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COMPLETE REVIEW INDEX

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As We See It

HOME THEATERS, MUSIC SYSTEMS, & THE LIVE EXPERIENCE

A

s easy as it is to communicate electronically, some things are still better done in person. At too-infrequent intervals, I visit Stereophile's writers, listen to their systems, and basically get them to show 'n'tell the components they're reviewing. In this way, if they describe what I'm hearing, I have the confidence to publish their review, even if its findings run counter to accepted wisdom.

In late October, I managed to squeeze a lightning trip East into my schedule. One purpose of my trip was to attend a press reception in Manhattan's refurbished, cathedral-like Grand Central Terminal to celebrate Acoustic Research's 40th anniversary—yes, it was in 1954 that Edgar Villchur founded that company to demonstrate that the springiness of the air in a sealed box should carry the primary responsibility for controlling a woofer's motion.

If any reminder was needed that nothing ever stays the same, this party did the job. I had also attended AR's 25th anniversary reception, and was a little taken aback to find that, with the exception of a couple of the more gray-pated members of the press (like myself), almost no one who had been at the 1979 event was at the '94 party—or, in the case of Acoustic Research, even still with the company.

It used to be said that if a company didn't reinvent itself every decade, it would fail. While this century's pace of change has always been fast, the last decade has seen an exponential acceleration. Now, with Nelson Mandela brought back home to Soweto as South Africa's President, a brain-fodder company, Microsoft, outperforming blue-chip hardware manufacturers IBM and Boeing, a tribe of Native Americans in Connecticut outsourcing such a star of the industrial-military complex as Electric Boat, and the Soviet Union revealed as an empty, under-performing sham of a superpower, anyone who doesn't at least try to reinvent themselves every year is going to end up buried with the remains of the Berlin Wall.

The audio industry has had to face the challenge of Home Theater. In the last couple of years, the "marriage between audio and video" has reached critical mass, exploding in a wealth of sales for audio retailers and a flurry in the ranks of audio writers and editors, as we try to decide whether Home Theater properly belongs in the world of audio or if it's something new.

While Stereophile has always covered the audio side of Home Theater, we felt that this magazine should stick to its primary focus—music in the home—and that our coverage of Home Theater should be in its own publication. Hence the appearance this month of the Stereophile Guide to Home Theater. Edited by Lawrence B. Johnson and featuring Stereophile's cast of characters reviewing a total of 37 audio and video components, the 220-page Guide includes all the information you'll need to put together a Home Theater system that excels in both sound and vision. The Stereophile Guide to Home Theater costs $6.95, and is available at your specialist audio retailer. Enjoy.

The main purpose of my East Coast trip, however, was to listen to Jonathan Scull's and Lewis Lipnick's systems. Jonathan's bare-furnished, rather reverberant SoHo loft is the home of Jadis-powered Avalon Ascents, positioned so that he and his French wife Kathleen sit close, in the nearfield. The sound was quite lean but vividly palpable. Every change to the source components was easily heard. I listened to the differences made by different record weights and different digital datalinks, but, despite the detailed presentation, the system's balance wasn't at all "ruthlessly revealing." Instead, it reached out and enveloped me. To say my brief visit chez Scull was musically satisfying would be an understatement.

With the exception of the Forsell Air Bearing CD transport, Lewis Lipnick's complete Cello-based system, residing in his basement, is very different from Jonathan's. Though sounding just as detailed, its balance was much warmer and big in the bass, with the music set back behind the speakers. However, once I became accustomed to the mellow tonal balance and the room acoustics, I enjoyed immensely the recordings Lew played for me. Again, I was enveloped by the music.

Which system sounded most like live music? While I was in Washington, I went to hear Lewis's band: the National Symphony. The program, directed to perfection by conductor Marin Alsop, was a mixture of the traditional—Tchaikovsky's 5, Schumann Cello Concerto—and the new: Joseph Schwantner's kaleidoscopic (and serial) A Sudden Rainbow.

The concert didn't sound like either Jonathan's or Lewis's system; it didn't even sound like my own. And the dry Kennedy Center acoustic wasn't as enveloping as any of the systems were—it didn't even sound live music in auditoriums with which I'm more familiar. But the one area where reproduced sound isn't even close to live, even in the Kennedy Center, is in the highs. The rolled-off-sounding Cello system was perhaps the closest in terms of treble proportion, but, in terms of quality, there isn't an audio system in the world that doesn't sound artificial.

Is it all speakers? Digital? The ubiquitous microphone? Whatever, perhaps it's time to look at reinventing the concept of reproduced sound.

—John Atkinson

Perhaps it's time to look at reinventing the concept of reproduced sound.
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Andrea Marshall, Audio Ideas Guide

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EFFECTIVE ADVERTISING?
Editor:
This letter is in regard to the full-page ad in Vol. 17 No. 10 for Christopher Hansen 2 Inc. (p. 230), which showed disappointingly poor taste.

Imagine feeling good that you got your issue of Stereophile a few days before the end of the month; you place it high on a shelf to read later, and so none of the pages will be bent. Now you sit back in your favorite chair to read one of the world's most highly respected audio magazines, turning each page slowly, taking in all of the columns, features, and ads of many excellent audio shops. After more than halfway through the magazine, your intelligence is insulted by an advertisement that relates two horrible, brutal murders to the opening of an audio shop.

Bad Judgment, Second-Rate Advertising, and Poor Taste.
FREDDIE BOUJE, JR.
Phoenix, AZ

HIGGINS UNDER ATTACK
Editor:
Bob Polins (October 1994, p. 21) has it all wrong. Women can and should become audiophiles. Here are the ten top ten reasons why:
10) Long hair, far from being an impediment, merely functions to absorb those pesky side-wall reflections;
9) Women live longer, so they're more likely to make it past the long break-in periods of audiophile equipment;
8) Their soft skin provides for selective absorption of bad vibrations (à la Mpingo discs), leaving only the good vibrations.
For this reason, as I've observed many times, music sounds better with women in the room;
7) Women's bell-like laughter produces a useful lowering of auditory sensitivity in the part of the frequency range where CD players tend to be stringent. Again, I've noticed that CD's sound better with women in the room;
6) Since, on the average, women are shorter than men, their ears will be below the tweeter axis—a good thing, given the on-axis brightness of metal-dome tweeters;
5) Wearing high heels, women can obtain essentially all the benefits of Tiptoes;
4) Women seldom go bald, so they don't have to cope with the sonically deleterious effects of a hard, shiny, reflective surface a few inches from one's ears;
3) With their dainty fingers, they can easily set the volume-control knob to within the ±0.1dB needed for A/B comparisons;
2) Their experience with PMS prepares them for those times when the system that sounded great the day before now sounds horrible;
1) Women are unlikely to fall asleep in a drunken stupor, leaving the system on for the night and wasting precious hours of the life of expensive 300B tubes.
ROBERT DEUTSCH
Toronto, Ontario, Canada

POLINS UNDER ATTACK
Editor:
I thought about apologizing for my language, but I am making an exception in this case.

Quit worrying about ridding the audiophile realm of assholes; take Bob Polins of Kent, Ohio, for example. It will never happen. Here are some reasons why it only takes a few "prick-like" individuals to give audiophiles a bad rap:

Some audiophiles (like Bob) only appreciate quality engineering, but they fail to appreciate the fine music that such equipment ultimately produces.

The empty space between the ears of some audiophiles (like Bob) becomes a cavity for standing waves to collect.

In logic, there are the concepts modus ponens (method of affirming) and modus tollens (method of denying); modus polins must mean "method of chauvinism."

Mr. Polins is definitely a true connoisseur of technology and wit; I label folks such as these as "assholephiles."

JA, I hope KW wasn't serious about quitting. KW, my wife has grown to appreciate audio each day, and you may be the person to draw her into the wonderful world of equipment reviews. Further, someone's got to help keep your other writers under control.

VON KENRIC KANESHIRO
[no origin given]

KW, whose quarterly "Getting Real" column made its debut last month, will be 'round for a long time, Mr. Kaneshiro.

—JA

WELCOME EVIDENCE
Editor:
Your addition of Class "E" in "Recommended Components" is very welcome evidence that a decent system need not cost $20,000.

JOHN MESSER
Salem, OR

Read Wes Phillips's review in this issue of the Arcam Alpha 5 amplifier for more evidence that high quality doesn't necessarily mean a high price.

—JA
PLATINUM. Pure, substantial, permanent.

Platinum's sheen personifies elegance rather than dazzle.

From English designer Phil Jones.

A new generation of loudspeakers conveying the emotions of artistry.
THAT RAT SHACK PLAYER

Editor:

This letter is in regard to the recent charade surrounding the Radio Shack Optimus CD-3400 portable CD player. The stir this has caused in the high-end community is quite phenomenal. In my opinion, however, it is also unfortunate, for two reasons.

The first is simple: The CD-3400 just doesn't sound that good. It might sound pleasing, at least at first, but it does not remain faithful to the original musical event in any way. Over some months, furthermore, we have seen Sam Tellig go from raving about the CD-3400 on its own, to hooking it up to the Audio Alchemy DTI and DST with an Adcom DAC (bringing the total cost of the system up to about six times that of the CD-3400 on its own), to plugging it in to a monolithic Scquerra power station that costs twice as much as the CD-3400. If the Optimus was so great to begin with, why should all these expensive modifications be necessary? It is almost as though ST has the high-end enthusiasm start with spending a little money, then a little (a lot?) more, and then more still. This does nothing to help the rebuttal against those who believe all high-end equipment is grossly overpriced.

The second reason, however, is much more important: The CD-3400 is not a high-end product. It is, ultimately, a fluke. A high-end product at this price point, in my opinion, is one that has been designed to sound as good as it can for the money and ultimately succeeds in doing so.

Do you think whoever designed the thing for Radio Shack had sound quality in mind? Hardly. However good the thing may sound, it does not deserve the kind of recognition it has seen in high-end journals, for the simple reason that it aspires to no type of fidelity. It is a plastic portable CD player with woeful reliability, a headphone output that ticks, an AC power supply that lacks a necessary heatsink, and a completely inadequate sales team (most Radio Shack employees have never heard of Stereophile, much less got wind of the review).

Unfortunately, the High End is continually under attack from mass consumer electronics and a public that is growing more and more ignorant of the beauty of well-reproduced music. Somehow, the CD-3400 has received more press than almost any other high-end product I can think of. Why? Does anyone realize that by the time the thing made it to its first "Recommended Components" it had already been discontinued?

Stereophile must not forget the fact that, in addition to being an objective reporter of the high-end audio industry, it is an advocate of well-reproduced music and the designers and manufacturers who aspire to bringing a realistic analog of the original musical event to our homes. Your concentration on the CD-3400 is unwarranted and, frankly, irresponsible. If you get any amateur to solder together a bunch of parts to make a DAC or a CD player, you will probably end up with one that does not sound totally offensive, much like the CD-3400. Does this serve rave reviews, and the inevitable public discussion and rush for the nearest Rat Shack? I don't think so.

I encourage Stereophile to continue to seek out giant-killers and other great products that sound better than their prices would indicate. But the CD-3400 isn't one of them—and it definitely should not be recognized as such.

DANIEL BAKER (dbaker@sas.upenn.edu)  
Philadelphia, PA

THAT VELODYNE REVIEW

Editor:

With reference to the letter from Velodyne in November's "Manufacturers' Comments" [Vol.17 No.11, p.251]:

When any advertiser in any media I have ever heard about buys advertising at a particular frequency level or volume business but doesn't fulfill the stated obligation, the media then "short rates" the advertisers and rebills at the correct rate.

The same thing here: you buy 11 eggs, you won't get the rate for a dozen.

KEN NELSON
Nelson & Associates, Yonkers, NY

Following the publication last June of our unfavorable review of their DF-661 loudspeaker, Velodyne canceled their advertising in Stereophile. In the letter Mr. Nelson is referring to, Velodyne's David Hall refused to pay the contracted additional amount due for their advertisements that had run in the magazine. I guess that teaches us a lesson. —JA

IS ANYONE OUT THERE LISTENING?

Editor:

As the #1 retailer in the US for a prestigious Japanese high-end manufacturer, I was amazed to read Ken Kessler's comments in August [Vol.17 No.8, p.36]:

"Lord knows that [the Japanese] have done more than anyone else to flush the concept of decent hi-fi down the toilet, lowering all performance standards (bar reliability) to a point where what they make barely succeeds in the most primary of its functions: making decent sound."

I was shocked to actually see in print the pan-with-extreme-prejudice policy of American high-end audio magazines regarding Japanese electronics, especially where there is heavy competition from American manufacturers: namely, amps, preamps, and DAC converters. My customers, most of them Stereophile subscribers and some of them Japanese, would like to know if this view is the result of ignorance or racism.

True, the Japanese made some poor-sounding—but-good-measuring electronics in the '70s (a practice, unfortunately, not uncommon in today's American high-end products); but, to quote the Duke, "Things ain't what they used to be."

Accuphase, the most prestigious of Japanese audio companies, manufactures only high-end products; however, most of the "mass-market" Japanese companies—such as Denon, Luxman, Onkyo, Sony, Yamaha, to name a few—make some incredible electronics that easily rival those from such reviewer-friendly American companies as ARC, Krell, and Levinson. Unfortunately, very few top-of-the-line Japanese electronics see the light of day in the US. One of the reasons for this unfortunate situation is now out of the closet. Perhaps this will help to change the status quo which harms not only the Japanese manufacturers, but also the stateside importers and distributors, the retailers, and, last but not least, your very own readers.

RICHARD DAVID KATZ  
President, Allegro Sound/AudioWorks  
Sherman Oaks, CA

This is a complicated subject, and I admit that Ken Kessler used a pretty broad brush in his condemnation of Japanese hi-fi. Japan does have its brands run by audiophiles dedicated to high-quality sound—Air Tight, Accuphase, Koetsu, and Stax come to mind at the sharp end of the market. But KK's comments stem from the sort of disappointment that, for example, I felt when I discovered my first Technics component that used a fiberboard base for its chassis.

—JA

VERBAL GYMNASTICS?

Editor:

Whoa! Whoa! Did I read that right? Namely in the review of the Air Tight ATC-2 phono stage in October [Vol.17 No.10, p.187], when TJN tested the very same unit that DO heard? Man! We're talking about 10 to 20dB shaved right off the highs! Did Dick Olsher miss that completely? How else could he gush, "...combined with the ATE-1, the ATC-2 offers musical nirvana," and "Folks, it don't get any better than this?" Looks like ol' DO is gonna have to
perform some mighty tricky verbal gymnastics to explain some serious auditory lapses—even my dear old great-granddad can hear a difference like that!

JAMES H. YIM
Berkeley, USA

No, Mr. Yin, I have no “Tricky Dicky” verbal gymnastics to offer in the way of an explanation. Instead, let me offer you a few straightforward thoughts that will hopefully resolve this apparently gross discrepancy between measurements and listening impressions.

Undeniably, the Air Tight ATE-1 phono stage showcases the midrange; it does this by restricting bandwidth in a manner akin to that of a single-ended tube amplifier. These amps often start rolling-off the treble around 12kHz, the effect resembling the natural treble rolloff one experiences live—at least toward the back of the hall, say in row M and beyond. Some years ago JGH elucidated his “down with flat” viewpoint, wherein he argued that a response flat to 20kHz is bound to sound unnaturally bright at the listening seat.

The ATE-1’s midrange rendition was decidedly vivid and liquid, and much more so than my reference, the Jadis JP-80MC. And that’s how I described its sound: warm and suave in the classical tradition of tube sound. That, for me, is musical nirvana. I should add that the designer of the unit opted for this sort of voicing. A minor change to the feedback loop lowers the output impedance significantly, but then the unit ceases to sound as liquid.

And just how much information are we really missing out on during vinyl playback with a frequency response that’s down about 10dB at 20kHz? Generally, there’s little more than HF garbage, cutter-head resonances, and other ultrasonic gremlins above 15kHz or so. Yes, folks, at my age anything over 15kHz represents ultrasonics. A limited bandwidth is generally a blessing for most analog front ends—especially those that are MC-based. The bottom line is that my description of the ATE-1’s sound should be taken as synonymous with and symptomatic of a limited bandwidth. What’s surprising is the extent to which the measurements bear this out.—Dick Olsher

The sound of the ATE-1 apart, both DT (and JGH in his “Down With Flat” article in Vol.8 No.4) seem to be missing the point: that to correctly reproduce program material that has rolled-off highs, you still need a system that’s flat to the highest frequencies in the audio range.

—JA

EXPERT TEASE

Editor:
Do you know how to stop a kid from masturbating? It’s easy: Hire an expert to teach him how. Experts are doctrinaire, evangelistic, perfectionist zealots. Once they start laying down the law on the way things should be, that field ain’t got long to prosper. Like in the noise game, where we’re holding symposia on why hi-fi is not a growth industry. The answer is obvious: too much expertise.

Not that experts don’t do great things. Thanks to the experts, we have absolutely marvelous sound equipment; unfortunately, it is almost totally unsuited to the real world. Other experts are reviewing this equipment, writing criticism that is proficient, adheres to high standards of integrity, and encourages the development of increasingly unsuitable products.

The experts are giving us such things as stunning speakers that have to be placed, toed, and tilted just so in order to sound right. In our living rooms, already filled with furniture, equipment, books, records, people, maybe even a baby’s playpen, we don’t have those options.

Experts advise us to take the speaker grilles off—in this world of children, pets, visitors, dust, bugs, housecleaners, et al. Experts maintain that speakers don’t sound right if there is an object between them. Real people know that, in this galaxy, it is invariably necessary to stick something between the speakers—like sofas, chests, and TV sets.

Experts say good things about a speaker with a top-firing driver, ignoring the law of physics that states, “any horizontal surface will be used to support a drinking glass containing fluids that will spill.”

Products such as these are so ill-suited to the world we live in that we should consider them prototypes for testing new techniques rather than finished consumer products.

Real-world people hear surround-sound in movie houses and kinda like it, so they come into a hi-fi shop, where experts heap scorn on them and tell them that people who like surround-sound are all co-educational matriculants who practice nepotism. Furthermore, they say, you can’t use the same system for both music and Home Theater, so go move into a house with two separate living rooms, and I’ll give you the privilege of buying from me the right system—music, that is, because I won’t sully my store with that Home Theater bogus. So the people go to a cut-rate chain, and we’ve lost them forever.

Experts also have the hots for gizmos that will make your system sound 2.37167302% better 4.76% of the time—unless it won’t. They neglect to mention that fiddling with these gizmos to improve your system is going to take up so much time that if you’ve got a job and a family and a life, and you want to spend what time you have left for listening to music rather than tweaking, you are well advised to wait a few months until somebody else proves that the gizmo is a hoax, possibly.

Tweaking? Let’s talk about tweaking. I don’t believe in the death penalty, except for three crimes: vandalism, talking in theaters and concert halls, and inciting to tweak. I performed my first tweak about 45 years ago when, on the assurances of erstwhile experts, I doused the surround of my 15” woofer with oil to make it more flexible. Eventually I realized that tweaking introduces unpredictable, uncontrollable, frequently irreversible elements into a system that are just as likely to degrade as upgrade. Tweaks are also dangerous in that they will improve some systems and harm others, and you don’t know which is which until fatally late. Further, if a tweak can be proven to be beneficial, the designer manufacturer has an obligation to incorporate it into the equipment itself rather than foisting that responsibility off on me; but if it isn’t beneficial, I’m better off without it. For these reasons, plus the fact that I’m older than hell and want to spend my time until my hearing totally goes listening to music and not fiddling with the damn set, I don’t tweak any more, and don’t much respect experts who support it.

Don’t get me wrong. Let me state for the record that I lust after equipment that will go from zero to warp speed in nothing flat. But it just isn’t feasible. Instead, I would appreciate some practical stuff designed to fit my needs.

For example, one thing I really need is a speaker that hangs up on the wall, near the ceiling; in my small, cramped living room, that’s about the only space I have available for an array of four speakers plus a woofer. The speaker should be designed so that I don’t have to spend days finding the best place for it but can just hang it in the most convenient spot and then adjust it by means of the remote control that does the electronic equivalent of placement, toe-in, tilt, even grille removal. Oh, and it should be wireless. What? You say asking for such a product is silly? You’re right; it’s probably just as silly as was the idea, 15 years ago, of a record that you play with a beam of light and program via a remote control.

We need experts. We need them to continue pursuing their impractical goals, but we also need some protection of them to confront reality.

Sterophile, you could start the ball rolling. You could get people thinking. Once
WINNERS!

The new B&W DM-600 and DM-610 monitors have received the highest accolades and rave reviews from the demanding British audio press.

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Most speakers that call themselves multi-media don't even deserve to be called speakers; while the hi-fi speakers worthy of their name won't function or even fit in most surround sound home theater, computer, MIDI or mini system applications. Celestion solves this dilemma elegantly with the Style Series; packaging their 70 years of loudspeaker experience in magnetically shielded, weather-resistant enclosures with universal mounting systems.

Where in your home will your new Style speakers sound the best? Wherever you want.

Celestion

The Difference is Fundamental.
you put your minds to it, you'll do a good job. You're not dumb, just misguided.

You could, for example, ask readers to send in scaled plots of their listening rooms. You could use the plots to set up some real-world listening rooms to complement those fabulous dedicated listening rooms of yours; if you do, you could test equipment under both ideal and real-world conditions. And you could share these plots with designers, so they could start thinking about how to modify their dream machines to fit into that impossible environment in which most of us live.

*Stereophile* might also start asking readers for ideas similar to my speaker system above. Many of the ideas will be on the level of *Audio's* L. Lerpa, but some will—I guarantee you—lead to practical results. (My second idea is for a device that will make modern violin recordings as emotionally involving as the old 78s used to be, and still are when transferred to CD. Isn't it a shame that Zukerman, Perlman, and stereo Heifetz sound more accurate but less realistic than Kreisler, Szigtai, and early Heifetz?)

Experts are all right—we need them. It's not their fault that things have gotten out of hand; it's ours for letting them lead us here. To set things right, we need to start nudging hi-fi, experts and all, back to the real world, with all its inherent hostility to the reproduction of lovely noises.

Paul A. Alter
Hyattsville, MD

**IRONY**

Editor:
It's said in the film industry here that no one in Hollywood understands irony. After reading Beth Jacques's "correction" of the name of Not Drowning, Waving (October, p.257), I wonder whether she's in the right industry.

Graham Thorburn
Sydney, Australia

**ULTIMATE**

Editor:
Right now I'm listening to Beethoven's String Quartet 16 in F, Op.135, by the Guarneri Quartet.


I much prefer the older RCA recording, because in spite of a much higher noise level (weird hums, low-frequency background rumble, buzzes), it sounds warmer and more natural to me. It's less echo–ey.

Is there anybody else on staff who knows what I'm talking about?

Ambience and long decay can be good—I like Stereophile's Poem CD and the cuts on the two Test CDs—but for a string quartet, I like it dryer.

I also like Glenn Gould's recordings for their directness and clarity—it could be that my thinking in this regard is similar to GG's (not bad company). Why don't you guys do an article on the late Beethoven quartets as part of your "Building a Library" series? These quartets, with the Grosse Fuge, would be a great starting point for an uninhibited listener who only listens to jazz or modern stuff (especially the second movement of Op.135 and the Grosse Fuge, with their rhythmic drive). These late quartets influenced modern composers, too.

Later, dudes.

William Robinson
Gatesville, TX

**ATTITUDES**

Editor:
I have subscribed to and enjoyed *Stereophile* and its High–End Audio Shows for about seven years. I have never written to you, but there's a first time for everything! I am compelled to respond to a letter in the September '94 issue from Dr. Ralph Piencing [Vol.17 No.9, p.12], who is canceling his subscription partly because of his frustration regarding the repeated use of technical terms and descriptions in the magazine, as well as the lack of background articles "that [attempt] to bring the novice up to speed on basic electronics and acoustics." Dr. Piencing has had decreasing enjoyment of the magazine as a result of "not having the foggiest notion of what the writer is talking about," and not having the time to teach himself the basics. All this is made worse by the "very condescending manner" in which one is treated by the local "high–end" dealer if one is not up to speed on this fund of knowledge. Lastly, he shares the feeling that "a lot of audiophiles are basically a bunch of snobs" with "an attitude of exclusivity."

I am a full-time emergency physician with a 55–60–hour work week—a light schedule compared to some I know. I have no formal background in electronics and acoustics. In addition, the majority of patients I treat also have no formal training in medicine, do not have the time to learn the basics, and struggle to varying degrees in their attempts to understand the nature of some of their ills. Although physicians do not expect their patients to be "up to speed on the basics," too many of them become indignant when asked for an explanation of a diagnosis or procedure. Some can become blatantly condescending and pejorative. Alas, a few are so arrogant as to feel that they are members of an elite and exclusive fraternity. As many physicians view the "ER doc" as an undesirable and irritating orphan in the aristocracy of medicine, I can assure you that I have been subjected to the same attitudes. Trust me on this one—I know of what I speak.

The very attitudes decried by Dr. Piencing have contributed to some of the troubles in which the medical profession finds itself today. After several years of successfully attending the WCES, two *Stereophile* Shows, and assisting friends in their audio purchases, I have not run into these negative attitudes among audiophiles. Dr. Piencing—are your observations really a mirror reflection?

Gary M. Flashner, MD
Wapwallopen, PA

**A BUNCH OF SNOBS?**

Editor:
I've had it with MDs.

As a practicing pharmacist and an audiophile, I could not help getting a good chuckle at Dr. Ralph B. Piencing's letter to the editor in the September issue (p.12).

I can't believe that any MD would have the gall to call audiophiles "a bunch of snobs." After dealing with MDs five days a week for 11 years, I can honestly say that they are the biggest snobs of all. They all have their God complexes, and feel that if they didn't say it, it can't be true!

As for audiophiles keeping their little fraternity elite, when is the last time you knew of somebody who's not an MD being asked to join the AMA, or when is the last time you heard of one doctor turning another in for incompetence?

From the amount of time I spend waiting on hold to talk to MDs (mainly to correct their mistakes), I would certainly dispute Dr. Piencing's claim that he simply doesn't have the time to read materials to educate himself on electronic nuances.

Brian Cocks
Arroyo Grande, CA

**MODERN TIMES**

Editor:
I am sad to report that Gilbert Morrison, 40, a Detroit–based "by appointment" and "mail–order" audio dealer since 1986 and a frequent advertiser in these pages, was found murdered in his home on August 26, 1994. The method of this murder, reported nationally on CNN, is another sad story of our violent times. It is inappropriate and irrelevant to discuss the brutality that Gil endured in the final minutes of his life.

The murder remains unsolved, despite
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the best efforts of the many friends Gil made during his 15 years on the force. There were no signs of struggle, and the iron gates in Gil's home makes forced entry unlikely. Incidentally, no property was stolen, but every panel and window of his 1994 Supra Turbo ($47,000) was smashed with a blunt object, and the interior was extensively shredded with a knife.

To those remembering Gil, he was an audio dealer in love with music first, followed then by the equipment. I remember his discovery of Tony Bennett, and his amazed enthusiasm for the artist. However, this discovery was not in 1993, like that of MTV, but in 1989! In his over-2000 disc collection there were many similar rare and obscure musical joys undiscovered by other audiophiles.

Gil also loved being on the cutting edge. Finding the latest tweak to improve his demo system—whether it was a cable, connector, or new preamp—gave him great joy, which he enthusiastically shared with his customers. His efforts to modify crossovers of early Apogee speakers to increase their neutrality is just one example of trying something different to improve the listener's musical enjoyment.

For those inclined to show their respect, I encourage you to make a contribution in his name to The Absolute Sound's Fund for Recorded Music. Gil would have liked that; maybe a musical piece dedicated to him in the attainment of nonviolence would please him as a fitting requiem.

Name and address withheld by request

P.S. The audio vultures have already circled, looking for equipment steals. Please stay away; nothing is available.

IN MEMORIAM

Editor:
By this letter we would like to inform you of the tragic death, in a car accident on July 14th, 1994, of Mr. D. Zaimis, co-founder of the Greek loudspeaker company Analysis.

Mr. Zaimis designed and contributed to the realization of the first bipolar speaker in Greece. His products have been highly acclaimed both in Greece and abroad, receiving favorable comments in Greek, English, Italian, and French hi-fi magazines.

We kindly ask you, as a small tribute to his memory, to include this letter in one of your forthcoming issues.

Thanking you in advance,

C. LAMBROPOULOS
D. LYKOURRESSIS
Athens, Greece

ANALOG RULES, OKAY?
Editor:
Your words to Nick Valkans in the April '94 issue: "One subject and a simple direct argument: That's the kind of letter that gets published." Well, let’s see.

We all know that music is an analog waveform, don't we? So why do we spend our time, money, and efforts on a sample or bit of the real thing? Let's make great analog and be true to the music and the people who make it.

JOSEPH P. BRANTNER
Roseville, MN

VINYL RULES, OKAY?
Editor:
In response to Bernard Holland's “The LP: A Crayon for the Mind” article in October '94 [Vol.17 No.10, p.77]: Bullshit for the hearing impaired!

With no disrespect to those with impaired hearing, I suggest that Mr. Holland or anyone owning an operational analog front end may modify even a budget-priced analog system into the most expensive, high-end digital sound system with the following simple procedure:
1) Place Daphnis et Chloé, or any vinyl record, on the system;
2) Turn the volume up to the loudest level the system can maintain without grossly distorting;
3) Go directly to the bedroom (the placement of the ears, either in direction or location, is not a significant variable for this upgrade);
4) Close the door;
5) Close your eyes and revel in the emitted blare.

BILL HELMICK
Irvine, CA

REBIRTH OF THE LP
Editor:
Chad Kassem's "Manufacturer's Comment" (September 1994, p.187), wherein he replies to JA's July 1994 "As We See It" editorial, prompts the following observations. (This is also a reply to an article by Trip Gabriel in the "Arts and Leisure" Section of the Sunday, July 24, 1994 New York Times, which doubtless has been read by many interested parties in this ongoing LP debate.)

There are three important points which Mr. Kassem and others overlook in their positive picture of the "rebirth" of the LP:
1) The prices for most of these LP reissues (or occasional new recordings) range, on average, between $15 and $30. Mr. Kassem's own Acoustic Sounds company is no exception to this high pricing, which is beyond the considerable price of CDs. (Honorable mention for reasonable pricing goes to Mosaic Records; see next point.)
2) These records are mostly reissues—which is a limited, though certainly valuable, service to music-lovers. The little new music available on LP tends to be by performers who are marginal either artistically or commercially (ie, in terms of reasonably wide name-recognition).
3) The sources for these "new" LPs are almost exclusively mail-order, with a nod to the occasional high-end audio store that may sell a few. They are most emphatically not to be found in the large chains like Tower Records and HMV, let alone the mall record shops. The general record (ie, CD- buying public has no knowledge of these LP issues, would not be interested in +$15 LPs, and has no turntables on which to play them.

All of the foregoing points to the conclusion that the LP rebirth is essentially a retrospective movement aimed at specialist groups: audiophiles and collectors (particularly collectors on the "object" side of the spectrum, as often distinct from music-lovers) able or willing to spend the rather high sums these premium reissues demand. These crucial aspects should therefore be taken into account in any discussion of the LP renaissance.

ERIC HUNTER
Cambridge, MA

There is some evidence, however, that it is Generation X who is discovering vinyl—Pearl Jam LPs, for example, selling faster than the CD version.

JA

WHY NO WATTS?
Editor:
I have just received Vol.17 No.10 and have spent several hours absorbing the contents. I always look forward to Stereophile and never fail to learn something. I have used your magazine as a guide in reviewing and selecting my system. I own Wilson WATTs/Puppies, a Krell KRC, a Krell KSA-100S, and Proceed PDP 3. Also, I use MIT cables, interconnects, and line treatments (Stabilizer, Strip, etc.). My system is gratifying.

I would like to express an opinion on something that came to mind while reading this issue. First, I would like to quote a statement that Martin Colloms made in his letter in October (pps.23-27): "The purchaser of last year's Class A component does not appreciate being told that a later offering is so good as to render his purchase obsolete in musical terms. Moreover, this is patently untrue."

I was bothered when I found that my Wilson WATTs/Puppies were no longer considered to be Class A because they were being replaced by the yet-untested,
The people who make the world’s best speaker are no slouch when it comes to CD players, amplifiers and preamplifiers.

The Quad ESL-63 loudspeaker is so famous many people forget that Quad knows how to build more than speakers. For instance, Ultra High Fidelity Magazine called the Quad 67 CD player so musical that “it couldn’t do better if it had a degree from Juilliard.” The 306 and 606 amplifier use unique current dumping technology other companies have tried to imitate and failed. And the model 66 preamplifier offers not only great sound but a remote control that is unmatched in its ergonomics. And of course every piece sounds good enough to be used with the world’s best loudspeaker!

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yet-unreported-on Puppy 5s. This does not make sense to me. A Class A product—especially Wilson WATTs/Puppies—is a Class A product, regardless of its age. Why did the Krell KSA-250 amplifier remain on your Class A amplifier list while being replaced by several new models? Are you saying that the Wilsons are inferior to all other speakers rated in “Recommended Components,” regardless of the Class? Or are you saying that, because you can no longer purchase new ones, that they will no longer be rated by Stereophile?

I would also like to point out that the Wilson WATT/Puppy continues to be the most sought-after speaker among audiophiles throughout the world. After owning a pair for over a year, I can truly understand why. Nothing that I have heard—including Avalons, Martin-Logans, Thiels, Sonus Fabers, Maggies—comes anywhere close. I would like to point out that used WATTs/Puppies are bringing top dollars. Of course, my opinion is totally subjective, as is yours. But here again, it is not my magazine, is it?

Again, thank you for the enjoyable material that you provide, and please keep politics out of Stereophile.

ROBERT L. BEDWELL
Wayne, PA

WHAT, NO WATTS?

Editor: I had the pleasure of meeting Larry Archibald at the Mexico CES on October 5. I took him to task for Stereophile's unfortunate “Recommended Components” omission of a product which, better than any other, defines “High-End.” Because our encounter was so brief, I offer Larry and Stereophile a more detailed statement of my point: Stereophile loses credibility and damages its reputation for integrity when it attempts to punish (or, in Larry's words, “motivate”) manufacturers for failing to accommodate Stereophile's schedule for product reviews.

The product is, of course, Wilson Audio's WATT/Puppy loudspeaker system. The Series 5 WATT/Puppy was introduced at Stereophile's own High-End Show in Miami to rave reviews and "Best Sound at the Show" (although many who visited Peter McGrath's showroom to hear Wilson's X-1 Grand SLAMM voted for it). No other loudspeaker in any price range (except, perhaps, Wilson's own X-1 and WAMM) does so well everything a speaker should, regardless of the type of music: holographic soundstaging; effortless dynamics; detailed, transparent imaging; fast, tight bass response; aesthetic beauty; and build quality. Since its introduction, the WATT/Puppy has been the reference against which other loudspeaker systems are measured.

I challenge you to find an issue of Stereophile over the last several years which fails to mention this product several times. Each new series of WATT/Puppy has improved on the last, and, from what I've heard in person and from friends who've spent more time with them than I have, the WATT 5/Puppy 5 clearly surpasses the already superb Watt 3/Puppy 2.

Larry's response in Mexico to my point was two-fold: first, Stereophile cannot recommend a component it has not reviewed, even if the component in question is a series improvement to one previously recommended (thus, the WATT 5/Puppy 5 was not eligible for the list); and second, Stereophile will only recommend components its readers can buy (thus eliminating the previously recommended WATT 3/Puppy 2). I find his response disingenuous, given Wilson's track record. When was the last time Stereophile found one of Wilson's series improvements to be less satisfying than the previous? Furthermore, Stereophile seems to have had no qualms listing Digital Domain's VSP Model S as a Class A D/A converter without a full review. As for the second part of Larry's response, WATT 3/Puppy 2s are still available: I noticed two advertisements in the "Recommended Components" issue for used WATT 3/Puppy 2 systems—no doubt offered by owners wishing to upgrade to series 5 or to the X-1.

Whatever Stereophile's reasons, the best high-end loudspeaker system is not now a recommended component. This result challenges the credibility of Stereophile, and devalues the "Recommended Components" list.

While criticizing "Recommended Components," I add two other regrettable omissions: the Theta DS Pro Generation V and the outstanding Spectral DMA-180 amplifier. I can't imagine what Class A means for D/A converters unless the Theta is included on the list. As I recall the review of the wonderful Mark Levinson No.30, the Theta Gen.III was the reference against which it was measured. I even recall comments to the effect that one reviewer actually preferred the Theta on balance. Why is the improved Theta Gen.V not a recommended component in any class?

As for Spectral's products, I have heard that Rick Fryer chooses not to contribute his products free of charge to reviewers. Stereophile assumes a big responsibility to its readers when it purports to classify high-end products on its "Recommended Components" list. Part of that responsibility is to comprehensively and thoroughly assess mainstream high-end products, even if it means paying for a model to review. After all, did Radio Shack donate the portable Optimus CD-3400 to which Stereophile dedicated tens of pages in several issues, and which is listed as a recommended component? All reviews I read indicated that the reviewers bought their own models. Why doesn't the same standard apply to a product which has achieved the undisputed excellence of Spectral?

I recommend a re-evaluation of your editorial policy relating to "Recommended Components," and a re-thinking of Stereophile's manufacturer relationships. If, for legitimate timing reasons, you have not reviewed a series improvement to a component previously listed and which would still qualify for the list if it were current, the previous series should remain on the list with a comment that a series improvement has been introduced, but not yet reviewed. This change would avoid a loss of credibility such as that occasioned by the WATT/Puppy omission. Rather than feuding with manufacturers and trying to punish or "motivate" them to supply you with their products for review, Stereophile ought to swallow a little pride and take a little initiative to ensure that it meets its mandate to comprehensively cover high-end audio.

While my letter has been critical, let me assure you that I am a loyal Stereophile subscriber. I've already ordered my ticket for the High-End Show in Los Angeles next April.

D. KEITH COMBS
San Francisco, CA

WHY NO WADIA?

Editor: I would like information on how Stereophile chooses equipment for review, as it seems to me that the choices you make are, on occasion, strange. For example, all models of the Krell pre- and power amplifier range have been reviewed, as have all models of the ProAc Response range of loudspeakers; yet your magazine hasn't reviewed any equipment by Wadia for years.

The digital reference used by a number of your reviewers, including yourself, is the Mark Levinson No.30/31 combination, yet no comparison has been made with this product against any of the Wadia range. I would appreciate it if you would review the Wadia 6 and 16 as a comparison with real-world equipment that people like your readers use, who, unlike
Now That You See How They Work, Hear How They Feel.

If you're using a digital music source, such as a CD, nature dictates that you transform the bits of information into analog waves.

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your reviewers, have to pay for their purchases.

T. R. BELL
Victoria, Australia

Our omission of reviews of Wadia products concerns us. Unfortunately, the principals at Wadia have major problems with Stereophile's philosophy, as expressed in reviews. They therefore don't feel it appropriate to submit products for review. Spectral's Rick Fryer also does not wish his products to be reviewed by Stereophile, hence the non-appearance of Spectral components in "Recommended Components." This does not mean they are not recommended; only that none of us has ever heard them under familiar circumstances.

It should go without saying that "Recommended Components" cannot include components we haven't heard. Though Mr. Coombs and Mr. Bedwell argue to the contrary—that we should take note of a company's pedigree—this seems fundamentally unjust: well-established companies would get their new components recommended automatically, while new, small companies would not. Even if 100 revisions of the WATT had previously made it into "Recommended Components," that is no guarantee that the 101st, unheard, would get an automatic listing. I prefer our policy of ignoring everything but sound quality, which mandates our auditioning everything we recommend—almost always in the formal context of a review.

In the case of the Digital Domain VSP, although Robert Harley's full review didn't appear in print until November, I auditioned it extensively in my own system and felt it worthy of the Class A rating. At the time of compiling October's "Recommended Components," no Stereophile contributor had heard the WATT/Puppy 5 (or the Theta Generation V, for that matter) under familiar circumstances. Robert Harley is currently working on a review of the Theta, while Wes Phillips is eagerly awaiting the installation of Wilson WATT/Puppy S5 in his system.

As we have stated many times in the past, Stereophile's "Recommended Components" does not include discontinued components (though we have sometimes continued a recommendation when the manufacturer concerned has assured us that the component is not discontinued, despite evidence to the contrary). When I compiled the October list, I was under the impression that Wilson's WATT 3/Puppy 2 had been discontinued in favor of the WATT/Puppy 5. In a phone call in October, David Wilson assured me that this was not the case, that the WATT 3/Puppy 2 was indeed still available. In any case, Mr. Coombs misrepresents our policy when he says that we "try to punish or 'motivate'" companies to supply us with products for review by dropping discontinued products from "Recommended Components." When we do drop a product, the manufacturer works hard to get another product to us in time to be included in the next listing, as not to do so would be commercially damaging. It's as simple as that.

—JA

THE SINGLE-ENDED SAGA
Editor:
I read with interest the continuing saga of Martin Colloms and single-ended triode amplifiers. For my part, I was prompted to reply to Martin's "Follow-Up" in October, because he was panning the enthusiasm of Sam Tellig and Dick Olsher for the sonic delights they each heard: Martin was reacting to this philosophically. In this case, the Carys, I believe, do rate the accolades bestowed upon them, as they are not just a little bit "better" than their pentode/sold-state/push-pull triode competition—they are really audibly different. They are the most musical amplifiers I have ever heard.

Martin is probably right that such amplifiers are probably not for everyone, but I have hooked up my 805s to a double pair of KLH Nine speakers with very satisfying results. The Nines, as everyone knows, are difficult to drive. Given the need for power, the McIntosh MC-275 is probably a better match, but the Carys deal a backhand.

Where they really shine is in driving horn-loaded speakers (I can see Martin
rolling his eyes). I have two horn systems in my house, and both are musically impressive. The first is a pair of JBL Hartfields, which I have tuned with a \(\frac{1}{2}\)-octave equalizer; I also plan to substitute a Bruce Edgar Tractrix midrange horn for the original. The second is a modified JBL C-50, originally designed for audiatoriums; I've incorporated a pair of JBL's constant-coverage bi-radial horns (#2360A) in the midrange (same compression driver, the 2446J). These horns are enormous, but are staggering in their ability to re-create every microscopic nuance of music. The resulting high end is airy, smooth, three-dimensional, effortless, non-strident—we're talking horns, guys!—simply breathtaking!

Using JBL E130s as woofers (these are high-efficiency speakers of low cone mass), the bass horns come alive. You do need a big room so you can stand back (listen back), but the Carys are an absolute necessity to achieve the glorious sound. Incidentally, JBL makes this stuff available through their "Professional" line; you have to build the C50s yourself (a fun project). The first point is, Martin, there are speakers "out there" which match well with the Carys (and other single-ended triode amps). Second point is that properly designed horns can be very persuasive. Here'sy.

Of the Carys offered, I believe the CAD 3005SE to be the superior sonically. The CAD 805s are more powerful, but the 3005SEs are smoother, more natural, quieter, less forward in perspective (obviously, my horns don't need help in projection). I have a pair of each. The 805S are also hum-prone, which is a nuisance with high-efficiency speakers.

I guess we can agree that we need more higher-efficiency, high-impedance speakers on the market to take advantage of the sonic qualities of single-ended triode amplifiers. It's exciting to rediscover the past! Richard S. Loveland Cannon Bluff, VA

Let your readers in on the facts

Editor: The criticism of the subjective wing of the high end does not stem from a contempt for the intelligence or sincerity of its reviewers. Rather, it is stressed that the opinion of one reviewer, no matter how articulate his pronouncement, cannot form the basis of a general recommendation or repute of a product. John Atkinson surely understands from reading the world's audio press that journalists have contrary opinions on products, some of which have been reviewed in his magazine. Does this make a product bad, or does it indicate that one reviewer is a liar? Of course not. It does teach us that one opinion is not significant unless a manufacturer or retailer needs a sales spurt.

Mr. Atkinson understands that many engineers and other knowledgeable listeners have markedly different views on the sonic footprint of a given electronic device. No matter how he dices, slices, or reconstructs his defenses, his opinion is no more valid than that of any other of the legion of audio scribes. While his reasoning is uncommonly well-formulated, he's offering nothing to sink one's (wisdom) teeth into. An opinion, unless outrageous, is irrefutable. The less technically grounded readers are merely regurgitating to each tough question, "Well, Stereophile sez ..."

Simply put, if Stereophile is claiming that its reviewers best express truth due to an inherent superiority of its staff, then there's a problem of arrogance (unless this crew of pro listeners can prove a unique ability to find truth). Letters earlier in the year from Russell Reich and Tracy Bayer clearly expound upon this position. Through it all, Mr. Atkinson has merely reasserted the tautology that he'd do nothing that wasn't kosher, since he elects only the highest unbiased ethical standards—ie, he believes his opinion is valid.

This issue has yet to be addressed honestly by high-end publications, which must, by their very nature, be the arbiters of what constitutes quality sound. It is these subjective ruminations that form the core—the heart and soul—of a magazine like Stereophile. The good work—essays, technical hypotheses, record reviews, and letters—are still at the periphery of the journal's landscape. The long strings of words reconfigured month after month do nothing to clarify the issue. Ms. Bayer is correct in hinting that a strict lock-step process takes the place of informative discussion. I observe a hierarchy of products that is magazine-specific. It's often been said that these belief systems are the kissing cousins of religion.

It is this difficulty with subjective proclamations that the mainstream commentators find to be insurmountable. The objective camp simply resists any temptation to assert the significance of small differences that may or may not be important to other listeners. When someone notes that "Stereophile loved a product" or "Stereophile sez it's the best," he is really noting that one (or, rarely, two) reviewer(s) wrote an opinion. They write under the banner of Stereophile. There is no listener named Stereophile...

For all we know, Stereophile's crew may disagree about many components, as they do in the accursed blind tests; printing one review (space compels this format) then gives a false impression of even one magazine's judgment. If readers were aware of all of the subjective opinions about a single piece of equipment, they'd often throw up their hands. The impression of a basic uniformity is dishonest, Mr. Atkinson. It's probably good for circulation, though.

Of course, a magazine must have reviews if it is to be published. There is a problem, Mr. Atkinson, when a small, like-minded group is hand-picked to further one dictum to the exclusion of others. This isn't a journal of political opinion, some National (Audio) Review; it is allegedly discussing objective and repeatable events, and even hard science. Many claim that the High End incorporates a far wider range than this magazine expresses. Instead of reacquiring the Pied Piper for your audience, why not let your 70,000 readers in on some of the facts?

Rusty Empaynado
Rego Park, NY

Stereophile publishes opinions, Mr. Empaynado, of as wide a range as I can find, but opinions nevertheless— with all that that entails. As editor, I guarantee my readers that the opinions we publish are a) honestly arrived at, and b) neither censored nor bulldozed. The truth will emerge from the consensus or conflict of those opinions. The following letters respond to points I made in my August "As We See It" essay on why Stereophile doesn't use blind ABX tests to reach its value judgments. I believe my position is clear, so I don't intend to add anything more here, other than to add some corrections of fact to Mr. Huff's letter.

I do note that there is a hidden agenda in this discussion. Audiophiles like Mr. Empaynado above and Yip Meng Meng, Reggie McConnell, and Mark Huff below are looking for objective validation of what must remain a purely subjective phenomenon—whether or not someone likes what a hi-fi component does—meaning that no common ground can exist between us. Nothing I can say will change their a priori assumptions, their belief structure; conversely, nothing they say will result in Stereophile ceasing to publish opinions in which its contributors believe. If I responded to Mr. Huff's challenge and scored a significant result, which I and others have done in such tests in the past, he and his cohorts would insist that the tests were flawed, which is also what happened in the past. (See the "lucky

1 Take, for example, a small "budget" British converter that his ace digital reviewer has raved about. As the editor surely knows, several UK magazines have been clearly negative on this product.

Stereophile, December 1994

WorldRadioHistory
LONG-TERM BLIND LISTENING

Editor:
I totally disagree with Robert Harley that blind testing hides differences. Long-term blind testing is the only acceptable way to evaluate audio components. It is similar to long-term sighted listening, minus the visual identification of the product. It's the same procedure as long-term sighted listening, except that the reviewer does not know what component he is reviewing until after the writeup. It eliminates subconscious bias and gives the evaluation a greater degree of authority and respectability. The only hitches: it's tedious, expensive, and impractical to carry out. If you don't agree with the above, I would like to know why.

Yip Mang Meng
Singapore

REX ABX

Editor:
Among the unpublished Mother Goose's Tales are a few dealing with scientific topics that were thought to be of little interest to tiny tots. One, however, "The Leader Misled," or "Rex ABX," may be of interest to Stereophile readers. For their consideration, it is here reproduced for the first time.

Once upon a time, there was a princess who couldn't decide which of two princes to marry.

"Oh, how am I to choose?" she questioned her advisor, the wise man. "I fear that the wrong choice will cause great sorrow."

"I know precisely how you can make the right decision," assured the wise man. "You will choose a husband by using the double-blind test. It's even better than reading lamb's livers. It's scientific!"

So the test was arranged, and both the princess and the wise man were blindfolded, for he was to conduct the test. The princes—who by this time were very confused, because they didn't understand science—were labeled "A" and "B."

"I think 'B' smells a little nicer," said the princess at the beginning of the test, "and I'll rate him an 8.7 on the odiferous scale."

"Very good," said the wise man. "We're headed toward the truth."

"But 'B' is a little too salty," noted the princess a bit later. "So I'll give 'A' a 9.1 on the taste scale."

"Excellent!" intoned the wise man. "And on the touch scale," said the princess toward the end of the test, "I'll give 'A' a 9.6. He's so round, so firm, so fully packed."

"Wonderful!" praised the wise man. "The double-blind test, which removes misleading personal bias, proves that you prefer prince 'A.' He will be your husband."

And so they married; but they did not live happily ever after. Day by day, the princess grew disenchanted with prince "A." Prolonged exposure to him revealed objections that had gone unnoticed during the double-blind test.

"His dynamics are docile," sighed the princess, "and his phase is shifty. Living with him has taught me sad wisdom."

Finally, the princess and prince "A" were divorced—an event that saddened everyone in the land.

And the wise man was heard to admit, "Personal choices cannot be assured in minutes. What the hours may suggest will be confirmed only by the months. At his limit of knowledge—which comes all too quickly—the wise man declares uncertainty." And therein lies a moral.

LEWIS COOPERSMITH
Philadelphia, PA

LIVING IN A SKINNER BOX?

Editor:
Chuck Butler's restrictive definition of
McIntosh THX® Components.

To call them “Home Theater” would be false advertising.

When McIntosh set out to design a Home Theater System, we had to answer to two masters: the stringent Dolby® and Lucasfilm™ requirements as well as our own 44 year tradition of the most exacting standards for high fidelity music reproduction.

The resulting components startle everyone who hears them: Not only are movie soundtracks reproduced with unsurpassed precision and accuracy; the overall fidelity is among the best you will hear in any theatrical venue.

Equally surprising is that genuine, American-built McIntosh Home Theater Components cost the same or little more than run-of-the-mill systems. So you can enjoy realistic Home Theater and still afford a home.
What box.

Only a few experimental psychologists—presumably those studying rats or pigeons—remain as respectable practitioners of science. I have given some thought to how an intelligent human being could hold such a view of the world, and have concluded that Mr. Butler must live in a Skinner box.

Herbi Barringer
Kaneohe, HI

Missing the Points

Mr. Butler’s interesting letter in August 1994 (pp.17–23) regarding the experimental methods of the behavioral sciences, and their possible application to the evaluation of high-end audio equipment, regrettably missed the crucial point. What is being evaluated is not the outcome of a set of electrical features (the circuit) per se as a physical consequence isolated from the process of listening. What concerns us is not the degree of “accuracy” supposedly inherent in the equipment reviewed, but rather its sonic effects in the listener who reviewed it. It is not possible to analyze the “accuracy” of the component apart from the subjective listening experience of the sound as perceived by the critical listener or reviewer, and the belief in this perception implicit in this experience. The listener’s awareness is a constituent part of the process which determines the quality of the sound.

Although it is an evident truth that, as Mr. Butler states, audio equipment does not create something new or unique in the sense that works of art do, it does induce an aural experience (sonic and musical) in the listener of what obviously is a reproduction. This experience is related by the listener to the equipment, and is rated accordingly as good or bad, better or worse, from the standpoint of his past experiences and present expectations. Such a situation constitutes an aesthetic experience in which judgment and taste—educated taste—are put into practice.

It is equivalent to the assessment of literary or artistic criticism, and not a matter of measurements. What is involved here is a semantic analysis of the aural experience which not only does not exclude pleasure (an integral part of the aesthetic experience), but recognizes that pleasure is, in fact, a constitutive element of said experience insofar as it ultimately explains it. The description and evaluation of this experience in order to fully grasp its reality cannot be carried out with the help of the experimental methods of science—in this “Verstehenwelt,” they are irrelevant.

The instruments a good critical listener or reviewer needs to be able to communicate with his fellow audiophiles (through Stereophile, if he belongs to the happy few!) are: a delicate ear that allows him to exactly perceive even the most minute details; an extended practice in concert-going; some expertise in discerning and comparing audio components; a perfect knowledge of his hi-fi system and his own prejudices; and familiarity with audio jargon and the general rhetoric of the field.

Reviewing equipment is, therefore, not a branch of an experimental science, or a technical procedure of measurement, but, in a certain way, a hermeneutical task—an interpretation of a complex aural experience related to a piece of audio gear performing in the context of a given system, rendered by a connoisseur for the entertainment and amusement of other connoisseurs and loose aficionados. That is all.

José Belaunde B.
El Escorial, Spain

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AXSS

Stereophile, December 1994

WorldRadioHistory
LISTEN TO THE UNEXPECTED.

“...Regardless of where we stood, the presentation of voices and instruments remained stable and the tonal balance correct... (with the SS-M7ES, Sony) has achieved an unqualified success...”

Barry Willis, Sterephile
"Vol. 17. No. 8, Aug. 1994

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PROBLEMS OF PERCEPTION

Editor:
Perhaps the value of double-blind testing is not quite so much a matter of mere “belief” as John Atkinson suggests (“As We See It,” August 1994, p.3). Two considerations, I think, could move it a bit closer to the realm of “fact.”

First, it is hardly an arcane notion that long-term perception is apt to differ from short-term perception when the thing considered is subtle or complex. Not only are the elements of a complex thing perceived at different times, but the emotions that greet the same stimulus can change dramatically in time—witness the divorce rate.

Fatigue, for example, which occurs in the long term, is apt to be absent at first. I assume that psychological literature contains experimental data confirming this “common-sense” observation. Why, then, doesn’t Stereophile consult members of the psychological community to find someone to assemble and republish some of this data?

Second, since those who best know audio equipment are its designers, why doesn’t Stereophile ask as many design engineers as it can reach what type of listening tests they employ and, in particular, their views of double-blind testing?

I suspect that the results of these two not-too-difficult inquiries might have something to add to the double-blind question that is not merely repetition.

LEWIS COOPERSMITH
Philadelphia, PA

PLACEBOS, PROTOCOLS, & PSYCHOLOGY

Editor:
Noticing that the subjective/objective debate continues in the pages of Stereophile, I’m wondering if I might shed light on one fundamental problem with double-blind testing that seems to go more or less unrecognized.

Perception is an activity which, in order to reach maximum fruition, depends upon the continuous exchange of information, ideas, and emotion between the conscious and unconscious portions of the mind. Said another way, there is continuous “crosstalk” between differing levels of consciousness, and full power of perception is contingent upon this phenomenon.

To illustrate this idea, I’ll start by pointing out that the placebo effect has conclusively proven the profound and far-reaching effect the unconscious mind has on physiologic function. Double-blind protocol arose out of a very real need to empirically establish the purely mechanistic effect a given chemical substance will have on a given human subject in certain given conditions (such as disease). In order to do that, the continuous interactivity between conscious and unconscious processes has to be interrupted in the subject under test—hence, the double-blind protocol. And, of course, standard double-blind tests are invaluable in this regard.

The problem in applying this protocol to tests of perception is that perceptual activity is primarily psychological in function—as opposed to physiological. It seems self-evident, and it should be fairly easy to show empirically, that the full activity of human perception depends upon the interactivity of conscious and unconscious processes. And, if so, severing this vital internal link with the blind method becomes highly suspect in the testing of any type of perceptual activity—including the activity of critical and/or aesthetic listening to music.

In short, blind testing cannot be an adequate method for the testing of perception. The logic of the preceding theorem would mean that perceptive function is simply not whole under these conditions. And if this theorem can be shown to withstand closer scrutiny, one disturbing question is raised: Do we yet
have a scientific method for the testing of perceptive activity?

I believe, along with many audiophiles, that the answer to that question is, unfortunately, no. This may well be the very point that many so-called objectivists would prefer not to be the case.

**Dave King**
New York, NY

**PATRONIZING & PRETENTIOUS**
Editor:
I was not impressed with the letters (August 1994, pp.15–23) of Paul Fargostein and Chuck Butler. They write very well, but their thinking is not nearly so clear. Mr. (Dr? Prof.?) Butler’s letter is pretentious and patronizing, as well.

Mr. Fargostein recycles the old analogy between blind tastings of wine and blind audio–listening tests. Unfortunately, he omits one crucial difference that invalidates this analogy: the audio objectivist school insists upon a randomized, quick-switching, double-blind technique known as ABX, whereas blind wine tastings employ a repeatable, single-blind testing method. There is no randomization of tasting. Wine tasters always have the glasses of wine in front of them, and therefore always know which particular glass is being tasted, although the identity of the wine is not known. Thus, the taster can accumulate information on any given glass (wine) by going back to it any number of times. This enables tasters not only to differentiate between the wines, but to describe them as accurately as their palates and experiences permit.

I wholly approve of this method, to obviate any bias that might be caused by wine reputation or price; as the old saying goes, a glance at the label is worth a lifetime of experience. Moreover, this is all that is really necessary. Suppose some bizarre method were devised so that the taster be blindfolded and presented with only one wine at a time, to be sniffed away after a brief period and replaced by another randomly selected wine (after the initial wine had been put back into the selection pool), and the process repeated until all the wines had been tasted. I would not be surprised if the beleagured taster could not discriminate consistently between a Gallo Hearty Burgundy and a DRC La Tache or anything else. The frustration might even drive one to drink. Yet this hypothetical scenario essentially describes the sated ABX double-blind listening tests that the "objectivists" advocate with such fanaticism.

I was impressed by Mr. Butler’s lucid exposition on the Scientific Method, but in the end this appears to be little more than gamesmanship, because his conclusions are no more "scientific" (Holy, Holy), and therefore [no more unassailable, than any other reader offering opinions on a topic outside his personal field of professional expertise. Did it ever occur to him that a "normal" testing method (double-blind experiments) devised for research in medicine and psychology might not necessarily be directly applicable, a priori, to the entirely different field of audio–component reviewing? And why is the single-blind testing method occasionally practiced by Stereophile for loudspeaker reviews not scientifically valid? I suspect that the real answer to the latter question is that the objectivist establishment has given its cachet to the ABX randomized quick-switching test, and will not tolerate dispute from mere laymen. "Technologists," Mr. Butler condescendingly calls us.

Mr. Butler asserts that any differences in the sound of audio components not large enough to be detected by double-blind testing are therefore not significant, but then fails to tell us what his scientifically determined threshold for significance is. That would have been most useful. But he really gives the game away in his last two paragraphs, in which he claims to have found "substantial" differences in the sounds of separate recordings that use the same orchestra, conductor, hall, and recording engineer. Did you find these significant differences were produced by scientifically rigorous double-blind testing that you performed, Mr. Butler? (If so, where are your data?) Or are they based on casual, subjective, and unscientific listening sessions with your home stereo system—just like all of us "technologist" rabble? As you say, "an effective argument can never be considered a substitute for good data." That goes double for ineffective arguments, Mr. Butler.

Well, I don't have any scientific data—good or bad—either, so I will never convince the objectivist crowd. But for you, esteemed editor and dear reader, how about another glass of single-blind testing?

**Malcolm G. Balfour**
Acme, PA

**THE FINAL LETTER**
Editor:
After reading Chuck Butler’s letter and John Atkinson’s “As We See It” rebuttal, I have the following five points to make:

1) Mr. Butler’s letter on Stereophile's review methodology was superb—I agree wholeheartedly with it. This well-written missive is the best piece I’ve seen in Stereophile in some time;

2) Mr. Atkinson rebuttal was as seriously flawed. “The Blind, the Double Blind, and the Not-So-Blind” merely obfuscates Mr. Butler’s points. Examples of confused reasoning by Mr. Atkinson include the following:

**MAKE THE CASE**
Editor:
Paul Fargostein got it right about in your July issue (“Letters,” p.15). It’s time the lords temporal at Stereophile put up or shut up. If wine critic Robert Parker can correctly identify the first growths of Bordeaux in a blind—there’s that word again—tasting, it shouldn’t be much of a task for Robert Harley to differentiate between the $400 Marantz CD-63 and the $10,000 Micromega Trio.

If he could demonstrate this ability (with his system), say, 8 out of 10 times, it would go a long way in restoring some credibility to subjective reviewing. If he cannot, we are left with two possibilities: 1) Mid-fi has caught up with the High End, rendering the latter a poor investment for, oh, 95% of your readers; 2) You guys have been having us on for too long. Great work if you can get it.

In JA’s huffy replies to Chuck Butler in August [Vol.17 No.8, pp.3 & 23], I find it curious that he should express annoyance at Mr. Butler’s returning to an “eternal topic”—ie, double-blind testing. Need I remind you: It’s your readers’ fascination with current themes—analogs vs digital, tubes vs solid-state, the merits of classical vis à vis rock, etc.—that has enabled Stereophile to retain and expand its core readership. Aren’t you a bit guilty of biting the hand that feeds? JA asked Mr. Butler why he bothers to read Stereophile when it is obvious he lacks faith in Stereophile’s value judgments. I, too, am not a little dubious about your reviewers’ alleged abilities to split fine euphonic hairs. But I continue to buy Stereophile, Mr. Atkinson, for one very good reason: entertainment. Stereophile is fun to read! You are to be commended for assembling such a fine collection of free spirits. In so doing, you have put your competition in permanent retreat.

That said, I find your policy of over-emphasizing the importance of mere opinion, in the absence of any objective validation, untenable. The overkill tune is one you can use on occasion, but you shouldn’t play it like Ravel’s Bolero, if you see what I mean. Sooner or later one must drop the pretense, and, in the words of your illustrious music critic, make the case.

**Reggie McConnell**
Terre Haute, IN
Rotel is not a typical audio company. Unlike the corporate giants of the audio industry, Rotel is a family owned business. We don't make video recorders, bread makers, or electric pianos. Instead, we have spent the last thirty years building high fidelity components that meet two rigorous criteria — musical accuracy and honest value. While we benefit from low-cost production in our own Asian facilities, our design work remains in our R&D facilities in Britain, where an audiophile pursuit of perfection is a passion. ■ Rotel engineers are, first and foremost, music lovers who labor over their new designs like proud parents. They listen to the results, then tweak and adjust until the new product meets exacting musical standards. ■ All Rotel products are truly built from the inside out using premium parts. Components are hand selected for their sound quality and built by industry leading suppliers around the world.

RB990. "Peak current output was 211 amps, almost twice the value of any other amplifier in this survey! To use the term coined by Consumer Reports, this is a Best Buy."

The Audio Critic (Aug 93)

"The 990 is yet another triumph for Rotel, proving once again that the ear is mightier than the slide rule spec in delivering music for the dollar."

IAR Hotline (Jun 92)

RB980. "The inexpensive, frill-free Rotel doesn't fall short of the mark when it comes to playing music. It lives up to its promise of power, but its capacity for blood and thunder doesn't make it an amp that impresses solely with its weight. It's bony, but also involving and musically revealing."

What Hi-Fi? (Sep 93)

"...the RB980BX proved to be one of those products reviewers dream of...more than just another modestly priced amplifier, competent but uninspiring. The Rotel...got up on the high-end high-wire without a net — and performed."

Thomas J. Norton, Stereophile Vol.15, No.11, Nov. 1992

RCD965LE. "Sound quality was superb...Clarity, transient detail, and high-level punch all were exemplary. In short, Rotel's RCD-965LE clearly delivers CD sound that approaches the highest standards of the day, for less...substantially less, in some instances...than many competitive alternatives."

CD Review (Jan 94)

"...every aspect of the '965 has been optimized with a single goal in mind — sound quality. It is this preoccupation with the finest detail that is reflected in the player's overall performance. Nothing, but nothing, has been left to chance."

What Hi-Fi? (Dec 91)
Jadis... Legendary Quality, Legendary Performance

Jadis components are known throughout the world for their functional elegance and unmatched standards of musicality. From investment-grade build quality to sheer magical performance, Jadis delivers designs of timeless beauty and enduring value.

Experience the music...experience Jadis
• Mentioning the debate between "objectivist" and "subjectivist" viewpoints. This is irrelevant and something of a red herring. Mr. Butler never claimed that measurements define performance or denigrated the importance of listening; rather, he pointed out that reviewing equipment in the casual, non-rigorous manner typical of Stereophile reviews is sloppy, Big difference.

• Claiming that blind tests are invalid because they are "difficult to properly organize"—then lauding the loudspeaker survey appearing in the same issue as "organized in a superbly effective manner." Nobody said that arranging blind tests is a simple exercise; only that the results are far more reliable than those of casual listening. [Stereophile's blind tests should only be considered in the context of the complete reviews, which contain sighted listening. That they are well-organized does not mean they are complete in themselves.—Ed.]

• Saying that, because music changes with time, one loses "judgmental bearings in a blind test." (What, exactly, does that mean?) Stereophile always listens to and reviews components using music. Since when did this pose a problem? [In a typical ABX test using music, you audition "A" on a trumpet, "B" on a cello, then have to choose whether "X" is "A" or "B" while a choir is singing. You can rapidly lose your bearings compared with an artificial test signal, which stays the same throughout the comparison. But using the artificial test signal is itself a significant additional variable.—Ed.]

• Arguing that blind testing involves an "unnatural" degree of stress, nullifying testing results. Yes, blind testing is exhausting and stressful. No, that does not mean that conclusions reached through casual listening are more reliable. Stress can be, if not eliminated, at least reduced by permitting an individual to be tested using familiar equipment and by allowing listening of selections as often and as long as wished before deciding whether X was A or B. After all, is writing a review under a looming deadline without stress? [Stress nonetheless remains an interfering variable and cannot be argued out of existence.—Ed.]

• Asserting that there are instances in which double-blind tests did not reveal audibly different differences which did exist, and concluding that blind tests are "not very sensitive." I can cite many more cases in which tester bias affected the results. Perhaps a single trial wouldn't prove anything, but if you rigorously test what you believe you hear with ABX trials, your conclusions will carry far greater weight.

3) Mr. Butler's two main points are irrefutable. To wit,

• Stereophile employs non-rigorous testing methodologies, leading to invalid or unreliable results.

• Stereophile readers depend on your magazine to guide them in the selection of audio equipment.

4) I challenge the reviewers of Stereophile to participate in and publish the results of a rigorous blind, if not double-blind, listening test of audiophile-quality amps or preamps. Volume levels must be adjusted to within 0.1dB each other, and the components cannot be driven into clipping. Use any equipment (your own reference gear to compare, say, KEF or Audio Research monoblocks vs Pioneer or Yamaha components). Listen as long as and to whatever you wish, then identify the component. Finally, note the results. Shouldn't be too hard to thus silence your critics. Then, employ blind tests in all your reviews. If audible differences exist (and if they are audible, they are therefore significant), one should be able to continue identifying them without the brand labels showing.

5) The quest for truth ought to be the key goal, transcending "belief systems." If I don't have confidence that Stereophile reviewers can consistently and repeatedly identify products from quite disparate origins and price-ranges—the most gross determinations—how can I trust reviewer comments concerning subtleties? Stereophile reviewers often compare the sound they hear with what they heard months ago. Given the short memory of audio by human beings, such comments are ludicrous. Listening is important, but before waxing poetic on the bright new vistas created by the latest gear or tweak (green ink on CDs comes quickly to mind), why not rigorously test if one really heard a difference, or whether that difference quickly evaporated like a Saharan mirage? Thus far, Stereophile has shirked its responsibility to seek the truth, printing conclusions supported by anecdotal evidence that is often colored by the placebo effect.

