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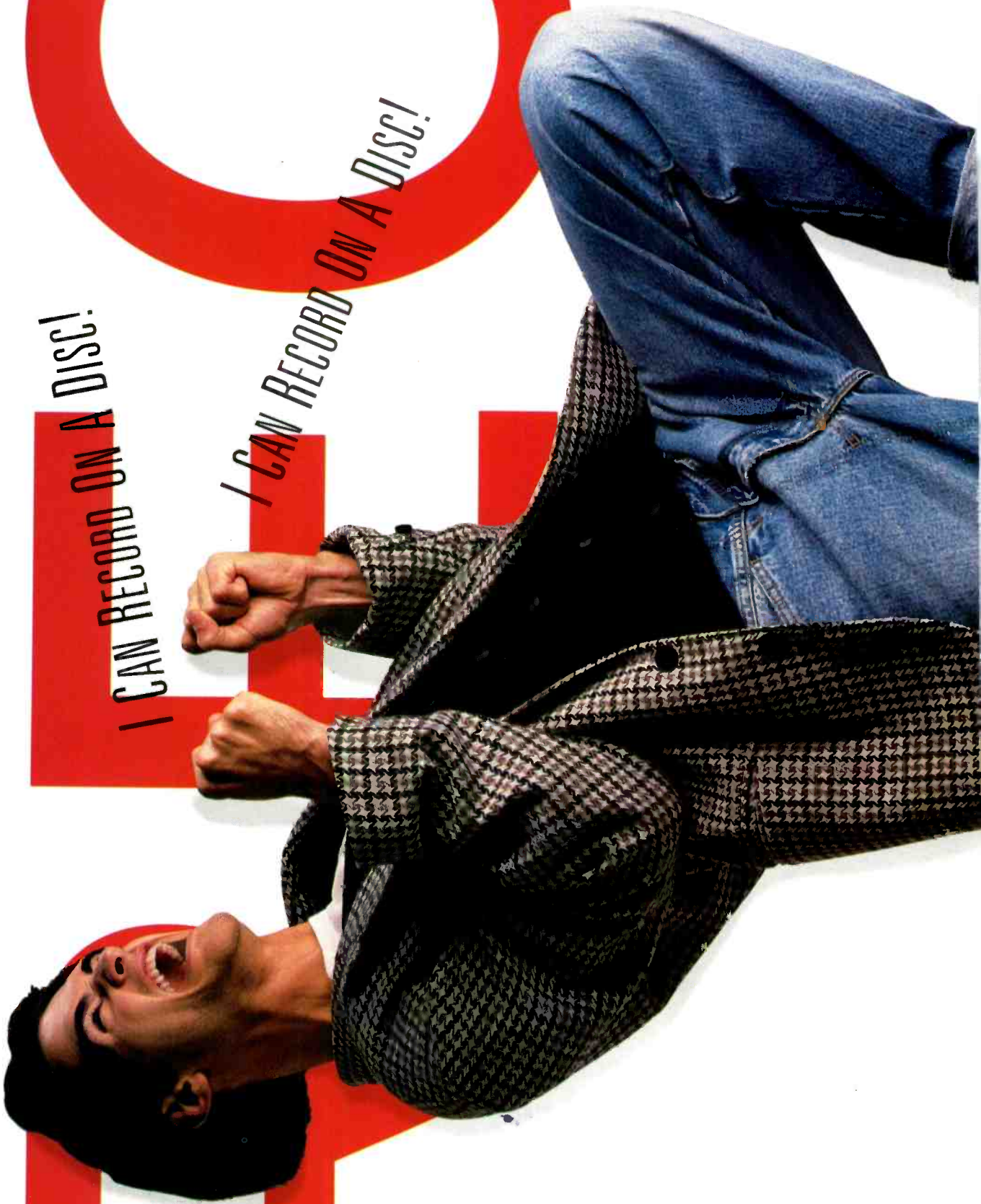


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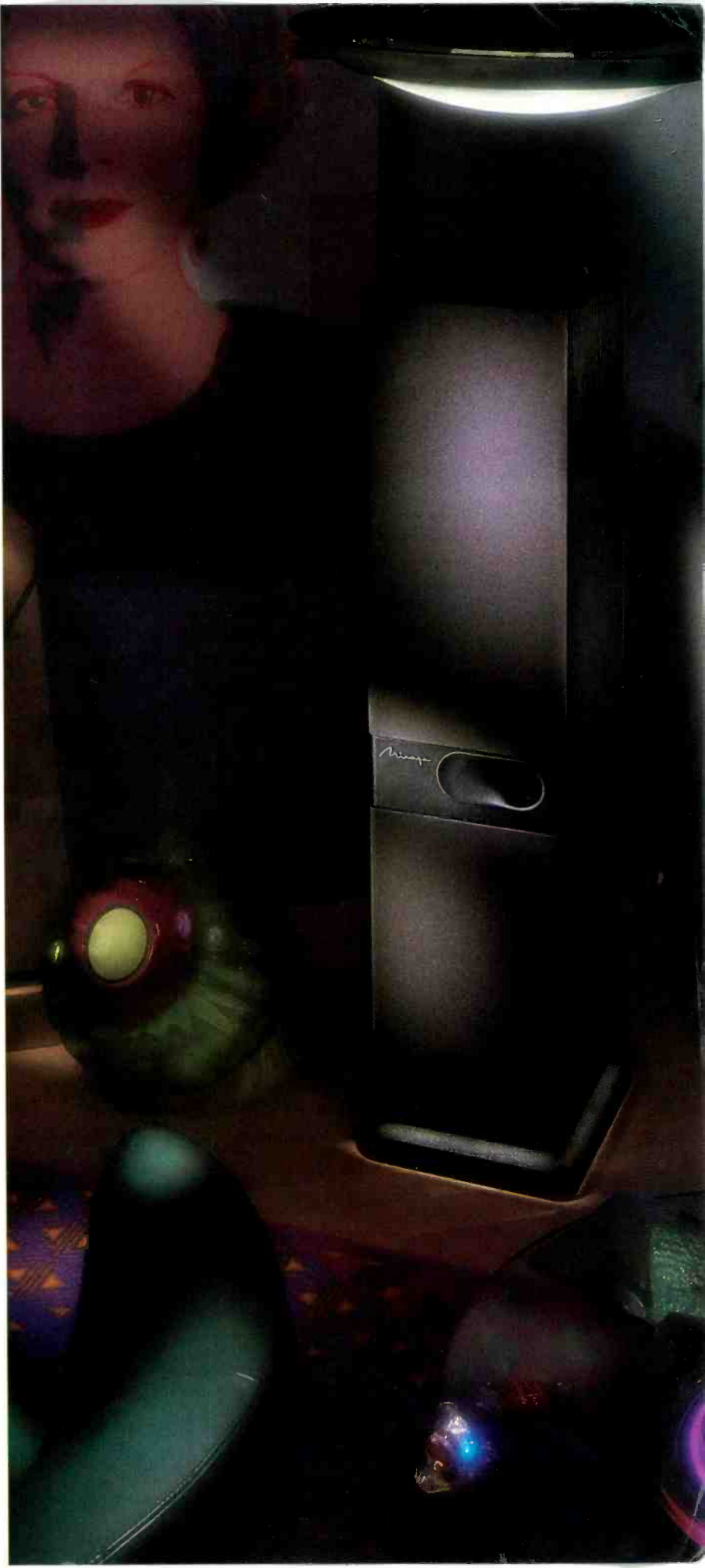
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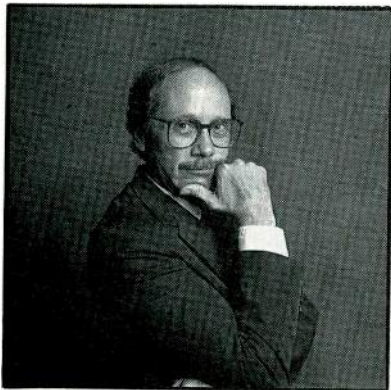
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The first Wednesday in June, I went to the best hi-fi store there is, the Summer Consumer Electronics Show; spent five days there. It's no secret that the number of Big Electronics Firms exhibiting on the main floor of McCormick East (nee Place) is down. After Panasonic-Technics, the biggest booth in terms of floor space was Thomson-RCA, with Recoton not far behind, if behind at all. Somewhere in the middle, however, was the "Innovations '93" display, which is a sort of sidebar showcase of products (and computer software) being introduced at the SCES. Not filler, but not paid space either.

Where was everybody? Well, some of them were in the ballrooms and suites of big, fancy hotels just off Chicago's Magnificent Mile. It used to be that the big hi-fi firms did both—had a large booth on the floor of the Show and a hospitality suite where copious libations flowed well into the night, washing shrimp and caviar past pampered palates. (Can I write like Bert Whyte or what?) But in this tough economy, we are seeing more of the big guys hold their own shows prior to the SCES. Getting a captive audience seems to be the idea, and I'm not certain that's a wrong technique.

Chicago's Hilton Hotel was the scene of most of the action interesting to audio folk, and the large majority of my contacts told me that this was a show where they wrote good business. There seemed to be moderately good traffic, both on the three trade days and on the consumer day, but one could get around through the halls.

Clearly, this last day is starting to be popular with the ultimate buyer, though it is curious to me why Joe Consumer would come to a hi-fi show in early June. After all, the traditional selling season is roughly from Labor Day to, say, early January or maybe Presidents' Birthdays in February. As I recall, the best attended consumer shows put on by the Institute of High Fidelity or Teresa and Bob Rodgers were during the fall.

There was, indeed, some talk about doing away with the SCES entirely. I'm told, however, that the Show sponsors are committed to Chicago at least through 1994. I certainly like Chicago when the weather is as fine as it was this year, but Friday's rainstorm produced a 1½-hour cab line at the Hilton. Yuck!

The Winter Show in great part is a car stereo show, because of the differing seasonality of sales of that part of the electronics sport—the six months of the year centered on July 4th. In addition, auto audio gear continues to sell pretty well. In contrast, the only in-home electronics gear that's going well, I'm told, is home theater equipment. Perhaps that's true; witness the number of traditional upper-class, hidebound, inbred audio makers who have slipped into making one or more pieces of this stuff "to pay the rent and keep from laying off people." I've asked a good deal about whether there is a sales seasonality to this equipment, and most of the answers indicate only a slight one, timed a month or two ahead of the car stereo season.

If so, this would make yet another constituency wanting some say-so about the timing of the Summer Show. What a curious state of affairs for a Show where there are so few big display booths on the main floor.

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Proboscis-Friendly Pushbuttons?

Dear Editor:

Here's a Lirpa-like response to Ivan Berger's complaint about "boring black equipment for the home" ("Roadsigns," April): Forget your eyes, use your nose. Most designers complicate "boring" by using dark-gray lettering. No sweat, pick up a flashlight. To parry this, many designers have refined their work to display *tiny* dark-gray lettering. Don't fret, add a magnifying glass. With both hands engaged, I attempt to use my nose as operator. I will buy more audio/video equipment as soon as I can train my proboscis. Until then, I will spend my money on user-friendly things, which I *don't* define as, say, gold-colored equipment adorned with gold-colored lettering.

*Edward Claymore
San Francisco, Cal.*

Plaudits

Dear Editor:

I have been a subscriber for a great many years, during which—I'm almost sure on this—I have never seen a word in print on the gratitude readers such as me owe to Joseph Giovanelli, Herman Burstein, and Edward Tatnall Canby. So here goes.

For the information, help, and entertainment in the words of wisdom from all of you: Thank you very much indeed. It goes without saying that my thanks are long overdue, but they are sincere nevertheless.

*Harry P. Wood
Cudahy, Wisc.*

Plaudits, The Sequel

Dear Editor:

I would like to congratulate you on your recent articles on listening room characteristics by F. Alton Everest ("The Uneasy Truce Between Music & the Room," February, and "Coloration of Room Sound by Reflections," March) and John Sehring ("Taking Up Resonance: Finding Room Modes on Your Computer," April; also see "Signals & Noise," June). These are the most interesting articles I have read in an

audio magazine in a very long time. The subject is often not well understood (it certainly was not by me) but is very important. I am glad that the authors were not afraid to include mathematics and a few formulae. I am keeping these articles for the time when (hopefully) I will be able to design my own sound room.

I also very much enjoy the articles that are less equipment-oriented or of a historical nature, such as the interview with Henry Z. Steinway in January. Keep up the good work!

*Andy Benton
Flemington, N.J.*

Manuals Wanted

Dear Editor:

I have acquired some old equipment without any manuals: Fisher 50S-T receiver, Dual 1019 turntable, Harman Kardon HK 1000 cassette deck, and KLH Model Six loudspeakers. If anyone has manuals for this equipment, please contact me.

*Herbert Palace
5 Helen Ct.
Spring Valley, N.Y. 10947*

Man Bites Digital

Dear Editor:

I have to refer to a highlighted passage in your "Auricle" review of the Linn Karik CD transport and Numerik D/A converter (February): "Linn has kept its commitment not to make a CD player until it could match analog quality." To achieve this, the Linn system will cost \$5,790.

Admittedly, CDs provide greater dynamic range than LPs. They are also more convenient to use, and they are more resilient to damage from handling, playing, dust, and scratches.

However, when are we all going to wake up and smell the roses and realize that analog produces a warmth and soul to music that continues to be lacking in the computerized digital format? Why is there not a resurgence of long-playing records that can capture the tone of the music as well as the emotions generated by the musicians re-

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ording them? If we are not careful, musicians will become obsolete as computers fully take over the actual making of music, thereby destroying the atmosphere that makes music so special and memorable to most of us.

Let's please get back to basics and enjoy a more natural sound. Think of all the money we can save by not buying expensive digital machines made to resemble analog sounds. As I recall, the cost of LPs is also substantially less than that of their CD counterparts.

I hope other people can understand this cry from a music lover who still has the hairs on his arms rise when a particular memory is conjured by a passage of music and who still has tears form during some live performances. Apart from love and fear, music is probably the most impact-producing thing we experience. In order to retain the emotion quotient, let us not do away with the human element, for fear of losing part of our souls.

Keith Mackenzie
Piedmont, Cal.

Styli for 78s

Dear Editor:

We have noticed an increased interest on the part of many record collectors in obtaining the old standard 3.0-mil stylus for 78-rpm recordings. This is a special size now and is considerably more expensive than the present standard 2.7-mil stylus for this purpose.

Collectors should be aware that for most 78s, the 2.7 will produce better sound. Because the 3.0 was the standard size during the 78 era (in metal, osmium, and sapphire), chances are your 78s are totally worn out at the 3.0-mil location in the groove; retracing this location produces distortion and noise. By using a 2.7-mil stylus, you have a good chance of tracing fresh, unworn groove.

Often, even better sound can be found deeper into the groove. Because going deeper increases the risk of bottoming out, styli smaller than 2.7 have a truncated point. Truncation is part of the polishing step, which flattens the tip and provides the necessary clearance. Special stylus sizes are available from 2.0 to 4.0 mils. The 4.0 size is ideal for the vertical-cut Edison Diamond Disc.

I would be happy to discuss concerns with individual collectors at any time.

Kevin A. Barrett
President, KAB Electro-Acoustics
P.O. Box 2922
Plainfield, N.J. 07062
(908) 754-1479

Coda: Bernard Kardon

Bernard Kardon, 79, the engineering cofounder of Harman-Kardon, died on April 14 at his home in New Rochelle, N.Y. Kardon got his audio grounding in the 1940s with the David Bogen Co., where he rose to the position of chief engineer. He was head of Kardon Manufacturing at the turn of the decade, when he teamed up with marketer Sidney Harman to form Harman-Kardon, for which he designed the first mid-price, high-performance stereo amplifiers for the developing hi-fi mass market created by the introduction of stereo records. Kardon is survived by his wife and two children.

(Courtesy of TWICE, April 26.)

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Noise Reduction for Home and Car

Q. *The cassette deck in my automobile has DNR (Dynamic Noise Reduction). The deck I use at home has Dolby B and Dolby C NR, with HX Pro headroom extension. Which noise-reduction system should I use at home, if any, to achieve the optimum sound quality for my car system?—Charles Andrade, Yuma, Ariz.*

A. In theory, you should record without noise reduction at home if the cassette is exclusively for playback in your car. This assumes that your car deck's DNR works very well, reducing treble response only when the program material has no treble content. However, DNR may in fact produce some audible drop in treble response. If that is the case, you should try recording with Dolby B encoding, which will tend to more or less offset any treble loss you may have in playback.

This procedure may be desirable for other reasons. One is that you might want some treble lift on your tape in order to compensate for car noise. Another is that you may want to play the same cassette both at home and in your car. Use of Dolby B NR in recording and in home playback would afford a compromise between home and car requirements. On the other hand, if your car's audio system has tone controls, you could use the treble control to adjust response more to your desires.

Experiment to find the best course.

Judging a Deck by Its Specs

Q. *I plan to buy my first cassette deck. The deck I am considering has frequency response of 20 Hz to 20 kHz, ± 6 dB; signal-to-noise ratio of 77 dB with Dolby C NR, and wow and flutter of 0.055%. In order of importance, what are the most important specifications?—Dennis Luchtefeld, Mt. Sterling, Ky.*

A. The most important specifications for a cassette deck, more or less in order, are: (1) Frequency response that's flat and extended from, say, 30 Hz to 18 kHz; (2) wow and flutter that is low, perhaps no more than 0.05% peak (people who are

more sensitive than others to wow and flutter might require a better spec, 0.025% or less); (3) S/N ratio of at least 75 dB or so with Dolby C NR; (4) accurate speed, deviating no more than, perhaps, 0.5% from correct speed (such a deviation in pitch is probably inaudible to most people), and (5) distortion that's low. Let me hasten to add that many audiophiles would place low distortion higher in order of importance.

A frequency response specification of ± 6 dB is not impressive. However, if the spec were ± 3 dB and applied to the range of 30 Hz to 16 kHz, it would be acceptable; still better would be a spec of ± 2 dB over such a range. A range that extends out to 19 kHz instead of just to about 16 kHz will not make an important difference to most listeners.

DIN and Dolby Levels

Q. *Recently you answered a reader's question about Dolby level, stating that it is 200 nWb/m (nanowebers per meter) at 400 Hz and that this is approximately 2 dB lower than DIN level, which is 250 nWb/m at 315 Hz. I believe that Dolby level is based on the ANSI Standard of measurement, whereas DIN level is not. This signifies that, using the DIN Standard, the Dolby level is about 1.1 dB below DIN (rather than 2 dB). Please correct me if I am wrong in this matter.—Bill Klodt, Weaverville, N.C.*

A. You are correct. Quite a number of years ago another reader also pointed out that, in truth, the Dolby and DIN levels are more like 1 dB apart than 2 dB.

Bad Luck with Car Tape Players

Q. *My car has a high-quality radio/cassette system, installed by the car manufacturer. The radio sound is quite good, but there is trouble with the tape player. I get a high-pitched noise that interferes with the music. The noise seems most prevalent at the beginning and end of a tape. Perhaps this is a winding-tension problem. I have had the same problem with at least two previous automobile tape players. When I play the noise-producing tapes on my home deck, they*

play okay. Can you give me some insight into this problem?—Franklin S. Simon, North Brunswick, N.J.

A. I take it that your problem occurs even when the car motor is off, so ignition noise can be ruled out. Also, the fact that the noise occurs mostly at the beginning and end of a tape would rule out ignition noise. Therefore, as you suggest, the problem may be due to improper tape tension. Service shops have informed me that improper torque of the supply and/or take-up reels is a frequent source of problems. Torque may have been improperly adjusted at the factory, or it may have gradually gone out of adjustment with time and use. If this is true, you require a visit to a competent service shop, preferably an authorized one. Ask your auto dealer whom he recommends. Also ask others, including friends and your local audio stores.

Although your cassettes play satisfactorily in your home deck, certain combinations of tape and deck don't work well together, even though each may individually be of high quality. I suggest that you try one or two other brands and/or types of cassette to discover whether this might solve your problem.

Listening Without Preamps

Q. *I recently bought a power amplifier. The salesperson told me that I could just connect my CD player's output to the power amp without ever using a preamp. I tried this, and it worked. But when I connected my tape deck to the amplifier, this didn't work, and it made a humming noise. What is the reason?—Joseph Sum, Rancho Santa Margarita, Cal.*

A. Your direct connection of the tape deck to the power amp should have worked, and I would have to see a diagram of your hookup to figure out why it didn't. From your statement that there was a "humming noise," I suspect a poor or incomplete ground connection. Have you checked your cables, preferably by substitution? Have you made certain there are secure fits of plugs to jacks? 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. In the event that your letter is chosen by Mr. Burstein to appear in Tape Guide, please indicate if your name and/or address should be withheld. Please enclose a stamped, self-addressed envelope.



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Connecting a Subwoofer

Q. *I have apparently backed myself into a corner in attempting to add a single subwoofer to both outputs of my 22-watt stereo system. I had hoped I could have accomplished this via some chokes, but I have the impression that trying this would damage my amplifier. I'd like to know what I can do to solve this problem without buying a separate amplifier for the subwoofer. I would appreciate your comments and suggestions.*—Gerald Little, Alexandria, Va.

A. The crossovers built into or supplied with many subwoofers have inputs for both stereo channels. The low-frequency information from the two channels is then summed to feed the subwoofer driver. If you're building a subwoofer system from scratch, look for a driver that has two voice-coils, each of which can be connected to one channel of your stereo system. Considering the modest 22 watts you have available, you should probably look for a subwoofer that has its own built-in amplifier; failing that, you should get a subwoofer of the highest possible sensitivity.

Frequency Response vs.**Frequency Limits**

Q. *I recently purchased a test CD so I could evaluate my stereo system. I was mainly interested in checking frequency response. My loudspeakers are only supposed to respond to frequencies from 50 Hz and above. Why, then, when I played the test disc, could I hear all frequencies down to almost 20 Hz?*—Bret Allie, Sauk Rapids, Minn.

A. Your speaker's spec for frequency response shows that it should be reasonably flat (not deviating greatly in amplitude) from 50 Hz to the upper end of its stated range. But response does not just die out beyond the stated limits. The further you go beyond those limits, the softer the sound gets, until it eventually becomes inaudible. If your speaker were flat to 20 Hz, those low bass tones would sound considerably louder than they do now. Also, you may be feeding your speakers more power than they normally get. Test

signals on CD are often made at maximum level (0 dB); few, if any, notes on a CD would actually get that loud. And people have a tendency to turn the volume control up when listening to test CDs, especially at frequencies where the system's response drops off. If that's the case with you, be careful—it's possible to damage your speakers if you overdrive them. If you hear distortion, turn the volume down.

Cable FM Reception

Q. *I am thinking of getting cable service to get better FM reception from some of my favorite stations. I am not interested in the television portion of the cable service; I am looking for a device that will make it possible to receive cable on my hi-fi system. It would be a box that would be connected between the cable and my FM tuner, so I could use my tuner in the usual way. Is there such a device? Where can I get one?*—R. Ross, Odessa, Tex.

A. First, find out what FM services your local cable TV system offers. Not all cable TV systems carry FM stations, and not all the systems that do require a converter box between the cable and the FM receiver. You will, however, need a switcher to select cable or over-the-air signals. Radio Shack and most electronics stores carry these. So that you get the proper switcher, note whether the antenna you use for normal reception is a 75-ohm coaxial with a screw-on F connector or a 300-ohm flat twinlead requiring screw terminals. (Cable systems almost invariably use F connections.)

You won't always get better FM reception from cable; some cable companies are rather sloppy about FM. You may also find that stations have been shifted to new frequencies on the cable or even that some stations you can normally receive aren't carried by your cable system.

Poor AM, Both Home and Road

Q. *My home and car stereo systems are considered to be of moderately high quality, but I get poor AM reception in both—particularly in the car. Both tuners have problems with hum and whining noises. At home, AM*

is unusable when I have my TV set on or am trying to videotape. In the car, the sound quality is sometimes reasonable, but at other times it is simply awful. What's wrong with my tuners?—Gino Catena, Buffalo, N.Y.

A. Let's take your home system first. Both TV sets and VCRs are notorious for wrecking AM reception. Harmonics of the horizontal oscillator beat against the desired AM station's carrier to produce noise within the AM band. It would take much work to shield your VCR and TV to prevent radiation of undesired signals. So your best solution might be to place a short AM antenna on your roof, as far from your TV antenna as you can place it. Check your local library for a good book on amateur radio to get details on how such antennas are constructed and how to protect them, when necessary, from lightning. Or contact the American Radio Relay League (225 Main St., Newington, Conn. 06111) for a copy of *The ARRL Antenna Book*, for \$23, including postage (plus 6% sales tax for Connecticut residents, and 7% for Canadians). The antenna designs shown will be for short-wave bands, but formulas in books about ham radio can help you calculate correct lengths for the AM broadcast band (530 to 1,600 kHz). In most locations, it pays to add lightning arrestors to any outdoor antenna; I'm told a good source for those and for information about them is Industrial Communications Engineers (P.O. Box 18495, Indianapolis, Ind. 46218).

As to the variable AM reception in your car, try to note when and where it's good and when it's not. If it's fine when your engine is off but not with the engine running, check your antenna, antenna lead, and the grounding of your radio and of the antenna's base. I've also found that getting a tune-up and replacing ignition wires has reduced some engine noise. After that, try interference suppressors, available from Radio Shack and car stereo specialists.

If the problem occurs only in certain places, then it's caused by local noise sources, such as high-tension power lines, which you can't do anything about. **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. In the event that your letter is chosen by Mr. Giovanelli to appear in Audioclinic, please indicate if your name and/or address should be withheld. Please enclose a stamped, self-addressed envelope.

