDs have straight-cut edges, but most are sealed. If you're foolish enough to coat CDs with Armor-All, or a similar product, for some imagined sonic improvement, the highly volatile substance may contribute to deterioration on CDs without sealed edges. There



was a case where an ink used on the CD label was wrongly formulated and supposedly caused damage. Well, friends, I kept CDs from the original 1983 release in the U.S. and now have thousands of discs in my collection. I have never encountered any deterioration and would be hard put to come up with a dozen CDs that mistrack!

An obvious question arises: How do the early discs sound now, on modern CD players? After all, those early players were only 14- or 16-bit designs, with low oversampling rates, if any. They also lacked the mechanical refinements and more precise servo tracking and sophisticated laser pickups that are common today. I was curious to determine if those "problem" CDs with strident strings and other sonic anomalies would sound any better on a modern player. Of course, I had to keep in mind that certain variables regarding ancillary preamplifiers, amplifiers, loudspeakers, and the listening environment entered into the equation. Whenever possible, I played the early CD of a given work versus a later CD of the same piece of music, preferably recorded by the same label. My reasoning here was that perhaps there are some record companies that persist in using techniques which consistently tend to make strings sound overly bright.

I played the original CD "offenders" through a Wadia 2000 D/A converter with time-domain processing and, as an example of a modern unit using one-bit technology, a Sony CDP-X77ES CD player. Two early recordings that had dismal sound—the previously mentioned Shostakovich Fifth Symphony and Leonard Bernstein leading the Israel Philharmonic in Prokofiev's *Symphony No. 5* (CBS CD-35877)—were a severe test. I did hear some smoothing, and the strings no longer sounded as overly bright, grainy, or shrill when played through the Wadia (because there was no brick-wall filter in the signal path); the Sony's built-in converter improved things to a lesser degree. However, the modern circuitry of these units could not overcome the poor choice of microphones, close-up mike placement, and multi-miking excesses that were the principal culprits of the strident strings. New CD recordings of the same music did not exhibit the offending amusical, wiry string sound.

On this 10th anniversary, the modern discs and playback equipment have reached a level of sonic refinement that should make it very difficult for any new digital format to surpass or supplant CD as the medium of choice for music playback.



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RECEDING RECESSION

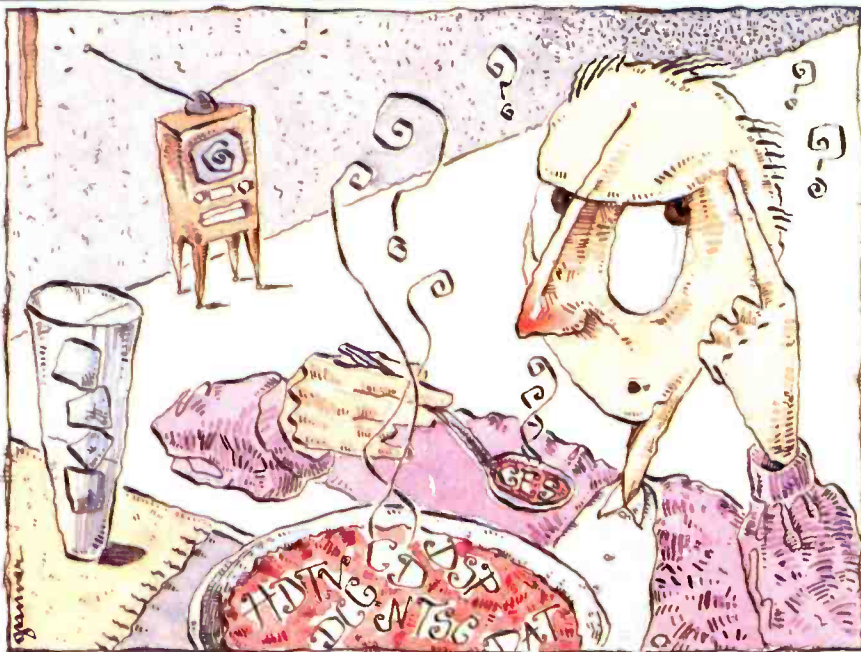
With the country in deep recession, it is paradoxical that the mood and tempo of the Winter Consumer Electronics Show were as upbeat as they were. Attendance was excellent, and the newly refurbished Las Vegas Convention Center was a welcome sight for all. I heard few people complain of business blues, and a number of new products were poised, albeit a bit cautiously, to make their big moves in 1992.

The chief new product is the Digital Compact Cassette, or DCC, which is targeted for both hardware and software introduction later this year. The release is contingent upon final Congressional action on a bill to set up a system of royalty payments to music copyright-holders based on unit sales of digital tape and recorders.

Because the encoding method used in DCC has been kept under wraps until recently, there has been considerable speculation on all aspects of data reduction as applied to music. Details of the Philips Precision Adaptive Sub-band Coding (PASC) have recently been made known, and a number of DCC recorders are now in the field, allowing listening tests to be made. (Editor's Note: See David L. Clark's feature article on the subject in this issue.)

I had the pleasure of participating in non-rigorous listening tests in BASF's demonstration room at CES. BASF is a major supplier of blank tape for pre-recorded cassettes, and their interest in DCC is a natural consequence of the fact that DCC can be phased into tape duplicators' normal production channels at a very competitive speed ratio of 64 to 1. In BASF's setup, a CD had been directly (digitally) copied onto a DCC tape. For the test, the CD and DCC tape were roughly synchronized, with careful attention given to level matching, and could be directly compared through switching. At all times you knew which was playing; the intent was simply to determine if there were any significant differences between the two.

Auditioning was made through the very high-resolution Sennheiser Orpheus headphone system, and I must state that I could not hear any differences between CD and DCC on a variety of music, including organ, orches-



tra, and piano. This certainly does not mean that there are no differences, only that they were not audible in normal listening. The various Dolby analog noise-reduction systems can all be "fooled" by certain signals, but for the most part the process is benign and beneficial. The same may logically apply to DCC.

Many record labels have joined the DCC movement and stand ready to issue their catalogs in the new medium. The hardware alliance extends virtually across the board, and only Sony seems to be missing from the list. Sony has its own rival system, the Mini Disc, a recordable CD-type disc that itself makes use of data reduction. At least one company, Denon, intends to support both DCC and the Mini Disc. Presently, it looks as though the momentum of DCC, and its general endorsement by the recording industry, places it in a clear position of leadership.

Video truly dominates the scene at CES. Most of the pertinent displays were on the main floor of the Convention Center, with specialty displays in the Mirage Hotel. High-definition TV (HDTV) appears no closer to becoming a commercial reality than it did two or three years ago, and the costs involved clearly suggest that it might never be more than a specialized medium for industrial and technical dis-

plays. The greatest benefit of HDTV is its seamless picture, free of the raster lines which afflict normal TV. Today, the average home TV viewer watches the set at an included angle of perhaps no more than 10° to 15°. At that angle, the 525 horizontal lines on the screen may not be noticeable as such, but at wider viewing angles these raster lines become a nuisance. The technique of line doubling has helped to bridge the gap between normal TV and HDTV. A major innovator in this field is Yves C. Faroudja, whose Super NTSC system has offered a workable interim system between conventional TV and some ultimate form of HDTV.

In its simplest form, line doubling merely interpolates an extra line between adjacent transmitted horizontal TV lines, effectively producing a field of more than 1,000 lines. When the TV scene is fairly stationary, this works very well. But when the scene is full of motion, other techniques must be invoked to handle the "jerkiness" which simple interpolation produces. Faroudja is clearly the leader in this field, but their line doubler, at nearly \$15,000, is beyond the reach of most consumers. Line doubling is a video relative of audio data reduction used in DCC and MD, and I suspect that we will see intensive product development in this area during the next 18 months.

Illustration: Courtney Granmer



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“Ice massacres the smooth, mellow taste,” says our Sandy Milne somewhat testily. “So, no ice. All you want is a drop or two of water to bring out the ‘nose,’ or aroma. Spring water, if you’ve got it. Cool, not cold. And use a fine crystal glass, gently warmed in a cupped hand to release the full bouquet.

“Save the ice cubes and big splashes of water for other Scotch,” advises Sandy, “where it hardly matters a hoot.”



—What is a single malt Scotch?—

A single malt is Scotch the way it was originally: one single whisky, from one single distillery. Not, like most Scotch today, a blend of many whiskies. The Glenlivet single malt Scotch whisky should therefore be compared to a château-bottled wine. Blended Scotch is more like a mixture of wines from different vineyards.

**The Glenlivet.
The Father of All Scotch.**

Something needs to be done at CES to provide a better forum for high-end audio, a small but important part of consumer electronics.

It would not surprise me to see an effective line doubler for \$2,500 in the next year or so.


Another relatively new area at CES is environmental audio/video. This includes piping sound around the house, often integrating it with intercoms and security systems, and gen-

erally includes hiding loudspeakers in walls. While it may be a boon to wives and interior designers, it has traditionally been considered low-fi. But things are changing for the better. Wall loudspeakers, subtly hidden by their grilles, now provide wideband response, and subwoofers can now be

located in walls as well. Major suppliers of electrical contracting gear are now routinely supplying switching and routing equipment for multi-room systems. In advanced applications, computer systems can be used for overall control.

As we have seen in the last five years, car stereo is where most consumers spend the bulk of their audio-only budget. The dominant factors in car stereo are, increasingly, the integrity of center-channel imaging, extended bandwidth, and low distortion. And no stereo system is considered first-rate today unless it has a CD player (or changer in the rear trunk). The major manufacturers displayed "competition cars," which demonstrate the full range of what they offer, both in loudspeakers and signal processing.

Two years ago, digital signal processing (DSP) represented an opportunity for car stereo to expand from its traditional confined listening environment to something larger, via reverberation synthesis. As normally implemented, DSP provides a wide variety of reverberation or ambience programs that operate on the stereo program. The ambience information is spread about the car's normal four loudspeaker channels, while the primary stereo information stays in front. The intent is to provide a more natural listening environment, which can be done if a subtle hand is on the controls. Unfortunately, this is rarely the case, and as things have developed DSP has so far not lived up to its initial promise. The manufacturers are responsible as well, since they have made it all too easy to dial in overdone effects.

As for high-end audio at CES, most manufacturers were again ensconced in the tacky old Sahara bi-level complex. The hotel has few really good demonstration rooms, and air handling and ambient noise are real problems. There was also little new to observe, but this is not surprising considering the relative maturity of loudspeaker and amplifier technology, which are the mainstays of the high end. Something needs to be done to provide a more effective forum for this small but important segment of consumer electronics. It is also the most "American" segment of the show, which should count for something. 

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C

ar audio manufacturers are especially interested in Philips' new Digital Compact Cassette format because it promises digital sound quality and compatibility with existing cassette libraries. However, DCC's digital format is not the same as CD's or DAT's. There simply is not enough room to record all of the bits necessary for 44.1-kHz sampling, 16-bit quantization, and error correction. But does DCC's data reduction result in sound inferior to CD? To find out, Delco Electronics conducted a series of tests last November in their listening room in Kokomo, Indiana. I was fortunate to be a part of this testing.

Philips' scheme of reducing data, hopefully without reducing sound quality, is called Precision Adaptive Subband Coding (PASC). It starts with a technically superior 18-bit format but attempts to encode only the audible sounds to achieve a 4-to-1 data reduction. (*Editor's Note:* For more details, see the feature article by David Randa in the September 1991 issue.) So what about the supposedly inaudible sounds that are not encoded? They are mainly soft, high-frequency sounds that are not heard because they are masked by simultaneous louder sounds, often lower in frequency. PASC encoding is a dynamic process; it continuously scans the audio spectrum and assigns its "bit pool" to encode the least-masked sounds.

Gerry Wirtz, senior product manager of the DCC project for Philips, took to Kokomo a test box containing a prototype PASC encode/decode system, a digital delay line matched to the PASC system's encode/decode time, and a switcher to select between the outputs of the PASC and delay signal paths. This switcher is operable by computer for double-blind listening tests. Wirtz was accompanied by Wil Wagenaars, Philips' psychoacoustics testing expert. Michael Williams, of Delco, organized the testing sessions and recruited listeners from Delco engineering and sales employees. Most of these listeners were trained and practiced in Delco's ongoing program of assessing competitive sound systems.

Philips, having previously performed a great many listening tests of the PASC system, suggested their usual testing technique and source materi-

als. Mike Williams instead opted to use different music segments and the double-blind A/B/X test method, so Wil Wagenaars quickly modified the computer software to use A/B/X testing. In

David L. Clark

this method, the listener is given a switcher that has three buttons: "A" for the first component (in this case, straight through, a direct feed from the source), "B" for the other component (in this case, the source after PASC encoding and decoding), and "X," the unknown, which can be either A or B. The listener's task is to switch between components and then to identify X as A or B. Neither the listener nor the person conducting the test knows the correct answer, which is why the procedure is called "double-blind." There is no time

limit or other restriction during the testing. It is thought to be the most sensitive means possible of determining if there is an audible difference between A and B. Since A was a straight-through connection in this test, any difference that was heard had to mean that B, PASC encoding/decoding, changed the sound—and such change is not desirable.

The Delco listening room is 16 × 25 feet, with an 8-foot ceiling and controlled acoustics. It has comfortable seats and dimmable lighting. The program sources, a Marantz CD-62 CD player and a Philips prototype DCC recorder, fed digital signals into the Philips test box. The output from the box's PASC/delay switcher was fed to a Krell Stealth 1-bit D/A converter with 18-bit resolution. (This ensured that the same converter, one capable of resolving the full 18 bits of DCC, was used for both the straight-through and the PASC encode/decode paths.) The converter's analog output was then fed through a Threshold FET Ten hi





preamp and SA/3 power amp to the speakers, Shahinian Diapasons and Double Eagle subwoofers.

Music segments included: "Allegretto" (from Mozart's Piano Quartet No. 1, with Bruno Giuranna), "Sanctus" (from Fauré's Requiem, with Robert Shaw and the Atlanta Symphony Orchestra and Chorus), "Magnificat" (from William Byrd's The Great Service, with the Tallis Scholars), "Dimples" (from Joe Williams' *I Just Want to Sing*), "Salamander Pie" (by Jay Leonhart on *A Taste of dmp*), and "Tiden Bara Går" (R. Rønning/Opus 3, Test Record 1, *Depth of Image*). These selections are from the standard battery of 52 segments Delco uses to rate their own and competitors' car sound systems. About three-quarters of the listeners were trained evaluators familiar with the selections. A few listeners opted to use their own favorite material.

Mike Williams ran the tests for one listener at a time, requesting that each listener make 16 attempts (or trials) to identify X. He noted that inexperienced

listeners showed anxiety about the test, while those who had participated in A/B/X tests before were alert and relaxed. By the time that the results of some 300 trials were accumulated, it became apparent that statistically the listeners were doing no better than chance even though many of them thought they heard a difference. Of course, there was a difference between the straight-through and the encode/decode channels; it's just that the difference was so small that it was

*Illustration:
Stephen Johnson*

not heard. It is not unusual for listeners to think they hear a difference even when two sounds cannot be distinguished on a statistical basis.

At this point, a different approach was tried. I planned to use a variety of

test signals and signal-analysis methods to find PASC's Achilles' heel. Assuming that I could find a troublesome test signal, I planned to search for music segments with characteristics resembling the test signal, then present those segments to the listening panel. Possibly, these segments would be audibly degraded by the PASC encode/decode process. I was not interested in the sound of the test signals, nor did the panel hear them; they were only a means of selecting difficult music passages to audition.

I knew something about PASC from papers written by Gerry Wirtz for the Audio Engineering Society. I knew, too, that PASC analyzes the data in blocks of 8 mS and divides the spectrum into sub-bands that are 750 Hz wide. I also knew that the PASC encoding bit pool is priority-assigned to the channel and the frequencies which are most audible. My strategy was to load the right channel with a difficult encoding task, thereby draining the bit pool, and then concentrate on testing the left channel.

I used the A/D converter of Philips' prototype DCC recorder to convert analog test signals for the digital input of the PASC encoder. First, I fed a 1-kHz sine wave into just the left channel of the system and connected the output to a Tektronix 2630 FFT spectrum analyzer. What I observed was a pure sine wave not in the least degraded from the original fed from the 16-bit, 44.1-kHz A/D converter going to the PASC encoder. How come PASC performed so well with only one-fourth the bit rate? I presume it was because only one sub-band (the left channel, from 750 to 1,500 Hz) was active and needed to be encoded. The bit pool had more than enough resources to fully encode it. I then tried square and triangle waves. In each case, PASC seemingly had enough bits to encode the fundamental and each of its harmonics without adding noise.

Next, I fed a more complex steady-state signal into the left channel—one composed of 26 full-amplitude sine waves centered on each of the PASC bands above 750 Hz. Now the spectrum analyzer showed some noise in the PASC processing. While continuing to observe the increase in noise in the left channel, I determined that the most demanding right-channel signal was white noise, a randomly fluctuating signal containing all frequencies.

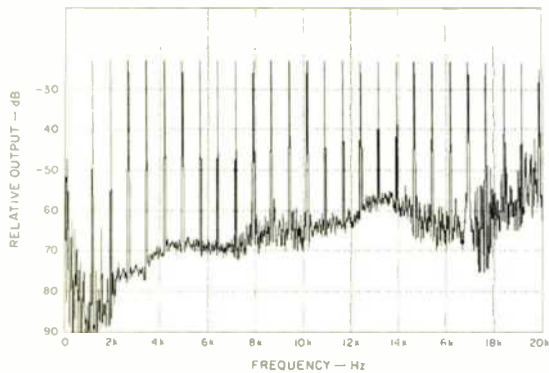
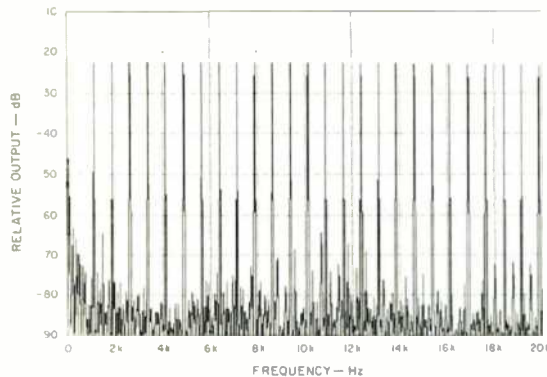


Fig. 1—Spectrum analysis of test signal devised to challenge PASC, and the resulting noise. The test signal, 26 sine waves centered on PASC sub-bands, is shown by the uniformly spaced vertical lines. While the noise floor does rise with frequency, the noise remained inaudible because of masking by the tones. Output levels shown are dB re: 1.0 V.

Fig. 2—Same test signal as Fig. 1 but without PASC encoding and decoding. As expected, the noise floor is measurably lower.



A/B/X

This task for the right channel must have stolen some bits from the left channel, because its measured noise went up. The sine waves and the noise are shown in Fig. 1.

The noise floor on the straight-through connection was essentially unaffected by the 26 sine waves and the right-channel noise signal, as seen in Fig. 2. However, no noise was audible for either the PASC encode/decode or the straight-through connection; I heard only the dissonant cacophony of the 26 sine waves. Psychoacoustics would predict that PASC's noise would be thoroughly masked by the sine waves.

At this point, the sub-band from 0 to 750 Hz in the left channel was unused. This range is extremely large in a psychoacoustic sense, as it carries over half of the perceived audible spectrum. It is also the only single PASC band which can contain the fundamental and its second harmonic, or two tones and their intermodulation products. The potential for audible artifacts in this band seemed to be very great, especially since the bit pool was being used up elsewhere.

My search for audible artifacts in the 0 to 750 Hz band was frustrating. I tried a range of pure tones, sliding tones, and double and triple tones, but all failed to show increased distortion on the spectrum analyzer. Some in-

crease in noise was seen but not heard, because the noise was far below the masking threshold of the test tones.

Onward. With the right channel still busy with the white noise, I tried tone bursts and sweeps in hopes of catching something missed by the 8-mS

When we hear DCC, will we be grateful for its 18-bit resolution or instead miss the data discarded by its PASC encoding/decoding?

analysis window. The oscilloscope showed little waveform distortion, and my ears heard no change in the signals. An imaging check was made by feeding each channel a sharp click that seemed to emanate from exactly midway between the two speakers. The frequency content of the click was changed, yet the image stayed centered with pinpoint accuracy. Delays, in 10- μ S increments, were added to the clicks to make them image off center. Again, no measured and no audi-

ble image shifts occurred between the PASC connection and straight-through connections.

In summary, although I used a variety of test signals, I could not find an audible problem in PASC. Instruments revealed differences between PASC encode/decode and straight through, but the data strongly suggested that the differences would not likely be audible. Not every combination of test signals was tried, so perhaps someone will succeed in fooling the PASC system. In the meantime, I gave up on my original aim of finding music that would fool the system and presenting it to the listening panel.

Michael Williams' listening tests continued for 41 sessions. (Some were repeats with listeners who thought they had picked up a difference; the few individuals who had scored high were not able to repeat this on a second try.) In all, 656 responses were accumulated, of which 321, or 49%, were correct. Since 50% correct is the average to be expected from chance alone, we can conclude from the statistical evidence that the listeners failed to hear a difference between PASC and straight through. The trained listeners, by the way, did no better than the others.