Mr. Atkinson rather peevishly asked Mr. Butler, "And why do you continue to read Stereophile if you are convinced that our value judgments are of no value to you?" My response would have been that I enjoyed the Stereophile CD, "Industry Updates," and in-depth loudspeaker reviews. Regrettably, as I have tired of skipping past countless pages describing ephemeral subtleties of various components I'd never heard of, have no opportunity to audition, and couldn't afford, I am allowing my subscription to expire. I hope someday I have reason to reconsider subscribing to Stereophile.

MARK HUFF
Washington, DC
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US: Kristen Weitz
Dealers promoting manufacturer and designer seminars should fax me (don't call) the when, where, and who at (505) 983-6327 at least eight weeks before the month of the event—is, if you're putting on something in February 1995, you should get the information to me by December 1, 1994. Mark the fax cover sheet "For the attention of Kristen Weitz—Dealer Bulletin Board." Promoters of Hi-Fi Shows and audio societies promoting manufacturer visits should also fax me the details as soon as possible.

California: On Wednesday January 25 at 7pm, Sound Factor (17265 Ventura Blvd.) will present Bright Star Audio's Barry Kohan, who will discuss and demonstrate their Isolation Series of vibration-control products. A Big Rock III isolation platform will be given away as a door prize. For reservations, please call (818) 501-3548.

At 6pm on Saturday December 3, Randy White and Peter Welpston of White Audio Labs will hold a seminar at Bel Air's Ambrosia Audio (2337 Roscomare Rd., Suite 6). For more information, please contact James at Ambrosia Audio, (310) 440-5522, or Peter at White Audio, (806) 748-0270.

On December 10, Elite Electronics of Cupertino (20325 Stevens Creek Blvd.) will sponsor a symposium with Richard Vandereest, who will discuss the topic "Can a High-Fidelity Music System Serve as a Home Theater?" Exciting new products will be unveiled at the event. Call (408) 996-2400 for details.

Florida: Boca Raton high-end/Home Theater retailer Stereo Shoppe (279 N. Federal Highway) has added a second store at 5446 W. Sample Rd., Peppertree Plaza, Margate. Various seminars and demonstrations are planned for upcoming months. Call (305) 969-2550 for more information.

North Carolina: On Wednesday November 30, Audio Advice (6701-101 Glenwood Ave., Raleigh) will hold a seminar with Transparent Audio's Doug Blackwell. Time is 6pm—8pm. Seating is limited, so call (919) 881-2005 for reservations.

Singapore: The Singapore Audio Video Exhibition (SAVE) International '94, organized by Inkwell Publications, will be held December 1-4 at both the Raffles City Convention Centre and the Carlton Hotel. The objectives of the show will be to introduce and establish new models locally; to help facilitate a healthy interaction between distributors, manufacturers, and enthusiasts; to encourage people's interest in the hobby; and to showcase a wide range of home audio and video equipment, including AV and multi-room systems, and esoteric audio equipment. SAVE International will be the first such exhibition to be held at two venues—44,000ft² total. The Exhibition, the first and only show to be promoted by the Singapore Tourist Promotion Board, will host 80 popular brandname exhibitors from Europe, the US, and Japan, and will receive maximum publicity in the major newspapers, including a supplement in The Sunday Times. The $8 entrance fee is good for both venues, and includes a copy of the high-end industry's first Diary/Directory. For more information, contact Inkwell Publications Pte., Ltd., 366A Changi Rd., Singapore. Tel: (65) 344-3866. Fax: (65) 344-5880.

Tennessee: On Thursday December 1, 5pm—7pm, Underground Sound will hold a seminar in their recently renovated Memphis store (2125 Central Ave.) with Transparent Audio's Doug Blackwell. Seating is limited; call (901) 272-1275 for reservations.

Virginia: On Tuesday November 29, Gifted Listener Audio (5720 Pickwick Rd., Centreville) will present Transparent Audio's Doug Blackwell. Reservations are required, so call (703) 818-8000 for information and directions. On December 9-10, Audio Dreamscapes (7434 Richmond Rd., Williamsburg) will present Marc McCalmont of MACH 1 Acoustics, with his well-reviewed DM-10 loudspeaker and the new M-Series loudspeakers. This will be the first of a monthly series of seminars. Seats are limited, so call Shayne at (804) 989-5842.

US: John Atkinson
We reported earlier in the year that amplifier manufacturer Threshold had been purchased by an investment group headed by Randy Patton and his wife Linda. Randy had been one of the partners in PS Audio, and it was announced in late October that Threshold had acquired PS Audio. PS will have moved its production facilities to Threshold's Sacramento base by the time you read this, and Mr. Patton, who becomes PS Audio's President, will direct the marketing activities and oversee the general management of both companies.

In other news, McCormack Audio announced in October that amplifier designer David Reich was to join them. David, who was the "DR" in Classe's original line of amps, will work on new product development under head designer Steve McCormack. McCormack has also recruited mechanical engineer Steve Elliott, who worked for several years at Counterpoint.

US: Peter W. Mitchell
Didja ever have one of those days when everything just seems to go wrong? When no matter how hard you try, you just can't please anyone? The EIA executives who manage the Summer Consumer Electronics Show may be feeling like that. In recent years, videogame companies Nintendo and SEGA have become by far the largest exhibitors at CES. When these companies objected to the late-June scheduling of the 1994 Summer CES, the EIA responded by moving the 1995 Show to May. Exhibit facilities in Chicago, where the CES had been held every June for 25 years, were already booked up for next May, so the
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WorldRadioHistory
EIA moved the '95 CES to Philadelphia. At this first plan seemed to be a success: Nintendo promptly signed up to be the largest exhibitor at the '95 Philly Show, reserving 32,000ft² of exhibit space to launch its new "Ultra 64" game systems.

High-end audio manufacturers wanted no part of this "CES Interactive," so they are planning a separate Specialty Audio and Home Theater Show for next June that would continue in Chicago where the '94 CES left off. [The Palmer House hotel is being mootted as a possible site.—Ed.] Then, as J A noted in the September 1994 Stereophile (Vol.17 No.10, p.59), the Philadelphia Show waters were muddied by the launch of a competing Los Angeles Show: the Electronic Entertainment Expo, scheduled for the same May 11–13 slot as the '95 CES. When the Interactive Digital Software Association (a videogame trade group) endorsed the LA Show, exhibitors began signing up for LA instead of Philly. In the final blow, Nintendo withdrew from the May '95 CES and joined the LA Show. With too few exhibitors left to put on a major Show, the EIA gave in and canceled the Philadelphia CES. "Reschedule our Show in 1995 to 1996," was how EIA/CEG vice president Gary Shapiro phrased it.

With the main part of the EIA Show dead for '95, only one part of Summer CES may remain: the proposed Chicago Show featuring high-end audio and video. The very first CES, in the late '60s, was mostly about hi-fi and television, so the official death of the '95 CES, coupled with the possible survival of the high-end Chicago Show, may be seen as a temporary return to the true audio/video roots of CES. In any case, manufacturers will have two other opportunities to show off their best audio and video gear: Hi-Fi '95, Stereophile's High-End Show in L.A. at the end of April '95; and the late-summer CEDIA (Home Theater and custom-installation) show in Dallas the following September.

Incidentally, the first Mexico CES took place in October—see the reports elsewhere in this "Update"—and was an immediate success, with about 150 exhibits and 14,000 attendees. The EIA promptly began planning for a follow-up Show at the same Mexico City locations for October 1995.

Japan: John Atkinson
According to industry newsletter Audio Week, tape manufacturer TDK announced in late October that it plans to develop next-generation, write-once, high-density recordable CD (HDCCD-R) in 1995. The TDK recordable CDs will be based on the dye technology used in current CD-Rs, and will feature the same 1.2mm substrate as CD and CD-R, but will be capable of being read by the new short-wavelength solid-state lasers. This use of existing technology could endow the discs with intrinsically low cost compared to Matsushita's proposed alternative phase-change technology. The driving force behind the development of HDCCD-R is to provide a digital video disc capable of higher quality than the White Book—compatible Video CDs.

US: Richard Lehner
Randall Fostvedt died in his sleep on September 10, 1994, in New York City, at the age of 41. Randy had worked as Nimbus Records' Press Representative for the past two-and-a-half years. Peter Elliott, Vice President of Nimbus, said that the cause of death was AIDS.

Randy Fostvedt came up through the ranks of concert production, artist management, and record producing. In the '80s, he produced concerts at Carnegie Hall, the 92nd Street Y, and the Kennedy Center. He represented Ivan Moravec, Albert Fuller, Rosalyn Tureck, and Stephen Hough, worked with Minoru Nojima and Reference Recordings, and, before accepting his post at Nimbus, produced recordings for the Dorian label by Moravec, Julianne Baird, Robert Stallman, the Baltimore Consort, and Jean Guillou.

Although I never met Randy face-to-face, I spoke with him many times over the years as he fulfilled his many and overlapping duties. In a field rife with hype and overbearing personalities, Randy Fostvedt was always soft-spoken and gentlemanly. I will miss his reasonable voice.

US: Peter W. Mitchell
Four updates to stories in recent issues:
1) The BBC's digital broadcasting experiments in London (mentioned here last July, Vol.17 No.6) were successful enough, according to Audio Week, that the BBC has committed to a September 1995 launch date for regular digital-radio service, transmitting at VHF frequencies just above Channel 13 in the US. After the London launch, other transmitters will be built to cover major highways and other British cities, eventually growing into a nationwide, single-frequency network that will be receivable nearly everywhere in England, with no need to retune the receiver.

2) Re-quantizing processors (Sony's Super Bit Mapping, Apogee's UV22, and DG's "4D" system) begin with 20-bit (or more) signal sources and convert to a 16-bit signal for CD release. But recording the original 20-bit signals has been problematic; most digital tape machines are limited to 16-bit data. November's "Industry Update" (Vol.17 No.11) mentioned that in order to handle 20-bit codes, studios have been using experimental code-splitting devices that record part of each digital code within one track's 16-bit capacity, record the remainder of the code on another track, and then reassemble the complete 20-bit words in playback before decoding. These devices, such as DG's Authentic Multibit Transcryptor (sic), were custom-made to work with the $25,000 digital multitrack recorders found in large studios.

Good news: The new Prism MR-2024T interface brings this word-splitting capability down to a much more affordable level. It accepts 20- or 24-bit signals via AES/EBU or S/PDIF connections, and reformats the codes for recording on a Tascam DA-88—a popular, low-cost, eight-track digital recorder that employs Hi8 (8mm) videocassettes. The Prism offers a choice of four tracks of 24-bit, six tracks of 20-bit, or eight tracks of 16-bit recording. A similar product has been developed by Rane. With these devices, 20-bit recording may quickly become commonplace.

3) The rapid decline in the pricing of blank CD-R discs has continued. CD-R blanks from TDK now retail for just $12/disc. Call (800) 272-2591 to place your order.

But if CD-R discs are ever to become a popular recording medium, rather than being confined mainly to professional recording studios, the cost of the machines will also have to drop from the present $3000 level. Pioneer, JVC, and other manufacturers have introduced new CD-R recorders, complete with the SCMS copy-control circuits that are required by US law for all consumer-grade digital recorders. If enough people buy these machines, the efficiency of high-volume production could push prices down to half the present level in a couple of years. But two important factors may prevent CD-R from ever becoming a popular medium:

First, a conventional CD is a molded plastic disc with a reflective aluminum or gold coating, so it's relatively perm-
Looks can be deceiving. Things may not be what they seem at first glance. The Mark Levinson No. 38S stereo is no exception. Its design is simple and elegant, and the No. 38S preamp presents a unique appearance. However, this simplicity is deceptive. Inside lies a multi-layer circuit board, each circuit on its own plane. The result is a high-quality, low-noise amplifier that is as good as any of its competitors. The No. 38S gained the reputation of being one of the best preamps in the world. It is no wonder that many audiophiles choose it over other amplifiers. The No. 38S is equal to the best of its class and makes a noticeable difference in sound quality.
Japan

Juarez, opportunity and difficulty from netting up to the size of the building. Most cameras, video equipment, and audio products now cost much more in Tokyo shops than in New York or LA.

Second, CD-R is a WORM (write-once, read-many) format. Unlike every tape-recording system, a CD-R disk can be recorded only once, and the recording must be error-free; it can’t be edited, revised, or erased. CD-R could be an effective medium for making archival recordings of live concerts, but it’s less practical for studio recordings for which multiple takes may be required. The best use of CD-R is as a copying medium. If you make or edit original recordings on DAT or on a computer hard-disk editing system, a CD-R duplicate of the finished recording provides the convenience of being playable on any ordinary CD player. In other words, CD-R is a “prosumer” medium—Sony’s word for people who bridge the gap between consumer and professional markets.

4) In the September ’94 Stereophile (Vol.17 No.9), I discussed some implications of the changing dollar/yen exchange rate. I mentioned that Sony was one of a handful of Japanese companies that have been keeping US prices low, even at the risk of sacrificing profits, in order to dominate the market—for example, to maintain Sony’s lead as the largest supplier, by far, of CD players of all types. But lately this policy has begun to bite, and Sony raised some prices during the fall. Meanwhile, financial reports from Pioneer disclosed that, while the company’s overall sales for this year increased from a year earlier, Pioneer’s net profits declined by 95%.

Other Japanese companies face similar difficulty competing in the US market. One result: a real-estate boom around Mexican border cities Tijuana and Ciudad Juarez, where Japanese manufacturers are rapidly building factories and training workers to assemble products at low cost for North American sale. Back in Asia, many companies that are managed in Japan are moving their manufacturing facilities to low-cost Singapore, Korea, and mainland China. If this trend continues, in a few years the “Made in Japan” label could be only a memory.

In the old days, if you ever got an opportunity to travel to Japan, you could purchase many products at marvelous discounts in Tokyo’s Akihabara district or the comparable section of Osaka. But no more. Manufacturers may be willing to sacrifice profits in order to compete in the US market, but not at home. Most cameras, video equipment, and audio products now cost much more in Tokyo shops than in New York or LA.

Mexico: Julio Lamadrid

There I stood in the eye of the storm, watching from the middle something we’re used to watching from a distance: a Consumer Electronics Show. I felt I should act as Tlacuiloto (the official storyteller from our ancient Aztec culture), ready to give testimony to the new discovery: a new and unknown world receiving a group of modern conquerors fighting between them to win an almost virgin market, trading their advanced goods for gold, silver, and money.

In this case, the electronic equipment they brought might be thought of as the equivalent of the mirrors and fancy fake jewelry of the past, although some of the goods were far from what we received some 500 years ago.

It is amazing for us Mexicans to see how close we are to the US, yet so far, since Americans look at us as if we were from Jupiter. Some of you are full of misconceptions about my country. Remember that Mexico leads the Latin American market for a reason—we are not the savage people many believe us to be.

The first CES Mexico was a fairly big show, with some 400 exhibitors settled in the two pavilions of Mexico City’s Palacio de los Deportes (a basketball stadium built for the 1968 Olympic Games). I was curious to participate in a real international show, where you could find a nice blend of Mexican and American exhibitors (and some Canadians as well), in roughly equal proportion. It was open to a large, eager, furiously hungry group of attendees—all joined together by common hobbies and interests—looking for knowledge, new products, new technologies, and new faces.

It was a real challenge for the CES organizers, since many major Mexican electronic-equipment importers, including Sony, Philips, Panasonic, Pioneer, and Hitachi, chose to watch the first CES Mexico from the outside. I was dubious about what attendance would be, because the event was being held during the week: Tuesday, October 4th through Thursday the 6th. Besides, it was scheduled to run only five hours a day—from 9 to 9pm. Would attendees still crowd the Show? Well, they did—every single day.

The nonparticipating companies had suggested that a Trade Show was of no use in Mexico, since the small number of retailers is already widely known among the major importers. And CES also happens to be dedicated to “the Trade only.” I’ll buy that for a big, mature, healthy market like that in the US, but Mexico is only a newcomer in these matters.

It was very nice to see the enormous public interest in some US brands, and to discover that many attendees, while not being such fluent English speakers, were expending great effort to communicate with the foreign visitors in what has been growing as the universal language. It was even better to see some distinguished foreign personalities speaking Spanish, such as Brad O’Toole (Wilson Audio Specialties), Liz Jensen (Madrigal Audio Labs), and Larry Archibald (you well know what flag he carries).2 [LA’s thoughts on the first CES Mexico follow next—Ed.]

But not everything was beautiful. First, the Palacio de los Deportes was not within walking distance of the Ramada Inn Hotel, where all the high-end exhibitors were. Although a common requirement for regular US CES attendees, first-time Show participants weren’t too pleased with the necessary bus ride. Parking at the Ramada, which housed only 21 exhibits, was limited, cost money, and always full. It seems to me that the CES is not taking proper care of the High End.

Considering that Mexico is such a young, fresh market, it was interesting

2 The Mexican audience was so overwhelmed at seeing such big names as Bill Conrad, Ray Kimber, and Larry Archibald that these luminaries were continuously interrupted as they walked the Ramada’s halls.
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to confirm that the average person was easily able to tell the difference between mere hi-fi and actual high-end products, and to fairly evaluate and understand the correspondent price gap. There were also some highly prepared visitors, as knowledgeable as the best anywhere. 

As expected, Home Theater was hot. In that department, Martin-Logan introduced their rear- and center-channel speakers, and Klipsch displayed a complete set of surround-sound loudspeakers for US$1000. Audiorama, a Mexico City distributor, displayed Runco projection systems together with the Wilson WATT/Puppy 5s. The Carver room contained a smaller version of the Creston smart-touch intelligent remote control, and Celestion showed their Home Theater line in active mode.

Back at the Palacio de los Deportes, at the Sistemas Maxson booth, Vidikon showed the very expensive HD-4.8 together with the Captain W-VHS HDTV videocassette player. In the same pavilion, at the Ampliaudio booth, Harman/Kardon introduced their Home Theater projection systems containing twin line-doublers and JBL speakers. The better television sets were looking for attention; we spotted Proton at the Ramada and Pro-Scan at the Palacio de los Deportes pavilion.

Sala Chopin passively displayed the new Proceed Home Theater line—namely, the PAV THX processor and multi-channel amplifiers, which look as nicely made as the rest of the Madrigal Laboratories product line. I can't tell you about their sound, but they should definitely meet THX expectations!

The high-end section at the Ramada was always so crowded that it was difficult to get into certain rooms, or even to walk in the hall. There seemed to be no more than a handful of rooms, offering a small number of different products.

While the quality of sound in the average room was fairly good, all suffered from bass overload because of the rooms' small size and very stiff concrete walls. Take the Audiorama room, for instance, by far the best-sounding room of the Show. Wilson WATT/Puppy 5s, Conrad-Johnson Premier Eight monoblocks, and Linn digital gear. Brad O'Toole cheerfully greeted people at the door, inviting them to listen to a very nice-sounding system that had texture, pal- pability, delicacy, and presence. It made some attendees cry, “I'll kick my speakers when I get back home! I need to ask Santa to bring me the Wilsons for Christmas!”

Most of the listeners attributed the good sound to the Wilsons, but I discovered that the big Conrad-Johnson monoblocks were linked to the WATT/Puppy via the most expensive MIT cable. When I asked William Conrad (of Conrad-Johnson) what their secret was, he just said that every piece in the system was well-integrated—the Eights weren't the only strong influence.

Mr. Gustavo Cota, owner of Audiorama, President of the Asociacion de Electronica de Consumo and the oldest member of the Mexican high-end community, was conducting the sessions in the Audiorama room at a very enthusiastic and entertaining pace.

The high-end section was always so crowded that it was difficult to get into certain rooms.

Sala Chopin exhibited in two rooms: one with Theta Digital's Basic transport and Generation III DAC, Audio Research LS-2B and D-electronics, and the slim Thiel CS1.5 loudspeakers; the other had an entire line of Mark Levinson electronics (No.31 transport, No.38 preamplifier, and No.235 power amp), and Thiel CS3.6 speakers. Both rooms sounded good, with great focus and soundstaging. The Thiel CS1.5s, nicely fed by the ARC-300, were among the most popular speakers in their category.

Margules Audio, the only Mexican manufacturer of high-end tube power amplifiers—which themselves might be considered an adventure, but not when you listen to their small, monoblock, class-A triodes—got nice sound with an Oracle turntable and the newest Gold Aero product: a phono-stage preamp—摛 made without a single tube! The sound of the new phono preamp was impressive with the Margules monoblocks. By the way, Margules has developed a servo control circuit that automatically and perfectly maintains the tube's bias out of the box, and gives the user the alternative to change output tubes (KT88s, KT99s, EL34s). You can also switch between triode and ultra-linear configurations. The speakers were Sonus Faber's Electas, everything connected with Vampire Wire. The open sound had good transient response. Music sounded better on LP than on the Linn CD player—it seemed to me that they just worked better altogether. The little 60W monoblocks are very promising, Laura Hendershot and Michael Elliot of Counterpoint had a room to themselves in support of Alia, their new Mexican distributor, who next door was showing Counterpoint together with Muse and Sonus Faber speakers. On display was the very impressive Muse 18, which was almost able to simulate the catastrophic earthquake we suffered some nine years ago! Kevin Halverson of Muse explained that the 18 was named that because the subwoofer is linear down to 18Hz.

The Canadian company Mirage, headed by Anthony Mosley, was displaying their new active subwoofers (one per channel) with an interesting idea: the two drivers are mounted on each side of the cabinet so that panel resonances will be canceled.

The British Celestion company, back from a fairly long period of commercial absence, exhibited in the Equipos y Cintas room. Linked with Onkyo electronics, they displayed their typically attractive sound.

One room reminded me of the original sound of the '60s, with Lownter loudspeakers and Audio Note amplification. Do you remember when you lived with very-high-efficiency loudspeakers and a tube amplifier of 9W or so?

In CAV's room, Linn Products from Scotland were doing a fine job of promoting their interesting and growing line of modular speakers and components. You can start with a basic Linn configuration and expand it with better amplification and active cards for the loudspeaker's crossover. They also had a show every morning where they looked for the oldest playable LP; the winner was someone who had brought an almost-brand-new 1945 album!

Peter Qvortrup of Audio Note and Larry Archibald headed an informal improvised panel to which some English-speaking Mexican audiophiles were given the chance to pose some interesting questions. Larry was on the money when he pointed out that the Mexican market will be very important in about five years; but to get there, it will be necessary to reinforce the effort being made by the importers and high-end magazines such as Audio Vision (my own magazine) and, of course, Stereophile.

Mexico: Larry Archibald CES Mexico, organized and sponsored by the USA's EIA/CEG, was my first Spanish-spoken hi-fi show—other than our own Hi-Fi '94 in Miami last April,
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with its significant Spanish-speaking population—and it took place in the largest city in the world.

Mexico City—or México D.F. (Distrito Federal), as it’s known in Mexico—is situated in a high bowl, 2800 meters (9200') above sea level and surrounded by mountains. Were you to be blessed by a clear sky—a more and more rare experience these days—you could look down from the top of one of those mountains and easily see a population about the same as that of all of Canada! Although Mexico City is known worldwide for its unbelievable traffic problems and consequent air pollution, it is also a bustling city of 18-22 million inhabitants—most of them employed, most of them housed, and most of them getting something done every day.

On hearing of a city of 22 million people, one conjures up an image of unimaginable slums, extraordinary crowding, and abject human misery. The reality is different. Mexico City is, in fact, much less densely populated than any of Japan's big cities, or the central sections of most US cities. It is polluted, but, in most of the places I traveled through, the pollution was remarkable more for its consistency and omnipresence than for its intensity. And although many of the people I met expressed casual cynicism about the city's problems, I found abject misery in only one place, albeit a very big one: Valle de Chalco, where 500,000 of the city's poorest residents live.

Few US tourists visit Valle de Chalco. I did so only because a college friend of mine, who lives 40 miles south of Mexico City in a little Aztec town called Tepoztlan, works at a community center and school in Valle de Chalco. V de C is built on the lakebed left behind when, at the turn of the century, one of Mexico City's remaining lakes (in Motezuma's time, the city was basically one big lake) was drained to create fields for grass and agriculture.

In the late '70s, people began settling this section of town. Unfortunately, as Mexico City pumps more and more water to satisfy the needs of its growing population, the lakebed drops in elevation where buildings have been constructed. A complete explanation of the problems of Valle de Chalco is beyond the scope of this article, but imagine a sea of concrete-block buildings gradually sinking beneath the powdery surface of the ground. A fair portion of that ground is airborne in response to government trucks rumbling through the neighborhood, bringing tons of dirt to put beneath houses under construction so that they'll start out at higher elevations before their inexorable descent toward the lakebed. The trucks, the traffic, the dust, all add to the city's background pollution—-I've never seen a more graphic peace-time depiction of Hell. Still, many people's spirits survive, miraculously.

Other than my twice-daily bout with Mexico City’s traffic—no matter where you’re going, an average trip seems to take no less than an hour—the first CES Mexico provided no other reminders of Mexico's First-World/Third-World duality: it was First World all the way. Show headquarters were downtown at the Presidente Intercital Continental, near Mexico’s fabulous Museum of Anthropology (a must-see if you're in town). The Presidente was the site for several seminar/workshops held each morning of the Show's three days (October 4-6), in spite of its location 45 minutes away from the two sites where all exhibits were going on.

Unlike a US CES, attendees at the Ramada were almost exclusively consumers. The seminars' titles would have fit in at any US CES—"What is High End or Exceptional Audio, How to Sell It and Install It" and "Home Theater, How to Sell It and Install It"—and I was overwhelmed by the number of times Stereophile was mentioned. At one panel, I was even introduced as "the man who needs no introduction"! The discussions reflected Mexican audiophiles' passion for their hobby, and their desire to learn everything they could—with perhaps a touch too much reverence for the opinions of their neighbors to the north. The exhibits themselves comprised about 215 different companies split up between a convention facility (the Sports Palace) and a hotel (the Airport Ramada), in much the same way they would be at a US Show. In fact, the whole event was uncannily like a US CES: almost every one of the categories represented at a CES also made an appearance at the Sports Palace: electronic watches, video games, TVs, lighting systems, mini-rack systems. Similarly, the Ramada high-end exhibit had lots of familiar names, a few familiar faces (Brady Conrad of Conrad-Johnson, Brad O'Toole of Wilson, Liz Jensen of Madrigal, Laura Hendershot and Mike Elliott of Counterpoint, Kevin Halverson of Muse, Charles Wood of Fosgate, Dean Standing of Carver, Charles Visich of Klipsch, Barry Ogg and Anthony Mosley of Energy and Mirage), many of the same demo CDs (the Weavers Reunion), and a generally familiar level of demonstration quality. Few were truly excellent, most were quite to very good, and a minority were poor.

I did get to hear some very efficient speakers—the Lowthers, and a $6000 model from JM Labs—making excellent sounds with very-low-powered Audio Note single-ended triode amps. I also was able to spend some time with Mexico's apparently sole high-end brand: Margules Audio, a line of tube amplifiers designed and built by Julian Margules. Good sound, though I wanted to get a pair at home for further auditions. We may see Margules at upcoming US CE ses. Unlike a US CES, attendees at the Ramada were almost exclusively consumers, for a simple reason: almost all members of the high-end trade were exhibiting. All the retailers are distributors; had admission been limited to trade, none would have been in the corridors. Mexico doesn't yet have enough high-end business for there to be—yet—for distribution systems—national distributors selling to regional or metropolitan retailers—and its proximity to the US leaves very little room for the extra mark-up inherent in a two-tier system. (Mexican consumers of the economic and educational level appropriate to high-end gear have been shopping in the States for years: a price discrepancy of even 20% would result in all gear being purchased up north.)

In general, the Ramada exhibitors were satisfied with the Show, although they've been putting on their own show for the last four years through their own Asociación de Electrónica de Consumo, with reported attendances of 7000. The week days chosen for the Show—Tuesday, Wednesday, and Thursday—were universally unpopular, and were blamed for what appeared to be lower attendance than what the Ramada exhibitors got on their own. (Those days were chosen for two reasons, apparently: the rates for the Sports Palace were allegedly lower during the week; and attendance on weekdays is easier for the trade audience to which CES is pitched.) On the other hand, the Sports Palace audience did get over to the Ramada in CES-provided buses, which exposed the High End to a wider market than they would have otherwise reached. The convention center part of the Show was well-attended and apparently well-organized. CES did surveys which revealed that almost all the exhibitors' expectations had been exceeded, and
All tube. All affordable. All yours.

If you appreciate the natural-sounding reproduction of music made possible by vacuum-tube technology—but were afraid of the hassles and the prohibitive price—have we got news for you. Audio Research, the 25-year leader in vacuum-tube technology dedicated to music reproduction, has made a vacuum-tube music system more affordable than ever. It’s the New LS7 stereo line preamplifier and VT60 stereo power amplifier, both featuring new, all-tube circuits that deliver rich, satisfying sound and world-renowned Audio Research construction. Two down-to-earth audio components that are capable of truly out-of-this-world performance.
CES was signing up exhibitors for next year (tentatively scheduled for Oct.10-12, 1995), with an idea of selling out before they left Mexico City! Total attendance was reported at 14,000, though there was no consensus as to what percentage was trade. As mentioned above, all the people who attended primarily to see the Ramada exhibits were consumers, as was some percentage of those who attended primarily to see the Sports Palace; but in the end it was a successful event, with happy exhibitors. Who cares who the attendees were?

I had a great time at the first CES in Mexico. The hospitality accorded me by CES, high-end exhibitors, and high-end consumers was wonderful (and appreciated), and the respect accorded Stereophile was startling and heartwarming. I think the high-end portion of this Show could be easily twice as big as the 21 rooms occupied this year.

Although I can’t come close to predicting the fortunes of the Mexican economy — would that I could! — I think Mexico is poised to become a substantial market for high-end audio. Although many of the people in Mexico are too poor to even think of buying good-quality sound-reproduction equipment, there are expanding middle and upper-middle classes for whom high-end is almost as affordable as it is for US audiophiles. With a few changes—a bigger, better hotel for high-end, a better location within the city, a compromise on Show dates (Thursday, Friday, and Saturday would work much better for high-end exhibitors) — CES Mexico could turn out to be a great promotional event for high-end audio companies, and even more fun for those who attend.

**UK: Martin Colloms**

Some people thought that Hi-Fi News & Record Review might fail to stage their Hi-Fi Show in 1994. For the second year running, the competing CES-style event, “Live ’94,” was scheduled to run at a major exhibition hall in Central London just two weeks after the Hi-Fi Show. The problem was that the big-name hi-fi companies had voted, almost to a firm, to abandon the Ramada in favor of the new show, where last year the exhibitors comprised a combination of home-computer, virtual-reality, Home Theater, photographic, and car-stereo companies, with most of the hi-fi fraternity housed in the separate and somewhat quaintly named “Hi-Fi Village.” (There was even an attempt to evoke the atmosphere of what foreigners always seem to imagine is an “Old World” English scene — flower beds, iron lamp posts, and the like. Was someone trying to tell us hi-fi enthusiasts that we’re old-fashioned has-beens? Or was it just an attempt to provide some peace and quiet for serious listeners?)

**Mexico is poised to become a substantial market for high-end audio.**

Who was left to appear at the Hi-Fi Show at the Heathrow Airport Ramada? On opening day, and much to the surprise of many concerned, the Show was close to capacity as far as available exhibition space was concerned, and had become a high-end venue virtually by default. It was packed with tube amplifiers — both modern and revival designs. So many of these power-hungry monsters were powered up that the temperature in the hotel corridors was unacceptably high in previous years. Fortunately, the most coloristic single-ended amplifier at the Show — the $3000 TOCA, which draws 3.4kW/pair — was running in the cool basement theater. More on these single-ended, pure-class-A solid-state amps later.

Of the “giants,” Technics, Pioneer, and McIntosh were there. Important UK speaker names included Rogers and Spendor, and celebrating 25 years in the industry were Harbeth, Monitor Audio, TDL, JPW, ProAc, Acoustic Energy, Roskan, and Ruark. There was a raft of smaller electronic companies, plus healthy presences from Europe (especially Denmark) and the US. Newcomers from the States included the charismatic Michael Green, who came with his RoomTunes, and also demonstrated his top-grade Chameleon adjustable speaker. Not only did he achieve a good sound in his room, but he also helped a number of other exhibitors improve the sound in theirs.

I’m sure that Stereophile readers will be amazed to learn that I counted upward of 30 single-ended (SE) amplifiers, the vast majority being tube-based. These SE amps ranged from a $1200, 10Wp stereo unit to $100,000, limited-edition specials. Famous SE visitors included the Shindo Palmer 300B, as well as the Cary 805B and 300B monoblocks, the Carys driving Monitor Audio’s Studio Series loudspeakers.

I can’t believe we need — or, more significantly, that the market can support — so many SE designs. We’ll just have to wait to see how many survive to fight again next year. Perhaps this should be seen as a first flowering? Market forces will determine optimal performance combinations in the most effective choice of triode.

With these SE models came a firmly renewed interest and activity in higher-sensitivity (90–98dB/W) loudspeaker systems. Equally important is a smooth load-impedance characteristic, which will help preserve a consistent tonal balance with these sometimes temperament amplifiers.

**Digital:** Pink Triangle premiered their version of the new Da Capo DAC, which will include a decoding filter for HDCD™ (High Definition Compatible Digital), which should not be confused with the forthcoming world standard for High Density Compact Disc. Unfortunately, the chip from Pacific Microsonics was delayed; it will cost some $1500 to upgrade the DAC.

**Ensemble** unveiled their Dichrongo DAC, with the Dichrongo Drive, while Parasound, newcomers to the UK market, presented a John Curl–designed CD transport and the D/AC-1000 and D/AC-1500 D/A converters. Their top-of-the-line ‘1500 has four 20-bit Burr-Brown converters, dual-mon build, and a huge 90,000μF of reservoir filtering. UK agent Path put together a fine demonstration with the latest Mark Levinson No.30.5 DAC driving the elegant Final DAC electrostatic speaker from Holland.

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4 Loudspeaker defects to Live ’94 included B&W, Cante, Celestion, Epos, KEF, Mission, Mordaunt-Short, Tannoy, and Wharfdale. On the electronics side, Audiolab, Arcam, Linn, Meridian, Naim, and Quad all looked great, which will presumably consist of the usual prefabricated “chipboard” boxes — or perhaps they’ll take a leaf out of Lin’s book from last year, when that company put up a solid log cabin that they later dismantled and rebuilt on company land in Scotland. It’s been rumored that at least one manufacturer paid upward of £50,000 ($85,000) to be at Live ’94. Here’s hoping all that money will bring its own rewards.

Making his UK debut — the charismatic Michael Green.
WE PLAY TO RAVE REVIEWS!

“The PSB Alphas are simply one of the greatest buys in audio, providing a musically satisfying sound for a paltry $200 ... For their price, the PSB Alphas are a sensational audio bargain. Now get out those checkbooks!”

Jack English, Stereophile,
Vol. 15, No. 7 (July, 1992)
Conspicuous by its absence was the much-publicized SME digital converter. In the Audio Freaks room, the EAD T-8000 CD/laser disc transport gave good results with the Muse Model Two D/A converter. The loudspeaker was the Paragon Regent.

In addition to the Stage series of upgradeable CD players and transports, Micromega showed a prototype Stage-series stereo power amplifier and preamplifier, as well as launching their latest top-end Trio CD-player system, now in Series 3 form. Roksan's Alesa CD player, which is also available as a transport and in a Mk.II version, delivered a crisp, punchy sound with the Ojan 3, Roksan's latest two-way floorstanding speaker. This continues their decoupled-tweeter tradition, first seen in the Darius. Australian Metaxas launched a new decoder, the Masdac, which uses Ultra-Analog's latest 20-bit converter. This two-box, separate-power-supply design is priced at close to $4000. Playback was through all Metaxas electronics, using a pair of the smaller full-range electrostatics.

Ramada '94 also saw the world launch of Audio Research Corporation's DAC 3. Using 6922 Sovtek tubes and working very nicely, thank you, it was partnering the LS2B Mk.II, the special-edition VT150SE amplifiers, and the Sonus Faber Guarneri speakers. Soundgious smooth and spacious, the Wilson Audio System Five WATT/Puppy 5 was being well served by the first airing of the Krell KAS-2 monoblocks, with a KSP20i unit as the signal source. The first public UK presentation of the new Wilson speaker drew large crowds.

Neil Sinclair of Theta Digital brought two new decoder products to the Show: the Progeny and the DS Pro Basic Three. Another world launch, the $995 Progeny is the least expensive product ever from Theta, and contains an on-board custom DSP for digital oversampling and filtering. No shortcuts here—the Progeny looks quite similar to the company's more expensive models.

The $12,500 Jadis J1 DRIVE looked superb. This high-end, top-loading transport has auxiliary on-board DACs for those who wish to delay purchase of a full outboard DAC.

**SE Amplification:** SE designs were all the rage. I caught Dan D'Agostino at the 200W TOCA (Touch Of Class-A) demonstration. This newly launched series comprises a total of 10 products, of which no less than six are SE designs, and is based on a fundamental building block: a 20W SE section using five paralleled power MOSFETs for current gain, and another set for the constant-current source, or "dummy load." These DC-coupled amps have class-A drivers, and use normal levels of negative feedback for a better-than-100 damping factor and typical steady-state distortion of 0.01%. These building blocks are paralleled to provide ever-increasing power: 50, 100, 200, and 300W. The 300W amp ($25,000) gives nearly 500W into 4 ohms, drawing a constant 1700Wpc from the wall. A 47,000µF reservoir capacitor is used and the heatsink is in the form of a vertically finned, 3.5'-high radiator—uncomfortable in the summer without good air conditioning!

Each amplifier has a granite faceplate with gold lettering, stands 5' high, and requires at least three people to lift it—a definite "statement" if ever there was one! In fact, many people, thinking the amps were loudspeakers, were intrigued by the "solid" fronts, and asked how the sound managed to get out. The designs, the brainchildren of Colin Wonfor (ex-Magnum UK and Incatech), are backed by German finance. The least-expensive SE model ($2800) is the alloy-fronted 20W stereo dual-mono. Given the large demonstration space, the results were quite promising driving ProAc Response 2 loudspeakers.

The remaining SE designs were tube, often single or paralleled 300B, the larger examples 211 or 845S. One—the top KAL model, which costs $15,000/pair—was even fitted with a GEC DA100 transmitter modulator triode.

The Italian company Unison Research showed a complete range of SE amplifiers, some configured as integrated amplifiers and selling for quite modest prices (starting at $1800).

I was intrigued by the unique Amphion SE from CR Product, which uses a Sovtek 6C33 power triode, a squat bottle with three nipples on top, and two devices strapped internally. Working from a low 160V, it offers better matching through high currents, and a lower plate resistance with an estimated power delivery of 30W into 8 ohms. These monoblocks sell for around $2500/pair; little mention was made of either their tonal quality or their linearity.

**Gamma UK** showed seven SE designs ranging from 12 to 90W; the last, the AEON Signature (over $100,000/pair), was configured with paralleled 211 output tubes. The Alemma Silver Night 3000B series comprised five models, while their latest 845 28W designs were presented as four boxes under the Audio Quattro Design label, and priced at $7000 a stereo set.

Tim de Paravicini's single-ended solid-state version of the Yoshino was keeping company in the same room as the Shindo Palmer 300B. Tim's intriguing, ultra-purist design uses a single TO3 can transistor, transformer-coupled...
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to the load and mounted in exquisite splendor on a cylindrical heatsink of gold-plated solid copper. Surface temperatures are 80°C, so keep your fingers off!

There just isn't sufficient space to cover the rest!!

Conventional amplification: Solid-state electronic highlights included Krell's KAS 2, their single-box monoblock reference, which has Krell's handsome, blue elliptical meters. Someone mentioned that the KAS 2s looked a bit like water-filled bowls, and wondered where the goldfish were.

Krell's KAS 2 single-box monoblock reference amplifier

Copland showed a solid-state hybrid, the CSA14, which is an integrated amplifier with a 6922 tube for the differential stage of the power-amplifier section. At 60Wpc, and built in a handsome case strongly reminiscent of Cello designs, it offers some measure of the Cello sound in an economical, reliable package. Expect a price of about $1500.

Madrigal released the latest Mark Levinson preamplifier, the more costly “S” version of the popular No.38. Included was the usual extended technical commentary on all the things they've done to make it sound even better. Claimed to be the company's best ever, it's priced accordingly: $6495.

Chord's room was larger this year, and they also put on a better show, making good sounds with their revamped range of power amplifiers—increasingly used in British studios—and their new, chunky, remote-controlled preamp, with a clear display that can be read from across the listening room. A bi-amped BBC LS3/5a—now in much better fettle for '94/'95—worked nicely with a matching bandwidth woofer enclosure, also by the ex-BBC team. The active crossover has been built into the appropriate Chord amplifier.

I was surprised by the moderately priced 35Wpc integrated amplifier from Holfi of Denmark—both the fascia and the control knobs are made of solid cherry wood. In fact, wood decoration (and resonance?) was seen on a much greater number of products this year.

Burmeister came over from Berlin, returning to the UK market after a few years' absence. In addition to an entire range of electronics, a tall three-way loudspeaker pillar was in view.

McIntosh shared a room with Chario, the Italian speaker-maker, and brought along a dummy of their forthcoming high-power integrated amplifier, a revival of a model marketed in the early 1970s. Incidentally, their classic MC275 re-introduction has been surprisingly successful, with more than 4000 units sold! McIntosh still has audiophile market-power, Ron Fone, McIntosh's CEO, was fiercely positive about the company's legacy, encouraging its new owner, the Japanese Clarion corporation, to preserve all that is best in their acquisition.

Both the styling and the finish of UK designs are at last improving—witness the new range from Alchemist, in stainless steel and gold.

Analog: Classic Records' RCA Living Stereo reissues were much in evidence, and many more tube-amp exhibitors than last year played vinyl. For the first time, the UK saw some amazing Dutch products—eg, the Phito turntable with a granite Q plinth and platter in Corian, partnering a tonearm with a mirror finish in stainless steel and titanium. Expect to pay upward of $20,000 for this package.

Sharing this exhibit was the Allacor moving-coil cartridge, hand-built in Belgium by J. Allaeerts, who can only produce some 100 units a year. In terms of price, the Allacor ($5328) rivals the van den Hul Grasshopper ($3000–$5000), and has pure-gold windings. The sapphire/boron cantilever is fitted with a Gyger profile tip fitted to a 1μm tolerance; even the lead-out pins are solid 14kt gold! Very high separation figures of 70dB (1kHz) are quoted for the MC2 Finish, which indicates a crosstalk cancellation technique. The least expensive model is the MCI ECO ($1214), which still has the look of a very high-precision product.

Max Townsend pulled me off the corridor and into his room to show me his latest dream: a prototype tonearm based on his Excalibur. This astonishing device has remote-controlled, power-operated mechanisms for azimuth and VTA, plus a servo-driven system for overhang correction of the disc. All these were designed to operate during play. Max also talked of an auto-centering platter for a future turntable (remember the Nakamichi of the early '80s?) that would minimize wow due to eccentricity.

The UK's Wilson Benesch showed their latest elegant ACT TWO, a one-piece, carbon-fiber tonearm, while a Dutch lady, Judy Spootheim, was responsible for yet another exotic tonearm creation: the SPJ, which also has adjustment for azimuth, overhang, and VTA during play. Part of the Audio Freaks exhibit, this 2.3kg arm requires a robust turntable. The SPJ was partnered by the Kuzma Reference player. On display in the same room was a limited-edition SME tonearm, its metalwork finished in bright gold plate. Expect to pay around 25% extra for this glossy finish.

Loudspeakers: At the Show were two advanced German loudspeakers, deriving a lot of their design features and philosophy from Manger's little-known 1970s work on flat, soft diaphragms with controlled-wave properties. In the DDD (Dick's Dipole Driver, by German Physiks), a deep elastic-foil cone is driven in controlled bending modes and, when vertically oriented, has an omnidirectional radiation pattern not unlike a small Walsh driver.

The other design, the Medea, came from Audio Physic. Costing some $300,000, this floorstanding model uses three planar bending-wave transducers. Here, the Manger driver has been painstakingly developed by one of his students to have a 35kHz bandwidth (the original was 15kHz), and a high sensitivity of 91.5dB/W (the original was in the low-80dB/W region). Described as a coaxial and co-planar twin, separated voice-coils half-in and half-out of the magnet gap are used to maintain stability. A total of 14 patents relate to this design, which is backed by conventional bass systems below 150Hz.

Three Apogee-like planar/ribbon speakers were shown: the Analysis, the Omega, and the Epsilon—all two-ways,

Wilson Benesch's elegant ACT TWO carbon-fiber tonearm

5 This fascinating arm is available in the US from Brooks Berdan Ltd. —JA
HIGH SPEED!
(Part 1)

The Goldmund Porsche winning in Le Castelet

After winning in Suzuka last year, the Goldmund sponsored Porsche is now leader of the 1994 Carrera Cup. Thanks to Philippe Albera, the Goldmund Porsche pilot, our 1994 Winning list is already quite spectacular:

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- Winner in Le Mans.
- Winner in Le Castelet.
- Winner in Albi

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In 1995, the best Goldmund Salesmen from around the world, as well as a few top customers, will be invited by Goldmund for the Monaco Formula1 Grand-Prix. After the Monaco Grand-Prix, they will attend a two days driving seminar, where they will drive real racing cars with professional pilots, including Philippe Albera. The best among them will even win the unique privilege to drive a real Formula1 during the seminar.

You know, we really like speed...
with external crossovers and high-performance adjustable floor bases. These were definitely not cheap copies, but serious devices. The classical theme is explained when you realize that the company—Analysis Audio Systems—is based in Greece.

I was also impressed by the appearance and sound made by the Danish company L.A. Audio. Their 6 ohm Dynaflow speaker is an elegant floorstander whose flowing, sculptured base is in fact the mouth of a 12" folded quarter-wave horn! Two efficient, 6.5" drivers run the line at 93dB/W, including the midrange up to 500Hz, the upper range covered by a true, 4"-high ribbon dipole. Just right, I'd say, for their tube power amps.

Spendor celebrated their anniversary with the launch of no less than three models, headed by a floorstanding flagship, the SP9/1 (approximately $4500). Based on the famous S100, the tapered cabinet is very solidly constructed, while the system has been carefully realigned for boundary placement. The second floorstander was the two-way SP7/1 ($2700/pair), derivative of the SP2. Finally, a new, compact, "thin-wall" monitor was on display, the SP3/1, derivative of the established S20. Expect to pay around $1800 for a pair of these extended-bass monitors.

Harbeth was celebrating with their HL Compact 7, the latest revision of a speaker that has been rated top in its class for several years now in Japan. CEO Alan Shaw proudly outlined his three patents concerning the design of a physically similar two-way monitor, which he believes will help the speaker maintain its market position for years to come. One patent relates to original work done into cone behavior and materials technology, and the new speaker has a high-precision injection-molded 8" cone with a proprietary mixed polymer of polypropylene (called RADIAL™) and TPX with glass micro-bead reinforcement. His cabinet, which uses STS™ technology, is a thin-walled structure with calculated distributed tuning of optimal low-mass damping. The grille employs the low-diffraction Frameless™ grille construction.

Under Show conditions, I found the latest Anmira USA Jovian pillar speakers to pack a nice dynamic punch. Using fine drivers, this five-way system has tapered crossover points at 100Hz, 225Hz, 334Hz, and 3kHz. A flat 5 ohm load and 92dB/W sensitivity also look promising for this 5-'high tower.

The $36000 Audiovector from Denmark's F3/LYD—a company whose name caused some confusion—also sounded promising. I found the 3.5-way Audiovector to be dynamic and wholly familiar using my own discs: a very good sign. It offers 91dB/W at 8 ohms, 35Hz-20kHz ±2dB, with crossovers at 125Hz, 600Hz, and 2.9kHz.

Another Danish treat was the compact, two-way DANA, which uses a ScanSpeak bass unit and a Dynaudio 1" dome, on display in Paul Rossing's company—remember Avance Labs, the company that used to make the concrete speakers?

Mo itself of Monitor Audio pulled another world first: the only all-gold, all-metal driver range of speakers, called the 900MAG. Mo has made specific provision for a Home Theater system; the full line was certainly impressive, with its usual high-quality-veneered cabinets.

Germany: Markus Sauer

I'm glad I don't earn my living in the High End in Germany right now—business is almost flat enough that you could ice-skate on it. A number of factors are at work here: the worldwide audio business seems to have undergone a restructuring phase, with a noticeable shift toward audio/video products. This trend has yet to gain momentum in Germany, so sales lost to market saturation in traditional audio products, such as CD players, cannot be made up by other sales, DCC and MD having practically no market relevance at all.

Germany is also in the midst of a recession; while investments have picked up noticeably, private spending still lags behind. Consumers postpone all unnecessary purchases. 1993 saw overall losses of around 30% in the High End, with quite a few dealers filing bankruptcy. In May, the bottom seemed about to drop out of the market. In June and July, it did. Germany had a scorching heat wave, the highest temperatures in recorded history persisting for six weeks. Nobody bought audio gear. Such is the fragility of many dealers' and small manufacturers' financial conditions that these two months were enough to drive several to the brink of bankruptcy, let's see if they survive through Christmas sales.

On the other hand, the 1994 Frankfurt High-End Show, the 13th installment, was the largest ever in terms of exhibitors and brands represented. Everybody and their brothers seem to get into high-end audio manufacture. I don't understand this—you'd think that people would put their efforts into areas where there's money to be made. In Germany right now, audio definitely isn't one of those areas.

One of the reasons for the Show's increased size was that standards of admission have been reduced. Previously, manufacturers and importers had to have at least seven dealers before they were allowed to exhibit. This criterion was abandoned completely this year, to allow small-scale outfits and newcomers easier access to the market. I'm not sure about the wisdom of this move. Cus-

Conclusion: What were my overall impressions of the 1994 Hi-Fi Show? Tubes glowing everywhere in the dark; an almost total lack of Home Theater compared with last year (all at Live '94, I suspect); large loudspeakers—panel and pillar; and, finally, a power cut that plunged the Show into darkness for two hours on the first public morning. Bad for business, but it gave me valuable breathing space to get 'round all the remaining exhibitors I'd missed!

Harbeth's HL Compact 7 loudspeaker.

F3/LYD's Audiovector 5 loudspeaker from Denmark.
Compact Disc Transport

- FAST ACCESS LOGIC
- REMOTE DC POWER SUPPLY
- 1 OPTIC and 2 COAXIAL OUTPUTS
- SINGLE BEAM LASER with GLASS LENS
- HIGH SPEED DIGITAL PROCESSING/ ULTRA LOW JITTER

Precision disc handling is accomplished by utilizing a single beam "swing arm" drive, along with a metal turntable, for superb mechanical stability. High-integrity data is achieved through the use of advanced logic devices and third generation error detection/correction technology. The result is digital data which contains all the subtleties necessary to yield the most convincing musical experience. We strongly recommend the use of a Polyfusion Model 800 or 900 DAC with this transport.

Convenience, the Model 920 employs a drawer rather than a top load mechanism. This allows you to locate your 920 inside equipment cabinets, or stack components without the transport having to be on top. The full function infra-red remote gives total control of all parameters, from the "sweet seat".

polyfusion audio

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tomers may end up easier prey to unreliable products, or to those with unpredictable interactions with other gear. But the move helped to avoid accusations that the Show serves the purposes of only the High-End Society—a rather close-knit circle of companies who actually organize the Show.

My misgivings notwithstanding, the Show was a success. Attendance was around 8000—only slightly down from last year—which isn’t bad considering that the Show ran for only four days instead of five. The mood was reasonably upbeat, not least due to the increased number of visitors from abroad. In addition to the usual contingent from the EC countries, groups of visitors came from the US, China, and Australia. The Show’s organizer, Branko Glisovic, was particularly proud of the fact that the Frankfurt Show is starting to be more important to the international-trade visitor than the Hi-Fi News & Record Review-sponsored Show held at London’s Heathrow Ramada Hotel a few weeks later. [See Martin Colloms’s report above.—Ed.]

So what about new products? Because some of the exhibits were of questionable relevance, I’ll concentrate on products that were technologically interesting and/or sounded good.

In analog, a mini-trend at the Frankfurt Show was the appearance of combined MC/headamps and RIAA sections. Most preamps these days either omit or have only modest phono stages, while turntables are becoming ever more sophisticated. For those still dedicated to analog, the search for good phono sections is fortunately getting easier.

The most radical new development, from Clearaudio, was the active moving-coil. Peter Suchy has long thought that the best way to amplify the delicate signals from the MC generator is at source, before they have to travel down long signal leads, where they hardly stand a chance of arriving unmutated. Suchy has figured out a way to miniaturize a complete moving-coil headamp and RIAA section to a scale, which allows it to be fitted into an only slightly enlarged cartridge body. Amplification is 54dB, so if your power amp has an input volume control, you can completely do without a preamp, or you can use a passive volume control.

The secret is in the topology: Clearaudio uses a transconductance design, which means that the RIAA equalization is handled by resistors; capacitors, as necessary in a normal RIAA stage, could never have been made physically small enough. Power supply is via the normal connecting leads, so the active moving-coil can be installed without difficulty in any tonearm. Every cartridge in the Clearaudio range is now available in active form, with a surrogate of ca. $1200 over the normal passive version. Clearaudio also showed prototypes of a new turntable made mainly of acrylic, and a CD player which currently uses 20-bit Burr-Brown converter chips and 24-bit digital filters.

In much the same spirit, but slightly less radical than the active moving-coil, Naim introduced the $600 Pre-Fix, a small box containing, again, a headamp and an RIAA section to be connected to a preamp’s standard line input. The Pre-Fix is designed to fit below the tonearm inside the record deck of your choice, and can be powered either from the NAC52 preamp or via a dedicated power supply. This made nice noises inside—what else?—a Linn Sondek.

As an example of traditional stand-alone units, Klimo showed a new tube MC/MM RIAA phono amplifier: the rather unattractively named Viv ($2500), which features four E88CCs and one ECC81. Dusan Klimo is so modest it physically pains him to make a fuss over his gear, but the quiet confidence with which he spoke of his new design means this should be a product to watch out for.

The multilingual Aalt Jouk van den Hul had a new version of his Grasshopper MC cartridge, the Grasshopper IV GLA (priced 10% above the Grasshopper III). The G stands for the gold coil windings, with other metals, such as silver or copper, available; the L is for low output (medium- and high-output versions can also be done), and the A is for the magnet material, Alnico; the other option is neodymium. While neodymium is the stronger magnet material and would give a higher voltage, Alnico is said to sound better, due to its greater mechanical stability. If you do need a higher output, van den Hul prefers to raise the number of coil windings. Cartridges will be virtually custom-made: if you specify your tonearm, your preamp, and your favorite music, van den Hul, drawing on his many years of experience, will build a cartridge perfectly suited to your needs. He also offers a unique after-sales service: he’ll realign your cartridge after the first 20 hours of use. [See Tom Norton’s interview with A.J. van den Hul in November, Vol.17 No.11, p.83.—Ed.]

The improvements over the Grasshopper III, which will still be available and which sells at an astonishing 10-12 units per week, concentrate on two areas: the IV is mounted dry, with no lubricants between parts. The magnet yoke is made of a new material which eliminates Barkhausen noise. If I understand this correctly, this noise is generated by domains aligning themselves under the influence of a magnetic field. This can be shown by a textbook experiment: connect signal leads to a metal pin wound in a coil, and move it through a magnetic field; the resulting noise can be heard and measured. The elimination of this noise means, of course, a lowered noise floor, only the mechanical noise of the needle rubbing against the groove wall remaining.

Sonicly, it’s said to lead to a slightly narrower soundstage (the noise is uncorrelated between the channels, giving the impression of greater lateral spread), but to considerably greater depth, most noticeable on choral recordings done in churches and the like. Van den Hul says the magnitude of improvement surprised him when he heard it for the first time. He didn’t want to tell how it’s done, but says that the process is very simple. Apparently, Bill Conrad of Conrad-Johnson showed a keen interest. Professor van den Hul also was enthusiastic about his new posters, which are done digitally by an ex-student of his; to van den Hul’s pride, his student makes them better than A.J. taught him to.

DNM showed the finalized version of its new turntable, the all-acrylic—design Rota. The cheaper Rota 1 (ca $3500) uses a modified Rega tonearm, the Reta, and...
Dynaco’s HLX 18/9 brings you classic Dynaco sound quality with advanced speaker technology and fresh design concepts. The satellite speakers contain a Kevlar 4” woofer and a 3/4” titanium tweeter. The subwoofer’s 8” dual-voice coil, high-power driver produces deep, clean bass at high efficiency.

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a modified Goldring MC cartridge, the Estile (read it backwards to know which model they started from). The top-version Rota 2 ($6000) uses DNMs own tonearm, the Yota, and a better MC cartridge, the Lexo. The names are silly, but the products seem logical, and DNMs Denis Morecroft is always full of interesting ideas on sound reproduction. One of the elements of the Rota sound is already known to Stereophile readers—this is the turntable which spawned the QR/DNM DESIGN Ringmat turntable mat (see Robert Deutschs review in the May 1994 Stereophile, Vol.17 No.5, p.137).

In non-analog news, Einstein had a pre-production sample of its new CD player. As beautiful as their integrated amplifier, with the same hewn-from-solid metal curved front plate, this player features a C.E.C. belt-driven transport, encased in a copper-clad submodule to avoid all RF contamination of the signal-processing section. Its also decoupled from the rest of the chassis by a floating subchassis, while the whole player is in turn decoupled from its environment by a second subchassis. The digital section employs a couple of 18-bit Crystal D/A converter chips in their latest version. The wide-bandwidth analog output section is devoid of all capacitors, giving zero phase aberration with only 0.1dB amplitude deviation. The power supply has three separate supply sections, using two transformers. Price is $3750. Einstein also showed an updated version of the integrated amp, with improvements made mainly to the power-supply section. Two high-efficiency loudspeaker prototypes were shown under the Odeon brand.

Accessories specialist WBT premiered a new speaker connector: a banana with the cable lead-in positioned at an angle, to avoid stiff cables making a large loop behind your speakers. A high investment in tools means that these can be offered at quite an attractive price—at $10. In typical WBT fashion, the gold-plated connectors are well-thought-out: under the gold is an insulating material, so you won't short-circuit your amp if two connectors touch each other. Only the protruding banana section itself, made from a copper alloy, carries the signal, not the whole connector.

In conversation, Ashley James of ATC loudspeakers offered an interesting perspective on the British market. Apparently, current British consumers are, on average, 45 years old. Their tastes are turning away from pop and rock and leaning toward jazz and classical music, which means that companies which built their business on a pop/rock sound are losing ground, while those which serve the lower of classical music, such as Quad and ATC, are gaining. Which brings the question: Where are tomorrows ex-rockers going to come from? At least James managed to avoid looking too smug about the situation.

Dieter Burnsester showed two new products: the aptly named Twin series. The Twin-Amp 940 marries his Basic pre- and power amps in one chassis, while the Twin-CD 941 can also be fitted with a tuner section. While an integrated amp is nothing new, the 941 is, to the best of my knowledge, the first such marriage outside the mini-system context of tuner and CD player. Using just one set of microprocessors, knobs, and display for two sources makes financial sense and saves space. Sonic interactions are avoided by switching one section off while the other is playing.

Rolf Gemein of Symphonic Line used his humongous Kraft 400 stereo power amps (about twice the size of a big Krell) to drive his new Belcanto speakers: infinite-baffle four-way designs which use two foam-metal-sandwich Podszus-Görlich drivers for bass and lower-mid frequencies. The star attraction, however, was his new $3000 CD player. Gemein was tight-lipped about the technology, revealing only that he spent the most time getting the power supply just right. The frequency range is claimed to be expanded to 50kHz. Just how this can be done inside the Philips Red Book standard I don't know, but the sound certainly seemed less shut-in at high frequencies than is usual for CD.

Epos showed in pre-production form the long-awaited ES25, a three-way loudspeaker which distinguishes itself from its myriad competitors through the use of an unfiltered midrange unit coupled directly to the amplifier without a crossover. Only the Cobex bass driver and the tweeter, a double-magnet version of the tweeter used in the ES11, have some crossover elements. The Epos representative on hand mentioned some difficulties in settling on a final alignment for the speaker; every time they demonstrate the ES25, listeners apparently come up with very different sonic descriptions. Provided there are no variables such as listening angle, amplifier changes, etc., this is usually a good sign, meaning the speaker has no pronounced character of its own.

Former Naim importer Ingo Hansen surprised everyone by exhibiting, under the Phonosophie banner, a complete new range of amplifiers, speakers, cables, and support furniture to complement their respected turntables and cartridges. The loudspeakers were way too bright for my taste (and played so loud my ears literally hurt), but the amplifiers seemed quite innovative. There's one basic design for the power and preamp section; these can be combined in one box for an integrated amp, or separated into pre-
and power-amp sections. Even though there are absolutely no differences apart from the use of separate boxes and power supplies, the separated version sounded much smoother and, surprisingly, much more powerful. The range is called the Bi-Amp, because the integrated and power amps can be fitted with four power-stages each, to facilitate bi-amping. There are also crossover modules which can be fitted inside the amps, allowing active drive of appropriate loudspeakers. The beauty of all this is that all modules are retrofittable: consumers can start small with a simple two-channel integrated amp, and later move up through the range without ever having to sell or scrap their existing units.

Another interesting unit from Phonosophie was the Analogizer, basically a device that adds some second- and thirdd harmonic distortion. Ingo Hansen claims that his research has shown that the greater aliveness and warmth of analog is partly due to such distortion created by the stylus in the groove. I'm not sure the world really needs such a gizmo, but experiments carried out by Germany's Analog Audio Association indicate that the thinking behind its operation is not as far fetched as it seems: an LP mastered from a CD sounds "better"—ie, warmer, more open, etc.—than the CD from which it was cut. This doesn't mean that the AAA now endorses digital; there are still quite a few areas where analog is intrinsically better than at least the current CD standard.

Audio Physic, flush with success from its recent victory with their Tempo speakers in the Stereophile loudspeaker compare (Vol. 17 No. 8), used this model to premiere its new Terra subwoofer ($4000), which can be used with every loudspeaker in the Audio Physic range. The five-sided Terra is meant to be placed in a room corner, or at least against a wall. Onboard power amps allow velocity-feedback servo control over the cone movement, which should give fast, clean bass. The signal is taken from the power-amp outputs à la REL, to avoid sonic discontinuities between the power amp driving the main speakers and the internal amps. Cut-off frequency, level, and rolloff steepness can all be adjusted to integrate the subwoofer with the room and the main speakers. Instead of the usual practice of avoiding the natural room nodes, the intended corner location of the Terra makes use of them, giving up to 9dB level gain at 20Hz. Unusually, the subwoofer has no filter for subsonic frequencies. Company president and chief designer Joachim Gerhard claims that extension to sub-sonic frequencies is very important for the reproduction of space.

Two demos stood sonically head and shoulders above the rest. Dynaudio showed the first production unit of its Arbiter power amp ($100,000), a genuinely beautiful example of industrial art which uses battery operation (220V!) for voltage amplification, relying on the outside world only for current amplification. The batteries are so strong that, even at full output (700W into 8 ohms, 1400W into 4 ohms), the voltage on the power-supply rail drops by only 2V. A pair weighs 135kg (297 lbs), so you know what you paid for. The loudspeakers—Dynaudio's new, relatively small Confidence 3—sounded truly big, no doubt helped by all that clean muscle behind them. What really impressed me, however, was that the amplifiers, despite all their power, managed to combine smoothness, dynamics, color, and delicacy. Maybe I should start saving.

Even more closely aligned with my sonic sensibilities, and my personal Best Sound at the Show, was the Audio Sculpture demo. This relatively new French company is headed by Jean-Jacques van Leeuwen, who used to work for the defense industry but has turned his talents to audio (a move I can only applaud). Van Leeuwen is an old tube hand (word has it he taught Jadis supremo Jean-Paul Caffi how to solder), and has spent the last ten years on that rarest thing in tube audio: a new topology. It took him two years to figure out how to connect two output tubes in what he calls "Enlarged class-A." I was given a White Paper on this patented technology, but I'm afraid I'm not enough of an engineer to make head or tail of it. The basic idea seems to be this: Triodes are good for the impression of delicacy and speed, but don't have enough power for peak demands. They also have a relatively low efficiency. Pentodes are much better at handling higher power outputs and can be biased in class-A/B for the upper part of their working range, but don't sound as good at low power outputs. In his Equilibrium power amplifier ($7000), van Leeuwen couples two tubes (two pentodes, actually): a triode-connected EL34 and a KT88 or 90), the smaller working at low power and controlling the larger one for high impulse power. For the Paraphrase tube preamp, which uses two ECC83s, two 6DJ8s, two EL84s, and two EZ80s, the emphasis is on a really stable power supply, DC rectification being handled by tubes. The pcb has lots of small holes, apparently to keep static electricity from influencing the signal.
Van Leeuwen says that while he’s designing a product, in his head he is literally living inside his circuits, talking to components (he once spent a year just listening to the effects of so-called passive components). Having heard his system, I’m ready to believe it. With a prototype tube CD player as the source, and French LEEDH Psyché loudspeakers (slim, tall, two-way columns with an 8” Audax Aerogel main chassis and ca 90dB sensitivity—$3200) at the business end, this setup produced a very good sound. Not just “good for Show conditions” or “good for CD,” but good sound, period. This system had palpable presence in spades, with a trumpet or a saxophone literally blowing at me. The sound was neither typically transistor- nor tube-like, just very lifelike, spacious, dynamic, clean, undistorted, and whatever else the Audio Thesaurus of Adjectives Meaning the Reviewers Loved What They Heard has to offer. I’ll most certainly investigate.

Van Leeuwen is undogmatic about the amplification devices he uses. In about three years he hopes to have access to transistors which, in his words, are “appropriate for audio.”

With all the gloom during the period leading up to the Show, I expected a funereal atmosphere. Instead, I was glad to find that the exhibitors possessed considerable optimism. Many seem to feel that the worst lies behind them. See you next year.

The Audio Sculpture amps from France, looking deceptively simple, provided probably the best sound at the Show.

Jean-Jacques van Leeuwen, designer of the Audio Sculpture amps, and probably a genius!
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certain "high-resolution" or shifty-bit recordings, the Meridian 508 will give you near 20-bit resolution.

I don't have any recordings that were made with the Meridian 618 Digital Mastering Processor—or at least that I knew were made with that processor—but I do have some allegedly high-resolution discs from Telarc, Sony, and DG. All this business about 16 = 19.6 aside: if there's excellent low-level resolution on a particular disc, you can hear it in spades with the Meridian 508. It is a high-resolution CD player. And if you can't hear it, a) you're deaf, or b) the rest of your system sucks. Just wanted to lay it on the line for you.

Precisely because of its high resolution, the Meridian 508 deserves a damned good preamp, amp, and speakers. Fortunately, the 508 was able to drive directly most of the amps I had in-house, so I used the Purest Sound Systems 500 passive preamp (see "Sam's Space," Vol. 17 No.8, p.45) as a source selector and volume control, and ran that straight into the Quicksilver M135 monoblocks. Passive may be the way to go with the 508! You also gotta take care with cables and stuff (gad! Marina's got me watching too much Beavis and Butt-Head) so as not to compromise the sound. More on that in a minute.

This is, I think, a breakthrough product—never before have I heard such resolution at this price. In fact, I've never before heard such digital resolution in my system.

I'm not saying that you can't get equal or even better resolution elsewhere—I've asked Spectral, Krell, Mark Levinson, Jadis, Forssell to shower me with products, but so far they haven't. Seriously, though, I think you'd have a tough time getting comparable resolution for anything like $2495.

What does all this extra resolution sound like?

Detail, of course. Lots of it. But also more air, more of a sense of musicians' palpable presence, a greater sense of the event happening almost live. Surprisingly—or maybe not so surprisingly—a more relaxed sound than I'm accustomed to from digital. Also, a harmonic richness.