WHAT'S NEW

Signet Speakers

The SL280B/U and SL260B/U loudspeakers (shown top and center, respectively, with the SL250B/U) use foam around their tweeters to enhance pinpoint imaging by reducing delayed reflections from the cabinet. The SL280B/U's 8-inch woofer incorporates Dynamic Damping for improved low-frequency transient response and extended dynamic range as well as reduced distortion at loud listening levels; the system's tweeter is a 1-inch



aluminum dome. The SL260B/U contains a 6½-inch woofer and a ¾-inch tweeter. Power-handling capacities for the 280 and the 260, respectively, are 200 and 150 watts. Prices: SL280B/U, \$700 per pair; SL260B/U, \$450 per pair. For literature, circle No. 100

JVC Cordless Headphones

Both the HA-W75 and HA-W55 infrared headphone systems are capable of operating at a distance of 33 feet within a horizontal angle of 90°. The circumaural HA-W75s



(shown) have polymer diaphragms 40 mm in diameter and incorporate JVC's Super Bass Sound System and an automatic muting circuit. The open-

air HA-W55s have 30-mm diaphragms. Both models include a volume control, auto power off (after three hours) for the



headphones, and auto power on/off for the transmitter. Prices: HA-W75, \$249.95; HA-W55, \$149.95. For literature, circle No. 101

Cambridge SoundWorks Crossover

Designed for use in home theater and music systems incorporating the company's Powered Subwoofer, the Cambridge SoundWorks EXO-1 electronic crossover provides 18-dB/octave

high-pass filtering for left, center, and right loudspeakers, complementing the low-pass filtering built into the subwoofer. Crossover frequencies can be set at 55, 80, 100, or 140 Hz. Distortion is rated at 0.006%. Price: \$299. For literature, circle No. 102



Storadisc CD Rack

You needn't kneel to see what CDs are on the lowest shelves of Storadisc racks. By mounting the bottom shelves further to the front of the rack, and angling all shelves upward, Davidson-Whitehall, the manufacturer,



has made it easier to read the title of each disc. The taller of the two Storadisc Library racks holds 576 CDs, and the shorter one holds 360; the Single Series shelf in the middle holds 36 CDs, but a 50-disc version is available. All models are available in red or white oak, cherry, black walnut, pickled ash, black lacquered oak, or in less expensive textured white, gray, or black finishes. Prices vary with finish, but the most common prices for wood finishes are: LS-576, \$495; LS-360, \$375; SS-50, \$52; SS-36, \$48. For literature, circle No. 103

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Edward Hopper "Room By The Sea" (Yale University Art Gallery)

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- Zinman: Górecki, Symphony No. 3 (Nonesuch) 00110
- Garth Brooks: The Chase (Liberty) 00141
- Red Hot Chili Peppers: What Hits? (EMI) 00144 †
- Elton John: Greatest Hits 1976-1986 (MCA) 00150
- SWV: It's About Time (RCA) 00151
- George Duke: Snapshot (Warner Bros.) 00176
- Beverly Hills 90210/Sdtrk. (Giant) 00180
- AC/DC: Live (Atlantic) 00201
- Nell Young: Harvest Moon (Reprise) 00208
- The Doors: L.A. Woman (Elektra) 00215
- The Private Music Of Tangerine Dream (Private Music) 00221
- Neneh Cherry: Homebrew (Virgin) 00239
- Frank Sinatra: The Best Of The Capitol Years (Capitol) 00242
- David Benoit: Letter To Evan (GRP) 00251
- Izzy Stradlin And The Ju Ju Hounds (Geffen) 00272
- Chieftains: The Celtic Harp (RCA) 00323
- Phil Collins: Serious Hits...Live! (Atlantic) 00324
- Erasure: Pop! The First 20 Hits (Reprise) 00328
- John Lennon & Yoko Ono: Double Fantasy (Capitol) 00333
- The Rascals' Greatest Hits: Time Peace (Atlantic) 00357
- Salgon Kick: The Lizard (Third Stone/Atlantic) 00371
- Steely Dan: Aja (MCA) 00409
- Reba McEntire: It's Your Call (MCA) 00422
- The Beach Boys: Pet Sounds (Capitol) 00513
- R.E.M.: Eponymous (I.R.S./MCA) 00701
- The Best Of Dire Straits: Money For Nothing (Warner Bros.) 00713
- Club MTV-Party To Go (Tommy Boy) 00754
- Shal: If I Ever Fall In Love (Gasoline Alley/MCA) 00757
- Fleetwood Mac: Greatest Hits (Warner Bros.) 00796
- Nell Young: Lucky Thirteen (Geffen) 00856
- Cecilia Bartoll: If You Love Me — Arie Antiche (London) 00862
- Bon Jovi: Keep The Faith (Mercury) 00868
- Maceo Parker: Life On Planet Groove (Verve) 00869
- Richard Elliot: Soul Embrace (Manhattan) 00871

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- Kronos Quartet: Short Stories (Nonesuch) 01444
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- World Party: Bang! (Ensign/Chrysalis) 01477
- Who's The Man?/Sdtrk. (Uptown/MCA) 01479 †
- Indecent Proposal/Sdtrk. (MCA) 01480
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- Green Jelly: Cereal Killer/Sdtrk. (Zoo) 01499
- McBride & The Ride: Hurry Sundown (MCA) 01508
- Aaron Neville: The Grand Tour (A&M) 01519
- Creedence Clearwater Revival: Chronicle: 20 Greatest Hits (Fantasy) 01520
- Bing Crosby's Greatest Hits (MCA) 04709
- Stone Temple Pilots: Core (Atlantic) 00981
- Heart: Rock The House "Live"! (Capitol) 05603
- Pet Shop Boys: Discography—The Complete Singles Collection (EMI) 05605
- Soundgarden: Badmotorfinger (A&M) 05637
- Van Halen: For Unlawful Carnal Knowledge (Warner Bros.) 10016

- Lee Ritenour: Wes Bound (GRP) 01327
- Rod Stewart: Downtown Train (Warner Bros.) 10708
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WHAT'S NEW



Bib Storage Tower

Requiring less than 14 square inches of floor space and standing 4 feet tall, Bib's MM-160 Multi-Media Storage Tower has adjustable shelves for storing CDs, audio tapes, videocassettes, or video games, in any combination. It is available in black or simulated oak, and assembly is required. Price: \$59.95. For literature, circle No. 104

Fisher CD Changer

One of the first changers to store and play back discs by category without computer assistance, Fisher's Studio 24 has a bidirectional radial transport system that stores 24 discs vertically. You can "name" each disc from a choice of seven programmed music types—Classical, Jazz, Country & Western, Rock, Rhythm & Blues, Easy Listening, and Show Tunes—or use the alphanumeric pushbuttons for custom naming. Up to 31 categories and/or subcategories can be stored in memory. To replace an entire category of CDs, Studio 24 will eject all discs



under the specified name. The unit also allows for loading of a single CD for immediate playback. Price: \$299.95. For literature, circle No. 105

Onkyo RBDS Tuner

The T-450RDS home tuner fully implements the Radio Broadcast Data System (RBDS), enabling it to display identifying information transmitted from radio stations. The AM/FM tuner is capable of



showing a station's call letters and its type of programming, as well as displaying the artist name, song title, and album title of the music being broadcast. The tuner can also switch automatically to incoming traffic reports. Additional features include 30 station presets that can be scanned by program type in any of six categories, Onkyo's Automatic Precision Reception system for improved tuning, and compatibility with Onkyo's other Remote Interactive components. Price: \$349.95. For literature, circle No. 107

Bose Speakers

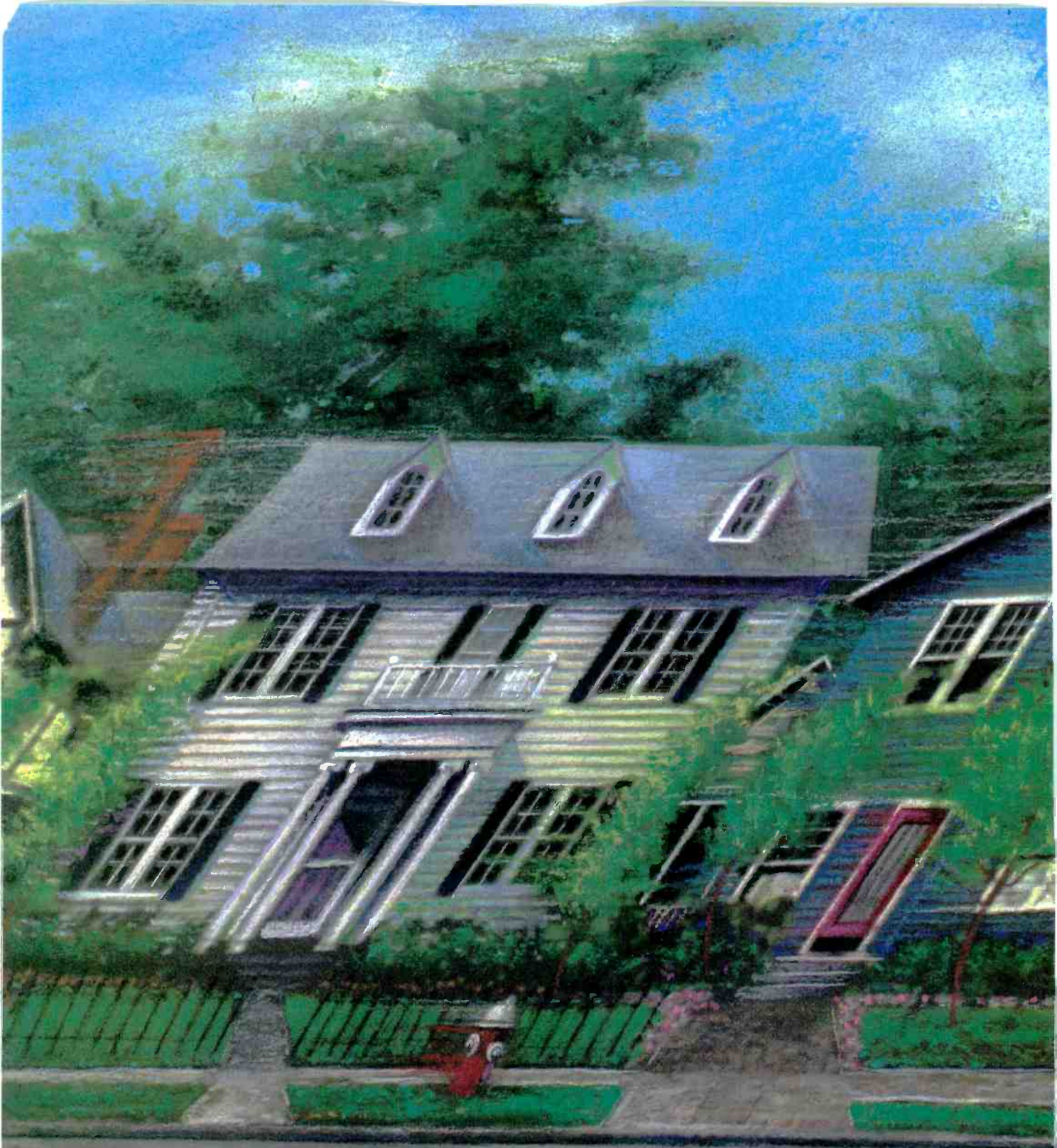
The Series II version of the Model 4.2 bookshelf speaker uses an 8-inch

crossover is designed for a full octave of overlap at midrange frequencies. Both black and wood-grain



woofer in a slot-vented cabinet and two angled 3-inch tweeters. The

finishes are available. Price: \$369 per pair. For literature, circle No. 106



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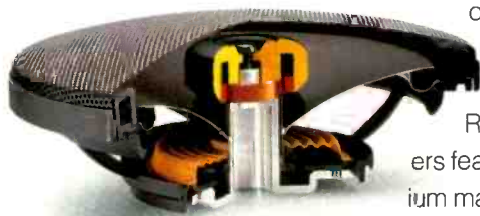
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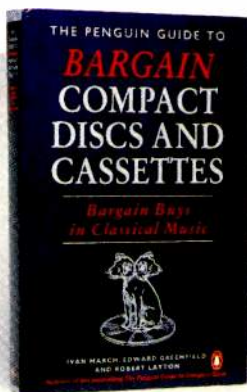
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The Penguin Guide to Bargain Compact Discs and Cassettes
 Ivan March, Edward Greenfield,
 and Robert Layton
 PENGUIN BOOKS, softcover,
 720 pp., \$17.50

This is the third Penguin CD guide for classical music in seven years, but while its predecessors surveyed the entire range of CD offerings, this one is devoted to the vast and ever-growing market of bargain-priced titles, both on CD and cassette. As before, the authors give short reviews of each title, commenting about equally on recording and musical matters. For quick reference, each release is awarded an overall rating ranging from one to three stars.

As the authors state in their preface, "The enormous range of music available on Compact Disc at considerably less than premium price is breathtaking, and as our current survey demonstrates again and again, there is no longer any direct relation between the cost of a CD and its quality or desirability."

Ten years ago, all CDs carried a premium price, a result of their scarcity and the fact that most of the earliest releases were imports from Japan or Europe. It wasn't until about five years ago that domestic pressing capacity, and the consequent rapid growth of the general catalog, reached the point where the record industry could make a clear economic distinction between older analog recordings and new digital ones. The older product could now be reissued at reduced prices and still be profitable for the labels.

Such conductors as Ansermet, Barbirolli, Beecham, Klemperer, Martinon, Munch, Ormandy, Reiner, Stokowski, Szell, and Walter made magnificent analog stereo recordings during the 1950s and '60s. Most of their repertory has been rerecorded by a later generation of conductors, and as these new items have been released at full price, the older titles have been reissued at a bargain price. The majority of these reissues have been given the benefit of careful transfer—often incorporating modern noise-reduction technology—to make them sound better than ever.

Recordings by soloists such as Cliburn, Grumiaux, Heifetz, Milstein, Piatigorsky, Rubinstein, and Tortelier similarly fall into this group, and most of their CDs are now in the range of \$9 to \$11.

How extensive is the bargain catalog as a source for building up a basic music collection? You'd be surprised. There are 80 pages of Mozart in this book, and 44 of Beethoven. In many cases, the *best* choices are here. Consider that most of conductor Charles Dutoit's early 1980s recordings of Ravel with the Montreal Symphony Orchestra are now available in a four-CD bargain set—recordings that are still benchmarks technically and more than hold their own musically.

The authors point out something I have been painfully aware of. In many cases, record companies will reissue a bargain set on a one-time basis. A retailer will order the product only once, and that is it. If the reissue is from overseas, you might not even know about it until everything has been sold! The rationale here is simply that there may be a very limited market for an older set of recordings; the company can easily recoup its reissue costs with no more than a few thousand copies, and the whole thing is seen as a service to collectors.

While many of you may continue to bemoan the high cost of CDs of contemporary artists, take comfort in the fact that the bargain side of the business will continue to flourish. Also take some small comfort in the knowledge that CD prices are probably lower in the U.S. than anywhere else in the world.

John Eargle

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BERT WHYTE

STEREO'S LIFE DURING WARTIME



With the Berlin Wall just an ugly memory, the post-Soviet political climate encouraged the Audio Engineering Society to hold its spring European Convention in Berlin for the very first time. Thus, the 94th AES Convention took place in the ultra-modern multimedia facility of the International Congress Center. As with all AES conventions, the exhibition halls were full of glittering new products, and a great many technical papers were presented, with heavy emphasis on digital.

The ICC complex is across the street from Das Berliner Funkhaus, the radio station building of the RRG (Reichs-Rundfunk-Gesellschaft)—and therein lies a tale.

The Haus des Rundfunks (Broadcast House), inaugurated in January 1931, was the first building in Europe specifically designed for recording and radio broadcasting. Part of the structure was devoted to the Grosser Sendesaal, a large hall from which symphony orchestra concerts frequently were transmitted live. After some years of development, by

1942 the RRG technicians were using the AEG/Magnetophon R22 magnetic tape recorder for recording and broadcasting. (An interesting aside: During World War II, the Allies thought the Nazis had developed a very high-speed aircraft, because live broadcasts of Hitler speaking in Berlin were followed a short time later by similar broadcasts from Hamburg or Munich. The Allies were not aware that they were hearing magnetic tape recordings of Hitler, ones then indistinguishable from live broadcasts!)

Now the scene shifts to early 1943. The Allies had begun to bomb Berlin, but the RRG continued to broadcast concerts from the Grät Hall in Broadcast House. One of the RRG technicians, Helmut Krüger, regularly made magnetic tape recordings of these concerts. AEG had developed a 30-ips (77 cm/S) magnetic tape recorder in which high-frequency pre-magnetization (a.c. bias) was used, affording far better performance—specifically, a frequency range of 50 Hz to 10 kHz, a dynamic range of 60 dB, and distortion of 1.5%! (My old friend Jack

Mullin of 3M brought one of these recorders to the U.S. and demonstrated it in San Francisco in 1945.) To gild the lily, AEG fitted a two-channel recording head to one of these machines for the RRG, thus permitting stereo recording. (These heads were originally intended to reduce distortion in monophonic taping by recording two channels in push-pull.) Krüger had access to this unit and decided to experiment with stereophonic sound. Ironically, his stereo tapes were actually bootlegs! During regular monophonic recordings with the orchestras, he ran separate signal cables from his microphones and directed them to a small input console with four potentiometers and

thence to the AEG stereo recorder, set up in an isolated room in Broadcast House.

Believe it or not, Krüger was using a spaced-array mike pickup—one mike to the left of the conductor, another to the right, and a third in the center—which Krüger fed to the left and right channels of the recorder. The mikes were 2 meters in front of the orchestra and 1 meter above the conductor's head. This setup, with slight variations, was used by Bob Fine in his Mercury recordings. I used it in my Everest recordings, and Jack Renner frequently uses it today in his Telarc recordings.

By the end of the war, Krüger had made between 200 and 300 stereo tape recordings, which were stored in a bunker in Broadcast House and in several other locations. Sadly, when the Russians occupied Broadcast House, the tapes there were lost or destroyed. Of all the stereo tapes recorded by Krüger, only five are known to have survived. However, those five were the stimulus for some extraordinary activities in connection with the 94th AES Convention in Berlin.

Illustration: Courtney Grammer

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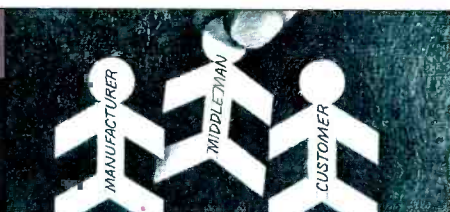
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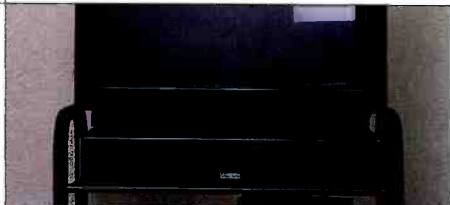
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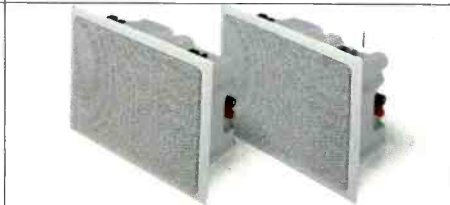
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It so happens that one of the tapes contains the Brahms Serenade for Orchestra, No. 1, in D Major, with the Greater Berlin Radio Broadcast Orchestra conducted by Walter Lutze on April 26, 1943. Thus, this year marks its golden anniversary, and in celebration the AES made arrangements to issue a CD with transfers of this recording and of two other recordings from the five surviving tapes. This historic CD was produced in cooperation with Harmonia Mundi Acoustica. Only 1,000 copies were pressed for distribution to convention attendees. (Negotiations are underway to make copies for other AES members.)

Krüger, who became chief recording engineer for the RRG, is still alive in his 88th year. The AES has made him an Honorary Member, and during the Berlin convention he conducted a seminar on his experiences, pointing out that his stereo recordings were indeed made almost on the exact spot from which he was speaking.

But we have only scratched the surface of this fascinating story.

The first track on the AES CD is Beethoven's Piano Concerto No. 5, "Emperor," with pianist Walter Gieseking and Artur Rother conducting the Greater Berlin Radio Broadcast Orchestra. Gieseking was then a famous world-class pianist, and when this recording was made in 1944, he was just 49 and at the peak of his powers. Rother was relatively obscure, a talented journeyman. (It turns out that this recording has been issued on Music & Arts CD-637, distributed by Koch International.)

The last track on the AES CD is the Finale of Bruckner's Symphony No. 8, with Herbert von Karajan conducting the Berlin State Opera Orchestra. The recording date of September 29, 1944 is significant. By then the apocalyptic bombing of Berlin was increasing, carried out by the American Air Corps by day and with Britain's Royal Air Force joining in the systematic destruction of the city at night. Miraculously, Broadcast House survived.

I must say, one has to wonder at and perhaps even admire all of the participants' resolve in completing this Bruckner recording. Amidst the *Sturm und Drang* of the bombing, the Allied armies advancing from the west, and the Russian juggernaut inexorably closing in on Berlin, it was clear from the vantage point of history that the

war was lost. Yet here was von Karajan, giving an intense, heaven-storming performance of Bruckner's music that revealed its beauty, its profundities, and the majesty of the stirring Finale—all the while facing a bleak and most uncertain future.

The five surviving RRG stereo tapes surfaced after taking rather tortuous journeys. Up until 1945, there was a military hospital complex in the Polish town of Kosten. Oddly enough, it also housed the RRG laboratories, whose director was Hans von Braunmuhl, co-holder with Walter Weber of the patent on high-frequency a.c. bias for magnetic recordings. Von Braunmuhl had a playback-only AEG stereo tape machine in his laboratory, and he often organized concert evenings for the doctors in the hospital, playing the latest stereo tapes from Broadcast House. After the German surrender, the Beethoven and Bruckner tapes were taken back to Berlin, and subsequently returned to Krüger. The other three stereo tapes were in a group of 1,500 mono tapes "liberated" by a Russian officer and taken to Moscow in 1948. They were closely guarded there in several archives, and in March 1991 they were returned intact to SFB (Sender Freies Berlin, or Free Radio Berlin). One of these three tapes contains Wagner's Prelude to *Tristan und Isolde*, which was recorded at too low a level for transfer to the AES CD; each of the other two tapes is an original master of the Brahms Serenade, one of which was used for the CD. (The Beethoven and Bruckner tapes are first-generation copies and were transferred to CD without any processing.)

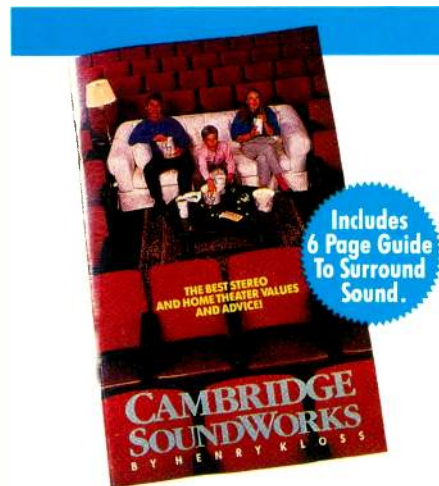
How do these pioneering stereo tape recordings sound on this unique CD? In a word, amazing! I was impressed by the fine clarity, relatively unobtrusive tape hiss, low distortion, wide frequency response, and surprisingly wide dynamic range, especially apparent in the contrasts of the Bruckner Finale. I would judge the Great Hall of Broadcast House to have a reverberation period of a little more than 2 seconds. Krüger had placed the orchestra and set his three mikes to afford a nice, warm ambience and good orchestral detail. There is a wide and deep soundstage to the CD, with obvious directionality and localization of instruments attesting to the authenticity of the stereophonic sound. Of course, these recordings aren't the equal of later vintage

analog stereo tapes, to say nothing of digital tapes, but they are far better than I expected. One speculates that had Krüger's 300 stereo recordings survived the war, they ultimately would have appeared on the consumer market by the mid-1950s.

My first knowledge of Hans von Braunmuhl came when Leopold Stokowski wrote me in 1950. Stokowski said he had heard about my stereo recording activities at Magnecord and that he had worked with von Braunmuhl in Berlin. He never mentioned when they had made their stereo recordings, but it must have been in the late '40s. I made my first stereo recording in 1951, with Stokowski conducting the Monteverdi Vespers of 1610 at the University of Illinois. Later that year, I made stereo recordings with Stokowski and the Detroit Symphony Orchestra in the world premiere of an exotic work, "The Taking of Tung Kwan" by Jacob Avshalomov—Chinese themes and lots of percussion! Then, in 1952 Bob Fine and I made stereo recordings with Rafael Kubelik and the Chicago Symphony, Paul Paray with the Detroit Symphony, Antal Doráti leading the Minneapolis Symphony, and Howard Hanson and Frederick Fennell with the Eastman-Rochester Orchestra and Band. In 1952 I also made stereo recordings of Virgil Fox on the organ in Chicago's Orchestra Hall and of the Don Cossack Choir.

Recently, *Gramophone* magazine has been publishing correspondence about early stereo tape recording. One writer noted that in October 1948, EMI made a recording of the Mendelssohn G Minor Piano Concerto in their Abbey Road Studio One, using the AEG/Magnetophon recorder. Then in 1949, EMI made a recording of the Dohnányi Suite in F, using a BTR-1 stereo tape machine. Another writer cited Decca's experimental stereo recording of the Mantovani Orchestra in 1953, as well as a series of recordings in 1954 with Ernest Ansermet conducting the Orchestre de la Suisse Romande. Another letter pointed out RCA's entry into stereo recording in 1954, which launched the Living Stereo series now being reissued on CD. (*Editor's Note:* See "Currents" in this issue.)

Stereo recordings were made in various places in the mid-1950s—but Helmut Krüger deserves the credit for pioneering stereo tape recording 50 years ago! **A**



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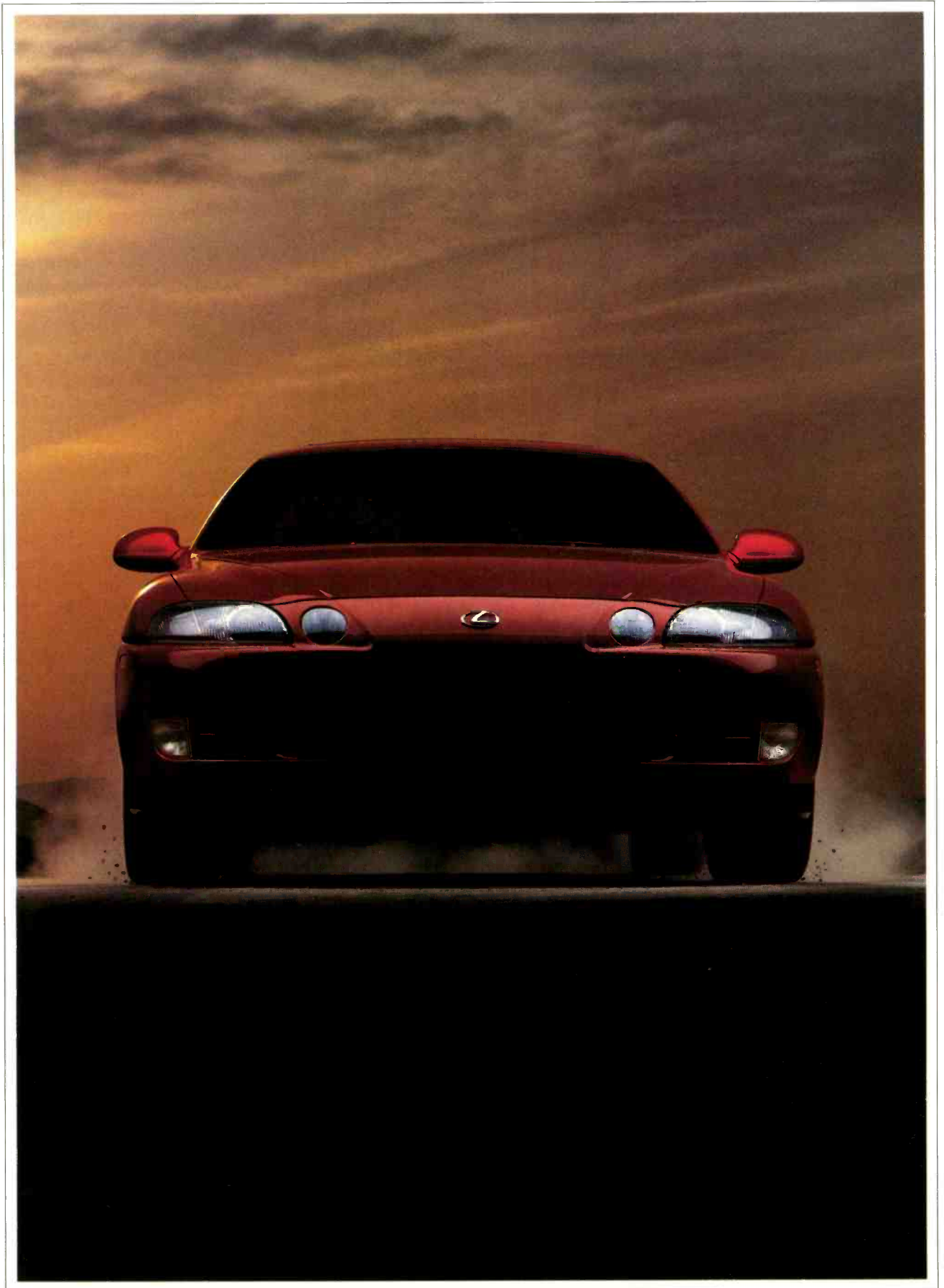
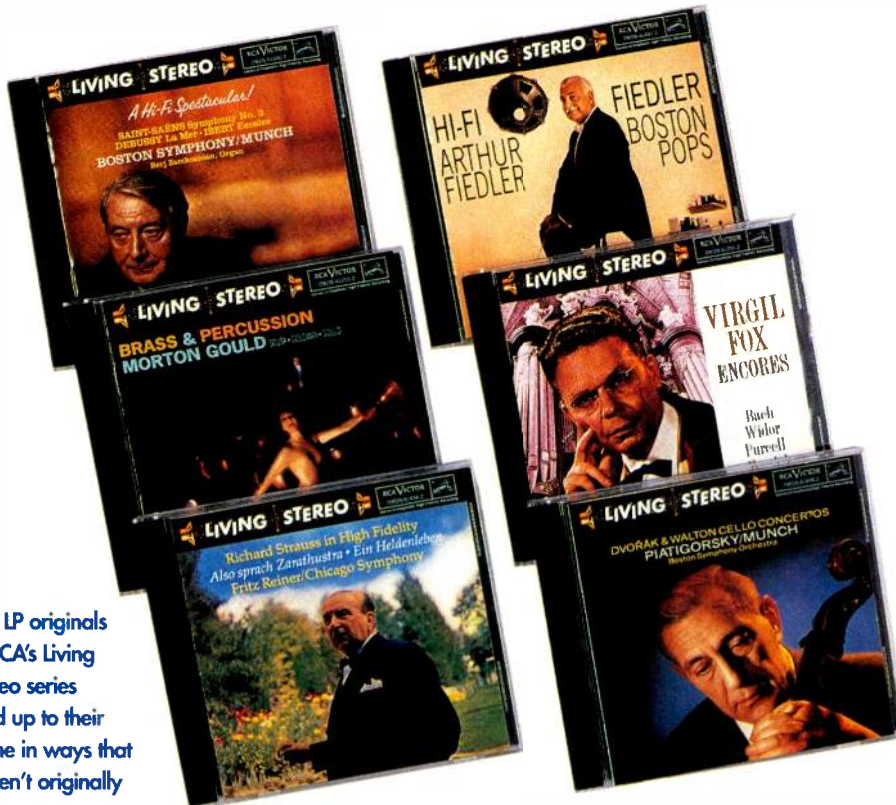


Figure is for comparison only, and was obtained with prototype vehicles under test-track conditions by professional drivers using special safety equipment and procedures. This should not be attempted on public streets or highways.