Audiophiles are bound to ask how DCC sounds compared to CD. Philips might answer that DCC has the potential to sound better because of its 18-bit resolution; others will insist that you can't discard three-quarters of the bits without sustaining an audible loss. However, the answer must come from listening tests, not technical analysis. Delco's listening tests concentrated on finding a degradation of CD sound by the PASC data-reduction scheme. None was found. Of course, the possibility still exists that in millions of hours of critical listening by consumers, some flaw may be uncovered. It may be true as well that one individual will be able to consistently hear a difference between CD and DCC sound and then be able to teach others to hear it. What I know at this point is that DCC's PASC encoding and decoding passed the toughest battery of tests we could devise. **A**

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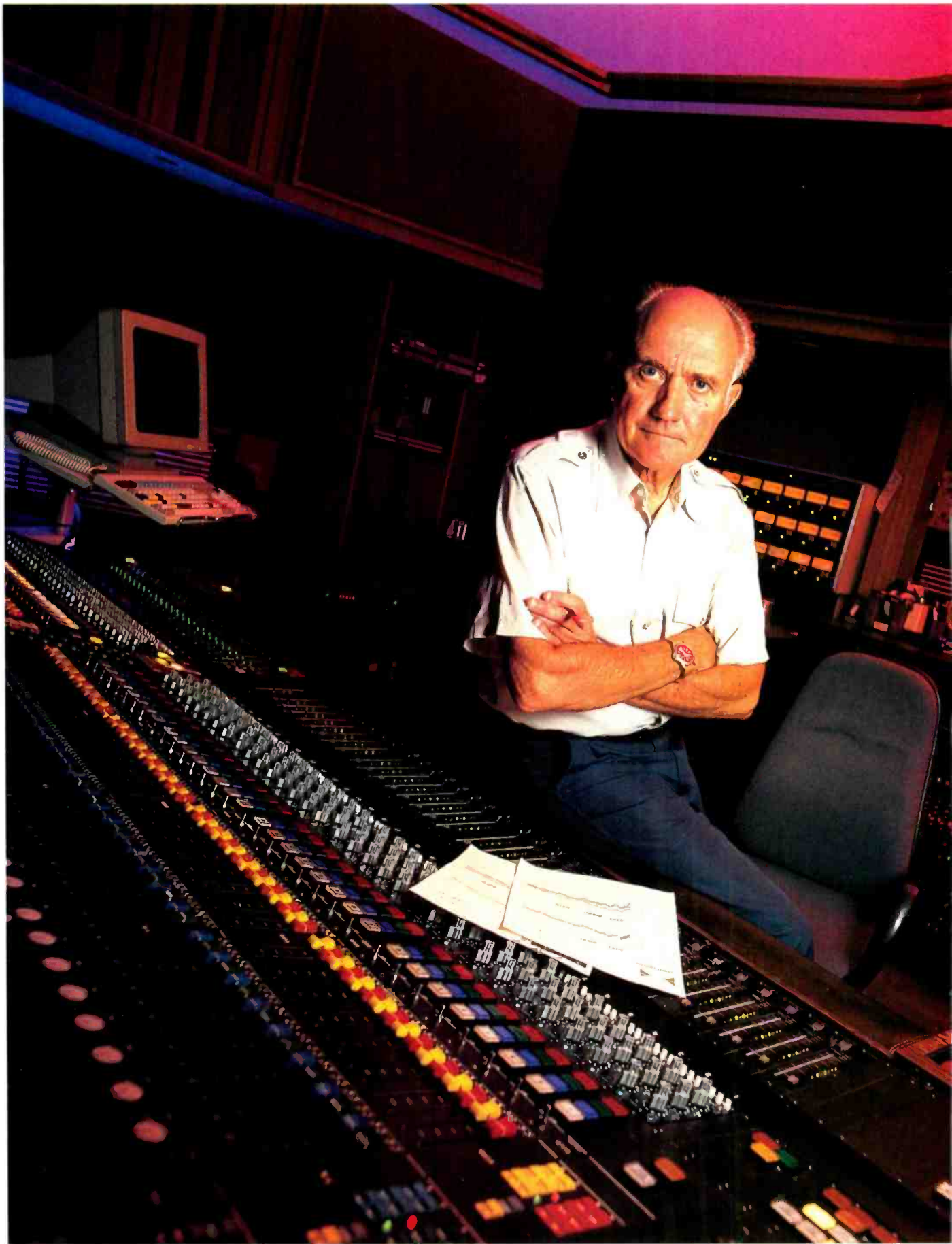
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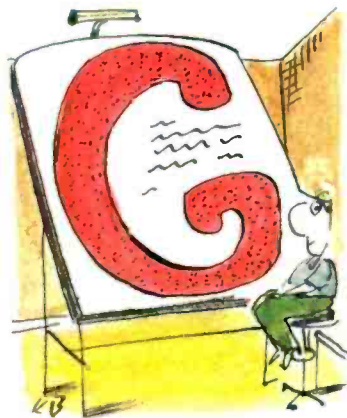
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PHOTOGRAPH: CHUCK POTTER

George L. Augspurger

Designs by Perception



George L. Augspurger has been involved in architectural acoustics for more than two decades, yet his small-room design work remains overshadowed by his many contributions to the evolution of loudspeaker design. He is perhaps best known as the author of the Patent Reviews published in the *Journal of the Acoustical Society of America* (JASA) and reprinted in the *Journal of the Audio*

Engineering Society (JAES). He maintains an active interest in scientific research and possesses a renowned penchant for tinkering.

After completing undergraduate studies at Arizona State University and earning a Master of Theater Arts at UCLA, Augspurger joined James B. Lansing Sound. In 1958, he served as JBL's technical service manager and later as manager of the newly formed Professional Products Division. As such, he was responsible for the liaison between the sales and engineering departments.

Back then, JBL was still a small company, and Augspurger was able to work directly with loudspeaker pioneers Bart Locanthi and Ed May. In the process of developing new professional loudspeaker systems, JBL had developed close relations with some of the major record labels—most notably, Capitol Records. He was named technical director of JBL in 1968. As the loudspeaker company grew strong in the professional sound market, Augspurger spent an increasing amount of time providing information and calculations to acoustical consulting firms. Also through JBL, he was given the chance to work directly with, and receive guidance from, Boner Associates of Texas—a famous old-line acoustical firm. When he left JBL in 1970, it seemed a natural move to form his own acoustical consulting firm.

Augspurger points out that there are many so-called experts who think that if a room looks nice, it is bound to sound nice.

WENDY J. DUCH





perated almost exclusively by Augspurger, Perception Inc. provides consultation for a wide spectrum of acoustical environments, ranging from the Hollywood Bowl to the screening room in TV producer Norman Lear's home. Among Augspurger's recent studio projects are the A & M mixdown room in Hollywood, the remodelling of Electric Lady's Studio A in New York, Take-One Studios in Tokyo, and Pegasus Studios in Tallahassee. Current projects include the remodelling of Studio A at Criteria Recording Studios in Miami, the remodelling of Studio 2 for Som Livre in Rio de Janeiro, a private practice room for Alex Van Halen, two new studios for Young and Rubicam Damaris in the Dominican Republic, a Hollywood Synclavier studio for New England Digital, and a surround sound R & D studio for Harman Electronics. Augspurger has also been the consultant for screening rooms at Geffen Records and MCEG Productions.



While attending the 1989 Audio Engineering Society Convention in New York, he was approached by a studio owner who wanted to know what his design philosophy was. "Well," replied Augspurger, "I think that a room should sound good when the designer is through with it." The man stood in thought for a moment and then said, "You know, that is a different approach." Augspurger readily admits his job is not entirely fair; many other acoustical designers also turn out rooms which sound good. As he is quick to point out, however, there are also many so-called experts in the field who believe either that if a room looks nice, then it is bound to sound nice or that if their favorite computer program tells them that a room should sound nice, then it sounds nice. To this he adds, "I can't imagine telling someone like [recording engineer/producer] Bruce Swedien that if he hears something he doesn't like, it means that he needs to get his ears recalibrated."

In Augspurger's opinion, good-sounding rooms are achieved only if the basic structure has been properly constructed. His environmental concerns are simple: Basic room geometry ("not a cube, not a half-cube, not a dome or a sphere"), basic construction techniques ("practical, functional considerations come first") and quiet mechanical system design ("noise isolation and the background levels come second"). Visual design considerations are also important. In reality, all of these are developed simultaneously within the constraints of available space and budget. In fact, he comments, "If the client runs out of money, I can make a good-sounding room with packing blankets and scraps of plywood if the basic structure has been done properly."



Augspurger has found the hardest acoustical myth to fight to be the notion that parallel surfaces generate standing waves. "Not so," says he. "The number of standing waves (or normal modes, or if you really want to sound stuffy, eigenmodes) is largely determined by the room volume. Making the room a pie wedge or an irregular polyhedron or any of the other shapes adopted by studio designers may shift the frequencies of resonance, but standing waves

are still there. Parallel reflective surfaces may produce flutter echo," he adds, "but that is easy to suppress with patches of surface treatment."

"Some of the best-sounding mixdown rooms and dubbing theaters share at least one acoustical feature in common with traditional concert halls: They are shaped like shoeboxes." Apart from movie theaters, Augspurger finds greater variations in consumer listening environments than among control rooms. "The only truly universal consumer audio environment, the Sony Walkman, is not a room at all."

Large, expensive home entertainment systems are generally placed in large, expensive rooms with adequate carpeting, furnishings, and draperies to be acoustically proper and aesthetically acceptable. The most common afflictions in home listening rooms are twofold—poor speaker placement and benign neglect.

It should be obvious that if you can't see a speaker, you aren't going to be able to hear it very well. The most singularly effective way to improve your home system is to experiment with speaker placement. Get those speakers off of the floor! Try them in different locations throughout the room—near the wall, away from the wall, near the corners, away from the corners, angled in, tilted, or even suspended! If it turns out there is no practical way the speakers can be located where they sound the best, as least you will have established some sense of what the trade-offs will be.

Also, if your system is over a year old, says Augspurger, you should unplug all connections. Clean and polish any connectors that are corroded or dirty; this goes for video as well as audio connectors and fuses. Then plug the system back together, and exercise all knobs and switches, including crossover controls, at least a dozen times. This should forestall any need for superfast, oxygen-free, atomically nonresonant speaker cable.

Augspurger likes to scatter reflective and absorptive treatment on all room boundaries. It is difficult enough to design a small room with neutral acoustics, but starting with a totally absorptive ceiling or rear wall just makes the job that much harder. "In this regard," he notes, "I am grateful for the efforts of live end/dead end (LEDE) designers like Chips Davis and Russ Berger in promoting the idea that the rear wall [of

If your system is more than a year old, unplug all connections, polish them, and exercise all knobs and switches.

a studio control room] should be a scattering surface, not an acoustical black hole."



ugspurger has used diffusion modules from RPG Diffusor Systems in several studios but generally sticks to custom-fabricated modules based on a design

that combines high-frequency scattering and low-frequency absorption within the same structural unit. Both he and Tom Hidley were instrumental in starting the trend toward extensive "bass trapping"—actually, broadband absorption—in mixdown rooms. This was in contrast to the practices of earlier designers like Bill Putnam, who relied on a few diaphragm absorbers and lots of diffusion. "Our approach," comments Augspurger, "was questioned by Michael Rettinger, who pointed out that normal stud and drywall construction has a substantial amount of built-in low-frequency absorption. I don't think there is any absolute right or wrong to this debate, but my experience of the last five years or so points up two interesting observations. First, tight bass is not necessarily dry bass; some tight, punchy mixdown rooms have much longer decay times at low frequencies. Second, less absorption often works better than more." He has personally pulled yards and yards of fiberglass insulation out of some of his earlier rooms and found that the bass character grew progressively tighter and cleaner.



o studio construction techniques and acoustical treatments have any bearing on home and commercial design trends? The answer is an unequivocal yes.

First and foremost, it is necessary to separate the requirements of sound isolation from those of room acoustics. To isolate, or soundproof, a room means to employ materials and methods of construction in a way that no outside sounds enter the enclosed space (nor should any inside sounds

The average room could be made fairly airtight by simply caulking any air gaps occurring at the seams.

travel to the outer environment). The perfect isolated room is airtight. To keep from suffocating, however, studio designers and an increasing number of private and commercial builders use long, rigid ventilation ducts lined with an acoustically absorptive material.

Sound can travel between two adjoining spaces by two methods—structureborne and airborne. The latter may seem obvious, since audible sound waves travel through air. The average room may be made fairly airtight by simply caulking any air gaps at the seams. But sound vibrations, especially lower frequency vibrations possessing longer wavelengths, are capable of travelling right through most solids. Logically, then, to contain low-frequency sounds, especially in wide-range music, the structural shell of the room must be massive.

Sound Transmission Class (STC) ratings are used by acoustical suppliers and designers in comparing the soundproofing characteristics of various materials. Standard office partitions, for example, weigh about 5 pounds per square foot. If they don't have any cracks or openings, they have an STC rating of approximately STC-45. If double 5/8-inch drywall, with a fiberglass insulating blanket in the cavity, is used, the weight increases to something close to 12 pounds per square foot. The rating will then be about STC-54.

In general, although sheer mass can in many instances provide decent soundproofing, there comes a point where the trade-offs no longer balance out. This is why many studio designers develop techniques such as that just

described, combining mass and bulk in a multi-layered fashion. For the soundproofing of existing rooms, one newly available product that looks quite promising is ProSPEC sheeting, available from the makers of Sonex acoustical foam (and sold by Illbruck).

Acoustical treatment has nothing to do with soundproofing a room. The purpose of interior treatments is to get well-balanced absorption and diffusion over the full range of audible frequencies. There are many commercially available products for a diverse range of acoustical applications. Some, such as Sonex, ASC's Tube Traps, and Room Tunes are designed as at least partially absorptive treatments, whereas the modules from RPG Diffusor Systems are designed to break up standing waves and promote a diffuse, non-directional, room sound. As stated, though, most home users should find standard room furnishings adequate for most acoustical purposes.

Augspurger's basic approach to installing monitor systems in studios is to include room space for the placement of speaker boxes in the basic design rather than building the boxes into the structure. When clients include subwoofers in their system, Augspurger often utilizes the lower studio window soffit, which, in his opinion, is perfect for this function. Even though the final installation is rigid and heavy, it is not a permanent part of the basic structure. If, as so often happens, the speakers need to be changed two or three years down the road, this may be accomplished with a minimum of fuss.



ome years ago, it was common practice for loudspeaker companies to package studio monitors in fancy boxes and sell them as top-of-the-line components on the

consumer market. This is, to some degree, still true of certain makers of large, direct-radiator systems and of at least one coaxial unit often used in monitoring and mixing down classical performances. There are, however, a wide range of esoteric speaker designs available to consumers that are rarely seen inside recording studios.

It has been more than 30 years since the first full-range electrostatic loud-

speaker was designed, yet it has remained a favorite with high-end audiophiles. Other bipolar radiators that have found widespread acceptance among high-end buyers include large ribbon loudspeakers, unbaffled arrays of conventional cone loudspeakers, and large planar diaphragms driven by zig-zag voice-coils. This last design seems to resurface in some new form every 10 years or so, but the original concept was developed in 1927.



Small home bookshelf speakers are quite similar, and often identical to, console-top near-field monitors. An offshoot is the miniature three-box ensemble that combines a single subwoofer module with a pair of tiny two-way speakers. "On two occasions," relates Augspurger, "I have seen such ensembles being auditioned in mixdown rooms, but none of them have been accepted as a reference standard."

Augspurger is a veteran designer who knows that styles can and do change. "Just 10 years ago," he says, "the goal of a good mixdown room was a sweet spot near the center of the console. Today the console is 15 feet wide, the producer is at the far left, the keyboard player is 10 feet behind the recording engineer, the synthesizer programmer is off in a corner somewhere, and they all expect to make judgements based on the sound they hear from the monitors. I think I have learned" he adds, "to rely more on flexibility and subtlety and less on brute-force acoustical approaches. Also, I have developed my own little bag of tricks and solutions to common problems." The previously mentioned custom diffusion modules he favors are but one of these many "tricks".

This designer's approach is determined by client need. He doesn't sell standard designs. His advice to home and commercial builders is to experiment and learn to adapt techniques used in studio design for private and commercial use. Augspurger has also done his share of garage studios. Although some have turned out very well, he feels that he is not really suited to help bargain-basement clients. Basically, he enjoys developing rooms for

professionals that make the most efficient use of the client's space, budget, and projected usage.

He rarely has to contend with strongly biased preconceptions. Once or twice clients have approached him with a design, asking about "what to put on the walls." Augspurger related one incident where he wound up politely telling the client that he didn't care what was put up on the walls, since the basic acoustical properties of the room had already been determined and it was too late for him to be of any real help.

He is not sure how far he is willing to compromise his own standards to keep a commission. "There have been," he relates, "perhaps a half-dozen opportunities—some with big names in the entertainment world—that I declined because I sensed that whatever I wanted to do would never get done." Fortunately, most of his clients are established artists, studio owners, or architects who are very practical, who can articulate what they want and don't want, and who are easy to work with.

Augspurger has a reputation for being fairly laid-back, but that is because he usually works with pros. Once or twice he has been involved in dire emergencies—at least they were emergencies in the producer's imagination. He even returned a client's check once ("a budget studio that was not my design"). "I told him," said Augspurger, "that since my services obviously did not fit his needs, he should, therefore, find someone else." Usually, the deadline arrives before his pa-

tience is exhausted rather than the other way around.

He is sometimes criticized for not being radical enough in his design work. Most of his techniques, however, make sense to other acoustical consultants because he does not try to rewrite the Laws of Physics. When Augspurger is responsible for developing a design, he tries to approach it the way an architect does, with lots of sketches and "what if" studies. "The biggest mistake made by clients," he cautions, "is to zero in on '... a control room like A&M and Studio A here, and a big artists' lounge here ...' before they have even found a suitable space to build in."



Unlike architecturally trained studio designers, Augspurger likes to work with architects and interior designers. He has never come up with a room design so perfectly conceptualized that it could not be improved on by suggestions from someone else. "Take-One Studios in Tokyo, for example," he comments, "were designed by architect Jack Edwards, who has established his own reputation in this area. I collaborated with Jack on the design and later, when it came time for checkout and acoustical tuning, with the Japanese acoustical consulting firm. This three-way international collaboration resulted in a highly functional studio complex suited to the specific needs of the owner."

Augspurger feels there is a great deal home listeners can do to improve their systems without reconstructing the room environment or resorting to expensive and sometimes ineffective commercial methods. Before buying, prospective homeowners and do-it-yourselfers should investigate all the options. There are also many ways in which private and commercial contractors can benefit from studio design techniques. Even college students, especially those forced to live in very noisy environments, can benefit from the adaptation of studio acoustics for non-studio use. Acoustics is by no means a voodoo science, inexplicable and unexplained. All it commonly takes, says Augspurger, is a little old-fashioned common sense. **A**

Augspurger offers advice to home and commercial builders: Experiment, and learn to adapt techniques used in studio design.

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1

PHILIPS LHH500 CD PLAYER

Manufacturer's Specifications

Frequency Response: 20 Hz to 20 kHz, ± 0.5 dB; overall, 2 Hz to 20 kHz.

S/N: Greater than 96 dB.

EIAJ Dynamic Range: Greater than 96 dB.

THD: Less than 0.0025% at 1 kHz.

Crosstalk: Greater than 96 dB.

Output Level: 2 V rms via RCA-type (unbalanced) jacks; 3 V rms via balanced XLR jacks.

Channel Balance: Less than 0.5 dB, unbalanced outputs; less than 1 dB, balanced outputs.

Number of Programmable Selections: 20.

Power Requirements: 17 watts.

Dimensions: 18 in. W x 5½ in. H x 14⅞ in. D (45.7 cm x 14 cm x 35.9 cm).

Weight: 36¾ lbs. (16.7 kg).

Price: \$2,000.

Company Address: One Philips Dr., Knoxville, Tenn. 37914.

For literature, circle No. 90



According to Philips, the LHH designation is applied only to the company's most technically sophisticated consumer and professional components. For example, their flagship consumer model CD player, consisting of a separate transport and D/A converter, bears the model number LHH1000 (reviewed in the January 1990 issue). In the professional audio area, the LHH8000 is a Compact Disc manufacturing system that occupies only 2,500 square feet of floor space but can turn out completed CDs—from formatted master tape to finished discs—in about six hours.

The Philips LHH500—the subject of this report—was only the second CD player offered to consumers that bears the LHH designation. I expected, therefore, that it would be special. In many respects it is; in some respects it is not. The LHH500 employs the Philips bitstream PDM (Pulse Density Modulation) D/A conversion technology. The player uses not two, but four D/A converters. Two converter pairs operating in differential mode are said to provide an increase in signal-to-noise ratio of about 4 dB compared to single converter-pair operation.

In the LHH500, two PDM D/A converters are used per channel. Each channel's digital data stream is split in two, and one of the resulting streams passes through a bank of flip-flop circuits, which invert it digitally. The inverted and noninverted data streams pass through separate D/A circuits, whose outputs are then combined. This results in a gain increase of 6 dB, and a noise increase of only 2 dB, for an overall 4-dB increase in dynamic range. The analog outputs of the two converter pairs are then fed to op-amps, combined, buffered, and, when necessary, de-emphasized. Outputs include both unbalanced RCA and transformer-coupled, balanced, XLR analog jacks and both optical and coaxial digital types.