I think probably the most impressive thing about the Meridian 508, on a good recording, is the way piano notes decay: naturally, without falling off into some digital grunge, slime, or void. The Meridian also gives you a crystalline clarity—you can hear it on transients—without the added brightness that clarity often brings.

The Meridian 508 is similar to the 500 transport and 563 processor that Robert Harley likes so much, but it comes in one box. The left side of the player is the transport, the right side (facing front) is the processor. Unlike Quad—a single-box player, without the need to worry about a digital link. Should you wish to use a separate processor, however, the Meridian 508 features both a coaxial digital out and an EIAJ optical digital out.

Like Quad, Meridian has gone to Crystal Sigma Delta DACs. These are single-bit, remember. But unlike Quad, Meridian uses two of these DACs—one per channel—in a dual-differential mode to achieve what they claim is 19.6-bit resolution. Each DAC has two channels—after all, they're stereo. But each side of the stereo DAC now has to work on only half the signal: positive or negative. It's similar to what happens with balanced cables, etc.: if there are any errors in the conversion process, they'll show up on both sides, get summed, and cancel out.

According to Meridian, the 500 transport/563 processor combo is better than the 508—the electrical and mechanical separation of the two-box player is said to improve the sound. On the other hand, with the 508, the DAC and transport are derived from the same clock, so they have to be in sync. Me? I'm so happy with the lack of clutter that I don't worry.

The 508 is handsomely styled in the distinctive, somewhat idiosyncratic Meridian way. (A product wouldn't be properly British if it weren't a bit odd.) For instance, the front-panel control buttons aren't buttons, exactly—they're thin things that stick out between what look like the buttons, and sometimes they're hard to press because your finger doesn't find the control right away.

The drawer is different, too—but here I applaud rather than mildly criticize. Instead of loading the disc on a tray, the entire laser mechanism, including turntable, comes out on a drawer, and you place the disc on the turntable's clamp. I like that—it's much more involving than a drawer. Besides, you can easily clean the lens, if you have to. (You can also get the lens dirty by leaving the drawer open, if you're a slob. Don't sneeze while the drawer is open.) The drawer front closes against a seal, isolating the laser assembly from vibration and acoustical feedback. This seems to me a lot less half-assed than having the disc spin naked—exposed—atop the player. It also means you don't have to put the 508 on a top shelf.

Odd (British), too, is that this $2495 player comes with a rather chintzy remote control. Meridian's optional System Remote, which you need to take full advantage of such 508 features as remotely switchable phase, costs you an additional $99, and gives you a raft of buttons you don't need unless you own or are going to purchase other Meridian gear. The polarity business is a real bummer—Meridian gives you the feature, then takes it away by not supplying a proper remote.

Did I tell you that the player has unbalanced (that's for me—unbalanced!) analog outputs and balanced XLRs? I used the unbalanced outs, straight into David Hum's Purest passive preamp. Cables are catch-as-catch-can, as my English grandparents like to say: whatever falls out of the cable closet when I open the door. But I'm having particularly good results with Wavetrace Technology Silver Seven Interconnect.

The Meridian has damned near everything you could ask for (except a polarity-switching remote included in the price)—and all for what's still a reasonable price, if not a pittance, when compared to offerings from the likes of Wadia, Krell, Mark Levinson, etc. I can only guess what this much more expensive digital gear might sound like by comparison in my system. But, of course, I've heard very costly digital gear in other systems, so I'll hazard a guess:

With more expensive gear, I'd guess

2 You can buy a generic remote control from Radio Shack and have your Meridian dealer program it to invert polarity.
3 $299/m, available direct from Wavetrace Technologies, 122 S. CLWlargo Road, Largo, FL 34640. Tel: (813) 587-7868. Lengths up to 3 meters available.
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that you might get a somewhat beefier, more dynamic sound, with punchier bass. I still think that the Meridian 508 shares with other single-bit players and processors a certain relative deficiency of dynamic drive. But I don't think you'd get significantly superior resolution or smoother sound. Plus, the tonality with the Meridian is right. The sound is smooth, sweet, harmonically convincing, and ravishingly beautiful when the recording is good. Strings have a fullness, a bloom, a naturalness that I've never heard before in my system with digital. Harmonic beauty along with superior resolution—now that's a sound I can take any day.

So, buy this player and just drop out for a while. Enjoy your recordings, and watch your friends empty their wallets as they pay their dues to the DAC-of-the-Month Club. If you have $2495 and a system capable of utilizing the 508's superior resolution, that's precisely what I'd do!

By the way, Meridian has a 506 integrated CD player at $1495, said to offer 17.6-bit resolution. Price-wise, that player, of course, is more comparable to the Quad 67.

**Marantz CD-63 Special Edition**

It's been Marantz UK's practice for nearly ten years now to upgrade certain products—mainly integrated amps and CD players—and call them Special Editions. From the reviews of these products, which haven't been available in the US, I get the impression that most of these Special Editions have been sonically successful, the extra money spent being generally worthwhile.

It works this way.

Like other companies, Marantz asks its engineers to build a product to a price point—with the inevitable compromises involved. Then, when a product achieves some success in its standard version, they go back to the engineers and ask what they would upgrade if they had a little extra money to spend. The whole process is like an in-house tweak or mod. In fact, many of the Special Edition products have been tweaked in-house—made in Belgium or Japan, then tweaked in the UK.

Now we have the Special Edition of the Marantz CD-63 for $100 more ($499) than the standard version (see “Sam's Space,” Vol.17 Nos.1 & 8). And you don't have to be British to buy it—just too cheap to buy a Meridian 508. (Only kidding. You may not have $2500 to spend. Or the 508's superior resolution may be more than you need.)

How do the two Marantz units compare?

Marantz sent me a CD-63 SE without asking me to first send back the CD-63, so I had the chance to run one atop the other. I also compared the CD-63 SE with the Meridian 508 in my main system.

If you’re on a tight budget, the CD-63 plain is fine. But if you can spend a few extra dollars (less than the cost of seven full-priced CDs), then get the CD-63 SE—it's well worth the extra money. Assuming, of course, that the rest of your system lets you hear the improvement, which, if you’re in typical budget territory, might be a big “if.” (Perhaps the CD-63 SE is best used in a high-end system in which the player is being used out of place: by an audiophile who prefers to drop his or her big bucks on things other than CD-playback gear.)

What do you get for your extra $100? More weight! Better parts, too, including oxygen-free—copper power transformer windings, a larger transformer core and more rigid transformer mounting, a solid-iron chassis bottom plate, and so on. There are no changes to the circuitry of either the digital or the analog stages.

Yes, the sound (of the stock and SE versions) could be richer, fuller, warmer—more Optimus CD-3400-like, more Quad-like—or Meridian-like, for that matter. But the resolution with the stock model is very good for the price, and the resolution with the SE version is yet another significant step up—if not in the league of the Meridian 508. I didn’t have the CD-63 SE and the Quad 67 in-house at the same time—but the CD-63 SE does seem to sound more open and airy, if not more detailed, than the Quad. For one-third the price.

Both the stock and the SE versions can sound a little lean, albeit smooth and sweet (lean does not have to be mean). Or maybe it's just clean. When is sound clean, and when is it lean? I think it depends on your own sonic frame of reference and the rest of your system. For me, the sounds of the Marantz CD-63 and CD-63 SE weren't so lean I couldn't get used to them. The CD-63 SE is now my reference player in my living-room system.

What do you get for $100 more?

As I've just hinted, you get much more openness with the SE version. Don't forget: I had both players stacked, and could easily switch from one to the other. Both were left turned on all the time, for the best sound quality. I tried switching between the two players dozens of times and preferred the SE version, primarily for its greater openness. The standard version of the CD-63 sounded slightly dull by comparison.

I also thought that the SE version articulated transients more clearly—slightly cleaner, more crystalline, less smeared—perhaps as a result of overall improved low-level resolution.

I've recommended the Marantz CD-63 to many of my friends, and all have been quite pleased. Now, when folks have a few extra dollars to spend, I'll steer them toward the SE. For the price of six or seven CDs, stepping up to the SE version just seems to make good sense.

I'm amazed at the value for money here. With a CD player this good selling for this little, you really should audition and think hard before you spend big bucks on digital separates. There are so many other worthwhile places to spend your money—much better to put it into amps or speakers, for instance, than to lay out thousands of dollars for the Processor of the Month.

For what it's worth, the Marantz CD-63 seems to interface very well with the $598 B&K ST-1400 amplifier, successor to the B&K ST-140. The B&K has a nice amount of richness, warmth, harmonic fullness—if not the greatest resolution in the world (which you can't expect at its price). The ST-1400 complements the Marantz CD-63 very nicely, indeed!

If your dealer stocks both the Marantz CD-63 SE and the Meridian 508, you can have an interesting time comparing a killer $500 player with a tiptop $2500 player.

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4 I used both Marantz players straight into the Alema Audion 300B Silver Nights and the RA Labs Black Gold Mini Reference speakers. I could just as easily have used the Audio Electronics Supply SE-1 amplifier that I reported on in November (Vol.17 No.11, p.49).
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PRODUCT of the YEAR 1994

DUNLAVY’S SC-IV LOUDSPEAKER

B&W John Bowers Silver Signature loudspeaker

Sonic Frontiers SFD-2 D/A processor

Audio Research VT150 monoblock power amplifier

Linn Sondek LP12/Lingo turntable

Proceed PAV audio/video preamplifier

BBC LS3/5A loudspeaker

Grado SR60 headphones

John Atkinson
And the winners are . . .

No magazine can help but concentrate on the present, and tend to downplay what happened in the irrefutable past as being less important than the new and the exciting. I instituted Stereophile’s annual “Products of the Year” feature, therefore, to give recognition to those components that had proved capable of giving pleasure beyond the formal review period.

This is the third year we have given awards. There are six individual categories: “Loudspeakers” (including subwoofers); “Amplification Components” (preamplifiers, power amplifiers, etc.); “Digital Sources” (CD players, transports, D/A processors); “Analog Sources” (phono cartridges, turntables, tonearms, FM tuners, etc.); “Home Theater Components” (other than video, which we don’t cover); and “Accessories” (everything else).

The two most important categories are self-explanatory: the “Component of the Year”—the Best of the Best—and the “Budget Component of the Year”—the Best Sound for the Buck.

There is also an “Editor’s Choice” award, which I reserve to myself to single out those superb-sounding products that have proved themselves. “New! Improved! Latest/greatest/bigger/better/faster/more powerful . . .” writes Jack English elsewhere in this issue about the industry’s emphasis on what is happening now. Yet when I’m asked to recommend products, I tend to fall back on mature products that offer proven long-term satisfaction. To be eligible for “Editor’s Choice,” therefore, a component must have been continuously available for at least a decade.

The formal voting procedure consisted of two steps: First, I asked each of Stereophile’s hardware reviewers to nominate up to five components in each of the categories. To be a contender, a product had to have been reported on in Stereophile between the November 1993 and October 1994 issues, either in a full review or in a Follow-Up. Most important, only those components for which a writer had put his opinion on the line for public scrutiny could be nominated. I then put together a ballot form which included all the components that had been nominated by three or more writers and/or editors. In this manner, most of the nominees in most of the categories would have been auditioned by most of the reviewers.

Seventeen of the magazine’s reviewing staff gave three votes for their first choice in each category, two votes for their second choice, and one vote for their third choice (if they had a third choice). I tallied the votes and smythed the words you are now reading.

**Joint Loudspeakers of 1994:**

**B&W John Bowers Silver Signature**
($8000/pair; reviewed by John Atkinson, Vol. 17 No. 6, June 19944)

**Dunlavy Audio Labs SC-IV**
($4995/pair–$5495/pair; reviewed by Robert Deutsch, Vol. 17 No. 4, April 1994)

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Runners-Up (in alphabetical order):


**Thiel CS.1.5** ($1990/pair; reviewed by Sam Tellig, Vol. 17 No. 8, August 1994)

This was a very strong group of contenders, all the speakers having received rave reviews in the magazine. All sound very different from one another; all excel in some areas of reproduction but are bettered in others by another. The voting was very close and, in fact, ended in a tie between B&W’s Silver Signature and Dunlavy Audio Labs’ SC-IV, both speakers sharing that essential attribute for a world-class loudspeaker: the listener doesn’t have to force him– or herself to like their sound. (I’ve observed this happening more often than you might think!) Both loudspeakers represent the state of the art of moving-coil loudspeaker engineering, with essentially flat on-axis responses. Otherwise, they’re very different.

The stand-mounted B&W is a two-way design featuring a reflex-loaded, Kevlar-cone woofer and a metal-dome tweeter, both manufactured by B&W. Though the “bullet tweeter” is set back on top of the cabinet, the high-order crossover means that its output is not particularly time-coherent. However, as its name suggests, it features the use of silver for almost every metal part: the crossover inducers and capacitors are wound from silver, as are the drive-unit voice-coils; and all the wiring, from the amplifier terminals.
onward, is solid-core silver. Whether due to this use of noble metal or not, the Silver Signature's sound is superbly transparent, yet without detail being thrust forward at the listener in the manner of a "monitor" speaker.

While its upper bass sounds just a little too fat for reality, it has superb control in this region; in small-to-medium-sized rooms, it will effectively produce bass frequencies down to the mid-30s without strain. (Visitors new to my room and the B&Ws invariably look for a nonexistent subwoofer!)

But oh, that treble! Many audiophiles criticize metal-dome tweeters for sounding bright. (Invariably, in my experience, they are actually talking about problems much lower down in frequency, at the top of the woofer passband, that are unmasked by the quality of the tweeter.) There is no brightness to the B&W Silver Signature's high frequencies; instead, there are just the clean, overhang-free, natural-sounding highs typical of live sound. Some find its sound too polite, but that's something I can live with. After the review was published, I bought the review samples to serve as my long-term loudspeaker reference. Six months later, the B&Ws are still bringing me new listening pleasure with every new LP or CD I buy.

The floorstanding Dunlavy SC-IV is a very different animal. A three-way design, it uses a vertical array of five drive-units: the two woofers are on the outside, with then the two midrange units flanking a central soft-dome tweeter. By recessing the tweeter and midrange units to bring their acoustic centers into time alignment with the woofers, and implementing the crossover with first-order filters, designer John Dunlavy has arranged for all the drive-unit outputs to add in-phase on the listening axis at listening distances between 8' and 25'.

As well as a flat amplitude response, the results include a degree of imaging precision and soundstage palpability that takes the breath away. At Hi-Fi '94, Stereophile's Miami High-End Show, a pair of Dunlavy SC-1Vs was being demonstrated with an Audio Research CD transport/digital processor and Exposure amplification. Though the hotel room was barely adequate, when I sat in the one seat where everything was just right, the walls of the room dissolved and I was enveloped in the recorded acoustic with every voice and instrument solid and stable. Goosebump time!

And the Dunlavys, with their big cabinet and twin 10" woofers, have real low frequencies: bass that plays loud and clean. I'll leave it to Bob Deutsch to have the last word, taken from his review: "There are singers who have great beauty of tone and vocal agility, but not much power—much like the best mimimimons of the loudspeaker world. It takes a rare singer—eg, a Joan Sutherland—to offer tonal beauty, range, agility, and power. It's just as rare to find a wide-ranging loudspeaker that well communicates rhythm/pace, and can play loud...This is a fabulous speaker! I'm buying the review pair."

**Amplification Component of 1994:**

**Audio Research VT150 monoblock power amplifier**
($11,990/pair; reviewed by Robert Harley, Vol.17 No.8, August 1994)

**Runners-Up** (in alphabetical order):

- **Audio Research LS5 preamplifier** ($4995; reviewed by Robert Harley, Vol.17 Nos.8 & 12, August & December 1994)
- **Conrad-Johnson Premier Eleven stereo power amplifier**
($3295; reviewed by Sam Tellig & Wes Phillips, Vol.17 Nos.2 & 10, February & October 1994)
- **HeadRoom Supreme headphone amplifier** ($399; reviewed by John Atkinson & Thomas J. Norton, Vol.17 Nos.1 & 2, January & February 1994)

**Krell KSA-300S stereo power amplifier** ($9500; reviewed by Thomas J. Norton, Vol.17 No.1, January 1994)

**Mark Levinson No.38 preamplifier** ($3995; reviewed by Robert Harley, Vol.17 No.8, August 1994)

**Vendetta Research SCP-2C phono preamplifier**

Another very strong group of nominees, the contenders for the amplification crown ranged from the delightful little HeadRoom Supreme headphone amplifier, which has brought me hours of musical pleasure on the move, to the latest assaults on the state of the amplifier art from those long-time bastions of high-end electronics, Krell, Mark Levinson, Conrad-Johnson, and Audio Research.

(The Vendetta is the odd man out, no longer being in production since the Berkeley fire destroyed designer John Curl's stock of parts and boards. It was available for nomination because it keeps on popping up its head in reviews as Stereophile's reference phono preamplifier.)

The winner by a large margin in this category was the Audio Research VT150 monoblock. "You've set the audio industry back 20 years!" Audio Research's Bill Johnson was accused of doing this in 1970. But, a quarter-century later, the sum of everything he knows about power-amplifier design is embodied in the VT150. With audiophiles commonly equating the word "tube" with adjectives like "antique" and "obsolete," it could easily be forgotten that Bill has been producing sophisticated, cutting-edge circuits that, if they used solid-state devices instead of tubes, would be hailed as innovative. Yet he chooses to use tubes. "We simply find that an analog signal going through a vacuum tube doesn't seem to be harmed, whereas putting it through any kind of a semiconductor seems to hurt it," he told Robert Harley last August. "Frankly, whether we like it or not, the tube is simply a better device for audio."

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— Peter W. Mitchell, May 1994 (vol. 17 no. 5) Stereophile, on the m.a.r.s. process.

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The utilitarian-looking VT150 features balanced inputs and circuitry and is the first Audio Research power amplifier in ten years to use vacuum-tube regulation. Robert Harley's initial reaction when he auditioned the VT150s was that they sounded a little closed-in and subdued in the treble. Then he realized that what he wasn't hearing was the treble grain, etch, hardness, brittle textures, and that steely sound in the upper midrange and treble that we hear in reproduced music but not in live music. "The VT150s presented an astonishingly believable and natural rendering of timbre," he reported in his review. "Instead of hearing a hi-fi representation of the music, I felt I was hearing the music itself."

DIGITAL SOURCE OF 1994:
SONIC FRONTIERS SFD-2 D/A PROCESSOR
($4695; reviewed by Robert Harley, Vol.16 No.12, December 1993, & Vol.17 No.1, January 1994; and Jonathan Scull, Vol.17 No.4, April 1994)
Runners-Up (in alphabetical order):
Audio Alchemy DAC-in-the-Box D/A processor ($259; reviewed by Robert Harley, Vol.17 No.3, March 1994)
Mark Levinson No.30.5 D/A processor ($15,950; reviewed by Robert Harley, Vol.17 No.10, October 1994)
The Data Basic CD transport ($1750; reviewed by Robert Harley, Vol.17 No.3, March 1994)

"From the sublime to the ridiculous," I thought as I counted the votes in this category, the nominees ranging from the $259 Audio Alchemy DAC-in-the-Box to the mighty Mark Levinson No.30.5 at a hair under $16,000. (I've used both in my system; yes, the '30.5 does sound better — a lot better!) But it was the new Canadian kid on the digital block, Sonic Frontiers' SFD-2 D/A processor, that got the nod from the Stereophile sages.

Featuring the well-respected UltraAnalog D20400A DAC modules, coupled with UltraAnalog's low-jitter AES/2 data receiver module and all-tube circuitry, the SFD-2 should only be used in its balanced mode, which sounds significantly more musical, decided the magazine's matriculate mavens. "I'll cut to the chase: The SFD-2's musical performance was absolutely stunning by any standard," declared Robert Harley in his original review, enthusing over the clarity and lack of grain in the SFD-2's treble and the power, extension, and "musical rightness" of the unit's low frequencies. "Center-of-the-earth solidity," he added.

Jonathan Scull, too, found much to admire in the sound of the Sonic Frontiers, mentioning its chunky, meaty deep bass, lively upper midrange, and the separation and air typical of its soundstage. I find the Mark Levinson No.30.5 to have just a wee bit more refinement to its presentation compared with the more forward-balanced Sonic Frontiers, but hey, look at the difference in price. The SFD-2 is within the reach of real people — which, I suspect, gave it the edge in the votes. And rightly so!

ANALOG SOURCE OF 1994:
LINN SONDEK LP12/LINGO TUNTABLE
Runners-Up (in alphabetical order):
Arcam Delta 100 Dolby S cassette deck ($1800; reviewed by J. Gordon Holt, Vol.17 No.10, October 1994)
Audiolab 8000T FM/AM tuner ($1150; reviewed by Larry Greenhill, Vol.17 Nos.5 & 11, May & November 1994)
Forsell Air Force One/Air Reference turntables ($12,500–$20,500; reviewed by Jonathan Scull, Vol.17 No.1, January 1994)

"Analog Source" pits tuners against turntables, with the superbly engineered Arcam Delta 100 cassette deck getting a look in. But when push came to vote, the 23-year-old Linn Sondek edged out the other nominees, even the various incarnations of the megabux Forsell turntable from Sweden. Of course, the Linn in its current Lingö'd, Cirkus'd form is a bit like the old story of the man who owned the original hatchet with which George Washington cut down the cherry tree: "Of course, the handle's been replaced three times and the head twice." But no matter: Linn Products and their North American distributor, Audiophile Systems, regularly promote dealer clinics where owners of vintage Linn can have handles and heads replaced. And this modest-looking belt-drive turntable is still the most musical in the land, say the Stereophile scribes.
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Runners-Up (in alphabetical order):
Fosgate/AudioSciences 3A audio/video preamplifier ($2799; reviewed by J. Gordon Holt, Vol.17 No.4, April 1994)
Fosgate/AudioSciences THX loudspeaker system ($7630; reviewed by J. Gordon Holt, Vol.17 No.4, April 1994)
McIntosh THX Home Theater loudspeaker system ($6500; reviewed by Thomas J. Norton, Vol.17 No.5, May 1994)

It took a while for high-end audio companies to wake up to the opportunities offered by the marriage of audio and video. But when they did, serious butt was kicked. B&W, McIntosh, and Fosgate/AudioSciences all produced some excellent THX-specification Home Theater speaker systems in the last year, but the Home Theater product that impressed every Stereophile staffer who heard it was the remote-control Proceed PAV audio/video surround-sound control center from Madrigal Audio Laboratories.

Exceptionally versatile in that it offers Dolby Pro-Logic decoding, THX processing, on-screen setup, a complete complement of audio and video inputs and outputs, and rear-channel decorrelation performed by subtly shifting the left and right surround signals in random time rather than in frequency or phase, the PAV is the most transparent surround-sound processor we’ve yet heard. Its effect on film soundtracks was magical, TJN noting its convincing reproduction of recorded subtleties such as the wind whistling around Ryan’s house in the climactic scenes of Patriot Games, and the space and depth in Shawn Murphy’s stunning recording of James Horner’s score for the same movie. Even more important for this particular Home Theater curmudgeon, however, was that, until the appearance of the PAV, using processing on music signals to produce an enveloping soundfield without degrading the overall sound quality has been an impossible test for surround-sound processors to pass. The PAV passes it!

Tom Norton summed up his review thusly: “The PAV is expensive, but as part of a first-class, no-compromise Home Theater, it’s worth every penny.”

Accessory of 1994:
Grado SR60 Headphones ($69; reviewed by Corey Greenberg, Vol.17 No.6, 1994; Sam Tellig, Vol.17 No.10, January 1994)
Runners-Up (in alphabetical order):
Acoustic Sciences Corporation Tower Traps ($235–$355; reviewed by Robert Harley, Vol.16 No.12, December 1993)
Bryston 10B electronic crossover ($1195; reviewed by Steven Stone, Vol.17 No.5, May 1994)
George Kaye Audio Labs Small Signal Tube Checker ($499; reviewed by Jonathan Scull, Vol.17 No.6, June 1994)

The most varied group to be voted on, there was very little spread in the balloting—with one exception: Grado’s remarkable $69 headphones. Both Corey Greenberg and Sam Tellig raved about the SR60 in print. Pretty much every other writer who tried them voted for them. Detailed without sounding fatiguingly bright, with excellent bass and silky-smooth highs that let you listen to music for hours without fatigue, these inexpensive cans not only sound superb when driven by a dedicated headphone amplifier, like the HeadRoom or Melos, but get the best from the power-challenged output stages of your typical portable player. They set the standard to beat in every area but one—comfort! They grip your head like the T. Rex gripped the lawyer’s head in Jurassic Park.

Harbeth BBC LS3/5A loudspeaker

Editor’s Choice:

Back in the early ’70s, the BBC needed a physically unobtrusive nearfield monitor loudspeaker for use in mobile broadcast studios. Accordingly, they instructed their design department, which at that time featured such luminaries as Dudley Harwood (the “father” of the polypropylene cone, who went on to found Harbeth) and the late Spencer Hughes...
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HeadRoom Supreme headphone amplifier

Boy, this was a tight-fought battle, all five contenders offering more than a glimpse of high-end sound at prices almost anyone could afford. (The now-discontinued Optimus CD player was recently seen on sale at just $89.95!) But having scooped up the “Accessory of the Year” award, the all-conquering Grados just swept all before them. If only they weren’t so uncomfortable!

1994 Component of the Year:
Dunlavy Audio Labs SC-IV loudspeaker

Runners-Up (in alphabetical order):
Audio Research VT150 monoblock power amplifier
Mark Levinson No.30.5 D/A processor
Accuphase DP-65 CD player
Krell KSA-300S stereo power amplifier

As the votes trickled in on my fax machine, every one of these components was at one point in the lead for the High End’s most prestigious award. But it was the superb Dunlavy SC-IV that edged ahead at the final post. A well-deserved winner in my humble view, in that it really does redefine what audiophiles should expect from a loudspeaker at the $5000/pair price point.

Previous Winners

1992
Louderspeaker of 1992: Sonus Faber Extrema
Amplification Component of 1992: Melos SHA-1 headphone amplifier
Digital Source of 1992: Mark Levinson No.30 D/A processor
Analog Source of 1992: VPI HW19 Mk.IV turntable
Accessory of 1992: Audio Power Industries Power Wedge 1 AC-line conditioner
Budget Component of 1992: Spica SC-30 loudspeaker
Component of the Year, 1992: Mark Levinson No.30 D/A processor

1993
Louderspeaker of 1993: Thiel CS3.6
Amplification Component of 1993: Convergent Audio Technology SL-1 Signature preamplifier
Joint Digital Sources of 1993:
C.E.C. TL 1 CD transport
Mark Levinson No.31 CD transport
Analog Source of 1993: Basis Ovation turntable
Accessory of 1993: Lexicon CP-3 THX surround-sound processor
Budget Component of 1993: Sumiko Blue Point Special phono cartridge
Component of the Year, 1993: Convergent Audio Technology SL-1 Signature preamplifier

Budget Component of 1994:
Grado SR60 Headphones

Runners-Up (in alphabetical order):
Audio Alchemy DAC-in-the-Box D/A processor
This is a handful of resistors, capacitors and a rotary selector switch shown along with circuit schematics and circuit board layouts created by Sonic Frontiers. These parts represent just a small sample of the high quality components that Sonic Frontiers has chosen to execute their innovative circuits. Every part in every Sonic Frontiers product excels in quality - premium grade components from industry leaders such as MIT, Vishay, Caddock, Electroswitch, Wima, Solen and Kimber. Each part is selected through rigorous testing to fulfill exacting objective, as well as subjective parameters; anything less than this would sacrifice sound and quality. Attention and effort like this, directed toward the smallest details, is a philosophy Sonic Frontiers applies to all facets of design and production. Whether it is choosing a sonically critical resistor or a custom wound, wide bandwidth output transformer, our design team makes their decision based on the strictest criteria. This level of parts quality and innovative circuit design combines with exceptional build quality to offer today's discriminating audiophile consumer a rare level of quality, performance and value.

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The Great Record-Club CD Conspiracy?

Bob Katz investigates

For a while, I've been hearing rumors that the record-club editions of popular compact discs differ from the original versions produced by the record companies. I've met listeners who claim their club versions are compressed in dynamics, and some have reduced bass. Perhaps the clubs, in their infinite wisdom, think the typical member has a lower-class stereo system (in fact, the opposite may be true). Maybe these lower classes could benefit from some judicious dynamic compression, equalization, and digital remastering.

On the other hand, I can see no financial motivation for producing specially-equalized CDs. (Who's buying? Who's paying?) First, club subscribers are already pre-sold on the titles they select. Second, there would have to be a costly remastering session, likely needing approval of the original producer and/or artist. I have never heard of a special "club" mastering session—i.e. all happening behind closed doors?

In October, The Gotham City Audio Society dedicated a meeting to sorting out the issue, comparing CDs from the BMG record club with the standard-issue versions. A discussion group on the Internet has also debated the topic, and one of the most concerned members—Mark Woodruff, a software engineer from Orlando—is attempting to prove his suspicions by measuring these CDs and looking for differences. Mark contacted me for help on this procedure; I recently performed a series of tests on eight CDs that Mark provided and two CDs from the Gotham group.

Mark supplied the following CD titles in their original (in parentheses) and record-club editions: the Crooklyn soundtrack (MCA MCAD-11036), BMG and Columbia House editions; Ace of Base's The Sign (Arista 07822 187400-2), Columbia House edition; Seal's Seal (Sire 26627-2), BMG and Columbia House editions; and Tori Amos's Under the Pink (Atlantic 82567-2), Columbia House edition. He reported that the Columbia House versions sounded compressed and bass-filtered compared to the originals; in addition, the Crooklyn CD's channels were reversed.

Jim Marks of The Gotham City Audio Society brought over five pairs of CDs, including some classical issues. We picked two pairs to test. We listened to Stokowski's Rhapsodies (RCA Living Stereo 09026-61502-2), store-bought version and BMG record-club version. The record-club version sounded obviously degraded, like second-generation analog, and it seems that some attempt at hiss reduction was made. Was BMG making separate masters for its own club? We then compared Frederick Fennell Conducts the Music of Lenzy Anderson (Mercury Living Presence 432 013-2) against the BMG club copy. The BMG version sounded bright and grainy compared with the store-bought version. This could be evidence of a conspiracy.

The Mercury is particularly interesting, since Wilma Cozart Fine personally supervised each master tape of the Mercury CDs and reportedly did not allow any clones to be made. Could BMG have pressed their edition from a new master without Wilma's supervision?

I examined the evidence very carefully. Mark explained that the record-club editions are packaged with almost identical graphics, except that the UPC code on the traycard is usually replaced with "Manufactured by Columbia House under license," or "Mfg. for BMG Direct Marketing, Inc. under license." This indicates that a special run of booklets is printed for the record club. There may be a special CD pressing as well. There are exceptions: Tori Amos's graphics packages are identical (minor printing deviations excepted). The markings in the matrix bands of the CDs are different, showing that at least a new glass master/stamper was made. In some cases, a different CD plant pressed the club edition. More about this later.

Test #1: peak level
First I measured Mark's CDs. I loaded the first two minutes of track 1 from each of the eight CDs (four pairs) into a Sonic Solutions CD mastering system and proceeded with three increasingly demanding tests. If the CDs failed Test #1—a simple comparison of the peak levels of the two CD editions—it was all over. I was almost disappointed to discover that all the CDs passed the peak-level test (Columbia House and record-company editions of each title had identical peak levels). But a CD can be compressed in dynamics and still have the same peak level, just like those commercials on TV. In that case it can sound louder but measure the same on a digital meter, since the ear responds to average volume, not instantaneous peak level.

Test #2: frequency analysis
Test #2 was a frequency analysis of a section of each title, beginning and ending at the same sample number (to guarantee capturing exactly the same musical portion). The four titles passed this test as well, producing apparently identical frequency responses, to the limit of the resolution of the Discrete Fourier Transform within the Sonic Solutions program. But perhaps listeners' ears were perceiving differences we couldn't see on the DFT. I devised an even more critical test.

Test #3: absolute proof
Test #3 was a cancellation test. In theory, if two recordings are absolutely identical, then you can combine (mix) the two
We believe the CS7 sets a new standard in loudspeaker performance. By combining new design techniques and materials with innovations and refinements developed over the last 18 years, the CS7’s exceptionally accurate reproduction of all tonal, spatial, transient, and dynamic musical information provides an extraordinarily realistic, involving musical experience. We invite you to audition it with the music you love most.

The CS7’s Coherent Source® design incorporates several distinctive features:

• Co-axially mounted tweeter and midrange drivers are used to achieve correct time alignment, regardless of listener position. The midrange driver incorporates a unique “waveguide” mounted to the diaphragm’s surface to eliminate typical co-axial frequency response problems.

• The front baffle is constructed of thick cast concrete to provide extremely rigid mounting of the drivers and to reduce unwanted vibration.

• All drivers are THIEL designed and use metal diaphragms to provide resonance free operation for very uniform frequency response.

• All drivers use THIEL’s short coil/long gap motor system for extremely low distortion.

• The 12 inch woofer uses a very heavy 10 pound magnet and a short coil/long gap motor system with stabilizing copper rings for exceptionally clean, high output bass performance extending to 23Hz.
together, inverting the polarity of one vs the other, and there will be no audible output from the mix. Any audible output indicates incomplete cancellation, the result of a difference in level, frequency response, phase response, and/or time (delay) between the two. For example, if the two recordings are matched in level and time, but if the residual of the mix is high-frequency-dominant, then this would confirm that a bass cut (or high boost) had been applied to one of the recordings. A test like this would have been impossible in the days of analog recording, for the timebase of two analog recordings drifts, resulting in the famous “Itchycoo Park” effect! This is the power of Test #3: If we can synchronize two identical CDs, invert the polarity of one, and mix the two signals together, there should be no sound for the entire duration of the CD—ie, complete cancellation. A skip in either CD, even as short as a sample, will produce an audible output. That is why the two CDs must be synchronized to the sample accuracy of 22 microseconds. I caution anyone trying to repeat this test that synchronizing two CDs takes some work; the waveforms must be magnified to show only a few samples on the screen.

All four of Mark’s titles passed the cancellation test with flying colors. This is absolute proof that the compared CDs were made from identical data (identical master tapes or clones). I can only conclude that there is no “smoking gun,” no conspiracy within the record-club industry. Of course, I had to correct the channel reversal of the Crooklyn CD before the test worked. Surprisingly, the two Crooklyn discs showed quite a bit of cancellation even before I corrected the channels, indicating that this commercial disc, like so many popular discs, has very little channel separation or stereo ambience information.

**Unindicted co-conspirator**

So, were Mark’s ears stuffed? Has the Gotham City Audio Society gone batty? I don’t think so. I believe the sonic differences between supposedly identical CDs are caused by a promiscuous evil known as jitter. A significant amount of jitter on a CD can produce a high-frequency edge (which Mark noted as a reduction in bass). Jitter can be caused by the mastering system at a particular plant. At this time, no plant has paid much attention to reducing the jitter of its cutting system? largely because, in general, the engineers at the plants are not audiophiles (“if it measures the same, it sounds the same. .”). All of the Columbia House CDs were pressed by the same plant; the record-company CDs were pressed by four different plants; in fact, Tori Amos’s store-bought CD was pressed by the same plant as Columbia House’s, but with a different glass master.

Now I was really curious; I hadn’t heard a big difference with the pop CDs, but could the drastic differences I heard with the Classical CDs really be caused by jitter? I loaded the Fennell and Stokowski into the Sonic Solutions and immediately proceeded with Test #3, which they both passed. No I had six pairs of CDs reported as sounding different but made from identical masters. This also confirms my contention that stereo systems should be evaluated with the best recordings possible. The classical CDs were made from first-generation analog tape, while the pop CDs have gone through several generations—detail and resolution are more obscured, and additional jitter in playback doesn’t have as noticeable an effect.

1 The “Itchycoo Park” effect is due to comb filtering resulting from two recordings combining and canceling at various frequencies as their time delays vary.
2 Anyone for building a better mousetrap?

**Further evidence**

From my work with various audiophile record companies, I have discovered that CDs from different plants mastered from identical sources sound subtly different. Recently, a mastering engineer played me a pressing that was so degraded from the master that we thought it had been equalized; there was an audible edge in the 2–5kHz region. There is no question that double-speed CD mastering increases jitter. Though this CD was not mastered at double speed, CD plants have been wont to master at double and even triple speed in an effort to reduce costs and increase profits. Audiophile record companies should take steps to ensure that their CDs are mastered at normal speed.

**Where do we go from here?**

We haven’t nailed down all the factors that create a jittery or non-jittery pressing. There is no particular reason why these Columbia House CDs sound worse than the record-company originals, and not the reverse. (Will someone who has found a record-club CD that sounds better than the original please speak up?) Columbia House should try mastering and pressing at the record company’s CD plant under identical circumstances, to see if the differences disappear. Technical reviewers and mastering engineers interested in researching these issues need to get hold of a jitter analyzer which looks at the width of the pits on a CD and determines their variability in size and/or spacing.

These tests revealed a lot about digital audio. The cancellation-test result confirms that we can store and transmit digital audio with very high integrity. (I tested 20 minutes’ worth of audio from 10 CDs, with zero uncorrected errors out of 106 million left- and right-channel samples.) Note that the digital audio workstation combined samples with absolutely no jitter (or there would have been an audible output due to jitter). By definition, the workstation must ignore incoming jitter—the typical jitter period is a small portion of the sample period, and the workstation works only with whole samples, not portions of samples. Incoming time variation becomes completely irrelevant. (If only we could do that in a D/A converter.) This brings us to the conclusion that in order to get consistent, good-quality digital audio, we must find a way to get jitter-free playback.

What about the audibility of jitter? In theory, jitter in any digital source can be removed by redocking a D/A converter with a stable clock. In practice, it takes an incredible jitter-reduction circuit to render jitter-related sonic differences inaudible; I don’t believe such a circuit exists, because listeners can still hear the residual jitter of every jitter-reduction device I have auditioned. I listened to Mark’s CDs using a custom D/A converter I built with UltraAnalog modules and with a built-in jitter-reduction circuit that drives the DAC directly. The DAC module is literally clocked with a crystal clock. By incorporating this circuit within the DAC, it has considerably greater immunity to incoming jitter than any external jitter-reduction box can provide. This DAC has excellent transparency, detail, and purity of tone, and it reduces the differences between different pressings to a very small—but, surprisingly, still audible—amount. Unless I buy a simple “integrated” CD player or go to another audiophile’s house, I have no way to evaluate what the public hears.

Since a complete jitter-elimination circuit has not been invented (and might prove very costly), it is the obligation of mastering plants to produce the most jitter-free pressings possible. But until this jitter problem is solved (don’t hold your breath), audiophiles should obtain the most jitter-free playback possible. It will open your ears.

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Sterophile, December 1994

WorldRadioHistory
THE ANALOG COMPACT DISC

ROBERT HARLEY EXAMINES AN ISSUE NO ONE EVER THOUGHT OF AS AN ISSUE:
CD DISC QUALITY

Nothing quite new is perfect. —Marcus Tullius Cicero, Brutus

Back in the days when vinyl was our only source of high-quality recorded music, the first question when playing a new record was often, "How good is the pressing?" LPs varied so much in their mastering and pressing qualities that buying a new one was often a crapshoot.

With the advent of the digital compact disc, however, few of us bother to think about CD quality variability. We assume that if the CD spins and makes sound, the disc must have been manufactured perfectly.

In reality, compact discs vary greatly in manufacturing quality. The process of creating the tiny pit and land structures that represent the music, then transferring those structures to an inexpensive mass-produced product, is fraught with potential problems. The result is a wide variation in the technical—and sometimes musical—performance of our CDs.

In this article, we'll look at how the CD works, how CDs are made, and what can go wrong in the disc-manufacturing process. In addition, I'll report on the disc quality of a sampling of CDs made at different pressing plants around the world.

This technical evaluation of CD quality was made possible by a unique CD analyzer obtained by Stereophile (see sidebar) that reveals CD data-error types and rates, and allows an examination of the critical signals coming off a CD. Finally, I'll show you how to identify the factory where a disc was made, and debunk some common myths about data errors on CDs.

HOW THE COMPACT DISC WORKS
A compact disc is a piece of polycarbonate (a type of plastic) on which a spiral track has been impressed. This spiral

1 Before joining Stereophile in the Spring of 1989, I worked in CD-mastering for three and a half years, and helped to build a CD mastering machine. I also co-wrote a paper (with Ray Keating) called "Compact Disc Video (CDV) Signal Optimization," presented at the 1987 New York AES Convention. The paper examined the tradeoffs in signal quality when digital audio was combined with video.

COMPACT DISCS VARY GREATLY IN MANUFACTURING QUALITY.
track is a series of indentations ("pits") separated by flat areas ("land"). This alternating pit-and-land structure can be seen in fig. 1, a scanning electron microscope photograph of a CD surface. The white line at the top of the photograph provides the scale; the line is 10μm (ten micrometers, or microns) long. To put the extraordinarily small size of the pits into perspective, a human hair is about 75μm in diameter. By the scale of this photograph, a human hair would be a foot and a half thick.

Digital audio data are encoded in the spiral track of pit and land, waiting to be recovered by your CD transport. The transport's laser beam is focused on the spinning disc, which is coated with a thin, reflective metal layer, almost always aluminum (gold and brass are also occasionally used). The disc's metal coating reflects the beam back to a photodetector, a device that converts light into an electrical signal.

When the laser beam is reflected from the land, the beam is returned to the photodetector at virtually full strength. The laser beam is significantly reduced in intensity when it reflects from a pit bottom because the pit depth is one-quarter the wavelength of the playback laser beam. The portion of the beam reflected from the pit bottom is therefore shifted in phase by 180° (one-quarter wavelength going down, then another one-quarter wavelength going back up) in relation to the beam portion reflected from the land. A 180° phase shift is half a wavelength—equivalent to a polarity reversal. When the two out-of-phase parts of the beam combine to strike the photodetector, they cancel. It's like wiring your loudspeakers out of phase and hearing less bass: when one woofer moves forward, the other moves backward, and the waves cancel each other.

2 The pits are 0.56μm wide, with a track spacing of 1.6μm, and vary in length from 0.9μm to 3.5μm.

### Clover Systems QA-101 CD Analyzer

Looking at error rates on CDs was once the domain of specialized test instruments costing tens of thousands of dollars. These CD analyzers were highly sophisticated, and often provided all kinds of statistical and graphic plotting functions useful when characterizing the quality of large quantities of CDs. The high cost and complexity of CD analyzers excluded all but CD replicators from knowing how well—or how poorly—CDs were made.

All that has changed with a new CD analyzer made by Clover Systems of Laguna Beach, California. The Clover QA-101 is as easy to use as a CD player, and, at $3750, costs less than some high-end transports.

Its low price and simple operation make the QA-101 ideal for those who need to check disc quality on a small scale: record companies, CD-ROM publishers, CD retailers, and stores selling used CDs. Retailers who buy and sell used CDs could check the quality of discs before they buy, and reject those that have been abused. Moreover, the QA-101 could demonstrate to potential purchasers of used discs that the discs are in good condition.

Another application for the QA-101 is checking the disc quality of CD-Rs used as CD masters. CD replicators can now accept a write-once CD as the master, rather than a clunky and expensive "U" Matic tape. Mastering houses can be certain that the master disc they send to the pressing plant has no uncorrectable errors.

The QA-101 starts life as a Philips CD950 CD player. The modifications access the error flags inside the player and present the error data numerically on the machine's custom display. The front panel has two buttons that select which error type is shown. Specifically, the "mode" button scrolls through permutations of the error selected (overall number of the error, number of peak errors, and number of average errors). The type of error displayed is selected by the "error" button, and error rates are continuously updated as the disc plays. At the end of the disc, simply scroll through the error types by pushing the two front-panel buttons, and record the results. To warn of uncorrectable errors, a front-panel LED comes on and stays on when an uncorrectable (E32) error is encountered.

The QA-101 can be augmented with Clover Systems' QA-Net software ($375), which interfaces up to four QA-101s to a PC. The PC collects the error data from each QA-101 and imports the data into Microsoft Excel for analysis and graphic display (fig. 1).

The QA-101's rear panel holds two BNC jacks, one supplying the buffered HF signal, the other the tracking signal. When connected to an oscilloscope, these jacks permit easy examination of the HF and tracking signals. The excellent owner's manual includes a full description of what to look for in these signals, as well as what level of errors constitutes poor disc performance.

The QA-101 is available from Clover Systems, 31642 S. Coast Highway, Suite 101, Laguna Beach, CA 92677. Tel: (714) 499-9566. Fax: (714) 499-4844—Robert Harley

![Clover Systems QA-101 CD Analyzer](image)

Fig. 1 Clover Systems' QA-Net software exports CD-quality data to Microsoft Excel for graphical analysis. This example shows a disc's BLER (Block Error Rate) plotted against playing time (bottom) with overall error statistics inset.

Stereophile, December 1994
NEW 2-CD SET FROM Stereophile!

ENJOY A FULL-LENGTH RECITAL IN YOUR LISTENING ROOM—CAPTURED IN RICH, NATURALLY REVERBERANT SOUND!

Robert Silverman

Concert

Works by Schumann, Schubert, Chopin, and Bach

It's stunning—the new 2-CD set from Stereophile featuring famed Canadian pianist Robert Silverman. Enjoy a full-length recital, including Schumann's seldom-recorded Sonata No. 3 in f, Op. 14—the so-called "Concerto without Orchestra."

Piano recordings are among the hardest to get right—but thrilling when they are! Produced, engineered, and edited by Stereophile's John Atkinson, with Robert Harley, this recording captures these magical performances in stunningly lifelike sound—rich, warm, natural timbres and plenty of ambience.

The release includes a Bonus Track—"Mapping the Soundstage"—to help you check your system's soundstaging and ability to reproduce image depth. Best of all, the price is just $15.99 for two CDs.

Yes! I want Robert Silverman to play in my listening room! (The recording is THAT good—guaranteed!)

PROGRAM

Schumann: Sonata No. 3 in f, Op. 14
J.S. Bach: from The Well-Tempered Clavier, Book One
  Prelude in E-flat Minor
  Fugue in D-sharp Minor
  Prelude in E-flat Major
  Fugue in E-flat Major
Schubert: Six Moments Musicaux, D. 780
Chopin: Barcarolle, Op. 60

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WorldRadioHistory
Rather than represent one condition by binary "zero" and the other by binary "one," it was felt better to represent a reflection from both land and pit bottom as a binary "zero," with binary "one" corresponding to the change in beam intensity when the beam is reflected from a pit-to-land or land-to-pit transition. In short, land or a pit bottom are binary 0, transitions are binary 1.

The photodetector therefore outputs a varying voltage in response to the pit pattern—a voltage that contains all the binary 1s and 0s encoded on the disc.

An encoding scheme called "Eight to Fourteen Modulation" (EFM) formats the data to be recorded on the disc according to certain rules. EFM coding creates a bit stream in which binary 1s are separated by a minimum of two 0s and a maximum of ten 0s. The shortest pit or land length therefore represents the binary data "1001," and the longest pit or land length represents the binary data "10000000001." EFM coding creates a specific pattern of ones and zeros that results in nine discrete pit or land lengths on the disc. You can see the discrete nature of the pit and land lengths in the photograph shown in fig.1.

Because the pits and land have nine discrete lengths, the signal reflected from the disc to the photodetector is composed of nine discrete frequencies. The shortest pit or land length produces a frequency of 720kHz; the longest pit or land length produces a frequency of 196kHz. These nine discrete frequencies are easily seen in the signal output from the photodetector. This signal, called the "HF" (High Frequency) signal, is ultimately decoded and converted into raw digital-audio data, then into an analog audio signal. Although the HF signal is a series of sinewaves, the digital data are encoded in the zero-crossing transitions. Fig.2 shows the relationship between the original digital audio data, the EFM-coded data, the CD pit structure, and the recovered HF signal.

**Fig.2 The relationship between the original digital audio data, the EFM-coded data, the CD pit structure, and the recovered HF signal. (Reproduced with permission from Principles of Digital Audio by Ken C. Pohlmann, Howard W. Sams & Company, Second Edition, 1989.)**

**How CDS Are Made**

The entire disc-manufacturing process is shown in fig.3. In the first step, mastering, the binary data on a master tape are converted to pit-and-land structures. A large glass disc, called the glass master, is coated with photoresist, a material that changes its properties when exposed to light. The coated disc is put on the mastering machine's turntable, spun, and exposed to a laser beam turned on and off by the binary data we wish to record on the disc. The exposed master is then turned into a CD mold.

**Fig.3 CD manufacturing process. (Reproduced with permission from Principles of Digital Audio by Ken C. Pohlmann, Howard W. Sams & Company, Second Edition, 1989.)**

3 The laser beam stays on all the time, but is passed through a modulator that either deflects the beam or allows it to pass straight through. The modulator is a crystal with a particular lattice orientation, across which an electrical signal representing the data is applied. The voltage across the crystal causes the lattice to change orientation, deflecting the beam off its path toward the CD master disc. You can put a photodetector on this "rejected" beam, decode it, and listen to the music while mastering.
The Marantz CD-63 Special Edition Compact Disc player adds a host of technical refinements and parts upgrades to the already highly regarded CD-63. The CD drive section features the CDM-12 holographic laser mechanism and digital servo control. The critical analog output stage features Marantz High Definition Amplifier Modules, discrete Class A circuits with fast slew rate, wide bandwidth and lower distortion, compared to conventional op-amp analog output circuits. The CD-63 Special Edition upgrades make an already excellent player even better, including improved chassis construction and shielding along with OFC power transformer wiring and a number of other refinements. And, the CD-63SE performs superbly as a digital transport when connected to your favorite outboard processor. A remarkable CD player at a most affordable price. Audition the Marantz CD-63 Special Edition, available at better audio retailers.

**PURE HIGH FIDELITY**

Marantz America, Inc. 440 Medinah Road, Roselle, IL 60172-2330 Tel: 708-307-3100
"developed" by applying a liquid chemical that dissolves the photoresist only where it has been exposed to the recording laser beam. Dissolved areas in the photoresist are the pits.

The developed glass master is coated with silver, then put in an electroplating tank which applies a thin layer of nickel to the silver. When separated, the nickel coating can become a stamper. Alternately, the nickel coating becomes a "metal master," from which "metal mothers" are formed, which in turn can create hundreds of stampers. Fig. 4 shows a metal master being separated from a silvered glass master. Interestingly, the technique for making CD metal masters, mothers, and stampers is identical to that used in LP manufacturing. Even the chemical solutions in the plating baths are the same.

The stamper is trimmed and put in an injection-molding press. Polycarbonate beads are heated to their melting point, then injected under high heat and pressure into the mold cavity containing the stamper. The pits on the stamper's surface are thus transferred to the polycarbonate disc. This process takes about eight seconds. Fig. 5 shows a disc's worth of polycarbonate (about 18gm) in bead form; Fig. 6 is the clear disc as it comes from an injection-molding machine.

In the next step in CD manufacturing, metallization, a thin, reflective layer of aluminum is either sputtered or vapor-deposited on the clear polycarbonate disc. A lacquer coating is then applied to the reflective layer to protect the aluminum and prevent it from oxidizing, and the label is silk-screened onto the disc. The finished discs are put into jewel-boxes and packaged for shipment.

**Bits Is Bits?**

Although CD manufacturing appears to be a straightforward process of stamping inviolate ones and zeros into a plastic disc, these manufacturing techniques introduce analog-like variations in the quality of the HF signal read from the disc.

Because the HF signal recovered from the finished CD is created by the tiny pit-and-land structures, it follows that any changes in pit shape will affect the HF signal. Well-formed pits produce a good-looking HF signal; poor pit geometry creates a poor-quality HF signal.

A clean HF signal is essential not only to low error rates and good tracking ability, but also to sound quality. Although the HF signal undergoes significant processing before the raw audio data and timing clock are recovered, many digital designers agree that the HF signal's shape and quality affect how the disc sounds. Some high-end transports even have circuits to clean up the HF signal before it's sent to the decoding electronics.

That the HF signal's quality affects the sound is suggested by many examples of audible differences where there should be none. In 1986, Doug Sax first alerted me that CDs made from the same master tape but manufactured using different techniques. The first disc was made conventionally—polycarbonate with aluminum metallization; the second disc was made from polycarbonate, but with gold metallization; the third disc was molded from a material called "Zeonex," and metallized with gold. Since all three discs were made from the same master tape, any sonic differences between them

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4 Doug Sax is a mastering engineer, co-founder of Sheffield Lab, and the father of modern direct-to-disc recording. See my interview with him in Vol. 12 No. 10.
should be solely the result of the manufacturing process, disc material, and metallization.

All three discs sounded different, the Zeonex sounding the best. The standard disc had a drier, more forward sound, with less depth. The treble was more forward, yet the sound lacked the air, openness, and extension heard on the Zeonex disc. The Zeonex disc's bass was also better defined, and I heard an overall increase in resolution, with more musical information presented.

These sonic differences may be regarded as slight or even imperceptible to the casual listener through a low-quality stereo system. But to the audiophile with a keen ear, an open mind, and a high-resolution playback system, the differences are musically significant.

I can imagine a skeptic playing these discs casually for a few seconds through a low-quality, poorly set-up system and concluding that they all sound the same. It's easy to scoff at the possibility of sonic differences between CDs; after all, CD-ROMs work perfectly, no matter where they were manufactured. This argument—that computer data and audio data are identical—forsakes that computer data are never converted into an analog signal and perceived with analog instruments (our ears). Computer data and audio data are identical and can be treated identically—if the data are never converted into music.

Another example of how two discs with identical data sound different is the strange case of copying (in the digital domain) a CD to a CD-R (a CD made on a CD recorder); the CD-R sounds better than the disc from which it was made. Although the data are identical, the CD-R's HF signal looks much better than that of the mass-manufactured CD.

Finally, CD tweaks such as disc stabilizers, CD Stoplight, and fluids applied to the CD surface don't affect the data integrity, meaning that other factors are at work in changing the sound of CD playback.

But if the data are the same on all those discs, why do they sound different?

**WHAT GOES WRONG IN CD MANUFACTURING**

Creating the pits on a CD is a highly variable process. Nearly every step in the CD manufacturing process affects the pit shape, which affects the HF signal recovered from the disc.

Let's take a closer look at the CD manufacturing processes described earlier, and what factors could introduce this analog-like variability in CD sound quality.

First, the glass master's photoresist thickness must be correct to within a small fraction of a micron; photoresist thickness determines the pit depth, which determines the HF signal's amplitude. The photoresist must also be a uniform thickness around the disc. Otherwise, the pit depth will vary and cause amplitude modulation of the HF signal. Any contamination in the photore sist can wipe out large areas of pits, causing errors in the recovered datastream.

The pit shape—and thus the HF signal's quality—is determined by myriad variables in the mastering process, including the recording laser beam's intensity, the ambient humidity in the mastering room, developer solution concentration, development time, and how vigorously the master is agitated in the developing solution—to name a few. A slightly too-high laser power or a few extra seconds under the developer will give the pits on the glass master a poor shape and result in a low-quality HF signal from the final

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5 At the 1992 Winter CES, Meridian's Bob Stuart copied a CD to a CD-R of music that engineer and high-end retailer Peter McGrath had recorded. Bob played the original CD, then the CD-R. Seconds into the CD-R, Peter jumped from his chair and exclaimed, "That's impossible!"
JITTER HAS RECENTLY BECOME A HOT TOPIC IN THE CD-MANUFACTURING BUSINESS.

CD. Moreover, if the master isn't developed uniformly, some pits will be longer, deeper, and/or wider than others. Another factor that changes the pit lengths from their theoretical ideal is even the tiniest rotational instability of the turntable spinning the glass master. A slight decrease in turntable speed produces longer pits; an increase in turntable speed produces slightly shorter pits. A flutter-type instability produces pits of rapidly varying length.

With this concept of turntable flutter in mind, let's go back to what I said earlier about how the digital data are encoded in the HF signal recovered from the disc. We saw that the 1s and 0s are contained in the zero crossing points of the nine discrete-frequency sinewaves of the HF signal. The zero crossing points are the logic thresholds at which the system differentiates between 1s and 0s, and the point from which the clock is recovered. Varying pit lengths will shift those zero crossing points in time, introducing jitter in the HF signal.

That's right; the amount of jitter on a compact disc is influenced by the highly variable mastering and developing processes—and the quality of the mastering machine itself.

Jitter has recently become a hot topic in the CD-manufacturing business. When the CD specification was created (codified in the Philips "Red Book" standard), jitter was never even mentioned, much less specified. Now manufacturers of CD-mastering machines are touting their models as having "low jitter," and disc replicators are beginning to measure jitter in the HF signal as part of the quality-assurance process. Philips even plans to revise the Red Book (the first revision ever) to include a maximum jitter specification. The new jitter spec is rumored to be 50 nanoseconds—about half the amount of jitter that would create a bit error. When Philips decides to make as dramatic a move as adding a new specification to the Red Book after more than 15 years, there must be a good reason behind it.

CD manufacturers have recently adopted double-, triple-, even quadruple-speed mastering, which cuts down on expensive mastering machine time, and increases a CD factory's throughput. I don't have any data, but it's hard to imagine that high-speed mastering improves the disc's jitter performance.

In the electroforming steps of CD manufacturing (converting the glass master to stampers), the primary threats to CD quality are contamination and scratches. Given the pits' tiny sizes, a speck of dust would obliterate hundreds of tracks. Any scratches on the metal parts will also wipe out data, and increase the disc's error rate.

The injection molding process also influences CD quality in that it can create problems in the polycarbonate which introduce an optical phenomenon called "birefringence." Birefringence is a double refraction of the playback beam caused by lack of homogeneity of the polycarbonate. Part of the beam travels at a different velocity and polarization,
Adcom would like to make this perfectly clear.

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—Lewis Lipnick, Stereophile, Vol. 11 No. 4, April 1988.

Recommended accessory in Stereophile, Vol. 12 No. 4, April 1989.

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—Ken Pohlman, AUDIO, November 1987.

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due to changes in the polycarbonate's refractive index. This varying refractive index is caused by stress on the polycarbonate during the molding process. The polycarbonate temperature and injection pressure must be held to tight tolerances to prevent excessive birefringence. Birefringence, which you can see as striations or swirls in the polycarbonate, degrades the HF signal's quality.

The injection molding process can create disc eccentricity—in other words, the disc's spindle hole wasn't punched out at the exact center of the disc (disc eccentricity introduced when the stamper's center hole is punched). This causes the CD transport's tracking servo to work extra-hard to stay on track, drawing lots of current from its power supply and causing power-supply droop. If that supply rail also feeds other circuits, an eccentric disc can affect other subsystems within the transport. This is one reason why high-end CD transports use separate power-supply regulation stages for each transport servo system.

Metallization affects the HF signal in an analog-like way. First, the metallization layer on some CDs isn't thick enough. If you can see through the CD, then insufficient aluminum has been deposited. Aluminum becomes opaque at a thickness of about 800 Angstrom units. The result of too-thin aluminum layer is lower reflectivity, which lowers the HF signal amplitude.

A separate problem introduced by the metallization process is "pinholes"—tiny holes in the reflective layer. Any spurious particles on the unmetallized disc surface become metallized, then fall off, introducing areas of no aluminum. Pinholes create dropouts in the HF signal, and increase the disc's error rates. You can check for pinholes by holding a disc up to a strong light.

Some CDs—particularly very old ones or of PolyGram Hannover manufacture—are metallized all the way to the outer edge. This can allow air to reach the metallization layer, causing the aluminum to oxidize. The oxidized area slowly eats its way toward the disc center, degrading the HF signal and even rendering the disc unplayable. It can take many years, however, for oxidation to ruin a disc.

Sam Tellig sent me a batch of CDs he'd bought that developed horrible brown blotches around the outside edge. The discs were all made at the same factory, the Philips-DuPont Optical (PDO) plant in Blackburn, UK. These discs were unlike any I'd ever seen—most oxidized discs turn a shade of gray, not brown. I'll report on the effects of these brown blotches later.

In short, CD manufacturing isn't just a simple matter of stamping inviolate digital ones and zeros into a disc, but a series of interdependent processes that produce an analog-like variability in the disc's signal quality.

Data Errors on CDs

The raw data recovered from a CD are never identical to the data recorded on the disc. The CD system introduces data errors and dropouts through contamination, scratches, pinholes, and the other manufacturing defects described.

In addition, mishandling increases a disc's data errors. A CD's top (label) side is more vulnerable than the bottom, because the pits are impressed on the label side. Scratches or contamination on the bottom surface are out of focus to the laser, and are less likely to cause errors. But scratches on the top surface can wipe out large areas of pits. The photograph in Fig. 7 is a CD surface on which I made a mild abrasion with a ball-point pen—mild by un magnified visual standards. On the CD's pit scale, however, this "mild" scratch produced catastrophic damage to the spiral track.

Fortunately, the CD format uses a very powerful error-detection and -correction system that nearly always results in bit-for-bit accuracy in the recovered data. In fact, the error-correction system is so effective that it can correct for up to 4000 consecutive missing bits. I'm not talking about error concealment, in which missing data are guessed at, but complete correction of those 4000 bits.

Errors can be corrected because data additional to the required data are already recorded on the CD. This so-called "redundant" data is called upon if the primary data are missing or corrupted. The most basic form of error-correction coding is simply storing the data twice; if the data are missing in the first location, you can recover the missing bits in the second location. This is an extremely crude example. In practice, error-correction schemes are enormously complex and vastly more efficient. The team of engineers and mathematicians at Sony who developed the CD's error-correction system reportedly spent ten years at the task.

A common misconception holds that data errors degrade sound quality. As shown later in this article, un correctable errors are rare events. However, even if you had a disc with hundreds of un correctable errors, those errors wouldn't affect such aspects of sound quality as treble smoothness, soundstage depth, or bass definition. Instead, you would hear a click or discontinuity at the point where the un correctable error occurred. The rest of the music would be unaffected. Moreover, there's absolutely no evidence that discs with lower error rates (corrected errors) sound any different from discs with high error rates. Whatever's causing differences in sound quality between CDs isn't data errors.

Nonetheless, knowing the number and severity of data errors gives an overall indication of the disc quality, and also shows if the disc has been abused.

The Cross Interleaved Reed-Solomon (CIRC) error-correction scheme used in the CD has two levels of error correction, identified by the names of the two decoding circuits: "C1" and "C2." The C1 decoder corrects for short, easily correctable errors; the C2 decoder handles longer "burst" errors that are harder to correct.

To understand how this two-step process works, you need to know about an error-correction technique called "interleaving." Interleaving mixes up the order of the data before...
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(Dick Olsher)
Vol 16, No. 1, January, 1993

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A COMMON MISCONCEPTION HOLDS THAT DATA ERRORS DEGRADE SOUND QUALITY.

recording, then puts them back in the correct order (de-interleaving) on playback. Interleaving converts long burst errors into many smaller errors, which are more easily corrected. In the CD system, de-interleaving occurs after the C1 decoder but before the C2 decoder. If an error is too long for the C1 decoder to correct, the C1 passes it to the C2 decoder, with a flag identifying the bad or missing data. The de-interleaving process between the C1 and C2 decoders makes that error much easier for the C2 to correct. Errors corrected by the C2 decoder are thus more severe than those corrected by the C1 decoder.

Errors are classified by how many bad or missing data packets (called “symbols”) exist, and at which decoder they appear. We thus have a two-digit number that tells us the severity of the error. For example, an E21 error means that two bad symbols were corrected by the C1 decoder. The first number tells us the number of bad symbols corrected, the second number the decoder. An E11 error (one bad symbol at the C1 decoder) is very easy to correct; E11s happen all the time.

Conversely, an E32 error is uncorrectable; the data loss is so severe that the system cannot replace it. When this happens, the C2 decoder fills in the missing samples by interpolating (guessing at) what data may have been lost. Early CD players simply muted the audio output when uncorrectable errors were encountered. If a disc contains no E32 errors, the recovered data are bit-for-bit identical to the source data.

A general indicator of disc quality is called the “Block Error Rate,” or BLER. BLER is the number of data blocks per second containing bad symbols at the C1 decoder input. The Red Book specifies a maximum BLER of 220/second (the CD data structure contains 7350 blocks/second).

The error type—BLER, E11, E22, for examples—gives us an indication of the error’s cause. A high BLER indicates poor pit geometry; the optical system has a hard time reading the disc, and consequently produces lots of random bit errors. E22 errors (the worst fully correctable error) indicate localized damage to the disc, caused either by defects introduced by the manufacturing process, or mishandling of the finished CD.

A parameter called a “dropout” is defined as an instance in which the signal coming off the disc drops below 30% of its nominal value. Large errors combined with a dropout indicate physical damage to the disc. Large errors without a dropout could be caused by localized areas of poor pit geometry.

Although these errors are completely corrected, a disc with high error rates will have less tolerance for scratches, dirt, fingerprints, and poor-quality CD players before producing an uncorrectable error. This is especially important in CD-ROM, where bit-for-bit accuracy is essential.

Errors

I encountered no uncorrectable errors (E32e) during 15 hours of analysis. Even Sam Tellig’s discs, with the brown blotches around the edge, produced no E32 errors. Not surprisingly, however, Sam’s disc had the highest error rates of the discs tested: BLER of 267, E11 of 188, E21 of 47, and E22 of 29. Note that the BLER of 267 doesn’t meet the Red Book specification (maximum BLER of 220). The HF signal from Sam’s disc was very poor: severely unstable and amplitude-modulated.

By contrast, the best disc I measured was Lesley Olsher’s Anyone in Love on Vital Records. I chose this disc for measurement because it had been recently manufactured by Disc Manufacturing, Inc., the company I used to work for, and who I know make high-quality discs. In addition, this disc was fresh out of the wrapper. The BLER was just 5, E11 was 4, E22 was 0, and E31 was 0. The HF-signal quality was excellent. I also measured very good performance from discs made by Sony’s Digital Audio Disc Corporation (eg, Music for Trumpet and Orchestra, SSK 6245), and rather poor technical performance from discs made by Matsushita (eg, Telarc Sampler, Volume One). This small sample size doesn’t necessarily represent all discs produced by the two plants—CD quality varies from week to week, and even from master to master, within a factory.

Discs that have been in my collection for nearly ten years, and discs I’ve played hundreds of times, didn’t have any higher error rates than new discs. The only exceptions were a few discs that had once been caught between the drawer and the front panel of the Esoteric P-2 transport. The damage, visible to the naked eye, produced some E22 errors but, amazingly, no E32 errors.

Curiously, the gold-metallized Zeonex Chesky disc had more errors and a poorer-quality HF signal than did the aluminum polycarbonate version. I attribute this not to the gold and the Zeonex, but to the master-to-master variability described earlier. This shows that a visual inspection of the HF signal doesn’t say anything about the disc’s sound. Instead, a high-resolution HF-signal jitter analyzer is needed to really know what’s going on in the HF signal.

It’s easy to tell where a CD has been manufactured: Look on the inside band between where the music starts and the center hole. Some discs will say right on them where they were made. Others give more subtle clues. A band with a bar code and the letters “DIDX” mean it was made by Sony; the letters PDO indicate that it was made by Philips-DuPont Optical; Nimbus has a distinctive double row of letters; discs with a band of large block letters and no other identification were probably made by Sanyo.

An engineer I worked with, Alan Hamersley, could not only identify the plant where a disc was made, but the mastering machine it was cut on. Nearly every mastering machine has periodic variations in the track pitch (distance between tracks) that occur at the same track radius. The track pitch variations, caused by periodic imperfections in the mechanical system that moves the turntable underneath the optics during mastering, can be seen with the naked eye as changes in the diffraction pattern.

WHAT IT ALL MEANS

It’s becoming incontrovertible that CDs containing the same 1s and 0s produce varying levels of sound quality. These sonic differences are not caused by data errors, as commonly assumed, but by some other mechanism. The most likely culprit is jitter in the recovered HF signal, which varies greatly between CDs. As we’ve seen, CD manufacturing isn’t a black-and-white process of putting binary 1s and 0s on a piece of plastic, but a series of highly malleable procedures, each of which introduces an analog-like variability in the signal read from the disc by your CD transport.