JOHN EARGLE

NEW LIFE FOR LIVING STEREO



The LP originals of RCA's Living Stereo series lived up to their name in ways that weren't originally apparent.

The contribution made to recording technology by the major American record labels during the 1950s is easily overlooked today. Companies such as RCA Victor, Columbia, and Capitol all had active record engineering groups (quite

**THE CD'S PLAYING TIMES
EXCEED THOSE OF
THE ORIGINAL
LP RELEASES.**

separate from the engineers who actually did the work in the studios); much of their activity focused on processes in the plant and developing better materials for plating and pressing LP discs.

These engineering groups also tackled problems in recording electronics and developed low-noise preamplifiers for their own proprietary consoles and transfer systems. RCA, in particular, was active in low-noise recording systems, and early in the stereo era developed a proprietary 30-ips record/playback equalization system that was truly outstanding.

Ironically, many of these improvements were not obvious to the end listener at the time. The vagaries of disc playback often hid them, and we have had to wait nearly 40 years for the CD to show us just how outstanding the original recordings were.

RCA Victor issued its first group of CDs from the Living Stereo series early this year. As Mercury's engineers did for their Living Presence

series, the RCA engineers went back to the earliest source tapes and reconstituted the original tube electronics for making the transfers to digital.

I recently chatted with John Pfeiffer, the producer for this ambitious reissue program. Pfeiffer's distinguished career with RCA Records dates back to the 1940s, and his roles with the company have included both technological development and artist and repertoire liaison with such luminaries as Horowitz, Heifetz, and Piatigorsky. (See *Audio's* November 1992 interview for more on Pfeiffer.) He was kind enough to fill me in on the overall project.

By the time the Living Stereo series is complete, it will include the very first RCA stereo recordings made in 1954 and will extend to recordings made in 1962. The original master recordings are carefully reviewed, and all edits are redone. In some cases, edits have been re-executed digitally to make better level matches between adjoining sections, but in no case has any digital method of noise reduction been used. Any damage due to faulty winding or storage conditions is carefully assessed so that proper restorative measures can be made. As you listen to these recordings, you will be amazed at how quiet most of them actually are; this is purely the result of superb early technology.

Original cover art has been used, and all CDs have been fleshed out so that playing times are well in excess of those of the original LP releases. Many of the works in the Living Stereo series have been previously released on CD, but every effort is made to avoid duplicating the couplings of previous CD releases. Here are some capsule reviews:

Richard Strauss in High Fidelity
The Chicago Symphony Orchestra,
Fritz Reiner
RCA VICTOR 09026-61494-2

"Also Sprach Zarathustra" and "Ein Heldenleben" were among the

very first reel-to-reel stereo tapes issued by RCA in about 1955. There was a Reiner "Zarathustra" in the early '60s, but RCA has wisely used Reiner's far better 1954 version. Both recordings on this disc were made direct to two-track stereo on quarter-inch tape with "minimal" miking, and the glorious ambience is that of the old Orchestra Hall before it was redone in the '60s.

A Hi-Fi Spectacular!

*The Boston Symphony Orchestra,
Charles Munch*
RCA VICTOR 09026-61500-2

The Saint-Saëns "Organ" Symphony (Symphony No. 3) was always one of RCA's best high-fidelity demonstration discs, and this transfer shows it in all of its technical excellence. Listen for the "purr" of the 32-foot pedal Violone in softer sections of the final movement. This, along with the other works here, Debussy's *La Mer* and Ibert's "Escales," were recorded between 1956 and 1959.

Brass & Percussion

Morton Gould and His Symphonic Band
RCA VICTOR 09026-61255-2

This album of marches contains music mostly of Sousa, Goldman, and Gould. The marches are fresh, never stodgy, and as cleanly recorded as much of what is done today. The recording dates were from 1956 to 1959.

Dvořák & Walton Cello Concertos

*Gregor Piatigorsky, cello;
The Boston Symphony Orchestra,
Charles Munch*
RCA VICTOR 09026-61498-2

Piatigorsky was the dedicatee of the beautiful Walton work, and for those of you who do not know it, this is as good an introduction as any. Recording dates were 1960 for the Dvořák and 1957 for the Walton.

Virgil Fox Encores

*Virgil Fox, the organ of Riverside
Church in New York*
RCA VICTOR 09026-61251-2

This is a collection of short compositions by Bach, Handel, Schumann, Mulet, and

Widor that shows the unique skills of Fox as master of the "orchestral organ." The sound is a bit dry, but that is the acoustical signature of Riverside Church. The range of the Aeolian-Skinner instrument is immense and is beautifully captured on this disc.

Hi-Fi Fiedler

*The Boston Pops Orchestra,
Arthur Fiedler*
RCA VICTOR 09026-61497-2

Here are popular works of Rimsky-Korsakov, Rossini, Tchaikovsky, Chabrier, and Liszt—all played with the special flair of Fiedler and beautifully recorded. Recording dates were 1956, 1958, and 1960.

RCA Victor is not as free with background data as Mercury has been, listing only recording producers, engineers, and dates in the CD booklets. It would be nice to have information on recording venues and any technical data that might be unique to a particular session.

As I write this, the second volley of releases in Victor's Living Stereo series has been announced. From all reports, this series should be as successful as Mercury's Living Presence releases, since both appeal essentially to the same devoted group of collectors.

**EFFORTS HAVE BEEN
MADE TO AVOID
DUPLICATING PROGRAMS
OF PREVIOUS CDs.**

There is a lesson here for other major labels. Capitol has some superb early material in their Full Dimensional Stereo series, MCA has the Command and Westminster catalogs to draw from, and Sony now has the Columbia catalog. The Everest catalog seems to be in limbo, which is a shame. And then there is the superb London-Decca catalog of the late '50s.

It is one thing to have landmark performances available on CD and something altogether different to have them packaged as facsimiles of the originals, transferred with the best that technology allows. **A**



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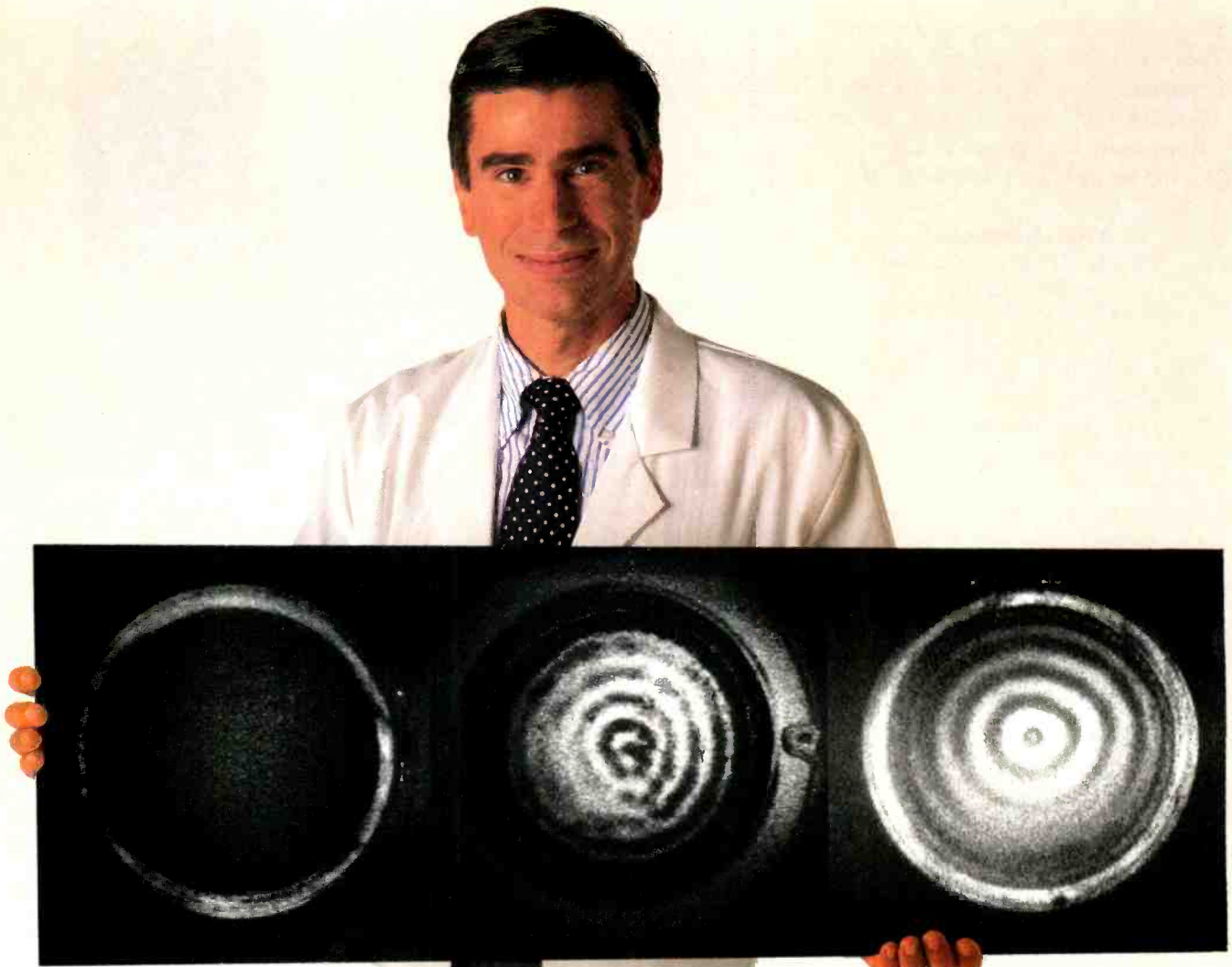
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Matthew S. Polk

Hologram "snaps" of tweeter showing no modal resonance, moderate amounts, and excessive amounts, each reflecting the use of different materials. The far left is Polk's Trilaminate tweeter.

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Before we could design and build speakers as sophisticated as the new LS Series, we had to design and build a whole new way to "look" at speakers.

At Johns Hopkins' Center for Non-Destructive Evaluation, a joint Polk/Hopkins team created a new Full-Field, Quasi-heterodyne, Laser Interferometry test. Much more useful than pronounceable, it allowed us for the first time to take a full-field hologram "snap shot" of microscopic forms of distortion generated by speaker materials themselves.

In the LS Series, the manifestation of Dynamic Balance™ is brilliantly executed with the addition of aramid fibers to the cone, insuring that music, not unwanted resonance, literally jumps off the cone.

Through a new patented process known as vapor deposition, we formed a trilaminate tweeter dome of aluminum, stainless steel, and polyamide. This turned out to be quite the musical combo, providing all the listening ease of soft domes with the superb liveliness of metal domes.

Styling in the LS Series is not only breathtaking, it is highly functional. The slim, tapered cabinet design belies its technological contribution. The angled sides break up standing waves inside the cabinet, so detrimental to midrange performance. At the same time, this design feature also enhances the stereo presentation dramatically.

All LS Series speakers are available in a striking, glass rosewood laminate. The LS50 and L70 are also offered in oak laminate with the LS90 available in natural Oak.

And each one of them is Dynamically Balanced.

Our pictures prove it. And so will your ears at your Polk Dealer.

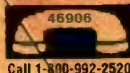
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A good car stereo display will give you whatever information you need at a glance. But as displays give us more and more info, we're tempted to glance more and more at them and less at the road.

Some displays now tell you the current function of adjacent, multi-function buttons or controls. Others tell you the call letters or program formats of memorized stations; depending on the radio's technology, you might enter that data yourself, retrieve it from an ID Logic data base, or pick it up on a radio with an RDS tuner (which will probably also include ID Logic). Traffic and weather information will pop up on RDS displays, along with ads. The name of the current song and the title and catalog number of the album will be shown by RDS radios

and by MD and DCC players; some stereos that control trunk-mounted changers let you enter titles already.

When big alphanumeric displays become common in car stereo, new applications will be found for them through tie-ins with such other systems as your cellular phone or a navigation system. For instance, your stereo's display could show the number you've called on your cellular phone or, with caller ID, the number that's calling you. And though the shape of current car stereos doesn't leave enough room for decent map displays, they could give you driving directions ("Left onto County 33"), augmented by warning tones before each turn or fork.

Nifty. But how do we use all this info and still keep our eyes safely on the road? Some years ago, one company tried a radio with a secondary display that could perch on the dash, just in front of the driver. I don't think it ever reached production. It may have failed because displays were pricier back then and there was less to show on them, or possibly just because it would have required making holes in the dash. Car companies have been working for de-

grades on "heads-up" display systems that superimpose data on the driver's view through the windshield, but as far as I know only military jets currently use that technology.

A company called CouponRadio, in New York City, takes an opposite approach, giving users of RDS radios a simple way to record broadcast data for later use instead of staring at the display until the information's memorized. The company would have radio manufacturers add slots to hold a memory module the size of a credit card. Any information transmitted via RDS could be stored on the card for playback on the radio's display or for printing at an appropriately equipped store.

David Alwadish, CouponRadio's president, estimates the system would add about \$5 in manufacturing cost to a radio (maybe \$20 at retail). What this added cost would bring you is the ability to store information instantly and safely while driving and, while listening to your home RDS receiver, to store it without hunting for a pencil. It would also bring the chance for discounts on advertised items or recordings played on the air. All you'd have to do to get the discount is to bring the card to a store to have a coupon printed out.

Radio manufacturers may or may not go for the idea, but radio stations would be very likely to. For them, the appeal would be the chance to charge advertisers for an extra service—and (since the coupons would show the station's name) the chance to prove that buyers actually were influenced by the stations' broadcasts.

Advertisers have long used coupon returns to tell them which newspapers or magazines brought in results. But though TV ad people have joked about using coupons, clipping the coupon off the screen has posed certain difficulties. Who'd have dreamed that radio might actually beat TV to the punch? And that it might promote both RDS and driving safety in the process? A

With CouponRadio, stations using RDS will be able to back up their commercials with discount coupons.



Adcom announces the cure for the common receiver.



Today, there is no reason to compromise your favorite music by listening to a common receiver. Because the Adcom GTP-400 tuner/preamplifier with GFA-535 (60 watts per channel)* amplifier gives you all the benefits of Adcom's legendary clear, dynamic sound for a price close to that of an ordinary receiver.

Why Separates?

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.

By dividing the tuner/preamplifier from the power amplifier, Adcom isolates low-current, low-voltage circuits from high-current, high-voltage elements ensuring sonic purity and demonstrably superior performance.

More Sound—Less Money

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



Zapping Electrical Noise

I sat down to listen for the first time since I'd moved. After several weeks of unpacking boxes, moving furniture, putting things away, and setting up equipment, I was eager to listen to my old friend. All was ready. I cleaned the connectors, plugged in the jacks, and put a record on the turntable. Good. No hum. The phono input is the severest test for noise, having the most gain. The system passed.

Next, I pressed the play button of my trusty turntable and sat back to listen to the opening measures of a favorite piece. I heard, instead, two cab drivers discussing their fares in Spanish. When they stopped, the system sounded fine, but not for long. If it wasn't some cabby or trucker on the radio to his dispatcher, it was the garbled but speech-like gabblety-gabble of a CB rig. (Some of these guys were surely exceeding the 5-watt power limit mandated by the FCC, but nobody seems to enforce such regulations anymore.) Sadly, I realized I had but two choices: Take up a new hobby, say short-wave radio listening, or try to shield my system from the effects of its new home in the radio-frequency soup of a crowded urban environment.

Usually the phono inputs are the most severely affected, followed by the tuner. But sometimes even CD and tape inputs are affected. I had to test them. With the volume control at 12 o'clock, radio-frequency interference, or r.f.i., was faintly audible. This was enough to destroy the pleasure of any audiophile, even a relatively casual one such as me. I checked the technical references. *The ARRL Handbook for Radio Amateurs*, published by the American Radio Relay League, has a section dealing with r.f.i. The ARRL has even published a book exclusively devoted to this subject, *Radio Frequency Interference: How To Find It and Fix It* (available from ARRL, 225 Main St., Newington, Conn. 06111; \$15 plus \$3 for fourth-class shipping or \$4 via UPS; order number 3754). It has an entire chapter on audio equipment, and I highly recommend this book for anyone whose problems are too severe or esoteric to be solved by the methods outlined below.

There are several broad categories of radio-frequency interference encountered in audio equipment. Radio signals make their presence known in several ways. AM transmission is heard as voice or music. It

The solutions for electrical noise are as varied as the sources, so you'll need to experiment.

Richard J. Kaufman



Snap-together ferrite chokes on power and signal cables can cut r.f. noise.

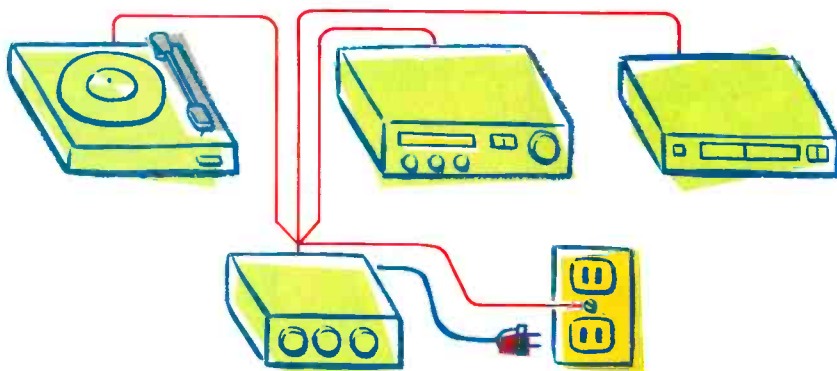
A do-it-yourself toroid on a commercial ferrite core; the more wire turns, the better.



Another filter type:
A power or signal lead
wrapped around the ferrite
core from an old
AM antenna.

**Some witchcraft is
involved in eliminating
noise; what works in
one place may not
work in another.**

To avoid ground loops, run all
component grounds to a single point,
then try grounding that to the wall.



may be very loud or slightly distorted.

Single-sideband (SSB) sources, including some CB transmissions, have the rhythm of speech, but their sound is garbled and indecipherable. Other forms of radio transmission—such as FM, TV, Morse code, or digital data—are characterized by buzzing, clicking, or “tweedling,” which can be like constant or intermittent static. Electrical devices around the home can also introduce noise. Motors produce constant static that can vary in intensity with motor speed; switches, thermostats, and other devices can cause single or intermittent clicks. Atmospheric disturbance produces uneven, crashing sounds. All of these can be treated by the same simple methods.

These electrical noises can get into your system in two ways. The first, direct radiation, is not common with modern, well-shielded equipment. In the unlikely event that direct radiation is your problem, mounting your equipment in a properly shielded case is the solution. The second way noise gets in is by conduction, through one of the wires that enters the equipment. Power cords, speaker wires, and interconnect cables are all possible culprits. Inexpensive interconnect cables, such as those supplied with most tape decks and other equipment, are often only partially shielded, with wires that are spiral-wound about the cable’s inner dielectric.

Better quality cable uses a braided shield that completely covers the dielectric. It isn’t necessary to buy very expensive cable to eliminate r.f.i. The cables for a VCR’s video

signals are designed to carry radio frequencies and usually are properly shielded. Sometimes upgrading your cables, even in this modest way, will eliminate a noise problem. Yet even properly shielded cables can carry noise into an amplifier. It travels on the outside of the cable but still manages to get inside the amp via the input jacks. Shielded speaker cables and power lines are not generally available, anyway. You must use a filter.

Filters for the a.c. line are available from hardware stores, electronic supply houses, and Radio Shack (catalog No. 15-1111). Plug your equipment into one of these filters, and most noise from electrical appliances is eliminated. Radio Shack also sells various filters to keep noise from getting in via your FM antenna.

If the interference isn’t coming from the wall outlet but is radiating into the cords and cables, another kind of filter is needed: A ferrite choke. Ferrite chokes are easy to make. They can be used on power cords, interconnects, or speaker cable. Ferrites come in several forms: Straight bars, rings or toroids, and tubes. You can wrap a cord or cable for five to 20 turns around a ferrite bar. The old way was to get a ferrite bar from the antenna of an unused AM radio. A square toroid can be obtained from the flyback transformer of an old TV set. Leaving the high-voltage winding in place causes no harm, except to physically limit the number of turns of wire you can wrap about the core. While these homemade remedies often work, ferrites designed for the task of r.f.i. filtering are more likely to be effective.

Radio Shack sells two useful devices: A snap-together choke ferrite (No. 273-105) and a toroid choke (No. 273-104). The choke ferrite fastens together around an interconnect or a.c. line cord. (AudioQuest and TDK make similar devices.) The toroid choke is formed by wrapping the line cord, speaker leads, or interconnects about the toroid form—as many turns as will fit. The more turns, the greater the power of the choke to stop interference. More than one core can be used for tough cases.

Put the ferrites as close to the input of the amplifying device as possible. In my

case, I used ferrite toroids on the phono input cable, as close to the preamp as I could (i.e., within an inch) and added a second set of toroids on the cable between the preamp and the amp, as close to the amplifier's inputs as I could. This did the trick. No more cab drivers talking on my system!

Grounding your equipment also helps r.f.i. and hum problems. Three-prong power cords generally ground the chassis of a piece of gear. Many audio components have only two-prong power cords, which may be a good thing as far as noise goes. First, you need a good ground. Just because you have a three-prong outlet doesn't mean the third prong is a ground, especially if you live in an older house. Test the ground status of your outlets, or have an electrician do it if you are not sure how.

The coverplate screw on an a.c. outlet is another possible ground source. It is especially useful when your equipment has

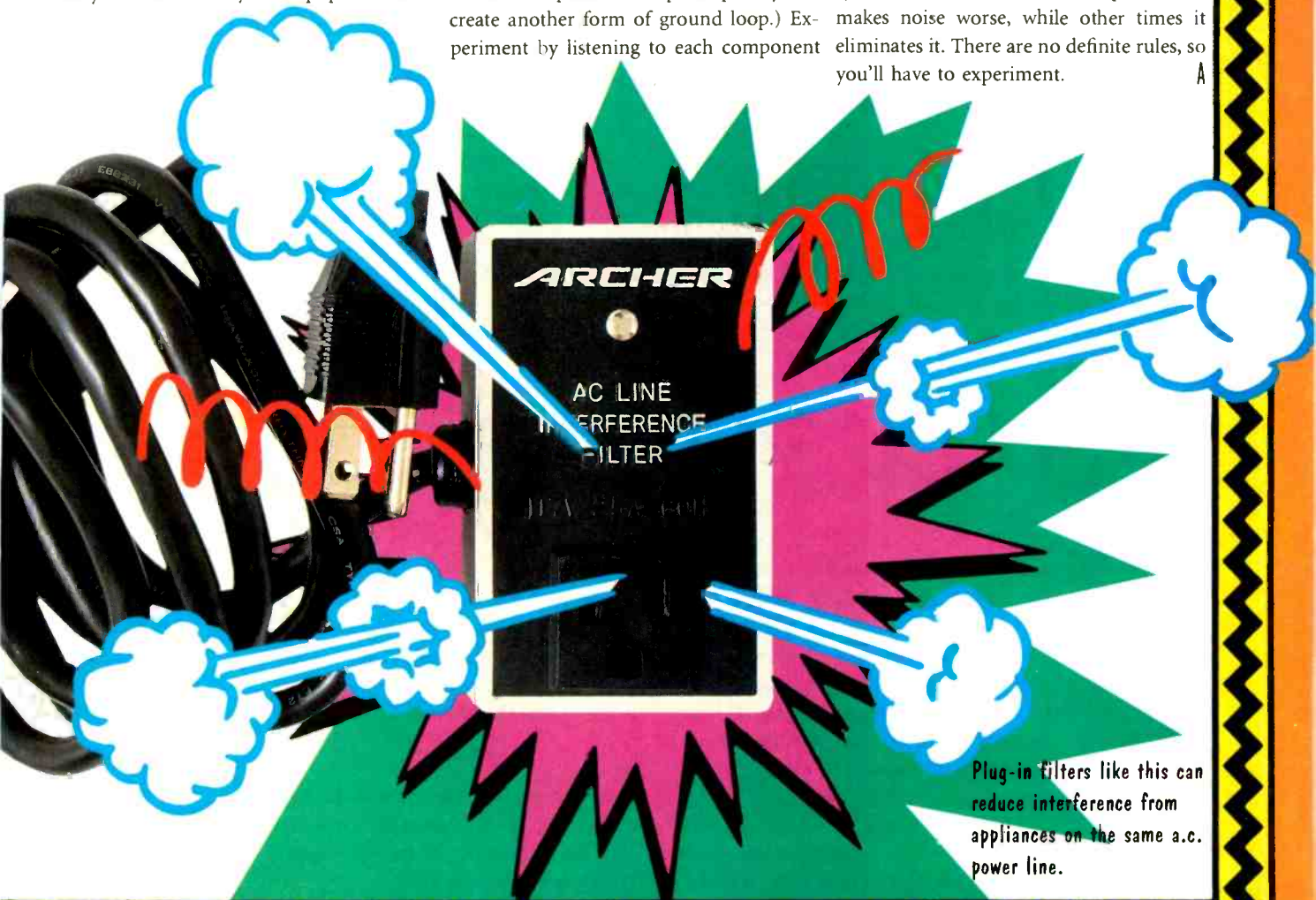
two-prong cords or when you have older wiring with two-hole receptacles. Again, test that the screw is, in fact, a ground. Water lines and radiator heat pipes are not always reliable grounds. If your amp or preamp is grounded through the power cord, fine. But only one piece of equipment should be grounded this way; otherwise ground loops may form, causing hum.

If there is no ground built into your equipment's line cord, you can try grounding the chassis to the electrical ground at the coverplate screw on the electric outlet. Usually the preamp (or the receiver, if you don't have separate components) should be the one component grounded this way. Many preamps have posts around which you can wrap ground wires from the other components and the ground wire (if any) you're running to the coverplate screw. (Don't make multiple ground connections to different parts of the preamp, or you'll create another form of ground loop.) Experiment by listening to each component

as you attach its ground to your preamp or receiver. If hum and noise improve, fine. If they get worse (a sign that the components affected are already grounded to the preamp through their audio interconnects, and your added ground just set up a ground loop), remove the ground.

In general, you want only one component grounded to earth, and the other components grounded to it. If you ground a component twice, the two paths to ground will never be the same length. This creates differences in electrical potential, setting up current loops that are audible as hum.

Some witchcraft is involved. In my old setup, the phonograph had to be grounded to the preamp or else it hummed. Same equipment, new location, and the phono couldn't be grounded to the preamp or else it hummed. Sometimes, grounding your system to the wall outlet's coverplate screw makes noise worse, while other times it eliminates it. There are no definite rules, so you'll have to experiment. A



Plug-in filters like this can reduce interference from appliances on the same a.c. power line.

A

s the director of the electro-acoustics laboratory at the University of Wisconsin, I have daily contact with students who have a great interest in high-fidelity systems. They often ask me about subwoofers: What is a subwoofer, and how did this term originate? Why not use two subwoofers for a stereo system? Or why not use two loudspeakers that have been designed for full-range bass response in the first place?

The subwoofer gained popularity because of the great number of small loudspeaker systems designed with very small woofers, 5 to 7 inches or so. This tactic was

for the high quality of their sound performance. In recent years a good understanding of the physics and design of small loudspeaker drivers, and improvements in materials, has made this possible. These loudspeakers are able to emit adequate power in the upper two frequency decades, 200 Hz to 20 kHz, but often lack the necessary cone area to give satisfying power output, especially in the bottom half of the lower decade of frequencies, 20 to 100 Hz.