The LHH500 offers convenience features that should appeal to music lovers, too. Favorite Track Selection (FTS) lets you program the unit to automatically play only your favorite tracks or sections from specific CDs. Several hundred selections can be stored in nonvolatile memory that holds its contents even when the player is turned off. The precise number of tracks depends on the number of discs as well as the number of tracks stored per disc. For example, if an average of five selections are stored per disc, FTS can accommodate 137 discs; with fewer selections per disc, up to 254 CDs can be accommodated. The player's "FTS" indicator light blinks if FTS programming has been stored for the currently loaded disc. Familiar features such as repeat play, A-B repeat, and shuffle (random track) play are also provided. To keep the appearance of the front panel simple, many of the LHH500's features are controlled only by means of the supplied wireless remote. The repeat-play and FTS functions—as well as display on/off—can be controlled from either the front panel or the remote control. But only the remote unit can control automatic music scan, shuffle play, skipping from index point to index point, and fast search at two speeds. The remote also enables you to access and program tracks directly by number.

Control Layout

The LHH500's "Power" switch and motorized disc tray are in the usual locations. To the right of the disc tray are two



separate display areas, one that shows track and index numbers and another that displays minutes and seconds. Beneath the first display are four small indicator lights that show when the display is off, when a repeat mode has been engaged, when FTS is being used, and when an error in programming (such as going beyond the number of selections or FTS choices that the player can handle) has taken place. The "FTS" and "Repeat" pushbuttons are located beneath the second display.

Further to the right are the buttons handling "Play," "Pause," "Stop," and track "Skip" (forward and backward). A button for opening or closing the disc drawer is also located here. Finally, at the lower right corner of the panel is a button for turning the displays on and off.

Measurements

Figure 1 shows the frequency response of the CD player. A small difference between channel output levels, amounting to about 0.25 dB at the middle frequencies, is noticeable, as is a slight ripple in response near the high end of the spectrum. I have seen this sort of ripple before in another CD player employing the Philips bitstream D/A technology. While it is of little concern to me in terms of audible effect, I wonder why this occurs and why I don't see it with CD players that employ other forms of one-bit D/A conversion.

Figure 2 is a plot of THD + N versus frequency for signals recorded at maximum digital level. At the middle frequen-

Through the LHH500, chamber music was pure joy, and I forgot about the equipment and concentrated on the music.

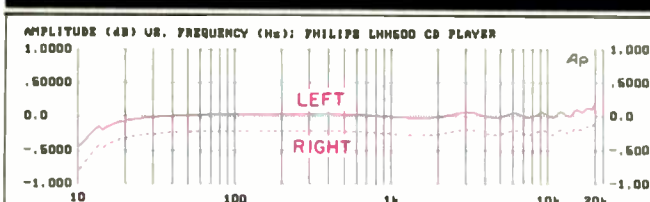


Fig. 1—Frequency response.

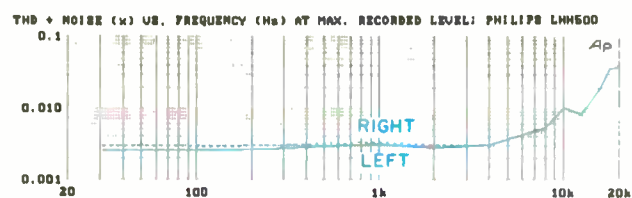


Fig. 2—THD + N vs. frequency.

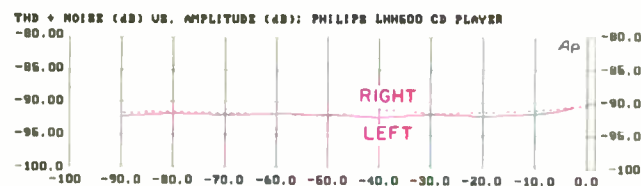


Fig. 3—THD + N (in dB re: maximum recorded level) vs. signal amplitude.

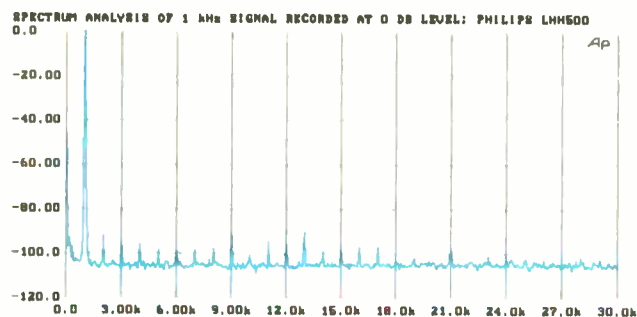


Fig. 4—Spectrum analysis of 1-kHz signal at 0-dB level.

cies, THD + N measures no more than 0.003%, while at 20 kHz, it increases to 0.032%. Figure 3 is a plot of THD + N for a 1-kHz test signal, with dB readings referred to 0 dB, or maximum recorded level. Even at this high level, THD + N measures 90.8 dB below maximum recorded level, corresponding to a THD + N percentage of 0.0029% and correlating almost perfectly with the results shown in Fig. 2 for a 1-kHz signal.

Figure 4 shows an FFT spectrum analysis of a 1-kHz, 0-dB signal taken at the player's analog output. The most significant, albeit minute, harmonic components visible are at 9 and 13 kHz. Computing their net contribution to actual THD (noise has been "averaged" out by sampling the data 16 times) results in a figure of 0.003%. Measurement of SMPTE-IM distortion at maximum recorded level resulted in readings of 0.0043% and 0.0045% for the left and right channels, respectively.

I also performed a spectrum analysis (not shown) of a 10-kHz signal reproduced from my CBS CD-1 test disc. There was only 0.021% second harmonic, but other spurious out-of-band components, caused by "beats" between the CD clock frequency and the 10-kHz signal (at 34.1 kHz and 54.1 kHz, for example), measured as high as 0.05%.

A-weighted S/N for the LHH500 measured 97.9 dB for the left channel and 96.7 dB for the right channel. A $\frac{1}{3}$ -octave spectrum analysis of noise versus frequency is shown in Fig. 5. Other than the expected slight rise in noise at high frequencies, the only significant noise "peak" occurs at 120 Hz, the second harmonic of the power-line frequency. That peak, however, measures an insignificant -107 dB on the left channel and -105 dB on the right channel, referred to maximum recorded level of a CD. Channel separation (Fig. 6) is excellent, in excess of 110 dB at 1 kHz and more than 90 dB even at 20 kHz.

Figure 7 shows deviation from linearity for both dithered and undithered test signals. With undithered test signals in the range from 0 to -90 dB, linearity is excellent down to -80 dB, but at -90 dB it deviates by 3.4 dB in the right channel and 4.1 dB in the left. For dithered signals, the results at -90 dB are similar, and linearity actually improves slightly at -100 dB. In theory, bitstream and other one-bit D/A converters are supposed to take care of such minor nonlinearities, and the nonlinearities observed here may well be caused by factors other than D/A conversion, such as self-dither noise introduced by the player itself.

Figure 8 is a plot of the fade-to-noise test, using a dithered signal fading from -60 to -120 dB, as a further assessment of linearity and as a means of establishing the EIA dynamic range. Deviation from linearity at these low levels is fairly consistent with the readings in Fig. 7, and EIA dynamic range was estimated to be about 106 dB. Measured according to the EIAJ method, dynamic range was 92.3 dB for the left channel and 91.5 dB for the right channel. A test using a unit-pulse signal (not shown) revealed that this player maintains correct polarity at its output terminals. Clock frequency accuracy was within 0.0008%.

Use and Listening Tests

Having tested several CD players that employ one form of one-bit D/A conversion or another, I am convinced that this

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The LHH500's ability to correct for missing data was so good that I could not believe my oscilloscope!

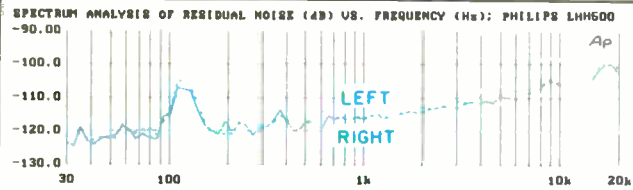


Fig. 5—Spectrum analysis of residual noise when playing "no-signal" track of CD-1 test disc.

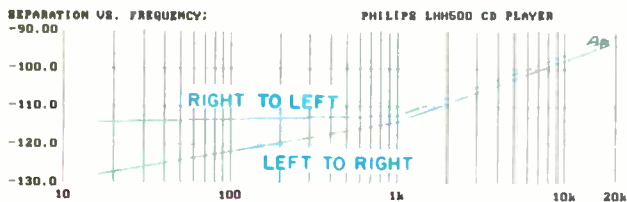


Fig. 6—Interchannel separation vs. frequency.

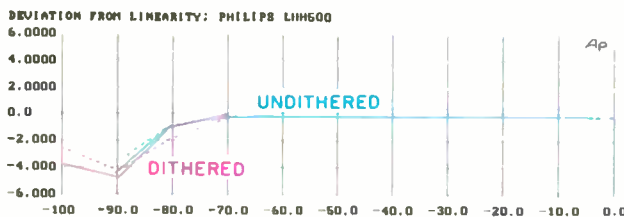


Fig. 7—Deviation from linearity for left channel (solid curve) and right channel (dashed curve).

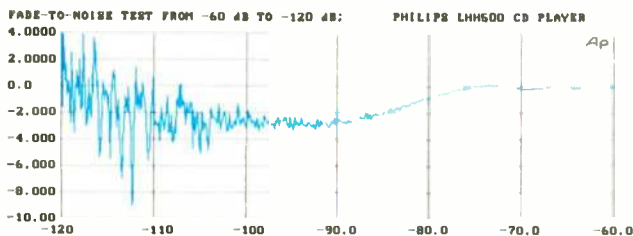


Fig. 8—Fade-to-noise test.

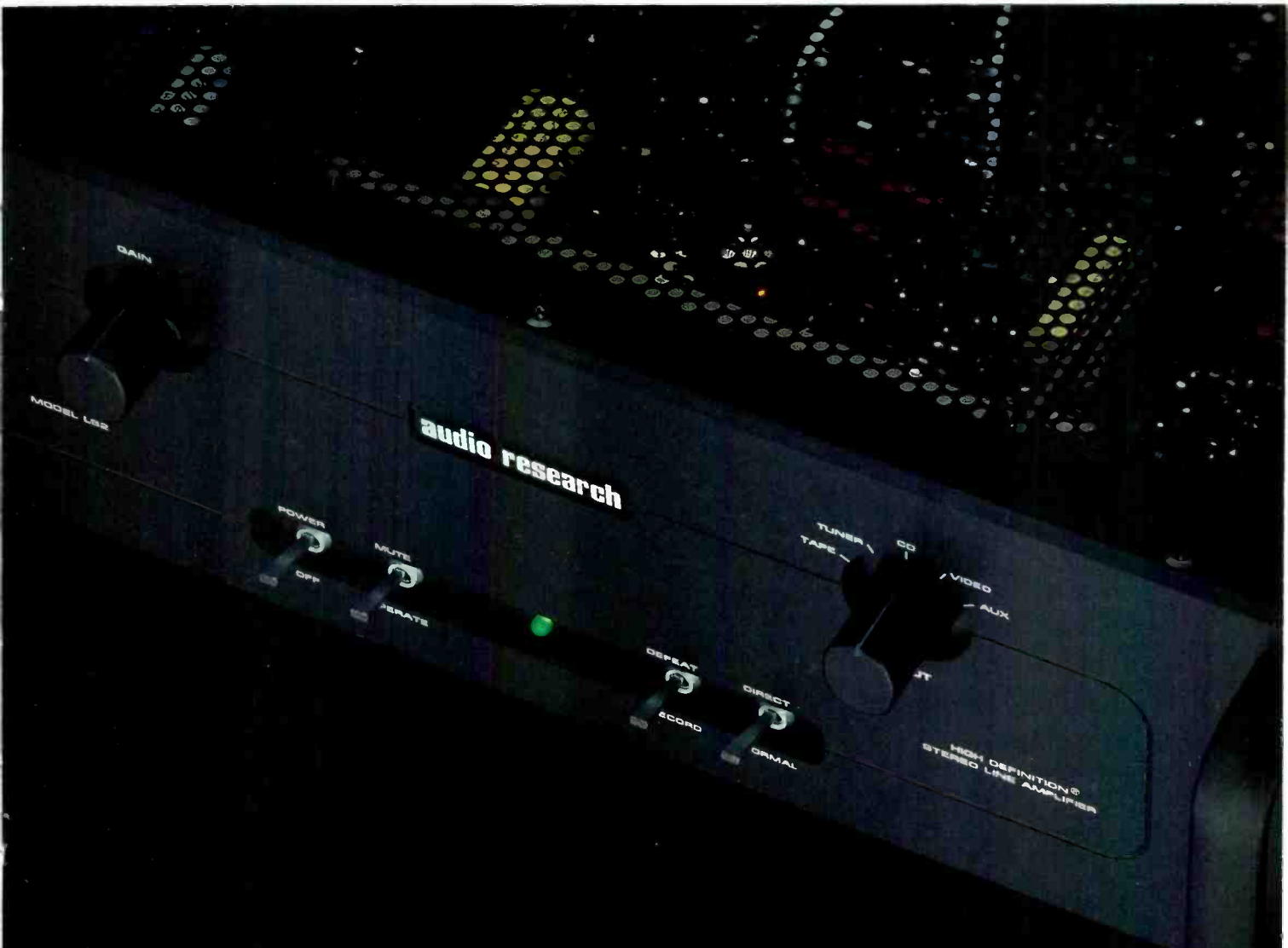
technology (whether you call it bitstream, MASH, High Density Linear Conversion, or whatever) has much to commend it sonically. In playing CDs on this unit, I was impressed by the complete absence of a harshness that I had previously blamed on some of my earliest-acquired CDs. Others have told me that, with some of the better current-generation CD players, their oldest CDs suddenly didn't sound nearly as brittle and raspy as they had remembered. With players such as the Philips LHH500 and a few others that I have tested in the last year or two, I was able to confirm these claims myself.

I still own a first-generation portable CD player and a fairly low-cost second-generation home CD player—both circa 1985 or thereabouts. Let me tell you that the same "old" CDs played on the LHH500 sounded a lot better than they did on my early CD players. Among the discs tested in this manner (just in case you own them and want to try the same experiment) were Bruce Springsteen's *Born in the USA* (Columbia CK-38653), a CBS disc (MK-35854) featuring Leonard Bernstein and the New York Philharmonic in Shostakovich's Fifth Symphony, and an early CD recording of Beethoven's Fifth Symphony and Schubert's Symphony No. 8, "Unfinished" (CBS MYK-36711).

From some later CD releases, I chose a couple of Delos recordings that I have used before, simply because I find that when listening to chamber music I am more easily able to separate the superb equipment from the merely excellent and the excellent from the just adequate. Listening to the Mozart Quintet in E Flat for Piano and Winds, K.452, (D/CD-3024), or to the Brahms Quintet No. 2 in G for Strings, Op. 111 (DE-3066), as reproduced by the Philips LHH500 and the rest of my reference system, represented pure joy, as I forgot about the equipment and was completely captivated by the music. That's one thing about superior equipment such as this—you tend to forget it and to concentrate on the music.

Returning from the sublime to the practical, I made my final check to see how the unit behaved in the presence of severe disc errors or missing data. Using the Pierre Verany test discs designed for this purpose, I literally could not believe my oscilloscope! (I not only listen to these test tones for glitches but observe them on a 'scope, because sometimes a minor glitch or mistracking is observable even though it is inaudible.) The LHH500 was able to play through areas of this test disc in which there was missing data for a full 3 mm of scanning distance. Being able to correct for 1 mm of missing data is considered very good; 2 mm is excellent, so I don't know quite how to characterize this amazing ability of the LHH500 except to say that it is a near miracle. Furthermore, I was able to literally pound on the outer case of this solidly built machine with my fist without making the laser pickup mistrack—at least not so that I could hear any glitches or even momentary muting. Before I tested the LHH500, a Philips spokesman suggested I hold a block of wood against it (to protect its lovely gold-colored finish) and pound on that block with a ball-peen hammer. I couldn't quite bring myself to go to that extreme, however—such is my respect for this beautifully built, feature-laden player from a co-inventor of the optical laser-read CD system.

Leonard Feldman



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2

HUGHES AK-100 SOUND RETRIEVAL SYSTEM DECODER

Manufacturer's Specifications

Passband: 20 Hz to 20 kHz. (Due to the manner in which the SRS and "3-D Mono" circuits operate, frequency response specifications do not apply here.)

A-Weighted S/N: Bypass mode, 93 dB at maximum input/output and 84 dB at 500 mV rms; SRS mode, 98 dB at maximum input/output and 86 dB at 500 mV rms. (See note below.)

THD + Noise at 500 mV: Bypass, 0.01% at 1 kHz; SRS, 0.25% at 1 kHz. (See note below.)

Input Levels: Minimum, 30 mV rms; maximum, 1.4 V rms.

Maximum Output Level: 3.9 V rms with 1.4 V rms input and all controls at maximum.

Impedances: Input, 50 kilohms; output, 30 ohms.

Power Requirements: 105/125 V a.c., 60 Hz, 15 watts maximum.

Dimensions: Approximately 17 in. W × 4 in. H × 11½ in. D (43.2 cm × 10.2 cm × 29.2 cm) including projecting controls.

Weight: 8 lbs., 5 oz. (3.8 kg).

Price: \$399.

Company Address: P.O. Box 7000, Rancho Santa Margarita, Cal. 92688.

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Note: Maximum-level measurements made with 1.4 V rms input, all controls at maximum; 500-mV measurements made with 500 mV rms input, "Level" at maximum, "Space" at midpoint, and "Center" set for output level of 500 mV rms.

I first encountered the Hughes Sound Retrieval System (SRS) about three years ago, when I was asked to evaluate a stereo enhancement system developed by the Microelectronic System Division of Hughes Aircraft Company out in Southern California. During that visit, I entered a room in which two small speakers, no more than a couple of feet apart, were positioned on the floor. At my listening position was a switch with a couple of controls. The music began, and, of course, stereo separation was virtually nonexistent

with the speakers placed so close to each other. Arnold Klayman, the inventor of SRS, then asked me to push the switch. The sound spread out before me was then so startling that I was certain additional speakers had been turned on. Yet there were none.

At first, Hughes sought to license other manufacturers to use the SRS technology. They succeeded in signing Sony (which has used SRS in many large-screen stereo TV sets) and, more recently, Thomson Consumer Electronics (which



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The sound spread was so startling that I was certain additional speakers had been turned on—but they hadn't!

markets RCA TV sets). Now, Hughes has decided to market a stand-alone SRS decoder, the AK-100.

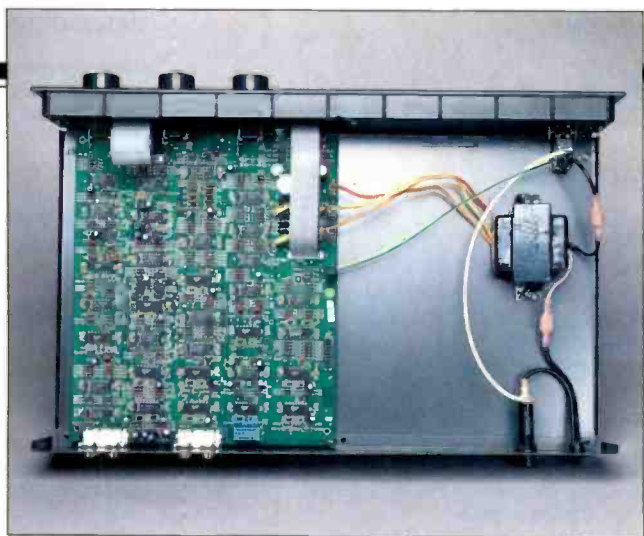
The AK-100, unlike several other stereo enhancers, does not have time-delay processing. Its Sound Retrieval System is single-ended, requiring no prior encoding of program sources. It employs no artificial reverberation, and neither does it use harmonic generation or artificial phase correction or alteration.

Human ears are the most important link in the audio chain, and SRS is based on certain principles of human hearing that have been explored by Hughes researchers and others over the years. In a stereo system, normally the sum signals ($L + R$) contain all of the direct and centrally positioned sounds; the difference signals ($L - R$ and $R - L$) provide spatial information and directional cues to the human hearing system. The Hughes system addresses the fact that the transfer function of human hearing is not constant: It changes with each degree of azimuth. For example, sounds coming from straight ahead have a different transfer function, or frequency characteristics, than sounds coming from the sides or from the rear. Aside from other aural cues, such as time of arrival and relative sound intensity at each ear (once thought to be the only elements involved in stereo perception), we use this transfer function to zero in on the directions from which sounds emanate. Unfortunately, microphones do not pick up sound in this manner and will not provide these spatial cues. SRS takes into account the varying transfer function of human ears and hearing in a continuous and dynamic manner. It processes the difference and sum components so that the resulting signals correspond with the spectral registration of human hearing. To put it simply, we are tricked into believing that sounds are coming from locations other than the two loudspeakers in front of us. Depending on the source material, it is even possible, on occasion, for SRS to provide a surround soundstage like that achieved with multiple speakers.

The AK-100 hooks into any stereo system via the usual in/out loop used for tape decks or equalizers. If the only tape loop is already being used by a tape deck, it can be reconnected via the in/out loop on the AK-100 itself. If you have a separate equalizer in your system, Hughes recommends that it be placed in the signal path *after* the AK-100. Clear diagrams in the owner's manual detail installation and wiring procedures for a variety of equipment combinations, including the use of the AK-100 with a TV monitor/receiver and a VCR. If you own a mono VCR, the AK-100's stereo synthesizing circuit (about which more later) can be used to create a very effective simulation of stereo sound.