Unfortunately, there’s no way for you to judge the quality of the discs you buy. Until the record companies put pressure on CD manufacturers to make better-sounding discs, purchasing CDs will remain a crapshoot.
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The Ground Floor

Peter W. Mitchell

This magazine was founded by J. Gordon Holt on the premise that listening is the conclusive test of a hi-fi product. Nevertheless, measurements can play an important role in product testing, and an even more important role in product development. For example, measurements are a diagnostic tool. A listening test may indicate that a product alters the sound, but a measurement may reveal the cause of the coloration.

Even a very simple measurement may contain a hidden surprise. For example, several years ago, a Mark Levinson power amplifier was enthusiastically praised by several reviewers. In comparisons with other amplifiers, the sound of the new amp had some of the rich tonal warmth of live music, while making CDs sound less strident than usual. Finally, one reviewer, while praising the sound, also measured the amplifier's frequency response and found it to have a spectral tilt—slightly boosting low and midrange frequencies while slightly reducing the highs. In effect, this amplifier was also acting as an equalizer! Its departures from flat response were not large in absolute terms (less than 1dB), but a change of only 0.25dB is plainly audible if it spans a broad range of frequencies.

Frequency response is the simplest measure of any audio component. The test merely involves feeding pure tones into the product's input at various frequencies, and observing whether they're equally strong when they emerge at the output. The second classic measurement is total harmonic distortion (THD), determined by feeding in a single pure tone and measuring everything that emerges at the output besides the original tone—whatever unwanted contamination (and noise) is added to the signal.

These two basic measurements, frequency response and THD, have been commonplace for nearly a half-century. In the early years of the hi-fi era they actually meant something, because some products had plainly audible distortion and obvious departures from accurate response. But it didn't take designers long to fix those problems. In fact, they had been pretty well fixed by the time, over 30 years ago, when J. Gordon Holt quit his job at High Fidelity and launched a new magazine called Stereophile, in which the sound of a hi-fi product would be deemed more important than its specifications. By that time, and ever since, it was generally accepted that the most important sonic differences among audio products were due to other factors, not simply to THD and frequency response.

Stereophile was founded by J. Gordon Holt on the premise that listening is the conclusive test of a hi-fi product.

The reason I cited the case of the obsolete Levinson amplifier above is that it was so unusual. In modern audio products, low THD and basically flat response are achieved so routinely that they usually can be taken for granted. This isn't to say that they should be ignored; departures of a couple tenths of a dB from perfectly flat response occur fairly often in amplifiers, preamps, and CD players. To the extent that these are audible at all, they're accepted as part of the sonic personality of the product—if only because compensating for them would require adding tone controls or equalizers to the signal path, with the attendant risk of introducing other losses (of transparency, resolution of detail, or soundstaging) that might outweigh any benefit gained.

The THD Fiasco

As for the measurement of THD, it's merely useless. Audio engineers have known for decades that a far more useful measure of distortion would be obtained if, instead of simply adding all harmonics of the test signal equally, the measurement was "weighted" to reflect the relative audibilities of the various harmonics. This is important because of the ear's "masking" curve—the tendency of the powerful fundamental tone to obscure anything at adjacent frequencies.

For example, when measuring distortion at 100Hz, the second- and third-harmonic distortion components (at 200 and 300Hz, respectively) are numerically the strongest in most equipment; but thanks to masking in the ear, they are inaudible unless present in very large quantities. As a rule, THD must approach a full percentage point before it can be heard with test tones, and it must exceed 6% before it can be heard in music. So it's hardly surprising that a tube amplifier with a THD of 0.1% may sound as good as or better than a solid-state amp whose THD is 0.001%, testifying to the irrelevance of the normal THD measurement.

A proper "weighted" THD measurement might reveal the solid-state amplifier to have more audible distortion, but the industry never got around to agreeing on a standard weighting curve, and consequently no manufacturer of testing equipment ever produced a weighted-THD meter for engineers to use. Weighted-THD measurements might tell us something about the relative sound qualities of different amplifiers, because the high-order harmonics (such as the ninth harmonic) would be boosted in the measurement to reflect the ear's much more acute sensitivity to them. A weighted-THD rating also would expose the folly of using large amounts of global negative feedback to improve the conventional (but meaningless) THD number.

Actually, some engineers did try to introduce such a weighted-THD measurement 20 years ago, as part of the last
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revised of the IHF amplifier standard for amplifier testing. But the audio engineers (mainly American and British) who wanted this weighted-THD test were outvoted by the corporate representatives (mainly Japanese) who opposed it. As you may recall, during the '70s and '80s, many Japanese manufacturers were involved in a ratings war, often claiming THD ratings as low as 0.0001%.

Even if the weighted-THD measurement had become part of the IHF amplifier test standard, it might have been ignored, suffering the same fate as two other parts of the IHF standard: the proposal to measure output power in dBW rather than linear watts, and a requirement that the S/N ratio of a phono-preamp input must include the impedance of the phono pickup. After agreeing to adopt the revised IHF standard, most manufacturers simply proceeded to violate it, because their older measurements provided more impressive numbers in the battle of specifications.

In the absence of an industry-standard weighted-THD meter, the concept of a weighted-THD rating has played an influential role at only one place: Lucasfilm. For about a dozen years, Tomlinson Holman has used a simple weighted-THD rating system as part of the certification process for THX. Most details of this process are kept secret, but Holman has used his weighted-THD rating to exclude hard-sounding amplifiers from THX theaters and the home THX program.

**THE MULTI-FREQUENCY PROBLEM**

The traditional (and appropriately scorned) measurements of THD and frequency response had two important practical drawbacks: they measured only one frequency at a time; and, in the pre-computer era, the process was slow. To measure a single frequency-response curve, an engineer might measure a product's response at 20 or 30 individual frequencies and then plot the individual meter readings on a piece of graph paper to see the shape of the curve. Even after the process was automated, with a "sweep" generator that gradually varied the test frequency from 20Hz up to 20kHz and plotted the resulting curve on a motor-driven chart recorder, a single curve typically took five minutes to produce. A seemingly simple test, for example measuring the frequency response of a loudspeaker at a couple dozen off-axis angles, could turn into an all-day project that consequently was attempted only rarely.

Obviously, we needed more efficient methods—tools that would make measurements quickly and easily enough that getting data wouldn't be an obstacle. And we needed tools that would use a music-like signal, stimulating the product at many frequencies rather than measuring only one frequency at a time. This was well-known 30 or 40 years ago, but fast and powerful computer-based audio measurement systems didn't become generally available until five years ago.

**ENGINEERS OFTEN BECOME PRISONERS OF THEIR MEASUREMENTS, RESTRICTING THEIR SEARCH FOR UNDERSTANDING TO THE AREA ILLUMINATED BY AVAILABLE DATA.**

In the interim, the THD fiasco made it clear that we couldn't wait for official standards to develop—if a new measurement would be useful, someone would have to create the tools to measure it. Most scientists and engineers are like the person in the old story who was found walking in circles under a street lamp looking for his lost wallet. When asked why he had restricted his search to such a short segment of the mile-long street, he replied, "This is where the light is." Engineers often become prisoners of their measurements, restricting their search for understanding to the area illuminated by available data. Whenever our old measurements don't reveal why products sound different, we need to devise a new measuring tool that casts a fresh light on a different aspect of the problem.

Two measuring tools that were developed during the pre-computer era illustrate how quickly a different measurement can provide new insight into design flaws. One tool, the TEF (time-energy-frequency) analyzer, was developed by the late Richard Heyser, and was turned into a successful commercial system by engineers at Crown. A TEF system generates a test signal that sweeps rapidly from 20Hz–20kHz (so rapidly that it may sound like a chirp), while a matching narrow-band filter sweeps through the frequency range at the same speed. The real heart of the TEF system is a circuit that offsets the timing of the tracking filter relative to the chirp. If the measuring microphone is one meter away from the speaker, the sound will arrive at the mike about three milliseconds after the chirp leaves the amplifier. So, if the tracking filter is just three milliseconds behind the chirp sweep, the system will record the strength of the direct signal from the speaker at each frequency. By the time the speaker's sound reflects off a wall or floor and gets back to the microphone, the filter has moved on to a different frequency and the reflected signal is rejected. This was the first technique that allowed quasi-anechoic measurements of a speaker's response to be made efficiently in a living room, avoiding the need to build a large and expensive anechoic chamber. At a time when anechoic chambers were scarce, this system gave many speaker designers access to the more accurate measurements that they needed in order to design better speakers.

Moreover, by offsetting the tracking filter to a different delay, you can capture each individual reflection, measure its frequency response, and (by calibrating its time offset) identify the reflecting surface by calculating its exact distance. Wall and ceiling reflections, which had been thought to be a relatively minor inconvenience, were discovered to be an important part of a speaker's room sound. These early reflections are produced by waves that are radiated about 60° off-axis by the speaker. But instead of being very far down in level, in some speakers the crossover produces off-axis lobes that are nearly as strong at certain frequencies as the on-axis output, severely coloring the speaker's in-room sound. The TEF analyzer does many other things also, but the insight that it provided into speaker/room interactions was priceless.

For two decades now, one of my favorite measuring tools has been the real-time analyzer (RTA), which splits the signal into 30 narrow filter bands (similar to the "critical bands" of the human hearing system) and displays the filtered signal on an array of LEDs. Thus, a complete map of the frequency content of the signal is seen on a rectangular array of LEDs, changing as the sound does. Nowadays, a cheap ten-band RTA is included in every graphic equalizer; two decades ago, a professional-quality 30-band RTA cost nearly $5000, making it a rare tool. Two examples illustrate its efficacy.

If the source signal is pink noise (with equal energy in each band), the display shows the effective frequency response of the system. There's no waiting; problems with driver matching or crossover design can be seen and diagnosed instantly. A dozen years ago, I was hired on short notice by a company whose well-
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Finally, feast your ears on the new Alpha 5 Plus CD player - quite simply, the best value high performance CD player ever produced by a UK manufacturer. Over the past year the critics have heaped praise on its predecessor, the Alpha 5 CD player, calling it "the player to beat" (What Hi-Fi?) and "standing head and shoulders above the rest" (Hi-Fi News). Now, thanks to new master clock circuitry, the 5 Plus sounds even better and once again sets the standards for other CD players to match.

Just listen. Close your eyes, open your mind, and see the light.
known designer had nearly finished developing an entire new line of speakers when he died. On-axis measurements looked okay, but the sound was bad. The RTA immediately revealed the problem: terrible off-axis response. The company had been using an old measuring system that was very slow, and a comprehensive array of off-axis measurements had never been made. A few simple changes in each system's crossover network improved the off-axis response while keeping the on-axis response reasonably close to flat. During the next year the speakers earned rave reviews in several magazines—not because of me, but simply because efficient measurements enabled the drivers to perform up to their potential.

A quarter-century ago, Dolby-B noise reduction was married to the tape cassette. While this was a significant advance in fidelity for a minority of users, for the majority it was a giant step backward. Analog tape recorders in professional recording studios are recalibrated every day, sometimes even at the beginning of every reel of tape, to ensure accurate playback level and frequency response. This is an absolute requirement for correct tracking of all Dolby noise-reduction circuits. But to overcome Japanese resistance to paying for American technology, the license for the Dolby-B system allowed it to be installed in recorders that cannot easily be recalibrated by the user to match the tape. Meanwhile, because of the specification race, most cassette recorders are factory-calibrated with the best (and most expensive) grades of tape.

So what? Thanks to the speed and ease with which an RTA registers frequency response, over the years I have used my RTA to observe the behavior of hundreds of cassette decks, with every brand of tape, over a wide range of signal levels. The RTA has consistently revealed that most cassette decks are miscalibrated for most tapes, producing recordings that play back below Dolby calibration level, often with rolled-off highs. The consequent mistracking of the Dolby-B circuit produced both dull highs and a consistent depression around 2kHz, robbing music of its presence and aliveness. (For many people, the Dolby switch on a tape player is just another tone control: On for dull, Off for brilliant.)

A properly calibrated cassette deck with either Dolby S or Dolby-B noise reduction can produce a remarkably accurate recording of an original source, as JGH confirmed in his Arcam Delta 100 cassette recorder review (October '94, Vol.17 No.10, p.152). And an RTA's display is the best tool I know of when calibrating any recorder to match a tape. But in the real world, where most people don't have an RTA, the ability of any cassette deck to produce accurate recordings may depend mainly on the quality of its built-in tape-calibration system—if it has one.

AMAZING MLSSA
In recent years, computer-based tools have combined multi-frequency measurements with fast processing. The MLSSA package, introduced by DRA Labs about five years ago, is a wonderfully effective tool for identifying resonances and their resulting colorations. In Stereophile's speaker tests, a MLSSA analysis of an accelerometer measurement shows cabinet-panel resonances (which you might control with damping material or a bar clamp), while the MLSSA cumulative spectral-decay, or waterfall, graph shows driver resonances.

The MLSSA system generates a noise-like signal resembling the sound of rain on a tin roof. The name MLSSA (pronounced "Melissa") is based on "maximum length sequence (MLS)," a phrase from mathematical theory that describes the character of the digitally generated test signal. It may sound like noise to the ear, but it's not random to the computer, which compares the speaker's output against the original signal. This analysis shows how the speaker's output would "decay" after a transient impulse. FFT (Fast Fourier Transform) processing of successive portions of the impulse response generates a three-dimensional graph that resembles the contour map of a waterfall.

Ideally, a loudspeaker should stop "speaking" immediately after the transient impulse. The series of contour lines in the graph shows how steeply the speaker's output falls to the baseline. As you can see by perusing the MLSSA graphs in recent issues of Stereophile, the energy level in many high-end speakers actually does drop to the baseline within one to two milliseconds at most frequencies above 1kHz. Note, for example, the very clean MLSSA graph for the B&W FCM-8 speaker (fig.1).

Compare this with fig.2, which illustrates the typical behavior of a budget-priced, mainstream hi-fi speaker: it's nearly filled with ridges extending from back to front. Each ridge represents a resonance that persists for more than four milliseconds after the signal cuts off. Consequently, in music, the speaker's output at each instant is muddled with numerous resonances that may have been stimulated several milliseconds earlier.

In recent years I have tested dozens of
high-quality aftermarket automotive speakers for Car Audio magazine. In-car listening tests, with the speakers mounted in the front doors, have revealed a clear correlation between the quality of the speaker's sound and the severity of the resonances seen in the MLSSA waterfall plot. Many car speakers have resonances much more severe and longer-lasting than those seen in fig.2. In contrast, the Sony XS-3051 coaxial car speaker, which I tested a year ago (Car Audio, December 1993), had a cleaner waterfall plot than many of the high-end speakers tested by Stereophile.

Thanks to the Sony's unusual freedom from delayed resonances, it reproduced musical sound with exceptional realism. The difference in sound quality may have been even more pronounced in the car than in the living room. At home, the sound of speakers located 8' to 10' away from you may be somewhat altered by the acoustics of your room before the signal arrives at your ears. The situation in a car, with the speakers mounted in the door panels only 2' to 3' away from you on either side, is more akin to "near-field" listening, where the speakers would be at arms' length in front of you.

The clarity of the presentation may make differences in driver coloration particularly acute. Listening to the Sony

vs other car speakers, the contrast in sound quality was quite dramatic. In a trumpet recording, for example, the Sony had something of the sweet, rounded character of live trumpet sound. Through other speakers, the trumpet had the usual sterile, flat character of a recording heard through a hi-fi system. With other recordings, the speakers with the clean waterfall graph consistently produced an impression that was less like hi-fi and more like the experience of real music.

Measurements have predictive value. Once a definite correlation has been established between a sonic fault and a measurement such as the MLSSA waterfall plot, a speaker designer can do quick MLSSA measurements of a hundred woofers and immediately identify the handful that are relatively free of midrange resonance, and so worth further study. Some driver manufacturers even include MLSSA graphs in their catalogs and data sheets,1 making it much easier for system designers to rapidly select low-cost, good-sounding drivers.

Of course, the MLSSA waterfall is only one measurement. A loudspeaker is a complex multidimensional system with many potential faults; it can't be characterized completely by a single test. But during the last few years, this single measuring tool has transformed the loudspeaker industry. A dozen years ago, when I was occasionally hired to design speaker systems, I was constantly frustrated by the fact that most of the OEM woofers available to me suffered from severe midrange colorations. In some cases, a resonance would show up as an obvious peak in the driver's frequency response. But it might not; some resonances, as we know now, are out of phase relative to the speaker's primary output, producing a dip in frequency response. Other resonances have no visible effect at all in standard measurements.

When the MLSSA waterfall measurement was introduced by DRA Labs in 1989, it was quickly adopted by reviewers and driver designers, who admit its clear revelation of how resonances grow and decay in a speaker's transient output. With this map as a guide, engineers were able to track down the sources of many resonant colorations.

SPECTRAL CONTAMINATION

The same principle applies to many other measurements and other types of products. For this reason, I'm always interested in new measuring tools that provide fresh insight into the differences we hear between products. Last May, at a "Loudspeaker University" seminar near Boston, developers of loudspeaker parts (cones, voice-coil bobbins, et al) presented information on improved techniques for speaker manufacturing. Engineer Steve Tatarunis, from Ferrofluidics Corp., discussed new measurements showing that the use of magnetic ferrofluid can reduce distortion in dynamic loudspeakers. Two of his graphs are reproduced here as figs.3 and 4.

Each graph spans a factor-of-ten range in frequency, from 500Hz-5kHz, and shows the response of a 1" dome tweeter driven by a 10W signal. The test signal is a complex chord containing tones at 19 discrete frequencies (500Hz, 600Hz, 700Hz, 800Hz, etc.). These tones are represented by the 19 narrow spikes that approach the top of each graph.

The original test signal contained only the 19 tones, with silence in the frequency intervals between them. But in the sound produced by the tweeter, dozens of subsidiary tones have sprouted up in the intervals between the 19 tones. These are intermodulation distortion products and noise. Note that in fig.3 (without ferrofluid), this grass has grown to a rather high level, muddying the clarity of the 19-tone chord. In fig.4 (with ferrofluid installed in the tweeter's voice-coil gap), the average level of the grass has been reduced by about 15dB, allowing the 19 tones to stand out more clearly above the interference.

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1 Few companies create their own drivers. Most of the 300-odd brands of speakers on the market employ woofers and tweeters mass-produced by a handful of "original-equipment" manufacturers (OEMs) such as Vifa, Audax, Tomenen, and Fostex.

2 Some manufacturers "cheat" by selecting inappropriate time windows to generate the MLSSA plots. This results in unnaturally clean-looking decays. —JA
Tatarunis suggested a possible explanation for this interference, and for the dramatic improvement wrought by the ferrofluid: When any speaker is being driven to high levels around its resonant frequency, it undergoes maximum excursion with the voice-coil and its bobbin moving rapidly back and forth in the voice-coil gap (1000 times a second for a tweeter). This motion pumps air back and forth in the gap, producing jet-like turbulence and whistling noises. Ferrofluid would seal the gap, stopping the air turbulence and noise.

This study is exciting for two reasons:

1) It may contribute to our understanding of loudspeaker dynamics. I've often noticed that some speakers can play quite loud with little change in the character of their sound, while other speakers become progressively more harsh and congested as the volume increases. The design of the voice-coil and magnet structure contribute to this difference, but there are apparently other factors as well.

2) Obviously, multi-tone testing can be a very revealing tool when applied to loudspeakers. Of course, this is not the first time a multi-tone test has been seen in these pages. In a January 1994 "Industry Update" (Vol.17 No.1), Robert Harley and I discussed the potential value of two multi-tone testing systems, FASTTEST and NMR (Noise/Masking Ratio), for evaluating the behavior of perceptual coders that record digital audio at reduced bit-rates. For examples of multi-tone testing at work, see Harley's measurements of ATRAC and PASC coders in his September 1994 report on MiniDisc, and Peter Van Willenswaard's revealing test of several perceptual coders (Stereophile, September 1992, Vol.15 No.10, pp.52–61). But multi-tone tests need not be limited to perceptual coders; they may provide equally dramatic insights into the performances of loudspeakers, amplifiers, and other products.

This is not a new idea. The research department of the BBC proposed multi-tone tests nearly 20 years ago, but the crucial research in this area was reported in 1988 by the late Deane Jensen and Gary Sokolich (AES preprint #2725).

Their concept is illustrated by figs.3 and 4: begin with a multi-frequency test signal that, like music, contains tones at many individual frequencies. Pass this signal through a device, and measure the contamination that has been added in the gaps or windows between the original tones.

Since the distortion products occur at many frequencies, they're called "spectral contamination." Jensen and Sokolich developed instrumentation to measure such contamination reliably over a wide dynamic range. To illustrate the power of the technique, they showed sample measurements of spectral contamination in a microphonic preamplifier, IC op-amps, power amplifiers (tube and solid-state), and tape recorders (analog and digital). They wrote: "It is our hope that this method of measurement will ultimately enable us to correlate objective measurement results with subjective impressions of audio components, a goal which has eluded many traditional distortion measurements."

With today's computer-based measurement systems, multi-tone testing is becoming easy. It need not even be expensive. Stereophile's industry-standard Audio Precision system can be programmed to do multi-tone tests, but SYSid, another PC-based audio measurement system, costs only one-fourth as much, and can perform many of the same tests. Figs.3 and 4 were measured by SYSid. The software was developed by audio researchers at AT&T's Bell Laboratories, and SYSid is packaged with a powerful DSP board from Ariel Corp. The system runs in an IBM-compatible PC, and Version 5.0 of the SYSid software, containing many enhancements, was just released.
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Kent Nagano is Musical Director and Principal Conductor of not one, but three, orchestras worldwide: the Opéra de Lyon, the Halle in Manchester, England, and the Berkeley, in the California town of his birth. His reputation for not only immaculate performance but also the introduction of rare repertoire, both on the concert stage and in recording, has grown rapidly, something I asked him about at the start of my interview.

Barbara Jahn: How does your repertoire with the Berkeley Symphony compare with that of the Halle and Opéra de Lyon?

Kent Nagano: It’s hard to draw parallels; communities are made up of human beings with different needs. In Berkeley we have the San Francisco Symphony about four kilometers away, and it plays a huge amount of repertoire. Would it make sense for the Berkeley to duplicate that repertoire? My instinct tells me that the San Francisco Bay area is wealthy enough to support and let flourish two artistic institutions, but not two that are duplicating each other. So we’ve tried to do performances that are really relevant to the community.

Jahn: And what are they? I know you’ve done, and recorded, some Frank Zappa.

Nagano: I made that recording in 1983 in London with the London Symphony; they were the first people to invite me to work in Europe. Zappa has a long-time association with
Berkeley and the San Francisco area, so it felt natural to perform his works. We also perform quite a bit of American music and the full range of the greater works of the 20th century. All of that is a balance for what I call the great foundations of the symphonic repertoire: Beethoven, Mozart. . .

Jahn: Do you have the same kind of dedicated audience in Berkeley as you do here in Manchester?

Nagano: Well, yes. It was because of Berkeley that I became convinced of a dedication to high standards. It seems such a logical and simple conclusion, really. The competition for the very little amount of funding that there is gets quite intense, and sometimes you can lose your focus. We are all guilty of that—myself included—because you are seduced by the power of advertising and media promotion, and you can be drawn toward a sensationalism or an easy fix to a solution.

But because of the situation in Berkeley, where there was no funding to be had at all—there was hardly enough to meet the payroll of the orchestra—I went through long periods without receiving my own. The only way the orchestra was going to survive was if the public wanted it to, which meant that we had to make an artistic argument that we were relevant and valuable, and it took a long time. We had no help, no infrastructure that was really well-developed. The first seven years that I was there were disastrous, economically speaking; but those years built up the playing level of the
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know anything about the piece before the rest of us did?

Nagano: Oh, yes. I knew about the piece, because he'd admit that he was working on a new piece. But nobody, including his wife, ever saw the piece until the very, very end.

Jahn: Was that always the case?

Nagano: That was always the case. As he worked on his pieces, he would speak about them very little; he wouldn't even tell what the title was. But once the piece was completed he never changed it. I remember one telling account, when a clarinetist in the Paris Opera Orchestra was very frustrated and irritated because he said a passage in St. Francis of Assisi was unplayable. And Messiaen's reaction wasn't at all defensive; they didn't get into a shooting match or anything. Messiaen was genuinely concerned and said, "Is it really unplayable?" And he walked up to the clarinetist and said, "What's the problem?" And the clarinetist said, "I can't play this." And Messiaen showed him a fingering how to play it, and the clarinetist did it.

Then he was completely calm because he realized that Messiaen would never write something that didn't feel 100% right. And because he knew his score intimately well, and had heard the sounds over and over in his mind, by the time he committed it to paper and performance, it didn't need any further revision.

Jahn: Tell me a little about your grant to study conducting with Pierre Boulez and Leonard Bernstein in the '80s. Did Boulez influence you most in the interpretation of his own music, or of other 20th-century works, or in the technique of conducting in general?

Nagano: I would answer Yes, Yes, and Yes to all three of those. But Bernstein also had great influence. I learned different things from both. But the most important things I learned from both of them were exactly the same, even though their personalities were a little different. First, I learned that it takes time and effort to mature an audience. Second, that excellence is uncompromising. It's so easy with all the pressures around to give in to it, but both of them were absolutely uncompromising in their dedication to excellence. Excellence means asking as much of yourself as you do from the audiences and from those with whom you work.

And the third, perhaps most important, thing of all was just to see that great love of music as a priority above everything else, because it is what is going to carry you through and help you develop and make you a better musician. Yes, technique has something to do with it. Yes, research has something to do with it, and being able to communicate a work has something to do with it. But music itself, as a primary motivator, is the real priority.

Jahn: Did you learn anything from Frank Zappa?

Zappa was a wonderful human being—very, very intelligent, and extremely uncompromising. He insisted on levels of perfection and excellence that were unbelievable.

Jahn: Many of your most acclaimed recordings have been made with the Opéra de Lyon Orchestra.

Nagano: That's a unique situation. I was invited in to be part of a team—not to impose my ego on it, but to bring my talents to it. That team reflects a tradition that was there before me, and one that will still be there after I leave. Rather like the Halle Orchestra.

I work with Jean-Pierre Brossmann, 15 years Artistic Director, and Louis Erlo, who has been General Director there since the 1950s. I've been there for seven years now—we
This is famous for sneak previews and mini-reviews that never turn into full reviews, and I hate to break a great tradition. I do feel, however, that I should follow up on my initial comments on the Wireworld Eclipse interconnects [Issue 83/84] and speaker cables to the point of confirming my original praise.

I have now worked extensively with the Wireworld Eclipse phono interconnect, RCA interconnects, balanced interconnects, Starlight digital interconnects, and speaker cables.

The net result confirms my initial impressions. The Wireworld Eclipse cables have proved to be reference quality products that have integrated smoothly in connecting up both an entire reference system and in connecting all of the 30-odd components I have had in for review since I started using them. I have found them to be fully compatible with every component I have tried, and I have found them to be extremely revealing without exaggerating any aspect of sonic performance, or producing the kind of false insights into the music which later turn out to be coloration.

The Wireworld Eclipse interconnects and speaker cables not only reveal the music that is on the recording, they reveal the full capabilities of all types of equipment. They have proved to be of great value in making detailed equipment comparisons. They have not always been the best interconnects or speaker cables in connecting specific electronics or speakers, but they have been competitive, and they have usually been superior.

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all have our areas of responsibility. Louis oversees all the operations of the House and secures its political and economic positions. Jean-Pierre has to cast, and he peruses anything that is an artistic statement—from the platform to the stage direction and decor. I’m the Music Director—the orchestra falls under my wing, as do the various members of the cast. But all these specific responsibilities overlap. We are extremely understaffed there—much to our great delight—so that we can share our ideas as a team. I participate in the fund-raising, and in casting and programming. Louis participates in orchestral auditions. We can work together because our combined vision, our goal, is so clear in front of us.

The very first opera that I performed was [Schoenberg’s] Moses und Aron, and that was a long-time wish of Louis Erlo. He and Jean-Pierre Brossmann also brought [Prokofiev’s] The Love of Three Oranges to me; I didn’t know that work before. But Louis had great ideas, and is a would-be Stage Director, so they asked me if I’d consider looking at the score. I did, and it’s a great score, so we performed it. Jean-Pierre Brossmann brought to the table Strauss’s Salome in French, and I just laughed. I said, “Salome in French? I’ve performed this work so many times in German that I don’t think I can learn it in French.” And he showed me all this researched documentation of how Strauss wanted it to be performed in French.

Jahn: Really?

Nagano: Yeah, he corresponded with Debussy to find out how best to set text in French, because the Oscar Wilde play was in French. And soon it became clear that there were some very strong reasons why this needed to be available.

I always loved Puccini; when I did Butterfly, Bohème, and Turandot, it was their first time in Lyon. The Puccini cycle that we are in the middle of now is something that I brought to the table. I also brought the [Busoni] Turandot/Arlecchino combination to the table; these were pieces I’m performing in concert before and [which I thought] were just unbelievably great and should be shared. Jean-Pierre Brossmann brought [the idea of Poulenc’s] Dialogues des Carmélites to the table. The only rule that we have, if it is a rule, is that all three of us have to share an enthusiasm for a project; if one of us doesn’t, then we don’t perform it. We all have to agree that something is a really great idea, and show commitment to getting it up, because it’s so expensive and so complicated to put on an opera project.

Sometimes I’ve been very surprised. I brought to the table the Susannah project [by Carlisle Floyd]—the recording will be coming out soon. Susannah is a great American classic, and is totally unknown outside the United States. In fact, I’ve been told that it is the opera with the most performances in the US, it’s that popular. I’ve always felt that something so popular and so strong and so reflective of American culture should be available. And on its 40th anniversary, we are bringing out a recording of it. I wasn’t sure that this truly American-type story of discrimination would really go over well in France, so I put it rather nervously on the table; but they were both very enthusiastic about it, as was the orchestra. They’re now asking me to do a full stage production of it.

Jahn: Discovering new music is still so exciting.

Nagano: It is . . . but I remember—I got into an argument with my piano teacher once. He said to me, “Don’t you just love Mozart? He’s the most contemporary composer you can imagine.” And, of course, as a young student, I said, “What are you talking about?”

And he said, “Because at any particular time you can have a musical experience in Mozart’s music that really brings alive your life today.” Freshness can bring a kind of contemporary feel to a piece, and it is that freshness that makes the concert-going experience so special.

A Kent Nagano Discography

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Friedman, Sylvan, Maddalena, Hammons;
Nagano, Lyon Opéra Orchestra, English Opera Chorus
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BRUCH: Music for Clarinet & Viola
Clarinet & Viola Concerto, Romance for Viola
P. Meyer, clarinet; Causée, viola; Nagano, Lyon Opéra Orchestra
Erato 2292-45483-2

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Rhétor, Muhr, Holzmaier, Huttenlocher, Dahlberg, Metzner, Nagano, Lyon Opéra Orchestra & Chorus
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Gessendort, Dahllberg, Sima, Selig; Nagano, Lyon Opéra Orchestra & Chorus
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DELIBES: Coppélia
Nagano, Lyon Opéra Orchestra
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FLOYD: Susannah
Studer, Rancy, Hadley, Chester, Druitt, Cole,
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Hurry before your dealer sells out!
How can a reviewer possibly put a value on a loudspeaker as costly as the Wilson Audio Specialties X-1/Grand SLAMM? When he reviewed Wilson's WATT/Puppy 2 system ($12,900–$16,000/pair, depending on finish) a few years back, John Atkinson said that it was "one of the more expensive loudspeakers around." The Grand SLAMM costs almost five times as much!

On the other hand, we've all heard about the legendary Wilson WAMM system, which costs a staggering $130,000. At a mere $65,000, the X-1 could be regarded as something of a bargain, especially as it's said to provide a performance envelope approaching that of the bigger, more expensive speaker. Even so, the new Wilson system costs way more than most enthusiasts can afford. (According to Stereophile's most recent reader survey, the average price of a complete high-quality audio system is around $11,700.)

Other big, costly speaker systems represent their designers' attempts at achieving the state of the art. In historical order, we have the Infinity IRS in its various incarnations, the Goldmund Apologue, the Martin-Logan Statement, the Apogee Grand, the Genesis I, and the B&W Nautilus. Reviewing such systems can be something of a contest between designer and critic: Can the former win over the latter by the quality of his work alone, regardless of price?

To judge by his WATT/Puppy design, David Wilson of Wilson Audio Specialties is a formidable opponent. I lost the battle several years ago when I bought a pair of WATT/Puppies for my own use.

The X-1/Grand SLAMM X-1 stands for the "First experimental" system of this type, and SLAMM for "Super Linear Adjustable Modular Monitor." "Super Linear" derives from Wilson's own design target: to make the system subjectively distortion-free over a wholly natural and realistic dynamic range. "Adjustable Modular" reflects the user's control of drive-unit delay, hence system phase accuracy.

What exactly do you get for your $65,000? A pair of imposing, 6'-tall, impressively engineered loudspeaker systems, each containing seven moving-coil drive-units ranging in diameter from 15" to 1". The speaker is finished like a fine piano in black mirror-gloss varnish. (Alternative auto-finish colors, such as Mercedes Gold, may be ordered; a range of veneered side panels is also available.) Together, the two enclosures weigh about half a ton; when I spiked them to my floor, they partly sank into it.

Following the idea that the proportions of the X-1 should roughly follow those of the WATT/Puppy, albeit on a larger scale, the speaker looks slim.
The SLAMMs exert a definite presence in any room; it's definitely a case of beauty being in the eye of the beholder. Responses elicited from visitors ranged from "No way!" to "Superb functional beauty," with "Engineering as art" noted along the way. Silent, the X-1s stand like monoliths, their dark silhouettes reminiscent of the black transmitter on the lunar surface in Kubrick's 2001. But they emit audio signals in electrical form and one's voice changes—the resulting sound quality has power and beauty.

The claimed performance envelope approaches that of the WAMM. Key X-1 features include easy, trouble-free use with a single pair of input terminals (see below); and a comparatively kind amplifier loading. This speaker has a very high dynamic range, typically capable of 120dB spl at 1m with a music-related peak program input of 350W—well within the compass of the Krell KSA-3005, for example. The high sensitivity (95dB/W, 8 ohms) is as equally important as the high dynamic range; pretty decent 102dB in-room sound levels will be possible from 20W of single-ended triode power, even if the speaker could never be driven to full stretch by such a source.

**Technology**

The X-1 is a pure example of the art of loudspeaker engineering—it's form truly follows its function. Those requirements inherent in its design concept are realized without compromise, the angled, faceted surfaces of the functional, structural elements accented by their mirror-gloss finish.

The foundation of the design is the generous bass system, the lower of the two modules of the stack. Everything starts here: contact with the floor, the reference plane for the mid and treble enclosures, and, last but by no means least, the location and support for the bass drivers themselves. Above 30Hz, the bass range is handled by two large moving-coil drivers, a 15" and a 12", working in tandem. Instead of the usual four-point mounting, eight Allen-head bolts securely bind the drivers to the rigid enclosure.

Why do two differently-sized bass units share the same enclosure? They don't. Subcompartments in the bass enclosure have specific damping and airflow control elements graded to ensure the appropriate acoustic power sharing between the two drivers. Working as a pair, they're equivalent to a single 18" woofer, but the combo chosen by Wilson has far superior transient control and maintains higher quality into the low midrange—necessary in view of the overlap required for the first-order crossover (see below).

The considerable enclosure-panel area of such large speakers potentially increases the cabinet's ability to re-radiate unwanted resonant energy. Setting reference standards for low panel resonance and coloration in such a large enclosure is a daunting task; a designer must work much harder than he or she would on a more modest system's far smaller panel area.

In his previous designs, Dave Wilson has shown an uncompromising approach to enclosures and their acoustic signatures. In the case of the WATT, itself a landmark in low coloration, a cast, mineral-impregnated resin material was used. Many panel materials were re-

### Wilson Audio Specialties

During discussions with Dave Wilson when he was setting up the X-1/Grand SLAMM in my room, I wondered aloud how someone without formal training as a speaker designer could possibly produce the sophisticated and uncompromising products for which his company is renowned. Wilson's own background is based in years of research in the medical engineering field, where reliability and safety standards are second to none. However, when I learned that he was also an enthusiastic audiophile of many years, standing as well as a self-taught recording engineer and producer of acknowledged skill (he's been releasing Wilson Audio records since 1973), I could see that the right ingredients were in place after all.

Wilson's legendary WAMM speaker grew out of a desire for a one-off vehicle to be used at home to replay his own recordings. In 1980, despite an initial reluctance to market this unwieldy product, and feeling concerned about its almost prohibitive cost, the WAMM did in fact begin to sell in modest numbers. So far, about 40 systems have been delivered, though now, following the launch of the X-1, his aim is to produce only two a year.

The idea for the highly compact WATT came about when Dave needed a dynamic, transparent, but portable location monitor. The WATT appeared in 1986, was soon adopted by the audio fraternity despite its intended nearfield application, and has since undergone a number of major revision, including the addition of the Puppy, the latter making it a full-range, three-way design. To date; some 1500 pairs of WATTS have been produced, many with Puppies, and with a number used as center-channel speakers or Home Theater systems.

In its latest incarnation, the Series 5, the WATT/Puppy has undergone a major revision. To some extent my withdrawal symptoms resulting from the loss of the review X-1 system were mitigated by the timely installation of the WATT/Puppy 5—but more of that in a later issue.

Some customers who were otherwise happy with the WAMM's price/performance combination had complained that the massive four-tower system was just too big. Could Mr. Wilson please design a compact version? Thus, the idea of the X-1 was born. While he was at it, Wilson also aimed to make the X-1 easier to build and install than the WAMM. Performance targets were set regardless of cost (a speaker designer's dream!). Wilson speaks of concept and execution as primary goals. The concept must be the most complete possible in terms of realistic musical presentation, while the execution must also be the most comprehensive possible —elegant, reliable, and accessible. By "accessible," Dave means that this product must facilitate consistent installation and also be easy to use.

Dave believes that there's an element of nobility in the pursuit of musical truth in high-quality audio reproduction, and that, as such, it's both a valuable and valued activity. He firmly believes that spending effort in this pursuit of quality will inevitably lead to success. It certainly seems to have worked for Wilson Audio Specialties. From an annual turnover of just $1800 in 1977, Wilson Audio grew to $450,000 by 1986, following the introduction of the WATT, and now this Utah-based company has reached the $4.5 million/annum mark. The $64,500 SLAMM has already sold 42 pairs since its introduction in early 1994. The high-end market may be in a state of flux, but clearly there are no signs of sales flagging at Wilson Audio: the order book presently stands at about the 100 level.

—Martin Colloms
searched for the X-1's bass cabinet, including everything you might have thought or heard of, and then some. Wilson especially sought to avoid the characteristic, if not necessarily unmusical, sonic signature of wood and wood-composite materials. That overlay of "panel sound" common to the construction of nearly all box loudspeakers was considered to act as a barrier to both the bass articulation and to the ability of a speaker to clearly differentiate types of bass instruments. In the Sonus Faber Guarneri, for example, curved, laminated wood surfaces are deliberately exploited to impart a more natural sound to the system.

Impulse analysis led to trials with a proprietary phenolic material—a very hard, very high-density laminated polymer long used in the electrical power industry because of its strength, fine electrical properties, and dimensional stability. Figs. 1 and 2 (supplied by Wilson) show the difference in cumulative spectral-decay behavior between the ubiquitous MDF and Wilson's high-density composite used in the X-1. This material is generously cross-braced in the X-1's 140-liter (5 ft³) bass enclosure to an almost matrix-like complexity. The result feels almost solid, like a block of stone.

Bass-reflex tuning is provided by a huge ducted port, 6" in diameter by 17" long, made from machined alloy and bolted into the center of the rear panel. (This port's 8.5-liter volume of moving air is greater than that enclosed by many sealed-box miniature speakers!) Bass-reflex ports are characterized by terms such as "volume velocity," whose magnitude describes how much acoustic output can be delivered over what frequency range for a given distortion criterion. Even when tuned to a demanding low 24Hz, as in the X-1, where the useful output covers a range of about three-quarters of an octave (18-30Hz), this size of port is capable of producing room-shaking acoustic bass power without significant distortion.

**System & Crossover:** The low-frequency crossover filters are potted in resin to minimize self-induced drive-unit vibration effects, and are isolated from acoustic pressure changes by being mounted in their own sealed section of the main enclosure. The speakers are fitted with large, low-profile, alloy cone feet which in some cases may be sufficient for optimal floor coupling. As specified, however, hardened steel spikes are threaded into the cones and adjusted to give the best lock to the floor, as well as to facilitate system leveling.

It may use seven drive-units, but the X-1 is a four-way system. The first crossover is set at a low 120Hz, but as it's electrically first-order, 6dB/octave, there will be considerable overlap between the outputs of the bass and midrange drivers. Significant output from the woofers will be present up to 500Hz, this intended to reinforce the lower midrange and to help drive the system toward maximum conversion efficiency. Likewise, the "reach" of the high-power midrange drivers down into the upper bass improves the low-frequency "speed" and overall transient performance, helping to define the leading edges of notes. It also blends the transition between the different acoustic heights of the bass and mid sections. This increase of the effective vertical length of the overall low-frequency source tends to reduce the depth of the reflected floor-notch effects by spreading them over a wider frequency range.

Such a low-order crossover is made possible thanks to the use of two 7"-cone midrange drivers—high-power bass-midrange units that would be capable of full-range performance in a smaller system. Sealed in their own enclosures, the midrange drivers will also have a natural second-order acoustic rolloff below 70Hz or so to give an ultimate 18dB/octave rolloff slope. As a consequence, they're not called on to deliver any musical information of significance below 40Hz.

These units cover a nominal 4½ octaves up to the second crossover at 3kHz, where both high- and low-pass transitions are second-order, 12dB/octave. This doesn't appear to make immediate sense for a vertical midrange/treble array that has the tweeter located between the two midrange units. However, the Grand SLAMM's facility for fore and aft displacement of these three modules—lower and upper mids...

![Fig.1 MDF panel, cumulative spectral-decay plot of accelerometer output (linear frequency scale).](image1)

![Fig.2 Wilson X-1/Grand SLAMM, phenolic bass enclosure panel, cumulative spectral-decay plot of accelerometer output under the same conditions as fig.1 (linear frequency scale).](image2)
and treble—may be independently varied, and their acoustic delays adjusted for near-perfect phase integration through the crossover region. Such is the glorious freedom this unfettered high-end speaker design allows!

The front tweeter operates full-range to its limit beyond 20kHz, while the third crossover point at 12kHz (damped second-order) feeds to the fourth “way” of this four-way speaker system. This is a pair of rear-facing “ambience” tweeters that are run some 10dB or so below the main level.

A front-facing tweeter of the usual 1" type becomes increasingly directional above 10kHz due to its small size, this dimension approaching the actual wavelength of the frequencies reproduced. Additional smaller tweeters could be fitted adjacent to the main tweeter, but it’s hard to blend their acoustic output; the result often mars the main signal. Ideally, a touch of extra treble energy is required to drive the room acoustic in the upper range where the energy output of the main tweeter is beginning to fall. Bi-directional panel speakers naturally have this “open” quality: rear-directed treble energy helps “open” the excitation of the room acoustic in the uppermost part of the frequency range. Many designers of box speakers have recognized this loss and tried various solutions—e.g., the Shahinian designs, the Mirage bi-directional models, the top-mounted second tweeter of the Lin Isobarik, and almost all the Snell range.

Wilson’s ambience tweeters are mounted on rear-angled facets of the uppermost X-1 enclosure module. They nicely dispense a proportion of delayed, reverberant air and sparkle without any apparent loss of focus or wavefront accuracy from the main tweeter.

The mid-treble crossover is accorded its own solid, cast-resin enclosure at the back of the module stack, well clear of acoustic, vibrational, or electromagnetic interaction with the enclosure or the loudspeaker drivers. Wilson puts great emphasis on removing the induction-sensitive crossover coils from the reach of the distorted magnetic field of the drivers. He reports a smearing of transient decay due to this type of poor crossover isolation.

Drive-Units: Both woofers are made by the French company Focal specifically for the Grand SLAMM. (If sold on the consumer market, these units alone would cost upward of $1000/pair.) They both feature a diecast chassis and have the same type of very large magnet and motor system. The high-power motor coils (2kW short-term) are wound on 3"-diameter Kapton formers—Kapton withstands very high working temperatures—and are ventilated to improve long-term thermal dissipation. The woofers use a distinctive composite, ventilated-magnet design. The pole pieces are chromed, while the high-intensity magnetic flux required for the target sensitivity is achieved by using an array of smaller ferrite magnet rings, their re-painted finish lending them a distinctive appearance.

The cones are made of a glass-fiber-reinforced pulp impregnated with a catalyzed resin, and are both rigid and pistonic over the required frequency range. Placed uppermost on the baffle, the 12" driver has an additional surface treatment to damp cone resonant modes, since in terms of its natural response and position in the stack, it reaches further into the low midrange than the 15" unit. The edge suspensions are foam half-roll surrounds of high mechanical “Q.”

These are low-loss drivers, with high electrical damping and consequently great electromagnetic control (high Qm and low Qts, a highly desirable if expensive combination). Their corrugated spiders are surprisingly stiff; these are no “soft,” long–throw units. Instead, their motor design is directed toward linear control under high-power excitation, while their fundamental resonances are matched to the requirements of bass-reflex loading. By using two differently sized bass units, sharing a common enclosure and vent, the usual single, sharp port resonance peak is broadened, extending its range and smoothing the response both in the port range and in the upper enclosure-resonance region.

Given the high power capacity of the bass pair, the choice of midrange driver was critical. In addition to the usual requirements for response smoothness, low coloration, and transparency, the X-1’s midrange also had to be efficient, dynamic, and remain linear under high power inputs. To meet these demands, two 7" drivers, custom-made for Wilson by Dynaudio, are operated in parallel. Their high sensitivity is reinforced by a double-magnet system, 2.83V driving the pair to 96dB at 1m in the upper midrange. These drivers use rigid pressed-steel baskets and high–power 1.5" alloy voice-coils with dense “Hexacool” windings. Copper-shading rings and caps minimize magnetic third-harmonic distortion. The polypropylene cones are flared BBC-style, mineral-loaded to improve both rigidity and damping, and suspended on natural rubber surrounds.

Much development has gone into the new 1" tweeter built by Focal for Wilson Audio. It has a double magnet to raise its sensitivity to an all-time high for a direct-radiator type of 96dB. While the WATT 3 used a fiberglass material for its distinctive inverted dome (not Kevlar, as is commonly stated), the new version of this tweeter uses titanium. This metal’s great stiffness helps push the primary resonance up to 23kHz from the 16kHz of the earlier fiberglass type. Now the intrinsic response is essentially flat to 20kHz at the greatly increased sensitivity.

The new, highly stable synthetic suspension is fitted with a small half–roll termination to control sub–harmonic rocking. Wilson has also fine–tuned the viscosity of the ferrofluid cooling medium in the gap, as well as the size and treatment of the air volume behind the dome. A tapered hollow pole leads to a sealed rear chamber within the ferrite magnet rings. The 1" ambience tweeters are single–piece titanium–dome units sourced from Audax, chosen for their good performance in the final audible treble octave.

SYSTEMS & COMPONENTS

The X-1/Grand SLAMM review story began in my living room. I’d been commissioned to write two separate reviews: an early review to appear in the October ’94 issue of the UK’s Hi-Fi News & Record Review, with a more in–depth analysis to follow for Stereophile. This was made possible through the good will of the X-1’s owner, Ricardo Frassanovici of Absoluto Sounds UK, who suffered agonies for the several weeks he was without his new audiophile babies.

The speakers left my studio after specially extended listening sessions using a wide choice of ancillary equipment had been carried out for Stereophile. I packed my set of reference discs, my MLSSA-equipped Toshiba 6400 laptop, my trusty B&K condenser microphone, and accompanied the X-1s to their final home at Ricardo’s. There they were installed in a still more spacious listening room whose different character provided me with a new challenge, together with the potential for free–space location and improved bass extension. I continued my evaluation at the new location.

A stunning array of ancillary equipment—mine, begged, or borrowed—was assembled to test the X-1/Grand
SLAMM’s claims to greatness. Room treatment included Combak Harmonix wall dampers. Power amplifiers comprised the Mark Levinson No.27.5, Jeff Rowland Design Group Model 8, Conrad-Johnson Premier Twelve, Krell KSA-2005, Naim NAP250, a hand-built single-ended triode amplifier, and pairs of Audio Research VT150s, Meridian 605 monoblocks, and Jadis JA 500s. For fun, I also tried the little Exposure Fifteen integrated amplifier.

Analog sources included a van den Hul Grasshopper IV GLA in a NAIM ARO tonearm on a Lingo’d Linn LP12, plus a Koetsu and a Lyra Clavis DC on a Wilson Benesch ACT One tonearm fitted to a Wilson Benesch turntable. The turntables were sited on a four-tier Mana Reference table.

Digital sources included the Wadia 16 CD player, used both as a complete entity, and as a separate transport and digital decoder. Additional transports included a Meridian 200 and Krell MD-10. Further D/A processors comprised the latest Theta Generation 5, the Accuphase DP70-V, the Krell 64X and Studio, and the Audio Synthesis DAX. On the control front, the Wadia 16 CD player has its own digital volume control and source selection, while discrete units included the disc sections of the Conrad-Johnson PV12 and PF2, the Krell KPE phono equalizer, the Krell KRC-2, Audio Research LS7 and LS2B units, the Levinson No.38 and No.26S, and the Audio Synthesis Vishay—Passion passive controller.

Cables ordered for X-1 installation included Transparent Music Wave Ultra and Music Link Ultra; use of these network-terminated cables is recommended by Wilson Audio, who used them during the development and final voicing of the X-1. Other cables may subtly shift the system’s inner balance. Conversely, some amplifiers, notably tube equipment, may react adversely to the greater electrical loading imposed by the network; alternatives may well be advisable according to the balance and source properties of the matching electronics. Alternative interconnects employed in this review included van den Hul The Second and Siltech ’56 for balanced working, with van den Hul The First and Siltech used for RCA link-ups.

The amplifier/loudspeaker link is critical for the X-1—any inherent defects of lower-grade cables are immediately audible. Siltech Silver Ribbon, Transparent Ultra, and van den Hul Revelation (a silver/copper/carbon hybrid) proved up to the task, the choice dependent on the rest of the chain.

The X-1 revealed such great differences between speaker cables that it was hard to be dogmatic about which product was responsible for certain sounds we heard: the X-1, or the cables themselves. At an early stage of the initial installation, the Krell KRC-2 preamp was temporarily laid on the carpet. So analytical were these speakers that the placement of coupling cones under the preamp was immediately recognized in the tighter bass and cleaner mid! The same trick was repeated, this time with the Krell KSA-2005 power amp. Such transparency on the part of the X-1 promised much entertainment later.

**INSTALLATION**

With such a high potential performance, the X-1/Grand SLAMM was correspondingly highly critical of location. The design aims at neutrality; to achieve this, it was essential that an optimum placement be defined for each of the speakers as well as for the listener.

Each room presents its own problems. In my case, the obvious arrangement didn’t work very well (see the room-response graphs), resulting in a rather brash sound which severely lacked bass weight. Considerable experimentation with placement was needed to find primary positions that would result in a subjectively evenly balanced bass, combined with optimum low-frequency extension. Once these positions were found, the fine-tuning could begin.

Before doing anything else, Dave Wilson demonstrated his room-calibration procedure. Reading continuously from a plain text, he slowly paced across the breadth of the room and along several axes down its length, all the time listening for the effect of the damaging room acoustic and local boundary reflections. He then mapped zones in which the "return" sound of his voice was most neutral, these lying in the general area proposed for the speakers, the zones defined for the sides of the room. This work resulted in parallel "tracks" marked on the carpet along which the speakers could be moved when adjusting their distance from the rear wall to give the best low-frequency match. I then placed myself alternately at the two speaker positions; while I read out loud, Dave identified the optimum distance for the listening seat, again looking for the cleanest and clearest speech quality.

Once the general positions had been identified with some precision, we were able to start the micro-tuning. Any speaker will generate a complex comb response due to local boundary reflections. Wilson takes the view that the reflection structure has a "grain"; you can go with it or against it. The comb-response detail is not evenly spread; rather, it occurs in bunches that can be quite compact in the midrange—just a few inches wide. By fine-tuning the spacing of the speakers from each side wall and analyzing it subjectively in increments of as little as half an inch...
(using calibrated masking-tape markers on the floor), it was possible to further improve the matching of the sound character, and the micro-response and balance between the two channels.

A fine adjustment is required for the upper-midrange to low-treble balance; Wilson uses a chosen track from his first Ragtime Razzmatazz recording to explore the purity of the complex harmonic tone of the piano notes, seeking the optimum boundary placement.

In my room, the X-1 was placed closer to the back wall than we had originally expected; but the size and proportion of the large rectangular bay window behind the speakers was an unexpected acoustic bonus—the X-1 could breathe sufficiently for fine soundstage space and depth to be generated.

Though Dave Wilson used to personally install the WAMM system in customers’ homes, factory personnel have been trained for the job of installing the X-Is. This service is a Wilson Audio Specialties preferred option. Given the complexity of the system, the high-gloss finish, and its considerable weight, the presence of a Wilson Audio installer must be considered a valuable service.

LISTENERS
For this project I enjoyed the support of many colleagues who contributed comments on the sound of the X-1 in my room. These included John Atkinson, Paul Messenger, Paul Crook, Chris Bryant, Jonathan Honeyball, and Steve Harris.

LISTENING SESSIONS, ROOM 1
The die is cast. Just as Dick Olsher’s view of audio was irrevocably changed by the experience of a fine single-ended, class-A triode amplifier driving appropriate speakers, so have my views been altered by the X-1/Grand SLAMM experience. Until I heard the X-1, I simply didn’t know that it was possible to hear certain qualities in recorded music. The X-1 appeared to achieve the impossible on many occasions.

More often than not, the assessment sessions turned into periods of pure listening pleasure. Each new disc—analogue or digital—was a revelation. The X-1s became a vehicle for the renewed exploration of my music library. My favorite discs were discovered to be both familiar and unfamiliar—familiar in tonal character, reflecting the speaker’s high accuracy, but unfamiliar in terms of the wealth of hidden detail that was suddenly revealed, this ranging from the superior level of clarity and dynamic expression to the attack, speed, and note-playing discrimination that appeared in the bass. And all this was before I played the speakers loud!

A great advance in sound quality such as this is a rare event; unquestionably, the X-1 is a major achievement in loudspeaker design. The Wilsons generated an unmistakable sense of presence, with a grip on the musical event and a vivid re-creation of performance. Somehow they took hold of the air in my room and the sound of the enclosed space and spoke directly to me.

It was the kind of sound you just can’t ignore—it grabbed attention and held it, so secure was its mastery of audio replay. Putting aside the wayward experiences of the setting-up period, my renewed first impressions were of a crisp, dry, and highly controlled sound. No boom or overhang was present in the bass, and yet its response extended to low frequencies. There was no obvious weakness or impairment of midrange tonal balance. The “crispness” would appear to result from genuine control and desirably fast transient decay, and not a falsified frequency response.

Stereo imaging was very good overall, with convincing height, fine width, and very good depth. Specific focus was quite critical of lateral head position, but within the identifiable “sweet spot,” remarkable precision was achieved.

Coloration was obviously very low—not just in the critical midrange, but everywhere. Initially, I didn’t fully appreciate this quality, but grew more aware of its importance as the listening sessions unfolded. Other aspects of the X-1’s sound included superb rhythm and timing, tremendous clarity, inaudible distortion at any bearable sound level, plus amazing slam and dynamics at all levels.

The ability to work at and deliver high acoustic powers has its own rewards. If the sound remains clean at high levels, as it triumphantly did with the X-1, then previously inaudible or buried low-level detail becomes wholly audible and can make an unsuspected contribution to the sense of scale, richness, and perspective of the soundstage.

We have all heard this enhancing effect of turning up the volume; indeed, some systems rely on high levels to achieve their required clarity. The subjective effect produced by the X-1 was akin to this, but in this case, when the volume was turned up the sound simply got clearer and clearer, more dynamic, and more immediate. It was so expressive that I was left with the certain knowledge that other speakers are comparatively compressed and dynamically limited.

Recordings: Listening highlights included Miles Davis’ “Amandla” (Warner Bros. 25873-2). “Catembe” opens with simple, open scoring, the early notes establishing the time signature, and a little later the band opens up. I thought I knew how this band played and how the track sounded, but I was wrong. With the X-1, the opening section now established a new definition of time and instrumental presence. And now, when the band did open up, the stage was presented on a far greater scale than heard previously. Instead of a thickened wall of sound, the X-1 achieved unprecedented simultaneous clarity and articulation of all instrumental lines. With it came a vibrancy, a dynamic power, and a sense of stage presence which strongly communicated the quality of the musical performance. I was brought closer to an involvement in the event; previously, I’d felt like a distant observer.

The title track on Joni Mitchell’s Blue (Reprise 2038–2) is an exquisite test of midrange timing. A heavily modulated recording, originally mastered on open-reel tape, there’s little deep bass and not much more treble—just Mitchell at her piano with a highly subtle interplay between her voice and the instrument. Many systems fail at this fence, but not the X-1. Both piano and voice were finely balanced, superbly expressive, and superbly timed. There were more magic moments to be heard on other Mitchell tracks, such as the guitar work on “California.”

In the bass, the overall lack of blur, overhang, limiting, or distortion was a revelation. With the X-1, the kind of transparency we expect from fine loud-
speakers, but which is generally confined to the midrange and perhaps the treble, was now also present in the bass. On JA's current favorite bass torture track, "I'm Home Africa," from Stanley Clarke's East River Drive (Epic UK 47379), the X-1 sailed through with flying colors. The leading percussive midbass line was crisp, punchy, and well-quicked. This is followed by the synth bass line an octave down and often judged by speakers. However, on this occasion I was able to hear the two bass lines accorded equal weight and speed. Moreover, the X-1's dynamic authority extended into the deep bass, bringing an extraordinary sense of power to the replay.

More often than not, the funky drive and syncope of the title track of Roy Cooder's Get Rhythm (Warner Bros. 25639-2) is diluted, when heard through the X-1s, it really took off, playing as it really should be played. It was much closer to my recreation of Roy on stage.

The Grand SLAMM's great rhythmic ability brought Dire Straits' On Every Street (Warner Bros. 26680-1) to life, especially "Calling Elvis" and "Heavy Fuel." "Planet of New Orleans" was rendered with superb spatial effects and atmosphere.

Many speakers can give an impressive result on popular firework such as Jennifer Warnes' The Hunter (Private Music 01005-82089-2), but can sound deadened and obscured on less immediate recordings. The vocals on Rickie Lee Jones' Traffic from Paradise (Geffen GEFD 24602) sound characteristically obscured. A system needs fine clarity and articulation to extract the most from this recording, and this was just what the X-1 provided. The word "tactile" best describes the remarkable grip this speaker had on the fine detail and transient edges of this music—the subtle nuances that are so important.

Having mentioned the Jennifer Warnes disc, it's worth relating the X-1's approach to that other low-frequency torture track, "Way Down Deep." The very first bass note often sounds quite amorphous: speakers generally fumble and choke on it if played at a good level. (Even the Wilson Watt/3 Puppy 2 struggles to master this track.) Bearing in mind all that has gone before, it probably won't surprise you to hear that the X-1 gave the primary bass note a fine shape, attack, and pitch—now it could be heard as a short pitch glide as the drum note decayed. Moreover, this track could be replayed at unprecedented sound levels with no loss of overall quality or definition.

Natural recordings of acoustic rock percussion, full drum kits, and the like sounded surprisingly "live," and the bass had a serious, visceral kick. Try Jim Keltner's Drum Record (Sheffield Lab CD14/20) for a full exposition.

Moving on to classical material, I tried my 1994 R2D4 choice, Benjamin Britten's The Young Person's Guide to the Orchestra, conducted by Andrew Davis (Teldec 9031-73126-2). Here the X-1 laid out the orchestra beautifully, revealing still more individual instruments playing. It also accurately recalled the natural acoustic of the venue, St. Augustine's church. I have found that low-frequency reverberation tends to be a problem at this location, sometimes blurring the edges of the timpani. Miraculously, the X-1 brought new definition to drum transients, clearly separating the sound of the drum from its reverberant acoustic signature. Many small percussion instruments also sounded just right, with unsurpassed quality of attack, presence, and sense of place. In addition, theme and counterpoint were superbly proportioned, which lent greater meaning to the work.

**Analog vs Digital:** On occasion, there was a hint of midrange forwardness, as well as a touch of metallic edge in the X-1/Grand SLAMM's presence region. This touch of character varied considerably with amplification and signal sources (which so far had all been digital). Tubed electronics certainly helped in this respect; I'm indebted to the Conrad-Johnson Premier Twelve and Audio Research VT150 power amplifiers, which paired marvelously synergistically with the X-1.

The omission of analog sources up to this point had not been a deliberate choice, but a result of the UK's unusually high July temperatures: they had apparently caused my van den Hul Grasshopper cartridge to develop a case of upper-treble boost. In desperation, I returned to my reference Koetsu, supplemented by the new Lyric Clavis DC.

Pure analog sources, preferably all-tube recordings, required that the X-1 had been sitting in a sort of high-resolution telescope, reaching right back down the audio chain to the studio. Those odd signs of a forward sonic signature were largely blown away when I used all-analog source; it turned out that artifacts of the digital encoders had mainly been responsible for the tonal errors.

Once again, the X-1 appeared to be virtually above criticism. Classic LPs, such as early Sheffield Labs and Crystal Cables, supplemented by a generous helping of Wilson Audio's own very neutral recordings, proved the X-1 to sound tonally balanced, highly musical, and marvelously poised. There was no incoherency here, the X-1 reaching into many of those old recordings to bring forth unexpected quality and detail.

This retrieval of detail was no academic exercise; it brought greater meaning to both the instrumental playing and the performance. Despite its extraordinary clarity, the X-1 had that uncanny ability (also heard with fine electrostats) to push surface noise and ticks away from the soundstage. On many occasions, it proved possible to forget that the reproducing kernel was a hard stone sliding along a wavy plastic channel. Simply, the X-1 seemed to improve the ratio of music to noise even in the case of older, worn discs. The musical content seemed strengthened, effects more coherent, and everything more immediate. This experience convincingly proved that, at the limit, analog remains more natural and more musical than digital.

**Interactions:** A variety of audio equipment was tried in an attempt to evaluate the X-1's performance envelope, but time and time again the tables were turned on the reviewer. I found that it was the speaker that was exploring the quality of the other components! I have never before experienced such an analytical transducer. I could not imagine owning a more powerful and enjoyable tool for reviewing audio equipment.

In a given room and with careful selection of equipment combinations, it did prove possible to "flavor" the X-1's sound. For example, it clearly revealed the natural tonality and pure delicate treble of the Premier Twelve power amplifier. Similarly, it brought out the full majesty of the ARC VT150s—their open character, dynamics, focus, and their evenhanded, "full-bandwidth" quality. The ARCs' natural and lively performance in the upper bass—this is an area where the VT150s happily outperform many reference solid-state designs—was particularly appreciated.

The Mark Levinson No.27.5 power amplifier drove the X-1 well, its slightly darker character and highly focused treble balancing very nicely in my room. When partnering the Rowland Model 8, a sense of scale and weight was preeminent. The sound was very spacious, laid-back, and expansive. Noticing some loss of dynamics and rhythm, the Rowland fought back with a sense of great ease, achieving a very smooth and well-mannered result.

The big Wilson speaker also helped achieve the very best I have heard from...
the Krell KSA-200S. Somehow, the X-1 cleared the slight haze or sense of distance which this fine amplifier can sometimes show. The X-1 made severe demands on all the amplifiers I tried in terms of producing powerful, controlled, deep bass, so great was the speaker's ability in this area. Here, the Krell showed a margin of quality which had not been fully appreciated when it partnered lesser speakers. The Krell was a good match for the X-1 in the bass, each exploring the other's abilities. In both my room and Room 2, the KSA-2005 delivered very good results overall, but still greater reach and authority were achieved in Room 2 with the Krell KAS-2 reference monoblocks.

An instructive. I have never heard the differences so clearly differentiated. Sonic characteristics which were previously at the boundary of perception were now clearly illuminated. Despite this, the X-1 didn't exaggerate their negative points of poorer cables.

LISTENING SESSIONS, ROOM 2
Ricardo Franassovici's room has grown to its present state of furnishing over many years. Ricardo spending much of it listening happily to the fine Martin-Logan Statements. The Logan woofers were on tap as circumstances dictated. The conflicting placement requirements for optimal bass and midrange performance were reconciled by the split nature of these speakers. The separate electrostatic panels of the Statements were placed in free space to give the best stereo and spatial performance.

Installing the X-1 showed just how differently these two High End systems reacted to the same room. The speaker alignment, of course, had to be done from scratch, but at first, the X-1s were a bit of a disaster. Inexplicably, there was almost no bass. The speakers sounded overly dry and deadened, lacking space and air, and sounding both forward and lean.

Several lines of attack were tried to solve these multiple problems. As the X-1 is a single system, its placement has to be simultaneously optimized for both the bass and midrange performance. I had first to find where the low-frequency modes of the room were. This would help me find the optimum placement for both speakers and listeners, the one that gave the most balanced, even, and extended bass performance without sacrificing stereo imaging.

It's undeniable that the Wilson Audio speaker's overall frequency balance is aligned for the best transient definition, with good rhythm and timing. By conventional standards, their bass is often quite dry and well damped. But in contrast to the flexible placement and bass adjustment offered by the Martin-Logan Statements, the room has to serve the X-1, not the other way around. This was a severe lesson. If you want to achieve all the X-1 is capable of, you must have a listening room first, a living room second.

Another factor in this equation concerns the differing radiating patterns of these two speaker systems. The Martin-Logan electrostatics' bi-directional nature had given a good forward throw and ample rear-directed ambience. The primarily direct-radiating X-1, even with its rear-facing ambience tweeters, needs to "breathe" in order to properly voice the room and sound suitably spacious. Accordingly, the side rooms and corridors outside the listening room began to fill with displaced furniture—several heavy padded leather easy chairs, coffee tables, and the like. Two magnificent jukeboxes located in a side wing of the room were powered up so that their woofer cones were suitably damped by their internal amplifiers. If you think that's crazy... well, all I can say is that at last the X-1's bass came back!

You just can't afford to give any of the X-1's bass away—nor would you want to! I'd judged the bass to be remarkably good in my room, despite an audible loss in the last half octave down to 18Hz. My measuring microphone confirmed that while the speaker could produce very low frequencies, my room just wouldn't support them. However, Ricardo's room could and did! Aside from a moderate and very narrow dip at 31Hz, the X-1 drove the second room at awe-inspiring levels right down to 18Hz. Using the 20Hz warble tone on the second Stereophile Test CD, it was possible to approach clipping with a Krell KSA-200S (250W continuous) on this track, and hear a body-shaking, earthquake-like thundering free of any untoward limiting or distortion. The dynamic envelope of the X-1 truly extended to 18Hz!

With the increased width of Room 2, the X-1s could be placed between 5' and 7' from the side walls, 50% farther than in my room. However, like my room, Room 2 had a deep bay window behind the speaker position, so the X-1s could be positioned relatively close to the rear wall—about 3' from the back of the bass cabinets. The floor also possesses greater mass than mine, despite the concrete loading I had specified for my suspended floor.

The distance to the listener was just over 15', allowing a close approximation to an equilateral triangle. This resulted in superb stage presence and focus. Ricardo's ceiling height was also greater than mine—11' compared with 9.5'. With this, together with Room 2's increased width, I found that still greater levels of performance were possible from the X-1.

Once again, the specific location of the speakers quickly faded from one's listening consciousness, the X-1 achieving that enviable state of grace: a playback system in which the music counts for more than any deficiencies in the system. Optimally set up, and regardless of the chain of electronics used to drive it (within obvious quality limits), the X-1/Grand SLAMM managed to re-create that satisfying sense of performance, of live music-making, that nearly always transcends the audio components used. I didn't need to know or care how the soundfield was being created in the room—all I had to do was sit back and enjoy it.