The power output delivered by a loudspeaker goes down rapidly as frequency

the

Lowdown

the result of trying to make acoustic-suspension, bookshelf speakers smaller and smaller. Design alignments often give the

on

best result with a relatively small driver piston size. In fact, it is quite possible to make a loudspeaker with a driver of, say, 5 or 6 inches in diameter that will have flat fre-

quency response down to 30 Hz or so. However, it is not easy to get a very satisfying amount of power out of such a system at the lower end of the frequency range. This is because the laws of physics require relatively small pistons to move a large distance to generate the required volume velocity of air, which, in turn, gives the acoustic power output required.

decreases and even more rapidly as the speaker's radius is decreased. At low frequencies, the limited mechanical motion of the loudspeaker cone limits the acoustic output. The Table in the sidebar gives approximate levels of acoustic power output for various driver sizes. Clearly, if we want to have as much as 0.1 acoustic watt of sound output at 20 Hz, we are hard pressed to do so with anything less than a

subwoofers

couple of very-long-throw 10- or 12-inch drivers. At 50 Hz, the problem is much less severe. I have always solved this limitation by using a large cone area for the bass end of my loudspeaker designs. For most large living rooms (3,000 cubic feet or larger),

Many of the small loudspeakers with small woofers now on the market are quite appealing for their size and price, as well as

R. A. Greiner, a Fellow of the Audio Engineering Society, is a professor of electrical and computer engineering at the University of Wisconsin in Madison, Wisc.

this requires a couple of 12- or even 15-inch drivers and a floor-standing box of 3 to 4 cubic feet for each speaker in a system.

It may not be practical for many people to have such a large system, for reasons of cost, space, or room aesthetics. A partial, but an interesting, solution to the problem was the introduction of the three-piece

R. A. Greiner

cost, space, or room aesthetics. A partial,

generally thought that a single monaural channel was all that was needed, because the frequencies below 80 Hz are typically mixed to monaural anyway. (This latter factor was a result of the limitations of the mechanical reproduction process used in making vinyl records.)

The assumptions that justified using a single subwoofer have some basis in fact.



system. This generally consists of two quite small loudspeakers that cover the frequency range down to 100 Hz or so. Such loudspeakers, with a 5- to 6-inch piston, are fairly easy to design. But a system with the bottom two octaves missing is not very satisfying, so a third component is added, the subwoofer.

The rationale for using a subwoofer is that a loudspeaker can be designed to give appreciable power output and have optimal performance at very low frequencies because it does not have to reproduce the higher frequencies. In theory, the box can be placed in a more or less out-of-the-way location in the room since the low frequencies have very little directionality. It was

Three-piece systems have been, and are still, popular when space and room styling take precedence over other acoustic considerations. However, I have some concerns and reservations about the technical justifications for the three-piece system. Certainly not all, or even most, loudspeakers need a subwoofer or two to make them complete in the extreme lowbass. In fact,

more and more floor-standing loudspeakers of the past several years have two 8-, 10- or even 12-inch drivers that can provide entirely adequate bass response for a relatively large listening room. It may be the wisest decision to get a truly full-range

**Illustration
Karen Stolper**

Loudspeaker Driver Capabilities

Approximately, loudspeaker drivers with the following *advertised* diameters will be able to generate the acoustic power levels listed below. The Table is based on an *actual* diameter of about 85% of the advertised diameter, a peak motion capability of about 5% of the radius (a generous amount for most drivers), and placement away from the corners of the room. Since all of these factors have a strong effect on the power capabilities of the loudspeaker, the approximate nature of the Table must be strongly emphasized.

Advertised Driver Diameter, Inches	Maximum Power, Watts	
	At 50 Hz	At 20 Hz
8	0.0025	0.00065
10	0.131	0.0034
12	0.547	0.014
15	2.64	0.068

The power levels listed look quite low, but fortunately an acoustic power output of 0.1 watt is very loud in a typical listening room. A reference level might be that a loudly played piano emits about 0.1 to 1 acoustic watt.

The most important aspect of the figures is to note that the loudspeaker runs out of power output capability very fast as the frequency is lowered, and it gains power capability very fast as the frequency is increased. Typically, one or two 8- to 10-inch drivers (or the equivalent) are needed to generate realistic acoustic power levels at 40 to 50 Hz in a typical listening room of, say, 2,500 cubic feet.

loudspeaker in the first place, since it will have been designed as a unit and have smoothly balanced response over its full range. However, in the case of smaller bookshelf-type loudspeakers, considerable advantage can be had by removing the lower two octaves of the sound and feeding them to a good subwoofer. The advantages are that the subwoofer now handles the hard-to-reproduce very low frequencies, and the smaller loudspeakers are freed of the power and displacement demands made by the low frequencies. This can result in lower distortion in the small loudspeakers and considerably improved sound quality from them. It also allows planning for system growth; if you first invest in a good, small pair of loudspeakers, you can augment them later by increasing bass capability with a subwoofer.

A question of concern is whether one or two subwoofers should be added. If one subwoofer is added, the result is a three-piece system with monaural bass below about 80 to 100 Hz. If two subwoofers are added, the result is two full-range loudspeakers with stereo bass. Does it matter if we have stereo or monaural bass? I would claim that it does, for at least two reasons. The first is that we have much better program material today from the Compact Disc than we did with the vinyl record. We have greatly extended bass frequency response and have two entirely independent channels. That is, there is more realistic bass—and it is often completely stereo. We

U[—]SING TWO SUBWOOFERS PROVIDES MORE REALISTIC BASS AND TAKES ADVANTAGE OF PROGRAM MATERIAL WITH FULLY STEREO BASS.

should try to reproduce this new and better sound, if possible. To do so requires two complete, full-range, stereo channels with two independent bass drivers.

The second reason is not quite so obvious: There is considerable interaction be-

tween the room and the bass loudspeakers. We all know that placing the bass loudspeaker near a wall or in a corner of the room changes the amount and distribution of the bass frequencies in the room. At low frequencies, strong and widely spaced room modes are occurring. These modes are evidenced by the fact that as we move about the listening room, some locations have a lot of bass while others lack bass. The locations where more or less bass is heard move around within the room when the loudspeaker is moved from place to place. The problem with the three-piece system is that we have only one bass loudspeaker. Thus, the room is only excited from one point, and we have a set of modes that are quite audible. When two bass loudspeakers are placed in the room and are excited by a stereo bass signal, each will have its own set of modes. It is not likely

that the lack or excess of bass from one loudspeaker will fall at exactly the same point as for the other loudspeaker. Thus, a considerably better uniformity of bass response is obtained when the room is excited from two sources. (See "A Theoretical Look at Subwoofer Operation in Rooms" by John D. Bullock, AES Preprint No. 2861, 1989.)

For best-quality bass response, I would therefore suggest that you use two full-range loudspeakers, that you augment a three-piece system with a second bass loudspeaker, and that when you enhance a smaller system with additional subwoofers, add two of them, not just one. In this fashion, you can take advantage of the full stereo sound at low frequencies available from the Compact Disc and other digital sources—or from analog cassettes, for that matter.

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PARASOUND HCA-2200^{II} AMP



The Parasound HCA-2200^{II} is surprisingly affordable, considering it was designed by John Curl, a noted designer in high-end audio. It is not a small power amplifier, not only because it's rated at some 220 watts per channel into 8-ohm loads but also because it maintains Class-A operation up to an output of 6 watts. The robust output stages use six pairs of output devices per channel; these devices are beta-matched for more equal current sharing.

The HCA-2200^{II} is attractive in its black metal finish. Its front panel is rack sized, 7 inches high by the standard 19 inches wide, with a pair of beefy handles to assist in lifting and moving the amp. (A second pair of handles is on the rear.) Toward the left of the panel is a rocker power switch, accompanied by a pair of LEDs. The red "Standby" LED glows when the unit is first switched on, and the green "Normal" LED

turns on a few seconds later, when the amp is ready for operation. Red LEDs toward the right indicate "Current Overload" and output stage "Overheat" for each channel.

On the rear panel, besides the handy extra handles, are an IEC power-cord socket and an a.c. line fuse, fuse-holders for each channel's positive and negative rails, and each channel's input and output connec-

**WITH JUNCTION FETs AS
INPUT DEVICES, THIS AMP
DOES NOT NEED CONSTANT
CURRENT SOURCES PER SE.**

tors (XLR for balanced input, RCA phono for unbalanced input, and dual five-way binding posts to allow bi-wiring). Also on this panel are toggle switches to select ei-

ther the unbalanced or balanced inputs for each channel and a single toggle switch for selecting stereo or bridged mono mode.

Mechanical construction is straightforward, using the two side-mounted heat-sinks as the foundation that everything else is built upon. A front subpanel and the rear panel bolt to the heat-sinks, and the top and bottom covers (of a heavier gauge than normal, about 0.1 inch thick) are mounted with machine screws to lips on the rear panel and front subpanel. The top and bottom are also bolted to tabs about half-way back along each heat-sink, which ties these covers to the heat-sinks as well. Two

SPECS

Power Output, 20 Hz to 20 kHz:

Stereo, 220 watts/channel into 8 ohms, 385 watts/channel into 4 or 2 ohms; mono, 750 watts into 8 ohms, 1,000 watts into 4 ohms.

Current Capacity: Continuous, 50 amperes; peak, 90 amperes.

Dynamic Headroom: Greater than 1.5 dB.

THD: At full power, less than 0.05%; at typical power levels, less than 0.009%.

IM Distortion: Less than 0.03%.

Transient Intermodulation Distortion: Unmeasurable.

Frequency Response: 2 Hz to 95 kHz, +0, -1.5 dB.

Slew Rate: Greater than 135 V/ μ S.

S/N Ratio: Greater than 114 dB,

A-weighted, with input shorted.

Channel Separation: Greater than 84 dB at 1 kHz and greater than 74 dB at 20 kHz.

Input Impedance: Unbalanced, 100 kilohms; balanced, 200 kilohms.

A.c. Power Requirement: 1,000 watts.

Damping Factor: Greater than 1,000 at 20 Hz.

Dimensions: 19 in. W \times 7 in. H \times 15 in. D (48.3 cm \times 17.8 cm \times 38.1 cm).

Weight: 60 lbs. (27.2 kg).

Price: \$1,695.

Company Address: 950 Battery St., San Francisco, Cal. 94111.

For literature, circle No. 90



toroidal power transformers, one per channel, are stacked inside the enclosure at the front and are attached to the bottom panel with a huge bolt. Approximately the middle third of the interior is taken up by four main filter capacitors and the attendant circuit boards mounted atop them. These circuit boards hold numerous bypass capacitors for the main filter capacitors, plus the circuitry for the front-end power supply and regulators. The main audio circuit is built on a p.c. board that takes about the rear third of the area and is mounted horizontally near the top of the amp.

Circuit Description

Revolutionary is the way I would describe the use of completely quasi-complementary circuitry throughout this design. (Well, revolutionary for John Curl, anyway, as he's known for using completely complementary circuits!) The input stage is a complementary differential amplifier using matched dual N-channel and P-channel J-FETs. The complete input stage is formed by cascading the J-FETs with bipolar transistors. In a design like this, where junction FETs are the input devices, there is no need for constant current sources per se; the FET source circuits of the two polarities are tied together with a common resistor that sets the overall operating current for the input stage. Both collectors of the outputs of each complementary input differential amplifier are coupled to a complementary differential second stage, which uses bipolar transistors. The appropriate collectors of this second stage are tied together through a bias-spreading regulator and drive the input of the output stage's driver circuit. This driver circuit consists of

a pair of complementary MOS-FET devices acting as source followers. Output of the source followers is applied to the bipolar output transistors, which operate as complementary emitter followers. This arrangement of MOS-FETs driving bipolar outputs is an unusual one. Generous amounts of feedback are present in the input and second stages. Overall negative feedback is taken from the output back to the inverting input of the input stage. A d.c. servo is also connected from the amplifier output back to the inverting input of the input stage; this reduces the amplifier's gain at d.c., thereby reducing any output d.c. offset to low values. The output of the amplifier passes through a relay to the output terminals.

A clever arrangement permits high impedance for both input polarities when the balanced XLR input is selected. A separate input source follower consisting of two N-channel J-FETs, one the source follower itself and the other a constant current load for the follower, buffers the negative input phase. The output of this source follower drives the bottom end of the shunt feedback resistor when the balanced inputs are used. In bridged mode, signal input is applied to the right channel only, and the output of the right channel is applied through an appropriate summing resistor into the inverting input of the left channel's input differential amplifier. This causes the hot output terminal of the left channel to be 180° out of phase with that of the right, thus providing the necessary conditions for connecting the mono load between the hot output terminals of both stereo channels. In my opinion, this is not the most signal-pure way of bridging, as one phase of the output goes through one amplifier channel and the oth-

er phase passes through two amplifier channels. However, to do it in a more balanced way would require more front-end amplification for polarity inversion, which could itself affect the sound.

Elaborate protection circuitry monitors output stage current, output d.c. offset, and

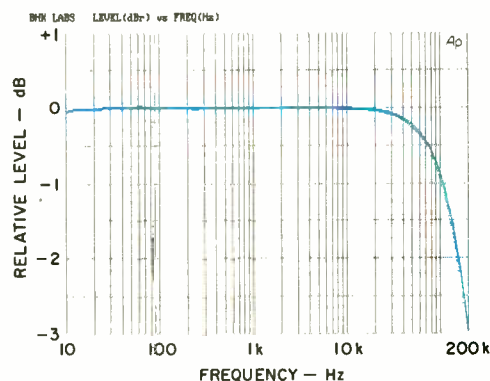


Fig. 1—Frequency response for open circuit, 8- and 4-ohm loads.



Fig. 2—Square-wave response of (from top) 10 kHz, 8 ohms (20 μ S/div.); 10 kHz, 8 ohms & 2 μ F (20 μ S/div.); 40 Hz, 8 ohms (5 mS/div.); all 5 V/div. on vertical scale).

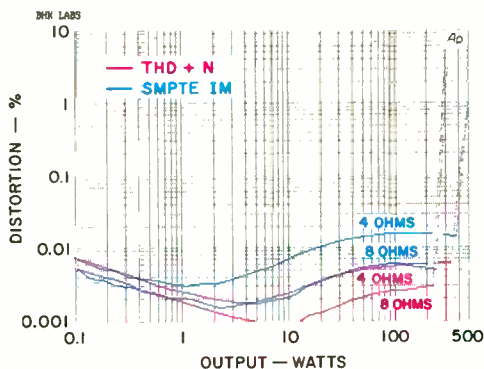


Fig. 3—Distortion vs. power.

operating temperature. If any of these quantities is deemed excessive, the output relay is opened (and the appropriate front-panel indicator comes on, in the case of overtemperature or excessive current). This circuitry also functions as a turn-on time delay, holding off the output relay's closure until the amplifier circuit settles out.

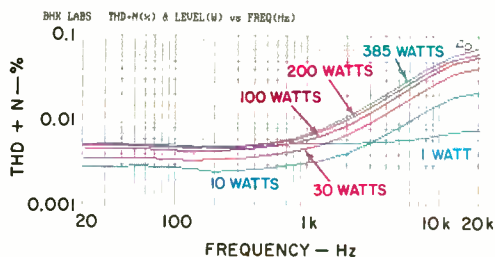


Fig. 4—THD + N vs. frequency, 4-ohm load.

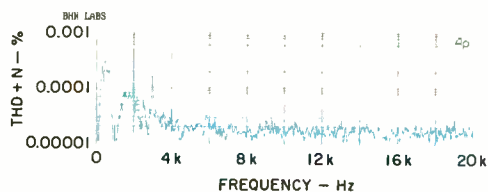


Fig. 5—Spectrum of harmonic distortion residue, 8-ohm load.

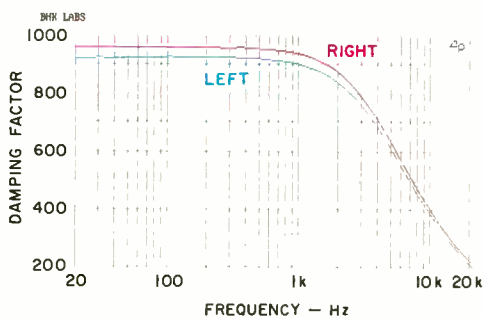


Fig. 6—Damping factor vs. frequency.

Table I—Output noise levels. IHF S/N ratios were 96.7 dB for the left channel and 98.4 dB for the right.

Bandwidth	Output Noise, μV	
	LEFT	RIGHT
Wideband	133.0	141.4
22 Hz to 22 kHz	59.3	50.2
400 Hz to 22 kHz	41.0	42.0
A-Weighted	40.7	34.0

Measurements

Since the channels in this sample were quite well matched, I am arbitrarily presenting data for the left one unless some particular measurement differs significantly between channels.

Voltage gain and IHF sensitivities were measured first. Results were 27.1 dB and 125.0 mV, respectively.

Frequency response at the 1-watt level into 8 ohms is plotted in Fig. 1 for open-circuit and 8- and 4-ohm loading. As can be seen, the frequency response shape and output level are rather unaffected by load, and the 3-dB down point is about 200 kHz. Rise- and fall-times measured 1.6 μs , which relates nicely to the 200-kHz bandwidth. Square-wave responses are shown in Fig. 2. The top trace is for 10 kHz at an output amplitude of about 10 V, peak to peak, into 8 ohms. In the middle trace, a 2- μF capacitor is paralleled across the 8-ohm load. Ringing with this load is nicely controlled (or damped). In the bottom trace, for 40 Hz into 8 ohms, no tilt is evident, which is testimony to this design's extended low-frequency bandwidth.

Distortion (THD + N at 1 kHz and SMPTE IM) is plotted in Fig. 3 as a function of power output for 4- and 8-ohm loading. Measured performance here is very good. Total harmonic distortion plus noise as a function of frequency and power is shown for 4-ohm loading in Fig. 4. The Parasound produces rising levels of distortion above about 1 kHz, which happens in many, if not most, other amplifier designs. A spectrum of the harmonic distortion residue, for a 1-kHz signal at 10 watts into 8 ohms, is shown in Fig. 5. This spectrum would make any amp designer proud! There's just a little second- and third-order distortion but nothing else except noise.

Damping factor versus frequency is shown in Fig. 6 for both channels. This high damping factor (or low output impedance) will help the amp deliver flat response

to speakers that have wide variations in their impedance curves.

Output noise levels for the HCA-2200^{II}, along with IHF signal-to-noise ratios, are given in Table I. The noise in this amplifier is commendably low.

Interchannel crosstalk was found to be more than 100 dB down at frequencies up to about 1 kHz; it then rose at a rate of 6 dB per octave to a level of about 77 dB down at 20 kHz. The amount of crosstalk was essentially identical in both directions.

The tests of IHF dynamic headroom yielded equivalent power levels of 315 and 578 watts for 8- and 4-ohm loads, respectively. This translates to dynamic headroom figures of 1.6 and 1.76 dB. Maximum undistorted output into a 1-ohm load,

BECAUSE OF ITS HIGH DAMPING FACTOR, THIS AMP CAN DRIVE SPEAKERS WHOSE IMPEDANCE CURVES HAVE WIDE VARIATIONS.

when I used the IHF tone-burst signal to assess dynamic headroom and operated one channel, was a healthy ± 60 amperes at the beginning of the 20-mS tone burst. It decayed to about ± 50 amperes at the end of the burst due to power-supply sag under load. Steady-state power output at the visual onset of clipping was 285 watts per channel into 8-ohm loads and 490 watts per channel into 4-ohm loads. Corresponding values for clipping headroom are 1.1 and 1.0 dB. This amp really puts it out!

The a.c. line current at idle was about 3.5 amperes, indicating a healthy idling dissipation in the output stage. The a.c. line current started to increase at an output of about 5 or 6 watts into 8-ohm loads, which indicates Class-A operation up to this power level. With 4-ohm loading, the current started to increase at a lower level, 1 to 2 watts.

Use and Listening Tests

Equipment used to evaluate the HCA-2200^{II} included an Oracle turntable fitted with a Well Tempered Arm and Spectral Audio MCR-1 Select moving-coil car-

continued on page 72

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PS AUDIO ULTRALINK D/A CONVERTER



When PS Audio changed hands a couple of years ago, one of the goals of the new regime was to develop a D/A converter that was among the finest in the world. Since the company was one of the first to offer a separate D/A converter, the new owners asked, what could be more fitting than to come up with a real killer D/A that's still affordable? The UltraLink is the result of that effort.

The UltraLink D/A converter is certainly a breakthrough product in that it is probably the lowest priced unit to use a version of UltraAnalog's highly regarded D/A converter module. A number of other features and design attributes also contribute to its overall excellence. Among these are the use of three isolated power supplies (for left and right analog outputs and the digital logic), 38,000 μ F worth of Panasonic HFQ-

series low-impedance electrolytic capacitors, some 50 Mylar bypass capacitors that were chosen for their sonic benefits, a frequency-dependent negative-resistance (FDNR) third-order analog reconstruction filter, an unusual op-amp/discrete analog output stage, and the superior sounding NPC SM5803 eight-times oversampling filter between the input receiver chip and the D/A converter module.

Front-panel control is exclusively through touch buttons that are located in a group, to the left of PS Audio's logo. Starting from the left, these buttons handle power, polarity inversion, "Optical" input selection, and selection of the coaxial inputs. Indicator LEDs above the last three buttons show operating status. To the right of the company's logo is another group of LED indicators for the sampling frequency in use, the presence of a locked-in data

stream, and whether the de-emphasis and power are on. The UltraLink is always powered when plugged in and is designed to stay powered for best sound. When the power button is not pushed, the LED pilot light is out and the outputs are muted, but otherwise the system is on and ready.

On the rear panel, from left to right, we have an IEC a.c. input connector, Toslink (and, optionally, AT&T) optical inputs, two coaxial inputs, a coaxial digital output, plus XLR and RCA analog output connectors for the left and right channels.

Inside the UltraLink is the most beautiful p.c. board ever to come out of PS Audio. This board is 0.093 inch thick, for structural integrity, and has been designed

**DESPITE ITS MODERATE
PRICE, THE ULTRALINK
ABOUNDS IN UNUSUAL
CIRCUIT NICETIES.**

for minimum signal crosstalk. Populating this board are carefully chosen, high-quality parts. Build quality is excellent in this unit, and long and trouble-free performance would be expected.

Circuit Description

Starting with the coaxial inputs, the signals from both terminals of the input con-

SPECS

Frequency Response: 20 Hz to 20 kHz, ± 0.3 dB.

De-Emphasis Accuracy: ± 0.1 dB.

Dynamic Range: 98 dB.

Noise: -110 dB.

THD: -94 dB with 600-ohm load.

Crosstalk: -120 dB at 1 kHz.

Dimensions: 17 in. W \times 2½ in. H \times 9 in. D (43.2 cm \times 6.4 cm \times 22.3 cm).

Weight: 11½ lbs. (5.2 kg).

Price: \$1,995; with AT&T optical connector, \$2,195.

Company Address: P.O. Box 1119, Grover Beach, Cal. 93483.

For literature, circle No. 91

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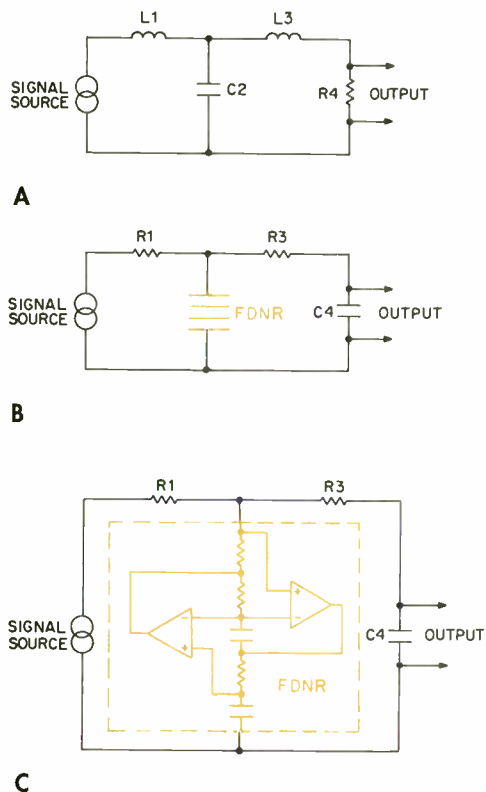


Fig. 1—Derivation of the FDNR. A third-order LC filter (A) transforms to a third-order low-pass filter (B), implemented as shown in (C).

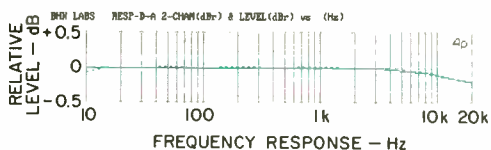


Fig. 2—Frequency response.

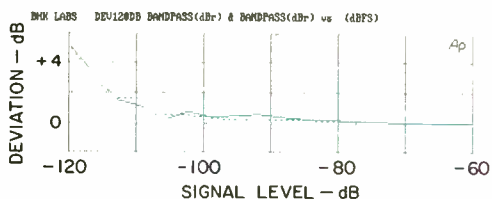


Fig. 3—Deviation from linearity.

nectors are applied through coupling capacitors to the inputs of a differential line receiver. This receiver has hysteresis for increased noise immunity. The outputs of the coaxial input receivers, along with the outputs of the optical input modules, are coupled to a signal selector multiplexer (MUX). The selected signal source is passed through a buffer chip and an output coupling capacitor into a voltage divider. This produces the proper output level and impedance for an SPDIF digital output. (Such an output attenuator, to produce a proper SPDIF interface output, is not in most of the digital output circuits I've seen.) The selected output of the MUX also goes through a line driver/buffer into the primary of a signal-isolation transformer for the main data path. Control of the MUX for signal selection is through opto-isolators, to maintain the isolation of the digital front-end from the following circuitry.

Output from the secondary of the front-end isolation transformer is squared up by a Schmitt-trigger chip and passed on into the data input of the Yamaha YM3623B input receiver. (This chip also reads the sampling rate info from byte 3 of the SPDIF digital signal input protocol. The information is then applied, via a two-to-four decoder, to the sampling frequency LEDs on the front panel.) The relatively well-known trick of killing the crystal oscillator when signal lock has been accomplished for reduced jitter is used here, with a twist: One side of the crystal is pulled low actively, with a transistor. Master-clock, bit-clock, and left/right selection signals are passed on to the input of the NPC SM5803 eight-time upsampling digital low-pass filter. Data output of the receiver goes into one input of an exclusive-or (XOR) gate, the output of which goes to the data input of the SM5803. A logic level of 0 or 5 V into the other input of

the XOR controls the polarity of the data signal, and hence the final audio output polarity.

The SM5803 is a somewhat different animal than the more commonly used SM5813. It has digital de-emphasis, a digital attenuator, selectable noise shaping, and a soft-muting circuit. An arrangement of a four-bit binary counter and three MUXs is associated with a power-on reset circuit that sets up the mode register of the SM5803 chip.

The upsampled signals out of the SM5803 are passed into the UltraAnalog D/A module. Trimpots allow adjustment of the d.c. offset in the output from each channel of the D/A module—and hence the final analog output, as the following signal circuitry is direct-coupled.

Passing on to the audio output circuitry: D/A analog outputs are applied to a novel third-order low-pass filter, of the FDNR variety, that is said to be “out of the signal path” and which has been used in a few other CD players whose manufacturers made the same claim. If one defines shunt filter elements as being out of the signal path, I guess this circuit qualifies. I personally do not agree that shunt circuit elements are out of the signal path, however. An interesting transformation of a classic LC filter yields the topology of the FDNR (Fig. 1). Output of the filter is passed into the final analog amplifier. This circuit consists of a unity-gain follower circuit made

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up of a carefully chosen IC driving a proprietary discrete buffer circuit. The negative output polarity for balanced outputs is generated by another circuit, as just described, acting as a unity-gain inverter fed from the positive polarity output.