Control Layout

The AK-100 is about the size of a typical preamplifier, but that's where the resemblance ends. A pushbutton at the left end of the front panel turns on power and illuminates an



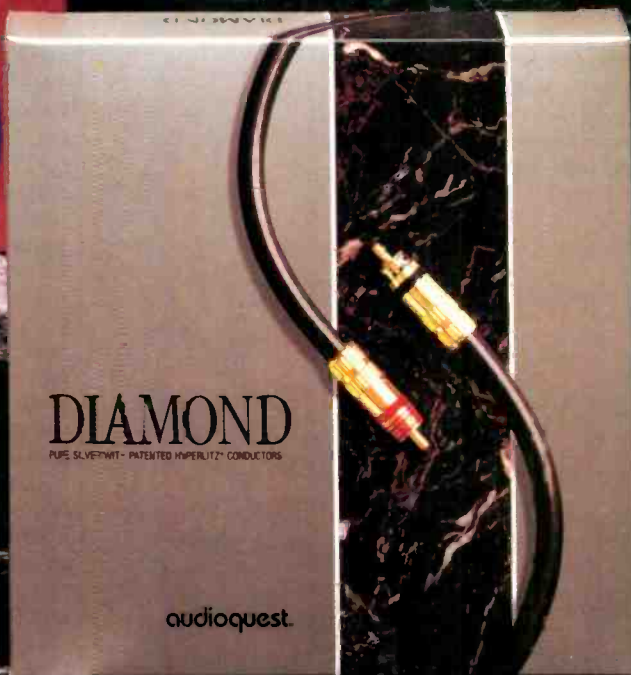
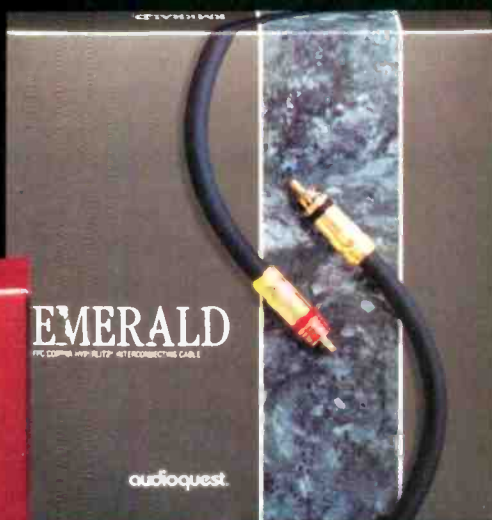
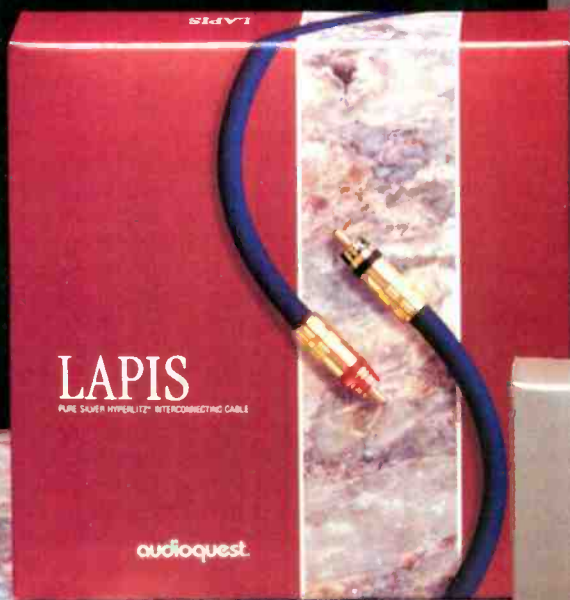
indicator light. An SRS in/out switch comes next, and a green light nearby confirms when SRS is active. A pushbutton bearing the label "Rev Trim" (reverberation trim) is next, allowing you to subtly reduce the amount of reverberation around a singer's voice. Pushing this switch will also decrease the amount of ambient information during quiet passages in music or in film soundtracks. The "3-D Mono" switch, next to the right, allows you to achieve a surround-type atmosphere when the input signal is mono.

The AK-100 may reproduce low-frequency rumbling found in some TV and video programs. For this reason, it incorporates a "Filter" circuit that, when activated, attempts to correct the problem with only minimal processing. The next switch engages the external loop circuit mentioned earlier. Because of the way this loop is arranged in the signal path, SRS will not interfere with the recording capabilities of any tape deck connected to it.

Hughes has come up with an unusual display "meter" which shows the amount of center ($L + R$) and "Space" ($L - R$ or $R - L$) audio information coming out of the AK-100. If you are in the bypass (no SRS) mode, the displays represent the original mix of $L + R$ (the vertical display) and $L - R$ or $R - L$ (the horizontal display). If SRS or "3-D Mono" is activated, the displays represent the signal after processing. The display can be turned off or be changed from what Hughes calls the "Bar Mode" to the "Dot Mode." Not surprisingly, when watching the display I noticed that the "Space Left" ($L - R$) area was not always equal to the "Space Right" ($R - L$) area when SRS was active. If more action occurs in the left side of the audio program, the "Space Left" display will extend further than "Space Right"—and vice versa.

Perhaps the most important controls are the pair of rotary knobs near the right side of the front panel, "Space" and "Center." The "Space" control allows you to adjust the amount of SRS ambience information ($L - R$ and $R - L$) in the audio output. Turning the "Space" control clockwise widens the apparent soundstage. The "Center" control adjusts the amount of $L + R$ information in the output. If a center vocalist seems to be too far in the background relative to orchestral accompaniment, you would increase the setting of the "Center" control and reduce the setting of the "Space" control. Each control has a center detent,





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The Hughes SRS circuit works because the human ear's frequency response changes with the direction of the sound source.

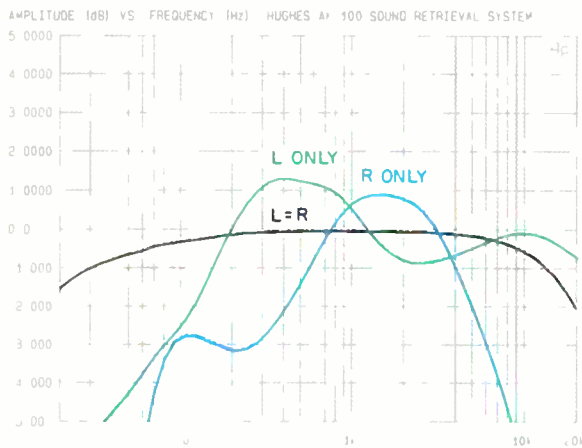


Fig. 1—Frequency response with identical left and right (mono) signals, with left-only signal, and with right-only signal; see text.

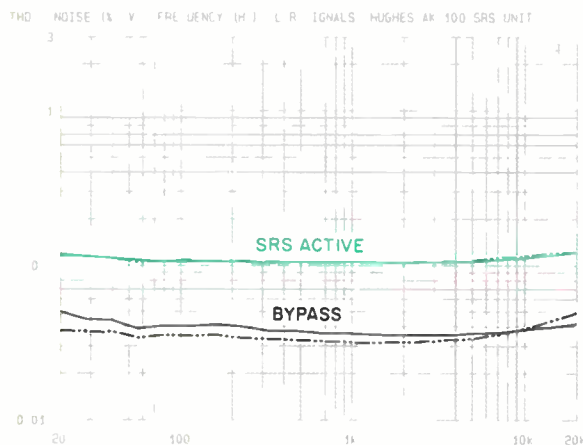


Fig. 2—THD + N vs. frequency for 500-mV input signals applied to both inputs. Left channel is solid curve, right channel is dashed.

which I found was a good place to begin when setting up the AK-100 for any kind of musical program. The rightmost rotary knob is a "Level" control for adjusting output level. Hughes recommends that you initially set "Level" at maximum. If, however, this setting results in clipping or overdrive of other components in your system, it can be lowered.

The rear panel of the AK-100 is equipped with pairs of input and output jacks and the loop input and output jack

pairs. A fuse-holder containing a 3/8-ampere line fuse is also found on the rear panel. The unit has no remote control.

Measurements

For a component of this type and purpose, relatively few significant bench tests need be performed. I simply wanted to ascertain whether or not the AK-100 would add an undue amount of distortion or decrease the available dynamic range and signal-to-noise ratio of a typical stereo system.

The manufacturer cautions that measurements of frequency response may be deceptive when using the SRS feature. However, I decided that if I applied identical left and right signals to the two inputs, the SRS circuit would consider that to be essentially a monophonic signal. Such an input signal should, I conjectured, result in reasonably flat response. It did, as is confirmed in Fig. 1. Response is down only 1.5 dB at 20 Hz and just over 2 dB at 20 kHz. I also measured response for a left-only input signal and for a right-only input signal. Although response under actual music listening conditions will vary dynamically, the results shown in Fig. 1 are at least suggestive of one of the elements used in the SRS scheme to "fool" our brains into believing that sound is coming from locations well beyond the speaker separation distance. The alterations from flat response shown for the single-channel signals are, however, only part of what the AK-100 is doing to create its psychoacoustic effects.

Total harmonic distortion plus noise was measured next, both with and without SRS (Fig. 2). Clearly, activating SRS does result in a moderate amount of distortion, with a reading of around 0.1% for a 500-mV input. Considering the sonic benefits achieved with SRS, I don't think a THD + N of 0.1% is worth worrying about. Note too that this reading is well below the manufacturer's claimed limit of 0.25%. In the bypass mode, THD + N decreases substantially, to between 0.03% and 0.05%.

Figures 3A and 3B show the results of an FFT spectrum analysis that I conducted to isolate actual harmonic distortion products from residual noise. Figure 3A was plotted with SRS turned on, and a second-order harmonic at around -78 dB can be observed along with a third-harmonic component at around -82 dB. Calculating the equivalent percentage of THD, I came up with a figure of 0.015%. In bypass mode (Fig. 3B), a much smaller amount of second-harmonic distortion is noted at around -88 dB, corresponding to a THD percentage of 0.004%. These results show that the higher overall figures of THD + N are really the result of noise contributions rather than actual distortion.

Figure 4 illustrates the distribution of residual noise of the AK-100 as a function of frequency, in third-octave increments. I also took overall readings of A-weighted S/N. With SRS turned on, the results were 85.4 dB referenced to 500 mV input and output and 98.4 dB referred to maximum input and output. With SRS bypassed, A-weighted S/N was 90.2 dB referred to 500 mV input and output and 93.6 dB referred to a maximum input of 1.4 V.

Use and Listening Tests

Having heard an early prototype of the stand-alone SRS component, I was anxious to find out if the final production unit lived up to the promises of the handmade sample. It not

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SRS not only helps when speakers are unusually close together but works better when they are positioned that way.

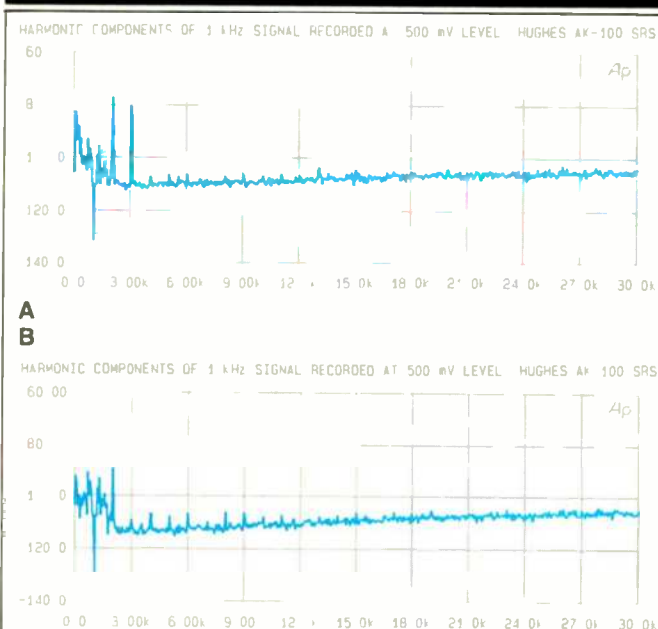


Fig. 3—Spectrum analysis of harmonics of 1-kHz, 500-mV signal with SRS active (A) and bypassed (B).

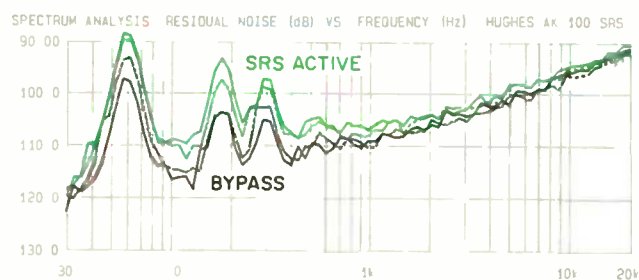


Fig. 4—Spectrum analysis of residual noise, referenced to 500-mV input.

only did—it surpassed it. One element that the early and new units have in common requires some explaining. You'll recall that in my initial exposure to SRS, the two speakers were very close to each other. In listening to the AK-100, I found that it too is most effective when the speakers are somewhat closer to each other than you would normally position them. I moved my KEF 105 Mk.II systems until they were no more than 6 feet apart, and results were far better

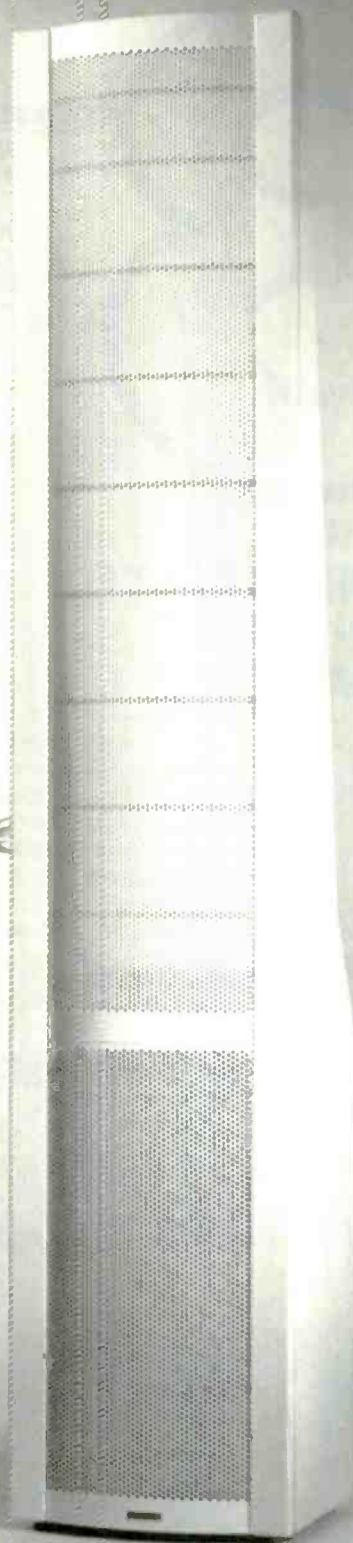
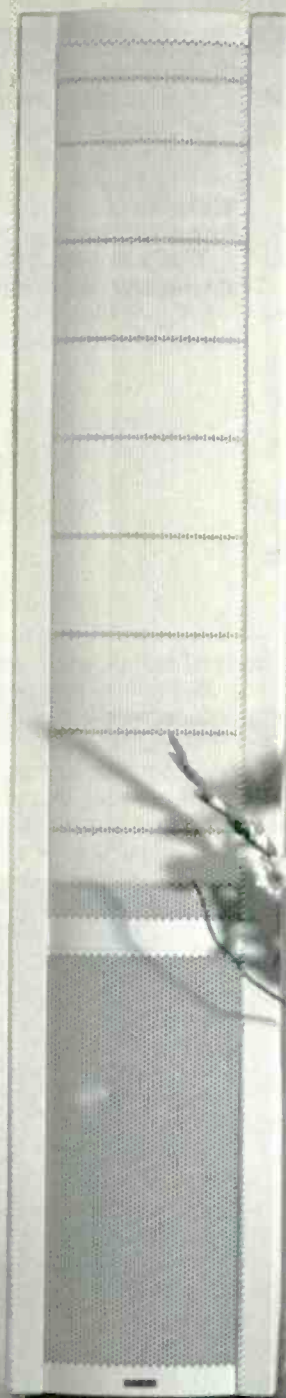
than when they had been 8 or 10 feet apart. Sound literally wrapped around me. I have a set of one of my favorite operas, Mozart's *The Magic Flute* (Deutsche Grammophon 410967-2), with the late Herbert von Karajan conducting the Berlin Philharmonic Orchestra. There are several moments in the opera when characters are supposed to be offstage or at the extreme left or right end of the stage. I had never been able to create these effects before, but with SRS in the signal path, they were startlingly realistic. And, when vocalists were supposed to be center stage, they remained clearly fixed in that position, even when I shifted my own listening position to either side of the listening room! That is one of the nicest things I discovered while listening with SRS: It does not depend upon a so-called "sweet spot" to be effective. You can move about the room and still hear a perfectly spread-out soundstage.

A couple of years ago, Telarc issued a two-CD album of Benjamin Britten's *War Requiem* (CD-80157 2CD). Robert Shaw conducts the Atlanta Symphony Orchestra and Chorus in this long, highly emotional work. This set also features the Atlanta Boy Choir and three vocal soloists. I had played these discs many times, but never had I enjoyed the performance as much as I did using the AK-100. I did find that I wanted to bring up the vocalists, who initially seemed to be somewhat overpowered by the chorus and orchestra. This adjustment was easily made with a somewhat lower setting of the "Space" control and an almost fully clockwise (maximum) setting of the "Center" control. The advantage of not having to worry about a sweet spot is particularly apparent when making adjustments on the AK-100. I was delighted to find that I could make adjustments at the front panel until everything sounded just right, and when I returned to my seat, the sound was still the way I wanted it to be.

I have a two-disc reissue of the famed Benny Goodman concert performed at Carnegie Hall back in 1938 (Columbia G2K 40244). Naturally, the concert was recorded monophonically, and while the digital remastering at CBS removed a lot of the original tape hiss, the result was still monophonic. I decided to try the "3-D Mono" setting on the AK-100 for this treasured performance. I could not believe my ears! I have heard stereo synthesizers before, but never had I heard one that actually sounded as though the program were being reproduced stereophonically. I was tricked into believing the recording was stereo (though, of course, I knew better), and it sounded like wide, expansive stereo. Audience applause came from a broad stage and even from the sides of my listening room. Frankly, although I understand the principles SRS uses to enhance true stereo program material, the manner in which Klayman achieved his "3-D" mono enhancement is beyond me. All I can do is enjoy it and stop wondering how it was done.

I don't know quite how to classify the AK-100. It's an accessory, but that classification tends to diminish its incredible capabilities. But regardless, the AK-100 is an incredible component that's certainly worth auditioning and owning. If you don't care for what SRS does to some music, there's always the option of bypassing it. However, I'll wager that most people who own TV sets equipped with SRS, or who add it to their sets by hooking in this unit, will probably leave it on at all times.

Leonard Feldman



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3

B & K COMPONENTS PRO-10MC PREAMP

Manufacturer's Specifications
Frequency Response: 1 Hz to 150 kHz, ± 1 dB.
RIAA Accuracy: Within ± 0.2 dB.
THD: 0.02%.
SMPTE IM: 0.02%.
S/N, A-Weighted: MM phono, 82 dB; MC phono, 70 dB; high level, 89 dB.
Volume-Control Interchannel Tracking: ± 0.1 dB.
Input Sensitivity: MM phono, 0.8 mV at 1 kHz; MC phono, 0.09 mV at 1 kHz; high level, 45 mV.
Phono Overload at 1 kHz: MM, 225 mV; MC, 17 mV.
Phono Input Resistance: Adjustable.
MM Phono Input Capacitance: Adjustable.
Maximum Output: 14 V rms.

Dimensions: 17 in. W \times 3½ in. H \times 11 in. D (43.2 cm \times 8.9 cm \times 27.9 cm); power supply, 4¾ in. W \times 2½ in. H \times 6½ in. D (11.9 cm \times 6.4 cm \times 16.5 cm).

Weight: 18 lbs. (8.2 kg).

Price: \$698 with unbalanced outputs, \$798 with balanced outputs.

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For literature, circle No. 92

The Sonata Series is the premier home line from B & K Components, and the PRO-10MC preamp is just the sort of design you would expect. It has all-discrete, d.c.-coupled, dual mono circuitry, a passive-mode option, and a separate power supply. The result is a tinsel-free package that is very satisfying, both sonically and ergonomically.

Naturally, the RCA jacks are all gold-plated, the volume is handled by a precision attenuator that employs 1% metal-

film resistors (as does all the circuitry), and the output can be routed via optional XLR connectors (at a \$100 premium) if your power amp will accept balanced input. In any event, there are two sets of RCA output jacks.

The owner's manual contains formulas and tables to guide you in replacing the resistors that control phono input impedance, should you need to customize it to match the load stipulated by the manufacturer of your cartridge. The



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Stereophile, Vol. 14, No. 11
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While the phono stage is, perforce, amplified, the rest of the unit can be operated actively or passively, however you prefer.

supplied load consists of a 100-kilohm resistor in each channel, netting a 50-kilohm load for moving-magnet cartridges and a load between 50 and 75 ohms (the exact value isn't spelled out) for moving-coil types. You can also add capacitors to increase shunt capacitance, if necessary, to meet your MM cartridge's spec. No soldering is required; the leads of the resistors or capacitors slip into friction sleeves on the main circuit board.