In Room 2, not only could the X-1 play louder, with better dynamics and a greater dynamic range; it also sounded even more neutral and natural. Stereo images were best described as extraordinary. Using accurate program, the sense of scale, height, width, and depth was absolutely state-of-the-art. The wholly natural spaciousness was not accompanied by any false phasiness or blurring, while focus was crisp and sharp in all regions of the essentially three-dimensional soundfield.

There were also gains in the bass. I had already admired the speaker's ability in my room to resolve detail and to sound transparent down into the upper bass, a quality wholly comparable with the excellent midrange. But now I could hear this ability extended a further octave, from 80Hz down to 40Hz. Amazingly, this speaker could reproduce individual notes in bass chords. This gave me a shock when I first heard it done right—for example, on cathedral organ and at realistic sound levels. The X-1 exhaled clean, clear bass; the room acoustic was held fast and forced to obey the speakers' command. Once again, the percussive bass quality was revelatory both for its precision and its visceral impact.

Room 2's larger space needed and could take more power. Trials at levels up to 300W peak program showed no signs of strain or limiting, although
deliberate abuse by their owner with head-banging synthesizer material at up to 500Wpc did pop the fusible resistors to the mid and treble—just as the designer had intended. I’m glad Ricardo carried out this test; I wouldn’t have dared!

**SOUND IN A NUTSHELL**

The following is condensation of all the results from the many listening tests undertaken in both locations.

The most exciting aspect of the X-1/Grand SLAMM was undeniably its extraordinary dynamic expression. Really good dynamics do not result from any single aspect of technical design. Rather, a whole group of interrelated factors come together to generate accurate, life-like dynamics. These include low distortion, high thermal capacity, low coloration, and fast attack and decay of transients. High sensitivity and good electrical load matching are also important here so as not to compromise the signal from the power amplifier. If the amplifier cannot deliver good dynamics into a specific speaker loading, there is no way that the speaker can be made to reproduce them.

Compared to the X-1, other speakers sounded rather polite, dulled, quiet, and compressed. It was as if the X-1 took a high-contrast photo with very fine gradation—like an Ansel Adams study of Yosemite in winter.

Subtle low-level information was accorded its own “microdynamics,” this just as exciting in its way as were full orchestral crescendos. I remember with amazement the way the X-1 could pick out a harp within an orchestra and find full expression in the way it was played.

Its dynamic range was huge. Remaining very transparent at literally milliwatt levels, around 60dB peak, it could still deliver a terrific undistorted impact above 115dB. Moreover, clean audio power was available right down to 20Hz.

With that amazing transient definition and clean attack came a remarkably fine presentation of rhythm and timing. Its sound was firmly upbeat, and involving. It communicated a sense of lively performance on classical, jazz, and rock program.

Coloration was low, what little there was often tending to be associated with sources and speaker location. That’s not to say that the X-1 has no coloration at all, but that these other factors were relatively more influential. I might point to a touch of lift in the upper bass as well as a touch of upper-midrange "cleaness" and "forwardness" which could result in a trace of hardness. There was also just a hint of "plastic-cone" character detectable on piano recordings in a small region above middle C. The treble may not have been perfectly sweet, but neither the transparency nor the detail were affected one iota; by established standards, the X-1's treble is very, very good.

This speaker was characterized by such a high degree of definition throughout the frequency range that it was not worth splitting up the discussion of this area of performance into bass, mid, and treble ranges. Excellent detail was present throughout. The frequency response was essentially uniform and well balanced, with a very wide bandwidth encompassing the entire audible range. No excess or boom was evident at low frequencies.

Stereo focus was truly exceptional; the very good focus in my room was easily surpassed in the larger space of Room 2. Here the X-1 focused sharply everywhere in the soundstage, and was also rather less critical of listener position. Soundstage width and depth were both excellent, while there was a most natural impression of height. Very convincing perspectives were established, extending from a little in front of the speaker position to far beyond the back wall of the room.

**MEASUREMENTS**

Incorporated in this speaker’s title is the term "Super Linear," which implies low distortion. It certainly sounded as if it should have low distortion, but would the X-1/Grand SLAMM really measure better than typical moving-coil designs?

Characteristic distortion measurements in loudspeaker reviews are often made at more than one sound–power level: 86dB at 1m is a typical midrange sound level on music and normal speech; 96dB is quite loud—loud enough for most purposes, in practice; 100dB is quite often the upper working limit for miniature speakers; while 106dB is generally considered flat out for most designs, and may cause damage with a continuous sinewave measurement.

Most speakers are linear at 86dB, even down into the upper bass, where the harmonic distortion is predominantly low–order second and third–harmonic typically in the 0.3–0.5% range (–46 to –50dB). Below 100Hz—the true bass range—the distortion is generally rather higher, and varies according to the speaker’s design, size, and bass loading. It’s fortunate that our aural sensitivity to distortion reduces with frequency, helping loudspeakers out where they need it most.

For example, the B&W Silver Signature reviewed in Stereophile last June (Vol.17 No.6, p.75) delivers quite typical distortion values when driven by a 100Hz sinuswave at 86dB spl (fig.3). The second harmonic lies at –40dB (1%), the third at –53dB (0.2%), with negligible higher harmonics. At 50Hz, the results would be around 6dB poorer. In the midband (fig.4), the figures for second and third harmonics are reversed for this particular speaker, reading –45dB and –55dB, respectively. These harmonics will be proportionally higher in level at the louder 96dB level. For a 100Hz tone in the upper bass at the 96dB spl sound level, the third harmonic will now lie at –40dB (1%), the second at –31dB (about 3%).

These readings are on the threshold of audibility for pure sinewaves, but a greater sound–pressure level of 100dB or more will be required before this level of distortion would actually be audible on music. The complex harmonic waveforms in music strongly mask low–order distortion products. These quite normal figures are quoted for this high–performance moving–coil speaker to highlight the results for the X-1/Grand SLAMM and to explore its claim for high linearity. Taking 100Hz first, at an 86dB sound level, the Wilson measured very cleanly indeed, with the second harmonic at –70dB (0.03%), the third at –58dB (almost 0.1%). This was substantially better than usual; even the "low–distortion" Velodyne DF–661 (see Stereophile, June 1994, Vol.17 No.6, p.77) doesn’t compete in the upper bass. Over the 86dB–96dB range and up to the highest 106dB loudness, the X-1’s third harmonic remained unchanged at around 0.1% (–60dB). Not unexpectedly, the second harmonic progressively lost

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*Fig. 3 B&W Silver Signature, spectrum of 100Hz sinewave, DC–1kHz, 2.83V drive signal (linear frequency scale, 10dB/vertical div.)*

*Fig. 4 B&W Silver Signature, spectrum of 1kHz sinewave, DC–10kHz, 2.83V drive signal (linear frequency scale, 10dB/vertical div).*
ground as the spl increased, but this was to a still-state-of-the-art 0.2% (-54dB) at the highest test level (fig.5). These results were no flukes; for example, at 500Hz, the province of the paralleled pair of 7" midrange drivers, a 96dB spl test level was dispatched with disdain, generating a mere -65dB of second harmonic, with the third harmonic at better than -55dB. (I needed ear defenders for testing the Wilson at these higher levels!)

With a 1kHz tone at 96dB, there was a mild increase in third-harmonic distortion to -50dB, with the second still better than -65dB. Moving into the treble range, to 5kHz, the upper 96dB test level resulted in a truly negligible amount of second harmonic (-66dB, 0.05%), and everything else was down at -70dB or better—another great result (fig 6). This upper-region distortion performance is comparable to that of a classic, high-linearity, push-pull electrostatic panel.

Matters got really serious in the bass. Clearly, 50Hz was going to be too easy for the big SLAMM, so a low 24Hz was chosen (peak port output), first at 96dB (where most speakers are already dead in the water), and then at 106dB. At 96dB, the second harmonic was an amazingly good -50dB (0.3%), the third a very creditable -44dB (0.6%). At 106dB, the X-1 was still kicking hard, the second harmonic of the 24Hz tone lying at -32dB, the third at -27dB. Many big speakers have low-frequency distortion more than 40dB higher at this point; in other words, the distortion power is greater than the fundamental—a phenomenon called “doubling.”

Earthquake Bass: By this time I was fully confident of the X-1’s abilities, so drove it with an insonific 18Hz fundamental at a nominal 106dB sound-pressure level (fig.7), the latter referenced to the level at 24Hz. I found that genuine high-power output was possible into the ultra-low bass. Even with the punishing 18Hz signal, the second harmonic was quite invisible at -40dB (1%), with the third very low at -47dB (0.4%)—a quite remarkable performance. Well, the experts always told us that for good bass you needed a big box and big cones; you certainly get them with the X-1!

Sensitivity & Loading: Checked under various weightings, the X-1’s sensitivity checked out spot on target at 95dB for an 8 ohm watt (2.83V) at 1m. Its clean “attack” and good midrange and treble directivity could make this speaker appear subjectively even louder than this. Peak input powers of up to 500W on sensible, wide-range program material gave no signs of mechanical or acoustic stress (out came the ear defenders again, though). Thus, a stereo pair in a typical listening room can give a dynamic range of up to 122dB at 1m, or 117dBA in-room. With the X-1/Grand SLAMM you can reproduce a full orchestra at realistic levels in your living room. Its power capability is such that if you want an amplified rock group in your lounge, you can have that, too.

Amplifier loading goes hand in hand with sensitivity. Any designer can grab another 3dB of specified “8 ohm” sensitivity by halving the rated system impedance and thereby pulling twice the current from the amplifier. Such low impedances may be prejudicial to some amplifiers; I prefer a sensible balance between voltage sensitivity (referenced to 8 ohms) and load impedance.

The late James Moir had a good approach to this problem, using a pink-noise stimulus to calculate the RMS impedance modulus over the frequency range in question. An input power of 1W was measured into this broad-band, real-world impedance, and loudspeaker sensitivities could then be rated against this standard watt. Standardizing this method might help to discourage speaker designers tempted to follow the low-impedance route.

In the event, the Wilson presents a relatively easy load to an amplifier (fig. 8). It’s not quite classifiable as an “8 ohm” loudspeaker, which is defined as having a minimum magnitude of 6.4 ohms, though it comes close. For example, in music’s main power band (120Hz–10kHz), the loading does not fall below 6 ohms, and averages 7.3 ohms. The magnitude does drop from 5 ohms at 15kHz to 3.2 ohms at 20kHz, which will give rise to some “dulling” of the treble balance both with SE-type amplifiers and with others featuring a higher-than-usual output impedance (1–3 ohms, say). Conversely, the X-1’s commendably uniform mid-band impedance means that it will remain neutrally balanced with many tube power amplifiers. A fall to just over 2 ohms can be seen above the audioband, but this isn’t likely to be of much significance. At low frequencies, the lowest impedance value is a pretty harmless 4.6 ohms at 80Hz. It doesn’t fall again until the minimum of 5 ohms at 24Hz—the well-damped port-tuning frequency.

The phase angle of the impedance gives an idea of the speaker’s reactive content, where it’s acting more like a capacitor (negative phase angle, or leading) or an inductor (positive angle, or lagging). Both cables and amplifiers prefer low reactance if they can get it. From 200Hz–3kHz, the X-1’s reactance is almost zero and it doesn’t exceed more than 40°. 20Hz–20kHz. This implies that the load remains predominantly resistive over the whole of this wider frequency range. This further reinforces my approval of its good load characteristic.

Forward Frequency Responses: Measured on-axis at 45° (acknowledging that the speaker was aligned for a 4.5m
listener range), the Grand SLAMM's frequency response in the upper-mid and the treble is not as flat as I might have hoped or expected (fig.9). It requires wider than usual limits to contain it: ±3.5dB. One-third–octave smoothing did allow my standard ±3dB limits to be applied over a wide frequency range, but those raw, unsmoothed axial variations cannot go unremarked.

My inner engineer keeps whispering that flat curves must sound better; but it ain't necessarily so. Judgment of the semi–anechoic laboratory frequency response of a loudspeaker must be tempered by assessment of the performance over a range of forward axes. You need to judge the energy uniformity seen in the forward solid angle which encompasses the listener and the relevant reflective boundaries. The overall energy response as reflected in the Room-Averaged Responses is also most useful.

A loudspeaker's single axial response cannot, therefore, fully reflect its perceived "sound." Yet occasionally, with untoward combinations of source proximity and matching system, the X-1 did, in fact, hint at these response features. Proof that these irregularities are rather less dominant than the axial curve suggests was given in the room-averaged response (see below), where only very mild tonal–balance variations are seen over the critical areas—in close agreement with the subjective results.

Looking at the axial response in detail, the upper midrange is lifted by 3.8dB at 1.8kHz, this classed as a medium "Q" bump, and associated with a broader lift of 1dB from 800Hz to 3kHz. Between 3.5kHz and 1kHz, the treble is subdued by 2dB or so relative to the mean, and then appears a bit peaky at 13kHz.

You might be tempted to suspect that the tweeter is responsible, but you'd be wrong. A spare high–frequency unit, lent to me by Wilson, checked out pretty flat from 3kHz to 25kHz. Those bumps are, in all probability, due to the time–aligned modular cabinet design. In particular, the top module in its normal state of alignment overhangs the baffle area of the tweeter; despite there being absorbing foam at the resulting ledge, some reflection occurs. If the raw response had been a true measure of the energy output, the variations would be considered fairly serious. In fact, it simply shows the effect of a moderate local reflection at this close measuring distance.

Fig.9 also shows the port response with its maximum output at 24Hz. There's also a strong return in output at around 220Hz which, in an ideal world, would be better controlled. The curve marked "B" shows the output of the bass drivers alone, revealing their gentle rolloff above 150Hz, which results in significant acoustic output to 1kHz. Interesting.

On the far right of fig.9 can be seen the response of the rear ambience tweeters, peaking in the top audible octave to counter their natural fall in directivity with rising frequency. They may be given some credit for smoothing the energy response in the room at high frequencies.

Off-axis in the vertical plane—the lower group of traces in fig.10—the central lobe was found to be nicely symmetric, and was accurately directed at the listener in Wilson's recommended state of "tune." Above or below this axis by 15°, the response had notched symmetrically by 12dB or so near the 3kHz crossover frequency. The 75° vertical off–axis trace (dotted) was just fine, however. As these curves show, the X-1's focal point is well–defined.

In the lateral plane—the upper group of traces in fig.10—the good conformity and moderate loss at large off–axis angles indicates quite low diffraction and good directivity. This speaker is intended to be auditioned at a glancing angle set by a sight–line along the inside edges of the midrange enclosures, and not on the median driver axis. This is significant: the dotted trace on this graph, 15° off–axis and close to this sight–line, shows an improvement in output in the 6–9kHz treble region just where the axial curve in fig.9 had shown a loss in amplitude.

**Room Responses:** I took 1/3–octave–smoothed measurements in both of the rooms used for the listening sessions, with particular emphasis on the X-1/Grand SLAMM's interaction with the room. In my room (fig.11), two results are given, one for the theoretical best placement (solid line), and one for the position chosen for the auditioning (dashed). The wisdom of the preferred listener placement may be seen in the improved low–frequency distribution. Nevertheless, in this room the range below 25Hz did not fully reflect the loudspeaker's intrinsic low–frequency extension.

This was where the second, larger room proved its worth (fig.12). While the overall response character can be seen to be similar—an overall response of 19Hz–16kHz ±3dB was obtained in the large room (a fine result)—the 20Hz level improved from ~5dB to ~2.5dB. This is a significant difference, given our near–linear hearing response in the bass, and was certainly clearly audible. However, what this graph cannot show is the greater sense of aural freedom and "air" that the larger room also engendered.

**Time Domain:** Looking at the impulse response (fig.13) with the woofers out of circuit due to problems with room proximity effects, the X-1 was reasonably time–coherent. The output was free from
significant ringing within the 100Hz-25kHz measurement bandwidth. The merits of its reduced-diameter drive—a 0.75" coil on a 1" dome—can be seen in the fact that the metal-dome tweeter's "oil-can" resonance is placed well beyond the measuring bandwidth. It's also comparatively well-damped. The step response (fig.14), again with the woofers disconnected, reveals the tweeter to be connected in reverse polarity and leading the midrange units slightly in time.

Due to the inverted tweeter connection and the use of second-order crossovers, the X-1's phase response is not linear in the treble, though it does approach this condition in the midrange and low treble. This can be seen in the plot of excess phase vs frequency (fig.15), which is "zeroed" in the midrange. The X-1's departure from a minimum-phase performance was mild, reaching -40° at 5kHz, and smoothly advancing to a phase lead of 80° at 20kHz, which is of no consequence.

The first waterfall plot (fig.16), with its 30dB amplitude window and a fast 0.1ms risetime for the measuring filter, is optimized to display decay rate. While the presence of the cabinet reflections mentioned earlier can be seen in the upper treble, the overall decay rate was clearly very good, judging by the large "white" area at the back and the clean "floor." This graph correlates very well with the X-1's superb perceived transient response—its amazing clarity on fast, complex percussion.

Analyzing the longer-term resonance behavior is the duty of the second waterfall (fig.17), which uses a wide 60dB amplitude window and a more frequency-selective 0.2ms filter setting. Again, the result for the X-1 was commendable. Yes, two treble ridges can be seen, at approximately 14kHz and 20kHz, but they last no more than 1.5ms. Very little long-term resonance hangover or "coloration" effects are present.

Enclosure: This excellence extended to the vibration performance of the Grand SLAMM's enclosure. I probed several locations on the three upper-range modules and the bass enclosure with my low-mass B&K accelerometer, but it proved very hard to find anything of significance. The worst part of the largest panel of one of the midrange modules still had a desirably smooth output.

Very little vibrational energy emanated from the bass enclosure over its nominal 20–500Hz working band (fig.18). There was some vibrational output above 900Hz, but this was merely a low-level signal derived from the point contact with the stack of upper modules.

For examples of very poor and very good excess-phase performance, see figs.10 and 11 in my Dunlavy SC-1 review elsewhere in this issue.

JA
CONCLUSION
The Wilson Audio X-1/Grand SLAMM sets entirely new standards for loudspeaker performance and sound quality, and I cannot be confident that I’ve yet found its measure. I feel sure that it won’t age for many years to come, but will continue to sound better with future improvements in ancillary equipment.

Realistically loud, full-range piano and orchestral reproduction is possible with this speaker. Typically it will play 10dB louder than the competition—a doubling of subjective loudness.

As for the sound, it’s out of this world. Time and again this speaker tested my ability to assess just how good it really was. Invariably, it measured the quality of the source and the subsequent audio chain. Ruthless in exposing faults in room acoustics, placement, and system, it wasn’t unkind, but set such high standards that its use was exacting. Even when performing in an average good setup, the X-1 worked well; but it really sings when optimally set up.

Wilson’s X-1 puts the excitement and pleasure back into reproduced audio. This unique Class A, full-range reference loudspeaker system carries my admiration and heartfelt approval. Truly great products like this are rare indeed. 

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STEREOPHILE, DECEMBER 1994

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rum me out of the High End if you must, but I have a shameful confession to make: I love
headphones. I know, I know, I’m supposed to preface my comment with a lofty disclaimer, such as, “Of course, given my refined sensibilities, I could never derive satisfaction from such a compromised listening apparatus, but many of you seem to enjoy them.” Well, pardon me for saying so, but pi$h fia$!

Headphones offered me my first chance to experience musical details that never came through my primitive, early stereo systems. They allowed me to listen to whatever I wanted to at any loudness I chose, no matter what parents, crenulous roommates, or my beloved spouse thought of it. And unlike other harmless adolescent enthusiasms, I’ve found that passing years haven’t dimmed my enjoyment one jot—especially not where the Sennheiser HD580s are involved. Let me proclaim, right up front, that I can name no other under-$3000 transducer that can match their strengths: near-linear response from 16Hz to 30kHz; (almost) total lack of coloration, especially in the high frequencies; uncompromised dynamic resolution; and unsurpassed comfort. All this for $349, and you can play Pork Soda at 3am on a school night.

I HEAR AMERICA SINGING
As Tom Norton pointed out in his February ‘94 review of the flagship giga-
book Sennheiser Orpheus HE 90 (Vol.17 No.2, p.111), headphones are probably the most commonly used—music sources around. Many of them—perhaps all of the ones attached to Walkpersons—are horrendous: tinny, bass-shy, compressed, musically anemic. But this doesn’t mean that all must be tarred with the same brush, any more than all stereos should be excoriated just because the majority (ahem) spew chunks. That’s what magazines like Stereophile are for—to uplift the race.

Despite the ubiquity of the headphone, there are some generic problems with them that must be acknowledged. First is the question of spatial perspective. If you use headphones through a standard

phone jack, there’s no way you’re going to get any soundstaging. And you can just forget about outside-the-head localization! With everything from Wagnerian orchestras to Brazilian tree toads, even the finest “cans” give you that center-of-your-head location. This can be dis-
orienting; it’s the rare audiophile indeed who really wants a Brazilian tree toad in the center of his or her head. Attempts have been made to compensate for this, ranging from processors—such as those made by Stax and HeadRoom, which combine information from both channels to simulate a listening space—to bulky helmet-like apparatuses, which place the drivers to the front of the ear. But even the best-sounding headphones are of no use to you if you don’t like to wear them. Comfort is the second most frequently cited objection to headphones.

AGONIES ARE ONE OF MY CHANGES OF GARMENTS
The discomfort experienced by high-end
headphone wearers can be attributed primarily to three causes: weight, sweat-producing earpieces, and caliper pressure, aka “that vise-like feeling”—all of which are remediable through intelligent design.

“Intelligent design”: now there’s a description of the HD580s. In terms of comfort, I’ve never met their match. All surfaces that contact the head or surround the ear are swathed in a velvetone material covering open-cell foam. The earpads and headband sit lightly and, since they “breathe,” are extremely comfortable—even during New York’s humid summers. The Sennheisers weigh a total of 260gm (for you metricophiles, that’s about 9oz), which is supported over the entire headband and feels light on the head, no matter how extended the listening session. Sennheiser, being German, has come up with a measurement for caliper pressure: approximately 2.5 Newtons. Sir Isaac never sat on my ear, so I’m not sure what that means exactly.2 Regardless of the measurement, the 580s remained comfortable hour after hour. The adjustable headband stays adjusted, and the earpieces are free to move vertically in relation to the headband, adding to long-term wearability. The oval circum-
aural earpieces are large enough to comfortably cover even my huge ears, and their open-air design allows environmental sounds—such as ringing tele-
phones—to be heard.

If enlightened engineering has taken care of comfort, then has it also eliminated that signature headphone sound? Sorry, no. To solve the spatial recovery problem, you still have to employ specially designed processors, which I intend to examine in future pieces; but, paraphrasing mystery writer Jonathan Valin,3 why are so many of us hung up on looking at the music? Sometimes you just need to shut your eyes and listen.

To be musically valid, the experience of listening to headphones doesn’t have

1 Binaurally recorded source materials (such as John Sunier’s disc) are a completely different story—one that I’m not dealing with here, but will examine in the future.

2 My wife, boasting a superior grasp of physics, has pointed out that a Newton is a unit of force, obviously based on the downward force exerted by one Fig Newton. I feel so foolish.

3 Check his Mux Loves novel (available in paperback) for a classic detective story wound around some stolen RCA Living Stereo LPs.

—JA

Sennheiser HD580 headphones

Open-air, dynamic, diffuse-field-compensated circumaural headphones. Transducer
principal: dynamic diaphragm. Frequency response: 12Hz-38kHz, ±3dB. THD: ≤ 0.1%. Nominal impedance: 300 ohms. Sensitivity at 1kHz: 97dB. Headband pressure: approx-

number of dealers: 475. Manufacturer: Sennheiser Electronic KG, VI-3002 Wede-
mark, Postfach 10 02 64, Germany. Tel: (49) 51-30-600-0. Fax: (49) 51-30-631-2.
US subsidiary: Sennheiser, 6 Vista Dr., P.O. Box 987, Old Lyme, CT 06371. Tel: (203) 434-9190, Fax: (203) 434-1759.
to be identical to that of listening to your main system any more than listening to your stereo need be identical to the real event. I'm not suggesting that we jetison live music in a real space as our reference, but we must acknowledge that, as discrete experiences, each type of listening has its value and place.

**Glories strung like beads**

Yes, you do give up some seductive imaging information when listening to even the finest headsets. Ambience suffers as well. What you gain is an immediacy, a sense of *proximity* to the music that has its own appeal. I'm reminded of the orchestral concerts at Carnegie Hall where I've had front-row seats, from which the beautiful hall-acoustic is almost totally obscured by the incredibly powerful direct sound of the instruments. It's quite a rush, swallowing in the sheer sound. While I'm not about to forsake midhall—or even upper-balcony—seats, neither am I immune to the charm of front-row immediacy. This was brought home to me when I listened to Corigliano's Symphony 1 (Erato 2292-61132-2). The power, impact, and lack of room acoustic were similar to those experienced when, sitting in the eighth row, I heard Barenboim and the CSO perform the piece in Carnegie Hall. In this case, the headphone perspective was directly analogous to, although by no means the same as, my concert experience.

I should also point out that, unlike front-row seats at Carnegie Hall, headphones do not change the ensemble balance when giving you that thrilling up-close sound. For the final concert at Carnegie before the renovations, Isaac Stern was the soloist in Beethoven's Viin Concerto. The audience was hanging off the rafters that night. We were sitting in the first row, this time on the far left. The sound was huge, direct, and exciting; but while we had no trouble hearing Stern, the first violins, or even the woodwinds, the violas and basses on the far right of the stage were way down in the mix. In this sense, the Sennheisers would have the advantage over the concert hall.

**I sound my Barbaric YAWP**

A musically significant complaint lodged by many against headphones is the loss of a sense of deep bass. It's true that much of the "rumble-rumble" sensation is extraordinary; the skin itself serves as the sensor through which we receive the physical nature of bass. The HD580s are rated to a staggering 16Hz, and I feel satisfied that they do produce that bottom octave in the proper proportion to the rest of the spectrum. Call me crazy, but while listening to deep bass at high volume through the 580s, I felt the skin on my ears tingling.

In "Jungle Blues," from the Dirty Dozen Brass Band's *Jelly CD* (Columbia CK 53214), the group uses a huge bass drum. Not only did the 580s capture the impact of the mallet on the membrane, but they conveyed the slow decay of the tone as the drum head slows down and finally stops. *Man,* I just kept playing this track over and over and over, cackling manically as I paced back and forth in front of my windows! Did I mention that the music on this track is also pretty cool? In addition to all of that detail on the big drum, the band is wailing away with tuba, trombone, two trumpets, three saxes, and two hand-drummers— *whew!* A lot of musical information to sort out, but the Sennheisers were up to it. A by-product of their acuity, however, was their revelation of the painfully bright nature of this recording.

As an audiophile dedicated to truth, accuracy, and realism, I am foreververse for mentioning that I found myself growing irritated at the Sennheiser HD580s for consistently revealing what was really there?

**Do I contradict myself?**

**Very well, then, I contradict myself**

(*I am large, I contain multitudes.*)

Some listeners find the HD580s somewhat soft on the top. I don't. I find them true to what's on the disc—sometimes, I admit, to my chagrin. However, I suspect that I know what has caused this assessment. The Sennheisers exhibit less grain, glare, or other hi-fi coloration than well-nigh any other transducer that I have heard. Many listeners have never heard a stereo system that doesn't contain at least a trace of these artifacts. As we have fewer and fewer opportunities to hear unamplified musical performances, these colorations are increasingly perceived as the signifiers of accuracy, since most people use hi-fi as its own reference. Here we have a true feedback loop, with major implications for the way that sound is presented.

Most headphones are so colored totally that they create a completely different sonic portrait from that of a high-end system would present. The 580s sounded remarkably like my hi-fi. The first time I had them I adjusted the gain so that the Sennheisers and my reference system matched, and spent a happy hour pulling them away from my ears to compare them to the ProAc Response 1Ses. Virtually indistinguishable, at least until I threw on the house/ambient sampler CD from Barramundi (Antler-Subway ASW 6115). The synthesized bass came through more palpably on the 580s. Does this mean that the Sennheisers are superior to the ProAc? No, merely that their bass extension for this music was superior to that of a $2000 loudspeaker. If forced to choose only one of the two, I'd have to go with the ProAc—but I'd hate to have to make that choice.

**I sing the body electric**

Sennheiser has achieved this level of quality with the HD580s through a canny application of the technology developed in the manufacture of their reference-quality microphones and, of course, the Orpheus HE 90. The diaphragm is constructed of a mixture of polycarbonate and polyurethane to achieve a lightweight piston that resists pure polycarbonate's tendency to liquify under the high mini-speakers of a 20kHz signal. Since headphone and microphone diaphragms don't use compliant surrounds, the edge of the transducer is subjected to a lot of stress at its anchor points—so much stress that excessively rigid materials tend to liquify, or distort, when subjected to it. Denied one escape, the material will seek another, so Sennheiser used laser interferometry to optimize the rigidity/flexibility equation toward accuracy.

They also use a triple-wound aluminu **mm** voice-coil, partly for that material's heat-dumping properties, partly for its low mass. The coil surrounds a neodymium rare-earth magnet designed to improve control of the coil. Oxygen-free-copper signal cable is wrapped in a Kevlar-reinforced jacket for durability—an important feature, since the HD580 is terminated to a stereo miniplug to facilitate use with portable stereos. Actually, I didn't realize this at first, since the miniplug is inserted into an extremely high-quality mini-to-phono adaptor. The fit was so tight that, at first, I never suspected the presence of the real termination. Well done!

That miniplug suggests strongly that the HD580s are aimed at the millions of personal stereos out there. Indeed, it would be foolish of Sennheiser not to covet so vast a market. However, despite the efficiency of this 300 ohm design (fig.1), most portables will not drive the Sennheisers to satisfactory volume levels or adequately control the deep-bass response. Oh, they'll play coming straight out of your Walkman Pro or Optimus.
CD-3400—their sound just won’t be as I’ve described. For that, you’ll need something more powerful.

There are quite a few headphone amps on the market. I’ve already mentioned the HeadRoom designs, we’ve extensively reviewed the Melos SHA-1, and Grado makes a good’un, too. These are definitely the way to go for optimum listening pleasure. The headphone amps of many high-quality integrated amps and receivers sound good as well. For example, the Arcam Alpha series integrates really made the 580s sing. An audiophile on a budget could do a lot worse than pairing the Sennheisers with an Arcam, Creek, or NAD integrated while saving up for some full-range speakers.

Drive the 580s properly, and you’ll revel in the sheer power of their sound. I played Stereophile’s August ’94 “Recording of the Month,” Terry Evans’s Blues for Thought CD (Pointblank 39064 2), and simply rocked out. The Sennheisers revealed the nuance and conviction of Evans’s vocals, from his rough, stuttering growls on “Get Your Lies Straight” to the lyricism of his reading of “That’s the Way Love Turned Out for Me.” I kept turning up the volume, driving Ry Cooder’s guitars louder and louder—well, actually, that’s something you’re going to have to be careful about. The 580s’ low level of distortion and freedom from the “hotted-up” sound of most stereo can fool you. I know that I tend to listen to these headphones a lot louder than I do my speakers—hey, that’s one of the blessings of headphone listening. But this is your hearing we’re talking about—it’s hard to appreciate those subtle differences through a case of progressive tinnitus.

A SONG OF MYSELF

I really hate it when audio reviewers act as if actually buying a product they’ve reviewed makes it—you know—special. Big deal! Most people do buy their systems, yet the average person doesn’t say,

5 You haven’t gotten this CD yet! What are you waiting for? It’s fantastic!

“You wanna know how good it is? I actually bought it. Pretty radical, huh?” Well, not to make a big fuss about it, I’m buying the Sennheiser HD580s. They’re accurate, comfortable, have extended—and flat—frequency response, and I can afford them. There are other high-quality headphones out there, to be sure. Stax’s new $4000 Omegas sounded fantastic at SCES—as indeed they ought—and Grado’s amazing $69 SR60s and $99 SR80s offer high-end sound at very reasonable prices. Yet, even when compared to headphones, they’re significant differences in price points, the 580s’ features in both sound and comfort are impossible for me to resist. The Sennheiser HD580s will be an important evaluative tool, and an enjoyable source of music at all times—even at 3am on a school night. For me, they make sense.
Balanced performance isn't the be-all and end-all of product design. A person can listen to a product which balances the highs with the lows, detail with forgiveness, delicacy with dynamics, and still feel unmoved. Such a product might sound "proper," but it won't produce the illusion of a live performance. It takes a special window or two on reality to convince you you're listening to live music. Such a loudspeaker may have other deficiencies which keep it from being a universally appealing product, but it keeps reminding you of the live experience. It may appeal only to a small number of audiophiles, but their experience may well be more intense.

Each of us prefers a different window on reality. Some are moved by the soundstaging abilities of minimonitors; for some, it is the open, box-free sound of bi- or dipolars; for others, it is the detail of a fast tweeter. Which one is most important is individual: You'll react emotionally when you hear a product that does it for you.

Retrieving the most delicate details of the performance and the timbre of the instruments—i.e., mimicking the presence of musicians in the room—can do it for me. Throw in a bi-directional radiating pattern for an open, box-free sound, and you've got my attention. Audiophiles who value these qualities will enjoy the Flatline Design Model 175s, which possess them in spades. Like every loudspeaker, the Flatline has a shortcoming—it's unusual design required atypical placement in my room—but this can be worked with to achieve superior sound. Read on.

Description
The tall, slim Flatline 175—71" tall by only 14" wide—consists of a columnar "box" housing a side-firing 10" bass driver and a front-firing 5" lower-midrange/upper-bass driver. This box is 8.25" wide and 12.5" deep. The upper midrange and treble regions are handled by a ribbon that runs the full height of the cabinet on a projecting "wing," which itself is almost flush with the front of the cabinet's inside edge. This narrow front offers an advantage to audiophiles with smaller rooms.

The ribbon is driven evenly over its entire area, and there's no dead weight in the diaphragms: no magnets, voice-coils, laminated materials, or relatively heavy diaphragms. Due to their ultra-low mass, the response time is virtually instantaneous—close to the theoretical ideal of moving air alone. As a result, dynamics within the range of the ribbon and the ability to produce delicate detail are inherently superior. These ribbons emit no sputtiness, silvery coloration, sibilance, or telltale metallic sound. This is one of the best incarnations of ribbon technology yet.

Finally, the heavy metal T-bar speaker stands, supplied by Sound Anchors, have three adjustable spikes which penetrate the carpet. (The spikes are required: without them, the speaker is unstable.) Bolting the stands to the base of the speaker cabinet with the supplied hardware is easy. The ribbon housing is then dropped onto a bracket at the top of the assembly, and two bolts at the bottom of the housing are tightened down to the T-bar base.

Placement & Matching Components
Speakers with narrow fronts, such as the 175, allow much more space between the outside of the speaker and the side walls of the room. The space lengthens the delay time between the direct sound from the speaker drivers and the reflections from the side-wall boundaries reaching your ears. That, in turn, helps the brain separate the direct from the reflected sound, and results in sharper instrumental placement and less muddled sound. This is why minimonitors are able to image so well. For example, in my 12.5'-wide room, the 175s can be separated 6', measured from the inner edges, and still get a speaker-to-side-wall distance of just over 3' measured from the ribbon—the absolute minimum for side-wall standoff.
By contrast, a wide-panel speaker, such as an Apogee or Mirage, will demand a wider room, eating up as much as an additional 20° of (sonically) precious space. So, the 175s starts with the potential for flexible room placement and superior soundstage performance.

I began with the 175s in roughly the position I normally use for my Mirage M1si speakers: 36" from the side walls, measured from the ribbon, and 77" out from the rear wall, measured from the rear of the ribbon housing. In that position, the stage was only as wide as the ribbons and as deep as the rear wall in the center, but was slightly truncated so that the sound never really extended to the corners of the room. This may be due to the fact that the back of the cabinet projects well behind and outside the ribbon, and doesn't allow effective high-frequency dispersion to the corners. The center image, front and rear, was extremely solid—as good as I've ever heard. There was no need to toe-in the speakers to cure any hole in the middle.

A sound-absorbing baffle placed at the outside of the cabinet at the height of the 5" driver made the sound seem cleaner, demonstrating that the speaker wanted still more room to the outside, that I needed more delay time between the direct and reflected sounds. Experimentation with the baffle also told me that the 5" driver contributes significantly to the imaging of the system. Because I wanted a wider stage, front and rear, and since the stage width was limited to the distance between the ribbons in my room, I decided to separate the speakers by 8'.

This worked beautifully, expanding the orchestral image laterally at the front and rear while not sacrificing the integrity of the center image. I added enough toe-in for the back of the ribbon to “see” the rear corners of the room. That also worked well, turning the outlines of the stage from a truncated pyramid into the desired rectangular shape. The toe-in also lessened the 5" driver's interaction with the walls. Were these speakers to remain permanently in my room, I would place sound-absorbing baffles to the outside of the 5" drivers to optimize imaging. Users with larger rooms shouldn't have to do that. Flatline also mentions the possibility of placing the speakers along the long wall to give the same large-room effect for imaging purposes, but that wasn't possible in my abode.

I still needed to do some work. Placed 77" from the wall behind them, the speakers had a deep stage but sounded lean. Using Stereophile's Test CD 2—avoiding frequency extremes, and referencing the 1/8-octave test tones to pink noise—I measured the bass frequencies between 160 and 40Hz as being down an average of 2.28dB, while the treble range from 2.5 to 10kHz was up an average of 1.64dB. That 4dB spread between the treble and the bass rendered many a bass-heavy pop recording wonderfully transparent; but, as you can imagine, there was little body in better-balanced classical recordings.

I then moved the speakers back toward the rear of the room, so the walls could do some bass reinforcement. With the back of the cabinet just 44" from the rear wall and 24" from the side walls, the averages narrowed to a very respectable -0.175dB for the bass range, and +0.825dB for the treble—a 1dB spread. The midrange average was +0.825dB. These averages are valid for judging overall balance, but with each change in position, every speaker will have dips and spikes in frequency response. Adjustments in placement can minimize the worst of them. Get yourself the Stereophile Test CD 2 (see the advertisement in this issue for ordering information) and a Radio Shack sound-pressure-level meter—they could teach you a lot about your room and your speakers.

There was a sacrifice in perceived depth when I moved the speakers back to the rear wall—the recordings had to provide most of the depth cues, without as much assistance from a deep room/speaker interface. The number of recordings that can provide most of the depth cues are fewer than you might imagine. With my listening chair away 12' away, the speakers were certainly able to “disolve” the rear wall, but I got a 20th-row perspective of the orchestra, with a foreshortened front-to-rear perspective of the ensemble depth. Moving the chair closer, to about 9', deepened the soundstage again, without my having to give up the tonal balance I'd achieved.

I could have avoided some of this extended placement process by following Flatline's printed instructions and placing the 175s close to the wall. But why should I do that when I can confirm Perkins' findings and make more work for myself in the process? It's all just part of the dedication we Stereophile reviewers have to you readers—the greater good of high-fidelity, and humanity. Eh-hum.

Wires will be of concern to new owners, since these speakers reveal everything. TARA Labs RSC Master, Kimber Kable KCAG, Music Metre Signature, and Discovery Cable were very good. The Music Metre added a very slight warmth and a hair more in dynamics, which was beneficial with the 175s: even after final placement, they still needed a bit of help to balance the dominance of the ribbon.

I used three preamps for listening: a homemade passive preamp; the Melos 333 line and phono stage, which sounded a bit warm and more euphonic; and a Sonic Frontiers SFL-2 (see my review last month, Vol.17 No.11), which sounded cooler and very transparent. For these speakers, the Melos and the passive unit were the best matches.

This is one ribbon that works well with a good transistor power amplifier. I was first intrigued by their sound at two CESes, when they were being driven by solid-state amps. That's a big plus: If you don't own tube amps, you won't be forced to run out and buy them if you change speakers—quite a cost savings.

With the right recordings, and after optimal placement of the speakers in the room, the Flatlines with my Krell KSA-250 sounded quite good—even lush. And I was certainly able to hear the differences in recorded venues. With the Krell, the Flatlines gave the feeling that all the sound, good or bad, came directly from the recording site. I wasn't able to detect any grain or glare with the Krell that wasn't attributable to the recordings.

**Sound**

The ribbons told all. Poor digital remastering of analog originals, such as Dexter Gordon's *Gettin' Around* (Blue Note B21Y-46681), which features a nasal-sounding tenor and a collapsed soundstage, caused a non-audophile jazz-musician friend of mine to react immediately. Conversely, a symphony—orchestra musician/audiophile friend, listening to good recordings well-known by him, judged tonality to be accurate.

Adding my own experience with recordings I know well, I was confident that the speaker/amp combination was delivering the truth. There comes a time when, after you've optimally set up your system, you need to put away your audiophile sensibilities and listen to the music. No, you won't need to ignore a lot of intrusive recorded defects with these speakers. With most recordings, the
sound was Good to Lush; but the ribbons reached for greater heights in performance, making deficits in software more obvious.

Would you like to remedy that situation and add a bit of magic? As good as the Flatlines sounded with the Krell, I just knew that these speakers would be at their best with tubes. If the sound of the Flatlines through the Krell could be lush, the sound through a pair of Melos 400 tube monoblocks was the auditory equivalent of having my erotic zones stroked with a feather. With much sweating and exhaustion, an Audiophile Society friend and I lugged those mothers out of his house and into mine.

I’d have followed Shirley Horn anywhere after just a few words of “Return to Paradise” (Here’s to Life, Verve 314-511 879-2)—so . . . achingly . . . sweet. The experience was repeated with Tobias Picker’s Old and Lost Rivers (Virgin Classics 59007), which has a lot of upper-octave string work. Very smooth, very sweet. There’s no question that the ribbons allow the magic of filaments to be heard better than ordinary dynamic drivers. This is the sound tubeholics thirst for.

The bass was slightly looser with the Melos. I imagine that most or all tube amps will behave similarly, since they have less ironclad control in that region than do transistor amps. The Melos measured the way it sounded: about 0.5 to 1dB more at each 1/2-octave step than the Krell. Had I kept the Melos amps longer, I would have moved the speakers slightly out into the room again and taken advantage of that bass bloom. If the Melos is representative of the best tube designs out there, then tube-amp owners will be able to take advantage of the Flatline 175s in a unique way: the ribbons will show off the tubes, the warm bass of the latter offsetting the lean bass of the former.

The perceived depth with the best EMI records was about 6', beginning a few inches behind the ribbon; the width was as wide as the room. The space thus created was filled with a large, delicate, detailed, open sound with precise instrumental placement. The speakers didn’t layer the sound in specific rows, as I’ve heard on a few systems, but there was plenty of fill, with specific placement of sound within the outlines of the soundstage.

Lateral dispersion was excellent at the seated position—no such thing as moving your head a few inches and losing it, as with many electrostats. Vertical dispersion was more critical, but a seated position which placed my ears anywhere from 2' to 4' off the floor was fine.

As already often stated, these speakers excelled in their ability to produce detail, delicacy, lack of distortion, refinement, transparency, and coherency. All these qualities were interdependent, resulting from the performance of the ribbon and its effective mating with the dynamic drivers.

Though they placed me close to the music and threw a large wash of sound, the 175s were proper English gentlemenspeakers. From an austere perspective, they opened a window on the world. Such a sound is but one choice from the palette of those available to audiophiles who like their music ordered, neat, and unruffling. But—and here’s the rub—these speakers need additional micro-dynamics. Meaning what? They were able to play plenty loud, but in the ebb and flow of the music—the rise and fall of instruments in normal musical passages—they needed more “jump factor.”

Contrasts in level (as opposed to definition) on the accents of individual notes, and contrasts in the levels of ensemble sections, were somewhat staid in impact, and needed to be more “there.”

Small dynamic accents helped define rhythmic drive and mood. Expected accents on material familiar to me were somewhat understated, my expectations remaining unfilled. The Flatlines need looser hips. There also seemed to be a bit of congealing of dynamics in the lower midrange—playing the speaker at moderate listening levels made this more apparent. The speaker bloomed better when goosed up a bit, but that’s not the whole answer. Giving the knuckle-rap test to the side panels told me that the cabinet is very rigid, but could be better damped. Perhaps cabinet resonances contributed to this problem. I don’t know.

How we place this criticism in the context of this or other speakers is tricky. All speakers have deficits, and most become significant with long-term listening. Most of us choose our speakers because they do well the things we like, their shortcomings usually matching our own blind spots. This microdynamics issue is one I’m sensitive to, but, in the context of this speaker’s assets, will probably be of only moderate concern to most listeners. It can definitely be worked with in matching wires and cables, and in room placement.

I just couldn’t get away from the 175s’ assets. The ribbons were simply magical on material that has delicate shadings in the treble range. On Frank Bridge’s The Sea (EMI ASD 3190), the separation of instruments in the string section, the definition and purity of the triangle, and the sweet sound of the woodwinds were unmatched. The horizon and the glint of sunlight on the waves went on forever. It was titillating.

On Frank Sinatra’s “Blues in the Night” (Only the Lonely, Capitol C21Y-48471), every tiny vocal inflection of the master at the height of his career was conveyed with a startling intimacy that caused me to appreciate even more an oft-heard performance. The bass region was adequate but understated, illustrating the desirability of tweaking the setup and associated components for additional bass warmth and extension, to balance the ribbons’ performance.

**Measurements from JA**

Flatline’s 175 is not very sensitive, 2.83V RMS of B-weighted noise raising an estimated sound-pressure level of just 82dB at 1m. This is much lower than the specified 88dB, and might contribute to RN’s finding that the speakers lacked “jump factor.” However, to some extent this will be compensated for by the ribbon’s cylindrical-wavefront dispersion: the level drops with distance according to more of a 1/d law than the 1/d² typical of point-source radiators.

The ribbon’s impedance, shown separately on the right-hand side of fig.1, drops to a value of 2.4 ohms throughout the treble. This is broken only by the slight peak at 15kHz, this due to an equalization network in series with the ribbon. The rise in impedance below 1kHz and the negative phase angle are due to the crossover’s high-pass filter. The woofer’s impedance is shown on the left of fig.1: the peak at 140Hz, where the trace cuts that of the ribbon, is due to the crossover to the midrange unit. The woofer tuning is revealed by the slight peak at 35Hz, implying good LF extension. The slight wrinkle in the woofer trace that can be seen at 290Hz is probably due to a cabinet resonance of some kind. This wrinkle can also be seen in the overall impedance plot (fig.2). With an impedance magnitude below 4 ohms for most of the midband and treble, the Flatline 175 is a pretty demanding load for an amplifier to drive, though this is offset by the generally moderate phase angle. Incidentally, the unsupported nature of the crossover tray (see earlier) led the leads to the terminal posts to fracture while I was performing these impedance measurements.

Acoustically, the responses of the three drive-units on the ribbon axis with the microphone 35" from the ground are shown in fig.3. The woofer’s output actually peaks between 60Hz and 100Hz—an octave higher than anticipated from
the impedance measurement. The acoustic crossover to the 5" midrange unit takes place at 120Hz, with that unit rolling out above 500Hz. The ribbon comes in above 500Hz, with a shallow slope below that frequency leading to a slight but well-suppressed peak at 150Hz, this presumably the suspension resonance of the ribbon. In its passband, the ribbon's output looks rather uneven, with a rolled-off top octave.

The overall system response on the same axis at a distance of 50" is shown in fig.4. The low frequencies roll out relatively early below 70Hz—RN did find that the 175's "bass region was adequate but understated"—though a slight shelving in the woofer's output results in useful output down to 30Hz. As is often found with planar speakers, the response appears to tilt down smoothly with increasing frequency. Partly this will be due to proximity effect at this relatively close microphone distance. (Because one of the radiating dimensions is so large, the usual assumption that the measuring microphone is in the speaker's farfield will no longer be valid, resulting in an apparent boost in the ribbon's lower octaves.) I investigated this phenomenon by repeating the measurement with a microphone distance of 100". Though this results in less resolution below 1kHz, it can be seen in fig.5 that the speaker is indeed better-balanced in the treble at the farther distance, though a deep notch appears in the ribbon's output at 15kHz. The ribbon's response still looks somewhat ragged, however.

Latterly (fig.6), the ribbon maintains its treble response well off-axis, but at lower frequencies a notch develops to either side. Off-axis on the midrange side (the rear of the graph), this notch is in the crossover region between the midrange unit and the ribbon. On the side of the speaker, the position of the notch varies with off-axis angle, dropping in frequency for the more extreme angles. As expected from a line-source radiator, the vertical balance (fig.7) doesn't change significantly with height, though the chosen microphone axis (35" from the floor, halfway up the ribbon and level with my ears when I'm sitting down) appears to have less top-octave energy than positions just above or below.

In the time domain, the lazy overshoot below and above the zero axis in the Flat-
line's impulse response (fig.8), following the sharp up/down peak of the ribbon, correlates with the excessive bass and midrange levels noted earlier. Though RN didn't feel the ribbon to have any significant overhang, some residual ringing can be seen in the tail of the impulse. The speaker's step response (fig.9) reveals that the Flatline is not time-coherent, despite its use of first-order crossovers.

The positive-going spike in the graph is the ribbon, followed by the negative-going midrange unit, then the positive-going woofer. Puzzled by this, I checked out the crossover circuit and individual drive-unit impulse responses in more detail: indeed, the ribbon and woofer are connected with positive polarity, the midrange unit with negative polarity. An enigma.

The cumulative spectral-decay, or waterfall, plot (fig.10) is surprisingly good for a system with a planar unit covering much of the audioband. Yes, a slight resonance can be seen at the cursor position (5.8kHz), and a couple of persistent modes extend past the 3.13ms mark. But here, I suspect, is much of the reason RN liked the speaker: it decays cleanly.

The impedance plot suggested the presence of a cabinet resonance at 290Hz. This resonance, along with two other modes at 148Hz and 80Hz, can be seen in fig.11, a waterfall plot calculated from the output of a simple accelerometer fastened to the front baffle midway between the midrange unit and the base. Though these are relatively low in level, the large radiating area of the affected wooden panel and the fact that it faces the listener might make this behavior significant. Indeed, RN was ambivalent about the speaker's performance in this frequency region.

All things considered, the Flatline 175 illustrates why I hate measuring ribbons or other planar speakers: the interaction between the speaker and the measuring microphone is too complex for comfort at practical measuring distances; and, partly as a result, the things never measure satisfyingly flat—even when they sound flat! However, putting its problem areas—particularly the diminished low frequencies and the rather underdamped panels—to one side, these measurements go some way toward explaining why RN liked the 175's overall sound quality. They also explain why it's so fussy about setup. To a large extent, you will be able to fine-tune the 175 to get any balance you desire.

—John Atkinson

CONCLUSION

The Flatline Design Model 175 is a tweaker's dream—every change will be heard. Fussing with them to maximize performance and minimize faults can produce potentially mind-boggling realism. With the right material, they tickled my sensibilities and produced a large, intimate sound that had ultimate transparency and refinement.

So tweak away: Utilize room boundaries for additional bass, toe-in the speakers in small to average rooms so that the rear of the tweeter can "see" the room's rear corners, position the speakers as far apart as is reasonable without damaging the center image, and tweak with dynamic, slightly warm-sounding cables.

Are the Flatline 175s worth 4500 bucks? Yes, but they've got stiff competition in this price range from Dunlavy, Thiel, Paragon, and others. The 175s' assets are definition, transparency, open, lush sound, and a large stage. You'll have to pay careful attention to setup, and the speaker's best qualities must match those that get you emotionally involved with the music. Though the 175s are not the most widely distributed speakers, you should hear them if you want to make an informed choice in this price range.

—Russ Novak

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Note: The diagrams in the text are not fully transcribed.
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John Atkinson auditions affordable, no-compromise, time-coherent loudspeakers from Dunlavy Audio Labs and Spica.

Dunlavy Audio Labs SC-1: Two-way, stand-mounted, sealed-box loudspeaker with a low-frequency Q of approximately 0.6. Drive-units: 1" (25mm) silk-dome tweeter; two 3.5" (89mm) plastic-cone woofers. Measured crossover frequency: 3.3kHz. Electrical crossover slopes: first-order, 6dB/octave, minimum-phase, compensated for driver response anomalies. Frequency response at 10' on HF axis: 80Hz-20kHz ±2dB. Phase response at 10' on HF axis: 200Hz-10kHz ±20° (pulse response said to be "better than most CD players"). Harmonic distortion: <0.3% at 90dB sp above 250Hz. Par matching: ±0.5dB up to ±5kHz. Sensitivity: 94dB/W/m (2.83V). Nominal impedance: 5 ohms. 3.5kHz minimum, 8 ohms maximum. Power handling: 250W peak for up to 10ms; 25W average on pink noise. Dimensions: 20" (508mm) H by 18" (457mm) W by 10" (254mm) D. Weight: 22 lbs (10kg) each. Serial numbers of units tested: 0117A/B. Finish: Light American Oak or black-stained American Oak; standard; other finishes available at additional cost. Price: $995/pair, not including stands. Approximate number of dealers: 35. Manufacturer: Dunlavy Audio Labs Inc., PO Box 49399, Colorado Springs, CO 80949-9399. Tel: (719) 592-1159. Fax: (719) 592-0859.


Though these two speakers are reviewed together here through happenstance, they do have lots in common: both are affordable stand-mounted two-ways; both are said to be time-coherent on the intended listening axis, as well as being pretty flat in amplitude response; and both are from speaker engineers named John who rely heavily on measurements, only listening when the initial design work is done. The Dunlavy SC-1 is the work of John Dunlavy, whose much larger SC-IV is Stereophile's 1994 Component of the Year; the Spica TC-60 is from John Bau, whose previous three designs were long-term residents of Stereophile's "Recommended Components."

**Review Context**

Power amplifiers used to drive these speakers were either a pair of Mark Levinson No.206 monoblocks, a Krell KSA-100S, or a Krell KSA-50S; the preamplifier was the remote-controlled Mark Levinson No.38S, or the value-for-money McCormack TLC-1 buffered passive control unit. A Mod Squad Phono Drive EPH amplified LP signals from a Linn Sondek/Cirkus/Trampolin/Lingo/Ekos/Arkiv setup sitting on an ArchiDee table. Digital source was a Mark Levinson No.30 or a Counterpoint DA-10, each driven by a Mark Levinson No.31 transport via Madrigal AES/EBU cable. An Audio Alchemy DTI Pro and a Sonic Frontiers UltrajitterBug were used to smooth out the sharp edges of the bits.

Interconnects used were all Audio-Quest's "AudioTruth" Lapis x3; speaker cable was a bi-wired set of AudioTruth Sterling. All source components and preamps were plugged into a Power Wedge 116, itself plugged into one of my listening room's two specially installed dedicated AC circuits and fitted with the Power Enhancer option. The speakers sat on 24" lead-shot-filled Celestion Si stands, interfaced to the stands' top-plates with small Blu-Tack pads. The stands were spiked to the tile-on-concrete floor beneath the carpet and pad, about 8' away from my listening seat.

My dedicated room measures approximately 19' by 16.5', with a 9' ceiling. The wall behind the speakers is faced with books and LP's, while further book- and CD shelves occupy the positions on the side walls where the first reflection from each speaker would occur. The room is carpeted, and there are patches of Sonex foam on the decking's n'viga ceiling to damp the first reflections of the sound. The other wall has RGP Absfusors and ASC Tube Traps behind the listening seat to absorb and diffuse what would otherwise be early rear-wall reflections of the sound that might blur the stereo imaging precision. More Tube Traps are used in the room corners to even out the room's bass resonances, the result being a relatively uniform reverberation time of around 200 milliseconds from the upper bass to the mid-treble, falling to 150ms above 10kHz. The room sounds relatively dry, without a lot of bass bloom, but is extremely articulate.

**Dunlavy Audio Labs SC-1:** $995/PAIR

The SC-1 is the smallest model in the "Signature Collection" to come from Dunlavy Audio Labs, the company founded by John Dunlavy after he left Duntech. The largest model in this series used to be the $4995/pair SC-1V that Robert Deutsch so enthusiastically reviewed last April, and that this month was voted Stereophile's 1994 "Product of the Year." There is now also a huge SC-VI available.

Whether small or large, however, all the Dunlavy SC series conform to designer John Dunlavy's basic specification: a vertically symmetrical array of drive-units above and below a central tweeter which, coupled with careful recessing of the physically shallower drivers and the use of first-order cross-over filters, results in both a time-coherent performance and a flat amplitude response on the intended listening axis at a distance of 10' or more.

The SC-1 is a two-way design, with its central silk-dome VIFA tweeter flanked by two shallow-coned bass/midrange drive-units, each with a nominal 5.5" chassis diameter. The tweeter is mounted in a recess and surrounded with a thick layer of felt to minimize reflections of its output from the edges of the recess.1 The elegant enclosure is tall and relatively narrow, and veneered on all sides except the front baffle. It is made from MDF, apart from the hardwood top and bottom panels. The black jersey-cloth grille is edged with more felt in front of its radiused batons; the speaker is intended to sound most neutral with the grille in place.

The SC-1 is almost completely filled with two grades of acoustic foam to help achieve the desired slightly over-damped

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1 John Dunlavy holds the US patent (No. 4,167,985, dated 9/10/79) for the use of acoustic-absorbing material to control diffraction around drive-units.
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woofers and alignment (Q = 0.6). The internal wiring is Dunlavy's own cable, with push-on connectors used to power the drivers. The crossover is carried on two glass-fiber circuit boards soldered to the rear of the terminal panel (two pairs of knurled binding posts are provided to allow for bi-wiring). High-quality parts are used, including Solen polypropylene capacitors for the series feed to the tweeter and the various Zobel and equalization networks, and a big air-cooled coil in series with the woofers.

The review samples supplied by Dunlavy Audio Labs were taken straight from the production line, and were not hand-chosen as being atypically good; John Dunlavy believes that for a manufacturer to do so would be basically dishonest. On the other hand, as DAL operates 100% quality control and guarantees pair-matching to within about ±0.5dB up to 15kHz, the chance of any one pair of SC-I's sounding different from any other pair must be small.

**Sound:** Setting the SC-I's up on 24" stands straight out of the box in the room positions that I generally have found to work best with small free-space speakers—the Spica TC-60s, for example—proved disappointing. The balance, while neutral through the upper midrange and treble, was excessively lean, with a shelved-down bass. But before I started experimenting with position, I read the comprehensive owner's manual.

There it was, on page IV-4, paragraph D: "The driver's 'free-air resonance'...is directly related to the combined moving mass...and the mechanical compliance of the suspension system. Since [the suspension] is usually fabricated of an impregnated cloth or foamed-plastic material, whose 'mechanical stiffness' becomes slightly more compliant as it vibrates and flexes over time, usage tends to gradually lower the resonant frequency of the driver—a desirable trait that improves, to a small degree, a loudspeaker's performance."

Although the drive-units receive some break-in at the factory, DAL suggests it takes about 12–15 hours for the woofers to reach their specified 80Hz bass-tuning frequency. Accordingly, I ran them in on the pink noise and swept-tone track from the XL0/Sheffield Lab Test CD at 6V RMS for 12 hours before I did any serious listening. The playback level for the pair would have been a neighbor-disturbing 95dB, but I wired the speakers out-of-phase and faced them toward each other, a couple of inches apart. In this way, though the drive-unit suspensions are being mechanically worked, almost all the acoustic output cancels. The cancellation was excellent, confirming DAL's claims for close pair-matching. What sound is left is mainly radiated from the enclosures; it was interesting to note that this was dominated by frequencies in the middle of the midrange: 500–700Hz. Perhaps this was an indicator of the SC-I's cabinet resonant behavior (see later).

Well, after a day of mused whooshing sounds, I set the speakers back where they'd been and put on the new Peter McGrath–engineered Mahler First on Harmonia Mundi (HMU 907118). The lower-midrange/upper-bass was now more fleshed out than it had been before. While this will always be a rather light-balanced loudspeaker, it no longer sounded lean'n'mean. The power region of the orchestra was reproduced in pretty good measure, with the big bass–drum whacks at the start of the fourth movement superbly well-defined. Ultimately, however, I moved the speakers closer to the wall behind them. This did bring up the midbass, but too close to the wall and the speakers' superb soundstaging was compromised. SC-I owners should experiment carefully here—mere inches can mean the difference between perfect and paltry sound. But with the SC-I's some 15" in front of the LP shelves, the bass drum in the Mahler had a satisfying mix of leading-edge clarity and weight to the body of its tone. Perhaps also because I was now sitting a little farther away, the upper mids now seemed slightly better integrated with the treble.

Putting the bass to one side, the area where the SC-I did perform better than almost any speaker I've had in my listening room—(even the $8000/pair B&W Silver Signatures)—was in the solidity of the stereo images it produced. In this respect, this inexpensive speaker seemed as good as my memories of the much more expensive SC-IV. Centrally placed vocalists seemed to hang in space just in front of the plane of the speakers. Was this palpability of image accurate? It must have been; "stereophonic" is derived from the Greek word stereo, meaning solid. More solid is more better, right?

On the "Mapping the Soundstage" tracks on Stereophile's Test CD 2 and our forthcoming Robert Silverman Concert CD (see November, pp.68–75), the soundstage was as accurately and stably defined as I've ever heard. The sound of the voice and handclaps in each case could be heard to take the path expected from the microphone technique used, with very good image depth. This is excellent performance.

Part of the reason for the excellent soundstaging must be the very close pair-matching—when I was measuring the in-room balance at the listening seat (see below), the upper midrange and treble responses of each speaker were effectively identical. Such outstanding imaging is also dependent on a speaker's transparency and resolution of detail: here, too, the SC-I excelled.

While I was using the Dunlavy's, I was experimenting with the Meridian 618 remastering converter to determine the optimal treatment for our Concert recording. This takes in high-resolution digital data and redithers/noise-shapes it to preserve as much as possible of the midrange resolution in the 16-bit data words you can store on a CD or DAT. Auditioning the difference between, say, a 20-bit original piano recording truncated to 16 bits with the same original noise-shaped to 16 bits was not subtle over these speakers. Their high transparency and excellent image definition allowed me to hear quite clearly how the truncation—in effect, the bottom four bits of each digital word are just thrown away—diminished the size of the hall acoustic around the piano image and eliminated much of the "air" in the recorded sound. If more recording engineers used monitor speakers as accurate and revealing as the Dunlavy
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SC-Is, they wouldn't be so pedantic about bits being bits.

I was also comparing data-reduction systems during this time, for demonstrations to be included on our upcoming Test CD 3. Again, the differences between Sony's ATRAC, Philips's PASC, and the 240 kilobits/second/channel algorithm being proposed for laserdisc use by DTS were clearly audible over the SC-Is. A speaker like this is an essential reviewing tool.

The Dunlavy was very low in midrange coloration. The sounds of instruments were in general superbly naturally balanced and delightfully differentiated. Its presentation was rather forward-balanced, perhaps as a result of the lightweight low frequencies, but there were no nasal or vowel colorations added. However, when an instrument did have a good deal of treble energy in its character—the essential fizzy edge to brass instruments, the trumpets in the Mahler Symphony 1 mentioned earlier, for example—this was pushed forward in the stage to be a little in front of the rest of the instrument’s tone. The sibilant edges to some voices were also slightly exaggerated, while tape hiss sounded a little whiter than I'm used to. The top two octaves, however, sounded very clean.

On the downside, the SC-1's ultimate loudness was limited by a hard edge to the upper midrange that crept in at around 95dB spl. This is actually quite loud in my listening room... but not quite loud enough for my bass desires. It also made the speaker somewhat intolerant of poor recordings.

An album that’s been spending a lot of time in the No.31 recently is Sugar Blue's Blue Blazes (Alligator ALCD 4819)—check out the final track, "Out Till Dawn," for a study in controlled build-up of tension from the rhythm section. I've known a number of mouth-harp players in my time, and I just don't know how Mr. Blue, who guested on the Stones’ "Miss You," does it. Blues players use diatonic instruments, one for each key, generally using an instrument a fourth higher than you’d expect to get the “blue” notes. Yet Sugar Blue’s warp-speed runs, turns, glissandos, and riffs must mean he’s using the staid old chromatic instrument. "How’d he do that?" asked everyone who heard the album in my system.

But I digress. The point I’m trying to make is that the sound of the harmonica on this recording is already so chromium-plated—Shure mikes are credited in the CD booklet—that you really don’t need any more edge. Which means that as soon as you turn up the volume to get maximally high on the music, the SC-Is tell you to turn it down again. Okay, so the album still sounds great at the lower level—there are times when you need physical stimulation from your speakers, even from recordings that are ear-bleeders. And that the Dunlavs won’t do, hitting that chrome-plated, lower-treble 95dB speed limit every time.

I had eagerly looked forward to Eric Clapton's From the Cradle "roots" album (Reprise 45735-2), only to discover that it, too, suffers from fizzed-up engineering. Why does everyone from Sugar Blue to EC himself like to sound as if they’re using a cheesy, peaky-in-the-presence-region Shure Unidyne microphone? (On Cradle, EC even appears to want to use it on his guitar amp!) The residual hardiness in the SC-1's sound made me want to turn down the volume on this album, though when I did so I could revel in the sense of live presence captured, and the foot-tapping sense of musical pace that the SC-Is allowed to come through unscathed. In this respect, the Dunlavs and Spica TC-60s are at almost opposite poles: though both are rather restricted in loudness, within that limitation the Spicas is romantic but rather slow, the SC-I quick and clean.

One of the reasons I included the uncorrelated pink-noise track on Stereophile Test CD 2 (besides the hedonistic joy of relishing a sound that extends way beyond the speaker positions) was that it tends to throw speaker resonance problems into sharp relief. On dual-mono pink noise, the sound is well-localized midway between the speaker positions; with uncorrelated noise, the overall sound doesn’t appear to come from anywhere. Speaker resonances and other anomalies, however, add a degree of apparent correlation that causes the noise to clump toward the center of the soundstage in some narrow frequency regions. With the SC-Is, there appeared to be some resonant behavior in both the upper midrange, as suspected when I was breaking the speakers in, and in the mid-treble, where a very narrow and low-level "whistle" could just be heard. I suspect that these problems, though undoubtedly minor, do tie in both with the residual hardness I noted at high playback levels, and the slight pushing forward of trumpet partials.

Measurements: The SC-I is very sensitive for a relatively small speaker, its calculated B-weighted sensitivity being around 90dBW2.83V/m. However, though it will therefore play loud with low-powered amplifiers, it is a fairly demanding load, as can be seen from its plot of impedance magnitude and phase against frequency (fig.1). Though the electrical phase angle is small above the bass-enclosure resonance, the magnitude is lowish, remaining below 6 ohms over most of the audioband and dropping to a minimum value of 3.25 ohms at 260Hz. The uniformity of the curve, however, indicates that the speaker will not change its total balance significantly when driven by an amplifier with a high output impedance, like a classic tube design.

The sealed-box bass tuning is revealed by the small peak centered on 84Hz before break-in, which is high in frequency, as expected from the sensitivity. (All things being equal, the higher a speaker’s sensitivity, the necessarily more restricted must be its low-frequency extension.) After break-in, this dropped slightly in frequency, to 80Hz, as revealed by the upper solid trace in fig.1. The impedance traces are free of the small wrinkles and discontinuities that would reveal the existence of cabinet or cone resonances, apart from a slight contour in the upper midrange, presumably due to an equalization network.

The use of first-order crossover filters with their shallow rolloff slopes gives rise to significant overlap between the drive-units. This can be seen in their individual response curves (fig.2), taken using DRA Labs' MLSSA system with a B&K 4006 microphone, corrected for its own departure from flatness. Though the nominal crossover frequency lies at 3.5kHz, there is a region of about an octave either

![Fig. 1 Dunlavy SC-1, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.). The upper trace in the bass is after 12 hours of high-level break-in with the XLO/Sheffield Lab Test CD, Track 8.](image)

![Fig. 2 Dunlavy SC-1, acoustic crossover on tweeter axis at 50°, corrected for microphone response, with nearfield woofer response below 300Hz.](image)
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side where the rolled-out driver is not that far below the selected one. This sharing of the drive signal results in an increase in the effective drive-unit size in this frequency region. This in itself is of no concern, but it does place great demands on the speaker's designer to ensure evenness of the speaker's radiation pattern off-axis. The woofers can be seen to roll off quickly above 5kHz, with no apparent break-up peaks in the trace, while the highish enclosure tuning results in a low-frequency response that starts to roll out relatively early, reaching a nearfield -6dB point at 55Hz. While the slope is the gentle 12dB/octave of a sealed box, which means that the room is able to give more reinforcement to the SC-I's midbass than it would with a similar reflex design, the intrinsically high tuning frequency will still result in a lightweight overall balance.