Front-panel touch control, LED indication of system state, and system-control logic take up a whole page of the UltraLink's six-page set of schematics. Most of the control circuitry is rather straightforward

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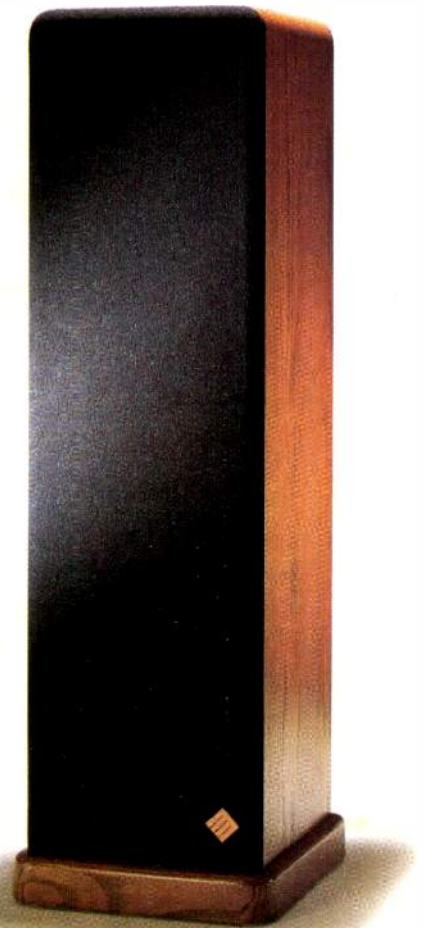
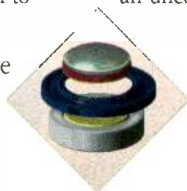
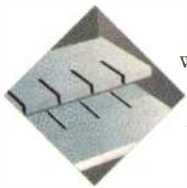
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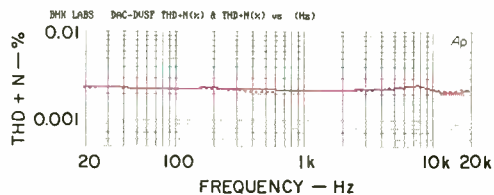


Fig. 4—THD + N vs. frequency at 0 dB.

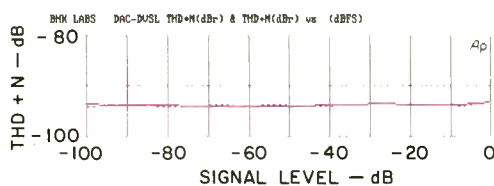


Fig. 5—THD + N vs. signal level.

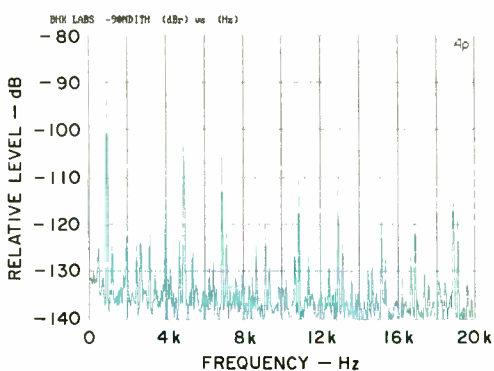


Fig. 6—Analysis of undithered, 1-kHz signal at -90 dB.

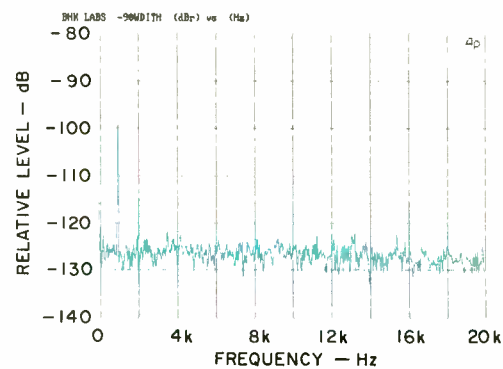


Fig. 7—Analysis of dithered, 1-kHz signal at -90 dB.

ward combinational logic and flip-flops. The touch-button circuitry works as follows: The button picks up 60-Hz hum from your finger and applies the hum to the input of an op-amp that's operated in an open loop (i.e., without feedback). There are four such circuits. The amplified outputs of the op-amps are rectified into a d.c. voltage to represent a logic "1" when a button is touched and a logic "0" when a button is not touched. These d.c. outputs of the touch-button circuits are applied as logic inputs to the signal-selection and control circuitry. Other logic inputs include emphasis-present and data-lock signals from the receiver chip, and system reset.

The power-supply circuitry starts out with two separate power transformers, one for the positive and negative analog supplies and the other for two digital supplies. The secondary windings of the analog supply's transformer are full-wave rectified and capacitor-input filtered into unregulated positive and negative voltages. These unregulated voltages in turn supply three pairs of positive and negative, 15-V, three-terminal regulators to power the left and right analog output circuits and the UltraAnalog D/A converter module. One of the +15 V supplies is dropped down to +12 V, via another three-terminal regulator, to supply power to the quad op-amp used for the touch-button amplifiers. Two separate secondary windings on the digital supply's power transformer are full-wave rectified and capacitor-input filtered into unregulated d.c. supplies. These supplies in turn feed 5-V, three-terminal regulators, one of which powers the digital front-end while the other powers the rest of the digital circuitry. Recall that signal-isolation transformers were used between the digital front-end circuitry and the SPDIF receiver and following circuitry. The use of the separate 5-V supplies with no

common connection permits this isolation, which the designers thought important enough to implement this way.

Measurements

Output voltage at digital full scale was 3.53 V, higher than standard, for both channels. This high output ensures enough

**DE-EMPHASIS ERROR WAS
A MERE ± 0.1 dB,
THE LOWEST I'VE SEEN
IN ANY CONVERTER.**

system gain when the UltraLink feeds passive preamps, but it also means that preamplifiers having active output amplifiers will have to be turned down quite a bit more than they would for signal sources with more normal output levels.

Frequency response without de-emphasis is plotted in Fig. 2. The response with de-emphasis was virtually identical to that shown in the figure, so the de-emphasis error itself, which is the difference between the two conditions, is less than ± 0.1 dB over the audio range. This is the lowest error for this test I have seen in any converter so far. Square-wave and impulse responses (not shown) were similar to those of the NPC SM5813 commonly used in other converters. This filter exhibits linear phase characteristics; it also clips the ringing on full-scale square waves at the full-scale point, leaving only those portions of the ringing that point toward the "0" line. The filter's ringing is normal and linear at levels below full scale.

Linearity of the UltraLink is extremely good. As Fig. 3 shows, deviation from linearity is less than 1 dB down to almost -110 dB—an excellent result, to say the least. The "fade-to-dither" test on the CBS test CD gave essentially the same results.

Figure 4 shows THD + N at digital full scale. Results are shown for 16-bit data words (the normal CD word length; measured distortion gets lower with 18-bit words). The results indicate that the S/N ratio of this unit is very good, as will be seen soon. Figure 5 shows 1-kHz THD + N versus signal level, for 16-bit words.



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I also made some spectrum analyses of both dithered and undithered 1-kHz signals at -90 dB. The spectra graphically show the effects of dither on the low-level linearity of the CD digital process. Without dither, the signal is full of nasty harmonics and other unwanted components (Fig. 6). Also, the third harmonic is conspicuously

absent, because the duty cycle of this undithered signal's waveform mathematically happened to just about eliminate that harmonic. The spectrum of the signal with triangular dither added is such an improvement (Fig. 7)! The noise floor has come up about 10 dB, and the harmonics have gone away.

offset was a maximum of -3.8 mV in the negative-phase output of the left channel. Overall, the UltraLink is one of the best, if not the best, D/A converters I have tested.

Use and Listening Tests

Analog signal sources in my system during the period of review included a Nakamichi ST-7 FM tuner and 250 cassette deck, and a Technics 1500 open-reel recorder. On the digital side, I used Krell Digital MD-1 and PS Audio CD transports to feed the UltraLink, a Counterpoint DA10, and other, experimental, converters. Preamps used were a First Sound Reference II and a Counterpoint SA-5000. Power

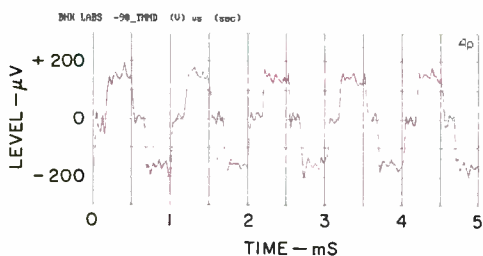


Fig. 8—Waveform of undithered, 1-kHz signal at -90 dB; see text.

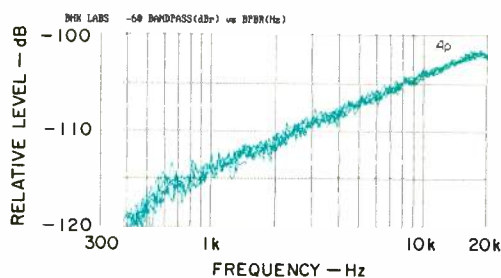


Fig. 9—Quantization vs. frequency at several modulation levels; see text.

THE ULTRALINK YIELDS FINE RESOLUTION, GREAT DETAIL AND SPACE, AND MUSICAL BELIEVABILITY.

One thing that really impressed me about this converter is that its overall S/N was good enough to let me really see a -90 dB undithered waveform. Witness this in Fig. 8, where the signal's three-state character (one LSB plus, "0," and one LSB minus) is quite easy to see. Many other D/A converters that I have measured obscure such low-level signals with system noise. I should mention, though, that many good CD players are quiet enough for such signals to be seen in their analog outputs.

Table I lists S/N for various bandwidths, plus EIAJ quantization noise and dynamic range. What is especially impressive are the S/N ratios at digital zero, i.e., with the digital signal off (as opposed to being on but at a very low level, like -120 dB). This is not usual with most external D/A converters. A test devised by Richard Cabot of Audio Precision looks at quantization effects as a function of frequency and the modulation level of a 41-Hz signal that varies from -60 to -100 dB in 10-dB steps. Good performance in this test is the degree to which the sweeps for different levels overlay each other. As Fig. 9 shows, the UltraLink's performance is very good.

amps used were Crown's Macro Reference, Parasound's HCA-2200^{II}, and a prototype pair of Quicksilver Audio M135 mono tube units. Loudspeakers used were Win Research SM-10s and B & W 801 Matrix Series 3. Additional listening was done with my Stax SR-Sigma Pro 1 headphones driven from a power amplifier with the Stax SRD-7 Professional energizer.

I remember when I first heard the UltraLink; Bob Odell of PS Audio brought one up for me to try out. I was then using the VTL Straight-Line. After going back and forth between these converters a few times, I realized that the UltraLink was indeed a very good-sounding unit. As a matter of fact, I bought it to use as a measurement reference (and of course, to enjoy listening with)! The unit tested for this report was a review sample; if anything, it sounds a little better than the original one I bought.

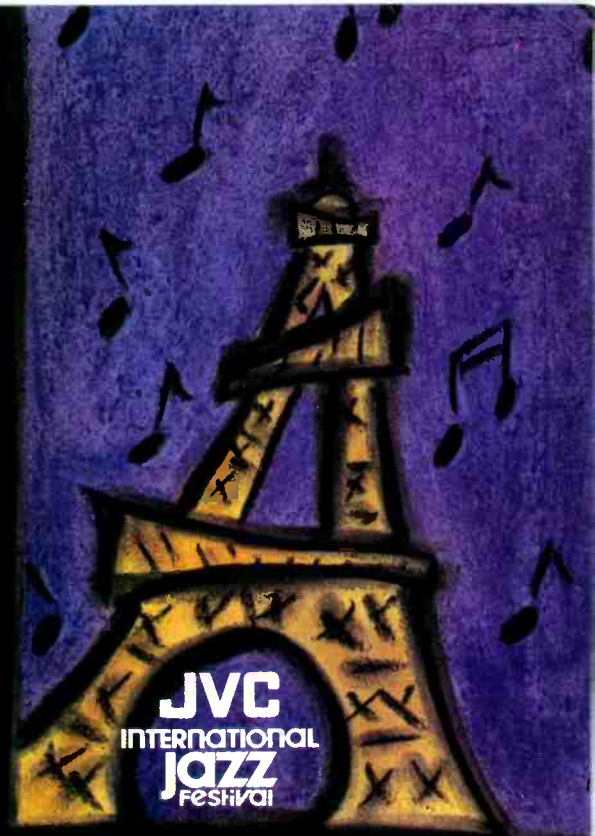
During my testing, I found no operational glitches. The UltraLink operated perfectly, which is as it should be. The sonic attributes that distinguish it from many other D/A converters I have tested include finer resolution, greater detail, better soundstaging and space, and generally more musical believability. This is a good-sounding D/A converter that deserves all the praise it gets.

Bascom H. King

Table I—Signal-to-noise ratios. Quantization noise was -94.2 dB for the left channel and -95.0 dB for the right; dynamic range was 98.3 and 102.0 dB, respectively, for the two channels.

Bandwidth	S/N, dB	
	LEFT	RIGHT
With -120 dB Signal		
Wideband	92.3	93.2
22 Hz to 22 kHz	93.8	93.8
400 Hz to 22 kHz	93.8	93.8
A-Weighted	95.9	96.0
With No Signal		
Wideband	99.7	106.3
22 Hz to 22 kHz	113.4	112.7
400 Hz to 22 kHz	113.6	113.5
A-Weighted	115.7	115.7

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McCORMACK AUDIO DNA-1 AMP AND ALD-1 PREAMP



McCormack Audio may seem like a new high-end firm to many readers. However, Steven McCormack is a leading high-end designer who began his work by modifying products of other firms back in the early

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1970s, and he headed a company called The Mod Squad, from which McCormack Audio has evolved. Steven is also the originator of Tiptoes, was one of the first high-end designers to produce a CD player whose sound lived up to its technical promise, and has designed several excellent passive preamps as well as the components reviewed here.

Opening the McCormack DNA-1 power amplifier and ALD-1 preamplifier immediately reveals that they are not the sort of luxury high-end products where the case costs more than the average mid-fi system. They do have excellent circuit board construction and layout, and both products reveal the designer's focus on use of a minimum number of quali-

ty active and passive components in the signal path.

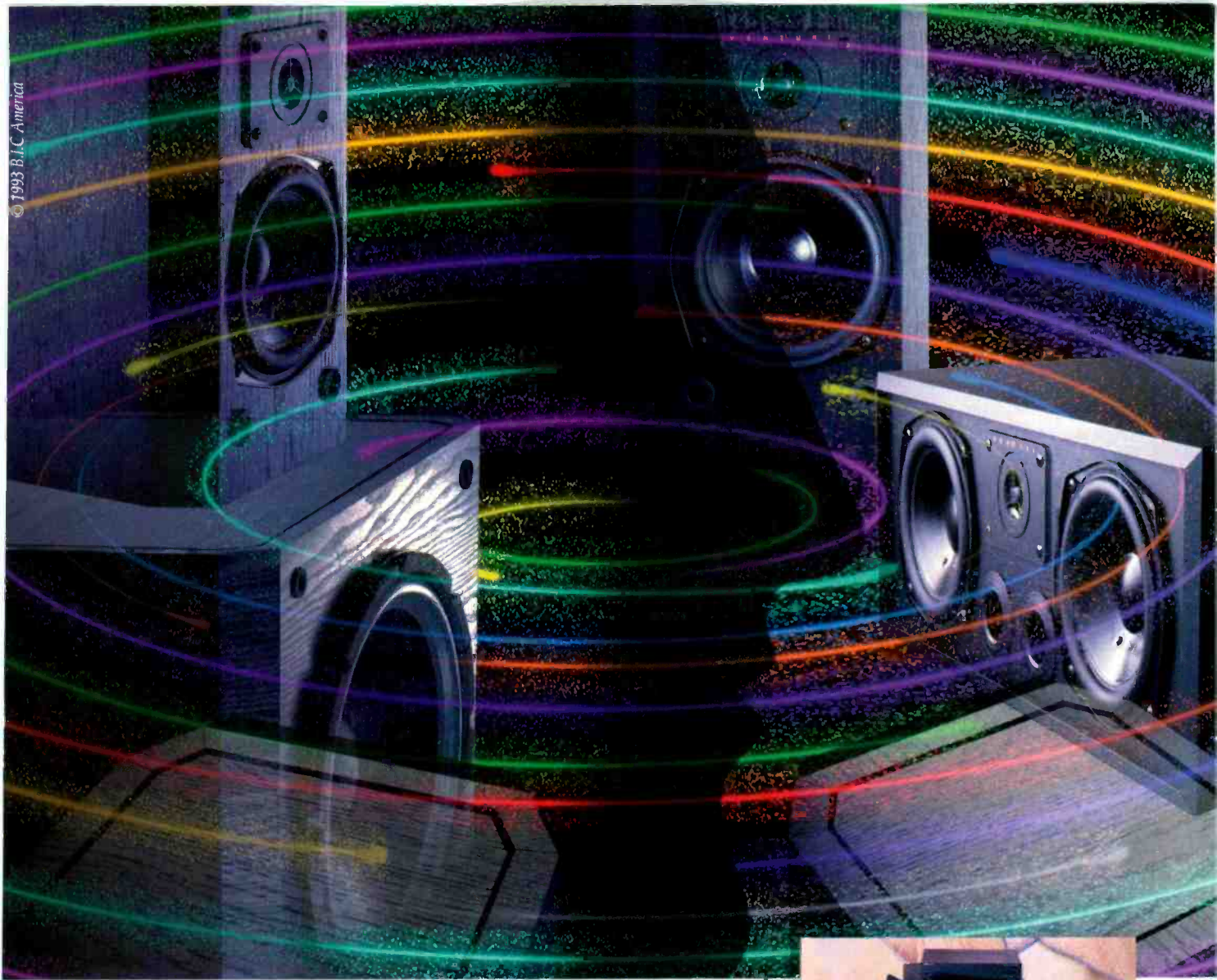
At \$1,745, the ALD-1 Active Line Drive preamp combines excellent European-oriented styling with a set of features that offer maximum flexibility with the least possible interference with the input signal. The source selector handles five high-level inputs, though an optional plug-in phono preamplifier card is available for one of these inputs. This card can be used with both moving-coil and moving-magnet cartridges, and it has a switch to

**THE ALD-1 PREAMP
CAN BE OPERATED
EITHER WITH GAIN
OR WITHOUT IT.**

choose between 40- or 55-dB gain. The phono preamp is said to meet the RIAA frequency response curve within ± 0.25 dB and to have a S/N ratio of better than 75 dB with moving-coil cartridges and above 80 dB with moving-magnet cartridges.

The input selector feeds a tape monitor switch that allows you to choose between source and two additional buffered tape feeds. A separate switch, with LED indicators, controls the two tape monitor loops to allow bidirectional dubbing; it disconnects the tape buffer op-amps from the main audio circuitry (to eliminate any coloration from the tape decks and associated circuitry) when they are not being used. The McCormack ALD-1 also has a muting switch, with LED indicators, that can mute the output of either or both channels.

The tape monitor control feeds a wideband buffer stage with two complementary J-FET transistors in each channel that act as an impedance transformer with a gain of one. The output of this stage feeds a switch that allows you to choose between the normal inputs with gain



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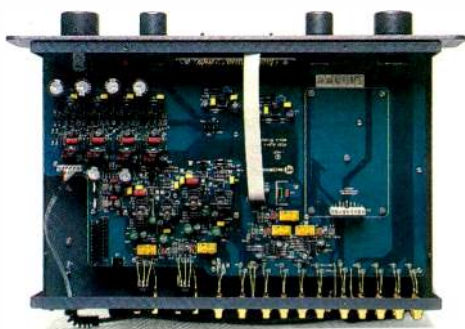
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and a sixth direct input that bypasses the buffer. The output of this switch, in turn, feeds the volume control.

The volume control can either feed directly into the power amplifier through the passive output jacks or into the input of the line amplifier. This amplifier is a wideband discrete J-FET and MOS-FET circuit with no nested or loop feedback, and it is d.c. coupled from input to output with servo control to keep d.c. offset under 3 mV. A fully symmetrical balanced output is provided, with XLR jacks, as well as two sets of single-output RCA jacks with inverting and noninverting polarities.

This set of features gives you exceptional flexibility in using the ALD-1 as anything from a passive to an active preamp. The design ensures that the ALD-1's unusual range of input features can be used with the minimum amount of passive and active circuitry, regardless of which mix of features you select. This purism does, however, have one drawback. The ALD-1 does not have a balance control, a feature that has been dropped from some other purist designs. While many audiophiles never



make any use of the balance control, I find it to be extremely important in adjusting the soundstage to provide the precise balance that locks in the left-to-right imaging, thereby centering the soundstage.

Two other features of the ALD-1 are of special interest. The power supply provides ± 22 V d.c. regulators for each channel, using a discrete circuit that has very fast response times. McCormack feels this method is sonically superior to conventional IC regulators.

The McCormack Power Drive DNA-1 amplifier has the same styling as the ALD-1 and costs \$1,995. Its only front-panel features are a power switch and power and protection-circuit LEDs. The back has RCA

inputs, but not balanced inputs. The speaker connections include a choice of binding posts or rugged terminal blocks that provide an exceptionally firm connection with spade lugs. The unit measures $19 \times 7 \times 15$ inches and weighs about 50 pounds.

Internal construction quality is excellent. McCormack uses a copper-plated steel chassis and double-sided, plated-through, glass-epoxy boards with thick copper traces. The DNA-1 has quality parts, such as Wima film capacitors, Holco and 1% Resista metal-film resistors, Toshiba and Hitachi transistors, and Wonder solder. The large toroidal power transformer is custom built for this application.

The DNA-1 has an input impedance of 100 kilohms, an input sensitivity of 1.0 V rms, an output impedance of less than 0.1 ohm, and a servo-controlled d.c. offset of less than 5 mV. It is noninverting, has a wide bandwidth of -3 dB at 0.5 Hz to 250 kHz, a rise-time of less than $2 \mu\text{s}$, and a slew rate of 50 V per μs . It delivers (per channel) 150 watts into 8 ohms, 300 watts into 4 ohms, or 500 watts into 2 ohms, and can be easily modified to drive even 1-ohm loads.

A high-current design, the DNA-1 is capable of 50 amperes peak current per channel and has a moderately high damping factor of greater than 100 into 8 ohms at 1,000 Hz. This is enough power and current to drive virtually all modern speakers, although it's not the kind of brute-force design that offers extremely high damping factors, power, and control into the most demanding loads.

The circuit is a direct-coupled, low-feedback design using J-FETs, MOS-FETs, and bipolar devices in a fully complementary configuration. At the input, two J-FETs are connected as a complementary differential amplifier, with source degeneration. The two sections of this stage produce signals of opposite polarity, which are direct coupled to the gates of a complementary MOS-FET pair, operating Class A, push-pull, and with a gain of approximately 10. This stage provides low-impedance drive for the bipolar output section.

The output stage consists of four complementary pairs of bipolar transistors (eight devices per channel). These are used in parallel, as emitter followers, to provide an output current capability exceeding 50

amperes. A low-value (0.47-ohm) emitter resistor is used with each output device to equalize current under very high drive conditions.

A d.c. servo amplifier reduces output offset to below 5 mV and allows the use of a direct-coupled circuit with a very-low-frequency cutoff. The output of this servo connects through an isolation resistor to the bottom of the feedback resistor at the input of the amplifier. The servo response is set below 1 Hz, providing stability without limiting the DNA-1 amplifier's low-frequency performance.

Unlike the ALD-1, the DNA-1 does use limited amounts of feedback. An RC network provides approximately 6 dB of voltage feedback to the input source's resistor

**RATHER THAN CALLING
MY ATTENTION TO ITS
SONIC DETAILS,
THE AMP INVOLVED ME
IN THE PERFORMANCE.**

junction. This provides gain consistency and further reduces any small distortion products that may be generated in the earlier stages. No inductive or RC networks are required at the output because the amplifier circuit already is stable at all applicable frequencies.

The output stage's power-supply rails are fed by a high-current winding on the power transformer. There are separate ultra-high-speed, 25-ampere bridge-rectifier blocks for each amplifier channel. The power filtration is handled by eight distributed 4,700- μF capacitors per channel, located close to the eight output transistors, and each bypassed by high-quality film-type capacitors. This provides low impedance and fast current-delivery response to each output device. These capacitors are considered individual current-reservoir nodes, giving the unit its Distributed Node Amplifier designation.

Like many modern high-quality line-stage preamps, the McCormack ALD-1 has comparatively little sound character of its own. Further, you can bypass much of the little sonic character the preamp does have



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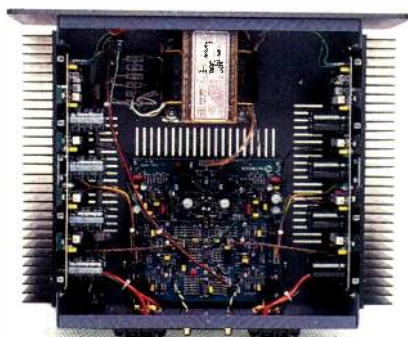
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by using the direct input and passive output. In practice, I preferred using the ALD-1's direct input from my primary D/A converter, and the normal active outputs for all inputs. I find that under most real-world listening conditions, it is better to have some gain in the preamp circuit, even if this means a marginal amount of extra noise and a slight veiling of detail. The gain provided musical life and dynamics, and I did not detect any significant coloration, change in the soundstage, or difference in musical dynamics. In fact, when I inserted the ALD-1 into the tape monitor loop of my reference preamp and adjusted for gain, the sound was remarkably neutral and transparent. All I could detect was a very slight loss of low-level information and an increase in noise that slightly elevated the upper midrange when I got within a few feet of my speakers—a listening position that no one would adopt in practice. There is no such thing as a straight wire with gain, but the ALD-1 comes close. Most important, it does not impose any new character on the music.



The McCormack DNA-1 amplifier has more active circuitry and a more distinctive sound character. However, the DNA-1's sound character complements that of the ALD-1 and is in many ways a mirror image of it.

The DNA-1 has a flat, open sound with a great deal of information in the upper midrange and the treble. It is not treble heavy or bright, nor does it have a "tube" sound that rolls off the upper octaves or has a forgiving character. What goes in is what you hear coming out. At the same time, the bass and midrange are powerful and provide a proper balance in overall timbre.

The deep bass of the DNA-1 is a bit too warm on occasion, and I would prefer

more tightness, detail, and control. However, the DNA-1 reproduces the excitement that can only come from good bass power, and which is vital to symphonic music, opera, and jazz.

The DNA-1's performance in the mid-bass to lower midrange is very good to excellent, and it's better controlled than the deep bass. This amp does an excellent job of reproducing dynamics, and transient definition is excellent. The mid-bass to lower midrange has the natural warmth of music and does not add dryness or leanness to the music. Many transistor power amplifiers still have a problem in this region. The DNA-1 has a natural midrange balance, sounding more like some of the best modern tube amplifiers than many transistor amplifiers. At the same time, the DNA-1 has a very "live" midrange, in contrast to the more "liquid" midrange of tube and hybrid units. This sound is exciting and involving with good recordings, although it also makes you feel as if you were sitting slightly more forward in the hall.

The upper midrange and treble are consistent with the DNA-1's midrange sound. There is a great deal of excitement, information, and energy—which are not exaggerated—but this does place a premium on good recordings and system balance. The DNA-1 worked well with speakers as diverse as Apogee Divas and Thiel CS-5s, though it is not the amplifier for speakers with a rising treble or which lack the bass power and extension to counterbalance highly revealing upper octaves. In terms of music, the DNA-1 does a very good job in reproducing the upper midrange and treble of reference quality CDs, but it also is all too accurate in reproducing the kind of irritating "in your face" close miking that some producers insist upon. Exactly why any producer should record a harpsichord as if the listener was chained to the instrument is beyond me, but the DNA-1 will add a touch of added energy to such recordings rather than being forgiving.

The DNA-1 does an excellent job of handling dynamic peaks as well as low-level dynamics and transient detail. It is a touch more live and dynamic than most power amplifiers, but it is also free of the slight constriction of musical energy that occurs during loud passages with many amplifiers in its price range.

The DNA-1 has very good transparency. In fact, music detail and definition are excellent for a unit in its price range, although it's not equal to the very best amplifiers. The ALD-1 and DNA-1 do an excellent job of working together to enhance transparency.

**THIS PAIR IS AN
EXCELLENT CHOICE FOR
LISTENERS WHO PLACE
A PREMIUM ON
MUSICAL ACCURACY.**

The DNA-1 has a wide and open soundstage, with good depth. The imaging is excellent and has a great deal of openness and air. The DNA-1 does a better job reproducing the left-to-right arc of instruments with complex music than it does with layers of front-to-back depth. It does particularly well in reproducing the imaging and soundstage of natural chamber music and jazz recordings. I also found that it involved me in the performance rather than called my attention to its sonic details. If you are a bit tired of units that etch the imaging or divide the orchestra artificially, you will like the DNA-1.