An illuminated red rocker that looks like the a.c. power switch is referred to in the manual as a "muting" switch. It actually diverts the signal from the amplifier outputs (with the switch in the position that turns on its internal pilot light) to the headphone jack. Thus, it precludes simultaneous use of speakers and 'phones—a desirable feature under almost all circumstances. And since this switch never actually shuts off the PRO-10MC, it prevents the thermal shock that preamps undergo from the usual on/off cycles (unless, that is, you plug the power supply into a switched outlet).

Internally, the preamp has two circuit boards. One, mounted vertically behind the back panel, handles in/out connections and switching. (Curiously, the right-channel connections are above the left, reversing the conventional setup.) The gain stages for both channels of the dual mono design are on another, horizontal circuit board.

The power supply is housed in a small black box that has an a.c. cord and fuse-holder on one side and the d.c. supply cable for the preamp attached to the opposite side. Since the d.c. supply cable is almost 4 feet long, you have considerable latitude in stashing the power supply well out of the way.

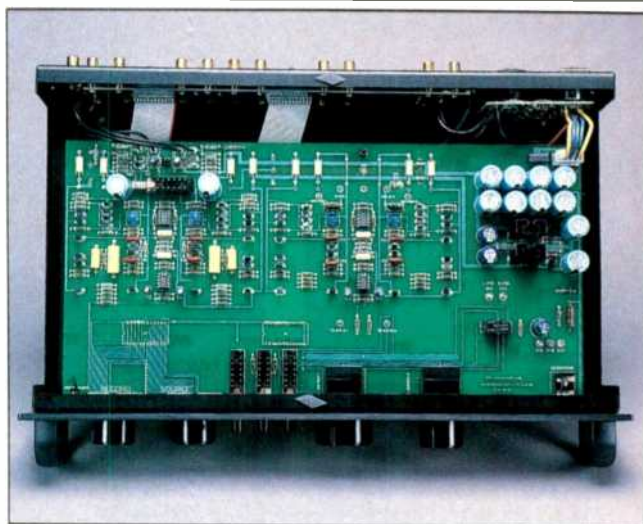
Two selector knobs choose the sources for output to the amp (or headphones) and to a single recorder. The six options for the selectors are marked "Phono," "DAT," "CD," "VCR," "Tuner," and "Tape." The last, which many companies might label "Tape 2," is for tape playback only. You can, however, dub from this or any other input to a recorder connected to the tape loop on the rear panel, using the preamp's front-panel "Tape Monitor" button to audition the recorder's output.

The only other controls are knobs for volume and balance and pushbuttons for stereo/mono mode and for bypassing the active high-level circuitry. The phono signals perforce are amplified in any event (the gain is selected at an "MM/MC" switch on the main circuit board). However, the switching circuitry is all passive (that is, unbuffered), and from here on the signals can be fed directly to the output or, with the bypass off, amplified in the usual fashion. A headphone jack is at the far right of the panel.

In case you hadn't noticed, there are no tone controls, nor is there specific provision for an equalizer. If you choose to add one, it can be inserted into the tape loop. (B & K even refers to it as a "processor loop.") The recorder could then be plugged into the equalizer's tape loop, if your equalizer has one.

Measurements

Figure 1 shows frequency response (like all the data, except as specified, measured in the active mode) through a high-level input ("CD") with the active circuitry set for 0 dB of gain and terminated with the IHF/EIA standard load (10

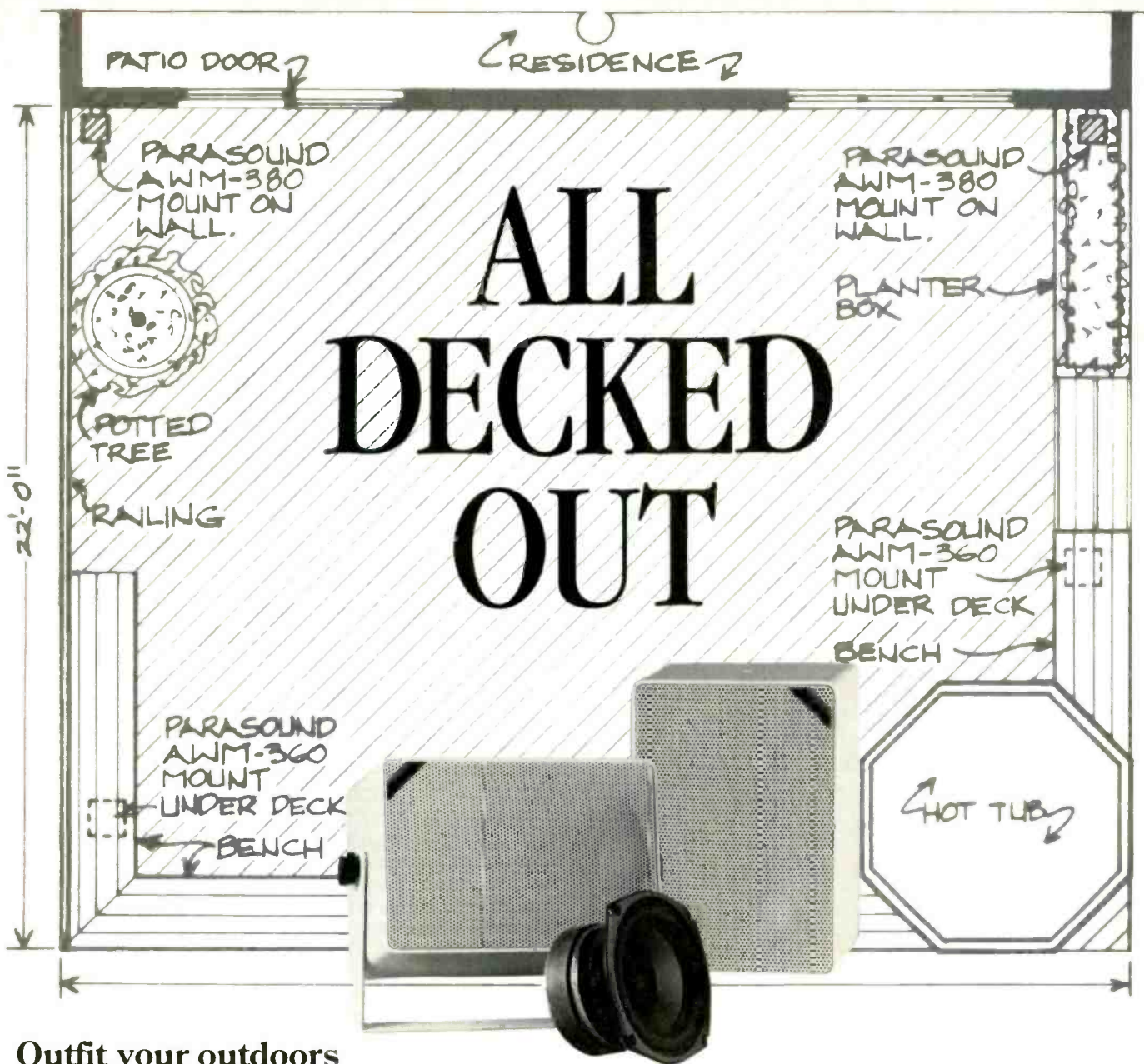


kilohms and 1,000 pF). These curves may look a little shocking because they've been extended well past the usual 20-kHz cutoff, allowing you to see that the response of the two channels diverges sharply above this frequency. Within the audio band, however, response is flat to within a tiny fraction of a decibel, and the channels match within 0.2 dB.

Figure 2 shows how the IHF load affects response when shifting from the active to the bypass mode. Once more, the plot extends far beyond the audible band and makes the results look horrendous at first glance. (Also keep in mind that the IHF load represents something near the worst-case condition among loads that might be supplied by real-world power amps.) At full output, response is essentially flat into the ultrasonic region. When the volume control is turned down to its first detent, output drops considerably and the ultrasonic roll-off is much more dramatic; furthermore, the roll-off increases somewhat at lower settings. Both effects are influenced by the IHF load, of course; with only the Audio Precision test system's instrument load across the preamp's output, the effects were minimal. In your own system, the preamp's performance might fall anywhere between these two extremes, depending on whether the load presented by your amplifier is closer to the IHF or the instrument load.

Although the phono response for MM input mode (Fig. 3A) and MC mode (Fig. 3B) is predictably less flat, in general it is excellent, particularly because it exhibits no roll-off toward the frequency extremes. The interchannel difference is a hair greater with the preamp set for 40 dB of gain in the MM mode than it is in the high-level measurements, but the two channels are superbly matched with the preamp set for 60 dB of gain in the MC mode. All of these gain settings were chosen to yield an output of 2 V.

These interchannel disparities did not occur at every detent of the volume control but only at settings two or four detents apart. At the 11 highest volume settings, channel balance was within 0.03 dB—far better than needed to satisfy B & K's spec. Throughout this range of settings, and indeed for the 19 highest settings, the level increments are spaced essentially at 2-dB intervals. At lower settings, the



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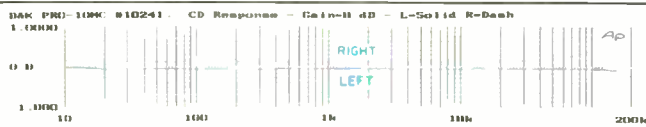


Fig. 1—Frequency response for high-level ("CD") input in active mode.

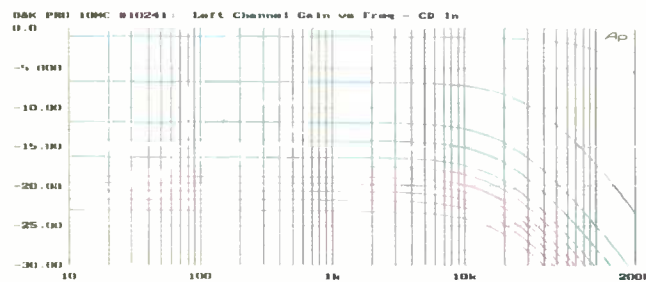


Fig. 2—Frequency response for high-level input (one channel only), in bypass mode, for the 11 highest volume-control settings, with IHF load on output; signal source was 600 ohms. See text.

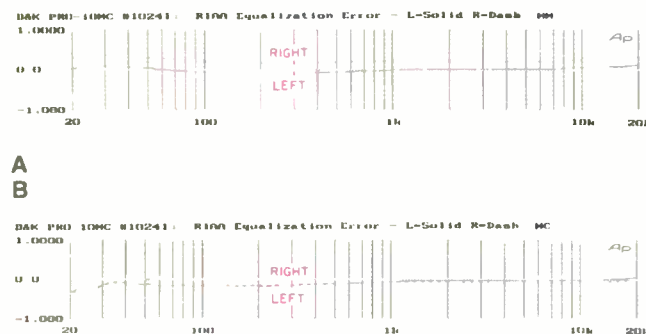


Fig. 3—RIAA-equalization error for MM phono (A) and MC phono (B).

interchannel disparity increases, and so does the size of the volume steps between detents. At maximum volume, the active circuitry boosted high-level signals by 21.4 dB.

In other overall tests, this preamp exceeded the manufacturer's rating for maximum output, measuring 15.1 V, and output impedance was found to be 220 ohms. Table 1 lists various parameters for a high-level input and each of the phono options, with the as-delivered phono loading. In most respects, the results merely confirm what we might expect. One exception is gain, which is in excess of 20 dB for the high-level input. Subtracting this from the figures shown in the Table for phono gain, we see that the phono stage alone delivers more than 35 dB of gain in MM mode and more than 55 dB in MC mode. From the viewpoint of practical listening, this means that there will be a difference of more than 20 dB between the output levels in the active and bypass modes.

The S/N ratios measured using the standard A-weighting bandpass filter are good, but B & K's specs are significantly better for high level and MM phono. This could easily be explained if B & K assumed an output reference level of 1 V instead of the EIA-mandated 0.5 V used by DSL. Part of the noise is line hum, but even when it is removed, the two bench measurements in question don't match the spec. With a cutoff at 100 Hz, the S/N figures improved by no more than about 1 dB; a 400-Hz cutoff shaved another 0.5 dB off the phono noise and 2 dB off the high-level figure. No matter how you view it, noise is down more than 80 dB for the high-level inputs and more than 75 dB for phono—that is, not as far below audibility as you'd get from most Compact Disc players but far enough to be below the ambient noise floor of normal home listening environments, even at very loud listening levels.

Figure 4 documents that THD + N through the line section remains extremely well behaved toward the frequency extremes. The MM phono section does display increasing distortion above 10 kHz but not to a degree that might cause concern. This rise is less apparent in the MC mode, only because distortion and noise are somewhat higher overall. (The dip in the curve for the MC phono mode is presumably the result of 60-Hz line hum.)

Figure 5 displays THD + N versus output voltage through the CD input at three discrete frequencies: 20 Hz, 1 kHz, and 20 kHz. The curves for 20 Hz and 1 kHz are virtually identical. At fairly high input levels, distortion at the top of the audio band does increase relative to the other two frequencies shown but is still far too low to be of any practical concern. Note that Fig. 4 employed the same high-level gain setting and was measured at a 2-V output—just below the point at which the 20-kHz curve breaks away from the other two. This further suggests that input levels would seldom drive the preamp hard enough to trigger the increase in high-frequency distortion, even if that increase were significant.

Bench testing of the PRO-10MC preamplifier was handled by Diversified Science Laboratories (DSL).

Use and Listening Tests

Let me say up front, before we get entangled in detail, that the PRO-10MC is a truly first-rate preamp. It delivered



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In the passive mode, I felt I could perceive a subtle increase in "focus," a gain in the illusion that the music originated in my room.

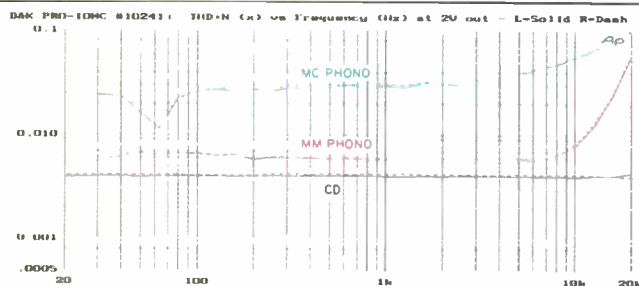


Fig. 4—THD + N vs. frequency at 2 V out for "CD" input (12-dB gain), "MM" input (40-dB gain at 1 kHz), and "MC" input (60-dB gain at 1 kHz). Solid curves are for left channel, dashed curves are for right channel.

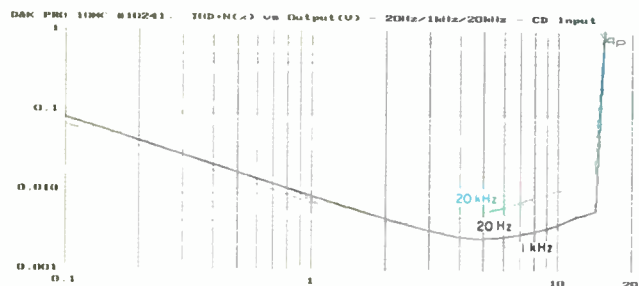


Fig. 5—THD + N vs. level for "CD" input.

Table I—Input and output characteristics, active mode.

Parameter	CD Input	MM Input	MC Input
Input Clipping Level	> 10 V	250 mV	24 mV
Input Impedance	48 kilohms	49 kilohms, + 30 pF	65 ohms
Voltage Gain	21.4 dB	57.2 dB	77.5 dB
Sensitivity (for 500 mV)	42.7 mV	0.69 mV	67 μ V
A-Weighted S/N (re: 500 mV)	81.9 dB	76.3 dB	76.0 dB
Channel Separation			
At 100 Hz	77.9 dB	77.5 dB	73.3 dB
At 1 kHz	59.5 dB	59.5 dB	57.8 dB
At 10 kHz	40.0 dB	40.1 dB	38.3 dB

utterly satisfying, even thrilling sound and did so with an unassuming competence of control behavior that made it a joy to use as well as to listen to.

The attempt to make a thorough comparison between the direct and active modes ultimately proved futile. With a level difference of more than 20 dB, switching between modes required a volume adjustment that precluded A/B comparison, let alone precise level matching. Anything I can say about the comparison, therefore, is extremely subjective and without rigorous basis.

Repeatedly, in going from active to direct mode, I believed I could perceive a subtle increase in "focus"—not only in the unambiguous stereo imaging but also in the cohesiveness between upper partials and their fundamentals. That is, there seemed to be a slight gain in the illusion that the sound actually was being generated—rather than re-created—in my listening room. But in going from direct to active mode, I could find no reciprocal loss in this characteristic. Does this apparent contradiction mean that the advantage of the direct mode was an illusion? Frankly, I don't know.

Again, one ancillary difference between the two modes is the level-control setting that each implies. For most of the listening tests, I ran the volume control at roughly the 9 o'clock position for the active mode and 3 o'clock for the passive mode. With this relationship between the two, the active mode offered noticeably cruder control over loudness because of the larger volume increments for each detent. On the other hand, the active mode's measured loss of precise interchannel balance at lower settings was never audible, nor could I hear any attenuation of the ultra-highs attributable to loading by my amplifier and the interconnect cable feeding it.

None of these factors offers a credible reason for a perceived difference in aural focus. Their practical importance lies elsewhere: In the loss of fine level control if you use the PRO-10MC in active mode with a power amp that offers too much gain, and in the loss of sufficient drive level in the direct mode if the amp's gain is too puny. Either way, the point will be moot if the preamp is consistently used in either mode with an amplifier of suitable gain for that mode—and assuming that the amp's resistive input impedance is high enough and its capacitance is low enough.

Even in my setup, with more amplifier gain than was ideal for the preamp's active mode, the consequences of this excess gain were too trivial to dim my listening experience. The clarity and liveliness of the sound were exemplary, and the sense of immediacy was never absent, whether or not it was subtly enhanced by the direct mode. Even after I became aware of the possible roll-off of the ultra-highs in the direct mode, nothing that could be called a coloration of any sort ever intruded.

And a simpler, more intuitive control layout is difficult to imagine. The controls' relative sizes and positions make perfect sense. Once you memorize the sequence of the input sources, which is identical for the two selector switches, you will never again have to read the front-panel labeling when you make adjustments: You can just reach out and do it. That's no small matter in a component you will live with for years.

Robert Long with Edward J. Foster

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4

ORACLE PREMIERE MK IV TURNTABLE & ORACLE SME 345 TONEARM

Manufacturer's Specifications

Turntable

Type: Belt drive.

Speeds: 33 $\frac{1}{3}$ and 45 rpm; electronic speed control with $\pm 5\%$ adjustment.

Permissible Tonearm Lengths:

Up to 250 mm (9.84 in.) from pivot to spindle.

Suspension Frequency: Adjustable; typically 3.5 Hz.

Dimensions: 20 in. W \times 6 $\frac{1}{2}$ in. H \times 15 in. D (50.8 cm \times 16.5 cm \times 38.1 cm); control box, 7 $\frac{3}{8}$ in. W \times 2 $\frac{1}{4}$ in. H \times 8 in. D (18.7 cm \times 5.7 cm \times 20.3 cm).

Weight: 43 lbs. (19.5 kg).

Prices: \$3,495 in silver, \$4,195 in silver and gold, \$4,695 in black and gold; dust cover, \$200; additional arm mounting boards, \$105 pre-cut, \$70 blank.

Tonearm

Pivot-to-Stylus Distance: 232.32 mm (9.15 in.).

Pivot-to-Spindle Distance: 215.35 mm (8.48 in.).

Cartridge Mounting: Detachable headshell; 12.7-mm (0.5-in.) mounting centers.

Offset Angle: 23.204°.

Linear Offset: 91.54 mm (3.6 in.).

Overhang: 16.98 mm (0.669 in.).

Height: 56.4 to 87.9 mm (2.22 to 3.46 in.) above mounting surface.

Permissible Height of Record Surface: 24.4 to 55.9 mm (0.96 to 2.2 in.).

Depth Below Mounting Surface: 56.75 mm (2.23 in.).

Radial Clearance for Balance Weight: 73 mm (2.87 in.).

Clearance Between Record and Dust Cover: 37 mm (1.46 in.) for cartridge height of 17 mm (0.67 in.).

Price: \$1,595 in silver, \$1,795 in black.

Company Address: 1237 Nielsen Dr., Clarkston, Ga. 30021.

For literature, circle No. 93



MEASURED DATA

Oracle SME 345 Tonearm

Pivot-to-Stylus Distance: 9.14 in. (232 mm).
 Pivot-to-Rear-of-Arm Distance: 2.375 in. (60.3 mm).
 Tracking-Force Adjustment: 0 to 2.5 grams.
 Tracking-Force Calibration: Calibrated tool supplied.
 Cartridge Weight Range: 6 to 17 grams.
 Counterweight: 154.2 grams.
 Counterweight Mounting: Locked to rear of tonearm after adjustment.
 Sidethrust Correction: Knob on extension from arm pillar.
 Pivot Damping: None.
 Lifting Device: Damped lever near pillar.
 Headshell Offset: 23.5°.
 Overhang Adjustment: Sliding pillar in base tracks.
 Bearing Type: Ball and race, lateral and vertical.
 Bearing Alignment: Excellent.
 Bearing Friction: Below 40 mg, lateral and vertical.
 Lead Torque: Very Low.
 Arm Lead Capacitance: 18 pF, each channel.
 Arm Lead Resistance: 1.3 ohms, each channel.
 External Lead Length: 3.9 ft. (1.2 m).
 External Lead Capacitance: 130 pF, each channel.
 External Lead Resistance: 0.3 ohm, each channel.
 Mounting: SME rack and pinion.