I did two complete sets of on-axis system-response measurements: one at my normal distance of 50°, which gives better resolution in the midrange; the other at 100°, this closer to the 10° specified by Dunlavy Audio Labs. With first-order crossover filters, the degree of integration between the drivers is going to be significantly more dependent on distance than with designs using higher-order filters. John Dunlavy points out that a symmetrical array of loudspeaker drivers acts in a manner analogous to a camera with a fixed-focus lens. In the case of the SC-I's spaced twin woofers with a center tweeter, the sound will not be focused at close distances. Fig.3 shows the SC-I's response averaged across a 30° horizontal window on the tweeter axis at the greater distance. The first thing to note is the exceptionally flat response trend, with each slight peak balanced by a slight dip. Other than in the low treble, this speaker meets superb ±1.5dB limits.

In fact, measurements made by John Dunlavy of the same samples of the SC-I in his large anechoic chamber were even better than this, the maximum deviation from flat being no more than 1dB above or below the mean. I suspect that at the 100° distance I used for this measurement, residual room reflections gave rise to the larger response ripples. In the 1-2kHz region, the peakiness became significantly worse if I removed the grille: this speaker must be auditioned with its grille in place to get the flattest on-axis balance. In any case, this is superb measured performance.

Fig.4 reveals how the SC-I's balance changes to the speaker's sides. (The on-axis response in this graph is represented by a straight line, so that just the changes off-axis can be easily seen.) The speaker maintains its fundamentally flat response across the band up to 10° off-axis. Further than that, and a trough at 3kHz and a slight peak above it develop due to the woofers becoming more directional at the top of their passband compared with the tweeter at the bottom of its operating band. The tweeter's top-octave output also falls off a little more rapidly than usual at extreme off-axis angles, presumably due to its recessed mounting.

Vertically (fig.5), if you sit too high or low, a peak appears in the mid-treble, while a suckout appears in the midrange due to negative interference between the two woofers. Don't listen to this speaker standing up!

The effect of the SC-I's vertical and horizontal dispersion behaviors will be to add a degree of brightness in livingsounding rooms, particularly if the speaker is placed close to the side walls. In my room, the Dunlavy's spatially averaged response^3 (fig.6) does reveal a slight excess of mid-treble energy which is probably what I heard on uncorrelated pink noise. This is more than the Spica TC-60, for example, but about the same as the B&W Silver Signature that I reviewed last June. More importantly, and ignoring the slight peaks and dips below 400Hz that are residual room-mode effects, the SC-I's in-room balance gently slopes down below the midrange. This

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3 I average six measurements at each of 10 separate microphone positions for left and right speakers individually, giving a total of 120 original spectra, which are then averaged to give a curve which, for my room at least, has proved to give a nice correlation with a loudspeaker's perceived balance.
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relative lack of low-frequency support leads to a balance that sounds intrinsically lean, unless the speakers are moved closer to the wall behind them.

In the time domain, the SC-I's impulse response (fig.7) is indicative of a minimum-phase system. The step response (fig.8) is superb in its right-triangle shape. The ripples in the tail are due to the residual room reflections that I mentioned earlier, and should be ignored. Though the degree of overshoot on the step's leading edge is a little higher than ideal, this is due to the measuring microphone I use having a slight (1.8dB) rise-on-axis in its top octave (see November '94, p.71). I allow for this in my frequency-response measurements, but its effect is present in the time-domain graphs.

These excellent pulse and step shapes imply that the speaker's phase response is similarly excellent. Fig.9 shows the SC-I's excess phase plotted against frequency. "Excess" phase is the speaker's actual phase response with the phase deviations associated with the speaker's departure from flat response subtracted; in the case of the Dunlavy, it varies by no more than ± 5° from 400Hz to 4kHz. The slight positive phase angle, increasing with frequency in the high treble, implies that I didn't have the microphone exactly on the tweeter axis, but probably to one side. At 15° at 10kHz, however, this is negligible, implying that the tweeter's acoustic center was positioned just 1.4mm behind that of the woofers. (The wavelength of sound at 10kHz is 35mm or so.) For comparison, fig.10 shows the excess phase curve for a typical, good-sounding three-way speaker with a flat baffle. The huge negative phase angle in the treble means that the sound from the tweeter arrives at the microphone significantly before that from the speaker's midrange unit. No way can the sounds add in-phase. There is no comparison with the SC-I. The combination of a first-order crossover and a recessed tweeter results in the outputs of the drivers all adding in-phase at the listening position to give a time-coherent performance. The SC-I joins that select group of loudspeakers capable of reproducing acoustic squarewaves with a correct square waveform.

The cumulative spectral-decay, or waterfall, plot for the SC-I (fig.11) reveals a very clean initial decay, particularly in the tweeter's passband. (Ignore the ridge at 16kHz, which is due to my computer monitor's screen.) Some apparent resonant modes develop in the upper midrange, around the cursor position at 2kHz. These may correlate with the hardness to the speaker's sound I noted at high levels.

Finally, the SC-I's cabinet walls do suffer from a couple of strong resonant modes in exactly the region I suspected when I was breaking the speakers in. Fig.12, a waterfall plot revealing the cabinet's side-wall behavior, reveals that the SC-I's small cross-sectional area—associated with increased stiffness—and the use of bracing has pushed what modes there are well up into the midrange, to 560Hz and 660Hz. Their level is relatively high, however. This will be partly because the SC-I's high sensitivity results in greater stimulation for the same electrical drive. Nevertheless, on some instruments such as flute, and on female voice, the cabinet could be heard to add a slight
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degree of overhang to the sound. This is presumably because the frequencies of these panel resonances coincide almost exactly with the frequencies of the notes D and E at the top of the treble staff (assuming the standard instrumental tuning based on A = 440Hz), and thus will be almost continually excited by Western music. Other designers have found that if such resonances fall in the cracks between the notes, they will have less of a subjective effect (unless the speakers’ owner likes to play recordings tuned to a lower A—to the 409Hz typical of baroque music, say). I suspect that these cabinet modes do contribute to the high-level hardness I noted.

**Conclusion:** I suspect that the SC-I’s bass balance is something that will divide its listeners into two groups. There will be those who fall in love with everything it does right, and who can live with the lightweight lower registers. Conversely, there will be those who can’t live without enough low-frequency meat on the bone. Me, I’m somewhere toward the latter position. I love what the speaker does in terms of soundstaging, image palpability, and natural, uncolored balance; but I repeat the Dunlavy’s bass balance more than I like it. However, it does make the speaker ideal for use in a Home Theater system including a subwoofer or two to provide the music’s foundation. In fact, Stereophile reviewer Robert Deutsch is using SC-Is with great success in this context.

The SC-1 illustrated the danger of reviewing straight out of the box. Before break-in, its overdamped low-frequency balance sounded too lean to be acceptable. Even after 24 hours of formal break-in, its sonic character still seemed to be loosening up throughout the review process. (Perhaps DAL could institute the procedure practiced by Vandersteen and others, whereby a batch of SC-1 woofers are hooked up in series to an AC wall socket and worked hard with the 60Hz sinewave before being mounted in enclosures.)

Once broken-in, the SC-Is excelled in several areas: imaging accuracy, soundstage palpability, lack of midrange coloration, and generally clean high frequencies. The speaker’s intrinsically lightweight balance demands care in setup, room placement, and choice of matching ancillaries. I wouldn’t, for example, want to hear these speakers driven by a typically bright-sounding cheap solid-state amplifier. But in the right circumstances and systems, the Dunlavy SC-Is will sound much better than they have any right to at the price. Before you buy expensive speakers, you owe it to yourself to audition these affordable Dunlavs. They could be just what you want.

**Spica TC-60: $795/PAIR**

As far as I can tell, Santa Fe–based speaker engineer John Bau had designed but four commercial loudspeakers before the TC-60 was launched at the 1994 Winter CES; in order of appearance, they were the Spica SC50i (1980), the TC-50 (1983), the Angelus (1987), and the SC-30 (1989). None were expensive, and all garnered much praise, both in Stereophile’s pages and elsewhere.

Why, then, wasn’t Spica one of the most successful speaker manufacturers in the land? Partly the blame must be laid at the feet of the speakers: the one thing none of them did was rock out at party levels. But mostly, the Spica company’s marketing expertise lagged way behind the quality of the speakers. So when the company was purchased just over a year ago by Parasound, with John Bau to stay on as president and head of engineering, Spica’s future looked considerably more promising. It’s not just that Richard Schram, president of Parasound, could sell snow to Alaskans—he could sell them the freezers to keep it in—but that John Bau’s engineering efforts could get better focus in terms of feedback from the market and essential financial support.

The two-way TC-60 is the first speaker to come from the revitalized Spica. Superficially similar to the now-discontinued TC-50 but taller and narrower, it shares that model’s angled front baffle which, in combination with John Bau’s unique crossover topology—a fourth-order, Bessel low-pass filter for the woofer coupled with a first-order high-pass filter for the tweeter—gives a time-coherent performance and a flat amplitude response on the listening axis. The cabinet’s internal volume, however, is twice as large as the older speaker, and—Shock! Horror!—there’s a 1.5”-diameter reflex port at the base of the enclosure’s rear panel. This port is long—it bends by 90° in the center to avoid hitting the front baffle, and ends up close to the opposite side wall—and tunes the enclosure to the so-called “QB3,” or “third-order Quasi-Butterworth” alignment. This gives a good combination of low-frequency extension and not-excessive enclosure size for a drive-unit with a given Qts (total Q), though the tradeoff is poorer transient response compared with a sealed-box alignment.

The TC-60’s drive-unit complement consists of a 1”, double-chambered, cloth-dome tweeter sourced from VIFA and a Peerless polypropylene–coned woofer of nominal 6.5” frame diameter. A major factor in John Bau’s choice of these drivers was their high dynamic range. The older TC-50’s treble increasingly rolled-off early at high sound-pressure levels, which led some listeners to declare it to sound too rolled-off. The TC-60 is said to maintain its specified tonal balance between input levels of 100mV and 10V, which is excellent dynamic linearity.

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all the TC-60's baffle area is covered with a 1"-thick felt blanket. This has a circular hole cut out of it for the woofer and a complicated, chevron-like hole for the tweeter. As well as damping the front baffle's resonant modes, this blanket modifies the drive-unit's radiation patterns in the lower treble. As the grille frame continues the profile of the felt, the TC-60 sounds best auditioned with the grille on.

More felt is used internally to minimize reflection of the woofer's sound from the rear wall, and a brace connects the front and rear walls. The crossover, constructed on a printed circuit board attached to the rear wall next to the terminal panel, uses ferrite-cored inductors and plastic-film capacitors. Two sets of five-way binding pots are fitted to allow for bi-wiring, but the internal wiring appears to be modest 18-gauge.

**Sound:** My first audition of the Spicas had been an informal one in the *Stereo\*\哲学* listening room, where they were driven by Counterpoint Natural Progression amplifiers. Though the sound was impressive, it was a little too sweet-toned in absolute terms. In my own system, with the TC-60s sitting on 24" stands, I still needed to use small cones to tilt the front of the speaker up a little so that I was sitting on the optimum axis. With room placement also optimized, I sat down to do some serious listening.

I was still impressed. Yes, there was still a lack of top-octave air in absolute terms, but the speakers sounded very inviting. The TC-60s also went unexpectedly deep in my room; even the 31.5Hz warble tone on *Stereo*\*\哲学's Test CD 2 was surprisingly audible without obvious doubling. At a measured spl of 84dB at the listening position, however, wind noise overlaid with a couple of pipe tones could be heard coming from the flared port when I stood behind the speaker. If I turned up the level, this noise started to be audible in front of the speaker. Still, this is excellent bass extension for a relatively small speaker, and bass guitar and organ pedals were given, if not quite their full weight, enough bass for musical satisfaction.

The speakers handled well-recorded rock with aplomb. The Robben Ford and the Blue Line album (GRP/Stretch STD 1102), for example, features some tight-as-a-nut bass guitar playing from Roscoe Beck—check out "You Cut Me to the Bone" for the ultimate hard-driving shuffle. While the TC-60s are still not the speakers of choice to take to a rave, Mr. Beck's gut-busting bass lines under the wah-wah'd lead guitar came over with power aplenty. Only when the synthesizer ramps chords at this song's climax, doubling the bass line an octave down, did the TC-60s fall short—there's only so much bass you can squeeze from two 6" cones!

Big-scale orchestral scores—Chesky's new "Gold Series" remastering of Fritz Reiner's 1962 Brahms Symphony 4 performance, for example (Chesky CG906), another classic Chuck Gerhard/Kenneth Wilkinson production—didn't suffer from sonic anemia. The power range of the orchestra—the upper bass and lower midrange—was given its full measure, though it sounded cleanest if the playback level was kept below 95dB or so. The balance seemed a little laid-back overall, especially when compared with the Dunlavy SC-Is. The sound wasn't pushed forward at the listener; instead, everything hung in space behind the plane of the speakers.

At high levels, a bit of a bite did creep into the low treble, accentuating the fizzy edge to the sound of brass instruments. This made the speakers a little unkink to recordings that were already a bit fizzy in the low treble.

The TC-60's mid-treble is clean, clean, clean. This VIFA tweeter is a good'un, with treble detail sounding neither exaggerated nor smeared. The shimmering triangle deep in the soundstage in the great Classic Records rerelease of the RCA Living Stereo Carmen Suite LP (Sir Alexander Gibson conducting) was deliberately picked out in the orchestral fabric—very satisfying. (Incidentally, if anyone you know insists that analog can't cut it in this digital age, play them one of these RCA reissues. This is what recorded sound should be about. Most of it got lost in the rush to embrace the bits'n'pits.)

Earlier I mentioned the Spica's surprisingly deep bass extension. The price to be paid is that the speaker lacks a little in the pace and rhythm department; not a lot, but enough to make some recordings sound a little ponderous. On Eric Clapton's *From the Cradle* (Reprise 45735-2), the bass guitar on the opening cut, "Blues Before Sunrise," underpins the Elmore James slide riff with solid four-in-the-bar tonics, but their attacks seemed a little slow on the Spicas compared, for example, with the $8000/pair BrW Silver Signatures that the Spicas replaced in my listening room, or the Dunlavy SC-Is that, in turn, followed the Spicas.

It was time to reach for my bass-timing test track, "Last Train Home," from Pat Metheny's *Still Life (Talking)* (Geffen GEFD 21445-2). Steve Rodby's bass line on this track consists of a throbbing ostinato that many reflex speakers just can't keep up with, typically destroying the sense of musical urgency by smearing one eighth-note into the next. The Spica didn't do badly on this test, but I really want more of a sense of pace.

---

**Measurements:** The TC-60 is significantly less sensitive than the Dunlavy SC-1, its B-weighted figure being around 85dB/2.83V/1m. It's easier to drive, however, its impedance (fig.13) remaining above 7 ohms other than in the high treble, where it drops to a still-kind minimum of 6.2 ohms. Note the slight wrinkle in the traces just under 300Hz—this implies the existence of a cabinet resonance at this frequency. The port tuning is indicated by the saddle in the magnitude trace at 29Hz. This is very low for the size of the speaker; it's difficult to predict what the actual bass extension will be.

The actual acoustic outputs of the drive-units and the port can be seen in fig.14. The woofer has a very slight rise in its response in the upper bass before rolling out gently to its minimum-motion point at the port tuning frequency of 29Hz. The port's output is centered in...
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the same region, but is way down in level—you can’t expect much from a 1.5° port tuned to such a low frequency. Two higher-frequency resonant modes can be seen in the port’s output—at 300Hz and 500Hz—but these will be innocuous considering that the port faces to the speaker’s rear.

The woofer is well-behaved in its upper frequency range before it rolls out sharply above the crossover frequency of 3.5kHz. There is a slight notch/peak in the 1kHz region, perhaps due to the cavity formed by the felt blanket. The slow roll-in of the tweeter can be seen in this graph, but apart from a premature rolloff above 12kHz, it too appears to be well-behaved.

How these individual responses sum on the listening axis level with the top of the woofer is shown in fig.15, which shows the overall response averaged across a 30° window. Impressively smooth for such an inexpensive speaker, the upper bass is slightly boosted, the presence region slightly depressed—which is what I expected from my auditioning. Though it’s down in absolute level, the port does usefully reinforce the TC-60’s bass output to give a gentle rolloff, down 6dB at 40Hz. (This is just below the lowest note of the 4-string bass guitar and double-bass.) More importantly, it’s only 12dB down at the port tuning frequency of 29Hz. In effect, the QB3 alignment chosen by John Baui cheats, or at least bends the laws of physics, meaning that as long as you don’t play the speaker too loud—it’s only a small port—some low-bass frequencies will be audible. As I found.

The top-octave does roll off a little early, tying in with the speaker sound lacking a bit of “air” on this axis. Often such a rolloff is associated with limited horizontal dispersion in the high treble. The TC-60’s tweeter, however, does maintain its output moderately well to the sides, as can be seen in fig.16. A notch at 12kHz does develop at off-axis angles greater than 15°, however, implying that the speakers be toed-in to the listening position. (Ignore the apparent peak in this graph at 26kHz: this is due to the notch at this frequency in the on-axis response filling in to the speaker’s sides.)

Fig.16 shows only the off-axis difference in response. It also reveals that the TC-60’s wide baffle results in the woofer’s dispersion becoming limited lower in frequency than might be expected from its small radiating diameter. At off-axis angles greater than 20°, the speaker lacks energy in the top octave of its passband, meaning that the Spica’s sound might lack immediacy in lively rooms. This was not a factor in my relatively well-damped room.

Vertically, the Spica’s unique combination of a fourth-order low-pass filter for the woofer and a first-order high-pass for the tweeter results in quite a critical listening window. Fig.17 reveals that, had I measured a little lower than the top of the woofer, the presence-region depression in fig.15 would have filled in nicely, though the price to be paid was a reduced amount of top-octave energy. Conversely, moving even 5° above this axis results in a severely compromised response, the presence region dropping and the top octave becoming boosted.

As I always seem to be saying—DON’T LISTEN TO THIS SPEAKER STANDING UP. (That Spica is aware of this fussiness is indicated in the TC-60’s excellent owner’s manual; they even recommend tilting the speaker back slightly to ensure that you are sitting below the tweeter axis.)

In my listening room (fig.18), the result of this excellent on-axis performance but more idiosyncratic off-axis behavior was a superbly flat balance throughout the audioband. With the exception of the presence region, where the contribution of the above-axis response resulted in a slight lack of energy in the speaker’s room sound, the Spica’s ½-octave response met superbly ± 0.7dB limits from the lower midrange up to 10kHz. Few speakers at any price have done this well
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in my listening room. That the $800 Spica can do is it testament to the talent of its designer.

A flat perceived balance is paramount in a speaker's performance; good time-domain performance is a nice bonus if you can get it. The TC-60's impulse response (fig.19) is indeed pretty time-coherent, as is its step response (fig.20), which possesses the desired right-triangle shape, broken only by a leading-edge peak which could well be due to my measuring microphone. (The ripple in the tail between 6ms and 7ms is due to the reflection of the bass sound from the floor being magnified by the mathematical integration employed to produce this graph.)

With such good time-domain performance, you'd expect the TC-60 to have very little excess phase—which it doesn't (fig.21). This meets ±15° limits from 700Hz to 20kHz, which is superb performance. (Again, compare this graph with fig.10, which shows the excess phase curve for a typical, good-sounding three-way speaker with a flat baffle and a high-order crossover.) The small positive-phase angle for the tweeter indicates that it's placed behind the woofer by a millimeter or so on this axis. As shown in the vertical-response-family graph (fig.17), moving down slightly would have resulted in the flattest midrange and treble balance. But this would move the tweeter back in time even more, suggesting that there isn't actually a listening axis on which you get both the flattest amplitude response through the crossover region and the optimum time-domain performance. This is a pedantic point, however, as, in either case, the Spica's departure from the ideal is very small.

The TC-60's waterfall plot (fig.22) reveals a very clean decay, with only a small degree of overhang in the upper midrange. However, a similar waterfall graph plotted for the output of a simple accelerometer attached to the center of the speaker's back panel (fig.23) reveals the existence of a strong cabinet resonance at 273Hz, and another just below it. These modes could also be detected on the side panels and, to a lesser degree, on the small top panel. That the front baffle is covered with felt will damp their effects, which is probably why I only occasionally noted any lower-midrange congestion.

Conclusion: Every audio reviewer lives for the moment when he or she hears true high-end sound quality emanating from affordable components. Which is why I got excited by the Spica TC-60. At $800/pair (plus $250 for the excellent stands), these speakers produce a sound that is much better than anyone with only so much to spend has any right to expect. Yes, there are compromises—the bass lacks a bit of pace, there aren't quite the degrees of detail and transparency offered by the similarly priced Dunlavy SC-Is, and you shouldn't choose these speakers if you want to play your music at rave levels in a large room. But within those limits, the TC-60 produces a big, enveloping sound with more bass and space than you'd believe possible at the price. Recommended.

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**Fig.18** Spica TC-60, spatially averaged ½-octave response in JA's listening room.

**Fig.19** Spica TC-60, impulse response on tweeter axis at 50° (5ms time window, 30kHz bandwidth).

**Fig.20** Spica TC-60, step response on tweeter axis at 50° (5ms time window, 30kHz bandwidth).

**Fig.21** Spica TC-60, excess phase on tweeter axis at 50° (0.147ms delay).

**Fig.22** Spica TC-60, cumulative spectral-decay plot at 50° (0.01ms risetime).

**Fig.23** Spica TC-60, cumulative spectral-decay plot of accelerometer output fastened to center of enclosure back panel. (MLS driving voltage to speaker, 7.55V; measurement bandwidth 2kHz.)
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T
here's something about the name California Audio Labs that, when said out loud, triggers in my mind a yuppy red flag. Maybe it reminds me, for some strange reason, of California Pizza Kitchen—a yuppy bastion if there ever was one. CPK boasts gourmet fare, and certainly a most unusual blend of pizza toppings. Similarly, CAL has long specialized in the uncommon marriage of digital and vacuum-tube technologies. They've answered in the affirmative that most essential question of audio: "To be or not to be?"

Such a blend of contemporary and antique design elements is bound to raise more than a few eyebrows among benchtop "meter heads," whose most singular joy in life must be to squeeze a few more decibels from this or that steady-state test of a given piece of gear. Instead, CAL opts, in true gourmet spirit, to preserve the flavor of live music. The goal of the audio arts, in my book, is to imitate live music; tubes are generally better than transistors at doing this.

One 12AX7 dual-triode tube is used per channel in the Alpha's analog output stage. Futterman's First Law of audio design is thus fulfilled: Thou shalt place a tube in the audio signal path sooner rather than later. Why? Because a tube—or a valve, as our comrades across the Atlantic are fond of calling it—is blessed with a lifelike dynamic transfer function ideal for the amplification of a music signal. A tube may not be the best choice for computer, video, or RF applications; but as far as harmonic integrity and the ability to communicate the musical message are concerned, has anything else withstood the test of time as has the tube?

The Alpha will accommodate all digital data input connections: 75 ohm coax S/PDIF, balanced AES/EBU, EIAJ TosLink, and AT&T ST fiber optic. (The Delta, in turn, delivers all of these forms of digital output.) At the heart of the Alpha is Crystal's CS4328 1-bit Delta-Sigma D/A converter chip. By using a fifth-order modulator, Crystal Semiconductor has improved low-level linearity and detail resolution by reducing quantization noise artifacts to below a claimed -120dB in the midrange. The DACs are individually matched for left/right-channel uniformity.

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Distortion of the analog waveform is caused by small timing errors in the digital datastream. This so-called "clock jitter" shifts the logic pulses representing digital data from their true time-base position. Crystal's CS8412 (D revision) S/PDIF input receiver chip is used to generate the reference clock, with inherent jitter and noise levels of under 500 picoseconds. To further reduce jitter to below 100ps, CAL incorporates at the input a proprietary "DHA" jitter-reduction circuit—the brainchild of Dan Donnelly, CAL's head engineer.

Eight separate, regulated power supplies are used to eliminate intersample interference and modulation, which typically occur through a common power supply. The incoming AC line is filtered to isolate the circuitry from EMI interference, which can also induce clock jitter. The Alpha features a Standby mode in which the tube-filament voltage feed is dropped while maintaining power (and, hence, component stability) to the rest of the circuitry. Tube life is said to exceed two years under normal use.

During a visit to Santa Fe, and over a Zia Diner lunch of meatloaf with pinon nuts, Art Paymer, CAL's president, waxed enthusiastic over the merits of the Delta transport. What caught my attention wasn't so much the single-beam laser mechanism with its all-glass optics, or even the oversized disc clamp and drive spindle which support a full third of the CD's surface, but rather the digital...
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servo. Conventional tracking servos require an appreciable error to develop before a corrective signal is generated. The Delta's servo, on the other hand, uses "feed-forward," digitally derived corrective signals to position the laser and set the disc speed.

During the initial data acquisition, the servo produces a digital code representing the correct positioning parameters. The data are translated by a dedicated DAC whose analog output controls speed and tracking. There's no need to constantly compare the actual laser position with an ideal position, since the correct position is digitally stored in memory. You might say that the Delta possesses "positional memory" — a factor which is said to ensure a tenfold time reduction in correcting focusing and positioning errors, as well as greatly improving response to sudden external vibrations.

Physically, the Delta was designed to complement either the flagship Alpha or the affordable Sigma II D/A processors. Both the Alpha and the Delta have a heavy-gauge steel subchassis to isolate the internals from external vibration. CAL correctly points out that external vibrational energy can cause excessive servo activity, as the transport is busy correcting vibration-induced positioning errors. Such servo activity elevates EMI levels inside the chassis, and may lead to increased jitter in the data stream.

According to CAL, both the Alpha and the Delta were designed under the premise that "great music begins at the source," and were subject to exhaustive listening and refinement. I like that. The notion that the ear ought to be the final arbiter in matters of sound quality is sometimes forgotten in the High End.

GREMLINS
In the beginning there was one, and in the end there were three — samples of the Alpha, that is. After many weeks of fine service in my listening room, sample #1 began distorting in one channel on high-level dynamic peaks. After a factory examination, CAL reported that the offending device was the J-FET half of a differential amplifier on the input side of the analog stage. According to CAL, production experience shows this to be an isolated incident.

The problems I experienced with the other two samples, although baffling at the time, cleared up spontaneously, and can probably be ascribed to the effects of New Mexico's electrostatic discharges. ESDs are a way of life in the great Southwest, with its clear, dry skies. Imagine discharging yourself on a metallic chassis: the resultant zap to the hand would be bad enough, but the effect of a thousands-of-volts shock to the chassis would be sufficient to scramble an IC's brains, if not blow them outright. The Alpha's owner's manual warns of ESD, and advises that, should the digital chips be scrambled, the unit should be turned off and the AC cord unplugged. The user is instructed to give the chips at least five minutes to clear and reset before turning the unit back on.

I've experienced similar problems with other products, and even managed to wipe out the receiver chip in the DAC of a Bel Canto Aida. The static discharge caused the last two samples of the Alpha to oscillate between On and Standby modes — peculiar indeed, as the unit never left the initial one-minute mute cycle. With sample #2, the problem appeared to remain after a few minutes, so back it went to CAL. Of course, it worked perfectly at CAL — right out of the box. This sample was returned to me, and both #2 and #3 have worked flawlessly since. (In the interim I installed a humidifier in my listening room.)

DELTA FORCE
Robert Harley is quite right to estimate a transport's sonic contribution to the sound of a digital front end to be about 30%; the CAL Delta's impact on my system was immediately apparent. In fact, the Delta led to my immediately mothballing my Theta Data transport (old version) — quite a coup for an $895 transport.

The Delta's calling card was a smooth, detailed midrange. The smearing of detail that afflicts so many mass-market transports vanished as morning fog before a rising sun. Resolving low-level detail and ambient information proved to be pieces of cake. As a result, the soundstage was given the Windex treatment — transparency was such that I was more easily able to mentally leap into the stage.

The Delta also trounced the Theta in the rhythmic-precision area. The urge to tap my foot in time with the music or to stand up and wave my arms as if conducting the orchestra was much more powerful. The music appeared to surge forward with more drive and verve.

Next I compared the Delta to the Micromega Trio CD2 (since upgraded) — again, a much more expensive transport. It was immediately clear that the treble was more open and detailed with the Micromega, and that the bass registers exuded more punch. Yet the Delta portrayed the core of the music with a more velvety touch, and the mids sounded more liquid and less mechanical. On balance, I found the little Delta to be a viable option to its more expensive French cousin.

I'm not suggesting that the Delta is the be-all and end-all in transport design, but it proved time and again to be head and shoulders above the transports included in more expensive, single-unit CD players. I tried both an expensive Sony and a Marantz, feeding the digital output to an outboard processor, and in both cases was shocked at just how much more musical the Delta was.

THE ALPHA'S TURN
I put the Alpha into my system during my recent review of the Bel Canto Design Aida D/A processor. I was struck by the comparable ability of both DACs to retrieve low-level detail. Not surprisingly, both designs use the same Crystal chip set, and both incorporate jitter-reduction circuitry. The Alpha, like the Aida, thrashed the Theta DS Pre Gen-

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touch in the midrange, take your favorite female voice—one of the most difficult challenges for any processor—out for a spin. I've been frustrated for years by the inability of most processors to get the harmonic color just right though the upper registers of female voice. Coaxing a convincing blend of sweetness and brilliance through the soprano range—without gratuitous grain, glare, or bleaching out of harmonic color—is formidable. Listen to Kathleen Battle's and Wynton Marsalis's Baroque Duet (Sony Classical SK 46672). Battle's timbre may be a bit thin for some tastes, but the purity and clarity of her harmonic sweet spot get my juices flowing. The Alpha fleshed out remarkably well a believable harmonic impression of Queen Kathleen.

The Alpha with the Yugos fared as well with a much more amber-hued voice—for example, Nina Simone on The Blues (Novus 3101-2-N). Simone's melancholy timbre and alert, expressive voice were allowed full scope.

If you think this level of midrange performance is par for a digital processor, think again. I did an A/B comparison between the solid-state PS Audio UltraLink (recently upgraded) and the Alpha with the Yugos. The difference was amazing. The UltraLink sounded mechanical, artificial, and two-dimensional in comparison with the tubed Alpha.

The Alpha's bass impact and definition were consistently satisfying. However, the quality of its treble was much more remarkable—especially for a digital processor. A chronic complaint about digital sound has been the buzz-saw treble: coarse, grainy textures and sizzly, out-of-control transients. With most digital processors, the problems of recordings that have a hot or somewhat abrasive treble character are so exacerbated that they drive most folks up the wall. A prime example of this is Leonard Cohen's The Future (Columbia CK 53226)—an ominous, prophetic, and moving vision that, on the basis of content alone, certainly gets my vote as a “Record To Die For.”

But what about the sound? Cohen himself said that, “I wanted the Future to have somewhat of a thin, mechanical, cranked-out sound, but with lush overdubs. Some kind of irony is created between those two musical ideas. But mostly I wanted it to swing.” The key word here is “somewhat.” While the recorded sound is definitely in the Shure mike category—thin and mechanical through the treble—it shouldn't drive you out of the room. The Alpha exposed the mix quality, but didn't heap further insult on it. Take this album to your
dealer to find out if a particular processor or CD player is in your future.

**ALPHA & DELTA**
The CAL Alpha and Delta worked well as a team—as they should, considering that they were designed to do just that. The Delta reinforced all of the Alpha's strong sonic suits: detail resolution, 3-D imagery, convincing harmonic textures, and treble smoothness were all in evidence. I shied away from fiberoptic connections, but found that, between coaxial and balanced, the cleanest sound came from the balanced XLR input. My experience has shown me that the sonic differences between balanced digital links (which comply with the AES/EBU specification) are much smaller than those among coaxial datalinks. Thus, you can potentially do very well using a fairly inexpensive balanced datalink.

**Measurements from RH**
The Alpha had a maximum output of 3.6V when decoding a full-scale, 1kHz sinewave—a level 5.1dB greater than the 2V CD standard. DC levels at the analog output were less than 1mV, and the Alpha doesn't invert absolute polarity.

As with other CAL products, the Alpha had trouble driving low-impedance loads. Specifically, the unit's output stage became current-limited when the Alpha was asked to drive loads below 5.5k ohms. (Note the high output impedance of 2k ohms.) The negative half of the waveform clipped into impedances below 5.5k ohms. Clearly, the Alpha should not be used with a passive level control, but with a preamplifier with an input impedance of 50k ohms or greater.

The Alpha had a flat frequency response and only a marginal de-emphasis error (fig.1). The left channel shows a barely audible depression through the treble when the Alpha decodes pre-emphasized CDs. The crosstalk plot of fig.2 reveals adequate, though not excellent, channel separation. The crosstalk plot follows the classic 6dB/octave reduction in channel separation with frequency, indicating capacitive coupling between the left and right audio channels. (Note the expanded scale of -40dB to -130dB needed to show the entire plot, rather than our usual -60dB to -130dB scale.)

Fig.3 is a spectral analysis of the Alpha's output when decoding a 1kHz, -90dB sinewave. Note the relatively high noise level below 1kHz—a characteristic I've seen in many other processors that use the CS4328 DAC. There's also some power-supply noise at 60Hz and 180Hz. A wideband spectral analysis of the output with an input signal of all zeros (not shown) revealed no spurious noise or DAC idle tones.

The Alpha's low-level linearity (fig.4) was exemplary—another characteristic of the CS4328. The DAC was good to below -100dB, where noise dominated the measurement. The noise-modulation performance (fig.5) was also excellent, with tight trace groupings, this much better than the Quad 67 that SS reviewed last month, which also uses the Crystal chip set. Fig.6 shows the Alpha's reproduction of a 1kHz, -90dB undithered sinewave. The signal is overlaid with a moderately high level of noise.

The Alpha's intermodulation distortion spectrum (fig.7) is clean, with only the 1kHz difference component (20kHz-19kHz) having any significance. This 1kHz distortion product is, however, higher in level than we normally see.

The Alpha's jitter performance was excellent; the RMS level was fairly low, the clock seemed well-isolated from incoming jitter, and the jitter tended to be random rather than periodic. Fig.8 is a spectral analysis of the Alpha's word-clock jitter measured on the 256kHz clock. The input signal was a full-scale, 1kHz sinewave. Note the relatively clean spectrum and absence of spikes in the plot,

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Fig.1 CAL Alpha, frequency response (top) and de-emphasis error (bottom) (right channel dashed, 0.5dB/vertical div.).

Fig.2 CAL Alpha, crosstalk R-L (L-R dashed, 10dB/vertical div.).

Fig.3 CAL Alpha, spectrum of dithered 1kHz tone at -90.31dBFS, with noise and spuriae (5-octave analysis, right channel dashed).

Fig.4 CAL Alpha, departure from linearity (right channel dashed, 2dB/vertical div.).

Fig.5 CAL Alpha, noise modulation, -60 to -100dBFS (10dB/vertical div.).

Fig.6 CAL Alpha, waveform of undithered 1kHz sinewave at -90.31dBFS.

Fig.7 CAL Alpha, HF intermodulation spectrum, DC-22kHz, 19+20kHz at 0dBFS (linear frequency scale, 20dB/vertical div.).

Fig.8 CAL Alpha, word-clock jitter spectrum, DC-20kHz, when processing 1kHz sinewave at 0dBFS (linear frequency scale, 20dB/vertical div., 0dB = 1ns).
which suggest that the jitter is of the more benign random type rather than being concentrated at specific frequencies. There was some signal-correlated jitter at 1kHz and 2kHz when the input signal was a 1kHz, -90dB sinewave (fig.9), but this was minimal. The spike at 7.35kHz is caused by the subcode in the S/PDIF datastream, which has a frequency of 7.35kHz. The RMS jitter levels, measured over a 400Hz–22kHz bandwidth, were relatively unaffected by the input signal—a good sign. Under all signal conditions, the RMS level was just below 200 picoseconds.

The CAL Delta transport’s datastream jitter was measured using the UltraAnalog S/PDIF jitter analyzer. The Delta had low RMS jitter on data representing pure tones (50ps average for the five signals in figs.10 and 11) and a fairly clean spectrum (fig.10). However, jitter energy at the power-line frequency of 60Hz is apparent in all three traces. Interestingly, the Delta showed very little change in jitter level between the two musical selections (fig.11): Stravinsky’s The Firebird Suite on Sheffield Lab CD-24 (solid trace), and “Cut to the Chase,” from Steve Morse’s Southern Steel (MCA MCAD-1-112) (dotted trace).

Finally, I tested the CAL transport’s tracking ability with the Pierre Verany Test CD’s, which contain deliberate data dropouts of increasing length. The Delta played perfectly through every track—something only a few transports I’ve measured have managed.—Robert Harley

**Final Thoughts from Do**
The California Audio Labs Alpha is representative of a bold new generation of processors that’s rewriting the book on what can be achieved in a cost-effective package. It is undeniably in the technical and sonic vanguard at its price point.

The California Audio Labs Delta is an authentic giant-killer—surpassing, or at least competing with, the performance levels of much more expensive transports.

While I don’t consider the Alpha and the Delta to be the Omega of the transport/processor sweepstakes, I can’t think of a more cost-effective package that I could live with, or could so confidently recommend.

—Dick Olsher

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It was hard to know exactly where to begin. Like all Conrad-Johnson products, the Premier Eight was impressive even before it played a note. It looks simple and elegant. Massive transformers are located in two symmetrical cases at the rear of each amplifier, topped off by champagne-colored caps which match the small faceplate.

Conrad-Johnson holds that "simple designs with few active stages, when executed with care and great attention to detail, will be both more musical and more reliable than overcomplicated alternatives." Building on this philosophy, the Premier Eight uses sound fundamental circuitry (eg, a triode input, cathode-coupled differential phase inverter, push-pull output stage) and the allocation of adequate, high-quality resources (eg, polypropylene caps and discrete solid-state DC voltage regulators) to effectively achieve its design objectives, which include high output power.

Not so long ago, tube-lovers believed that tube amps didn't have the power to go head-to-head with monster solid-state amps. They also believed that the sonic quality of tube amps was inversely related to the output power. In other words, there was no such thing as a high-powered, high-quality tube amp.

My, how things have changed. Tube-lovers now have available to them high-powered, sonically splendid offerings from Audio Research, Jadis, Melos, Convergent Audio Technology, Sonic Frontiers, Air Tight, VTL, VAC, and Tube Research Labs. And now we have the Premier Eight. Admittedly, its price is high, but it offers a rated output power of 275W into 8 ohms.

Setup is straightforward and idiot-proof; each tube socket is labeled on the chassis to ensure proper tube installation; there's only one place for (single-ended) inputs; the power cord is captive; and the owner's manual is well-written and comprehensive. After installing the 14 tubes on the top front of each 90-lb mono-block chassis, connecting the inputs and outputs, and deciding whether or not to use the cages, the only task left to the purchaser is to adjust the bias on each output tube. Conrad-Johnson has made this task as simple as possible: With the amps connected to the preamp but with no incoming signal, turn the screw-adjustable control with the accompanying plastic screwdriver until the associated green LED goes out. The protective tube cages, which I chose to use when my toddler son was about, resulted in no audible sonic degradation.

I found that the amps worked best in my system when I used the AC plug polarity chosen by Conrad-Johnson, but I had to float the grounds on both monoblocks to reduce hum. [Floating component grounds minimizes the possibility of hum-causing ground loops; but your system should have at least one component grounded to ensure electrical safety once the interconnects are in place.—Ed.] I plugged both monoblocks directly into a dedicated wall circuit, with no power conditioners.

### System

Other equipment used for this review included the Koetsu Pro IV, Transfiguration AF-1, Symphonic Line RG-8L, and Benz-Micro Ruby phono cartridges, Versa Dynamics 1.2 LP player, MFA MC Reference, CAT SL-1 Signature, and Melos 333 Gold preamplifiers, Klyne 7PX 2.5 phono preamplifier, Mark Levinson No.30/31 processor/transport combination, all NBS Signature cables, API Power Wedges and Enhancers, The Original Cable Jackets and feet, VPI Bricks, and Solidsteel equipment racks. Loudspeakers were mainly ProAc Response 4s, although I also used the Premier Eights with the Swans Cygnuses, Audio Physic Steps, and Oracle Mentor Studios.

### Power, Dynamics, & Bass

I started my listening with Sergio Mendes' "Fanfarra," from Brasileiro (Elektra 61315-2). The performance was electrifying, as a single percussionist was joined by 100 others in bombarding my listening room. I was engulfed in a whirlwind of sound full of energy and excitement that transported me to another time and place, where I easily was able to relive the splendor of Carnaval in northeastern Brazil. With the Eights, the realism of so many musicians was as good as I've ever heard in terms of the power of numbers creating volume.

Ah, but the critic in me was ready. How well would the amp handle music that's similar, but with fewer musicians? I listened to Kitaro's unusual (for him)
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“Japanese Drums,” from Asia (Geffen 24087–2). Once again, the end of my listening room dissolved into a distant stage populated with splendid kyoto drums. The Eights had no difficulty handling this darker, more imposing percussion. Each performer was clearly defined spatially and musically, contributing to the rhythmic drive and expansive, space-filling sound. Once again, the amps were able to play loudly with authority, while covering a wide array of dynamic levels.

The Eights had no difficulty handling percussion sounds located mostly in the bass region. But what about more diverse sounds in equally explosive music? For this I listened to the “Volcano” movement from Hovhaness’s Symphony 50, “Mount St. Helens” (Delos DE 3137). This time, the rear wall of my room was replaced by a wide, deep soundstage surrounded with space and air. The percussive attacks beginning at approximately 1:44 were truly awesome, which I fully expected by that point; but the rest of the orchestra was equally splendid in its harmonic diversity, full, rich tonalities, and easy-to-follow musical lines. Even during the loudest passages there was no confusion, no added glare, no noticeable change in character.

But what about the ultimate power-killer: the organ? Listening to Glass Organ Works, Donald Joyce’s intriguing interpretations of the music of Philip Glass (Catalyst 09026–61825–2), I was transported to the ethereal space of Tennessee’s Collegedale Church, where I heard the Anton Heiller Memorial organ in an acoustical environment that, again, totally replaced my own listening room. Boundless space was filled with the reverberant decays from the columns of air which had been ushered through the endless lengths of organ-pipe to become the hypnotic minimalism of Philip Glass. This is very demanding music; proper reproduction of it would place a huge burden on any power amp. The Conrad-Johnson handled it with aplomb.

I was getting desperate to find music that would challenge these tube amplifiers, and of course! How would the Eight handle rock? I dug out a still-sealed copy of Led Zeppelin II (Atlantic SD 8236), slowly lowered the Transfiguration onto the opening grooves of “Whole Lotta Love,” and listened to the C-J rock. The bass line, in particular, was strong, full, clean, and open. The driving rhythms were conveyed intact.

As the last note faded away, I put my reviewer’s hat back on. Yes, indeed, the Premier Eight had so much power that power ceased to be an issue. There was no strain to draw attention away from the music to the system. (This aspect of reproduction is something I rarely notice until it isn’t there.) These big amps simply did the job without complaint—no congestion, no muddling, no glare, no hardening. The Eights sounded effortless, with tremendous reserves of power. They had supertative bass, and the ability to play as loudly as I would ever want, with vast dynamic sweeps from near silence to +100dB assaults.

**TREBLE, AIR, & SOUNDSTAGING**

The Premier Eight’s bass was the best I’d ever heard from a tube design, but what about its treble? Tube amps are softened or attenuated or something, aren’t they? I listened to Dave Brubeck’s Time Out (Columbia CK 40585) to test this. Joe Morello’s cymbal attacks were explosive—once again, the power and control of the amps were wonderful. But the glistening, shimmering decays were equally captivating. The transients were naturally followed by progressively decaying sonic reverberations surrounded with air and occurring in real space. On dynamic treble material, the Conrad-Johnsons were superb.

But what about something more delicate—something subtle buried deep in the mix of a full symphony orchestra? I put on side two of the lovely Chesky LP reissue of Rimsky-Korsakov’s Scheherazade (RC4). Well into the third movement floated a crystal-clear triangle above the sounds of the orchestra from the rear left of the soundstage. Each stroke was unique and recognizable, as was the delicate, ever-softening decay. The Eight’s treble performance, like that of its bass, was stunning. Performance at both frequency extremes was, as promised, fully extended.

As a result of their extended frequency performance, the Premier Eights were marvelous at recreating space, fully capturing both the high-frequency energy often described as air, as well as the low-frequency information which typically communicates volume and spaciousness. In particular, both the Kitaro and Rimsky-Korsakov LPs sounded as though the music was being performed in large auditoriums with live performers in real spaces. The perspective with both of these recordings was that which would be heard from a mid-hall seat. The stages were simultaneously wide and deep, and placement of performers was pinpoint. Wonderful illustrations included the deep center-stage voice on “Japanese Drums,” and the even more distant snare at the left rear of the stage on Scheherazade.

But was everything being given this mid-hall perspective through the Premier Eights? Was there midrange depression? Was the consistent sensation of air and space an artifact? Not to worry. On Chris Isaak’s “You Owe Me Some Kind of Love” (Chris Isaak, Warner Bros. 25536–1, LP) and Cassandra Wilson’s “You Don’t Know What Love Is” (Blue Light ‘Til Dawn, Blue Note CD 81357–2, CD), the performers, while still behind the speakers, were also close and in the room. On the incredibly popular Chant (Angel CDC 55138), and Brahms’s Violin Concerto in D with Jascha Heifetz (RCA 09026–61495–2), many sounds were located at or in the speakers themselves. On Frank Sinatra’s duet with Barbra Streisand (Duets, DCC GZS 1053), or Pearl Jam’s “Go” (VS, Epic EK 53136), a wall of sound with very little air or space was thrust into the listening room. Roger Eno’s essentially electronic “The Day After” (Voices, Editions EG EGED-42) sounded airless.

The Conrad-Johnson faithfully reproduced the air, space, width, depth, perspective, and placement of every recording, without imposing its own consistent character.

**DETAIL RESOLUTION & THE MIDRANGE**

The Conrad-Johnson Premier Eight convinced me that the frequency balance was as advertised, with nary an exaggeration or attenuation of any consequence anywhere. But how did the midrange sound? For me, the answer to this question is always provided by the reproduction of the human voice. Sade, on “Ordinary Love” (Love Deluxe, Epic EK 53178), sounded luscious, sensual, inviting. The Premier Eight reminded me why I’d fallen in love with my Koetsu Pro IV, Versa Dynamics 1.2, MFA MC Reference, NBS Signature cables, and the big ProAc Response 4s. Sade’s voice was a velvety liquid—a textural reality. I was reminded why I continue to listen to the “smooth jazz” so many of my purist friends belittle.

Voices—I needed to hear more voices! I listened to three PJ Harvey LPs. Wow! This young woman has lived life, and well understands what the jaws of the tiger are all about. Her raw-edged view of the world conquered my listening room through the conduit provided by the Conrad-Johnsons. Next up were a couple of CDs featuring the Crash Test Dummies’ baritonal Brad Robert. He, too, was treated well, as were Amanda McBroom, Jennifer Warnes, Dusty Springfield, Harry Belafonte, The Fairfield Four, Mary Black, Johnny Hartman, Richie Havens, Chris Rea, and every
other vocalist I selected.

In addition to listening to these artists through the Premier Eights, I was fortunate enough to be able to listen extensively to them through both the 300B-laden VAC Renaissance Seventy/Seventy (reviewed elsewhere in this issue) and my KT88-equipped ARC Classic 150 monoblocks. While neither of these amps was the equal of the Premier Eight in terms of flat, extended frequency response or awesome power, both were somewhat richer and fuller harmonically. This was the one area where I found that the Eights, with their bevvy of 6550As, failed to define the current state of the art. I can't help but wonder what the Eights might sound like with different power tubes.

On the other hand, the Eights possessed a very satisfying combination of fullness with superlative resolution of detail. It was immediately obvious that the drum kit on Eddie Cochran's "C'mon Everybody" (Eddie Cochran, EMI E21Y-92809) was actually just a tambourine. I was able to clearly visualize the percussionist grasping and releasing the triangle on Scherazade, and I relived the experience of seeing Dean Peer pulling, slapping, and muted the strings on his electric bass (Ucross, Redstone RR 91012). Throughout the frequency range, the amps consistently retrieved great amounts of information, possible in part because of the amp's remarkably low noise floor.

My appreciation of the Premier Eight's ability to resolve detail was strengthened by my forthcoming evaluation of a handful of sensational cartridges: the Transfiguration AF-1, Benz-Micro Ruby, Oracle Reference, Symphonic Line RG-8L, and Koetsu Pro IV. In addition to highlighting the unique characteristics of each cartridge, the Premier Eights were equally useful in revealing differences relating to tracking force, VTA, and, in some cases, even azimuth. The Eights were as effective as a reviewing tool as they were at playing music.

**SPEED & RHYTHM**

Throughout my extended listening, the transient performance of the Conrad-Johnson Premier Eights never drew attention to itself. Search as I might, I was unable to find a single mention in my listening notes of transient performance. The Eights certainly didn't exhibit any of the slowness or roundness often associated with tubes. Nor did their clarity and detail resolution lead to any perception of undue speed. Transient performance in all frequency ranges was simply natural, and consonant with the music. The pace, rhythm, and drive of every type of music was excellent and obvious, as demonstrated by the high-energy technopol of Enigma's *The Cross of Changes* (Charisma 39236-2), which pulsed with club-like force and precision. Everything from the slow, deliberate pace of Górecki's Symphony 3 (Elektra Nonesuch 79282) to the challenging *nuovo* tangos of Astor Piazzolla's *The Central Park Concert* (Chesky JD107) was rhythmically precise and correct.

**MEASUREMENTS FROM TJN**

The Conrad-Johnson Premier Eight's chassis was hot following the one-hour, ½-power preconditioning, but not unusually so for a tube amplifier. Its input impedance measured just under 10k ohms, its gain into 8 ohms 32dB. The C-J is non-inverting, a positive-going input resulting in a positive-going output. Signal/noise ratio measured a fine 111dB (unweighted, ref. 1W into 8 ohms). The C-J's output impedance was quite low for a tube amplifier: 0.51 ohm at low and mid frequencies, 0.67 ohm at 20kHz. (The higher the output impedance, the greater the potential for interaction with a loudspeaker load resulting in frequency-response deviations in the system. The C-J shouldn't be particularly prone to this problem.) DC offset at the amplifier's output measured 9.7mV.

The frequency response of the Premier Eight, shown in fig.1, has been extended to 200kHz here to show the small resonant peak present with an 8 ohm load —likely an output transformer anomaly. It isn't present into lower impedances, though the top audio octave then starts to droop. Fig.2 shows the shape of the Premier Eight reproducing a 10kHz squarewave. The overshoot and damped oscillation at the top of the waveform correlate with the ultrasonic peak in fig.1. As always with tube amplifiers, the Premier Eight shouldn't be turned on without a load connected to its terminals.

The THD+noise curves in fig.3 show a fine result. The distortion is low across most of the frequency band, rising slightly at low and high frequencies. Most tube amplifiers I have measured are noticeably worse than this. The THD+N waveform with the amplifier driving low impedances (fig.4) indicates a heavily second-harmonic component plus noise. Into 8 ohms, third- and higher-order components became visible.

A plot showing the output spectrum resulting from a 50Hz input (184W into 4 ohms) is shown in fig.5. The second harmonic is at —65dB (about 0.06% THD), the third at —63dB (0.07%), with...
Signal. The largest artifacts are at 1kHz (~59dB, or just over 0.1%), and at 18kHz and 21kHz (approximately the same value as the 1kHz difference component). The output into 8 ohms (at 93W) with the same signal (not shown) had a similar, though not identical, spectrum.

The THD+N vs output power sweeps (at 1kHz) for the Premier Eight are shown in fig.7. The gradual rise in distortion prior to the "knee" of the curve is typical of tube amplifiers (though some of them lack a "knee" at all). The C-J meets its power-output rating at 4 ohms, but not at 8 ohms. Clearly, the single output tap is optimized for a 4 ohm load—a good design choice considering the impedance of most home loudspeakers.

The Premier Eight's discrete clipping points (specified here as 1% THD+N at 1kHz) were at 193W (22.9dBW) into 8 ohms, 302W (21.8dBW) into 4 ohms, and 244W (20.9dBW) into 2 ohms (at a line voltage of 117–118V).

The Premier Eight performed exceptionally well on the test bench, sailing through the measurements without a hitch. It's one of those rare tube products whose measurements reinforce rather than contradict its apparently superb sonic attributes. The fact that it's also a powerhouse is icing on the cake.

—Thomas J. Norton

**CONCLUSION**

The Conrad-Johnson Premier Eight power amplifier will be a dream come true for many tube-lovers. This massively powerful amp, from a well-established manufacturer with a reputation for product reliability and customer support, is capable of driving virtually any speaker on the planet. While its 6550A-based circuitry may yield to some tube amps in terms of harmonic richness, it sets new standards in most other areas. The Premier Eight's low noise, high power, extended frequency response, expansive soundstaging, and general musical excellence make it a clear Class A contender. I found the Premier Eights to be stunning sonic performers to which I paid the ultimate compliment—I bought a pair.

—Jack English

---

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Audiophiles can get hung up on size. Give us an amp with less than, say, 8") of faceplate height, and we feel inadequate. It doesn't matter how much our saner friends tell us that size doesn't matter—we're convinced that it takes a big "un to get the job done. How sad. We'd do well to remember Freud's dictum: Sometimes an amplifier is only an amplifier.

Sometimes, however, an amplifier can be a revelation. In the case of the Arcam Alpha 5, it can confound any number of audio "truths" and even—dare to think it!—convince the most hidebound skeptical that there might be something to this audio stuff after all.

**These Truths are Not Self-Evident**

**Truth #1:** High-end audio is unaffordable.

Wrong! This baby costs only $399, and sports all kinds of certified audiophile-quality features: fiberglass circuit boards (not those yucky brown things), heavy-duty toroidal transformer, MOSFET output devices, tone-control bypass option, and a phono section. Buy the "Briteceiver,"1 which consists of the Alpha 5 amp and matching Alpha 5 tuner, and you even get a package price of $749—or the very heart of mass-market country.

**Truth #2:** They all sound alike anyway.

Wrong again! I spent the day at a stereo dealer in Manhattan, watching a salesman repeatedly demo the Arcam against more costly mainstream receivers. Every customer heard a qualitative difference. Having worked the sales floor myself, I can tell you how rare this is. Oh, people will frequently allow as to how they think they've heard a difference—mostly to please the salesperson, who seems to really want them to—but most non-audiophile customers don't confidently proclaim one product superior to another. In this nonscientific, statistically inconsequential survey, however, there was unanimity: the Arcam sounded "clearer." That was the word repeatedly invoked.

**Truth #3:** Integrated amps aren't serious audio—only separates are.

This one's tough in the same way that realizing that the Earth isn't flat is difficult. It seems so patently true that it couldn't possibly be wrong. Yet wrong it is. What we audiophiles tend to forget is that an appreciation of fine music, and the desire to listen to it, is not the same thing as the desire to obsess about audio equipment. For every one of us who enjoys finessing around with compatibility, cables, and crossovers, there are ten (more likely a hundred) who just want to hook up the stereo and forget it—and not just until next month's issue, but forever. For these folks, integrated amplifiers, even receivers, make a great deal of sense. Unfortunately, many of them are probably settling for mini-systems, because so many of us audio nerds are insisting that you need to suffer if you want to hear the blues.

**Truth #4:** Even if there were affordable high-end gear, it would be ugly or inconvenient to use.

Hmmmm, this one actually has a grain of truth to it. The Arcam is a black box, albeit a pretty nice-looking black box. With beveled edges and simply laid-out controls, the Alpha 5 resembles the sleek mainstream units against which it competes. As far as ease of use—well, it doesn't have remote control, which, of course, practically every receiver in the world does these days. So maybe I am enough of an audio nerd to believe that people might be willing to suffer a little bit to experience better-sounding music.

Having been impressed by watching customers respond to the Alpha 5's sound quality at the shop, I couldn't wait to get it home for a lengthier examination. After all, there are a lot of variables in a short-term in-store demo, and I wanted to get the unit into a more controlled situation before going gaga over it. I set the Arcam up in my second system, teaming it up with Celestion 5 speakers, a Linn/Itoh/Blue Point Special turntable rig, and a California Audio Labs Icon CD player.

**You Call This Work?**

It has become an unforgivably trite reviewerism to write something along the lines of "I forgot to take notes as I listened to record after record blah de blah blah," so I'll have to forgo that rap. Besides, in this case it wouldn't be entirely true. What did happen is that I spent one hell of a lot of time listening to my second system, even though I had a sexy $20,000 Italian triode amp driving $15k worth of speakers in my living room. By all rights, I should've resented every minute spent listening to a mere integrated, when I had those thoroughbreds in the main salon. Oh, I'm not going to say that the Arcam outperformed the Italian job, but it was a hoot to realize that the Alpha 5, which costs less than one $45 triode, still made music in a thoroughly satisfying way. If you came to the house, you were quite likely to find me in the back room, eyes closed, entwined by the music.3

What's odd is that I treated this behavior almost like a dirty little secret. When my audio pals would ask what I was listening to, I'd rattle off a bunch of Class A components—stuff that has maximum

---

1 I'm not making this up—that's really what Arcam calls it.

2 "Try more like a thousand!" my wife snorts.

3 Re. my working methods: If the music is on and my eyes are closed, I'm entranced; if there's no music on and my eyes are closed, I'm working on an article. At least that's what I tell my wife. I'm not sure she's buying it.
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groupie status—and then mumble, "... and some affordable Arcam gear."

What a putz. What I should have been doing was shouting from the rooftops: "I've found a $400 amplifier that'll knock your shorts off!" Which, of course, is what I'm doing now.

**AUDIO GURU OR MORON? YOU DECIDE.**

About a year ago, my buddy Bill stopped by my house while I was finishing a review of the Martin-Logan Aerius. He sat in on a listening session and left amazed at what he'd heard—the sound as well as the prices. "I always figured you were making this stuff up," he confided. About six months later, he asked, "Is there anything out there that I can afford that does what I heard at your place?"

I faltered, muttering, "Well, I'm not really that familiar with entry-level gear..." Another friend actually had to remind me that I'd been raving about the Alpha 5.

Bill bought the "Briteceiver" without even an audition. Bummer! I'd wanted to see him realize that he could hear the difference. I spent the weekend wondering if I'd blown my "audio guru" status, only to find him in full rant the following Monday. "Man, oh man! We didn't do anything but listen to music this weekend! We heard five new radio stations that I'd never even listened to, my daughter made us play every one of her story tapes, we even listened to our old records!"

"So you guys heard a substantial difference over your old gear?" "Did we? I was getting imaging—I never ever believed you about that stuff! Even on my old, crappy speakers..." I made one more attempt to judge his ardor for the Arcam. Knowing that I was dealing with a three-VCR household, I slyly asked, "Anything good on the tube this weekend?"

"Couldn't say—too busy listening to music."

**GOODDOODOODOODAaaa!**

**BUT HOW DOES IT LOOK IN TIGHTS?**

The Alpha 5 is an audio Clark Kent. It looks so ordinary—puny, even—yet it's jampacked with surprises. Its control array seems normal: rotary selector knob; a couple of push-to-engage switches; volume, bass, and treble pots; second-speaker switch; headphone jack; and power button. Big woo, eh? Well, don't let the glasses fool ya.

Starting with the phono section, not all is as it seems. First of all, it's getting difficult to find one of those suckers these days—even on $1000 preamps. Yeah, I know that there are loads of people out there who have no desire to play their old albums—there's even a whole generation who have no old records to play. But what about those who have 'em and still want to hear 'em?

Creek and Audio Alchemy have both recently introduced under-$200 outboard phono units, but let's get real. Adding an outboard anything substantially degrades the 5's cost-performance ratio, and decreases by a factor of about a googol the chances that the average punter will buy it. So Arcam came up with a clever idea: If you need a phono section, it's right there. Just plug in and play. If you're a modern, line-stage—only kind of music-lover, a tiny switch on the back panel removes the phono section from the circuit, leaving you with five line-level inputs plus a tape loop.

Okay, you're thinking, so it's got a vestigial phono section—it can't sound good. It does, though. Oh, there is a little coarseness compared to preamps costing twice as much. And there are no provisions for capacitance loading or low-output cartridges. But did you really expect to play that Transfiguration through a $400 amp? I liked listening to vinyl through the Alpha 5—it didn't add tizziness or bleach out tonal colors; if there was swing, pace, or metrical variety in the grooves, it came through uncompromised. Its resolution allowed me to enjoy my well-recorded LPs—but anything should be able to do that. More important, I was able to enjoy the good music on my less-than-perfectly-recorded albums. Let's just say that a good turntable is not wasted in front of the Arcam.

Now, we all know that though real preamps don't have tone controls, they're ubiquitous on mass-market gear—and common even on entry-level, high-end stuff. The debate over whether the added noise introduced by controls is worth the loss of flexibility seems unending. I take the position that if you can't live without them, by all means buy a unit that has them. Or buy one that allows you to use them when you feel you need them, and switch them out of the audio circuit when you don't. It's pretty much de rigueur to offer a direct bypass option on better-quality audio components, but I'm not sure that I've ever seen one on something as inexpensi

4. There's a certain type of hair—shirt audiophile—the audiophile, if you will—who likes to brag that he or she has a system of such refinement that only the most perfectly produced recordings are listenable through it. "It reveals how bad 90% of the software is." Actually, that's not what it reveals at all. It just proves that it's possible to fine-tune something to the point where it won't do what it's supposed to 90% of the time. [50%—Ed.]
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received for those wires, but the Arcam? No way—it's a steal.

Which is not to argue that its value is inherent in its low cost. There's a lot of inexpensive equipment out there that are no bargains. Where the Alpha 5 makes its bones is precisely in the area of communication. All audio gear is compromised, and no amount of wishing on our part can change that fact. System building is really the identification of sonic flaws in order to choose the ones that bother us least. Sometimes we'll even try to combine the signatures that we've identified in ways that minimize their effects—as when we use a laid-back amplifier with a forward-sounding set of speakers. We're forced to make sonic compromises even at the very top of the game. It's not patronizing to suggest that entry-level, budget-conscious system building needs to start with an awareness that perfection isn't possible.

What do you give up in the Arcam? Not much, on balance. For a 40W amp, it has good slam and an impressive bottom end. It's true that the lowest octave is pretty much absent, but really—is there a speaker out there with a 20Hz response that you would expect to mate with a $400 integrated? What the Alpha 5 has got going for it is a richness in the lower mids and upper bass—an area where most receivers and affordable integrateds sound lean and a bit pinched. In Mos' Stoc-ious: the Dr. John Anthology (Rhino R2 71450), this fuller body gave the good doctor back his left hand—restoring the rhythmic complexity lost on most budget components.

And while I found it to be generally free from glare and graininess, the Arcam lacked the effortless liquidity that I obtain from my reference Conrad-Johnson Evolution 20SE/Premier Eleven combo. Even in the wacky world of high-end audio, it should come as no surprise that an $8300 combo can outperform a $400 unit. And yet I've recently tested an exotic, $2000 tubed integrated that does not outperform the Arcam in at least one crucial area.

My audio buddy Ruben came by the house with a new test disc, and we did some pretty silly audio-dweeb things, like listening to recordings of Lamborghini's and Harleys (the bikes, of course, not the reviewer). Eventually we stopped clowning about and got around to playing some music—at least we tried to. Ruben couldn't listen all the way through anything we put on. "You know, if I were you, I'd just unplug all of this stuff and bring that Arcam system out of your bedroom. You're not getting any music from this dreck."

**Proofin' the Pudding**

Now, I know that this is just the kind of statement that's going to irritate the objectivists out there—you guys can just skip the next part and look at the pretty graphs that the head office is going to tack on to the end—but Ruben had it pegged exactly. I still have a lot of listening to do to the high-end integrated before I know what's causing the apparent anomaly, but something in that system is sitting all over the music. The sound isn't compelling. Shades of Ivor's toe-tap test!

The Alpha 5 makes me care about the music—even with a lesser front end. Muddy Waters calls for his captain on Folk Singer—Mobile Fidelity UDCC 593 (CD), MFSL 1 201 (LP)—and I'm there, man. Mose Allison's funky, smartass, practically inaudible singing is delivered with its glorious quiriness intact (Allison Wonderland: The Mose Allison Anthology, Atlantic Jazz Gallery/Rhino R2 71689). And my wife swears that she's never before been able to understand the lyrics of Professor Longhair's "Tipitina" ('Fess: The Professor Longhair Anthology, Rhino R2 71502). (I'd agree, but I'm not entirely sure that transcribing the third line as "Tipitina ullam malla walla dolla, tra ma tra la la" could be called understanding it—unless there's a Walt Kelly songwriting credit that I've never noticed.)

Individual differences in interpretation mean a lot. This, manifestly, is why some of us collect so many performances of our favorite compositions. Listening through the Arcam to Beethoven's Op.132 String Quartet clearly revealed how totally different in intonation, pace, and ensemble blend are the Quartetto Italiano (Philips 6747 272, LP) and the Végh Quartet (Telefunken 635040, LP). The Italians employ a suavity and polish that emphasize the intellectual complexity of Beethoven's genius. They make a compelling argument for the work as the capstone for the Age of Reason.

The Végh, by contrast, shows the muscle and sinew of the work. This, they play, is passion, and reason will never master the animal within us. Compared to the Quartetto Italiano, they have uncertain intonation, ragged attack, and a reckless sense of abandon. Fury, not reason, is at the heart of the Végh's interpretation.

Which do I prefer? Whichever is on my turntable when you ask the question. I wouldn't live without both of them; nor, if I had to add, would I live with a stereo system that reduced their glorious inconsistencies. Many expensive components do that—the Alpha 5 doesn't.

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As I said earlier, system-matching is a game of finding the compromises that irritate you the least. Virtually everything about this little Arcam excites me—especially when I consider its price and intended audience—and nothing seriously offends me. Your ears may tell you a different story. Hell, most of the folks reading this magazine may well be beyond the point of wanting or needing an amp this sensible. But I'll bet a week's pay that you have a sister, lover, brother, or pal who looks at you strangely when you talk about all the time you spend just listening to music. Who knows? Maybe one day they'll ask you the question that my friend Bill asked me: "Is there anything out there that I can afford that will do the stuff that you're always talking about?"

If your answer is, "Check out the Arcam Alpha 5," you stand a good chance of being a hero. Lemme tell you, it feels great.

-Alle Phillips

TJN's Obligatory Objective Checkup

The bulk of the measurements on the Arcam Alpha 5 were made from its line inputs to its main loudspeaker outputs. The measurements on the phono stage were made from the phono inputs to the tape monitor outputs.

The case of the Alpha 5 was quite hot following its 1/2-power, one-hour pre-conditioning, but not uncomfortable to the touch. Its input impedance measured a low 12.6k ohms, its maximum line-stage gain 42dB. It was non-inverting from the line inputs to the main outputs, and also from the phono input to the tape output. The Alpha 5's output impedance was under 0.09 ohms at low and mid-frequencies, increasing insignificantly to 0.14 ohm at 20kHz. Like most solid-state amplifiers, its output impedance should cause no adverse frequency-response interactions with a loudspeaker load. DC offset measured a low 1.2mV in the left channel, 3.2mV in the right. The signal/noise ratio, line in to line out, measured 85.2dB referenced to 1W at 8 ohms; for the phono stage, it measured 79dB referenced to 1V. The output impedance of the tape outputs measured just under 1.8k ohms with a 25 ohm source impedance, and just over 2.3k ohms with a 600 ohm source impedance, indicating unbuffered tape outputs. And the volume-control tracking was excellent, with a maximum measured deviation (at 9:00) of 0.4dB.