The ALD-1 and DNA-1 performed well with every component I used. The one reservation I have is that the DNA-1 has better bass definition and control with speakers that do not require extreme reserves of power or very high damping factors, though this is true of every amplifier I have reviewed in this price range.

The McCormack Audio ALD-1 and DNA-1 both qualify as excellent products in their price range, offering a clearly defined set of musical choices and sonic nuances. They are not the units for those who like their music to be polite, who want equipment that softens the upper octaves or who accept speakers without bass power and extension. This pair is, however, an excellent alternative for anyone who wants a modern high-end system that covers the entire frequency range, who is willing to become deeply involved in the music, and who stresses accuracy over a forgiving nature.

Anthony H. Cordesman

Building BLOCKS



The World Of Accessories

Great music does not appear miraculously. As any musician or recording engineer will tell you, it takes a lot of effort, building upon artistic inspiration every step of the way. They'll also tell you without hesitation that the payoff is well worth it. The same holds true for building a high-end home audio system. It requires extensive listening sessions and a thorough study of each component that comprises a system worthy of the label audiophile. In this special advertising section, we'll examine some of the often-overlooked components and accessories that can make your system one to be proud of—and one that will deliver years of listening pleasure.



Cutaway of a Straight Wire cable.

A LINK TO GREATNESS

"Anyone who's truly serious about audiophile sound spends a lot of time auditioning their components. Once those critical decisions are made, it's important not to overlook the vital links between them. In a word—cables," says Bill Low, President of AudioQuest. "Each stage of a music system performs a very complicated task—from the recording process to the CD player to the power components, the loudspeakers, and the cables in between. Each must transform or transfer a complex, multi-octave signal without altering any information carried in the signal. So with cables, the most important goal is to be as neutral and honest as possible."

Roger Skoff, Designer and President of XLO Electric adds, "Just as any component in an audio system should only do what it's supposed to do, the same should be true with cables. They should be 'a component between components,' a totally passive means for connecting equipment. They should do nothing at all to affect the sound of the system."

"If you're trying to transmit audio or video signals, you want the electronics or speakers to receive all of the information as accurately as possible. No alteration or degradation of that signal is the ultimate goal," says Steven Hill, President of Straight Wire. "While there's been a lot of discussion about specific cables, there is no question that how you connect one component to another is absolutely critical. It can mean the difference between good

sound and great sound." Hill notes that the laws of physics do not change with the season and neither should the engineering philosophy and approach toward cable design.

Dwight Fitzmaurice, designer of Apex Audio cables, says there's another issue as well—affordability. "There's a fine line between cost and quality that every manufacturer must walk. We all know what it takes to build the absolute best cables. The goal is to build quality cables that do the job and are within the reach of enthusiasts."

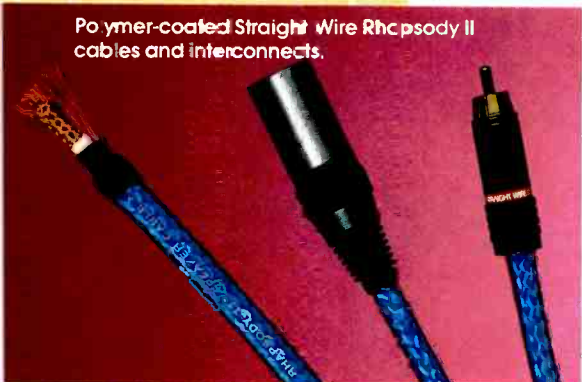
There are a number of fundamental problems confronting cable technology according to the executives. Skin effect causes different electrical values at different distances from the surface of a strand of copper. The result is that some of the delicate high-frequency information can be smeared. For many listeners, the resulting sound is lacking detail and has a flat soundstage.

Magnetic interaction between strands is another obstacle to good sound. Much of the energy traveling through a cable is carried as a magnetic field. In many cables, the magnetic field of any given strand faces a complex and changing series of interactions as it travels through a constantly changing magnetic environment. The magnetic field is modulated and the audio signal becomes distorted. Materials quality also impacts cable performance. Copper and silver offer the lowest resistance, but copper is the most cost effective. Normal high-purity copper has about 1,500 crystals or grains in each foot. Oxygen-Free High-Conductivity (OFHC) copper drastically reduces the forma-

Cover Credit: Photograph by Michael Groen. Shown are the Bell'Oggetti CD racks and cables by AudioQuest and Straight Wire.

This special advertising section was specially prepared for the publisher of *Audio* magazine. None of the magazine's editorial personnel were involved.

Polymer-coated Straight Wire Rhapsody II cables and interconnects.



The advertisement features a dark background with several audio cables. At the top, two black cables with red and black internal conductors are shown with their ends frayed and exposed. Below them, two more cables are shown with gold-plated connectors. In the foreground, a large, thick cable with a braided metal shield is visible, along with another cable with a black connector and a red stripe. The overall aesthetic is professional and emphasizes the quality and variety of the cables.

APEX

A U D I O

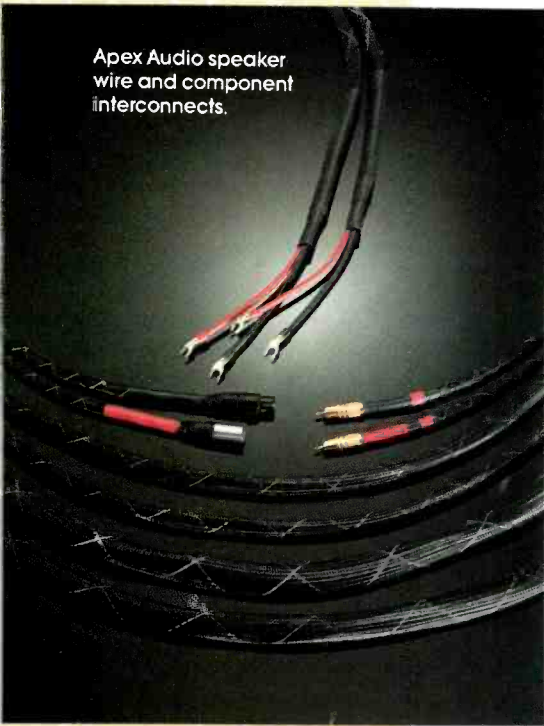
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Apex Audio speaker wire and component interconnects.



tion of copper oxides within the copper itself, reducing the distortion caused by these grain boundaries. Another factor is the type of dielectric (insulation) used. Common materials range from PVC to polyethylene, with Teflon considered the best dielectric available as it delivers outstanding electrical stability. The result is negligible signal alteration and dissipation.

Along with all of these challenges of moving a signal from Point A to Point B, Ohm's Law and the basic issues of resistance, capacitance, and inductance must also be considered. And, finally, let's not forget the composition, construction, and effects of the actual cable connectors.

"Because the connectors make the actual contacts between components they are part of the signal path and should be subject to the very same design considerations as the cables themselves. This means they must make good electrical contact for very low resistance, and they must be designed so neither their capacitive nor their inductive effects will alter the transmitted signal," explains XLO's Skoff. Apex's Fitzmaurice adds that the solder or connection technique for attaching the wire is also important, not only for sound quality but for long-term corrosion and resistance problems.

Given all of these challenges—and the demands of audiophiles for transparent sound—companies now offer a wide variety of cables to meet these needs. Apex Audio features Transmission Line Speakerline (TL) cables for affordable connections, advancing up to its patented dual-impedance Impedance Controlled Transmission Line (ICTL) wires. The ICTL-SG cables are custom built with half the DC and inductive resistance of the ICTL wires. "If you require the ultimate in music reproduction, this is wire you should try," says Fitzmaurice. Apex also has Transmission Line Interconnects (TLI) and Line Level Transmission Line (LLTL) cables with UHPC-LC copper and foam Teflon insulation.

AudioQuest has a wide variety of cables ranging from the very affordable Type 4 with four OFHC conductors spiraled together in a Hyperlitz configuration, up to the renowned AudioQuest Dragon. The Dragon uses Functionally Perfect Silver (FPS)—20 solid polyethylene insulated conductors spiraled together in a Hyperlitz array. According to Bill Low this is the "ultimate speaker cable. It is ex-

pensive so we also designed alternative cables like the Indigo, Crystal, and Midnight." Low points out that AudioQuest has a full line of component interconnect cables ranging from the Turquoise with OFHC copper to the Diamond using FPS silver around a Teflon core.

Straight Wire has an extensive array of speaker cables and interconnects. Steven Hill points out that individually insulated strands of OFHC copper is used extensively and the dielectric most commonly used is foam Teflon. "Standout interconnects and speaker cables are the Virtuoso and Maestro II," he claims. "There's absolutely no compromise approach taken with these wires, but I can say that about our Rhapsody II and Encore cables too. We're so sure about our quality that our authorized dealers offer consumers a no-obligation audition at home called 'Try Before You Buy.'"

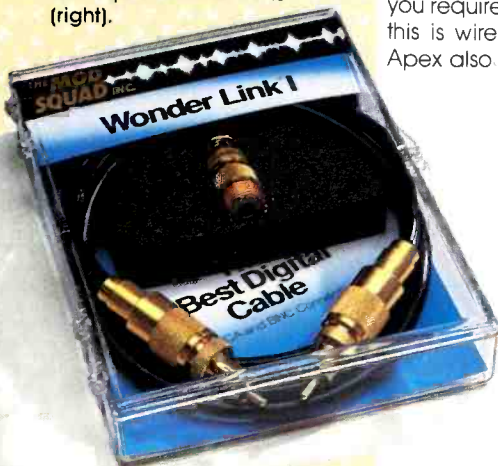
XLO/PRO audio cables from XLO Electric use .9999 pure OFHC copper with two proprietary treatments applied prior to the insulation. The insulation used is a special ethylene polymer with excellent dielectric properties. The inner and outer jacketing is either Dupont Surlin



(used on golf balls) or a combination of Surlin and Teflon. The XLO/PRO Type 100 interconnects feature a shielded quad conductor arrangement so it can be used in a variety of custom audio and home theater systems. "The solid-core XLO/PRO 600 speaker cable is perfect for any high-end application. It's a heavy gauge wire with very high power-handling capacity and superior amplifier damping," Skoff said.

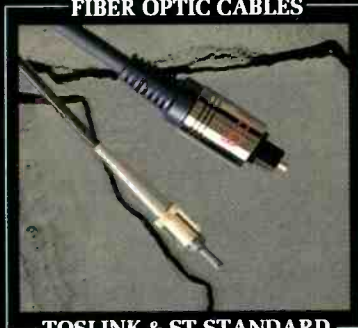
As digital audio enters its second decade, high-end companies are designing cables specifically for digital applications. McCormack Audio Corporation, which is well known for innovative digital products, manufactures award-winning McCormack components and Mod Squad accessories. The company was founded in 1982 by Joyce Fleming and Steven

The Mod Squad's Wonder Link digital cable (below) and Squad Connections (right).



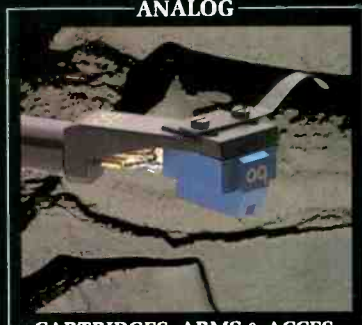
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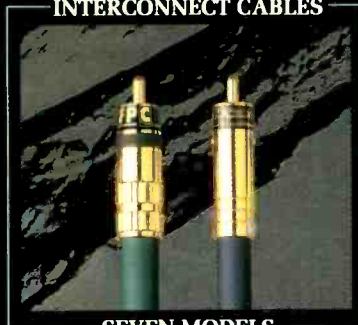
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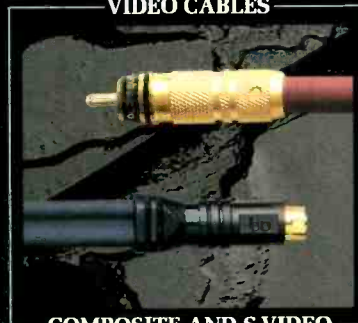
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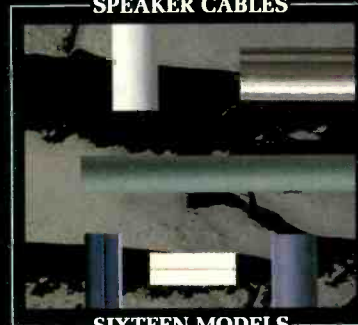
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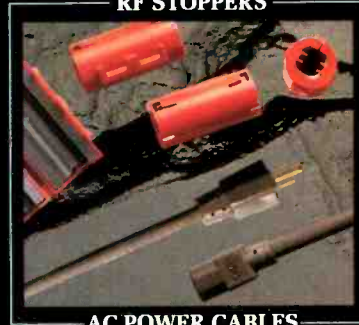
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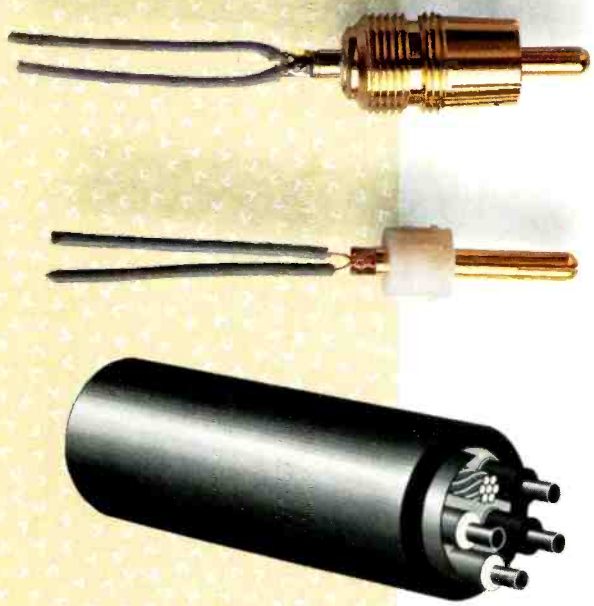
AC POWER CABLES

In the world of high technology the term "envelope" is used to describe the performance limitations of the equipment. In the world of music and wonder, a diverse group of technically competent products from AudioQuest lets you expand the performance envelope of your audio or video system.

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Inside view of AudioQuest plugs and cutaway of Ruby, Quartz, Emerald and Lapis wire construction.

McCormack. According to Fleming, "More audiophiles than ever are purchasing outboard digital processors and digital preamps. We designed the Wonder Link cable to deliver an accurate digital signal from your CD or DAT source to these components. Unlike the relatively slow and forgiving analog signal, the digital variety is fast and fussy. Wonder Link requires exacting manufacturing methods which were carefully developed through a lengthy series of listening tests. Not only is the cable itself directional and sounds best when sending the signal in the preferred direction, the sending and receiving ends must first be plated differently, then attached differently,

for optimal sonic results." Along with its Wonder Link digital cable, the company also offers the Squad Connections, adaptors and Y connectors that let you change the configuration of your system without signal loss. Five types are available including RCA-XLR adaptors and XLR-XLR Phase Reversal Adaptors.

Quality interconnects and speaker cables also are available from Esoteric Audio and Monster Cable. Esoteric recently introduced Artus and Primus hyper-balanced interconnects as part of their Audiophile Series of high-end cable components. They offer significantly improved musical signal transfer. The RCA plugs are machined from solid copper and electroplated with 24-karat gold. Also new from Esoteric Audio is the affordable Isopath Speaker cable featuring oxygen-free solid core copper conductors, Teflon insulation and a crystal-blue Polyflex jacket for aesthetics and durability.

"Although some people think 'wires are wires,' they are absolutely necessary just to get your system operating!" concludes AudioQuest's Bill Low. "They should be given the same careful attention as any important component. And use the best instruments available as your final decision maker—your ears." ●

XLO/PRO speaker wire features .9999 pure OFHC.



XLO/PRO Type 100 Premium interconnects.

Music's Little Helpers

For want of a horse, a kingdom was lost, at least according to Mr. Shakespeare. The little things can also degrade the musicality of an audio system . . . things like dust particles and dirt.

AudioQuest's Bill Low says that you definitely should not put a high-quality interconnect into a dirty socket. And any contact surface exposed to air is dirty and will perform better if cleaned. He notes that one of the most cost-effective accessories available is AudioQuest UltraConnect fluid. "It's Earth friendly (no Freon) and gives you filed-clean surfaces without the file."

Every city dweller and car driver knows dirt can also settle in the most out-of-the-way places. The heads of your tape decks are no exception—a place where oxide buildup will also reduce sound quality. There are many excellent cleaning systems currently available that clean the heads, capstans, and pinch-rollers of your deck for top performance. Companies such as Gemini, Geneva, Allsop, and TDK offer complete kits that take just a few moments to use. The result? Contaminants and dirt that can cause poor frequency response, limited dynamic range, and tape damage are quickly removed.

Another neglected yet critical link in audio systems is the power cord. Whether it comes from radio and TV signals, computers, microwave ovens—even CD players (which are registered with the FCC)—performance-robbing radio frequency interference (RFI) is a fact of modern life. A very affordable solution to this common problem are ferrite clamps that fit easily around component power cords such as RF Stoppers from AudioQuest. The quality of the ferrite clamps is crucial here. As with everything in the audio chain, there are differences even among inexpensive accessories. It's the wise shopper who pays attention to these details.



AR-701



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HOLD THE EQUIPMENT, PLEASE

Once the difficult decisions have been made for components, speakers, and cables, enthusiasts looking for the finest audio experience know there are several other key questions to answer, including: "How do I best insulate my components from vibration?" and "What's the smartest way to display and use my new system?"

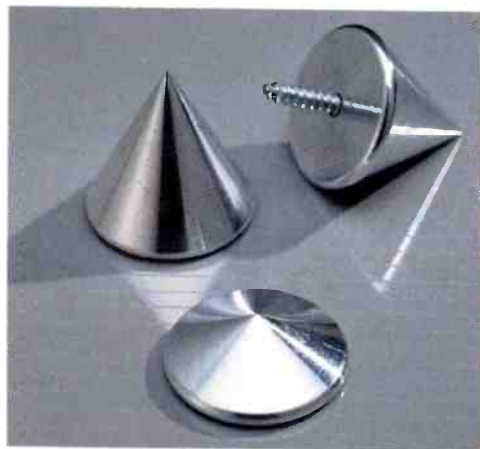
According to McCormack Audio's Joyce Fleming, "The 'grunge' look may be the latest fashion statement but *grunge sound* is a definite minus when it comes to high-end audio. When I say grunge, I'm referring to sound smearing caused by vibration at the point where your components come in contact with shelves or the floor. Tiptoes® point-coupling feet are designed to eliminate this unwanted interference. In fact, they might be the most cost-effective upgrade you can buy for your music system."

McCormack Audio's Mod Squad brand first introduced Tiptoes in 1984 and since then over one million have been purchased by discerning music lovers. Fleming noted that Tiptoes were the first mechanical grounding spike available. "Until that time, very few people in the audio community even considered what went underneath a component. Today it's hard to find audiophile components that don't feature grounding spikes."

Fleming emphasized that Tiptoes are not just for high-end equipment. "From the most modest bookshelf models to the most expensive towers, they will improve the sound of all speakers. That's why they won a Hi-Fi Grand Prix For Accessories award from *AudioVideo International* magazine. The Academy For The Advancement of High End Audio also cited Tiptoes along with Wonder Link Digital Cables, when they nominated designer Steven McCormack for the 1991 Golden Note award in the Cables and Accessories category. They're available with a variety of attachment options so they can be used with everything from Apogees to Versa Dynamics turntables."

Tiptoes are not just for speakers explains Fleming. "They're right at home with turntables and transducers since they improve stability and drain away vibrations caused by normal operation. By eliminating these vibrations, your music is more detailed and defined. This is by far the easiest decision when building your system. It's just a matter of choosing the right Tiptoes for your speakers and components."

If vibration can be a detriment for speakers and turntables, it can be just as much a problem for CD players, cassette decks, amplifiers, and signal processors. The Mod Squad's Soft Shoes Damping Feet are designed to both soak up chassis resonances of all audio components and eliminate environmental vibrations. Fleming pointed out that Soft Shoes are a lot more than just *slip-ons*. "A lot of testing and research went into the material we use," she added. "We chose a material with a superior damping profile." The stiffness limits lateral vi-



bration and their non-reactivity eliminates vibration from the material's own resonant frequency. Fleming said Soft Shoes eliminate a veil of sonic impurities from your music. "By using Tiptoes in combination with Soft Shoes, you're making one of the most cost-effective upgrades available to music lovers."

With good cables, state-of-the-art components and speakers, and proper insulating accessories from McCormack, AudioQuest and others, one of the last elements enters the audio equation—furniture. As with the lava lamp, the days of brick piles and a piece of lumber as a hi-fi shelf are gone. Today, a growing number of audio/video furniture makers are pushing the envelope of quality and design. On the cutting edge is Bell'Oggetti, an award-winning Italian furniture manufacturer.

"It's one of the commonly asked questions we hear," says Bell'Oggetti's Rose Marie Ruggieri. "I've just purchased a number of high-end components. How can I fit them into my house without upsetting the look of the room? This is especially true for homes with a contemporary look. In 1989 we unveiled our first pieces for TVs and VCRs. They struck a responsive chord across the country." Ruggieri noted that the company's Ambienti and Ercole models were especially popular—and still are. Some of reasons are the heavy gauge, all-metal construction and tempered glass shelves.



Soft Shoes (above) and Tiptoes from The Mod Squad (right).

A/V furniture with flair. Bell'Oggetti's Alfa Arco.





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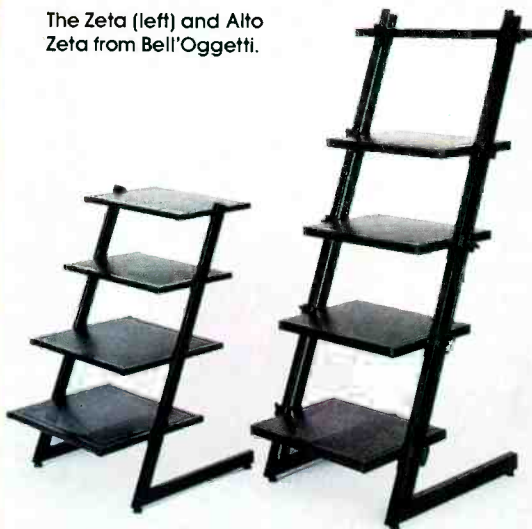
"They're easily assembled and can hold today's hefty monitor/receivers," she adds. "And they look great."

With the quick acceptance of the Ambienti and Ercole, it was just a matter of time before audio aficionados decided their components deserved to be showcased as well. Bell'Oggetti's AR series was designed for them. With names like Fort-Angolo and Alto Evoluto, they are Italian style at its best. All models feature extra-heavy gauge, all-metal construction, high impact thermo finishes, and adjustable shelves and are easily assembled. "Depending on the number of components you own, it's just a matter of choosing your style—all metal or a combination of metal and glass."

Home Theater systems continue to work their way into more living rooms, and Bell'Oggetti has designed complementary audio/video furniture systems such as the WU-840 and WU-850. The new WU-840 can handle a 35-inch monitor/receiver and up to 18 components. The WU-850 is metal and glass and can also handle a 35-inch TV and up to 18 A/V components.

Other firms have taken different approaches in solving the "Where do I put the amplifier?" riddle. As the company name implies, Custom Woodwork And Design (CWD) uses only high-quality wood for its home theater furniture. The Rialto, for example, is offered in a Southwestern or Mission style. And that's just the tip of the

The Zeta (left) and Alto Zeta from Bell'Oggetti.



iceberg from CWD. Other top furniture makers such as Ethan Allen, Henredon, Pennsylvania House and Thomasville also are tackling the question with style, quality, and flair.

Finally, let's not overlook another common dilemma: "Where do I put all my compact discs?" Bell'Oggetti has two different stylistic approaches: The Tower, which holds 76 CDs, and Tre Sorelli, three attractive mini-towers that hold up to 58 jewel boxes. ●

Tre Sorelli CD racks.



Buyer's Guide

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AudioQuest
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Bell'Oggetti
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Morganville, NJ 07751
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McCormack Audio (The Mod Squad)
542 North Highway 101
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(619) 436-7666

Straight Wire
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Y Connectors to avoid *signal degradation*.

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MAXIMIZE THE MUSIC

"If you spend a small fortune on digital-to-analog converters, two-piece CD players, or Dolby S tape decks, it makes no sense to scrimp on blank tape," says Steve Diamond of TDK. "This is one investment that has an instant audible payoff." Diamond pointed to the recent winner of *Audio* magazine's exhaustive tape tests

as an excellent example. "Our MA-XG Type IV tape features two magnetic layers of specially-tuned Finavinx metal particles. The top layer gives low noise while the bottom layer a noticeably higher output. Combine this advanced tape technology with the vibration-suppressing RS-III mechanism for lower

modulation noise and you have a tape that can handle even the most demanding digital sources."

Much of the same dedication to recording excellence can be found in TDK's SA-X Type II cassettes. "They feature a dual-layered Super Avilyn formulation and the result is extra high resolution and output with extremely low noise. It's another *Audio* magazine leader," adds Diamond.

TDK is well aware that transferring music from CDs to cassette can be difficult so it developed a special CD to aid the process. Called the "Recording Level Optimizer," the disc (packed with three SA-X 100-minute tapes) contains 27 reference tones for that many different types of music.

Other tape manufacturers continue to improve their formulations to maximize the music. For Type II cassettes, the Fuji Z II and FR-IIx Pro are standouts and feature excellent bass MOL and level uniformity. Fuji Z II cassettes feature Double Coating technology that delivers wide dynamic range and minimal hiss. Other cassettes of note from Fuji include the DR-II and FR-IIx. Maxell's Type IV Metal Vertex features Super Energy Pure Metal Magnetic Particle for extended dynamic range and ultra-low noise modulation. XL*SIII Type II cassettes use high-density packing and dual surface base film for superior results. Other Maxell highlights include the XLII, the MX and MX-S. Sony UX and UX Pro tapes are known for excellent sound reproduction and wide dynamic range. Denon MG-X and HDM Metal are superior cassettes while Memorex, Scotch and BASF continue to improve their entries as well.

THE BOTTOM LINE

Achieving great sound at home extends beyond the basic components of your audio system. The interaction of *all* your system's parts—even the ones you often forget or think aren't important—has a clearly audible effect on the music you hear. Remember that fact and your listening experiences will reveal all of the emotions an artist has struggled to deliver. An experience that only comes from audio at its best. ●

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AUDIO BY VAN ALSTINE SUPER Pas 4i PREAMP KIT

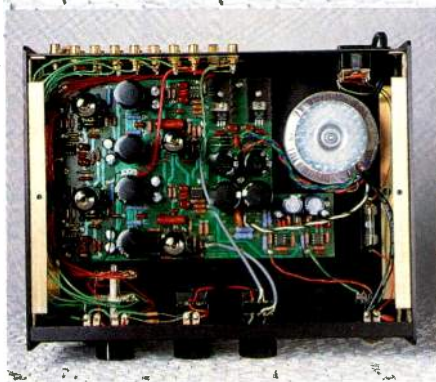
Van Alstine's Super Pas 4 pre-amplifier is not unusual in being a hybrid design (four 12AX7A vacuum tubes supported by a panoply of solid-state devices) and certainly not in taking a minimalist approach (volume and balance controls, selector switch, two tape loops, and a headphone jack are all you get). It is special in being a kit, at a time when even the redoubtable Heath Company has fled the field, declaring that its former customers are now too busy programming their computers to bother with soldering irons. Building this kit (\$595) affords a \$200 saving over the wired version, and it also enables you to more easily admire the quality of the parts included (e.g., all American-made Dale 1% resistors, in my sample, and top-quality controls, most of them environmentally sealed).

Frank Van Alstine, known for modifying products manufactured by the original Dynaco (which closed its doors in the late 1970s), has also long been a manufacturer of original designs. Though its model name is similar to that of a familiar Dynaco product, the Super Pas 4i falls into the latter category. All parts, including the chassis, are new. Each channel uses a 12AX7A for phono and line voltage gain, but the outputs are FET op-amps. The operating instructions claim the sonic virtues of both tubes and transistors but without making clear where their presumed synergy is supposed to lie. The Audio by Van Alstine catalog, however, says that the tubes perform the voltage gain, the solid-state stages serve as current amplifiers and high-speed buffers, and the combination reduces distortion, improves high- and low-frequency linearity, and keeps noise low. The re-



sult, a company newsletter claims, is that "there is no solid state sound . . . no mush and rolled off vacuum tube sound . . . only delightful transparency."