My first turntable report, in the March 1982 issue, was on the original Oracle turntable, an exceptional performer. At the time, the idea that sound quality could be affected by any mechanical imperfections of a turntable, aside from wow and flutter or rumble, was controversial, to say the least. I knew that the Oracle would challenge me to devise tests that could be correlated with listener comments, and I remember my trepidation as I began. A decade later, measuring the imperfections of the Oracle Premiere MK IV still presents a considerable challenge.

This latest version of the Oracle is similar in many ways to the original but has some notable improvements. The MK IV is even more beautiful and superbly finished than the original, which was a standout in its day. The MK IV's gold-plated suspension towers and record clamp, the satin-finished aluminum turntable and its platform, the black record mat and platter rim, and the clear acrylic turntable base make a stunning sight. The satin-finished aluminum tonearm, which is made especially for Oracle by SME, looks perfectly at home, mounted on the special SME-type mounting base which extends from the rear of the turntable platform. The Oracle SME 345 is essentially similar to the SME 309 tonearm, which I reported on in the September 1990 issue. When I performed the tap test on the 345's armtube, it sounded more uniform, from a point behind the headshell all the way to a point just forward of the tonearm pillar, than did the SME 309. Perhaps the damping is slightly different in the Oracle 345 version. The tonearm bearings are excellent and have very low friction. When I tried to push, pull, and twist the armtube while holding the tonearm pillar firmly in my other hand, I could discern no play at all, an indication of good design and assembly. The general appearance and fine finish of the Oracle Premiere turntable and 345 tonearm give testimony to the great care in design and manufacture.

The Premiere MK IV turntable's base is made of transparent acrylic, 7/8 inch thick. The suspension towers are about 4½ inches high and 1¼ inches in diameter. The bearing well, tonearm mount, and a bubble level are all mounted to a four-layer skeletal structure of laminated aluminum, like that in the original Oracle. This structure is suspended at three points by spring systems, damped by rubber inserts, in the towers. Threaded rods, extending through the acrylic base to the mounting feet, are used to level the turntable base.

MEASURED DATA

Oracle Premiere MK IV Turntable

PARAMETER	MEASURED	COMMENT
Speed Stability	±0.15%	Excellent
Wow, DIN Unwtd.	0.22%	Very good
Wow, DIN Wtd.	0.13%	Good
Flutter, DIN Unwtd.	0.15%	Good
Flutter, DIN Wtd.	0.03%	Excellent
Wow & Flutter, DIN Unwtd.	0.27%	Very good
Wow & Flutter, DIN Wtd.	0.13%	Good
Long-Term Drift	0.10%	Excellent
Rumble, Unwtd.	67.5 dB	Excellent
Rumble, Wtd.	82.9 dB	Excellent
Suspension Resonance	3.0 Hz	Good

The feet are of aluminum and have elliptical bottoms that give them some of the advantages of point-contact mounting feet without the possibility of marking or damaging the surface on which the turntable is placed. Where the original Oracle used a rod and adjustable weight to counterbalance the mass of the various tonearms that might be used with it, the Premiere MK IV has a semicircular weight attached to the skeletal structure, directly opposite the tonearm mount, which the company says will effectively counterbalance whatever arm is mounted. The turntable motor is mounted directly to the acrylic base and has a specially shaped pulley on its drive shaft. A belt runs from this pulley to a step on the underside of the platter. The platter, which weighs 6 pounds (including its integral mat), is of sandwich construction, with its black composite inner layer visible as a 5/8-inch black band between the aluminum top and bottom layers. With the arm attached, the turntable requires about 8 inches of vertical clearance.

The switches for a.c. power and speed selection are flush-mounted on the sloping front panel of a separate, brushed-aluminum, electronic control box. On the rear of this box are two DIN sockets plus a control for adjusting both the 33⅓- and 45-rpm speeds together. (Two separate pots, on the bottom of the box, can be set with a screwdriver to adjust each speed separately.) The four-pin DIN socket accepts the power cable from the motor, and the five-pin DIN socket accepts the cable from the power supply. This power supply is in a separate box that has a heavy-duty "U" frame cover and a mating bottom chassis. The supply can be mounted well away from the turntable because the power cable is 57 inches long.

The Oracle SME 345 tonearm has a detachable headshell and the famous SME rack-and-pinion sliding base for setting the overhang to match different phono cartridges. The Premiere MK IV turntable's round aluminum arm mount has been machined with the special slot that accommodates this base. The 345 is a pivoted tonearm with static balance; the arm is balanced for different cartridge masses by mov-

Oracle has integrated an SME-built tonearm and optimized the combination to produce a decidedly superior product.

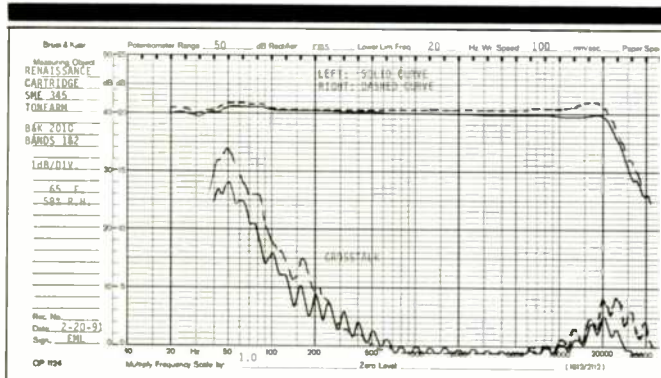


Fig. 1—Frequency response and crosstalk of the Renaissance cartridge in the Oracle SME 345 tonearm. The increase

in crosstalk at low frequencies is an artifact of the B & K 2010 test record.

ing the counterweight at the rear of the tonearm, after which the tracking force is set by moving another counterweight, closer to the arm pivot. The counterweight is moved by turning a screw with a supplied, calibrated, hex-head adjustment tool; each full turn applies 0.5 gram of tracking force. The 345 includes a damped-lever lifting system with a rubber interface to keep the tonearm from sliding horizontally when it is raised or lowered. It also has a calibrated knob for sidethrust, or anti-skating, correction. A swivelling male DIN plug, mounted at a right angle to the bottom of the tonearm pillar, mates with a female DIN connector on one end of the detachable phono cables and ground lead. The cables have gold-plated phono plugs with coiled-spring strain reliefs; the ground lead has a spade lug that can be connected to the ground on your preamplifier.

Measurements and Listening Tests

After I set up the turntable and tonearm and mounted the cartridge, I made some preliminary measurements that helped me finalize the adjustments; this procedure helps me get optimum performance and also verifies that there are no hidden problems which could invalidate listening or the final measurements. The listening sessions were conducted after the technical measurements were completed, but none of the members of my listening panel ever see the results of these measurements until the listening sessions are finished.

The cartridge I used for my tests was the Renaissance, a low-output moving-coil type that performed well but is being discontinued. I was amazed by its light weight, less than 5 grams.

The frequency response and interchannel crosstalk are shown in Fig. 1. The response is very uniform, without the sag in the middle and upper middle ranges I have seen from some other arm/cartridge combinations. Sometimes this sag can exaggerate the perception of depth in a recording so that it seems to have more front-to-back spaciousness than was actually recorded. The Oracle/Renaissance combination doesn't need this artificial assistance, because comments by members of the listening panel indicate that it excels in presenting a realistic sense of depth. The level of the crosstalk is extremely low, even in the high-frequency range, which may contribute to the uncanny sense of realism. The rise in crosstalk in the low-frequency range is an artifact of the B & K 2010 test record.

Figure 2 shows the low-frequency resonance of the left and right channels at 8.0 Hz from the cartridge compliance and the tonearm's effective mass. The effect on the bass response above 20 Hz is insignificant, and I couldn't correlate it with any comments made by the listening panel. The quality of the sound of double bass and bass drum was very close to that of the reference system, as rated by most panel members, and only one of them commented that the Oracle turntable setup sounded "slightly tighter."

The response of the tonearm and cartridge to a slow sweep from 20 to 1,000 Hz is shown in Fig. 3. There is a slight step, or glitch, at around 40 Hz in each channel as well as glitches at around 400 Hz in the left channel and 500 Hz in the right. The low-frequency glitch may have been caused by the connection between the counterweight and

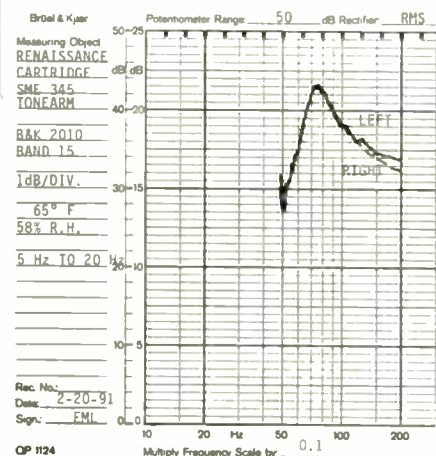


Fig. 2—Low-frequency arm/cartridge resonance is at 8.0 Hz; the Q is 4.7 in the SME tonearm, indicating underdamped response.

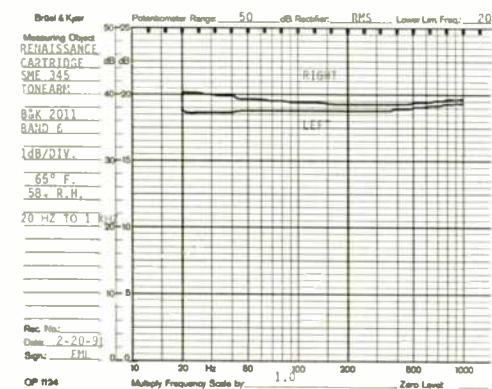


Fig. 3—Slow-sweep check (20 to 1,000 Hz) for tonearm resonances.

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The Premiere MK IV's rumble is lower than the original Oracle's and is comparable with the best that I have measured.



Fig. 4—Response to vertical and lateral modulation from 2 to 100 Hz (slow sweep).

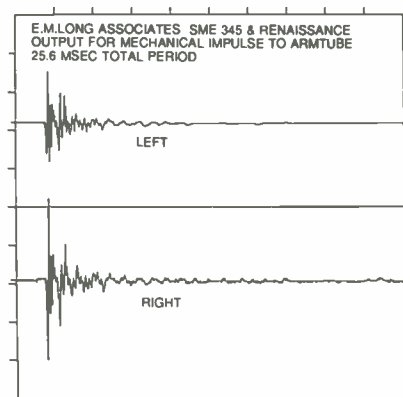


Fig. 5—Output vs. time of tonearm and cartridge when mechanical impulse was applied to armtube, with arm on rest.

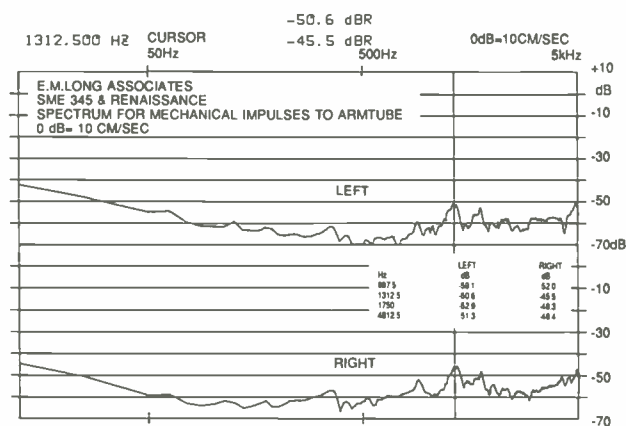


Fig. 6—Spectral output (averaged) of arm/cartridge for series of 16 mechanical impulses applied to armtube.

the rear of the tonearm; the other glitches may have been due to reflection of energy from the vertical and lateral tonearm bearings. There is also a slight possibility that the connection between the headshell and armtube might have been involved, even though it is extremely tight. Sometimes delayed energy reflected back to the stylus can cause coloration in the sound, but nobody on the listening panel made any comments about coloration. Perhaps the superb performance of the Oracle/Renaissance system, which was very close to the reference system in this regard, made it difficult for the listening panel to focus on what slight coloration there may have been.

In Fig. 4, the result of a slow sweep from 2 to 100 Hz for vertical and lateral groove modulation, the response of the 345 tonearm and Renaissance cartridge is greater for vertical modulation. Recordings are usually made with most, if not all, of their low-frequency energy confined to the lateral (mono) groove modulation, for practical reasons having to do with the way records are cut. Therefore, the rise in the vertical output at the low-frequency resonance seen here should not cause any serious ill effects.

The output of the tonearm and cartridge from a mechanical impulse applied to the armtube is shown in Fig. 5. The smaller peaks that follow the initial output are the result of delayed resonances. One might think they would cause audible effects that could diminish the transparency of the perceived sound. This was not the case, however, since comments from the listening panel ("clearer than the reference" and "very transparent sound for full orchestra") indicate that the clarity of the sound was excellent.

The spectrum of the output for a series of 16 mechanical impulses applied to the tonearm and cartridge is shown in Fig. 6. There are some peaks in the midrange, the highest at 1,312.5 Hz, but they are not very severe. These peaks might be correlated with some comments about brightness of the sound of voice and brass, yet when I asked panel members about these written comments later, they said that they considered the sound of the Oracle/Renaissance to be brighter than that of the reference system but that they still considered the sound of the Oracle/Renaissance to be more realistic.

Although the Renaissance cartridge is being discontinued, a few words are merited here on its performance in the Oracle system. This cartridge had a slight interchannel phase difference, only 9.21 mS at 20 kHz, which might just possibly have been perceived as an increase in spaciousness of the presentation. One panel member commented that the orchestra sounded "similar to the concert hall," and the final tally put the MK IV turntable, 345 tonearm, and Renaissance cartridge slightly ahead of the reference system in the rating for spaciousness.

The Renaissance cartridge and 345 tonearm had some difficulty in precisely tracing the 30-cm/S, 10.8-kHz tone on the Shure TTR-103 test record. This is a very severe test, and the combination's performance, if not perfect, was still very good.

Figure 7, the spectrum of the wow and flutter for the Premiere MK IV turntable, is lower than that for the original Oracle turntable but not the lowest I have measured. The contribution of the arm/cartridge resonance can be seen as

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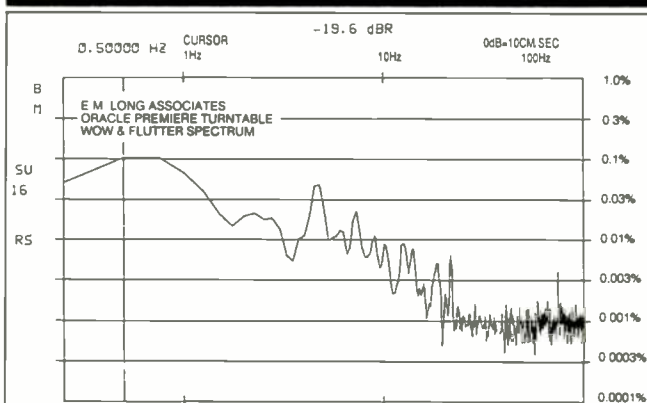


Fig. 7—Wow and flutter spectrum of turntable, from 0 to 100 Hz. The

output at about 9.5 Hz is due to the arm/cartridge resonance.

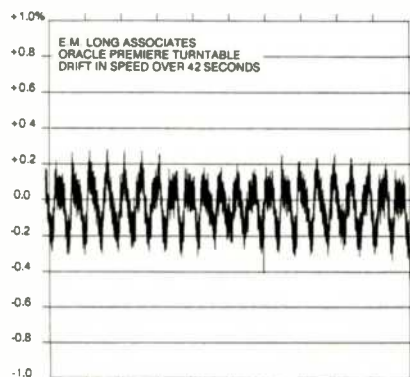


Fig. 8—Speed drift over 42-S period. Cyclic variations at 0.56 Hz are related to the rotational speed of 33 1/3 rpm.

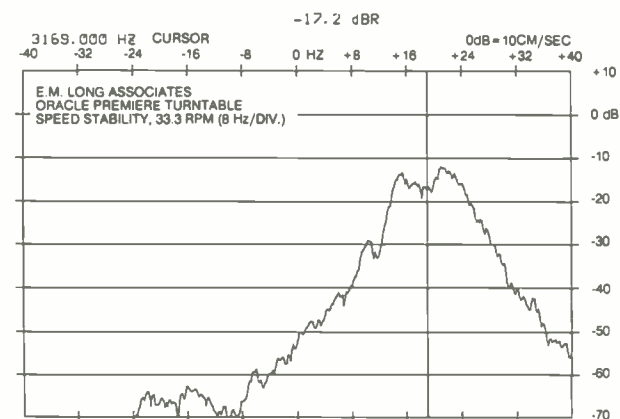


Fig. 9—Speed stability, showing variation from the 3,150-Hz nominal frequency of the test band on the B & K 2010 test record. The center frequency (cursor position) is at 3,169 Hz,

19 Hz above the nominal frequency, which would seem to indicate that the turntable is running 0.6% fast. However, the recorded frequency is probably a bit high.

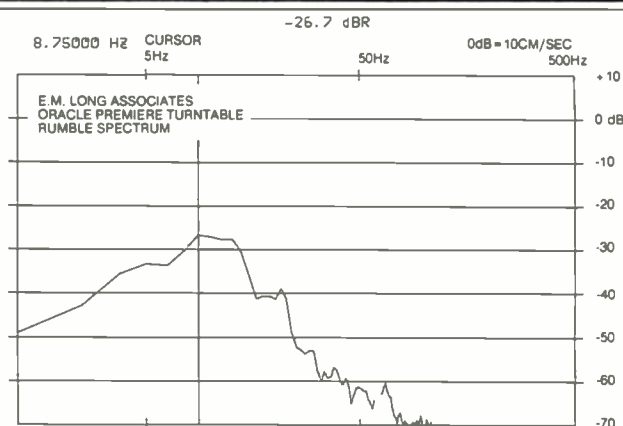


Fig. 10—Rumble spectrum. Most of the output is near the arm/cartridge resonance.

a peak at 9.5 Hz, but it is reasonably low. Figure 8 shows the long-term drift over a 42-S period. You can observe undulations at the rotational frequency of 0.56 Hz, or the 33 1/3-rpm speed of the turntable. The curve appears to be more uniform than the original Oracle turntable's, probably due to the superior power supply of the newer MK IV. The speed stability is shown in Fig. 9; the result is similar to that of the original Oracle. I have come to the conclusion that the 3,150-Hz tone on the B & K 2010 test record is actually a little higher in frequency when the rotational speed of the record is set exactly at 33 1/3 rpm by using a stroboscopic disc. This has been consistently true for most of the turntables that I have tested. In any case, for listeners with perfect pitch, the speed adjustment on the control box should take care of any problems caused by recordings that may have been cut slightly off-speed. The listening panel's comments about the Oracle Premiere when reproducing piano—such as "cleaner," "clearer," and "more realistic" than the reference system—tell me that its wow, flutter, and drift deserve the excellent to good ratings I have given them in the "Measured Data" Table.

The spectrum of the rumble, seen in Fig. 10, is primarily due to the arm/cartridge resonance. The MK IV's rumble is lower than the original turntable's and is comparable with the best that I have measured.

The output of the system due to a mechanical impulse applied to the edge of a stationary record is shown in Fig. 11. The stylus was sitting in a groove on the record, so the output includes the contributions of the cartridge, tonearm, turntable, and record. The spectrum of the output for a series of 16 such mechanical impulses is shown in Fig. 12. This test is meant to determine, among other things, the ability of the turntable platter's mat to remove or damp out the mechanical energy inside a record. Figure 11 shows that the energy is dissipated quickly, while Fig. 12 shows that most of the energy is in the lower frequency range.

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Even my earliest stereo LPs sounded so good that I was swept into the scene, and isn't that what great sound reproduction is about?

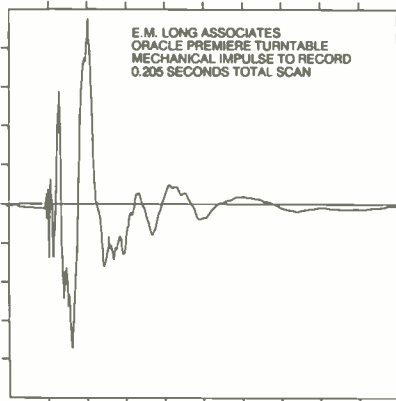


Fig. 11— Output vs. time for mechanical shock applied to the edge of a stationary record.

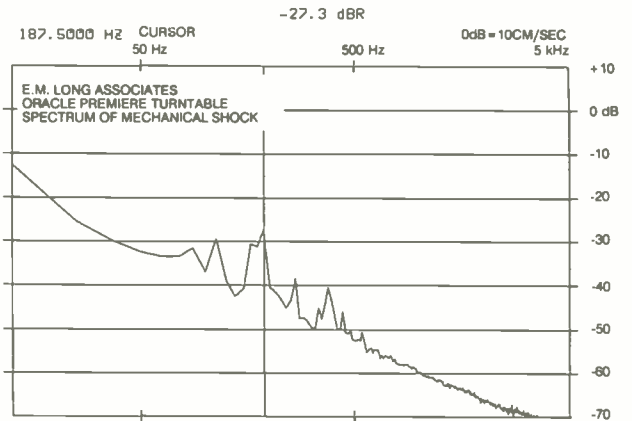


Fig. 14— Spectrum to 5 kHz of the vibrations caused by mechanical shock applied to the platform on which the turntable was resting (16 impulses, averaged).