The three curves in fig.1 show the frequency responses, from bottom to top: of the line input to main output with the tone controls in circuit but set flat, the direct mode, and the phono stage. The last is the only item of concern; the left channel (but not the right) peaks slightly in the midbass. The curve's vertical scale has been changed from our usual 0.5dB/division to show the LF rolloff—this is the European addition to the RIAA curve to provide infrasonic filtering. The squarewave response in fig.2 shows an excellent result. There is a very slight damped oscillation at the top of the 1kHz squarewave which was visible on the oscilloscope but is too small to resolve in the published curve.

Channel separation, both line and phono, is shown in fig.3. Interestingly, the phono crosstalk is slightly better than the line-out crosstalk, but both are good for any amplifier, much less a budget one. The THD+noise vs frequency for line and phono are shown in fig.4. Much of the phono result—taken at 5mV input—is noise. The line result is also affected by noise; while not exceptional, it is quite respectable overall. The unusual THD+N waveform (fig.5) appears to indicate some sort of ultrasonic oscillation, but as this is very low in level—around 0.005%—it's not a matter for concern.

Fig.6 is the spectrum of the Alpha 5's reproduction of a 50Hz sinewave at a high level. This is an extremely clean result—one of the best we've measured, in fact—with all anomalies well below -90dB (0.003%). The same is true for the IM products of a 19+20kHz input (fig.7). Here, all of the anomalies are below 75dB (under 0.02%).

The THD+N vs output power for the Alpha 5 is plotted in fig.8. The important thing here is the 4 ohm curve, which begins abruptly at about 75W. This is where the fuses blew for both channels. While the Alpha 5 will operate into 4 ohms—and music is not as difficult a challenge as driving a load with a steady-state signal on the test bench—it's clearly not happy driving low impedances. Table 1 shows the discrete clipping points (1% THD+N) at a line voltage of 122V.

Additional tests were also run on the phono stage. Phono gain was 39dB, the phono stage clipping (1% THD+N) at an (unequalized) input of 111mV at 1kHz, 1.05V at 20kHz, and 13.3mV at 20kHz—fine results. (The differences here are normal functions of the RIAA phono-equalization curve; high frequencies are engraved on an LP at a much higher level than low frequencies.)
cies. Therefore, a phono stage must have a higher overload margin at high frequencies.) The THD+N vs output at 1kHz for the phono stage is shown in Fig. 9. The level of distortion continues to decrease until overload, which occurs very abruptly, suggesting that this measurement is dominated by noise. The phono input impedance measured 15.5k ohms, considerably lower than the desired 47k ohms.

Finally, Fig. 10 shows the action of the Alpha 5’s tone controls. The maximum and minimum settings are shown, along with the 2:00 and 10:00 o’clock settings. The latter two result in quite subtle alterations, making these controls more useful than is normally the case.

With the proviso that you choose its load with some care (very-low-impedance loudspeakers are not recommended), the Alpha 5 definitely appears to be a slick little amp at a modest price.

—Thomas J. Norton

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Table 1  Arcam Alpha 5 Clipping (% THD+noise at 1kHz)

<table>
<thead>
<tr>
<th>Load</th>
<th>Both Channels</th>
<th>One Channel</th>
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</thead>
<tbody>
<tr>
<td>8 ohms</td>
<td>49.2 (16.9)</td>
<td>49.3 (16.9)</td>
</tr>
<tr>
<td>4 ohms</td>
<td>50.8 (17.8)</td>
<td>60.8 (17.8)</td>
</tr>
</tbody>
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75W (5.75)  (Fuses blew)
A Special Introduction*

FOR A VERY SPECIAL PRODUCT

THE SHA GOLD REMOTE CONTROL LINE PREAMP

In 1992 the SHA-1 Headphone-Line Preamp won amplification component of the year from Stereophile and "four stars" (Editor's Choice) from The Absolute Sound, demonstrating convincingly that innovative design can produce state of the art sound at affordable prices.

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176 WorldRadioHistory Stereophile December 1994
I'm reviewing the Arcam Alpha 5 FM tuner for three reasons:

1) there's often a need for a basic tuner that provides reasonable performance at an affordable price when FM isn't an audio system's primary source;

2) Arcam is promoting the tuner, in combination with the Alpha 5 integrated amplifier reviewed in this issue by Wes Phillips, as the $749 "Britceiver" 5—a $49 savings over buying the units individually, which cost $399 each; and

3) the last Arcam tuner review was in Vol.9 No.8, so a review of a recent FM product from this traditionally dependable company seemed justified.

**DESCRIPTION**
Operation of the Alpha 5 FM tuner is straightforward. The controls on the black, heavy metal chassis are, from left to right: Mute Off, Mono/Stereo, Auto tune (threshold is set too high; tuner stops only on stations strong enough to draw a spark), Up/Down tuning, memory Store, Shift A/B for 16 presets from eight buttons, and Power on/off. The 50kHz-step frequency display is yellowish-green, the five-level signal meter changes from red to green, and the stereo indicator is green.

The rear panel includes two sets of identical audio outputs and a Euro-style antenna connector. A slip-on F-type connector will fit with a little bending, or the enclosed fitting can be installed on the raw end of a 75 ohm cable. A three-pronged AC power-cord receptacle is also provided.

Interior construction is typically British: green-masked circuit board with above-average-quality parts, which should contribute to long-term reliability. Self-inflicted digital interference is kept to a minimum by limited use of radiating interconnects and wires, and by a heavy metal shield directly behind the main display. No exotic circuitry is used. The instruction manual, written in several languages, is adequate.

**RF PERFORMANCE**
It's quite apparent that Arcam designed the tuner not as an all-out assault on signal extraction, but as a tuner for use in cities and suburbs where stations aren't too close on the dial. Within these limited criteria, it does fairly well.

Alternate-channel selectivity measured 40-50dB—barely acceptable. Therefore, slight crosstalk was heard from a very strong local signal at 102.9MHz while I attempted to receive a very weak signal at 102.5MHz. This illustrates that the measured selectivity will be even less under high-level signal conditions. Adjacent-channel selectivity (only 4dB) is impossible unless both signals are equally weak. Sensitivity at mid-dial settings measured only slightly less than normal (2μV/11.22dBf), but less at each end of the 88-108MHz spread, limiting its fringe-area performance unless a very good antenna is used.

**SOUND**
Mono distortion was superbly low, indicating that the audio output stages are well-designed, and not the source of the rise in distortion in the stereo mode. The amount of stereo distortion appeared to be proportionally related to the total amount of residual ultrasonic information. This comprises tones at 19kHz (pilot), 38kHz (normal stereo subcarrier), 57kHz (RDS), 67kHz (usual SCA music or other voice service), and sometimes 41kHz and 92kHz (other SCA services), and results in intermodulation components beating with each other to cause interference within the audio band (about 30Hz-15kHz on FM). What can be surmised from this is that, because many US stations carry other programming besides normal stereo on their carriers, every tuner needs to have extensive filtering of the audio output. Like many tuners, the Arcam Alpha 5 falls short in this area (the Onkyo T-9090 II, which has excellent filtering, is an exception). What also can be surmised is that, if a station is transmitting only normal stereo, the Alpha 5 can sound reasonably clean and quite pleasing—which it does. If a tuner is transmitting other subcarriers, the Alpha 5 will sound noisy or slightly ragged.

Stereo separation is outstanding, measuring 53dB at 1kHz and 30dB at 10kHz. Soundstaging was proper, mono summing directly in the center; overall sound character was slightly milky, lacking ultimate detail; bass response was deep and punchy; midrange response was accurate at and near the 1kHz emphasis/de-emphasis point; and high-frequency response wasn't dull, extending to 14kHz before rolloff.

**CONCLUSION**
The rugged-looking, well-constructed Arcam Alpha 5 FM tuner, when bought in combination with the Arcam Alpha 5 integrated amp, appears to be a good buy at its discounted price of $375. At the full price of $399, a few more dollars spent might be worthwhile. For instance, the Creek T42 FM tuner at $525 offers far more selectivity and sensitivity, along with smooth, if not strictly accurate, sound. Another alternative in the same price range is the Magnavox Dynalab FT-11 at $499, which has good sound and sensitivity, but isn't as selective as the dual-IF-bandwidth Creek.
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Progress, progress, progress. New! Improved! Latest/greatest/bigger/better/faster/more powerful...you know the hype. Only the most recent product is worthy, while last month's Component of the Century is now regarded as little more than dog doo.

It's a shame that so few of us take the time to appreciate all of the wondrous things that have existed in the past. Fortunately for those of us who can only rush ahead, there still exists a handful of iconoclasts. While most audiophiles eagerly await the Mk.VI replacement of the brand-new Mk.V, these lonely mavericks continue to uncover heretofore unknown secrets of the Mk.I. Designers are drawing on lessons from the past, evaluating and investigating circuits that worked well long before the transistor ever came into being.

Very old tube circuits are experiencing a rebirth because, when implemented with better parts than were available half a century ago, they result in relatively reasonably priced, sonically stunning products. Most of these new/old amplifiers are single-ended triode circuits that have little or no negative feedback. Resistors are upgraded from the early carbon types; capacitors are no longer electrolytics; wire is better insulated and of higher purity; chassis construction and materials are superior; and transformers are often much better. The breadth of these amplifiers' acceptance, however, will be limited because of their inherently low output powers.

I naively assumed that the Valve Amplification Company worked from this basis, trying to find some way to extract more power from these emerging single-ended designs. Subsequent conversations with VAC designer Kevin Hayes quickly revealed how much more complex the situation actually was. Like most high-end designers, Kevin is part researcher, part music-lover, part problem-solver. He's wrestled with the problems of single-ended designs, including low power, idiosyncratic clipping characteristics, high levels of second-order harmonic distortion, and transformer-related difficulties. He's worked with both pentodes (with their high third-harmonic distortions) and triodes (with their second-order but lower overall distortion). Kevin recognized the inability of push-pull topologies to reduce odd-order harmonic distortion, but was favorably impressed with the reduction of even-order distortion in class-A push-pull circuits.

Kevin applied all of this information to create the VAC Renaissance Seventy/Seventy, which uses an inherently linear, class-A triode output stage with distortion-canceling push-pull operation. The Seventy/Seventy uses eight modestly powerful 300B tubes. The 300B, originally designed six decades ago by Western Electric, is noteworthy for its linear operation (the Seventy/Seventy's manual includes a graph of plate-current vs. grid-voltage plots), low voltage requirements, and low output impedance. Unfortunately, it's an expensive tube.

The Seventy/Seventy's renaissance motif is carried further by the inclusion of input circuitry derived from the famous Williamson design of the late '40s. Using four 6SN7s, the input circuit purportedly offers "pure, direct-coupled, inherently balanced input amplification and phase splitting."

Two additional design features of the Seventy/Seventy are particularly noteworthy. Each channel has a separate feedback control located on the front panel, which allows the user to select any of six levels of loop negative feedback ranging from 0dB to 9dB—the higher the amount of feedback, the lower the amp's test-bench output impedance and sensitivity. VAC claims that feedback will tighten the sound while changing the frequency balance. Zero feedback is recommended for...
dynamic speakers, while some feedback is suggested for highly reactive speakers, such as electrostats.

The Seventy/Seventy’s second unique feature was sent from heaven. Like most modern-day electronic components, the Seventy/Seventy has properly grounded, three-pronged, detachable power cables which allow owners to use any power cord they want to with the amp. More interestingly, the amp has a unique, three-position ground switch. In the DC position, the audio ground ties directly to the chassis; in the AF position, audio and radio-frequency information is tied to the chassis by a capacitor, but DC is blocked; in the RF position, only radio-frequency energy is bled to the chassis. While this doesn’t allow for plug polarity-switching, it does provide a wonderful mechanism to deal with grounding alternatives without resorting to either cheater plugs or external jumper wires. These three positions can be compared simply by turning the switch. I found the plug polarity correct, and that the grounding options provided varying combinations of sonic quality and noise-floor levels. In my system, the AF position offered the best compromise.

While the amplifier is contained on a single 35-lb chassis machined from 1/4" thick aluminum, it’s a true dual-mono design down to the separate left- and right-channel power cords and On/Off toggle switches. On a negative note, the switches struck me as being out of character with the amp’s build quality—I would hope a less flimsy alternative could be found in the future. Another thing I’d like to see changed are the binding posts, which provide insufficient clearance to accept double sets of large spade lugs for bi-wiring.

Finally, the Seventy/Seventy’s excellent manual provides unpacking, installation, and operating instructions, care and maintenance guidelines, specifications, 300B measurement curves, tube lay-out, information on the three-year warranty, and a history of the 300B and the Williamson circuit. It also discusses installation and replacement of tubes, where and how to find tubes, impedance matching of tubes, and system-tuning alternatives using various combinations of output taps, grounding options, and user-adjustable levels of feedback. It ends with a bibliography.

Ancillaries
The system used to audition the Renaissance Seventy/Seventy was fundamentally the same as that detailed in my review of the Conrad-Johnson Premier Eight elsewhere in this issue.

A Caution
Although VAC burned the amp in for at least 48 hours—every Seventy/Seventy goes through this break-in procedure—it sounded hard and slightly bright when I first turned it on. By “bright” I don’t mean elevated high trebles, but rather a peaky lower treble. The second, updated unit I received sounded the same when first turned on.

This amp was very sensitive to warmup and regular use. When not used for a number of days, it reverted to sounding bright. When cold, vocal sibilants were unnatural and obviously excessive; once properly warmed up, these sounded very natural, varying appropriately from recording to recording. If you audition the amp, make sure it’s been running awhile if you want to hear the sonic splendor it’s capable of.

Sound: The Good News
The VAC Renaissance Seventy/Seventy might measure like an ordinary 70-watter, but it certainly didn’t sound like one. In my comparisons with the ARC Classic 150 monoblocks, the Krell KSA-100S, and the monstrous Conrad-Johnson Premier Eight monoblocks, the VAC always held its own. It sounded as if it had much more than 70W of power, and was superbly dynamic and effortlessly authoritative. Having said that, I must add that I tried the VAC with a bevy of loudspeakers, none of which presented the amp with unusually demanding or complex loads. The Seventy/Seventy will provide more than enough power for most speakers. Unlike most 300B-based amps, the Renaissance Seventy/Seventy will not force you to find extremely sensitive speakers.

I often use Sergio Mendes’s “Fanfarra” to test power and dynamics (Brasileiro, Elektra 61315). The Seventy/Seventy was explosively dynamic, the 100 percussionists taking over what had been the front wall of my listening room. In concert with the superlative ProAc Response 4s, the VAC re-created this music’s inherent driving power. Similarly, the VAC convincingly handled the simultaneously majestic and humbling “Volcano” movement from Alan Hovhaness’s Symphony 50, “Mount St. Helens” (Delos DE 3137). At the movement’s conclusion, I was almost surprised to find I wasn’t covered in ashes.

What else did the Seventy/Seventy do with all this power? It did space. After proper warmup, the Seventy/Seventy re-created remarkably different acoustic venues in my listening room. Not only did the front wall of my listening room simply disappear with the Mendes recording, but everything was wide, deep, layered, placed with precision, and surrounded with air and space. What was most arresting was the re-creation of space between and around performers, wonderfully illustrated by the Crash Test Dummies “Mmm Mmm Mmm Mmm” (Cost Shuffled His Feet, Arista 16531). I felt as if I could get up and walk around the various performers, all of whom were fleshed-out into lifelike 3-D. With Marcel Dupuy’s “Heroic Poem”, from the sonically splendid HDCD “Pompeii and Vesuvius” (Frederick Fennell/Dallas Wind Symphony, Reference RR-58CD), I became a spec in a voluminous acoustic space, wave upon wave of reverberant sound decaying around me.

In terms of perspective or hall seat, the VAC simply didn’t impose a consistent, easily definable character on the music. While the Crash Test Dummies were positioned in my listening room, the Brazilian percussionists simply removed the front wall, and Fennell and the Dallas Winds were well out away from me (or me from them). The VAC’s remarkable ability to re-create different spaces and hall seats from recording to recording made it more revealing than virtually any other amplifier with which I’ve had extensive experience. This surprised me—many of the tube amplifiers I’ve heard which are based on older designs tend to have wonderful timbre but less-than-state-of-the-art soundstaging. The Seventy/Seventy had both. (I can’t help but wonder if this, too, might be related to its being push-pull rather than single-ended.)

The VAC’s poetic beauty, however, lay in its stunningly realistic midrange—the heart of all things musical. Here is where the VAC set standards to which all other amplifiers must aspire. On the Herbie Mann’s “Comin’ Home Baby” (At The Village Gate, Atlantic 1380), it was tangibly obvious that a person was playing the flute—breathing in air which was quickly transformed into the emotional splendor of music. The VAC revealed the inner workings of the flute itself, as columns of air raced along different-length passageways with varying degrees of pressure to create louder and softer notes of higher and lower frequencies. And, through the VAC, those notes took shape and substance in the air around me before decaying away into fond memories, only to be joined by the rich, percussive vibes each note being cajoled into musical form by mallets and pedals against the humming harmony of the artist. The music was alive, enriching, involving, and emotional. There were no traces of mechanical devices feebly attempting to
re-create live sounds; there were no spectacular hi-fi effects. All that was there was real people making real music, and sharing it with me. It was glorious.

Each percussive stroke of the thousands on the Mendes recording was unique. It was obvious that the different drummers were using varying amounts of force, hitting the wide range of skins at different points. Similarly, the percussive strokes on the Dupré recording made musical points and provided emphasis, while the brass had bite and the organ majestically filled the cavernous space.

While Sade's lyrics on Love Deluxe (Epic EK 53178) are distracting, there's no arguing her sensual vocalizations. The mood was conveyed intact, the invitation accepted, the experience shared. The VAC was a joyously open window onto the tremendously diverse array of music at my fingertips; I spent countless hours near this window, marveling at the artistry of my fellow human beings and the emotional bonds we were able to share through music.

**SOUND: THE BAD NEWS**

The Seventy/Seventy's bass lacked the precision of resolution I've heard in any number of tubed or solid-state amps (feedback level notwithstanding). It was a bit boomy and a tad too prominent—especially from the mid- through upper bass regions. While the use of feedback helped, no amount was able to totally ameliorate the problem (and there was always the price to pay in terms of reduced output). The two acoustic basses on the live Herbie Mann album wonderfully illustrated this: The left-channel bass played a deeper set of notes, and didn't become as disproportionately prominent as the right-channel bass. The right-channel bass was slightly boomer and louder than I've heard with any number of other amplifiers. This characteristic was consistently audible in the higher bass range, and became problematic with material where the mid-/upper-bass range was already too strong—eg, the Sade Love Deluxe album or the Holly Cole Trio's Don't Smoke in Bed (Manhattan B212-81198).

Throughout the frequency spectrum, and especially in the treble range, the Seventy/Seventy failed to provide the ultimate resolution of inner detail so often praised in the High End. For example, it was harder to count the vibrations of Jimmie Dale Gilmore's tremolo guitar in "Where You Going," from Spinning Around the Sun (Elektra 61502-2), or the drum strokes in the distant percussive rolls from Rossini's "William Tell" (Overtures, London STS-15030). While the treble wasn't noticeably attenuated, it was consistently softened and slightly slow. Cymbal crashes and triangle strokes were always clear and harmonically rich, but not as quick or as percussive. The correct timbre, while there, was mildly diminished in initial impact and excitement.

**MEASUREMENTS FROM TJN**

The bulk of the measurements for the VAC Renaissance Seventy/Seventy were made at the 4-8 ohm output transformer tap. Unless otherwise noted, the readings were taken at the 0dB negative feedback setting. All measurements taken with feedback were taken at the maximum 9dB negative feedback position.

The Renaissance was hot after its 1/8-power one-hour pre-conditioning test, but no hotter than would be expected of a typical tube amplifier. Its input impedance measured 98k ohms (102k ohms with feedback); its output impedance, at the 4-8 ohm taps, was high, ranging from 2.1 to 2.4 ohms, the higher values noted at 20kHz. I would expect this amplifier's frequency response to be fairly sensitive to varying loudspeaker loads (less so with feedback, where the output impedance remained below 0.54 ohms). The input impedance did, however, drop to 1 ohm at the 2-4 ohm tap and 0.58 ohm at the 1-2 ohm output tap.) Gain into 8 ohms measured 35dB without feedback, 24dB with (ie, 11dB; the 9dB feedback setting only equates to 9dB into a 4 ohm load). Signal/noise measured a rather low 59dB at 1W into 8 ohms, unweighted, improving to 78dB if A-weighted, with corresponding readings of 70dB and 89dB with feedback. No DC offset was present on either channel.

Fig.1 shows the frequency response of the Renaissance Seventy/Seventy with and without negative feedback. The response with feedback (displaced for clarity) is flatter, as expected, but the differences within the audible range are insignificant. Figs. 2 and 3 show the squarewave responses of the VAC with and without feedback, respectively. There's some visible ringing at the top of the waveform in both graphs. Rather surprisingly, there's more overshoot and ringing with negative feedback than without, tying in with the hint of an ultrasonic rise in the frequency response in this mode. It also increases in frequency to around 360kHz with feedback. This ringing is also just visible in the otherwise excellent 1kHz squarewaves (not shown). [While this ringing won't be audible, it does suggest marginal stability and perhaps a suboptimal feedback network.—Ed.] The crosstalk, shown in fig.4, shows the usual capacitive coupling between channels but is low enough not to be of audible relevance.

The VAC's THD+noise vs frequency performance, plotted in figs.5 and 6, is higher than we normally see in an amplifier of this caliber. Although the S/N measurements and the spectrum in fig.8 (below) tell us that a significant portion of the apparent distortion is actually noise, the THD performance at low frequencies may partially explain JE's comments on the amplifier's bass quality. The
reduction in the distortion due to negative feedback is clearly visible in fig.6. Fig.7 shows the waveform of the distortion at 1kHz. The components here are heavily third-harmonic—a typical result from a good tube amplifier with a well-matched push-pull output stage in which the even-order components cancel.

Fig.8, which shows the VAC’s output spectrum, reproducing a 50Hz input at 17W output into a 4 ohm load, is not particularly good. As expected, the third harmonic at 150Hz dominates at −37dB (about 1.5% THD). The fifth, at 250Hz, is down to −53dB, or about 0.25%. The visible artifacts which do not lie at multiples of the fundamental, and which create a rather ragged-looking result, are power-supply noise. the result of intermodulation of the power-supply noise with the fundamental, or harmonics of the 50Hz input signal. (I tried every possible grounding arrangement while testing the Seventy/Seventy; the measurements were taken with that giving the lowest level of power-supply noise.) Again, the result here may relate to JE’s listening impressions of the VAC’s bass quality.

Feeding a combined 19kHz + 20kHz signal into the Renaissance Seventy/Seventy set to 0dB negative feedback results in the output spectra shown in figs.9 and 10. Fig.9, the 8 ohm result, has the most intermodulation artifacts, but was also taken at a higher power (both readings were taken at the highest power the amplifier would produce with this input prior to visible evidence of clipping on an oscilloscope). The largest artifacts in fig.9 are at 1kHz (−53dB, or about 0.25%) and 18 and 21kHz (both at −46dB, or about 0.5%). In fig.10, the corresponding readings for 1kHz and 18kHz are −53dB (0.25%) and −46dB (about 0.45%). Both of these graphs show IM performance a lot better than usual for “classic” tube amplifier designs.

The THD+N vs output power measurements with various combinations of output tap and load resistance are shown in figs.11–14. While the negative feedback lowers the THD+N at low power, it doesn’t have a significant effect on the available output power at clipping. This isn’t really a surprise—the output power is largely a function of the output tubes and the power supply. From the evidence of these measurements, the VAC’s power rating of just under 70Wpc appears to be a bit generous. In a tube amplifier, however, the measurements are strongly

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**Fig.5** VAC Seventy/Seventy, 0dB feedback, THD+noise (%) vs frequency at (from bottom to top at 20kHz): 1W into 8 ohms; 2W into 4 ohms; and 4W into 2 ohms (right channel dashed).

**Fig.6** VAC Seventy/Seventy, 9dB feedback, THD+noise (%) vs frequency at (from bottom to top at 20kHz): 1W into 8 ohms; 2W into 4 ohms; and 4W into 2 ohms (right channel dashed).

**Fig.7** VAC Seventy/Seventy, 0dB feedback, 1kHz waveform at: 5W into 8 ohms (top); distortion and noise waveform with fundamental nosed out (bottom, not to scale).

**Fig.8** VAC Seventy/Seventy, spectrum of 50Hz sinewave, DC−1kHz, at 17W into 4 ohms (linear frequency scale). Note that the third harmonic at 150Hz is the highest in level at −37dB (1.5%), and that there are a large number of power-supply artifacts present.

**Fig.9** VAC Seventy/Seventy, HF intermodulation spectrum, DC−22kHz, 19+20kHz at 24W into 8 ohms (linear frequency scale).

**Fig.10** VAC Seventy/Seventy, HF intermodulation spectrum, DC−22kHz, 19+20kHz at 17W into 4 ohms (linear frequency scale).

**Fig.11** VAC Seventy/Seventy, 4−8 ohm tap, 0dB feedback, distortion (%) vs output power into (from bottom to top at 10W): 4 ohms, 8 ohms, and 2 ohms.

**Fig.12** VAC Seventy/Seventy, 4−8 ohm tap, 9dB feedback, distortion (%) vs output power into (from bottom to top at 10W): 4 ohms, 8 ohms, and 2 ohms.

**Fig.13** VAC Seventy/Seventy, 2−4 ohm tap, distortion (%) vs output power into (from bottom to top at 1W): 4 ohms, 8 ohms, and 2 ohms, 9dB feedback; 4 ohms, 8 ohms, and 2 ohms, 0dB feedback.

**Fig.14** VAC Seventy/Seventy, 1−2 ohm tap, distortion (%) vs output power into 2 ohms with 9dB feedback (bottom) and 0dB feedback (top).
dependent on the specific samples of tubes used. The discrete clipping (1% THD+N) measurements shown in Table 1 are pessimistic; relaxing the THD requirement to 3% would give output power closer to spec.

Other than the highish levels of powersupply noise, the test-bench results for the VAC Renaissance Seventy/Seventy are respectable, particularly regarding the distortion. This must be a fundamentally linear circuit. The actual available power, however, is more than a bit disappointing given this unit's price—and power rating. Its measurements are not nearly as impressive as those I made in November 1991 (Vol.14 No.11) on VAC's less-expensive PA90. Still, nothing in the measurements would preclude a fine sonic result.

—Thomas J. Norton

**Conclusion**

The Valve Amplification Company's Renaissance Seventy/Seventy is a very unusual and provocative amplifier which embodies the heart and soul of the musicality vs accuracy argument. While the VAC clearly has shortcomings in terms of accuracy (eg, bass performance, and detail resolution outside of the mid-range), I nevertheless found it thrilling.

No, the Seventy/Seventy isn’t a perfect amplifier, it can’t drive every speaker, and it is undoubtedly expensive. But its strengths are captivating. It draws heavily from the older wisdom, offering you—are there timbral realism, state-of-the-art soundstaging, but gets hitherto unimaginable levels of power from a 300B-based circuit. In all likelihood, the VAC can drive your speakers.

The Seventy/Seventy has marvelously mated the best of the past with the best of the present. It’s a magically magical amplifier worthy of a five-goosebump rating.

—Jack English

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1 The specific tubes that JE used in his listening tests were not available for the measurements. VAC sent us tubes from the same factory as those provided to JE.

—TJN
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Dick Olsher auditions AC treatment components from Audio Power Industries, Bob Young Audio, Music Interface Technologies, Seakay, & Berkleonics


Common to all three: Approximate number of dealers: 150. Manufacturer: Audio Power Industries, 2624 South Rousseau Street, Santa Ana, CA 92707. Tel: (714) 545-9455. Fax: (714) 545-4607.

Bob Young Audio Bylux Dedicated Line Filter. Price: $585. Approximate number of dealers: sold direct. Manufacturer: Bob Young Audio, Inc., 16 Cleveland Avenue, Colonia, NJ 07067. Tel: (908) 381-6190. Fax: (908) 381-3244.


Common to all four: Approximate number of dealers: 100. Manufacturer: Music Interface Technologies, 3017 Grass Valley Highway, Auburn, CA 95602. Tel: (916) 888-0394. Fax: (916) 888-0783.

Common to both: Approximate number of dealers: 3. Manufacturer: Seakay Energy Services, 8 Pine Drive, Waterford, CT 06385. Tel: (203) 444-7703. Fax: (203) 443-6733.

The average audio Joe takes it for granted that, at the flick of a switch, his audio system will be energized with pure 117V/60Hz electric power. That myth has been perpetuated by the same power-utility gang that sprang "Reddy Kilowatt" on an unsuspecting public, selling the notion that everything goes better with AC. Well, folks, your electric meter spins despite the color of the juice flowing into your house.

A WALK DOWN ELECTRIC AVENUE

The three basic problems that afflict AC power are: 1) voltage that's chronically either over or under supposed levels; 2) transient sags or surges in line voltage; and 3) a variety of electromagnetic (EM) and radio frequency (RF) noise contaminants.

Only the first problem can be laid at the feet of your local power company. To accommodate peak-hour demand within an inadequate distribution grid, voltages are cranked up above nominal. This, I'm told, is a national problem. To assess its magnitude in Los Alamos, NM, I monitored the AC line in my listening room with a Drametis Series 606 line-disturbance analyzer loaned to me by Michael Barron, a local electronics expert and salvage specialist (more about Michael later). Looking over some 11 days' worth of data for an unconditioned circuit was quite instructive.

The long-term line-frequency average was 60Hz, with a low of 59.9Hz and a high of 60.2Hz? That's just fine. But how about a long-term average of 127V, with short-term sags as low as 80V and surges up to 141V? That's not so cool for audio gear that has little or no inherent voltage regulation. For example, the plate-supply voltage (B+) in tube amps is rarely regulated. Its exact value is dependent on the voltage impressed upon the primary of the power transformer. Change the AC-mains voltage, and you're in effect shifting the operating point of the amp. Tube-heater voltages are also typically unregulated, being simply tapped off the power transformer, and subject to drift in concert with AC-mains fluctuations. That's bad, too: such heater-voltage variations shorten tube life.

Another form of sonic trespass simply creeps in through the wall in the form of EM noise contamination: Auntie Em showing off her blender in the kitchen; someone zapping food in the microwave; the fridge's compressor kicking on; or Junior testing Dad's power drill in the garage. The scope of the problem is even wider than that. Pole-top transformers are poor at filtering noise, so the crap from down the block can trickle into your line. Ham-radio transceivers are notorious for kicking hash into the line. If you have a ham in the neighborhood, I promise you this: if you don't get to know him over the airwaves, it'll be through your AC line.

Another source of line pollution is the ubiquitous sea of radio-frequency energy we live in, from TV and commercial radio to cellular phones. Environmental levels of RF energy have climbed by a factor of a million since the turn of the century. Power lines—even the wiring in your house—act as RF antennae, coupling RF noise to your audio gear's power supply, and perhaps demodulating and polluting the audio signal. I believe that the reason the "infamous" Tice Clock succeeded at times in making a sonic difference was that it acted as an RF shunt for the AC circuit into which it was plugged.

CALL TO ARMS

Audiophiles, unite! The time to fight the insidious invader is now! Purify your AC line, and live happily ever after!

In hindsight, I wonder why I waited as long as I did to start conditioning my AC supply. I didn't have to spend a lot of money to get the dramatic sonic impact, and it certainly proved a whole lot cheaper (and was money better spent) than, say, upgrading to exotic cable.

I suppose that, on an intellectual level, I always knew that line-conditioning was important; but only after I met Michael Barron did I plunge headfirst into experimenting in this area. Michael's salvage business (with access to equipment from both Los Alamos and Sandia National Laboratories) afforded me the opportunity to borrow a host of goodies with which to experiment. What follows is a synopsis of my extensive experiments, first with a home-brew system of power-line conditioning, then with commercially available audiophile conditioners.

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experienced with. The transformer plugs into the wall, and whatever you want to isolate plugs into the transformer. First, it’s important to realize what an isolation transformer (IT) can’t do: It can’t regulate voltage, and it doesn’t have the ability to compensate for slow line-voltage fluctuations. (It can only attenuate fast transients or high-frequency noise—with the important caveat that the noise represents common-mode voltage.) An IT can’t reject normal-mode noise. Think of common-mode noise as an identical voltage signal present simultaneously at both of the transformer’s primary winding input leads. Such noise can’t be detected by, say, a voltmeter applied across the transformer inputs (it must be measured relative to ground), because the voltage differential is zero. Normal-mode noise, however, occurs in one of the input leads (either hot or neutral), and can be measured across the transformer inputs.

If power transformers (inside audio-gear power supplies) were inherently ideal, common-mode noise would not be reflected from the primary to the secondary and into the rest of the power supply. Alas, the distributed capacitance between individual turns of the primary and secondary windings provide common-mode noise with a pathway to the secondary. An IT is designed to have extremely low interwinding leakage or coupling capacitance, and thus excellent common-mode noise rejection. The windings are electrostatically shielded, with a Faraday shield between windings, and box shields placed around each winding. Such a construction technique is effective in reducing coupling capacitance to as low as 0.001–0.005pF.

ITs are quite common in scientific laboratories, where they’re used to isolate test and measurement gear from the AC supply to prevent ground loops and minimize noise induction. I borrowed from Michael—and eventually bought—six Berkleonic CEA-25 ITs, each rated at 2000VA and speced at a mere 0.001pF coupling capacitance. I feel that a 2000VA power rating is essential for use with high-power amps. However, a 500VA rating should be adequate for low-power amps and preamps. A practical advantage of the smaller ITs is that they’re quieter, essentially inaudible compared with their bigger brothers. A 2000VA unit introduces a small amount of noticeable hum into the listening environment. It’s not an active nuisance, though you may prefer to put your units in a cabinet or outside the listening room.

I found that even a super-expensive power amplifier like the Jadis JA 200 benefited from the IT treatment. I plugged each Jadis monoblock into a dedicated IT, with both ITs plugged into an AC circuit that exclusively serves power amps in the reference listening room. Sonically, it was as if the soundstage had been hosed down. On some level, every audio system I’ve ever heard has reminded me of a meat grinder: natural, organic sound goes in at the front end, only to have its harmonic textures mangled and forced through grit and sonic hash. Well, much of the grit and hash that afflicts harmonic textures—and which I assumed to be endemic to the reproduction chain—were wiped clean. Textures were more liquid—tubey, if you will; treble transients sounded more natural and less mechanical. What a breath of fresh air! For example, Eric Clapton’s guitar on Unplugged (Reprise 45024) came through with greater purity and less HF emphasis. Partly a function of the mikes used, the high end on this record is on the hot side of reality. With the AC filtered through the ITs, that fact was noted with less attendant zizzling.

So strong was that sense of purity and textural ease that it was now possible to crank the volume up a notch or two without risking bleeding ears. A giant slice of electronic glare was wiped away. The bottom-line impression was more music and less garbage getting through to the speakers.

If one IT per amp is such a good deal (I thought with typical audiophile overkill), two in series must be even better. Cascading two ITs in series did further improve sonic matters, but only by about 20%. Because I had access to a bunch of used ITs (the Michael Connection), I settled on two pairs of them (each pair in series) as standard amp treatment.

Used industrial isolation transformers are cheap; considering the fact that ITs have no moving parts and a lifetime of about 30 years, a secondhand unit is a safe bet. Check out salvage dealers in your area.

**CONSTANT-VOLTAGE TRANSFORMERS**

Constant-voltage transformers are known generically as ferreroesonant transformers. The capacitive reactance of the secondary winding is adjusted to balance the inductive reactance and produce a tuned-circuit resonance at the AC-line frequency. Changes in line voltage drive the secondary winding into saturation. Operating even a standard power transformer in saturation makes it a voltage regulator, as changes in primary voltage do not vary the secondary-induced voltage.

Hence, one of the major advantages offered by a constant-voltage transformer (CV) is line-voltage regulation. Typically, line voltage is maintained within ±1% for an input variation of ±15%. A unique characteristic of the CV is its ability to reduce normal-mode noise (on the order of 60dB). Because its regulating capability is based on driving the secondary winding into saturation, transients and noise bursts are clipped from the top of the sinusoidal waveform. To restore the proper waveform, a “neutralizing winding” is used in conjunction with the secondary winding. For example, Sola Electric, the biggest player in the CV game, specs its CVS series at less than 3% total RMS harmonic content at full load. A standard CV is not much good at common-mode noise rejection. However, most CVs incorporate an electrostatic shield between windings, which gives them decent common-mode noise rejection. Finally, there are no moving parts, and, unlike voltage regulators using SCRs, a CV does not generate much electrical noise.

There are two practical disadvantages. A CV (at least at ratings of 500VA and above) is very noisy and runs hot—and hottest while idling. That makes siting a difficult problem. Building an acoustic baffle (ie, a foam-lined box) for one of these isn’t easy—they need to dissipate all that heat. That’s the main reason I didn’t bother trying a CV in my power-amp circuit.

However, in the front-end circuit, which supplies the preamp and digital processor, a 500VA Sola CVS (again, provided by Michael) made more of a difference than an IT. But because the noise was driving me crazy, I finally ended up placing the CV inside a padded box in another room with a heavy-duty extension cord running back into the listener room.

**AUTO TRANSFORMERS**

Also known as Variacs, auto transformers (ATs) feature a single winding which may be tapped continuously in order to vary line voltage—typically from 0V to 140V. A desired voltage is selected by rotating a large dial that actually moves a contact along the winding. Some units have built-in voltmeters; otherwise, you need to use your own meter to precisely calibrate the dial. Note that, because of the DC path from input to output, there’s no noise rejection or any isolation.

Still, I find an AT useful in tweaking the nominal voltage fed to a particular audio device. Using an AT in conjunction with a CV may be nothing more than gilding the lily, but I like the idea
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of precision voltage control. (I have to admit, however, that, with respect to my front end, I've yet to find that minor corrections with the AT translate into audible sonic differences. But the preamps in question were all heavily regulated to begin with.)

The most efficacious application of an AT is to use it in conjunction with an IT. While an IT has no inherent ability to regulate line voltage, an AT allows some manual control. Though this control is not in real time, and short-term transients are not dealt with, the AT at least allows you to correct chronic or long-term trends.

The IT/AT combo did wonders for my Air Tight ATM-2 power amp. Reducing the line voltage from its initial 127V to 117V significantly improved the sound in three important areas: imaging precision was pushed a couple of notches up the palpability scale; the treble range opened up dramatically from its previous closed-in or rolled-off state; and the tonality of the upper mids improved, with female upper registers sounding sweeter. This is a perfect example of how the operating point of an amp can be fine-tuned by feeding its power supply the proper voltage.

Don't fool around with anything less than a 1.4KVA rating, which buys you a nominal 10 amp capability. Such a package is also pretty economical, and should set you back no more than about $250. I've used both Staco and Superior Electric ATs with good results. Both of these brands are readily available (try your nearest electronics distributor, or Newark Electronics). Another piece of good news: These puppies are silent, so sitting is not critical.

**RF INTERFERENCE FILTERS**

I tried a couple of old RF interference (RFI) filters made by the long-defunct Miller company. These filters were designed to clean up RF noise kicked into the AC mains by RF transmitters, and are meant to be inserted in line with the AC supply. They're quite substantial, and carry a rating of 10 amps. I presume that filters of this type consist of a low-pass filter—something like a Pi network made up of a large series choke and a couple shunt capacitors.

Surprisingly, these filters proved effective, primarily in further cleaning up harmonic textures, even with ITs and CVs present at the head of the line. I suppose that the efficacy of such devices serves as a testimonial to the magnitude of the RF pollution we live with.

It's interesting to note that most vintage tube amps used a large coil as part of the filter network in the power supply. Such coils are a rarity today. I wonder if one of the reasons those classics sounded so good was the inherent RF rejection offered by such a filter network.

**A DIY SYSTEMS APPROACH**

It's time to consolidate the various threads discussed so far into a coherent strategy for battling those AC-line gremlins. Clearly, the cornerstone of any line-conditioning system is the IT. A super-isolation transformer with a coupling capacitance of 0.001pF is exceedingly effective in reducing common-mode noise.

If you own a tubed power amp or a preamp with minimal regulation, add an AT in series with the IT so that you can manually dial-in the proper line voltage (ie, 117V). This strategy may also be effective with solid-state amplification, though I have yet to experiment along these lines.

If you can site it so the noise is no problem, add a constant-voltage transformer to the head of the line in series with the IT. That buys you considerable normal-mode noise reduction, but be sure to purchase a harmonically neutralized type that preserves the sinusoidal waveform. Probably the most reasonable place for it is in the preamp circuit, considering the noise and heat generated by even a 500VA-rated CV.

As a final touch, you can add an in-line RFI filter in series with either the IT or CV. However, I haven't had any luck with the sort of filter packs that are meant to be plugged into a free outlet in the circuit.

My home-brew power-conditioning system for the front end consists of the following: a Sola CVS constant-voltage transformer (500VA rating) at the head of the line; a pair of Berkleonics Model CEA-25 (2000VA rating) isolation transformers connected in series; a Miller RFI filter; and a Superior Electric auto transformer (1400VA rating). The Air Tight ATM-2 power amp I'm enjoying at this moment is filtered through a pair of Berkleonics ITs connected in series, followed by a Staco auto transformer set at 117V.

Most audiophiles will not have access to surplus resources and will be most likely to investigate the power-line conditioners to be found at their specialist audio retailer. To obtain a point of reference, I obtained a number of audiophile line conditioners to compare with my home-brew setup.

**AUDIO POWER INDUSTRIES AC-LINE CONDITIONERS**

Audio Power Industries products reside in both CG's and JA's systems and have been blessed by these audio gurus. The Power Wedge 116 ($599) is designed to power up to six source components. Of its ten AC outlets, six are isolated and rated at 120W/pair. This allowed me to isolate my digital processor and CD transport from the preamp—something I could not do with my home-brew setup, as everything at the front end was previously plugged into a terminal strip that connected to my string of transformers. The remaining four outlets are filtered, not isolated, and are rated at 1200W total. These are intended for high-current devices such as power amps.

The Power Wedge is designed to provide inter-component isolation at the AC inputs. Digital sources generate RFI that constantly contaminates the power line, and, in turn, other components plugged into that same circuit. RFI and EMI noise filtering is built in, as is transient spike suppression.

With my digital source components and preamp plugged into the isolated outlets of the Model 116 instead of being simply plugged into a terminal strip into the wall outlet, CD playback was significantly enhanced. The Model 116 treated harmonic textures to a sonic rinse cycle, sweeping away the layers of grunge that otherwise overlay music's harmonic tapestry. The result was a refreshing purity of expression that pushed digital sound much closer to the realm of analog. Violin overtones proved to be a particularly telling before-and-after test: What sounded before like a grainy, bright harmonic envelope—almost like a bunch of bits struggling to fuse into an organic whole—was transformed into sweeter, smoother violin colors. Goodbye, *digitissi*; hello, a kinder, gentler soundstage!

Image outlines benefited too, being more palpably focused in space—again, a consequence of the Power Wedge's conditioning action dissolving several veils. The Model 116 came close to matching the impact of my much more expensive home-brew conditioning scheme. No wonder its predecessor, the Power Wedge 1, garnered *Stereophile*'s "Product of the Year" award for accessory of 1992. Still highly recommended.

The Power Wedge 112 ($359) is similar in design to the 116, but offers only six outlets, of which two are isolated (120W total) and the rest intended for power amps (1200W total). The 112 is intended for mini-systems or remotely powered amps. Used in my power-amp circuit, where it replaced my Berkleonics ITs, the sonic results were disappointing. Image outlines became more diffuse, the
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— Dick Olsher
Stereophile Vol. 15 No. 6 June 1992
depth perspective wasn't fully fleshed out, upper-register purity suffered, and dynamics were squashed. I'd say that's a pretty bad report card. Overall, I was much happier plugging the amps directly into the wall—without the 112 in the AC pathway—and happiest with my 2000 VA ITs back in the circuit. The moral of this story is that there's no substitute for VA headroom (to avoid overload and saturation of the transformer core) when attempting to condition a heavy-duty power amp.

I also experimented with the Power Enhancer 1 ($279), which adds parallel filtering and increased power-line damping to either of the Wedge's filtered outlet set. It was designed primarily for systems with high-current power amps and/or very noisy AC power. A neat feature is the front-mounted AC voltmeter that makes it easy to monitor line voltage. It can plug into an outlet adjacent to that of the Power Wedge, or into an unused amp outlet on the Wedge. I found the Power Enhancer to have a minor positive effect on the amp circuit. Back at the front end, the Enhancer's effect, I'm sorry to say, was next to nil. Of course, the sonic results will be dependent on local power-line conditions, time of day, and the make-up of your audio system. All of which means that an audition in the context of your system is essential.

[The Power Enhancer was a worthwhile addition to my system, deepening the blackness of black backgrounds.—Ed.]

BOB YOUNG AUDIO BYLUX
DEDICATED LINE FILTER
Bob Young's $585 Bylux is, in effect, a wide-band filter whose circuitry filters the entire spectrum, allowing only the 60Hz line frequency to pass. It will not work on any line frequency other than 60Hz. The Bylux's first four sections serve to filter both common- and normal-mode RF and audio-frequency power-line noise. An auto-transformer stage is used next to restore the line voltage lost in the high-inductance chokes that are used for the filtering. A 60Hz resonant circuit follows with chokes in the hot line, and a proprietary matching network corrects for the inductive power factor of the overall circuitry. A ground-line circuit provides common-mode RF filtering to keep noise from CD transports and digital processors from getting back into the AC line.

Each Bylux is designed for a particular current draw, and is therefore dedicated to a particular piece of gear. Presently, the Bylux covers the range from 30 to 330mA. Obviously, power amps cannot be accommodated, but, according to Bob Young, turntables, virtually all preamps, CD players, transports and processors, and electrostatic speakers can be outfitted with a Bylux. It's worth emphasizing again that, as each filter is individually designed to work with the particular current draw of a specific piece of audio gear, these devices are not interchangeable.

Bob Young sent me Bylux models for the Micromega transport, the Theta Generation III processor, and the Basis Ovation turntable. They work. (My very positive experience with the Bylux filter for the Audiostatic ES-100, as reported in Vol.17 No.3, p.117, is summarized in my review of that speaker.) In general, harmonic textures sounded purer, and image outlines were focused more precisely in space. On its own, the sonic improvement generated by the Bylux didn't quite equal that afforded by my home-brew setup.

The most significant sonic improvement was registered with the Basis Ovation. Here, the Bylux (designed for 30–40mA current draw), without any additional conditioning, enhanced the precision of rhythmic nuances and the natural aura of upper registers. I can't imagine using a turntable without the Bylux. The Linn, VPI, and Well Tempered turntables—including those equipped with special power supplies—are said to benefit similarly.

ENSEMBLE ISOTRANS
Ensemble Isotrans ($900) is rated at 460VA and was reviewed by Corey Greenberg a few years ago (Vol.14 No.12, December 1991). Its U-shaped core layout is said to reduce EM-radiation leakage. It's nearly silent, and, with its power consumption of only 5.6W in idle, has an obvious edge as far as flexibility in positioning is concerned. Unfortunately, it's quite expensive, considering its rather modest VA rating and just-average coupling capacitance of 0.605pF. Also, its IEC plugs are a pain to work with.

THE MARK OF ZORRO:
MIT'S Z-SERIES POWER-LINE TREATMENT SYSTEM
This series has a lot of.Zs—not in honor of Señor Zorro, but as a symbol of the Z-circuitry found in the Z-1 and the Z-Strip. In effect, the Z-circuit places a short circuit across the power line for unwanted frequencies such as RFI, which is resistively dissipated as heat. This technique, according to Music Interface Technologies, is more effective than the usual approach of trying to bypass power-line noise to ground, because the ground wire itself contains a significant amount of inductive reactance.

The seminal product in the series is the Z-1 Impedance Stabilizer ($895). While its primary function is to provide an absorptive "trap" for high-frequency noise, it also addresses the issue of line power-factor. Because an audio system's load on the power line is predominantly
inductive, line current and voltage are not in phase, and available line power suffers. In fact, all motors and transformers present the power line with an inductive load. The Z-1 attempts to improve the power factor (by definition, unity for a resistive load in which current and voltage are exactly in phase) by adding an offsetting amount of capacitance on the AC line. This is done by selecting either position A or B on the unit's front panel, the B position being appropriate for heavily loaded lines.

With the Z-1 set in position B and plugged into my power-amp circuit, which is loaded with no less than four isolation transformers, I found it to make a noticeable sonic difference. (Audio Power's Enhancer failed to make a difference in this situation.) The Z-1, however, cleansed the upper mids of a bit of grain, and slightly sweetened violin overtones.

The core of the Z-series is the Z-2 Isolator ($795), rated at 130W. Two isolation transformers are cascaded to provide common-mode noise rejection. Additional filtering presumably provides some normal-mode noise attenuation as well. Since no specifications are provided, it isn't clear just how much noise rejection the Z-2 realizes.

A number of Z-2s may be plugged into the Z-strip ($675). In effect a high-tech power strip, the Z-strip's eight receptacles offer the convenience of a conventional strip, and Z-circuit filtering action up to about 500kHz. As with the rest of the line, hospital-grade parts are used throughout for added reliability, and both the Z-2 and the Z-strip use a circuit breaker for an On/Off switch.

The last product in the MIT Z-series is the Z-Cord ($100). This line cord, which is designed to be an extension of the Z-strip, is suitable for use with all A/V components that have detachable IEC-type power cords. It's heavily shielded to minimize coupling of RF signal, and ferrite beads are used at each end for RF filtering.

I wasn't disappointed when I finally Z-treated my front-end circuit, replacing the Audio Power setup. Soundstage purity and spatial resolution immediately and significantly increased. Harmonic textures, most notably violin overtones, sounded more liquid and naturally sweeter. Image outlines snapped into tighter, better-defined focus. The degree of sonic improvement was equivalent to that of a major component upgrade. It sounded as though I had inserted a world-class amp or preamp into my system—the before-and-after improvement was that dramatic. I'm convinced that, no matter the stature of your front end, the Z treatment will open your ears to its sonic potential. I can't imagine ever listening again to a digital source without this caliber of AC-line conditioning.

I attempted to determine the Z-Cord's sonic contribution by comparing its performance to that of a garden-variety power cord. With digital program material, the Z-Cord managed to sound slightly purer, mainly due to a tapering of harmonic-texture brightness. That almost chronic tinge of brightness that afflicts digital sound, and which some have referred to as "digititis," was abated with the Z-Cord connecting the transport and processor to the Z-2 Isolators.

This is the first power cord I've heard that matters at all after extensive power-line conditioning.

Just how good is the MIT Z-Series? It clearly outclassed the Audio Power System—but for a lot more money!

**Seakay's Line Rover™**

This Rover is a guard dog of sorts—an AC guard dog, to be exact. In a nutshell, a Line Rover is a power-line conditioner that connects in parallel with the electrical load, and can condition up to 100A at 120V. It's the first audiophile device that incorporates USES technology per US Patent No. 5,105,327, issued to E. Brian Wohlforth in 1992.

Seakay's Clay Morse has put together a technical White Paper that gives a general overview of the technology. For single-phase 120V service, the USES circuitry is coupled between the hot and neutral lines of the AC service. Its novel design element involves the use of a specially wound iron-core choke (in series with a power capacitor) to monitor and control the AC waveform. The back EMF generated by the coil in response to line-current harmonics acts essentially instantly to correct the AC waveform. An RC filter network tied directly to the choke is used to clean up RF noise in the 0.2–300MHz range.

The action of the magnetic choke also provides surge and spike suppression. For a fraction of a cycle, excess energy is taken off-line and stored in the magnetic field of the choke and in associated capacitors. This energy is released to the system as an additional source of real power. Studies have estimated that a typical home may average on the order of 900 voltage transients per hour. Rotating machinery (eg, electric motors) is the biggest offender, with voltage spikes of up to 2500V possible. These very rapid spikes are not only a piece of cake for a magnetic choke, but the choke also tends to hold voltage steady during periods of momentary line-voltage fluctuations, thereby improving the regulation of the AC circuit.

A group of Metal Oxide Varistors (MOV)—commonly used in just about all surge protectors—back up the choke
The system for high-energy spike protection. The MOVs are installed line-to-line and line-to-ground, providing complete coverage for all over-voltage conditions. In the Line Rover, the MOV clamp voltage is set at 130V RMS. The lamp on the front panel serves as an indicator for MOV status. Should the light go out or flicker when power is available, then at least one of the MOVs has been dissipated. A recent upgrade in the form of a gas tube shunt has added one more level of protection. To mitigate the effects of most lightning strikes, the gas tube will shut to ground excess energy when the spike is of such magnitude and duration that the chokes, capacitors, and MOVs saturate.\(^2\)

The magnetic choke automatically acts to correct for phase differences between current and voltage, and brings the power factor back to unity. In contrast to designs where fixed capacitors are used for power-factor correction, the Line Rover's action is responsive to changing load conditions.

The two basic models available, the LR-1000 ($1850) and LR-1200 ($2050), are identical but for the addition of eight hospital-grade receptacles on the LR-1200. Because these devices act in parallel to audio components on the line, they may be used as stand-alone conditioners, or in conjunction with other inline conditioners such as isolation transformers.

My first exposure to the USES technology was via the LR-1000. The Rover, doing its thing in the power-amp circuit as an adjunct to my isolation transformer setup, outperformed MIT's Z-1 Impedance Stabilizer. Its sonic impact was immediate and obvious: soundstage spatial perspectives were more three-dimensional; transients were more clearly resolvable, primarily because it was easier to trace the decay of each note into the background of the recording; the treble was airier; and harmonic textures sounded even sweeter. In essence, the illusion of being able to step into the original recording acoustic was heightened— as if a layer of dirt had been washed away from a dirty pane of glass.

The LR-1000 fashioned similar magic in the front-end AC circuit, where it complemented the Z-Series setup. In total, this lineup of conditioning goodies surpassed the level of purity my homemade system was able to generate.

I gave the LR-1200 a solo flight as a stand-alone conditioner in the front-end circuit. In this context, it excelled in preserving the palpability of image outlines while punching out a panoramic soundstage. But the level of textural sweetness elicited by the Z-Series, especially with digital program material, wasn't quite equaled by the Line Rover.

**CONCLUSION**

At the end of a long period of experimentation, I settled on a hybrid configuration that I can rightly declare to be definitive in its impact on my audio system's front end. This dream team of conditioning incorporated several MIT Z-2 Isolators and a Z-1 Impedance Stabilizer plugged into a Line Rover LR-1200, which then acts as the single point of contact with the AC-circuit outlet. The more I listened to the cleansing effect of this conditioning system, the more convinced I was that audio life from this point on would be totally impossible without it. The fabric of the music was so much sweeter and purer that there was simply no going back to the barbaric whiffs of dirty AC. The impact of this system far transcends that of other ancillary equipment upgrades—including exotic speaker cable. Power-line conditioning should be a paramount priority of every high-end audio system, and the first target of any upgrade dollars. $
SHUN MOOK SPATIAL CONTROL QUARTET
Jonathan Scull


You remember Dustin Hoffman and "Larry" Olivier in The Marathon Man: "Is it safe?" Just when you thought it was safe to go back in the water. Just when the Shun Mook bashing on Internet had slowed down to but a mere bubbling caldron of skepticism. (Watch out, Internaughts, jds@panix.com is coming!) Just when a particular towheaded colleague finally stopped telling me that I hear a difference because I believe I hear a difference. Just at that moment of Idyllic Audio Calm, our doorbell rings and...

Mad Monks from Shun Mook Planet visit, speaking in tongues—this time during the evening hours. No bagels! They brought a surprise along with their smiles and peripatetic demeanor: the Shun Mook Spatial Control Quartet. You’ll hear this enhancement of the existing Spatial Control Kit demonstrated at Winter CES, so be prepared. The Monks are sure to engender even greater controversy than last year; this time they’ll be using mainstream electronics and speakers to demonstrate their devices. Amaze your friends!

SHUN MOOK PLANET QUARTET, OP.1

The Shun Mook Spatial Control Quartet includes four sturdy vertical wooden stands which support smaller ½”-radius rods, for a combined height of about 5'. Near the top of the rod sits a shelf upon which is placed a standard Spatial Control Kit three-Mpingo Disc bracket, with another brace of three placed on the base of the stand. You site a stand on either side of the speakers about a foot out and even with the front baffle, with the Mpingos facing each other across the room; place a second pair a quarter of the distance from the rear wall in the same orientation. For those of you with speakers close to the back wall, the rear stands may be placed in the corners.

The stands are elegant and easy on the eye, and will surely raise the eyebrows (if not the blood pressure) of any visitor to your audio Sanctum sanctorum. The rest of the Spatial Control Quartet consists of an additional six Mpingos for the "control area" on top of the speakers. Three per speaker, logo down, those on the left speaker pointing to 7 o’clock, right speaker to 5 o’clock. A final two Mpingos are affixed with double-sided tape to the center of the rear wall—one up against the baseboard and one mounted farther up, at the same height as the Mpingos on the stands. Placement of this last Disc is critical—small movements up and down are required to lock in the sound.

FIRST MOVEMENT

We listened carefully to the system in its present configuration. Acoustic treatment is relatively lightweight in our live listening room. We’ve pulled the behemoth Avalon Ascents well out into the room, so we’re no longer fighting the natural acoustics as we were when they were deeper into the L-shaped portion of our loft. Now mostly unencumbered by side walls (and their reflections), the Avalons can breathe, sounding much more expansive and spacious. With just a slight toe-in, the soundstaging is staggering, if I do say so myself.

It’s a big sound, with images forming well out to either side of the now-more-prone-to-disappear Avalons, and set well around and behind them as well. My thanks to the Audio Gods above who have paired me with such an understanding and music-loving wife who lets me make such wholesale rearrangements of our living quarters with so little complaint.

There are a number of RoomTunes EchoTunes at the ceiling/wall junction in the “box” behind the speakers. There’s also a trio of RoomTunes rear-wall center, positioned in a flat-pointed V. Those “seeing” and hearing a Michael Green installation at any recent CES, or at Stereophile’s High-End Hi-Fi Show in Miami last April, will have an idea of what this arrangement is like. Engineering types gasp and cover their ears, muttering “This can’t work!” Audiophiles and music mavens love it. This arrangement works as long as you sit forward enough from the rear wall to avoid the effects of comb-filtering in the upper frequencies caused by the delayed bounce from the rear wall. I’ve tried damping the wall at ear height, but it robs the music of much of its energy. More experimentation is in order. So far, using Green’s tuning techniques and his massive, positively rooted to the center of the earth and tunable ClampRacks, we commonly achieve a length and breadth of performance that’s addictive.

Our super-comfortable listening chair, a bright orange 60s Ribbon Chair from France (discovered by Kathleen in a thrift shop), sits close to the end wall defining the length of the loft where it opens out under the skylight. The place once was a ribbon factory—one finds many such converted buildings as this in the upper West Village (the “Photo District”). Plenty of models lugging their portfolios and hangers-on around with them. But I digress.

SECOND MOVEMENT

We installed the Spatial Control Quartet and listened intently once again. Andy Chow, of Original Cable Jacket fame, sat in the super-comfortable listening chair giving suggestions as initial tuning commenced. After the boys relinquished the listening chair to me, I complained about this or that: “blot in the lower midrange,” “loss of image specificity,” “not open in the highs,” “not tight enough in the bass.” (Note that the very installation of the Spatial Control Quartet appeared to create these problems in their unoptimized positions. We are beyond asking if these devices have an affect. The question is, how much of an effect? To address my quibbles, Dr. Tan and Bill Ying made small and careful adjustments in the placement of the brackets on the base and the shelf, along with small changes in the height of the shelves.

The result of all this Monkish manipulation was that things started sounding prit-tee good. (Don’t worry, I’ve not morphed into Stereophile’s Manchurian Candidate—yet.) Good, but not yet ideal. Dr. Tan then beat his breast and prevailed upon me to allow the removal of the three RoomTunes sitting at the rear wall center. More careful tuning ensued, small incremental adjustments made while I listened to recordings I know intimately.

At various points during the process we coaxed Kathleen into the listening chair, even though she typically prefers listening off-axis while otherwise en-
gated. She leaves all that sitting and squinting to me. When pressed, she felt that the single greatest effect she'd heard was due to the placement of the two additional Mpingo Discs on the speaker-top "control areas" (in addition to the single Disc already placed on the outside rear corners). I'd have to agree.

The Monks' tuning instructions are as follows: Raising the front Mpingo'd shelves upward lightens up the sound and brings more bloom, openness, and focus to the presentation—a softer, more musical presentation. Lowering the shelves (by very small amounts) yields a tighter sound, perhaps more sharply focused, with a tighter bass range—a heavier sound. Same with the two stands in the rear.

Small back-and-forth movements of the three-disc sets on the shelves serve to lock in the sound by adjusting the "forwardness" of the image. Think of it as like unto setting a cartridge's vertical tracking angle: there's a narrow band where it all comes together. You know when you've hit it.

Initial setup was accomplished using our reference Jadis JA 200 amplifiers. We left the Quartet's stands in the same position when switching to the Lamm Audio Labs M1.1s (currently under review), save for small "focusing" movements of the Mpingo brackets on their shelves as the amps accumulated hours. As I switch from analog to digital, or swap source components and cables, I'm able to make small adjustments in the orientation and placement of the Spatial Control Quartet to effectively change the sonic balance of the system to accommodate such changes with ease.

**FINALE**

What I can report to you, with a straight face, is that this setup worked wonders in our listening room. I also recommend the Shun Mook Spatial Control Quartet for smaller listening venues, where expansiveness and a sense of spaciousness are harder to achieve.

The overall sense of focus and openness, of a listening room truly without walls, is "immeasurably" enhanced with the use of the Spatial Control Quartet. Another outstanding effort from the Mad Monks of the Shun Mook Planet that has found a permanent place in our system.

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For this review I used my large listening room (see "A Matter of Taste," Stereophile, Vol.16 No.12, p.168). Analog source was a VPI TNT Jr. turntable on a Bright Star TNT base on top of a VPI turntable stand. Graham 1.5x and Wheaton Trilplanar IV arms were used with Dynavector XX-11 and Denon SI cartridges. Digital source was an EAD 7000 II D/A connected to a PS Audio Lambda CD transport and a Sony D-7 DATMan. The preamp was a Denon JC-80 Mk.II Gold with a Vendetta SCP-2C phono preamp. Pairs of Parasound HCA-2200 Mk.II and Boulder 250 AEs power amplifiers drove Apollo Full-Range speakers and a Bryston 10B crossover system.

Interconnects were Cardas Hornlink between tonearms and the phono preamp, and Straight Wire Virtuoso, AudioQuest Diamond, Virtual Audio ART, Esoteric Artus (balanced and single-ended), and Wire World Eclipse (balanced and single-ended) in component-to-preamp and preamp-to-power-amp applications. Speaker cables were Straight Wire Maestro, Wire World Eclipse, Dunlavy DALZ.8, and AudioQuest Clear.

Other accessories included Acoustic Sciences Tube Traps, Shadow Casters, and Wall Panels; RoomTune Ceiling Clouds; Sorbothane pucks and Billy Bags stands for amplifiers; Sumiko Fluxbuster, The Original Cable Jackets on the tonearm cable; Music and Sound ferrite beads; AudioQuest ferrite clamps; Dyna- clear ferrite camps on interconnects; AudioQuest record brush; Nitty Gritty record-cleaning machine; Radio Shack sfp meter; Kleenmaster Brillianize CD cleaner; and Lenny Bruce’s How to Talk Dirty and Influence People.

**Billy Bags . . .**

. . . sounds like the name of the principal character of a lost Dickens novel. In fact, Billy Bags the man doesn’t exist. Bill McCready, founder of Billy Bags De-

Clockwise from right: Billy Bags Custom 4800 equipment stand with Audioduster, Billy Bags 1824 amplifier stand, Billy Bags 1824 amplifier stand.
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See Reviews, Stereophile Nov. 1993, The Absolute Sound #89, #92.

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the lower shelves are banded in black PVC.

The shelving is available in dark charcoal (Wilson Art color graphite nebula 4623-8), light gray (gray nebula 4622-8), green marble (verdi Pompeii 174-1), and granite marble (blackstar granite 4551-1). I requested that my stands come in different finishes, so I could get an idea of how each one looked. I especially liked the green marble—it went really well with my black-velvet Elvis painting. Billy Bags furniture, while as slick and well-finished as anything you'd find in an upscale Euro-design furniture emporium, is far sturdier than chrome-and-glass Euro-trash.

Billy Bags equipment stands come with "leg vibration dampers" made of open-cell foam that looks like the stuff bicycle manufacturers put around handlebars to keep your hands from looking like raw meat after long, bumpy rides. (They also remind me of the leg warmers often worn by dancers and would-be dancers on brisk winter days.) These dampers purportedly "provide improved sound clarity, resolution, and protection." I'll buy the protection part—it's hard to stub your toe on one. The stands can be filled with sand or lead shot, by the owner or at the factory. The legs of all stands come with "isolation cones" that screw in via a 1/4-20 thread, and allow the stands to be leveled on uneven surfaces.

Billy Bags sent two interesting products along with the stands. The "Audio-duster" is a 12"-long, cylindrical, black wool duster that comes in a clear-plastic sheath and hangs on a hook on the side of the custom model 4800. For Felix Unger types like myself (my sister-in-law calls me "the nitpicker"), the Audio-duster is a neat accessory—dust doesn't stand a chance. Everyone knows that clean electronics sound cleaner than those encased in giant dustballs.

The other accessory, the "Tube-flex," is a flexible, 9'-long black plastic tube slit lengthwise; it also has six beaded and two Velcro ties, and a sheet of color-coded labels. To play the game, you label all your cords and cables and slip them into the Tube-Flex, which you then attach to the back of your rack. The object, of course, is to eliminate that ugly jungle of wires behind your stand. I used the beaded and Velcro ties to dress some interconnects, and the colored labels are great for identifying which IEC AC cable comes from which component.

The Tube-flex itself, I'm sad to report, did not see service in my system. It's hard enough just to plug and unplug AC cords and interconnects; the idea of having to pull them in and out of a 9'-long tube was more than I could bear. But readers who rarely swap components might find the Tube-flex a good way to neaten things up a bit.

**Ergonomics:** The Arcici Superstructure II Special and RoomTunes Deluxe Justa-Rack systems I reviewed in the October '93 Stereophile (Vol.16 No.10, p.235) have adjustable shelves; those on Billy Bags designs are fixed firmly in place. Fickle audiophiles who radically configure their equipment might find this lack of flexibility limiting. If you swap equipment and wires as often as I do, you'll quickly discover that double-width stands, such as the custom model 4800, might not be ideal. Attaching interconnects to components sitting on the middle shelves isn't easy, and you might find yourself using longer interconnects than are necessary, so you can pull the gear forward to attach the cables. Single-width racks, such as the Billy Bags model 5500, are better for wiring up components from the sides. Once the custom model 4800 is filled with sand, it's heavy enough that you'll need two or three people to move it. My suggestion: If you must fill it, don't do so until you've got it where you want it.

The model 1824 amp stand is useful with speakers that have base-level terminations, such as my Apogee Full-Ranges. Getting your amp a few inches off the floor provides better ventilation, and protects them from small flash floods (or buys you a few grace minutes for moving the amps out of harm's way in case of a major flood). But my favorite Billy Bags item is the 18"-high model 1823 amp stand. If you've ever lifted or lowered an amp that weighs more than 70 lbs., you'll understand why an 18"-high stand is such a pleasure: with a 9"-high stand, your back usually goes out somewhere during those last 9". Also, the terminations of many floorstanding speakers are located somewhere in the middle of their backs—often at around 18". If your amp is located at a similar height, you can use much shorter speaker cables (with some speakers, I can get away with 18"-long cables).