The kit I built was a Pas 4, a model that was supplanted, midway in my review process, by the Pas 4i. So while I can comment on the sound of both versions, my comments on assembly apply more strictly to the older one. In build complexity, that kit fell somewhere between a fully prepackaged Heathkit or Dynakit and an *Audio Amateur* project. All necessary parts were supplied, as was all necessary assembly information, though the instruction manual I worked from did not attempt to be a rigorous, step-by-step guide. Also, I found it helpful to depart from its suggested sequence of operations several times to avoid some tight



corners that appeared to be developing. I stated these concerns to Frank Van Alstine, who says he has since incorporated some of my suggestions into the manual for the Pas 4i, now in production. So the 4i manual (which I haven't seen) should be an improvement in this regard. In any case, Van Alstine says, he revises his manuals frequently, based on errors he finds in home-built units sent to him for checkup. (The price of his kits includes a free checkup after construction; Van Alstine recom-

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For literature, circle No. 93

mends home-built units be sent to him for checking before they're first turned on, so he can catch any construction errors before they lead to damage.)

The basic layout of both the Pas 4 and 4i is conventional. The chassis floor is occupied by a large double-sided epoxy circuit card with plated-through holes and by a substantial toroidal power transformer. The builder stuffs the card, mounts controls and connectors to front and rear panels, and wires the subassemblies together point-to-point. An accomplished assembler could probably deal with the job in two evenings. (Still trying to adjust to age-related failure of near vision, I had to proceed much more slowly.) It might even be considered a project for a first-timer, although not one so green as to be unable to distinguish between a resistor and a capacitor at first sight.

The assembled preamp, a snug package about the size of a desk dictionary, offers no amenities beyond the headphone amplifier, which is a meticulous design sharing nothing but the power transformer and rectifiers with the rest of the unit. The three polarized a.c. convenience outlets are unswitched. While these outlets are rated at 15 amperes, the manual states that they're not intended for use with high-powered amplifiers, though I consider such amps otherwise appropriate for use with the Pas 4i. The unit therefore depends solely on its sonic characteristics to win your approbation.

In the earlier Pas 4, those characteristics were not encouraging, and they failed to persuade me that I was listening to sound that qualified as high end. Then Van Alstine changed the design. This change, making the preamp the Super Pas 4i, involves merely parts upgrades: Beefier plate capacitors in the line-level stage and new op-amp ICs all around (AD845s to AD843s). Modifying the older version costs \$50 for these parts and, if desired, factory installation. I made the alterations on my review sample without mishap, but I am short on appreciative capacity when forced to bumble around in a deep chassis, half blind, with a lethally hot instrument in my hand. So those who need the conversion might prefer having it done by the manufacturer, although I feel that the fun of building a kit includes the fun of modifying it.

I was pleased and impressed by what I heard from the updated unit. It has taken a long stride into the center of the high-end arena. All the signs familiar to audio enthusiasts are present: The solid identity given to the instruments at the back of the orchestra without diminishing those at the front, the exciting contrasts of instrumental blending and divergence that mark a good performance and good playback equipment, and the valuable clues to the acoustical nature of the performing environment.

In addition, for better or worse, the Super Pas 4i *does* manage to sound like what many enthusiasts expect from an amplifying device that uses vacuum tubes. The highs gleam and tinkle sweetly instead of splashing aggressively, and you no longer drive casual visitors out of the room with a system religiously operated at flat settings. Beware of the risks in this, however. One of my first tests of the preamp was the beginning movement of *Mahler: Symphony No. 8* (Telarc CD-80267), a colossally congested piece of work that, dismayingly, began to *sound* somewhat congested toward the end. But it turned out to be neither the recording nor the playback. It was me. Liking what I heard, I had played it too loud and too long. The whistling in my ears persisted for more than an hour afterward.

Van Alstine has no use for conventional specifications as descriptors of audio quality, so he publishes none. However, a few perfunctory measurements, made after listening and only on the 4i version, suggest he has little to be ashamed of. The performance profile of the Super Pas 4i is generally what you'd expect from a fine vacuum-tube preamplifier. My main caveats are the phono input's overload point of 60 mV, quite low by today's standards, and that there is no infrasonic filtering which might block record-warp assaults. With the low-output cartridges I used for listening evaluations, there were no discernible difficulties—but caution is advised, particularly with marginally stable tonearm/cartridge combinations.

I'd guess that the Super Pas 4i is not the best preamplifier I've ever heard—but then, I no longer have that "best" preamp for comparison. I couldn't afford it and had to send it back. However, I can afford the Pas 4i, so it will stick around, probably plugged in much of the time. *Ralph Hodges*

PARASOUND, continued from page 44

tridge, a Krell Digital MD-1 CD transport feeding a PS Audio UltraLink and other D/A converters, a Nakamichi 250 cassette recorder and ST-7 tuner, and a Technics 1500 open-reel recorder. The Vendetta Research SP-2C phono preamp was used when playing vinyl records. The preamps were First Sound's Reference II and Counterpoint's SA-5000. Other power amps on hand included a Crown Macro Reference and a Metaxas Solitaire. Speakers used were Win Research SM-10 broadcast monitors.

**OVERALL TONAL BALANCE
MAKES THE PARASOUND
EASY TO LISTEN TO; IT
SERVES THE MUSIC WELL.**

My first impression in listening to the HCA-2200^{II} was that it is a nice, musical amp. It ought to do well for Parasound and for John Curl's reputation. I loaned the amp to a friend who has Apogee Diva speakers and normally drives them with Esoteric Audio Research EAR 549 200-watt tube mono amps. This guy is fussy and critical in his own way, and most of the amps I have sent his way "just don't do it for him." However, he used the Parasound for quite a while and generally thought it was very good.

Further listening to the HCA-2200^{II} led me to characterize it as follows: Overall tonal balance sounds a little laid-back in the upper mid and high end, which makes it easy to listen to and serves the music. There is very little irritation in the sound, which in my book is very important. Resolution of detail and space is very good, although not as good as some other amplifiers that excel in this area—but then again, they are usually more irritating to listen to with many CDs. Dynamics and bass control are excellent.

All in all, the HCA-2200^{II} is an amp that I found myself listening to a lot. It worked flawlessly, with not a hint of improper operation of any kind. I think Parasound's HCA-2200^{II} is a very good power amplifier and definitely recommend that you give it an audition. *Bascom H. King*

ADVENT AUDIO FOCUS AND MINI-ADVENT A/V SPEAKERS

As more and more audio enthusiasts integrate their audio and video components into home theater systems, some of the more familiar and respected names in loudspeakers have produced or adapted models for use in surround systems. One such familiar name is Advent, whose rebirth as a division of International Jensen has led to the production of a wide assortment of high-quality loudspeakers at reasonable prices.

Mini-Advents have been around for some time, and Advent suggests that they would be ideal as rear-channel speakers when combined with their recently introduced Audio Focus center-channel speaker. Naturally, Advent would like to see us use their speakers for the front channels as well; the company recommends their magnetically shielded Prodigy Tower models, at around \$380 a pair, as being ideal for the front stereo pair in any home theater system. Since my reference home theater installation was already equipped with a pair of DCM Time-Frame TF-1000 units, I was pleased when Advent mentioned that the add-on speakers I was about to evaluate were "compatible with nearly all brands of speakers." The DCM speakers had about the same efficiency as the Advent add-ons, so no major level adjustments would be needed. Had I needed to make adjustments, though, the surround sound receiver I used in the tests (a new Yamaha RX-V870 with 80 watts of power available for front and center channels and 25 watts for the rear) provided for any level balancing that might have been required.

The cleverly designed Audio Focus center-channel speaker incorporates a pair of magnetically shielded,



dual-cone, 4-inch drivers mounted in a horizontally oriented cabinet that measures 13 inches wide \times 6 inches high \times 5½ inches deep. Frequency range of the system extends from 80 Hz to 20 kHz, \pm 3 dB. Sensitivity is 92 dB, unusually high for an acoustic-suspension design, and recommended amplifier power is 10 to 70 watts. The cabinet's angled design lets the speaker be aimed slightly downward when mounted above a TV screen or slightly upward when mounted below. I encountered no color or geometric distortions when I mounted this speaker directly atop my TV set; however, the single sheet of instruc-

tions warns that such distortions can occur, and four small rubber feet are supplied to raise the speaker away from the screen should such problems arise. The speaker weighs only 6 pounds, so there should be no problem mounting it atop any large-screen television set. The Audio Focus center-channel speaker carries a suggested list price of \$149.

Advent sent me the indoor/outdoor version of the Mini-Advents, though I suspect that the standard indoor version would have served just as well. (Both models have a suggested price of \$230 per pair.) Also included in the package of "add-ons" that arrived at my lab

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Suite 400, Lincolnshire Ill.
60069.
For literature, circle No. 94

were a pair of Mini-Advent mounting brackets (\$59.95 per pair), which made attaching the Mini-Advents to the rear wall of my listening room simpler. As suggested in the literature I've read on placement of home theater speakers, I mounted these brackets a few feet above ear level. Thanks to the mounting brackets' horizontal and vertical adjustments, I easily set the radiating direction of the Mini-Advents for optimum surround effects.

Each Mini-Advent houses a 5/4-inch cone woofer and a 1/2-inch dome tweeter,

with the crossover frequency set at 4.5 kHz. Response claimed for these small acoustic-suspension enclosures extends from 110 Hz to 21 kHz, ± 3 dB, while sensitivity is rated at 88 dB. The minimum power recommended is 10 watts per channel, a requirement easily met by most surround receivers' rear amplification channels. Each unit measures 6 1/2 inches wide \times 5 1/2 inches deep \times 11 inches high and weighs around 10 pounds.

Once the installation of the Audio Focus and Mini-Advent speakers was complete

(the hookup, including incorporation of the Yamaha receiver, took less than an hour), the moment of truth had arrived. Using the Yamaha receiver's standard Dolby Pro Logic settings, I spent no more than five minutes balancing sound levels from all the speakers and setting the decoder's time delay for my listening position relative to the front and rear speakers.

The Advent Audio Focus center-channel speaker is aptly named, as it does a remarkably good job of maintaining on-screen dialog just where it belongs—on screen. Mounted atop my reference Sony XBR 32-inch TV monitor, it never gave me any sense of drifting dialog sound. I found no need to add a subwoofer to the installation, since the DCM TimeFrame speakers in the front channels offered excellent bass response down to 35 Hz or so.

By far my biggest surprise came when I played a few favorite clips from several blockbuster films that feature surround effects ranging from aircraft overflights to volcanic eruptions and sporadic gunfire. The Mini-Advents performed very well, providing a sound field that did not pinpoint the origin of these effects but, rather, completed the sense of a true 360° sound field. Ordinary stereo music program sources also benefited from the additional channels. Of course, the amount of ambience and the reverberant sound fields created during these musical listening tests were governed largely by the DSP settings on the Yamaha receiver (which has settings for four types of acoustic environments ranging from "Church" to "Jazz Club"). However, the use of well-designed, properly installed and oriented rear speakers, such as the Mini-Advents, certainly contributes to enhanced musical reproduction.

Conversion to full-fledged surround home theater, despite many magazine articles suggesting the contrary, need not be an overly expensive proposition. The total cost of the add-on speakers, including brackets, comes to about \$439 if purchased individually but to only \$399 if purchased as a set. And excellent surround processors are available for just a few hundred dollars (assuming you want to stay with your present stereo audio electronics). So, if the cost has made you reluctant to make the big switch to home theater, there is no reason to wait.

Leonard Feldman

MASTERS AT WORK...



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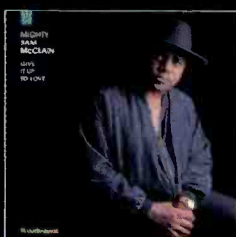


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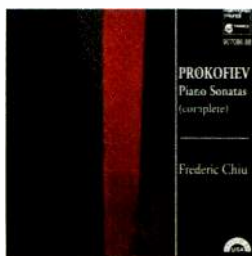
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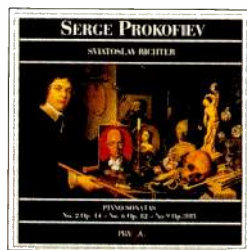
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Prokofiev: Piano Sonatas (complete)

Frederic Chiu, piano
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Prokofiev: Piano Sonatas, Nos. 2, 6, and 9

Sviatoslav Richter, piano
PRAGA PR 250 015/3, CD;
ADD; 67:02

Sergei Prokofiev's piano works make it clear he understood just about everything worth knowing when it came to playing that instrument. Before establishing himself as a composer of the first rank, he enjoyed a major international career as a virtuoso. He wrote his first piano sonata (plus the original versions of his third and fourth) at the age of 16 and his last at the age of 56, six years before his death in 1953. These sonatas cast clarifying psychological light on what happened to this great composer, who voluntarily returned in 1932 to live as a Soviet citizen in

an ever more repressive environment, ending his free travels forever.

In Prokofiev's earlier works, that British expression "too clever by half" comes to mind, and not without cause. Exploding with an enormous talent, heavily laced with mischievous wit, he seemed to have a thumb almost permanently applied to the end of his nose. A transitional passage in the Second Sonata's finale, where he hammers away at a C sharp for no less than 60 hilarious measures before resolving it up to a D, is a brilliant example of how funny "serious" music can get, and quite legitimately. The "wartime" sonatas—Nos. 6, 7, and 8—show us another Prokofiev, humbled by political yahoos and grieving profoundly over the millions of his fellow Russians killed during World War II.

In Frederic Chiu, born in 1964 to Chinese parents in Ithaca, N.Y., we have yet another example of a major American-born talent who has found a more hospitable welcome abroad than here: He now lives in Paris, as assistant to Prof. Marian Rybicki at the Ecole Normale de Musique. Chiu's musical intelligence shows through not only in technically superb playing but also in exceptionally literate program notes. His transcendental technique easily meets these pieces' formidable demands; he plays with a suitably dry clarity that reveals Prokofiev's acrid harmonies and intricate counterpoint with crystalline brilliance, recorded with electrifyingly sumptuous sound.

To Sviatoslav Richter (who gets my nomination as our era's greatest pianist), Prokofiev entrusted the world premieres of his Sixth and Ninth Sonatas. This Praga (son of Chant du Monde, so to speak) CD preserves, thank God, rare and extraordinary 1956 and 1965 live performances in Prague. Sonics freaks may wrinkle their noses, but the pianism itself I have to call definitive—downright superhuman.

Paul Moor

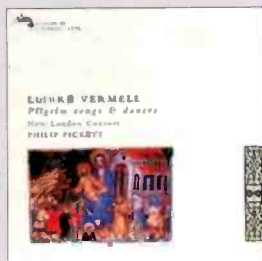
Llibre Vermell:

Pilgrim Songs & Dances

New London Consort, Philip Pickett
L'OISEAU-LYRE 433 186-2,
CD; 69:48

Back at the very beginnings of the art of Western music, *Ars nova* was the name of the game. The new art. It was spontaneously all over Europe in many religious centers as the beginnings of harmony and counterpoint—that is, more than one melody at once. It has been a tough period for us, the present general public. But all that is changing.

This "Vermillion Book," of 1399 is simply a manuscript—parts of it missing—from Montserrat, a once famous center of monastery culture in Spain. (I had visions of a West Indies island with a volcano!) It is the basis for what is best called a reconstruction of the music notated at the time. My knowledge of musicology tells me that much of this recording is manufactured—with all sorts of authentic instruments and voices—from a scant few actual notes in the "Llibre." Details of orchestrations, who should play or sing what, and how many, were not included in music notation for centuries after



this time. Only from the 17th century on did composers add the specifics. But it is not hard to figure out what might then have been appropriate for the music, via evidence that includes both verbal accounts and a multitude of pictures of instrumental groups in action. The same would apply to this early music, when "consonance" meant the octaves and fourth and fifths that now sound harsh to us, not the softer (as we hear them) upper overtone relations, the thirds and sixths.

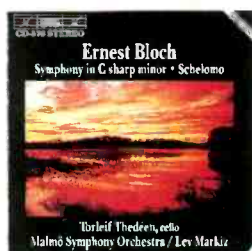
And yet, what astonishing reconstructions we can produce with our expanding indirect knowledge! This is a wonderfully dramatic and persuasive recording, even if manufactured from the simple notations available. Every one of the works, mostly in praise of the Virgin Mary (Ave Maria), is based on some sturdy, strong-minded, almost folk-like

melody, many of them treated as canons or rounds, precisely like that classic American/English round, "Three Blind Mice." There is a choir of voices, women substituting for the boys that might have sung the original. There are dozens of instruments of the period: Gittern, lute, gothic harp, high and low fiddles, rebecs, recorders, shawms, dulcimer, bells, nakers, tabors, and something cryptically called a symphony. Such an amiable racket (a word reflective of a loud period instrument called a racket)! The laying out of these forces is highly expressive and varied, even if the "Llibre" itself surely did not specify them, though it probably did specify the frequent two-part counterpoint, two lines of music.

In a few words, the music sells itself and the elaborate reconstruction of possible sounds is as scholarly and authentic as present knowledge admits. I found it hugely, muscularly, attractive. If you enjoy, this English ensemble has plenty more—another Spanish monastery and two CDs' worth of music, *The Pilgrimage to Santiago*, on the same label.

Edward Tatnall Canby

Llibre Vermell is a wonderfully dramatic and persuasive recording.



Bloch: Symphony in C-Sharp Minor; Schelomo

Torleif Thedéen, cello; Malmö Symphony Orchestra, Lev Markiz
BIS CD-576

While Torleif Thedéen's deeply felt version of Schelomo meets the competition, the main interest here is the youthful symphony by the Swiss composer. Ernest Bloch's unique style pits Germanic orchestral writing against Jewish melody, with influences of Bruckner, R. Strauss, and Debussy.

The four movements are traditional, with large forces and much percussion. In the scherzo the xylophone comes to the fore. Perhaps this 23-year-old's Brucknerian symphony is a bit long-winded, but its rich sonority and slightly exotic melodies are well displayed by the Russian Jewish conductor and his Swedish players. Robert von Bahr, CEO of BIS, succeeds well in capturing the symphony in the label's own concert hall, using a complement of six Neumann mikes.

John Sunier

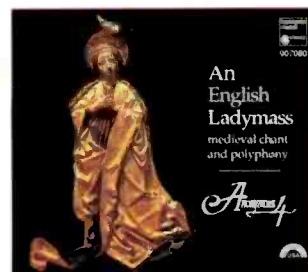
An English Ladymass

Anonymous 4

HARMONIA MUNDI HMU 907080,
CD; 59:01

"Ladymass"? A Mass dedicated to Our Lady, Notre Dame, the Virgin Mary. This one is recently assembled from music out

of the 13th and 14th centuries, when the Blessed Virgin exerted an enormous fascination on people throughout Europe. All the texts, in one way or another, concern the Virgin. The music is performed, incredibly, by four lady singers, no instruments or



other voices. They are superb musicians, with a blend and a pitch more accurate than a string quartet (or a barbershop quartet!) and a marvelous sense of rhythm. Their combined sound is indeed an anonymous and perfect mix.

The music is derived from the fragmentary bits and pieces of cryptic manuscript that are all that remain today of a vast, healthy, and enthusiastic world of music that ranks with the contemporary marvels of the Gothic cathedrals. It was the first flower and maturity of written-down, and hence recoverable, music that followed the earlier Gregorian chant; only now, after a century of musicological research, is the reality of this music appearing for the general listener. Musicologists, unfortunately, are not always good musicians. For decades, music like this has been incomprehensible to most of us as performed—plodding, unimaginative, *unmusical!* Not our fault, though understandable, and the enormous and painstaking work of the scholars has been vital in creating even a semblance of this once-lost experience. Just try this disc and hear the difference.

Even the recording is astonishing. Just four female voices, and yet the sound is as of a vast Gothic cathedral and a full choir of men and boys. At times you would swear there are instruments assisting—but no. It is a wonderfully appropriate audio sound, however it may have been produced at the microphone end of things. One wonders merely how these singers might manage their “live” performances on tour, with all sorts of impossible acoustic surrounds.

Do not expect lugubrious or solemn music! That belongs to much later Mass settings, the kind we usually hear. This could easily, in the listening, be taken for a joyous folk festival, full of dance-like rhythm, catchy tunes, folk-like “verses” with repeats, and a variety that never lets you grow bored with sameness. Even the keys—or, rather, the modes—are chosen to avoid too much of one sound. A good deal of this simply takes advantage of the prevailing triple rhythms of the music, music in threes for religious reasons, not for dancing. To us it sounds very nearly worldly. Do we hear it right?

No matter. If it “works” as worldly entertainment, it is music for today and, as such, the finest, most persuasive performance I have yet to hear.

Amusingly, all four of the singers’ names are printed plainly enough, and there is a photo as well. Not exactly anonymous. Odder still is the *venue* of this project, which sounds ultra-European, if ever a recording sounded so. A monastery in France? A cathedral in England? Instead, the four are based in New York. The recording was made in, of all places, Los Angeles at, of all places, Skywalker Sound, a division of LucasArts Entertainment. What next, out of Hollywood?

Edward Tatnall Canby



**Turina: Danzas Fantásticas;
La Procesión del Rocío;
Sinfonía Sevillana; Ritmos**
Bamberger Symphony, Antonio de Almeida
RCA RED SEAL 09026-60895-2

Though he lived in Madrid, Spanish composer Joaquín Turina’s music evoked the more southern, Moorish, flamenco-flavored atmosphere of Seville. This sparkling CD presents most of his dynamically colorful works for orchestra (Turina’s output was primarily confined to chamber and piano music).

While such pieces as Turina’s popular “Triana” include moody religious passages, most of these sonic fireworks stress brilliantly joyful aspects of the Spanish ethos, not its dark side. The superb orchestrations make one wish Turina had spent more time scoring for such larger forces. The wide dynamic range and thumping percussion will surely captivate ‘philes.

John Sunier

Czech Horn Concertos

Zdeněk and Bedřich Tylšar,
horns; Capella Istropolitana,
František Vajnar

NAXOS 8.550459, CD; 73:32



It will astonish most music listeners to hear in actual performance what quantities of “other” music in familiar styles once existed behind our cherished masterpieces of the concert repertory. Here is music of Mozart’s time, more or less, and all of it for pairs of horns plus small orchestra, out of Mozart’s own favorite Bohemia, now become Czechoslovakia. Such floods of music! You could probably find a dozen more of the same in the libraries without much effort.

Two brothers, who seem to be musical twins, do the playing here.

But if I am right, they are strictly “modern” hornists performing on the present play-everything instrument, not the transition horn of Mozart’s day. Oddly, these are somewhat experimental or pioneering works with that older horn, where the lower register was first exploited for melodic use. It would be good to hear what this music sounded like on the “advanced” horn of that day, using the now-fa-

miliar hand inside the bell to add lower tones. Judging from the brothers’ playing, it must have been extraordinarily adroit. In spite of excellent modern technique, they aren’t up to all the sprightly running fast notes the older composers demanded—they sound stumbly every so often.

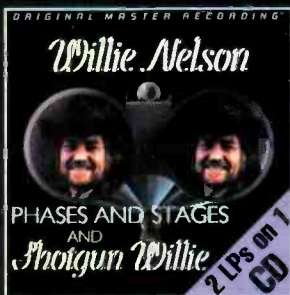
The first two composers, Fiala and Pokorný, are fluent and flexible in the “galant” style but on the whole not very interesting. The pieces are too much all in one key—first in E flat, then F. But the man called Rosetti, who was also called Rössler, is dramatically more interesting. He’s a real composer, not just a technician, and his two concertos are worth the whole long CD.

Edward Tatnall Canby

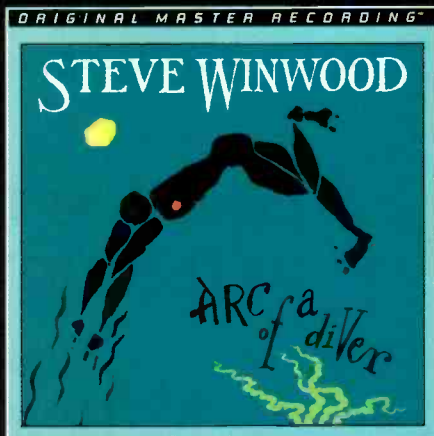
**Here is music of
Mozart’s time,
more or less, and
it’s out of Mozart’s
own favorite
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DREAM HARDER THE WATERBOYS

●
BANG!

WORLD PARTY



Mike Scott

Dream Harder

The Waterboys

GEFFEN GEFD-24476,

CD; 43:49

Sound: A, Performance: B+

Bang!

World Party

ENSIGN/CHRYSALIS 21991-2,

CD; 52:27

Sound: A, Performance: B+

Eight years after they last worked together in The Waterboys, Mike Scott and Karl Wallinger are back on common ground. Scott has travelled farther, taking his once epic-happy Boys through a Celtic phase on *Fisherman's Blues* and *Room to Roam*. Wallinger formed World Party to indulge his '60s inclinations, quickly reaching a peak with *Goodbye Jumbo*. Now, lured by the simple pleasures of melody, each artist has made an enjoyable, scaled-down pop album.

Dream Harder finds Scott, having moved his living/recording base from Ireland to New York, feeling liberated by fresh surroundings

("Preparing to Fly," "The New Life") as well as powered by deliberate guitars: "I've got sparks and electric shocks just exploding in my hands!" Small wonder he's written a tale called "The Return of Jimi Hendrix." There's also "The Return of Pan," pointing to Scott's fondness for other kinds of supreme beings, even those who may be making those wacky "Corn Circles" in English fields. Scott's musical and lyrical

tools are rather basic, but they're in the service of a truly contagious enthusiasm.

Bang! gets off to a sweet one in "Kingdom Come," a sort of foggy Party breakdown where Wallinger frets over losing the planet. The same world view informs the similarly acoustic "Is It Like Today?" and the mechanized, funkified "Give It All Away," while the rest of the album turns personal, now asking



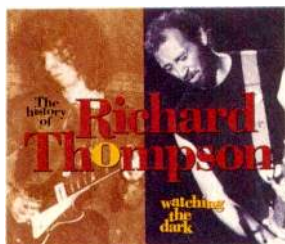
Karl Wallinger

Photograph: M. Halsband

Photograph: Lorenzo Aguis

“What Is Love All About?” in the style of a Stevie Wonder shuffle and yearning for recuperative “Sunshine” to strains of The Who’s “Getting in Tune.” And in “Radio Days,” Wallinger layers samples, choral harmonies, processed/natural lead vocals, and a buzzing guitar line to transform seeming filler into late-Beatles finery.

Ken Richardson



**Watching the Dark:
The History of Richard Thompson**

Richard Thompson
HANNIBAL HNCD 5303

This three-disc set, covering 1969 to the present, includes 47 tracks of Thompson material, with roughly half previously unreleased or rare. Gems include the chilling “From Galway to Graceland” in an alternate take only recently discovered. Three early versions of songs from *Shoot Out the Lights*—recorded in 1980 but shelved by Thompson for being “too pop”—are also here. Rykodisc/Hannibal has packaged the set in a double jewel box to hold the retail price down to a buyer-friendly \$35 or so. For the Thompson fan, it’s a must. For the uninitiated, it’s a superb overview and introduction.

Michael Tearson



Great Expectations

Tasmin Archer
SBK/ERG 7 80134 2

If christening her debut album *Great Expectations* is any clue, U.K. native Tasmin Archer has been profoundly influenced by Charles Dickens and a certain

street urchin named Pip. Not surprisingly, certain Pip-like characteristics appear throughout Archer’s album: It takes risks, it challenges itself, and it reaches in ways that are unlike a pop album (but quite like Pip). Archer’s highly personal songs, as well as her songs of social commentary, fuse accessibility with brilliant creative flourishes. “Lords of the New Church,” for example, begins with a resonator guitar before keyboards and contemporary “pop” elements are introduced. On nearly every song, acoustic guitars and pianos provide additional rhythmic support and ornamentation, all of which, with the exception of Eric Clapton’s *Unplugged*, is hardly commonplace for a pop album these days. Archer’s is a stunning and beautiful debut.