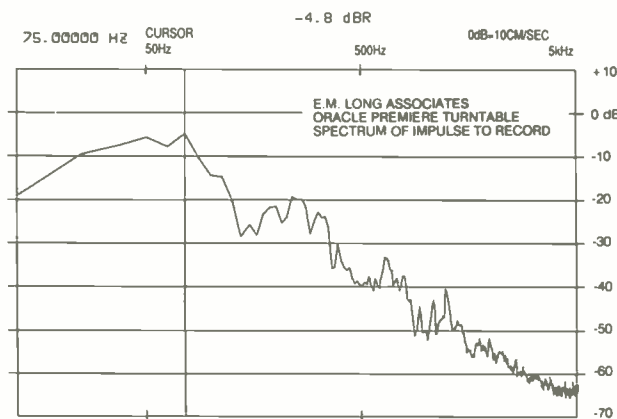


Fig. 12— Spectrum to 5 kHz of vibrations from mechanical impulse applied to edge of a stationary record (16 impulses, averaged).

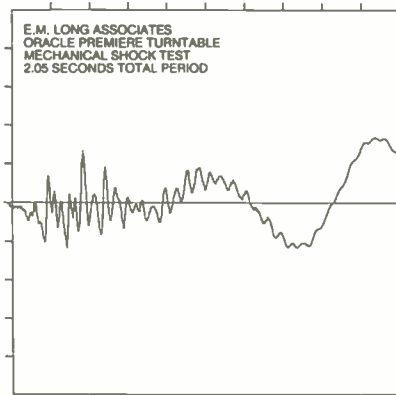


Fig. 13— Output vs. time for mechanical shock applied to the platform on which the turntable was resting.

Piano music with staccato passages and recordings with rapid, high-frequency transients were used to correlate the perceived sound with these measurements. Comments such as "very clear," "superb transients," and "excellent detail" were used to describe the Oracle/Renaissance combination.

A mechanical shock was applied to the platform on which the Premiere MK IV turntable was resting, and the output is shown in Fig. 13. Some energy at frequencies higher than the 3.0-Hz suspension resonance is apparent, and there is a delay before the energy at 3.0 Hz builds up. A series of 16 mechanical shocks, spaced at 3-S intervals, was applied to the platform. The spectrum from these shocks is shown in Fig. 14. There are energy peaks between about 80 and 500 Hz, with the major peak at 187.5 Hz. This energy is at a very low level and should not pose a problem under normal conditions.

Acoustical breakthrough, or feedback, was tested by playing very high-level, low-frequency passages rather than by conducting the usual controlled test. The turntable, tonearm, and cartridge exhibited excellent isolation and freedom from feedback problems.

Conclusions

The Premiere MK IV is an improved and refined version of the Oracle turntable that set new standards in sound quality when it was first introduced in the beginning of the 1980s. By integrating the SME-built 345 tonearm with the MK IV and optimizing the combination, Oracle has produced a definitely superior product. I couldn't resist the urge to play some of the earliest stereo recordings in my collection to hear them again with these components. Even the Cook Laboratories *Fiesta Flamenca* with Carlos Montoya, recorded in about 1951 with two Capps condenser microphones, sounded so good that I was swept into the scene and began clapping along with the performers. That's involvement! But isn't that what great sound reproduction is supposed to be about?

Edward M. Long

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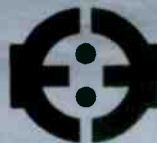
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My first acquaintance with Beyer was around 1959, when I listened to their DT48 earphones. These 'phones were designed for professional use and were superior to those designed for audiometry at that time. The DT990 Pro has an excellent heritage and does credit to Beyer's long-term commitment to designing and producing high-quality earphones.

The DT990 earphones are very light and well made. The plastic bails are made as one continuous plastic molding. The headband, of imitation leather, is attached to a sliding metal piece on the bails. Detents on the bails keep the headband in the selected position; the DT990s are most easily adjusted by removing them, selecting the correct position, and then putting them on again. The left and right earcups can be distinguished by the "L" and "R" embossed on the outside of the sliding bail adjustment. The vinyl ear cushions are covered with a felt-like material I found very comfortable.

The diameter of the ear cushions could be a little larger, at least for my ears, but nevertheless I found them to be relatively comfortable when listening for an hour or more. The felt covering probably makes up for the cushions' slightly small size, because it is better than having vinyl ear cushions used in other earphones, against your skin for any length of time. Another feature of the DT990s that helps in ad-



justing the earcups to your head is that they are mounted so they can swivel slightly. The tension provided by the plastic bail, which keeps the earcups in place, is not excessive and actually produces a sensation of having very little pressure against the ears. The DT990s weigh only 8 ounces, so it is easy to forget you are wearing them.

The DT990 earphones are "open air" types, which do not have a tight seal at the rear or front of the diaphragm. Because of this, the bass output might be less than in a closed type of earphone, but Beyer has designed the dynamic

transducers to account for the lack of a tight seal and the output in the bass range has been increased by using a tuned-port technique. The attenuation of outside sound is negligible, and it is quite easy to hear outside sounds.

The DT990s' subjective sound qualities were rated by members of a listening panel, many of whom have been evaluating high-quality audio components with me for years. They were asked to listen to various types of program material and write down their comments. The measurements I made showed that the bass output was very

EARPHONE EVALUATION

PARAMETER	RATING	COMMENTS
Overall Sound	Very good	
Bass	Very good	"Solid bass" and "Lowest bass subdued"
Midrange	Good	"Bright" and "Slight nasality"
Treble	Very good	"Clear" and "Smooth hiss"
Overall Isolation	Poor	
Bass	Poor	"No isolation"
Midrange	Poor	"Outside sounds are easy to hear"
Treble	Fair	"Some attenuation of highs"
Comfort	Very good	"Ear cushions slightly small"
Value	Very good	

GENERAL COMMENTS: Very comfortable; good adjustments; good perspective; very comfortable for long-term listening.

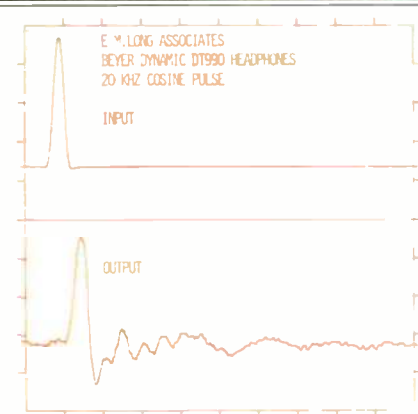


Fig. 1—Output vs. time (bottom) for 20-kHz cosine pulse (top).

extended, with only a slight roll-off of about 10 dB at 32 Hz compared to the output at 64 Hz. Comments by members of the listening panel—such as "solid bass," "tight bass," and "lowest notes slightly subdued"—correlate well with my technical measurements in this regard. Comments about the sense of presence as being "excellent" and "bright" correlate well with the measurements I made with the B & K head and torso simulator (HATS) mannequin (which I discussed in the article "As Close As You Can Get" in the April 1991 issue). Beyer has designed the DT990 earphones to have a diffuse-field response that closely matches that of the B & K measuring system. The Stax SR-Lambda Pro ear-speakers, which I use as reference, showed a dip at 2.8 kHz when measured with the B & K system's diffuse-field response (see my review, also in the April 1991 issue), and the listening panel's members all commented that the DT990s sounded brighter than the reference.

Listening panel comments of "bright" and "extended highs" about the mid- and high-frequency range also correlate well with the way the Beyer DT990 earphones reproduced the spectrum of a 500-Hz square wave; the natural harmonic output at 3.5, 4.5, and 6.5 kHz were accentuated, as were the harmonics at 17.5 and 18.5 kHz. The shape of the 500-Hz square wave was excellent, with a slight tilt showing some low-frequency phase shift.

Figure 1 is the output of the Beyer DT990 earphones for a 20-kHz cosine input. The output after the input has stopped correlates with a listener comment regarding "excellent details," since the output shows a good recovery and very little ringing. It also shows that the DT990 earphones produce a positive acoustical output for a positive electrical input. This caused very favorable comments about the articulation of voices, the sound of brass, and other asymmetrical musical sounds.

I also measured the frequency response with a Fast Fourier Transform (FFT) analyzer by using the same 20-kHz cosine pulse with a B & K 4133 mike directly in front of the earphone element. The response was very flat; a slight dip at 5.5 kHz might have been caused by reflections between the transducer diaphragm and the protective metal screen in front of it. The ear cushions and the other exposed parts of the earcup are well padded, and I don't think that they were the cause of this dip. In any case, the relationship between the amplitude- and phase-transfer functions of the output showed that the response was minimum-phase. There was a very slight coloration that I would describe as an "aaw," as in "aaw, that's not bad at all."

The rated impedance of the Beyer earphones is 600 ohms, which means that the impedance of the source should have very little effect on the shape of their response. If the DT990s sound different when fed from different sources, you can therefore blame the sources, not the earphones. Even with their high impedance, the high efficiency of these earphones means that the DT990s can produce very high sound levels with relatively little input power.

The Beyer DT990s are very comfortable, and it is easy to forget that you are wearing them even when listening over long periods. The listening panel gave the DT990 a rating of "very good" for overall sound quality and for physical attributes. I personally think that they are very close to the Stax SR-Lambda Pro reference earphones, and only a slight veiling of the sound keeps them from being the Lambda Pro's equal. When the prices are compared, I think they are a very good value.

Edward M. Long



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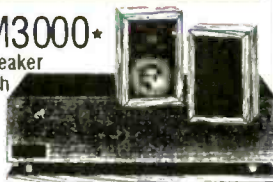
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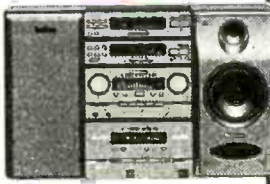
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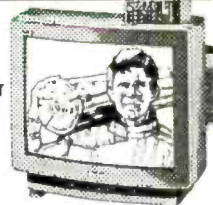
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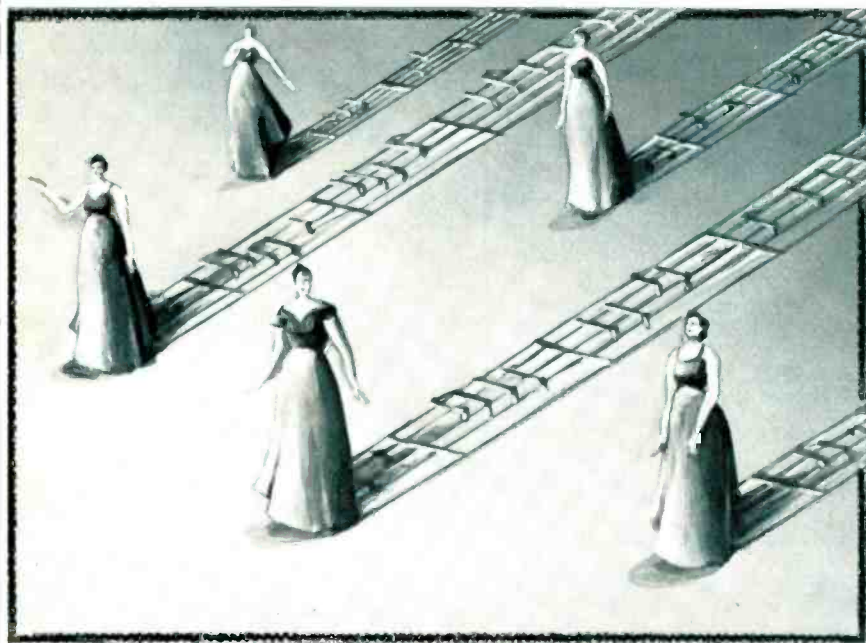
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OUT OF THE MANY, ONE



Handel: Messiah. Lorraine Hunt and Janet Williams, sopranos; Patricia Spence, mezzo-soprano; Drew Minter, countertenor; Jeffrey Thomas, tenor; William Parker, bass-baritone; Chamber Chorus of the University of California, Berkeley; Philharmonia Baroque Orchestra; Nicholas McGegan, conductor.

Harmonia Mundi 907050.52, three CDs; 3:10:12.

In the summer of 1741, George Frideric Handel (as he spelled his name after forsaking his native Saxony to become an Englishman) composed his "Messiah" oratorio but kept tinkering with it as long as he lived.

By the time of the world premiere in 1742 (in Dublin), Handel had already departed from the autograph score, and for performances at London's Covent Garden in 1743, 1745, 1749, and 1750 he produced further disparate versions. For the London Foundlings' Hospital performance in 1759, he had yet another. The score which Handel used when he conducted shows still more ad hoc discrepancies, as does the final version he made, for a return to Dublin.

No doubt singers' differing abilities motivated many changes of Handel's mind. Take, for example, "But who may abide the day of His coming?" Handel

originally composed it as an aria for bass, but for the world premiere he downgraded it to a bass recitative. For the first two Covent Garden performances, he used the aria version, but for the third he returned to the recitative. For the fourth Covent Garden performance, he used it as an aria again—only this time for alto (sung here by the outstanding countertenor Drew Minter). The Foundlings' Hospital performance brought yet another aria version, for soprano.

The multifold virtues of Harmonia Mundi's resonant, refulgent new recording include—for the first time—a neat little technological trick. The three CDs contain *all* the "Messiah" music, from all versions, so you yourself, by programming your CD player, can listen to whichever of the nine versions strikes your fancy. In the trilingual libretto accompanying this recording, the text of any section having an alternate version appears in a shaded block, with the alternates as separate cuts at the end of the respective disc. A master plan tells you how to program your CD player to call up whichever version you want.

Your reaction to this meticulous, technically brilliant recording will depend largely upon your personal position in the great Authentic Performance debate. The Philharmonia Baroque, re-

siding in San Francisco but with its English conductor, stands foursquare on the contention that works of the baroque and classical periods must sound the way their composers themselves heard them. In this oratorio, that means natural horns (without valves) and instruments strung not with new-fangled products but with gut, played totally without vibrato (which was introduced into general usage only later by the great Belgian violinist Eugène Ysaÿe [1858 to 1931]). The booklet lists 42 choristers and 32 instrumentalists, including harpsicord and organ (with Chorus Master Philip Brett doubling as organist). This means a true chamber performance—as Handel himself did it—but far removed, indeed, from the roof-raising joyful noise dear to audiences who pack such immense spaces as London's Royal Albert Hall.

Even the experts squabble about these performance principles; in view of that, I feel no shame in admitting that I hem and haw. One could argue *ad infinitum* over whether Beethoven would have cursed or kissed a fine, modern concert grand, or wind players turned up their noses at contemporary instruments, or string players welcomed the unarguable advantages—tonal and otherwise—of strings made of nylon and metal. I've heard Christopher Hogwood himself enthusiastically describe, eyes aglow, a Hollywood Bowl "Messiah" involving vast armies of participants.

If you like your "Messiah" à la Cecil B. de Mille, you'd better pass this recording by. If, on the other hand, you want it "authentic," you'll probably not find a better choice for a long time to come. Nicholas McGegan whips things along at a brisk clip indeed (at times even to the point that some soloists, beset by fast *fiorature*, sound slightly beleaguered), with each section leading directly into the next. For this particular endeavor, you could probably not find better forces anywhere in the world. Among the excellent soloists, William Parker stands out with enunciation almost any singer in the world could learn from.

And now, dear Harmonia Mundi, when may we expect *Mozart's* delicious version of Handel's "Messiah"?

Paul Moor

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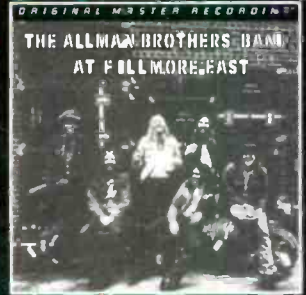
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Shostakovich: 24 Preludes, Op. 34; Alkan: 25 Preludes, OP. 31. Olli Mustonen, piano. **London 433 055-2.**

Though similar in title, these prelude sets are utterly different. Dmitri Shostakovich shared Bach's concept of the prelude as an abstract distillate of a musical idea, and his results are in the

same league. Charles-Henri Alkan was a French virtuoso pianist. His preludes of 1847 are much more atmospheric and subjective, prefiguring Debussy in this respect, and are an interesting contribution to the literature. Olli Mustonen plays both sets with a mastery of color that makes Shostakovich's own

recordings from his Preludes and Fugues, Op. 87 (once available on Seraphim LP) seem a little pallid. The sound too is fine, but the overriding interest is in Shostakovich's crystalline and often playful writing.

Robert Long

Nielsen: Choral Works. Various soloists and children's choruses; the Danish National Radio Choir and Symphony Orchestra; Stefan Parkman and Leif Segerstam, conductors. **Chandos 8853.**

All the world's Danes total only four million, so it's taken too long for the extraterritorial advocacy by Karajan, Bernstein, and Blomstedt of the six symphonies to win Carl Nielsen (1865 to 1931) his merited reputation as a great composer. These less familiar but equally impressive choral works, outstandingly performed and recorded, reinforce it. His rapturous "Hymn to Love," by an enamored genius of 30, acknowledges that love is God, and closes not with Amen but with Amor.

Paul Moor

Schubert/Mahler: "Death and the Maiden"; Schubert: German Dances and Trios. I Musici de Montréal. **Chandos 8928.**

Schubert/Mahler: "Death and the Maiden"; Schubert/anonymous: Quartettsatz. Franz Liszt Chamber Orchestra. **Harmonia Mundi/Quintana QUI 903025.**

Mahler's transcription for string orchestra of Schubert's String Quartet No. 14, "Death and the Maiden," does little more than increase the instrument count and add a double-bass line. That's enough to turn drama into melodrama and pathos into schmaltz—at least to anyone who knows and loves the original. Still, the resulting sonorities are (dare I say it?) great fun. Both these recordings go for big, spacious sound, wide dynamic range, and emotional intensity. Chandos, working in a church in La Prairie, Quebec, wins sonic honors, but its filler is trivial. The Quartettsatz (similarly transcribed by the Liszt Orchestra's members) is far more appropriate, and the marginally more relaxed Quintana performance has its charms, despite the artificial-sounding pickup in the Budapest "Town Hal."

Robert Long



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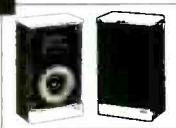


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JOHNNY B. ROTTEN



That What Is Not: Public Image Ltd.
Virgin 91815-2, CD; AAD; 49:41.

Sound: A Performance: A

With his piercing caterwaul and irrepressibly cantankerous iconoclasm, John Lydon would hardly be anyone's first-choice candidate for making a conventional rock record. Yet with *That What Is Not*, it seems this is almost what Public Image Ltd. has done. Emphasis on "almost." I wouldn't want to ruin Lydon's reputation—or your expectations—with the accusation that PiL would ever be truly "conventional."

In a way, *That What Is Not* continues a minor trend toward accessibility that began as far back as 1985 with *Album*. Returning with guitarist John McGeogh and bassist Allan Dias, PiL lays down highly melodic and infectious grooves that combine elements of hard rock in often surprising ways. Inventive song structures and sonic distortion convey a feeling of musical anarchy that belies tight arrangements and skillful play-

ing—a perfect foil for Lydon's affected wailing and trademark cynicism. Every song here, as on previous PiL records, wears the badge of the snotty punk attitude, which continues to surround Lydon's persona.

At times, the band's arrangements bring delight through unexpected instrumentation, as on "Covered," where the lead break is taken by a very hot blues harmonica, backed by the Tower of Power horns. Other times, the grin comes from the sheer chutzpah of eclecticism run wild, as on "Good Things"—which begins with the bird call of a rousing salsa inflection and chugs joyously on to reveal steel drums, harmonica, the T.O.P. horns, and the soulful backing vocals of none other than Bonnie Bramlett.

Production was handled in no-nonsense fashion by hard-rock/alternative boardman Dave Jerden. He went straight for the jugular, capturing the raw aggression underlying the power and allure of rock 'n' roll that comes

from (or aspires to) the garage. At the same time, Jerden does not forsake PiL's musicianship. This tough combination, and sneaky twists that keep your head turning and your face smiling, make *That What Is Not* a ton of fun.

Michael Wright

The Missing Years: John Prine
Oh Boy OBR-09CD, CD; AAD; 54:32.
 (Available from Oh Boy Records, P.O. Box 36099, Los Angeles, Cal. 90036.)

Sound: A— Performance: A

From the first chord of "Picture Show," *The Missing Years* stamps itself as John Prine's most aggressive album. It really grabs your ear fast, due in no small part to producer Howie Epstein (of Tom Petty's Heartbreakers), who has imbued the album with a genuinely raw confidence that can't help being encouraging.

Prine's singing is his most assured, and his songwriting is sharp—engaging even when he is being mysterious. Epstein uses a variety of arrangements, from solo acoustic to rocking blues, to get the most out of Prine's songs. Some of the best tracks include the James Dean chronicle "Picture Show," the tender "All the Best," "Unlonly," the purposely cliché-loaded "It's a Big Old Goofy World," and the bizarre "Jesus the Missing Years."