Mike Bieber



In Thrall

Murray Attaway
DGC DGCD 24495

The shimmering flourish of the opener, “No Tears Tonight,” sends a thrilling signal that *In Thrall* might be something special, and it is. Murray Attaway’s songs, filtered through Tony Berg’s sympathetic production, are memorable and poignant, delivering the goods far more often than not. “Under Jets” (about growing up on military bases), “August Rain” (inspired by his father’s final battle with cancer), and the rocking and rollicking “Fall So Far” are all sturdy works. Also of note is the faith-driven “Allegory.” Attaway, the former mainstay of Guadalcanal Diary, makes a big impression on his solo debut. Very strong.

Michael Tearson

Where You Been

Dinosaur Jr
SIRE/WARNER BROS. 9 45108-2

On their second major-label album, this Massachusetts-based trio expands on the



An Evening with Frank Loesser

Frank Loesser
DRG 5169, CD; 64:51
Sound: B+, Performance: A

Loesser by Loesser: A Salute to Frank Loesser

Jo Sullivan Loesser with
Emily Loesser and
Don Stephenson
DRG 5170, CD; 50:53
Sound: A, Performance: B+

Frank Loesser, active coast-to-coast from the mid-'40s through the late '60s, was a great songwriter of comic and romantic wit. Neither as arch as Cole Porter nor as neurotic as Stephen Sondheim, he was satiric and genuinely warm. Loesser conjured up Broadway gamblers, California waitresses, corporate chairmen, and suburban wannabes with a pitch-perfect ear to American idioms and values.

Digitally cleaned and remastered by Doug Pomeroy, Loesser's archival tapes deliver fully conceived performances of classic songs. *An Evening with Frank Loesser* includes eight sets of words and music he wrote for *Guys and Dolls* and 10 from *How to Succeed in Business Without Really Trying* (one of these, "Organization Man," being the unused original version of "The Company Way").



His renditions certainly rival later versions by Frank Sinatra, Stubby Kaye, Rudy Vallee, and Robert Morse, so natural is his phrasing and dramatic his articulation. It's as if the author always meant the song's characters—who tell about restlessness, risk, romance, and the rigors of gainful employment—to resemble himself. Loesser plays piano with the swing of a man about town who's entertaining in a late-night barroom or trying to interest investors. In the CD's centerpiece, Maxene Andrews and unidentified others sing to

tender, hilarious perfection the 24-minute mini-opera of *The Most Happy Fella's* Act I, Scene 1.

In 1992 Loesser's widow and one-time stage star Jo Sullivan Loesser, their daughter Emily, and Emily's husband Don Stephenson recorded some of these same songs and many others for *Loesser by Loesser*. The three combine attractive voices with a polished stage/concert/cabaret style that takes advantage of and emphasizes the author's jazzy lyricism. Their 19 tracks tap some of Loesser's better known stage and screen work: "Thumbelina" and "Wonderful Copenhagen" from *Hans Christian Andersen*, "Baby, It's Cold Outside" from *Neptune's Daughter*, "I Hear Music" from *Dancing on a Dime*, and his first hit, "Once in Love with Amy" from the musical *Where's Charley*, to name a few. Elegant, spare arrangements by Colin Romoff for a very small band serve as accompaniment. Annotation is by the late Sammy Cahn.

Released just after two successful Loesser revivals in New York, both CDs recall better aspects of Eisenhower-era culture. And if they renew interest in *more* Loesser revivals, wouldn't that be lovely? (DRG Records, 130 West 57th St., New York, N.Y. 10019.) *Howard Mandel*

Two recent CDs should renew interest in Frank Loesser, a great songwriter of comic and romantic wit.

musical direction of their last album, *Green Mind*, by adding strings, chimes, and an organ. But make no mistake, the thunderous Neil Young-type guitar and speeded-up melodies are still prevalent. J Mascis, Dinosaur Jr's singer/songwriter/guitarist, continues to develop as writer and musician. With squalls of melodious guitar noise and his plaintive drawl, Mascis describes the futility and desperation of unrequited love and alienation. On the opening track, "Out There," he conveys resignation, loss, anguish, and emptiness with his wailing guitar and ragged, urgent vocals. Despite the lyrical bleakness, the music is melodic, and Mascis' guitar playing is suffused with a bluesy, expressive sound reminiscent of Jimi Hendrix. On *Where You*

Been, Mascis taps a little further into the depth of his potential, and while the results are pleasing, they hint at even greater things to come. *Gerald F. McCarthy*

Symphony or Damn

Terence Trent D'Arby
COLUMBIA CK 53616

Terence Trent D'Arby was once a soul/funk pop sensation, the "next big thing." Upon the release of his '87 debut, he rode the big wave of stardom until (taking his cues from Muhammad Ali) a self-aggrandizing blunder ("I am a genius") hastened his fall from grace.

Symphony or Damn, D'Arby's third and best album, is firmly rooted in soul and



R&B traditions; it is a soul album, and D'Arby is a soul singer. With the exception of "She Kissed Me," which rocks out too much for its own good, these tracks—particularly D'Arby's theme for the movie *Frankie and Johnny*—come close to R&B greatness. He's not above occasional arrogance, as revealed in "Welcome to My Monastery," his I-am-a-sex-god paean.

When Otis Redding proclaimed himself a "love man," he came across as a tad more genuine (perhaps because he never attested to being the genius that he was). But D'Arby is neither Otis nor Al or Percy or Wilson nor even Rufus. He's D'Arby, the testosterone-driven missing link of soul music—not quite a genius but brilliantly talented.

Mike Bieber

FAST TRACKS

Dynamite Monster Boogie Concert: *Raging Slab* (Def American 9 45244-2). With an intensity that blends neo-Cream psychedelia with vintage '70s three-guitar Southern rock, Raging Slab rips through in-your-face hard rockers plus a few gentler acoustic moments. Nicely recorded via a mobile unit on their Pennsylvania farm. **M.W.**

A Meeting by the River: *Ry Cooder and V. M. Bhatt* (Water Lily Acoustics WLA-CS-29-CD). Cooder's bottleneck guitar meets Mo-

han Vinā (an Indian guitar/sitar hybrid) master Bhatt in four spontaneous dialogs abetted by tabla and dumbek. Trance-like, dreamy, and droning but also witty and stimulating blues-meets-raga. (P.O. Box 91448, Santa Barbara, Cal. 93190.) **M.T.**

Vintage: The Very Best of Moby Grape: *Moby Grape* (Columbia/Legacy C2K 53041). San Francisco's Moby Grape had the misfortune of being pegged as hype rather than musical talent. *Vintage* attempts to add to their legend and give them their due. Dated material doesn't obscure some outstanding moments that make this package worthwhile. **J. & S. T.**

Black Tie White Noise: *David Bowie* (Savage 74785 50212-2). Had Bowie made *Let's Dance, Part II*, we could chalk it up to cheap cynicism and at least enjoy the groove. But the result of this reunion with Nile Rodgers is an ill-conceived batch of songs destined to be, at best, a footnote for Bowie. Most interesting for Mick Ronson's quickie guitar solo in Cream's "I Feel Free." **J. & S. T.**

For the Beauty of Wynona

Daniel Lanois
WARNER BROS. 9 45030-2,
CD; 55:09
Sound: B, Performance: B-

What do you do when you've given your sonic design to artists who've scored No. 1 records and Grammy awards? That's the challenge for producer Daniel Lanois, whose productions for U2 and Peter Dinklage have gotten him worldwide acclaim.

Over the course of his two albums, Lanois has developed a style that might be called Cajun-psychedelic, with origins in the music of The Band. It's rooted in songs and storytelling, as Lanois relates tales of lust on "Beatrice" and longing on "Lotta Love To Give." But he surrounds them with the strangest shifting palette of sounds and atmospheres. *For the Beauty of Wynona* is a messy album, with intentionally bizarre echoes, cheesy synthesizers, drums that sound like cardboard boxes, and a hallucinatory mix.

Everything about this album is confrontational, from Lanois' na-



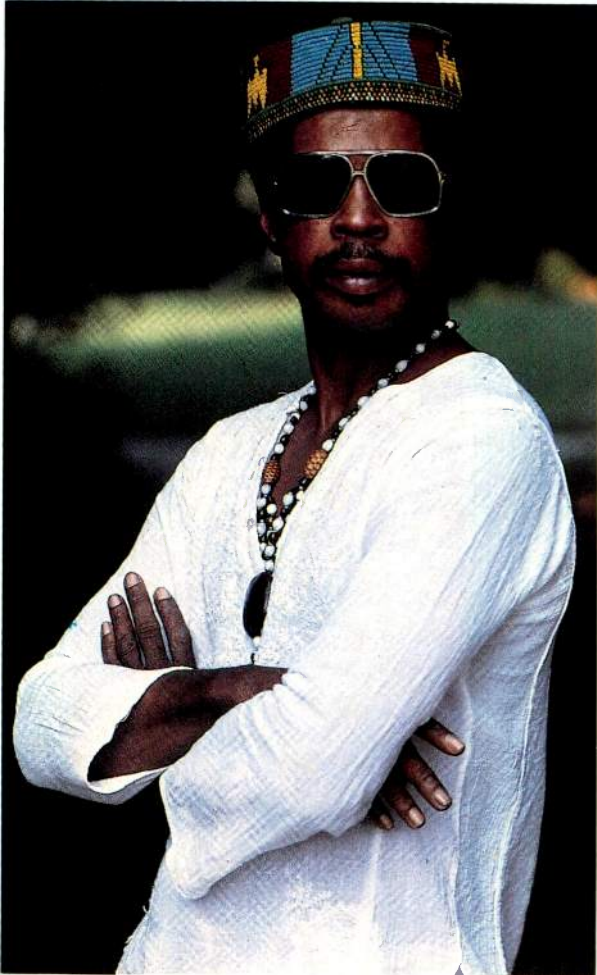
kedly fragile voice, which he pushes to its limits, to the Jan Saudek cover shot of a nude woman in profile, holding a knife at groin level (you'll have to pick up an import for the uncensored version).

Not all of *Wynona* works, and I miss the more acoustic, rustic sounds of Lanois' solo debut, *Acadie*. That sound leaps out with natural austerity on the acoustic guitar ballad "The Collection of Marie Claire," and even that has a spacey tag played over a train fading in the distance. But Lanois catches an atmosphere on *For the Beauty of Wynona* that rages out of the New Orleans humidity like a fever dream.

John Diliberto



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Ode to Life
Don Pullen & The
African-Brazilian Connection
BLUE NOTE CDP 7 89233 2,
CD; 58:39
Sound: A-, Performance: A

Don Pullen was initially struck by the power and lyricism of Brazilian music while touring with Charles Mingus some 20 years ago. With his current ensemble, the five-piece African-Brazilian Connection, the pianist explored the cultures' common musical ground to great effect on last year's *Kele Mou Bana*. With *Ode to Life*, the group refines this approach and achieves a seamless whole.

ODE TO LIFE

.....

DON PULLEN & THE AFRICAN-BRAZILIAN CONNECTION

Throughout his career, Pullen has attracted attention and praise for his distinctive takes on gospel, blues, bebop, standards, and ballads. Distinction, in Pullen's case, has been the alliance of a song or composition with his signature sweeps and tone clusters. On *Ode to Life*, Pullen's spontaneity is firmly grounded, owing in no small measure to the rhythmic textures woven by bassist Nilson Matta and percussionist Guilherme Franco (both Brazilian) along with Senegalese percussionist Mor Thiam. On alto saxophone and flute, Carlos Ward (a New Yorker born in Panama) provides melodic and harmonic counterpoint to Pullen's right hand.

The album is a collective effort; band members call forth their individual statements in addition to their respective cultural influences. Franco's "The Third House on the Right" is playful and coy; Matta's "Paraty" floats a beautiful melody over a 6/8 salsa. "Aseeko! (Get Up and Dance!)," composed by Thiam, features the album's only vocals. Ward contributes "Anastasia/Pyramid," a piece that begins each phrase straightforwardly before taking a clever rhythmic turn.

Ode to Life is dedicated to the late saxophonist George Adams, with whom Pullen shared a long and

healthy musical relationship. Pullen's flamenco-flavored "El Mator" reflects the daring bravado the two exhibited with the renowned

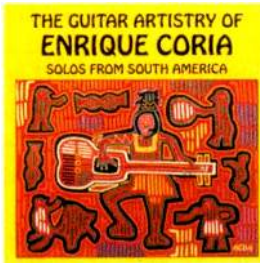
**THE PIANIST'S
SPONTANEITY IS
FIRMLY GROUNDED
IN RHYTHM.**

quartet they co-led. In another Pullen composition, "Ah George, We Hardly Knew You," Ward's alto makes a straightforward melodic statement before sliding into a bluesy conclusion; Pullen's response is a mixture of love and loss—part longing, part thoughtful reflection.

The closing tune, "Variation on Ode to Life," begins and ends on the wisps of a lullaby. In between, Ward's flute and Pullen's single-note runs carry a gorgeous melody. Alone at the piano for the final bars, Pullen allows the song—and the body of emotions so powerfully represented—to achieve full resolution.

As *Ode to Life* demonstrates, Pullen's African-Brazilian Connection works because it is not a connection forged or fused, but rather one revealed.

Larry Blumenfeld

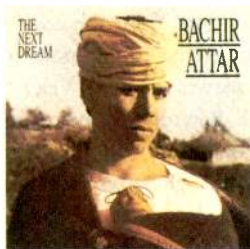


The Guitar Artistry of Enrique Coria

Enrique Coria
ACOUSTIC DISC ACD-6

Argentine guitarist Enrique Coria flies through both familiar and new “classical” pieces from his homeland plus music from Bolivia, Chile, Venezuela, Paraguay, and Brazil. Coria’s selections—full of tangos, zambas, and polcas—rarely stray from the inspiration of the dance, fusing the heritage of late-19th-century European Romanticism with the enthusiasm of the South American soul. Coria, whose technique has been honed through more than 20 years of ensemble and solo work, plays with the attack and grace required to bring this music to life. This entertaining album was recorded and mixed live on vintage analog two-track equipment by producer, Acoustic Disc owner, and mandolinist extraordinaire David Grisman. (Acoustic Disc, Box 4143, San Rafael, Cal. 94913.)

Michael Wright



The Next Dream

Bachir Attar
CMP CD 57

The ghaita is a double-reed instrument that sounds like an oboist who’s been kicked in the groin: A screaming, soul-shredding wail. It’s the voice of the Master Musicians of Jajouka and the dominant sound of *The Next Dream* by current Jajouka leader Bachir Attar.

But this isn’t an ethnic recording from the mountains of Morocco. This is a stu-

dio-crafted production by world fusionist Bill Laswell that pits Attar’s multitracked reeds against a throbbing, dance-provoking percussion orchestra from Senegalese drummer Aiyb Dieng. *The Next Dream* is an album of ecstatic trance music whose only fault is that the tunes may be all too short. In fact, any length may be too short for the hypnotic cauldron that Attar and Laswell have formed.

Laswell has done a remarkable production job, retaining the soul of Attar’s music while recasting it in a new context. An example is the appearance of Maceo Parker whose flute creates a staccato punctuation to Attar’s dervish whirl and whose saxophone adds a cadence that recalls Ornette Coleman. This is body music for the mind and spirit.

John Diliberto

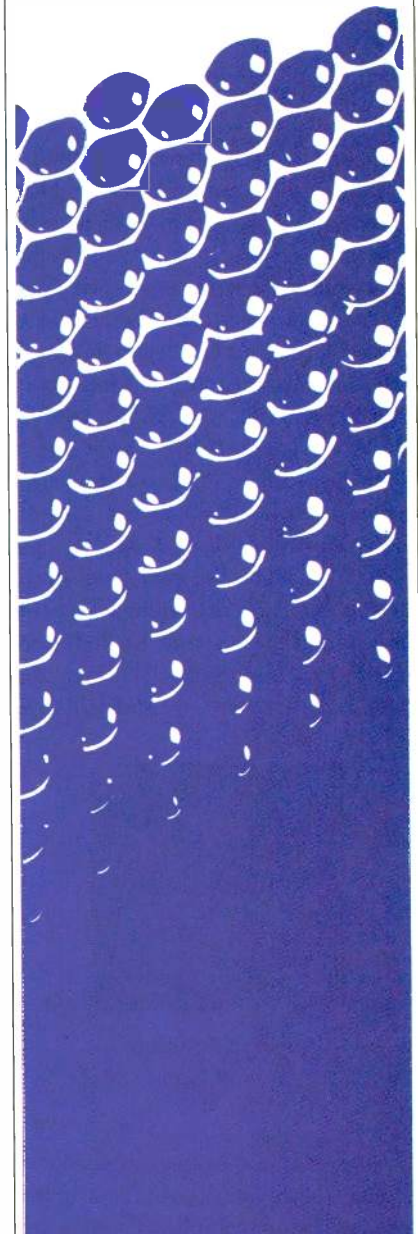


King of the Blues

B.B. King
MCA MCAD 4 10677

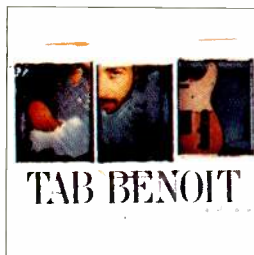
This four-CD box set documents B.B.’s success as a self-appointed ambassador of the blues. Given the dozens of albums he’s recorded since 1949, any retrospective would require compromises. That said, this collection is another lovingly packaged set from MCA. The 77 tracks are drawn from every stage of his career, and they include 19 rarities and seven unissued performances. Consistency has *not* been the hallmark of King’s career. Still, it’s difficult to overlook his eloquent guitar and talents as a vocalist. If this package is too rich for your blood, I recommend searching out any of King’s live sets for a stellar introduction to one of the world’s best known and most widely imitated bluesmen.

Roy Greenberg



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Nice and Warm

Tab Benoit

JUSTICE JR 1201-2

Nice and Warm is the album debut of Tab Benoit, a 25-year-old Louisiana blues guitarist and singer. Mixing original material with covers of Howlin' Wolf, Buddy Guy, Lightnin' Hopkins, and Robert Johnson, Benoit ultimately reveals more Chicago than bayou. The net effect brings to mind white bluesmen such as Johnny Winter and John Mayall, particularly in the vocals. As a guitarist, Benoit clearly owes a debt to the rock-ified fluidity of Winter, the fat tone of Stevie Ray Vaughan, and the punchy brevity of Albert King. Not "authentic," but if you like your blues strong and with lots of guitar riffing, *Nice and Warm* should be on your shelf. (Justice Records, P.O. Box 980369, Houston, Tex. 77098.)

Michael Wright



Chicago Revisited

Ahmad Jamal

TELARC CD-83327

Chicago Revisited captures this neo-icon and increasingly influential pianist in that oh-so-familiar setting: The trio. With help from bassist John Heard and drummer Yoron Israel, Jamal is captured live with Telarc's typically crisp recording, allowing the pianist's many intentionally spacious moments to breathe properly. A dynamic player, he can pound chords out but also can be delicate and graceful. "Bellows," *Chicago Revisited's* masterpiece, strategically encompasses Jamal's approach.

Jon W. Poses

Too Much Sugar for a Dime

Henry Threadgill

AXIOM 314 514 258-2

Henry Threadgill and his ensemble, the Very Very Circus, here draw on thematic elements of European classical tradition, African and Venezuelan rhythms, and the pulsing energy of second-line and tradi-



FAST TRACKS

The Sky Is Crying: *The History of Elmore James* (Rhino R2 71190). Essential to any serious blues collection, with 21 classic tracks from the 1950s, including "Dust My Broom," "Standing at the Crossroads," "Rollin' and Tumblin'," and others in the true Delta blues tradition. Compiled by Robert Palmer and James Austin. **E.P.**

Ancient Fusion: *Ancient Future* (Narada ND-63023). This longtime world fusion band carves another album of evocative East/West melodies, this time using plucked string instruments from Vietnam and China. The melodies are as compelling as ever, with colorful rhythms and some gorgeous soloing. **J.D.**

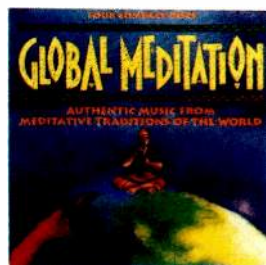
The Missouri Connection: *Jay McShann and John Hicks* (Reservoir RSR 124). An unexpected but well-thought-out concept whose beginnings took place last year during a concert in St. Louis, Hicks' hometown. This two-piano gem is steeped in McShann's Kansas City-style repertoire. **J.W.P.**

Shadow Bright: *Bruce Stark* (M-A Recordings MO11A). One of the most transparent, elegantly stated, and emotionally deep albums of piano solos since Keith Jarrett's Köln concerts. Stark's lush melodies are tempered with an austerity of ornament that recalls Lennie Tristano. A pristine and haunting release. (4728 Park Encino Lane, #117, Encino, Cal. 91436.) **J.D.**

Portrait of the Blues: *Lou Rawls* (Manhattan CDP 7 99548 2). Here's the record Robert Cray wishes he could make, and the date David Sanborn should learn from. With contributions from Buddy Guy, Lionel Hampton, Phoebe Snow, Junior Wells, Joe Williams, Hank Crawford, and too many others, Lou Rawls is at his best. **J.W.P.**

Go Together: *Carla Bley and Steve Swallow* (Watt/ECM 314 517 673-2). The latest from one of jazz's most incorrigible duos. Introspective, cinematic, anachronistic, and original as always. **J.W.P.**

tional march pieces. The resulting compositions, all brilliantly connected, suggest a logic as amusing and otherworldly as their titles ("Paper Toilet" and "Try Some Ammonia," for instance). With two tubas serving as anchors (that is, if anything can anchor such a free-floating sound), Threadgill creates a whirlpool of sorts and uses his alto saxophone to ride the currents. Two strong themes pop up again and again—one urgent and one more playful—and are perhaps most satisfyingly realized on "Better Wrapped/Better Unwrapped," which includes the support of Venezuelan percussion. *Larry Blumenfeld*



Global Meditation

Various Artists

THE RELAXATION COMPANY CD3210

I could be picky with the fact that this isn't all drawn from meditative traditions. But marketing qualms aside, *Global Meditation* is a compelling swing through world music traditions from the ancient sounds of Tibetan monks to the more contemporary percussives of Glen Velez. It recalls Joachim E. Berendt's *Voices* compilation of world choirs (Mesa) although without Berendt's erudite global consciousness theories.

The music is beautifully programmed on four CDs, divided by sonic affinity. The "Harmony and Interplay" disc features sounds from the Gnawa musicians of Marrakesh to the Indian electric mandolin of U Srinivas. "Music from the Heart" explores more refined contemplative spaces with modern Celtic harp, Turkish dervish ney (a wind instrument), and the echoing Chinese flutes of the Guo Brothers. *Global Meditation* creates its own coherent journey out of a diversity of sound and experience. (The Relaxation Company, 20 Lumber Rd., Roslyn, N.Y., 11576.) *John Diliberto*

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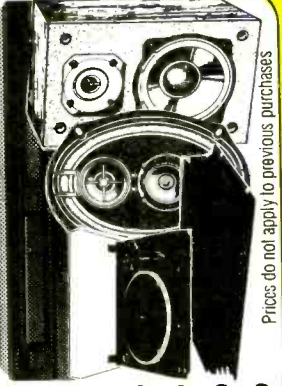
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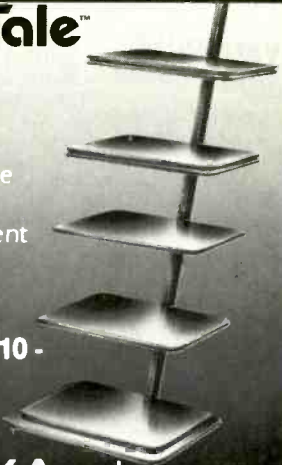
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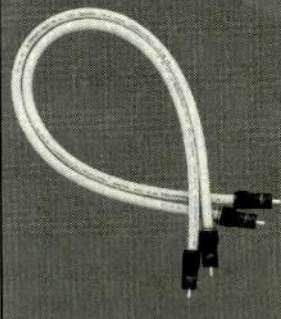
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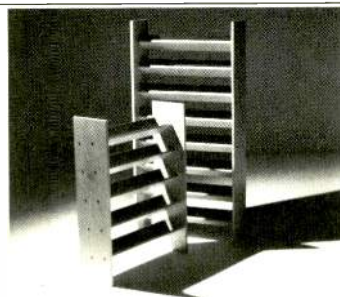
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TIPS FOR MAIL ORDER PURCHASERS

It is impossible for us to verify all of the claims of advertisers, including product availability and existence of warranties. Therefore, the following information is provided for your protection.

1. Confirm price and merchandise information with the seller, including brand, model, color or finish, accessories and rebates included in the price.

2. Understand the seller's return and refund-policy, including the allowable return period and who pays the postage for returned merchandise.

3. Understand the product's warranty. Is there a manufacturer's warranty, and if so, is it from a U.S. or foreign manufacturer? Does the seller itself offer a warranty? In either case, what is covered by warranty, how long is the warranty period, where will the product be serviced, what do you have to do, and will the product be repaired or replaced? You may want to receive a copy of the written warranty before placing your order.

4. Keep a copy of all transactions, including cancelled checks, receipts and correspondence. For phone orders, make a note of the order including merchandise ordered, price, order date, expected delivery date and salesperson's name.

5. If the merchandise is not shipped within the promised time or if no time was promised, 30 days of receipt of the order, you generally have the right to cancel the order and get a refund.

6. Merchandise substitution without your express prior consent is not allowed.

7. If you have a problem with your order or the merchandise, write a letter to the seller with all the pertinent information and keep a copy.

8. If you are unable to obtain satisfaction from the seller, contact the consumer protection agency in the seller's state or your local U.S. Postal Service.

If, after following the above guidelines, you experience a problem with a mail order advertiser that you are unable to resolve, please let us know. Write to Tony Catalano, Associate Publisher of Audio Magazine. Be sure to include copies of all correspondence.

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*Regional Ad

The Velodyne 15" Subwoofer: Controlling Brute Force Through Superb Engineering

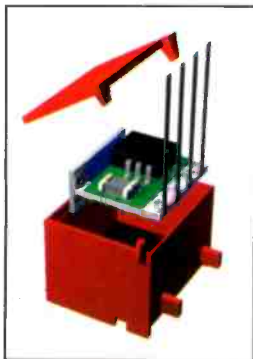
High-output, low distortion bass response can only be achieved by creating and controlling the power of brute force. Perfection of such an accomplishment demands superb engineering, critical manufacturing, and dedication to ideals: A feat, according to the audio press and listeners worldwide, that has been attained only by Velodyne Acoustics.

More than a decade of engineering excellence has generated Velodyne's "High Gain Servo" speakers to the forefront of the audio industry.

Velodyne's patented speakers are built in-house, to the most exacting specifications, using the finest materials available. With their superb design, engineering, and error-correction electronics, Velodyne's subwoofers remain the standard by which all others are judged.

LOW MASS (2.5 GRAMS)

ACCELEROMETER The brains of Velodyne's patented "High Gain Servo System," this amazing device is mounted directly on the voice coil, and measures the actual movement of the driver. The information is sent to a circuit, which makes corrections for any deviations from the pure input signal. This "error correction" circuit virtually controls the motion of the driver, and eliminates distortion.



HOLE PATTERN IN CONE Used to break up unwanted standing waves radiating from the throat of the cone.

**HIGH DENSITY FOAM SURROUND
PENOLIC IMPREGNATED LINEN SPIDER
AND SPACER** To handle the long, 5/8 inch peak-to-peak cone excursion, Velodyne uses the strongest most durable surround and spider available.

**3 OUNCE RESIN REINFORCED
CELLULOSE CONE**
Disatisfied with "off the shelf" cones that flex and distort when called upon to reproduce the lowest bass frequencies, Velodyne designed the strongest and stiffest cone ever produced.

**3 INCH EDGEWOUND
COPPER VOICE COIL**
Carefully matched to the massive magnet structure, it assures constant linearity and instant response.

STEEL BASKET
Specially designed to accept the deep cone and voice coil structure.

26 LB. TOTAL MAGNET STRUCTURE
One of the largest magnet structures on any speaker, it provides the necessary torque required for maximum high-output, low distortion bass response. Includes:

STEEL TOP AND BOTTOM PLATES

10 LB. CERAMIC MAGNET

STEEL POLE PIECE

3 1/2 LB. CERAMIC SHIELDING MAGNET

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