The players assembled for the project are a stellar crew, among them Epstein and fellow Heartbreakers Mike Campbell and Benmont Tench, Dobroist Steve Fishell, and steel guitarist



Photograph: Jeff Katz

Jay Dee Maness plus multi-instrumentalists Albert Lee, John Jorgenson (from The Desert Rose Band), and David Lindley. Six of the songs here sport duet vocalists, who include Divinyls' Christina Amphlett, Phil Everly, Tom Petty, Liz Byrnes, Bonnie Raitt, and Bruce Springsteen.

There can be no doubt that Prine called in some favors for this, his first studio album in years. And it all pays off, as *The Missing Years* is entertaining while often thought-provoking. A whole lot of care went into the project, and it shows. This is one of John Prine's best. *Michael Tearson*

Magic and Loss: Lou Reed
Sire/Warner Bros. 9 26662-2, CD;
 AAD; 58:37.

Sound: A Performance: A-

It doesn't take a Lou Reed biographer to understand the storyline of *Magic and Loss*, a docudrama in 14 cuts. Reed, prince of the gritty, encountered death through two friends who died lingeringly in hospitals, and now he reports back: How he watched "the cancer reduce him to dust" and saw "that mix of morphine and Dextrodine/We use it on the street." There are no detached observations on *Magic and Loss*, but a lot of painful empathy. Though it's a hard album to listen to, it leaves you fuller afterward.

None of this is evident from the first cut, "Dorita," a heavy, crunching, discordant instrumental that bangs its fist and brags for over a minute. Then after a moment's silence, the soft-spoken, sprightly, rhythm guitar of "What's Good" comes out like a bird after the rain. But as Reed's operatic story progresses, even this upbeat pop sensibility proves to be misleading. The chainsaw guitars and thunderous drums that surface in the song turn out to be serious metal, not kitsch, evincing an inarticulate rage against the extinguishing of two lights.

The rest of the album is much quieter. One cut, the horrific, metaphoric "Harry's Circumcision," is a spoken-word prose-poem set against bare, vaguely countryish music. Other songs are by greater and lesser amounts more musical, but *Magic and Loss* remains a showcase for Reed's lyrics—poetry, really.



Either way, as poetry or lyrics, Reed's words would do Cole Porter or Noel Coward proud. In "Magician," taking the persona of a dying woman begging for release and then becoming afraid of it, he expresses, starkly and simply, "I'm afraid that if I go to sleep I'll never wake/I'll no longer exist." And in "Cremation," the inevitable and the inexorable collide in the form of ashes on the ocean: "The waves hit the shore/Crying more, more, more/But the coal black sea waits forever."

The mostly acoustic accompaniment, much of it co-written by Reed and guitarist/co-producer Mike Rathke, never takes center stage, but it does clamber onto it on songs like "Sword of Damocles," a ballad about the double-

edged blade of radiation treatment. Elsewhere, a couple of hopeful, upbeat songs build to points where they seem about to break into a dance bridge à la Los Lobos. Thoughtful and engaging, the album is less a dirge than a well-versed barroom reminiscence of two seemingly special people.

One of them, indeed, was special to many: The late songwriter extraordinaire Jerome "Doc" Pomus. The lyric booklet opens to a black-and-white collage with ghostly close-ups of Pomus and a smiling young woman. Since the album is dedicated "to Doc and especially to Rita," this woman is evidently Rita. And in the cover photo, Reed conjures up classical myths as he stands on a pathway to hell like Orpheus on his doomed journey to retrieve Eurydice, his dead bride. It's one more way that *Magic and Loss* lives up to its title. *Frank Lovece*

Walking in London: Concrete Blonde
I.R.S. X2-13137, CD; AAD; 42:32.

Sound: A Performance: B+

Sex sirens or objects, but too infrequently serious artists, women occupy a hard place in the world of hard rock. As Johnette Napolitano hurls at us at the conclusion of *Walking in London*, irony oozing from between her clenched teeth, perhaps this is because "it's a man's world."

In many ways, at the very core of Concrete Blonde's latest album lies a fundamental test of that assumption.





Beneath the thick snarl of Swervedriver's primal guitars lies some fairly conventional rock but in a powerful presentation.

It's not that *Walking in London* is mired in confrontational feminism. Rather, with a combination of finely tuned humor and bemused introspection, Napolitano presents a set of songs that clearly flow from a female perspective. No sickeningly coy cuteness. No silly posturing. Just rock songs, written by a woman.

Many of rock's standard themes are here, but given a fresh twist. For example, the old separation/heartbreak blues get uptempo travelling time on the title cut and bittersweet balladry on the delicate "Les Coeurs des Jumeaux." Unrequited love has its day on the plaintive "Why Don't You See Me" and again on the hip-hop-tinged "I Wanna Be Your Friend Again," complete with hilarious running commentary via the telephone ("Say what you really mean, you idiot"). And the ancient lovers' triangle gets flipped inside-out in "Woman to Woman." My favorite of all, however, is the clever sex fantasy of "Ghost of a Texas Ladies' Man," played as a pastiche of "Rawhide"/"Ghost Riders in the Sky." Although Napolitano's bass, along with her vocals and lyrics, dominates the sparse-textured musical groove, the return of original drummer Harry Rushakoff adds zip, and guitarist Jim Mankey plays some solos and fills that are stunning in their propriety.

Walking in London isn't the first record of its kind. It's not perfect either, with the songs weakening a bit toward the end of the album. You'll also hear more than one echo of some influences to which the band clearly pretends (excuse the pun). Still, there's an air of dignified comfort that seems right in a world where both sexes work damned hard to make things work. And it's a pleasure these days to hear anything that puts an intelligent spin on rock clichés. *Michael Wright*

raise: Swervedriver
A&M 75021 5376 2, CD; ADD; 44:58.

Sound: A Performance: B+

loveless: my bloody valentine
Sire/Warner Bros. 9-26759-2, CD;
AAD; 48:38.

Sound: A Performance: A

Kevin Shields of my bloody valentine describes his band as "music with a sense of optimism, yet with an undercurrent of disorientation." This description also applies to the entire growing swell of like-minded alternative bands emerging from the U.K. Building their sounds around a carefully controlled cacophony, not unlike the noise of industrial rock or the grindcore of Seattle, my bloody valentine and Swervedriver transform their own noise into melody—outlining the parameters of a nascent movement we might here dub "noise pop." (*Editor's Note:* Writer Simon Reynolds, in *The New York Times*, referred to it as "dream pop.")

Of these two albums, Swervedriver's *raise* is perhaps closer in touch with pop-song sensibilities. Adam Franklin sings with a Michael Stipe-ish intensity about the American road (seen through Oxford eyes) as a metaphor for self-discovery and yearning for freedom—"Route 66" revisited in the '90s as "Son of Mustang Ford" and "Lead Me Where You Dare . . ." Beneath the thick snarl of primal guitars lies some fairly conventional rock. That it seems so fresh is testimony to the power of presentation.

Teetering closer to the edge is my bloody valentine's *loveless*. Pushing the sonic boundaries past the limits of three-chord pop, mbv soars from the chant-line solemnity of "loomer" to the re-creation of whale songs on "touched." Indeed, mbv's loping rhythms, ethereal "disorientation"

(abetted by the liberal use of varispeed distortion), and mixed-back vocals open up fantastical visionary worlds that sweep you away in imaginary flight. Lyrics in this visceral context transcend cognitive meaning.

It's hard to see *Zeitgeist* from the middle of the times. But in an age when empires dissolve and viruses rage, the magnificent tension between disorienting noise and optimistic beauty—as heard in Swervedriver and my bloody valentine—just may be the perfect soundtrack. *Michael Wright*

Music from the Motion Picture Soundtrack *Until the End of the World*: Various artists
Sire/Warner Bros. 9 26707-2, CD;
AAD; 69:39.

Sound: B+ Performances: B to A-

Wim Wenders' new film, *Until the End of the World*, posits a global community facing the limits of technology at the end of the century. Clearly a man with a good ear, Wenders asked a wish list of his favorite recording artists to project what music will sound like in 1999. The results range in tone from doomsday to salvation day but have a unity of spirit unlike other "songs from movie" compilations. Amazingly, nearly all of the participants came up with sparse and simple sounds rather than the electronic "cartoons" we've been conditioned to call "futuristic."

The Talking Heads, a band that has always sounded of another time, starts things off with "Sax & Violins," punctuating their signature sound with cool marimba samples. Sinister bass and leering vocals make "Adversary" by Crime and The City Solution sound like a diabolical Warren Zevon.

Four cuts could be faithfully reproduced in a smoky coffee house. Lou Reed's trademark guitar strumming over bare bass on "What's Good" is frank and effectively underproduced. The tortured "Fretless," by R.E.M., endures emotional neglect aided by one guitar. The wry, witty "Humans from Earth," by T-Bone Burnett, and the loping country-western "Sleeping in the Devil's Bed," from Daniel Lanois, feature singer and guitar only.

The award for sonic restraint goes to Depeche Mode for "Death's Door." Who knew that the seminal gadget

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Teenage Fanclub's lifts seem fresh, and they have a wry sense of humor and great potential for growth.



united Can are well worth the listen. Theme pieces by Graeme Revell, the acclaimed composer of film scores, round out an outstanding collection.

Toby Haber

Bandwagonesque: Teenage Fanclub. DGC DGCD-22461.

Scotland's Teenage Fanclub stands apart from the pack of increasingly redundant alternative bands by somehow being a melodic and appealing little group, owing much to Big Star in songwriting, singing, and overall approach to record-making. But as this is nearly 20 years after Big Star's seminal #1 *Record*, there appear to be more recent musical developments that these guys have absorbed—notably from The Jesus and Mary Chain, Dino-saur Jr., and The Ramones.

Comparisons aside, there is a hint of originality here (singing with a slight Scottish brogue helps). The band's lifts seem fresh, and there's a great potential for growth. Teenage Fanclub also has a pretty wry sense of humor (check out "Metal Baby" or "Satan").

Jon & Sally Tiven

Girlfriend: Matthew Sweet. Zoo 72445-11015-2.

The promise Matthew Sweet showed on *Inside* (Columbia, 1986) and *Earth* (A&M, 1989) is fulfilled spectacularly on *Girlfriend*. Sweet's professed Jekyll-and-Hyde influences of ELO and The Sex Pistols merge as never before. Memorable pop lines breathe free, yet they're pushed by the angry, thrill-seeking guitars of Richard Lloyd and Robert Quine. Ballads and rockers alike are keenly focused in a live-sounding production that reveals every genuine snare. In all, *Girlfriend* comes on like a tryst between *Rubber Soul* and *Revolver*. That it was shopped to record labels for most of 1991 is a sad commentary.

Ken Richardson

pop band could sound melancholy and sweet? Jane Siberry brought in k.d. Lang to help her with "Calling All Angels," a gentle, floaty plea.

Three cuts share the theme of 11th-hour repentance, pledging faith in a farewell to your true love. In the hands of Nick Cave and his Bad Seeds, this

theme emerges via a bittersweet beer-hall ballad. With U2's title track, it's a driving rock finale. In Elvis Costello's stirring rendition of the early Kinks' "Days," it's an elegy saluting a departed lover who has given and taken all.

Other tracks by Patti and Fred Smith, Julee Cruise, Neneh Cherry, and a re-

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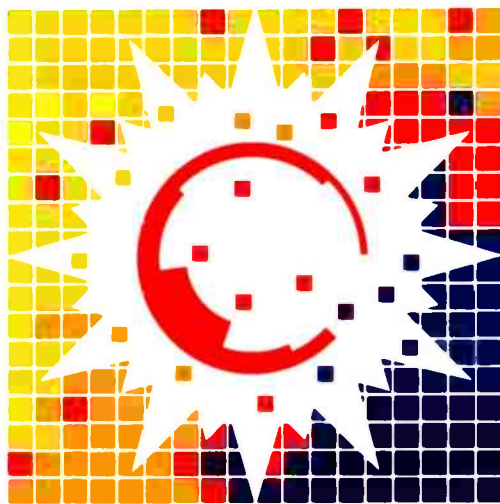
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SPEAK EASIES



Lord Buckley

Lord Buckley Live
Shambhala Lion Editions SLE 020, cassette. (Available from Shambhala Lion, 300 Massachusetts Ave., Boston, Mass. 02115.)

Devout Catalyst: Ken Nordine
Grateful Dead Records GDCD 40152, CD. (Available from Grateful Dead Merchandising, P.O. Box X, Novato, Cal. 94948.)

Lenny Bruce Originals, Vols. One and Two
Fantasy FCD-060-023/024, two CDs.

Lord Buckley, Ken Nordine, and Lenny Bruce all made an important impact in the 1950s, working with the spoken word as an adjunct to the world of jazz.

Lord Buckley, who died in 1960, emerged first. His career dates back as far as Prohibition and the speak-easies, where he was a sort of court jester for gangsters. (Al Capone credited Buckley as "the only man who could make me laugh.") He used the vivid slang of black jazz musicians in retelling the stories of great figures like Mahatma Gandhi ("The Hip Ghan") and Jesus Christ ("The Naz"). He also transliterated into this dialect—which he called Hipsomatic—Lincoln's Gettysburg Address, Dickens' *A Christmas Carol*, and Shakespeare ("Willy the Shake"), all to stunning effect.

The Shambhala Lion tape includes 11 selections, four of which appeared on Buckley's great Pacific Jazz albums. Three of these—"The Naz," "God's Own Drunk," and "The Gasser"—come from a legendary February 1959 concert at Los Angeles' Ivar Theater. The other, "Scrooge," is a stu-

dio recording that has been treated here to cruel electronic processing which all but ruins the piece. Fortunately the live tracks are intact.

As there is no annotation of recording date or anything else, the source of the other seven selections remains a mystery. Some are alternate (rehearsal?) takes of previously released pieces—"The Hip Ghan," "Gettysburg Address," and "Murder." To my knowledge, four have never been released, most notably Buckley's recounting of his meeting with James Dean.

Lord Buckley Live is not perfect, but it is one of only two Buckley recordings that are available. (The other is *Immaculately Hip Aristocrat*, available on Bizarre/Straight via Rhino). With *Live's* previously unheard material, it is a treasure. Too bad there are no plans for a CD release.

Ken Nordine



Ken Nordine's "Word Jazz" musings first appeared on four albums released from 1957 to 1960. About half of this material has been reissued by Rhino. Ken was first known as a killer advertising voice ("Poof! There goes perspiration..."). With the clout he acquired doing voice-over work, he wrangled a record deal where he could marry his skewed observations of life with subtle jazz and electronic settings. He created his own medium and has continued to work with it through the years.

Devout Catalyst is an album of all-new Word Jazz recorded absolutely live with no overdubs. Ken's whimsical basso is supported by a combo that features Jerry Garcia, David Grisman, Howard Levy, and Tom Waits, among others. These new pieces are mostly dark hued, more atmosphere than

storytelling, and more than a little melodramatic, as is Ken's wont. But his wry charm still permeates and animates it all quite thoroughly. *Devout Catalyst* truly is the great-grandson of Word Jazz, and it wears its mantle well.

Then there was Lenny Bruce. Two new reissues on CD of his historic four Fantasy albums were recorded in San Francisco nighteries from 1958 to 1960. Listening to this material now, you have to remember the extreme reactions it provoked in its day. Lenny exploded cultural taboos to lampoon and lambaste the most sacred of cows: Religion, race, sex, and so-called dirty words. Back in the '50s, you just didn't do that! But for telling it exactly as he saw it, Lenny Bruce was subjected to police and political harassment everywhere he went, thus becoming a *cause célèbre*.

Personally, I was never a very big fan of Bruce. However, some bits have always struck me as hilarious, particularly "Lima, Ohio" and "Father Flotski's Triumph." To me, Lenny's performances now represent crucial sociological commentary and history more than great comedy, and I applaud Fantasy for finally getting his catalog onto CD, where it is permanently preserved and available anew.

Michael Tearson

Right There: Steve Turre
Antilles 314-510-040-Z, CD; ADD; 57:49.

Sound: B+/A- Performance: A

Most viewers of *Saturday Night Live* are familiar with the G. E. Smith-fronted



Lenny Bruce

Illustrations: Rick Tulka

house band. Many, though, merely take the musical snippets as cues for refrigerator runs. Far too few are aware that the band includes some serious jazz players who have signed on to NBC to earn a living.

Among them is Steve Turre. For the last decade-plus, this superb trombonist and composer has participated in and led a series of sterling recordings. His most recent is the aptly titled *Right There*. Turre continues to field exemplary, mid-size ensembles, re-creating the type of personnel blend he participated in when he arrived on the scene. Here, he splits selections between two different groups, one involving the straight-ahead rhythm section of pianist Benny Green, bassist Buster Williams, and drummer Billy Higgins, the other including a number of New York's best Latin/salsa players, such as flutist Dave Valentin, pianist Willie Rodriguez, and bassist Andy Gonzalez.

Every selection is a winner, and the album as a whole may be one of the year's best. If you're looking for highlights, turn to "Woody & Bu," so titled for both the late trumpeter Woody Shaw, who showcased Turre on several early-1980s recordings, and the late drummer Art Blakey (whose nickname was indeed Bu). An attentive historian, Turre also renders Ellington's "Echoes of Harlem" while contributing his own "Duke's Mountain." *Jon W. Poses*

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Vocalist Abbey Lincoln remains not only one of the most intriguing singers of our day but also one of the most articulate and diverse. She's done experimental and mainstream theater on and off Broadway and has worked in a variety of productions that incorporated poetry, music, and dance enveloped in cause-related politics. *You Gotta Pay the Band* stands as one of the last of the late Stan Getz's documents. Furthermore, the 10 selections bring together the talents of Hank Jones, the planet's senior be-bop pianist, and bassist Charlie Haden, among others. Included are interpretations of Clifford Brown's "Up Jumped Spring" and "Brother Can You Spare a Dime?" Overall, *You Gotta Pay the Band* is a heartstopper. *Jon W. Poses*



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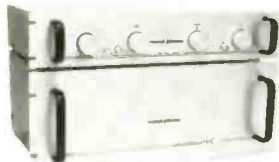
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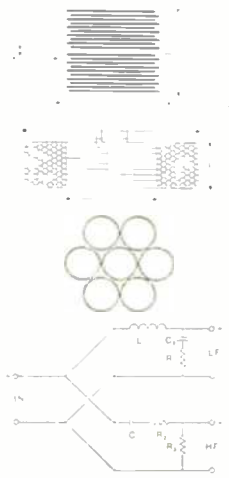
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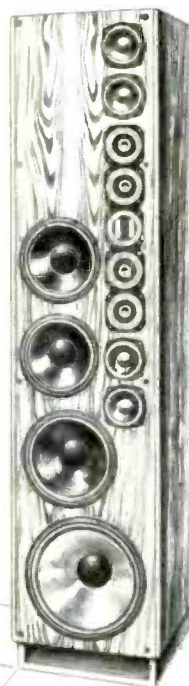
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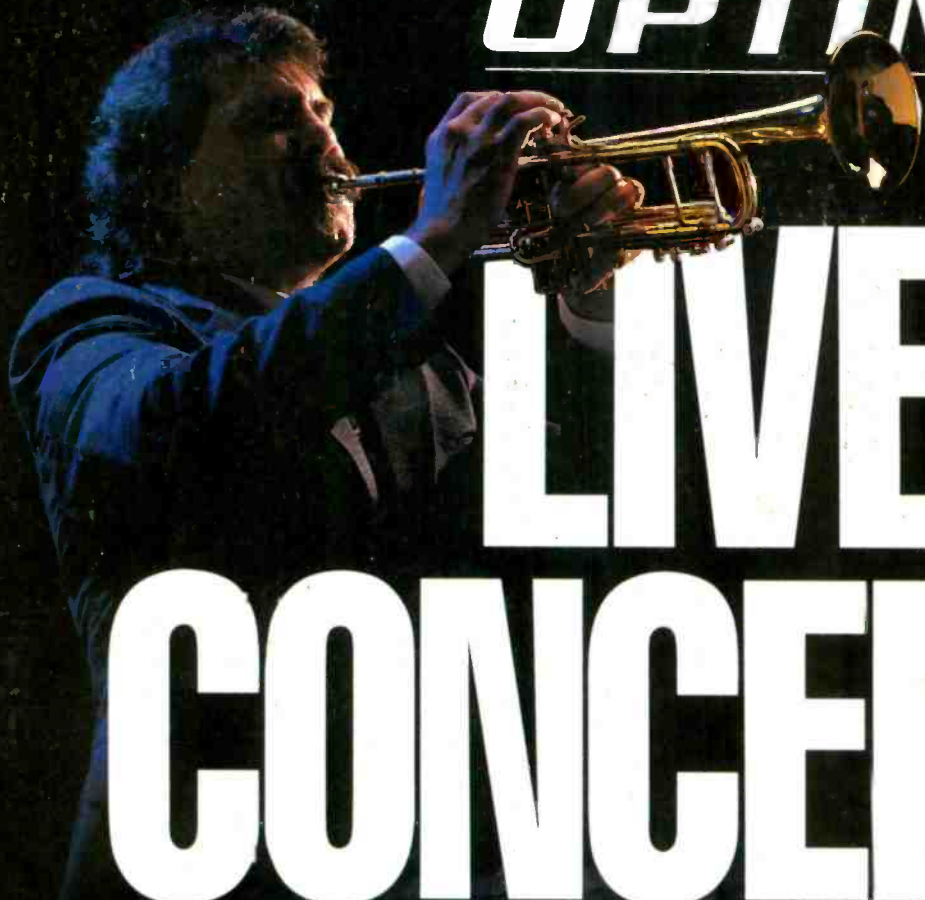
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