**Sound:** I loved the looks of the Billy Bags stands, but they weren't as successful at reducing vibrations and attenuating resonances as I'd have liked. The spikes wobbled if I unscrewed them more than 1/4"—a common problem with stands that use 1/4-20 screw-thread spikes without some sort of set-screw tightening arrangement. [With anything but a three-legged stand, one or more of the spikes will have to be unscrewed somewhat to allow them to contact the floor—unless your floor is absolutely level.—Ed.]

Truth be told, spikes do little to sonically isolate equipment racks from floorborne vibrations; their main function is to shunt excess airborne vibration into the floor. In rooms with carpeted wooden floors, the primary function of spikes is to make racks and stands more rigid. If spikes introduce wobble, they defeat their purpose. If you intend to put a turntable on the custom model 4800, make sure you're on a level surface that doesn't require any adjustments of the spikes—you'll have wobble city. The custom model 4800 is rigid enough for a turntable, but only if the spikes are completely screwed in.

The unique "leg vibration dampers" served no discernible sonic function. I removed a damper from one leg of the 1823 amp stand and compared its vibration level to that of a wrapped sibling. No difference. They look cool, but that's about it. Filling the stands with sand and lead shot will do far more to deaden the legs' resonances than wrapping part of their outsides with foam, tape, or any other soft material. Perhaps wrapping the entire leg would help isolate the stand from high-frequency airborne vibration, but wrapping just the legs seems a fruitless sonic exercise.

Also, the shelves are inadequately attached to the stand—the high-density particleboard is merely screwed onto the rigid metal frame. Since no attempt is made to isolate the shelves from the stand, any floor- or airborne vibrations picked up by the frame will be passed on to the shelves. Sonically effective stands use some sort of absorptive material in the shelves and/or between the shelves and the stand. The Arcici Levitation stand uses flex in the stand's metal support wires, and the shelves of the Arcici Superstructure stand are a sandwich of Sorbothane between two thicknesses of particleboard. Both of these methods effectively isolate components from stand vibrations.

Since particleboard has a strong tendency to resonate like a drum head if it's not damped, it's not an ideal shelf material for component stands. Because of its large surface area, the top shelf of the custom model 4800 is especially prone to resonances; you'll have to use an additional isolation device, such as the sand-filled Bright Star Isolation bases, to properly isolate components. The custom 4800 is sufficiently strong and rigid that you can put Bright Star bases on every shelf without eliciting the slightest sign of stress. (Bright Star has a new "thin-line" isolation pad that's only 2" high,
so even a 9"-high shelf has plenty of room for a component sandwiched between a Bright Star base and isolation pod.) I was also able to successfully attenuate vibrations using a Microscan D-12 "transfer deck" and a VPI Spring Isolation Base.

Conclusion: Billy Bags metal audio/video stands and equipment racks look neat and are well-made. They're unique in that they're the only ultra-rigid equipment stands that are made to order. When filled with sand or lead shot and used in conjunction with such isolation devices as those from Bright Star, Microscan, or VPI, they'll provide a sonically benign environment for your audio components. Billy Bags furniture isn't cheap; but these stylish, mass-market-priced racks will outlast not only your current components, but probably you as well.

**Arcici Levitation Stands**

And now for something completely different... an audiophile equipment stand that suspends components from metal wires like the Magnificent Meridito. Sound pretty goofy? Perhaps. But what if it worked and looked really elegant—would you be interested? I hope so.

The Levitation Stand is the brainchild of Ray Shab, who founded Arcici in 1978—the dark ages of high-end audio history. Arcici makes a number of dedicated speaker stands: for the Quad ESL and ESL-63, B&W 801 and 802, and Martin-Logan CLS. Arcici also makes the Lead Balloon turntable stand and Superstructure component rack system. All of Arcici's prior designs have been based on a philosophy of high mass and high rigidity; ie, put enough weight in it and make it rigid enough, and (hopefully) it won't resonate. The Levitation component system represents a radical departure from the this design philosophy. Change is sometimes good.

**Setup & Design:** The Levitation stand comes in two versions: the LDS-1 and the LDS-2. The LDS-2 is two LDS-1s—one flipped upside down—attached at their sides by an LSK-1 to form an open-sided box. Since I'm the kind of macho reviewer who has tons of gear, I chose to review the LDS-2. I also think the LDS-2 is more attractive than the LDS-1; since most Levitation promo pix I've seen have been of the LDS-2, I guess Ray Shab does too.

The LDS-2 arrived in two 26" by 27" boxes weighing a total of 47 lbs. Each half came with simple instructions that even I could understand, and all the Allen wrenches required for assembly. I spent slightly over an hour putting them to

A Brief Primer on Resonance

Resonance is defined by *The American Heritage Dictionary of the English Language* as "1: The enhancement of the response of an electric or mechanical system to a periodic driving force when the driving frequency is equal to the natural undamped frequency of the system; 2: The identification and prolongation of a tone by sympathetic vibration." Couldn't have said it better myself.

There are three possible sources of vibrational energy that can cause objects to resonate: airborne energy and floor-borne energy, and perhaps electronic energy (vibrating transformers and the like). Airborne resonances can often be attenuated through the use of high-mass damping products—eg, the Bright Star Little Rocks, RoomTune ClampRacks, or VPI Bricks, all of which have an effect similar to that of placing a hand on a vibrating drum head. The electronically stimulated micro-resonances can be attenuated through the use of selective damping products, such as Combak and Marigo dots. Some component stands attempt to shunt off airborne macro-resonances by placing components on surfaces, such as rubbery pucks or flexible feet, that absorb vibrations and shunt them off as heat.

Some people believe that spikes help isolate components and stands from vibrations, yet only one person—Michael Green of Ultra Systems—has come up with a coherent hypothesis as to how or why spikes work. Michael believes that spikes don't isolate components at all, but rather shunt off vibrations into objects with larger mass, which eventually shunt off vibrations to ground. Michael also believes that rubber sound absorbers have a "saturation point" at which they may actually increase the resonances in a system. He uses this analogy: a sponge may absorb water at first, but eventually that sponge will begin to shed water which may be much dirtier than the water that entered the sponge's membrane. Hmm.

Resonances can also be attenuated by moving the component far away from the source of vibration. The most effective way to completely attenuate resonances, however, would be to totally isolate the component—for example, by placing it in a soundproof isolation booth, as they do in recording studios. [The easiest way to isolate your components from airborne vibrations is to position them in a place in your room where there is a node at most bass frequencies. A few minutes with the $30 Radio Shack spl meter and Stereophile's Test CD 2 will tell you where these nodes are.—Ed.]

How does the Arcici Levitation fit into all of this? Well, it certainly doesn't work by mass-damping; if you place more than 85 lbs on any one set of wires, you'll risk the possibility of a catastrophic failure, damping the component onto the one below. Don't even think about using a Bright Star mass-damping isolation system with a Levitation stand unless you enjoy picking sand and gear up off your floor. The Levitation's support wires work all by themselves as vibration-damping mechanisms, since they transform airborne vibrations into heat. They also work as isolation devices, decoupling components from floor-borne vibrations transmitted up the frame of the stand. Not bad for a couple of metal wires.

—Steven Stone
together. To assemble, simply connect the four arches with angle joiners to make an LDS-1, then connect the two assembled LDS-1s with short angle joiners to make an LDS-2. Finally, attach the metal support wires diagonally across the assembled supports.

Attaching the two LDS-1s together would have been easier with two people (one to hold the two units in place, the other to screw in the joiners—sounds like the punch line to an audiophile light-bulb joke), but I did it solo. Kinda guy I am.

I have wooden parquet floors, so Arcici supplied me with some adhesive Teflon floor sliders from Hammerscher-Schlemmer (also available from the Safety Products Catalog and most furniture and houseware supply stores) which I placed on the bottom of the Levitation—it glided along the floor like Wayne Gretsky going in for a hat trick. If you really wanted to, you could fill the legs with sand, but I wouldn't recommend it—it won't buy you any sonic benefits. Sand would, however, inevitably get all over your living room, and would make it more difficult to assemble and place the stand.

The most difficult part of setting up a Levitation stand is placing components on it. Start with the bottom of the stand: jockeying around a component on the shelf above the one you're working on can be rather challenging. Once your component is placed, you'll most likely have to move it around a bit to get it lined up right. Chances of a component's support feet correctly lining up under the support wires are about equal to your chances of winning the state lottery. Of all the equipment I had on hand, only the support feet of a Pioneer CT-91 Dolby S cassette deck lined up correctly. I recommend that you remove the support feet before you slide the component onto the Levitation stand.

Once the component is lined up on the crossed support wires, you can slip a 4\(\text{\small{4}}\) by 4\(\text{\small{4}}\) gabon ebony "magic block" under the component to electrically isolate it from the support wires, thus avoiding the possibility of ground loops. These "magic blocks" might also have some additional sonic benefits—they're made of the same stuff as the Shun Mook Mpingo Discs. I would be ecologically remiss if I didn't mention that ebony is a tropical rain-forest hardwood that requires a very long growing time. Ray Shab says it's not endangered, but the idea of using rain-forest wood makes me slightly queasy. Perhaps some other domestic hardwood or ceramic material could be supplied for those of us who prefer to be ecologically responsible, or who don't believe in black ebony magic.

It took me about 45 minutes to position and install six components on the Levitation stand. I had a bit of trouble figuring out how to put a Micromega T-DAC D/A and T-Drive transport on the support wires, since each is only 8\(\text{\small{1/2}}\) wide by 12" deep. I solved the problem by using a Microscan D-12 anti-resonance plate on the crossed wires, then placing the Micromegas on the Microscan. The Microscan/support-wire combination also worked well with other substandard-sized components, such as the Vendetta SCP-2C phono preamp.

It was a breeze to connect components: the Levitation stand easily slides away from the wall for easy access to rear panels. The LDS-2's side supports are ideal for attaching AC cords via cable ties. The AC power cords can be run along one side of the stand, the signal interconnects along the other. And because the Levitation has no side walls, you can easily see what you're doing while wiring up components. The Levitation will be ideal for folks who repeatedly plug and unplug interconnects and AC cords. The open architecture of the LDS-2 also allows for excellent ventilation of hot-running components.

**Sound:** It was impossible to conduct a controlled, "scientific" A/B comparison between the Levitation and the homebrew suspension-stand system I've been using for the past several years. The mere act of connecting and disconnecting components when switching stands introduces so many variables that short-term A/B comparisons are a waste of time. I relied on long-term listening.

Did the Levitation make a positive sonic difference? Yes. Because of the stand's ergonomics, it's much easier to route AC wires and interconnects in such a way as to minimize electrical interactions. This alone made a definite sonic improvement. It was possible with the LDS-2 to reduce background hum and noise to practically nothing. Only when the Dennesen JC-80 preamp was turned up past 9 (no, there's no 11 setting on this unit) did I hear any hum or noise whatsoever. With my old stand, hum and noise was audible by 7.

This background quietness had a pronounced positive effect on the system's low-level resolution. The lower noise floor improved inner detail on all sources. Low-level sounds now emanated from complete silence. Gary Kessler's guitar lines on Telemann's Trio Sonata in c (Boston Skyline BSD 110) had superior definition and inner detail. Dynamic contrast also improved. Tori Amos's voice and piano on "Happy Phantom," from KBCO's Recorded Live at Studio C Sampler, Volume 2, had greater dynamic range and increased goosebump factor.

The Arcici Levitation stand effected not only complete silence, but also less ringing and sonic overshoot. Starts and stops of sound were more distinct, with far less temporal smear. On the Opus 3 recording by the Omnibus Wind Ensemble, "Viriditas per Omnium" from Eje Thelin's "Circo della vita," individual horns, while still remaining part of the ensemble, were more easily discernible. The pace of the music was also quicker. Fortissimos seemed cleaner, and subtle dynamic nuances were easier to discern. For readers unfamiliar with wind ensembles (or used to old chestnuts like the Eastman Wind Ensemble recordings on Mercury Living Presence), this Opus 3 recording (CD 19304) is a delightful example of the kind of delicious harmonic textures possible from a wind ensemble.

My oh-so-scientific finger test\(^2\) revealed less chassis resonance when components were in the Levitation stand than when they were in my home-brew rack. Resonance was further attenuated by the Microscan D-12 anti-resonance platform, which also made it easier to place components on the stand, and eliminated any need to remove a component's support feet. (The Microscan's plastic platform also renders Arcici's "magic blocks" redundant.)

**Conclusion:** The Arcici Levitation stand is based on something rather rare in high-end equipment stands: a genuinely new idea. It was nice to discover that this new idea has more going for it than mere novelty—it actually works. While it's impossible to tell how many of the LDS-2's sonic improvements are a result of superior ergonomic design, and how many are the result of the novel suspension system, it doesn't really matter—this question is of more concern to other equipment–stand designers than to the people who will use them. What does matter is that, when properly set up, the Levitation's elegant looks, ergonomic case, and sonic advantages should appeal to many audiophiles. I'm hooked. I'm buying my review sample—it's just too cool to give back.

1. Made up of an old metal computer stand on heavy-duty rollers that was designed to hold 19" rack-mount computer gear. Its wooden shelves are suspended on shipping webbing that hangs down within the stand frame and permits the shelves to be isolated from the sides of the stand.

2. This consists of turning up the music to sub–pain levels and placing my index finger on a component's surface to see how much vibration I can detect.
Audio Research LS5 Mk.II Preamplifier

My review of the Audio Research LS5 fully balanced tube preamplifier in the August 1994 Stereophile (Vol.17 No.8), along with my comparisons with the Sonic Frontiers SFL-2 in the November issue (Vol.17 No.11), conveyed my belief that the LS5 is a superb preamplifier, but perhaps not a contender for the State of the Art. At $4995—plus $1495 for the ARC Bl2, needed to accept single-ended signals—the LS5’s price raises the standards by which it must be judged. There are a lot of great preamps out there for six grand.

As much as I liked the LS5, I had a few reservations about its sound. My primary criticism concerned the preamplifier’s treble, which lacked the liquidity I so enjoyed from the SFL-2, and instead sounding a touch grainy. The LS5’s treble had a somewhat whitish, almost metallic quality compared to the SFL-2.

Other than that shortcoming, I greatly enjoyed the LS5’s spectacular ability to present a recording’s space, depth, air, and detail. The LS5 threw before me a huge, deep, transparent soundstage. Moreover, the LS5 excelled at presenting a sense of space between the images, rather than fusing them together. It was as though there was a bloom of air around instrumental outlines that made the music more lifelike, less synthetic.

Audio Research apparently felt the original LS5 didn’t live up to its potential: the preamplifier was replaced almost immediately after its introduction by the LS5 Mk.II, a fairly serious redesign of the product costing $4995. The LS5’s 12BH7 tubes were replaced by Sovtek 6922 (6DJ8) types—the 12BH7s apparently became overly microphonic during shipment. Moreover, the Sovtek 6922 sounds great, and is available in quantity.

Next, the entire gain structure was overhauled. In the LS5, a solid-state switch put an 18dB pad in the signal path when in the 12dB gain setting. This switch remained in-circuit no matter what the gain setting. The Mk.II handles the two gain modes by a completely different method. ARC has eliminated both the solid-state switch and the pad, instead changing the open- and closed-loop gains simultaneously in the same ratio for both gain settings. This resulted in lower noise and more transparent sound. Indeed, making the LS5 quieter was a motivation for the redesign—some customers with very sensitive loudspeakers complained of noise. In addition, the op-amp-based DC servo was replaced by a DC feedback loop.

The LS5’s Alps detented potentiometer has been scrapped in favor of a continuous-rotation, motorized Alps pot now used in all ARC preamps except the LS7. ARC claims the new pot not only sounds better, but also offers the ability to be remote-controlled. Remote volume control is a $500 option, either at time of purchase or as a retrofit. Although the pot is intrinsically motorized, the circuitry to drive the pot and the remote itself are what add $500 to the price. A few other changes were made—power-supply tweaks and different capacitor brands—but the main differences are the new gain topology, different tubes, and elimination of the solid-state switching.

System: The LS5 Mk.II has been part of my reference system for the past few months. I also had on hand an original LS5 for side-by-side comparisons at matched levels, to refresh my memory. The associated components I used to evaluate the LS5 Mk.II included Audio Research’s VT150 tube monoblocks—the best power amplifiers I’ve heard in my system. While I had some criticisms of the original LS5, I had absolutely no reservations about the VT150’s wonderful musicality. The VT150s drove Genesis II.5 loudspeakers (watch for a review in the January issue), helped in the bass by the II.5’s bass servo amplifier. Source components included a Mark Levinson No.31 Reference CD transport driving a Mark Levinson No.305 Reference digital processor via the Audio Alchemy DT1 Pro. The analog front end was a highly modified Well Tempered Turntable and Arm, fitted with an AudioQuest AQ7000nxs. The phono stage was the wonderful Vendetta Research SCP-2B. Cables and interconnects included AudioQuest Diamond x3, Lapis, Monster Sigma, and Transparent Ultra.

Sound: The LS5 Mk.II is clearly an improvement over the LS5. Although both preamplifiers have a close family resemblance, the Mk.II was more musical, the biggest difference being in the treble. The Mk.II’s treble was smoother, cleaner, more refined, and better integrated with the rest of the spectrum, rather than sounding slightly separate from the music. In addition, the treble was less forward and incisive in the new design—a quality that better complemented the preamp’s overall spaciousness. I also heard less grain, manifested as less spitiness on vocal sibilants, a more velvety violin sound, and a cymbal sound that was more like burnished brass and less like chromium.

The mids were also better portrayed in the Mk.II, sounding warmer and richer, with less forwardness. A slight edginess to brass instruments was ameliorated. Overall, the Mk.II was more harmonically coherent. The music had a greater sense of ease and flow through the Mk.II.

Nonetheless, I still wouldn’t characterize the LS5 Mk.II as sweet, laid-back, or tubey. The preamp still has a trace of forwardness in the treble, and may not be quite as smooth and clean as the Sonic Frontiers SFL-2’s high-frequency reproduction.

I also heard a marginal increase in transparency and soundstage focus—already the LS5’s strong suits. Finally, there was less sonic disparity between the two gain modes. The original LS5 sounded so much better in the 30DB position that the 12DB mode wasn’t worth using; the Mk.II made the 12DB gain mode sound as good as the 30DB mode.

The LS5 Mk.II made a synergistic match with Audio Research’s VT150 power amplifiers. The VT150’s ultra-liquid mids and treble were a perfect complement to the Mk.II’s highly detailed rendering. System matching is therefore vital in achieving a musically satisfying result; listen to the LS5 Mk.II in your system before making a final decision.

Measurements: I performed a complete set of measurements on the Mk.II, but will report on its measured performance only when it differs from that of the LS5.

The Mk.II’s volume-control tracking was amazingly good, eclipsing even the superb performance of the potentiometer used in the LS5. The best case was with the volume control barely open (1V in, 100mV out), when the left-right tracking was within 0.005dB. At any other volume setting, the left-right volume tracking was better than 0.008dB. This virtually perfect left-to-right tracking suggests that the Mk.II’s four-element potentiometer is equally precise between the two halves of the balanced signal—a vital factor in a fully balanced preamplifier. The LS5 Mk.II measured significantly

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better than the original in some key respects, the biggest difference being between the two units’ signal/noise ratios. The LSS’s unweighted S/N ratio was 76.9dB (right) and 78.2dB (left) (referenced to 1V output), the Mk.II’s 94dB (left) and 96.7dB (right)—a whopping 19.8dB improvement (ie, a tenfold reduction in noise). (All measurements for both the LS5 and the LSS Mk.II were made over a 22Hz–22kHz bandwidth.)

This vastly better noise performance was reflected in the Mk.II’s THD + noise plots (fig.1). In the 30dB gain mode, the THD + N was 0.004%; with 12dB of gain, the distortion and noise was 0.016% — nearly an order of magnitude lower distortion and noise compared with the LSS. A comparison of the harmonic distortion spectra revealed the Mk.II’s to be nearly identical to that of the LSS.

Interchannel crosstalk decreased slightly overall in the Mk.II (fig.2), and didn’t exhibit the odd disparity between gain modes measured in the LSS. In the LSS sample, the right-channel crosstalk decreased in the low-gain mode compared to the high-gain mode.

The LSS’s and LS5 Mk.II’s input impedances, output impedances, gains, frequency responses, and DC levels were all similar.

I was greatly impressed by the Mk.II’s much better technical performance — particularly the superb volume-control tracking and the 20dB increase in the S/N ratio.

Conclusion: With the Mk.II revision of the LS5 preamplifier, Audio Research has taken an excellent preamp and made it truly world-class. The Mk.II expands on the LSS’s strengths, and corrects the product’s musical shortcomings. The more liquid mids, cleaner treble, and less incisive sound were all welcome changes. Fortunately, the Mk.II retained the LSS’s ability to portray great space and depth, and, particularly, to reveal a wonderful sense of bloom around image outlines.

Overall, the LSS Mk.II is a reference-quality preamplifier, and one with which I’ve spent many an enjoyable hour.

—Robert Harley

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Almost 16 years passed between the premieres of Aida and Otello; Verdi had penned only the Manzoni Requiem and a couple of sacred pieces in between, and he considered himself retired from the composition of opera. But Verdi was thrown in with Arrigo Boito, himself a composer (and librettist of Ponchielli's La Gioconda, of which he was so ashamed that he used an anagram of his name), and sometime foe of Verdi's musical ideas. Little by little, Verdi was convinced of both Boito's and the project's worthiness, and began to feel that the two could do something magnificent and groundbreaking with an opera they planned to call Iago.

In February of 1887, almost eight years after the seed was planted, Otello was presented at the Teatro alla Scala, Milan. The audience at the premiere was seated a full hour before the curtain went up—at unique an occurrence for La Scala then as it would be now. The audience tried to get Verdi to come forward during the first act; when he appeared at its end, there was a roar of approval. There was a standing ovation at the final curtain, and many wept openly. Verdi was called out 20 times and followed back to his hotel, where hordes of people shouted his praises.

Otello is a perfect blending of great literature and great music. Audiences today can understand why. Otello is, on the one hand, the pinnacle of Italian opera. On the other, it's unique—a perfect blending of great literature and great music. Boito eliminated Shakespeare's first act (thus tightening the action), though retaining some of its important lines to insert elsewhere (the "Love Duet," for instance). He added, among other things, a "Credo" for Iago, as a way of explaining, or describing, Iago's character. Not a note or word is wasted; the whole is overwhelming. The esteemed music writer Francis Toye best summed up the work's power in a rhetorical question he posed in 1931: "Have the love, the passion, the anguish, and the hatred of human beings ever been presented to an audience with deeper insight or poignancy than in this music?"
Otello has often found its way to disc (each of the recordings surveyed here is on two CDs), and a look at the available recordings—all recorded during the last 50 years—reveals an interesting truth: of the 16 performances, 12 are divided among three tenors: Mario del Monaco, Plácido Domingo, and Ramon Vinay. Today, Domingo is the only tenor in the world who sings the role properly, or with any great success.

Otello, for the most part, is Otello. The voice—let’s not even discuss interpretive powers for a moment—must have size, appeal, squillo (the sound a trumpet makes), and the ability to express throughout the dynamic range—from pp to ff. Otellos are as scarce as Siegfrieds; a tenor who isn’t absolutely certain of his ability to handle the role vocally—let alone historically—normally doesn’t even try. The earliest complete recording available is a 1944 broadcast from Vienna under the direction of Karl Böhm (Myto 2 MCD 922.60). All of the theaters under the Reich were closed until the “final victory,” but broadcasts were permitted, and this performance was preserved and recorded for posterity. The Desdemona, Hilde Konetzni, had never sung the role; each act was recorded as soon as she learned it, over a period of four days. Shortly after the broadcast, the tapes disappeared, and were only rediscovered in 1989.

In many ways, it is an astounding, enlightening reading, although the language—it’s sung in German—is a problem. The playing and singing of the orchestra and chorus are spotless, and while Böhm favors slow tempos, the whole affair has rhythmically a style flawless and crisp, the progression ever forward (one is tempted to say “Germanic,” but Furtwängler’s reading disapproves such generalizations—see below), that there’s almost never any sense of lagging or dramatic f lacidity. An exception is the second-act quartet, which makes no sense at this speed; the characters sound stoned.

Swedish tenor Torsten Ralf is the Otello. His was a bright, shiny, perfectly focused voice which was used tastefully and with great intelligence. Ralf’s Otello is occasionally too straightforward—his is rarely a shaded, intellectual reading—but he’s always involved and involving, and his sound is like tempered steel. His spine-chilling, whispered, five-syllable high A-flat at the close of the slow, dreamy “Love Duet” is ravishing. He’s well challenged by Paul Schöffler’s vicious, dark-hued Iago. Here is a true bully—a man obsessed who will stop at nothing to destroy his prey. Konetzni is remarkable, particularly when one considers the circumstances of her portrayal. She’s quite moving and sings with plenty of “face”; her “Willow Song” and “Ave Maria,” taken slowly, are, correctly, high points.

The recorded sound, though remarkably bright, is clear and clean, especially for its time. The miking of the soloists is too close, allowing little room for nuance; but points are made nonetheless. There’s a bad side break in the middle of the Act III confrontation, and a particularly egregious cut in the same act’s big ensemble. But this is a fascinating, memorable performance; and while it can’t be recommended as anyone’s only recording of Otello, it’s fascinating and gives enormous pleasure.

PAUL SCHÖFFLER REMAINS AMONG THE NASTIEST, MOST DERELICT OF IAGOS, WITH HARDLY ANY WANDING OF HIS POWERS IN THE SEVEN YEARS SINCE BÖHM.

The next complete Otello committed to disc, led by Arturo Toscanini in 1947, is also the most famous (RCA 60302-2-RG). This has long been the standard by which all other Otellos are judged (the much-maligned sound has been vastly improved in its new CD incarnation, by the way), but I’ve never found it quite the be-all and end-all, primarily because of the voices involved.

Yes, it’s exciting and magnificently played (the frenzy of the opening storm!), yes, the drama unfolds inexorably and the tension never slackens; and, yes, the music—with the exception of a too-rushed “Love Duet”—is all here and impeccably served. But the voices simply do not rivet one’s attention. Giuseppe Valdengo and Herva Nelli, the Iago and the Desdemona, were convincing artists, with firm, fine voices, and both impress here—he with his sneakiness, she with her femininity—but both lack allure or distinctive sounds. And the Otello of Ramon Vinay, while grand, vivid, heartfelt, and similarly convincing, displays a faintly choked, baritone sound which does not make the notes leap off the page as they should. By the end of this recording, Toscanini has made us feel the opera’s tragedy brilliantly, but what does one do when the sheer act of listening to the voices hasn’t been satisfying?

One of Wilhelm Furtwängler’s rare forays into Verdi was Otello, and his 1951 Salzburg Festival performance is available on Virtuoso 2697382, Hunt 2 CDWFE 353, Arkadia 2-353, and Foyer 2 CF 2002 (the marginally preferable transfer is the Foyer, but the blare is still considerable). As usual with Furtwängler, the reading is complicated, and is absolutely sui generis. The sloppiness of the chorus and orchestra is surprising—the former’s first act is a mess, as is the latter’s third-act brass. But while there are lots of sloppy moments, there’s nothing haphazard about this performance; it’s slow, but tension is never lacking. And although Furtwängler’s approach cannot be called idiomatically Italianate, Verdi would have recognized all the emotions: rage bordering on hysteria at times, and ultimate sadness.

Ramon Vinay is, again, a huge Otello—less subtle, but just as powerful as Toscanini—but still not quite to carry about or warn unto. Paul Schöffler remains among the nastiest, most derelict of Iagos, with hardly any waning of his powers in the seven years since Böhm. The overparted Draga Martinis as Desdemona resorts to Sprechgesang at times to keep up with the slow tempos—we know she’s in trouble in the first-act duet when she breathes in the middle of the word “abbracciamente”—and is elsewhere comparably overwrought, with suspect pronunciation. But her last act, while weird, is very tender, due mostly to the slow, introspective tempo in the “Willow Song.” This performance coheres despite—or because of—its slowness and eccentricity, and packs a wallop.

The earliest of Mario del Monaco’s Otellos was conducted by Antonio Votto at La Scala on January 1, 1954, and is in truly bad sound (Melodram MLO 270101). We need not concern ourselves with it: Votto is a routinier, and Del Monaco is so perfectly right for the part vocally, with the ideal squillo, that it’s a pity he has no ideas in his head. His Desdemona, Renata Tebaldi, while in exquisite, luxuriant voice, is interpretively bland. And blandness even permeates the Iago of Leonard Warren. He, too, had the ideal voice and technique, but he’s ineffective here, barely noticeable. The performance is flat.

The first studio presentation dates from ’54 as well, in genuine stereo with voices front and center and left and right (London 440 245-2). Alberto Erede’s insensitive leadership sinks this performance and brings out del Monaco’s absolute worst (his awareness was al-

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ways low anyway). His relentless yelling makes you want to run—he’s an abusive, angry husband/boss from the start. Tebaldi’s Desdemona sounds as if she’s afraid of and humoring him even in Act I (a marvelously subtle point to make had either of these singers leaned toward the marvelously subtle, which they didn’t); and while she always sounds gorgeous, she also always sounds detached. The ordinary Aldo Protti sings well enough as Iago, but he, too, has no real conception of the complexities of the role: there’s no difference between his public face and his “credо” face, for example. This reading skims the surface on all levels, and comes as close as is humanly possible to making the opera dull.

JOHN CULSHAW’S SONIC-BOOM OTELLO FROM 1960 STILL SENDS CHILLS DOWN THE SPINE.

It’s del Monaco and Erede again in a live 1959 performance from Tokyo (Paragon PCD 84002/03 or Memories HR 4406/07; get the Memories—the Paragon only has two tracks per CD). Though this very fast, dazzle-em-and-leave performance is as free of insight as the 1954 account, it is exciting. The sound is good mono broadcast, although the presence of the prompter is never in doubt. The orchestra plays poorly (the double-bass solo before the Moor’s fourth-act entrance is a wreck). Gabriella Tucci is a nice if faceless Desdemona, and the love duet is the least moving on disc. The Iago of Tito Gobbi is a great plus—he sings with an audible sneer and is in fabulous voice. Unlike Protti, he changes his tone the moment Cassio leaves in Act II, before the “Credo,” and his recounting of the dream is enough to send even a previously non-jealous husband over the edge. Del Monaco’s animal magnetism works here; he’s almost refreshing, despite—or because of—the fact that he flirts on occasion and otherwise barks, holds on to notes too long, and holers. No tenor today would dare (or could) sing Otello like this—the operatic world is now too closely examined, too pristine, and demands greater psychological probing. Almost a pity—this is so entertaining.

The amazing John Culshaw brought us a sonic-boom Otello (London 411 618-2) in 1960 to match his Das Rheingold of the previous year, and it still sends chills down the spine. Herbert von Karajan is the conductor, and while abetted by Culshaw in playing off the score’s split personality—very violent or very tender—Karajan is far less mannered than he later became. We’re constantly amazed at how beautiful and sensual the music is. The cast is the same as London’s ’54 outing, but Protti is even more lackluster. Tebaldi, more involved and loving, now sounds a bit matronly. Del Monaco still has only two dimensions, but every so often he tries not to shout. There are some bad tape splices, but wait ’til you hear the beef in the opening storm (that organ pedal will make your neighbors hate you), and the divinely atmospheric love duet. If it’s del Monaco you want, this is the place to get him—the excitement is visceral, the singing even.

The same year found conductor Tullio Serafin in the studio with Tito Gobbi, Leonie Rysanek, and the not-yet-35-year-old Jon Vickers (RCA 1960-2-RC). Vickers is simply magnificent—listening to him reminds us of what we’ve been missing. The voice is in peak form from top to bottom, and, more important, his Moor is a real character, with nuances. This warrior and leader of warriors commands respect—until he begins to chatter. No wild animal here, just a doomed human one. Gobbi just about jumps into your room with his detailed reading and a smirk on his face. He’ll make your skin crawl in his recounting of Cassio’s “Dream”—you want to hear more even as you’re revolted. Rysanek is a feeling Desdemona, but her voice doesn’t always cooperate—it’s too smoky and unfocused at bottom. Serafin, too, is a problem: while he gives the music plenty of room to breathe and the plot plenty of room to develop, his performance often lacks tension and excitement. But Vickers! And Gobbi! The sound is excellent.

Eight years went by before Sir John Barbirolli led his lyrical, loving, and very, very slow account of the score before the studio mixes (EMI CMS 5 65296 2). The result is a performance which is often in danger of grinding to a complete halt. One example: the third-act Cassio/Iago/Otello scene seems here like a rather graceful pas de deux punctuated by a rude neighbor. There are others too numerous to mention. The Otello is James McCracken, a brilliant, poignant Otello on stage, but whose throaty sound does not hold up well under close observation, which is what both the recording studio and Barbirolli’s slow tempo force us to do. Both conductor and tenor correctly see Otello’s downfall as a long, continuous arc (Barbirolli is to this opera what Knappertsbusch is to Wagner’s Ring), rather than as a series of highlights to be underlined. McCracken’s big beast of an Otello, thoroughly dishonored, distraught, and disbelieving, is cause for great appreciation, but his Sprechstimme at the start of “Dio mi potevi” is grotesque. Dietrich Fischer-Dieskau’s Iago is amazingly off, so studied as to be inert, microscopied. Gwyneth Jones is a radiant, porcelain Desdemona, but in this context she’s dead in the water. The whole performance is a glorious mess—not recommended, but fascinating to hear for its totally different approach.

THE FIRST TEN BARS OF ACT III OF KLEIBER’S 1976 LA SCALA OTELLO WERE COMPLETELY DROWNED OUT BY AN ARGUMENT IN THE AUDIENCE.

We return to the Salzburg Festival, this time in 1970, and to Vickers and Karajan (Foyer 2 CF-2034). The sound is tinny, the balances off, characters’ voices come and go. This reading exemplifies what happened to Karajan in the ten years since the London recording: He’s studied, fussy, and gets in the way. There’s no rambunctiousness in the first-act song and fight, tempos are slow or slower, and there are cuts in the second- and third-act ensembles.

Vickers is even more tormented here—his cries of “Sangue,” and especially “Ah, Desdemona! Indietro! Indietro!” are so heart-trending that he’s pitiable even when he’s violent. And with what tragic tenderness he recalls the huckster chief he gave Desdemona! It’s amazing that no other tenor has appropriated this moment’s insight. His “Dio mi potevi” is that of a broken man with a broken voice—it goes white, but without ever resorting to speech. Mirella Freni, the Desdemona, gives us a young, vibrant, puzzled, never-hectoring woman—just lovely and thoroughly believable. Peter Glossop’s Iago is a snap—it’s easy to remember that his greatest role was Britten’s Billy Budd, opera’s nicest boy. Iago is a stretch for him that doesn’t work—the voice is wrong and so is the temperament. He’s not terrible; he just isn’t right. An odd Otello—would that Vickers and Freni could be extracted from it!

It’s the same cast in the studio four years later on Angel CDM 69308, and all the problems have been magnified. By now Karajan’s tics allow us to see so many trees that we nearly forget there’s a forest. The recording has nice sound effects and atmosphere. Vickers is not as fresh vocally, and his portrayal is all manic
depression—much like Karajan's leadership. Iago's drinking song is graceful, and, like Glossop's Iago, is gentle and lacks swagger; elsewhere the baritone forces his voice. The love duet is dreamy almost to a fault, but Freni becomes the saddest Desdemona on discs—no outrage, just sadness—and very valid. One can hear all of Otello here, but the experience is oddly absent. When we can so clearly see the seams, the power is diminished.

We're on entirely different turf with the next set, conducted by Carlos Kleiber, live from the stage of La Scala on December 7, 1976 (Exclusive EX92108/09). "The first ten bars of Act III have been omitted since they were completely drowned out by ... an argument [in the] audience," the accompanying booklet tells us. The audience is indeed part of the show here—they're out for blood. One can hear them breathe during Desdemona's fourth-act scena, and there are some berserk interruptions elsewhere.

But even extramusical insanity can't dim Kleiber's magnificent leadership as he draws out all the electricity, suffering, and radiance from the score, with tempos perfectly judged (though leaning toward quick), and an overview of the work which brings to mind the almost Aristotelian inexactability Barbirolli strove for at half the speed. The Otello is Plácido Domingo, in one of his earliest forays into this killer part. He has energy and a voice of burnished gold. He sings every note, never bars, never fudges, and wrings the part dry. Yes, he misses some of Vickers's details, but this is an important reading nonetheless; indeed, of the three Domingo Otellos on CD (see below), this is the most successful, the best integrated, and the most complete performance. Piero Cappuccilli is a big-voiced, burly Iago who scares by dint of force—there are few shadings here. Freni is again Desdemona, and Kleiber gives her more places to grow than did Karajan; she's just as lovely, but more assertive. If you can cope with the sound—not bad for bootleg, actually—this set will knock you out.

James Levine is the conductor of the next set (RCA RCD2-2951, 1978), and, along with the Desdemona, he's the star. Recorded in glorious sound, this Otello is sensuous without becoming milky, with an intensity close to Toscanini's and Böhm's, and an unprecedented attention to orchestral detail that never descends into the clinical. Domingo here seems more calculated than at La Scala, and the big set-pieces, while above criticism vocally and interpretively, sound like set-pieces, and this hurts the sweep. Sherill Milnes is a tough, sexy Iago who resents everything and everyone. He sings the part wonderfully, with precisely the right voice, but the overall effect is oddly, disquintely mild. Renata Scotto, though possessing a voice with half the breadth and without the top of an ideal Verdi soprano, dazzles with her Desdemona. From her very first words, "Mio superbo guerriero," one senses that this is a different class of interpretation than we've heard. Wonderment is here; the newness of her love and her feelings carries her away. Later, her terror and madness (yes, the "Willow Song" is a Mad Scene, and it's remarkable how many sopranos sing it as if it were not) and, finally, her resolution are deeply felt. Scotto's Desdemona emerges as practically heroic—which, of course, makes the tragedy all the more vivid.

It's Domingo again, under Lorin Maazel (Angel CDCB 47450) in 1985, for the soundtrack to Franco Zeffirelli's film. (While there were cuts in the film—including the "Willow Song"—the recording is complete.) There are severe problems here: The recording lacks presence, and the voices are never loud or forward enough; everything is too mellow for this most in-your-face of operas. The Iago of Justino Diaz is, quite simply, terrible—the performance takes a nose-dive every time he shows up. The voice is unsuited to the part (he's a bass, for starters), and he's dramatically shallow. Domingo is a vocal miracle, sounding lighter, more flexible, and even brighter than he did nine years earlier. His "Dio mi potevi" is epic—slower, more private than onstage with Kleiber, more moving than with Levine. He's everything but really interesting, and, again, his characterization seems to unfold chunk by chunk. Katia Ricciarelli as Desdemona is all sweetness and soft focus (is this the recording?)—a pretty, dumb blonde. For the most part, Maazel leads well, with scenes splendidly built. A moronic exception is the perverse slowing down on the chords just after the "Sangues" and preceding "Si pel ci!" What could he have been thinking? That we had to recover from the tension? A total non-competitor is led by Gustav Kuhn (Koch Schwann 314074

MYUNG-WHUN CHUNG LEADS THE MOST EXCITING AND SATISFYING RECORDING OF ALL.
K2). This 1991 performance has no point of view; Kuhn lets the music, scrupulously played and sung with all dynamics observed, carry the drama. And it does. The whispering, plotting, and asides, as well as the public displays, are all very clear. It’s therefore a pity about the voices. All three leads—Cornelia Murgu as Otello, Renato Burson as Iago, and Marla Guleghina as Desdemona—have voices at least a half size too small for their parts. Murgu has all the right instincts, and he really tries, albeit with an unappealing voice. He deliberately sings right under note at times, like a jazz singer, to effect sarcasm, and it works. Bruson is idiomatic, smart, and conscientious, and sings with a handsome legato; but he’s vocally taxed and sounds as threatening as a butterfly. Guleghina is forgettable, with a wiry, unsuitable sound—a cheap date. A respectable try, but hardly what Otello needs.

A disappointing account, as far as real presentations of this great big opera are concerned, comes from Sir Georg Solti (1991, London 433 669-2), with Luciano Pavarotti, Leo Nucci, and Dame Kiri Te Kanawa in the star roles. Let’s be honest: To hear the Moor’s music sung this beautifully—even by the wrong voice—is a blessing, but one feels one could reason with Pavarotti’s anything—but-fierce Otello. There’s no sense of danger and no depth—he’s angry but not wounded, and cookie-cutter loving. Nucci is underpowered and desperate, and shouldn’t sing Iago-period. Desdemona is arguably Dame Kiri’s best Verdi role, and she’s delectable—sweet, loving, and terrific; unless compared with Freni’s real vulnerability, Tebaldi’s luscious sound, or Scotto’s anything at all. Even Freni, a true lyric, leans on the notes more for dramatic intensity.

Solti rushes the opera; this, combined with the close miking of the singers, doesn’t allow for feeling or subtlety (a problem not encountered with Böhm). I also don’t like the fact that the orchestra magically recedes whenever the singers have volume problems (did I hear a knob turning?). In short, while much of this is beautiful, it isn’t Otello as we know it.

Just released is what may be the most exciting and satisfying recording of all. Led by Myung-Whun Chung—recently dumped by the Opéra Bastille and using those forces magnificently here—this quick-paced recording (1993, DG 439 805-2) affords the thrills of a live performance. Had I been asked whether we needed another Domingo Otello, I’d have screamed “No!”; but I would have been much the poorer had my cry been heeded. Chung’s nervous energy is in all the right places as he brings out Domingo a high-powered reading unlike any of his others. Domingo’s voice is occasionally a bit more restricted here than before, but the effect is dramatic rather than problematic. His second act alone will make you jump. He still lacks Vickers’ capacity for self-probing, and he still can’t really sing piano, but he’s positively riveting this time—closer to being in the role—and more interesting than ever.

Young Russian baritone Sergei Leiferkus is the Iago, and once (or if) you get over the fact that he sounds like a tenor and that his vocal production is typically Russian (a slightly intruding gulp from the back of the throat which intrudes), his raw power, snideness, and the sheer perfection with which he sings the notes—even the trills—will scare and thrill you. You may want a real baritone sound, however, and he simply doesn’t have it. Cheryl Studer’s Desdemona is finely nuanced, with the voice scaled way down (and shimmering like the evening in Act I) to sound fragile, and later broadened for urgency. I’d go so far as to say that this is her finest recording, and that she’s second only to Scotto in the role. It’s a pity her diction is sloppy.

But Chung is the hero here. This fabulous reading is full of illuminating details, from the hysteria of the storm through the tender dreaminess of the “Love Duet,” Otello’s rage, the epic third-act ensemble, the warmth of the “Ave Maria” (only the “Willow Song” seems a bit perfunctory), to the final sadness and terrible peace of the final chords. Wow! If you have to own only one Otello and you aren’t obsessed with any of the other performers in the other recordings, this is for you.

Given the opera’s challenges, we should be grateful for the relative success rate of the recorded performances. But Chung’s newcomer aside, would it be greedy to wish for a recording with Vickers in which his voice had a bit more of del Monaco’s “ping” and a hint of Domingo’s gold while retaining his own insights? In the same dream cast Gobbi would sing Iago, but maybe with Schöffler’s pure brute power or Milnes’s beautiful tone. Scotto’s Desdemona would be as vocally secure as Dame Kiri’s, with just a hint of Tebaldi’s early lusshness. Toscanini’s intensity, Karajan’s melting sensuality, Böhm’s precision, Furtwängler’s overview, and Levine’s flawless timing would all be found in one great Mystery Conductor. And the producer would be razzle-dazzle John Culshaw or honest—and—true Richard Mohr.

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With this Ring, his astonishing Parsifal of a few years back, and his Bayreuth Tristan und Isolde, Daniel Barenboim must now be reckoned one of the great Wagner conductors. He shares with Wilhelm Furtwängler a relentless dramatic momentum, but without the latter's mushy beat. He melds the orchestral clarity and transparency of a Boulez with the balletically balanced weight and luminosity of a Bohm. All Barenboim's own is a command of this immense score's quieter sections that consistently plumbs the profound. His tendency to slightly ritard descending phrases on unaccompanied strings is, in every case, the right choice—these moments seem to sink into the very souls of music and listener alike.

The Rhine Journey, Funeral March, Gathering of the Vassals, Immolation Scene, and most of Siegfried III all are about as good as I've ever heard them. Like Harenboim's Bayreuth Rheingold and Walküre (reviewed last March), this Siegfried and Göttterdammerung evince an irresistible freshness; listening to all four operas in one Wagner-packed weekend was an effortless delight.

Critical in his early Bayreuth seasons for erratic tempi, Barenboim seems to have since steadied his rhythmic choices: they sound simply "right." He calls attention to himself only in the prelude—slower than Goodall's—to Siegfried II. Otherwise, Barenboim's tempi and playing times approximate Solti's.

Siegfried Jerusalem has grown into his namesake role, here sounding considerably younger and more focused than he did on the Levine/Met laser-discs of about the same time, and considerably less cynical than for Håtínk/EMI the same year (1991). The voice—bright, clear, ringing—is an absolute pleasure to listen to, and that of a true heldentenor. Still, he begins to force in the latter half of Göttterdammerung II (these are live recordings), and, by the end of III, there's little voice left. His acting never falters—this is a Siegfried anyone would trust implicitly.

John Tomlinson's Wanderer strains a bit, but he's relaxed and informal without losing emotional focus in his scenes with Mime and Alberich. The voice is immense and powerful, à la Hotter—the Siegfried/Wanderer confrontation in Siegfried III is a stunner.

Following her perfectly proportioned but miniature Walküre Brünnhilde, Anne Evans here sings almost everyone under the table. The sound is not as big, broad, or incisive as that of a Varnay, Flagstad, or Nilsson, but Evans is a first-rate actress. Her voice is under complete control, nothing's wrong with its top or middle. (She loses all power at the bottom, however.)

Günter von Kännen's Alberich is in the Gustav Neidlinger, or topnotch, class: twisted, driven nobility wedded to seemingly limitless vocal reserves and stiletto-like accuracy of dramatic intent. As Mime, Graham Clark wheezes and pants, as full of stage business as a Dickens caricature. When he actually bothers to sing the notes, Clark is excellent, but otherwise his interpretation is far too much of a good thing.

Bodo Brinkmann's Gunther seems to be in a constant state of disarray; I miss the emotional complexity Fischer-Dieskau brought to this role (for Solti). As Gutrune, Eva-Maria Bundaushch makes more of her tiny solo scene following the Funeral March in Göttterdammerung III than I've heard anyone else do, but is otherwise unmemorable.

Philip Kang tears into Hagen with far greater ferocity than he brings to Fafner (his Hunding was better). Kang may lack the subtlety and sheer power of a Gottlob Frick (Solti), but this is a fine Hagen by any other standard.

Waltraud Meier sings Waltraute with surprisingly erratic vocal control but appropriate angst. Birgitta Svendsen is a youthful, clear-voiced Erda and a stately First Norn, and Hilde Leidland (who also sings Woglinde) is probably the best Forest Bird on record, her voice high, light, and full of avian agility. The Bayreuth Festival Chorus, directed by Norbert Balatsch, is its usual immaculately disciplined self, and the Festival Orchestra's ensemble playing is the now-expected perennial miracle.

These sets, the best representations yet of the Festspielehaus's unique acoustic, should satisfy those who love it as well as those who think it lacking in orchestral heft. The orchestral choirs are perfectly blended and discrete, as unlikely as that sounds, and the dynamic range is startlingly lifelike. The only problem is director Harry Kupfer's hyperactive blocking: stage noise is almost constant.

I usually recommend the Solti/London Ring as a first choice. I still do. But what Barenboim's Ring lacks in absolute top-flight voices it more than makes up for in substance, inspired conducting, and unparalleled sound. One of the great Rings.—Richard Lehnert
TRANSCENDENTAL BACH
Thoms Lab, piano
Transcriptions by: Rachmaninoff: Three Movements from Violin Partita 3 in E, BWV 1006; Busoni: Chaconne from Violin Partita 2 in d, BWV 1004; and Godowsky: Cello Suites 2 & 3, BWV 1008 & 1009; Prelude & Fugue from Cello Suite 5, BWV 1011; Siciliano from Violin Sonata 1, BWV 1001; Aria from Violin Sonata 2, BWV 1003
Dorian DIS-80117 (CD only). David H. Walters, eng., prod. DDD. TT: 70:26

Quite a few decades ago, when I was serving as Art and Editorial Director for Westminster Records, I mentioned to the company’s Musical Director, Kurt List, that there were some piano transcriptions of Bach unaccompanied violin and cello suites by Leopold Godowsky—that one-time devotee of late romantic pianists and teachers. These, I told him, had never been recorded; wouldn’t it be interesting to have one of Westminster’s keyboard whizzes, such as Raymond Lewenthal, tackle them? “Over my dead body,” he growled.

That anti-transcription attitude, so foreign to performers of the earlier part of the century, held full sway throughout the ’50s and until fairly recently. Now the tide has turned sufficiently to provide hyphenated-composer pieces that many listeners consider perfectly acceptable, whether in arrangements by the likes of Stokowski, Respighi, Busoni, Liszt, or Godowsky.

All this is by way of introducing the oddly entitled Transcendental Bach—not especially transcendent, but certainly featuring very effective transcriptive techniques. The Rachmaninoff, a delicious set of three violin partita movements, has of course been recorded a number of times, notably by the transcriber himself. Busoni’s Chaconne is even better known; but the Godowsky pieces—indubitably difficult, sometimes perversely complicated with their ingeniously added polyphonic voices, and just occasionally smacking of overkill—have here received, so far as I know, their recording debuts.

Thomas Labé, who had previously recorded Johann Strauss transcriptions for Doric, uses a wide set of dynamics for all these pieces, and he obviously has the fingers to deal with their vast technical demands. His style is modern, as opposed, for example, to the old grand manner of an Artur Rubinstein (in the Chaconne, for example). That Chaconne, in fact, at the end of each section tends to degenerate into too much noise-making, and tempo are occasionally much too hurried. Could there have been more charm to the other, shorter dances? And what about the numerous places where phrase endings really need to breathe in order not to sound hectic? Doric’s piano reproduction also leaves me wondering what happened to the treble of the instrument: though in other respects perfectly satisfactory, the sound is slightly reminiscent of a piano with a blanket over it.

—Igor Kipnis

Evgeny Kissin continues to mature on a recent Chopin solo recital disc.

BEETHOVEN: Piano Concerto 5 (“Emperor”)
RACHMANINOFF: Piano Concerto 2
Van Cliburn, piano; Fritz Reiner, Chicago Symphony Orchestra
RCA (09026-61961-2 CD only). Lewis Layton, eng.; Richard Mohr, prod. ADD. TT: 72:14

These classic recordings have long been prized by collectors for their sonic qualities. They’ve also been reissued a number of times. Here, RCA’s Living Stereo CD series continues by combing the contents of LSC 2562 and LSC 2641 (the original Shaded Dogs). Rather than dwell on the performances, which are top-notch and well-known to classical aficionados, let’s see how the sound of the new CDs compares with that of the original LPs.

My original 35/S5 pressing of the Beethoven “Emperor” LP (LSC-2562) spotlights a larger-than-life piano over luxuriously blended strings. Bass is exceedingly natural without being exaggerated, and soundstage depth is very good. Perspective is the same on the new CD, but the strings have a distant, artificial quality. Also, the piano has a metallic, ringing afterglow which detracts from its natural timbre. Soundstage depth is reduced somewhat, but bass is articulate and natural. A good CD, but not up to the original.

On the Rachmaninoff, my 35/S5 original LP sounds like a different recording. Bass is wonderfully warm, soundstage depth is tremendous, and the piano is dynamic and resonant. The dynamics in the introduction, in particular, are wide and realistic. By comparison, the CD sounds subdued, laid-back, and smooth. The piano is “woolier,” with less life and sparkle—-it seems to lack punch. The strings sound almost muted, with far less character than on the Shaded Dog. This CD simply doesn’t do justice to the recording.

Collectors pay upward of $100 apiece for these titles on clean, low-numbered, original LP pressings. At less than $10, this CD may fill the bill for many listeners, but don’t expect to experience the originals’ full glory. In this case, you get what you pay for.

—Carl Baughers
CHOPIN: Piano Music
Evgeny Kissin, piano

Recorded in concert before an obviously ecstatic audience at Carnegie Hall in February 1993, this program [marked “Volume I”] impresses most by the sheer technical brilliance of the playing—for example, the Op.34 No.1 Waltz. Having failed to be significantly impressed (should I perhaps have written “moved?”), both by the young pianist’s interpretations and the piano sonics in the majority of Kissin’s many previous recordings, I am happy to report that, sound-wise at least, the piano reproduction is far less electrophonic and unnaturally close-up than in the past—a decided improvement, though the bass is a bit woolly.

Regarding the performances themselves, there is also, it seems to me, more emphasis now on tonal values, especially at lower decibel levels. It’s still a problem when the pianist pulls off most of his declamatory stops, for his loud playing becomes massive and monochromatic rather than shaped for tone, graded volume, and direction. Pounding is too strong a word here, but I found the Polonaise in #1, in its outer sections, a really top-heavy experience.

The most beautiful playing (dare I guess that Kissin has heard the famous Lipatti recording?) is in the D-flat Nocturne, Op.27 No.2—a really lovely rendition—but in one of the other Nocturnes and the waltzes, I thought the pianist’s right-hand melodic painting could have utilized a more variegated, subtle palette. One is aware, seemingly, of a desire to be more lyrical—all to the good—and there is a certain deliberate quality (the opening of the Fantaisie) that hints at exploring the profundities of Chopin’s writing. When inward sensibilities appear, Kissin impresses me greatly, but, as with the Op.31 Scherzo (mislabeled Op.32), he sometimes lacks an overall view to his conception. Does Chopin have to sound so sectionalized? His music ought to be more than a series of mainly technical monuments raised for the purpose of extravert display. Can there not be more charm?

To be sure, there is much fine playing here. One hopes that even better can be forthcoming. BMG’s printed timing is two minutes shorter than that given above.

—Igor Kipnis

DELIBES: Coppélia
Kent Nagano, Orchestre de l’Opéra de Lyon
Erato 4509-91730-2 (2 CDs only). Michel Legrand, engs.; Martin Sauer, prod. DDD. TT: 99:05

I’m no lover of ballet music on disc, but this had me dancing ‘round the room. Nagano is something of a genius when it comes to putting works across. How does he get such jeûne du vire into a recording? This music fairly trips along—it’s witty, charac-
recorded by Albany records in 1984. This is a delightful work, tonal and easily accessible, and readily summoning to mind Vaughan Williams's London Symphony, Prokofiev's First Violin Concerto, the more frivolous style of Shostakovich, and Gershwin's swagger. Again, the recording is clear, detailed, and well-focused. The magazine's good, too, so go ahead if you can get it.

—Barbara Jahn

Nagano's Coppélia—a marvel of simplicity.

terful, and bursting with good humor; what's more, it is played with such precision and deft articulation that it seems a marvel of simplicity. And that is basically where Nagano scores—he gives the music without embellishment or idiosyncrasy; it all seems right and natural. The very first Waltz in Act I signals his intentions: it dances along with an easy lift and a beautifully sprung bass, and this surely is the secret of his success. All the performances that I've heard from this conductor have been rhythmically driven; with lift and vigor in this area he can make easy sense of even the most tortuous and complex melodies.

But there are certainly none of those here. From the variations in a Slav Theme and the Hungarian Dance in Act I, to the delightful Music for the Automata in II and the numerous specialty dances in III, momentum and freshness are in endless supply. The final Galop is as crisp and neat as the opening Prelude, and I would imagine that his live performances at the Opera House in Lyon last year were just as scintillating—it certainly looks as though they were having fun in the cover photograph. So, captured by a recording of equal focus and clarity, this production has to come with my highest recommendation.

—Barbara Jahn

Paul Hillier directs the Theatre of Voices in Lassus's St. Matthew Passion.

LASSUS: St. Matthew Passion
With: Visitatio (Easter Dialogue), Exsultet (from the Paschal Vigil)
Paul Hillier, Theatre of Voices
Harmonia Mundi 907076 (CD only). Robina G. Young, Paul F. Witt, prod.; Brad Michel, eng. AAD2 TT: 77:29

Most listeners' knowledge of Passion settings doesn't go beyond Bach or perhaps Schütz, or Penderecki's Passio et mort Domini nostri Jesu Christi secundum Lucam of 1965. But we have a rich history of polyphonic passions, both Protestant and Catholic, from the late 15th through the mid-18th centuries.

In Lassus's St. Matthew, the words of the Evangelist and Jesus are sung in a chant version from a manuscript in the Bavarian State Library. Lassus himself composed only the minor roles (Judas, Pilate, Peter, etc.)—all done either as duets or trios—and the crowd scenes (turbae), which are in five or six parts. The entire 59-minute performance is unaccompanied.

Visitatio, a brief Easter play, falls in the long tradition of "Quem queritis" dialogues—the models for all liturgical drama in the Middle Ages. Both this and the 14-minute Exsultet from the Paschal Vigil contain only chant, so I presume they have no Lassus in them at all.

Perhaps 80% of the CD consists of tenor Paul Elliott, who narrates the Passion, and conductor Hillier, who also sings the role of Jesus. Both are very fine, though it is Elliott's supple musicality that hangs in the memory. Under Hillier's direction, the 13-member Theatre of Voices, based at the University of California, Davis, is a sensitive, well-blended group.

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— Bound for Sound, No. 7a, 8a/93

Panink’s new Mahler Fourth—third time’s the charm.

This looks like an unusually egregious case of repertoire duplication: Haitink has already remade this symphony digitally, with the Concertgebouw Orchestra (Philips 412 119). Presumably PolyGram’s powers—be felt that an entire cycle should be recorded in Berlin, for consistency’s sake. Whatever the reason, the result is a beautifully sung version. The later two movements are the highlights of the performance. The Adagio’s opening theme flows smoothly at a just pace. The second theme sings sweetly, but as the clouds gather the succeeding climax is wrenching, and Haitink is not afraid to bring the D-minor section to the brink of desolation. Tempo relationships are perfectly gauged throughout, including the tricky Alla breve variation and the terraced accelerations leading to the horn choral. By comparison, Karajan’s spacious, burnished reading with the same orchestra (DG Galleria 419 863-2), impressively conceived in a single seamless line, seems reserved, although beautifully played.

The Finale’s opening has just the right easy, bucolic tone, while conductor and soloist convey the serenity of the final E-major strophe as one. Other conductors have brought more menace to the violent flashbacks to the symphony’s opening, but Haitink’s characterful pacing accommodates the need for verbal clarity. Sylvia McNair brings a fresh, girlish tone color and an even line to the solo, as well as a Lieder singer’s attention to verbal coloring and...
Sir Charles Mackerras's (left) new Così fan tutte runs neck-and-neck with John Eliot Gardiner's (center), with Sigiswald Kuijken (right) close behind. Mort Frank calls the race.

It is surely one of the better editions of the opera: well-paced and -sung; stylish, and aptly intimate, with a richness of orchestral color usually associated with period instruments.

One is immediately struck by the uncommonly crisp opening chords of the overture, where sharply defined detail and unhurried animation set the tone for all that follows. In fact, the orchestra in this production functions (as well it should) as a seventh character somewhat akin to a Greek chorus, commenting upon the action and helping to italicize the ethos of the moment. Also contributing to that ethos is the style-consciousness of all the performers, with added embellishments and accented appoggiaturas lending many arias a welcome emotional intensity. Certainly Mackerras and his able cast project the sensuality, rage, and remorse that are so central to this profound work. And the expressivity of the whole is heightened by the absence of self-indulgence. Fussy ritards at key cadential points that infect some performances of this work are never permitted. And the two great arias of Fiordiligi—"Come scogliera" and "Per pieta"—typify the entire production in conveying the power of the music without ever violating its Classical frame.

Perhaps the most distinguishing feature of this performance is its prevailing theatrical sense—a sense conveyed not with sonic gimmickry, but with a clarification of emotional context. Recitatives, for example, are delivered with an uncommon dramatic conviction that suggests a character's feelings of the moment. In many other performances, the recitatives sound bland and mechanical by comparison.

The only (minor) shortcomings involve a few instances of less-than-ideal pacing. One occurs at the close of the first act, where Mackerras's fleetness causes some blurring of notes and words: the other occurs near the conclusion of the great Act II duet, "Fra gli amlessi." Here Fiordiligi's resistance to seduction crumbles, and, in one of the most sensual moments in all of Western music, she and Ferrando sing of "embracing, moaning with pleasure, and sighing with sheer delight." At this point, the rapid tempo denies the music the ethereal weight; she stands with Emmy Loose (with Kletzki, last on Seraphim 6-60105, LP) and Karajan's Edith Mathis as the finest exponents of the part.

The first two movements, though less striking, receive strong, positive performances: well paced, full of expertly balanced detail, and attentive to Mahler's carefully marked changes of tempo and mood. True, many passages are played somewhat louder than their piano and pianissimo indications; on the other hand, Haitink draws more precise ensemble and full-bodied tone from the Berliners than Karajan's penchant for smoothed-over textures permitted. The sound is full and clear, with plenty of impact and color.

As a document of Haitink's growth as a Mahler interpreter and a testimony to his newfound willingness to take risks in the music's service, this is comparable to his recent recording of Symphony 3 (Philips 432.162). Of the currently available Fourthsthat is, in the absence of Horenstein—this ranks with Solti/Chicago (London 410 188), Bernstein/NYP (Sony SMK 47579), and Bernstein/VPO (DG 423 607); for me, Haitink comes closer to the composer's essence than his two esteemed but inevitably more intrusive colleagues.

—Stephen Francis Vasta

**Mozart: Così fan tutte**

Amanda Roocroft, Fiordiligi; Rosa Mannion, Dorabella; Rodney Gilfry, Guglielmo; Rainer Trost, Ferrando; Eirian James, Despina; Carlos Feller, Don Alfonso; John Eliot Gardiner, English Baroque Soloists, Monteverdi Choir

DG Archiv 437 829-2 (3 CDs only), Ulrich Vette, eng.; Karl-August Vette, prod. DDD. TT: 3:05:15

**Mozart: Così fan tutte**

Soile Isokoski, Fiordiligi; Monica Groop, Dorabella; Nancy Argenta, Despina; Markus Schäfer, Ferrando; Per Völstad, Guglielmo; Maub Calessen, Don Alfonso; Sigiswald Kuijken, Orchestra & Chorus La Petite Bande

Accent ACC 9296/98 (3 CDs only), Adrian & Andreas Gliert, prod., engs. DDD. TT: 3:01:22

**Mozart: Così fan tutte**

Felicity Lott, Fiordiligi; Marie McLaughlin, Dorabella; Nuccia Focil, Despina; Jerry Hadley, Ferrando; Alessandro Corbelli, Guglielmo; Giles Cachenaille, Don Alfonso; Sir Charles Mackerras, Scottish Chamber Orchestra, Edinburgh Festival Chorus

Telarc CD-80360 (3 CDs only), Jack Renner, eng.; James Mallinson, prod. DDD. TT: 3:08:44

Time was when Così fan tutte suffered as the stepchild among Mozart's greatest operas, though not because of any musical shortcoming. Rather, as Anthony Lewis once suggested in a brilliant op-ed piece in the New York Times, it resulted from the work proving too disturbing to 19th-century audiences. After all, it questions, even reutes, the traditional notions about the moral rectitude of sexual fidelity. But as these three new releases suggest, Così is now recognized as a profound commentary on human nature.

Given the prevailing glibness of Mackerras's Mozart-symphony recordings, his new Così comes as a refreshing surprise.

This interestingly conceived two-piano program, brilliantly and excitingly played by two Soviet-born performers, devotes just under a quarter of the contents to two pieces by Medtner, contrasting them quite effectively with the far-better-known works by the composer most often compared with him. Rachmaninoff, seven years older than his compatriot, was extremely fond of Medtner's music; but, in spite of the recent efforts of a number of enterprising record companies and proseyenting pianists, it remains Rachmaninoff, in my view, who continues to make the lasting impression. The present performances are definitely worth hearing, though Argerich and Rabinovich (Suites 1 & 2 and Symphonic Dances) are just as electrifying in ensemble, slightly warmer in tone, and rather less bangy in recorded sound. Still, this is a set of performances to admire for the sheer rhythmic spirit and power of the two players. As mentioned, the piano reproduction tends toward percussiveness at top volumes; soundstage is good, though perhaps there is more reverberation than one might like.

—Igor Kipnis

**Medtner: Russian Round-Dance, Op.58 No.1; Knight Errant, Op.58 No.2**


Dmitri Alexeiev, Nikolai Demidenko, pianos

Hyperion CDA66654 (CD only), Philip Hobbs, eng.; Ates Orga, prod. DDD. TT: 78:52

**Rachmaninoff: Piano Concerto No.2, Op.18**

Mr. Karsani's U.S. debut was announced last week by the New York Philharmonic, where he made his American orchestral debut last night at Avery Fisher Hall.

Mr. Karsani's debut with the New York Philharmonic was described as a "tremendous success." The audience was enthusiastic, and the review praised the "virtuosity and technical precision" of the performance.

Mr. Karsani's Concerto No.2 is a challenging and demanding work that requires a high level of technical skill and musical interpretation. The concerto features a complex and virtuosic piano part, with extended passages that require fast and precise fingerwork. The orchestra also plays an important role, providing a rich and dynamic accompaniment to the piano.

The performance at the New York Philharmonic was well-received, with many critics praising the "brilliant" and "energetic" performance of the concerto. The review noted that Mr. Karsani's "interpretation was powerful and passionate," and "the orchestra played with great precision and enthusiasm."
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**Stereophile, December 1994**
real eroticism conveyed so well in the recordings of Karajan and Sir Colin Davis. Still, if Mackerras does not quite project the magic of the moment, he nonetheless sustains a high level throughout.

Telarc provided a triple harp in string tone, with the overall ambience suffering from a slight hi-fi glassiness. But it is exemplary in the way it clarifies the placement of singers in the complex ensembles, where each character maintains his or her own identity while blending musically with the group. In short, whatever the minor shortcomings of this release, they are outweighed by its many virtues.

The first among many things that sets Gardiner’s totally different production apart from Mackerras’s is its engineering. Recorded during a staged presentation at Ferrara’s Teatro Communale in 1992, it offers some of the most realistic sound I’ve heard on CD, the period-instrument strings having a natural musical timbre that remains all too rare on disc. Furthermore, the voices are often seem (as they should) to be coming from behind the orchestra. In other words, there is a depth perspective here absent from the Mackerras set. To be sure, Telarc provided greater separation of voices in the ensembles than the DG engineers were evidently able to do in a live staging where considerable movement occurs. To DG’s credit, however, none of the voices is ever off-make—for, of course, when a character is present to be well-removed from center stage.

Perhaps the best way to distinguish this Archiv set from the Telarc is to say that the latter is a modern-instrument account that incorporates aspects of period-instrument style, whereas the former is a period-instrument version that (despite its A = 430 pitch) often sounds closer to modern-instrument productions. At the root of these distinctions are the contrasting approaches of the two conductors. Gardiner not only favors a wider range of tempos, he also leans toward a more flexible rhythm within individual areas. The overall effect of his freer style is to suggest more of the music’s sensuousness and implicit emotional range.

Gardiner also seems less interested in italicizing individual orchestral strands, so that there is less superficial color in his performance. But the period instruments, of themselves, are often more colorful than their modern counterparts, particularly the brass. Consequently, Gardiner’s orchestra is every bit as vibrant a commentator upon the action as Mackerras’s. It is also interesting that Gardiner’s “authentic” production features less embellishment than Mackerras’s “modern” one. Each approach is convincingly in its own way, a preference being a matter of taste. Similarly, taste may govern one’s view of Gardiner’s less nervous and less inflected way with recitatives. (Both performances include an appendix featuring a long, but not especially distinguished, aria that Mozart composed for Guglielmo but later replaced with the glorious “Un aura amorosa.”)

With regard to the singers, Gardiner’s are as fine as Mackerras’s, and sometimes better pitch-centered in very demanding moments. One surprise in the Gardiner set: I had anticipated (on the basis of what had preceded) that the moment of Fiorillil’s seduction would match the haunting sensuality conveyed in the Karajan and Davis editions. No such luck! Gardiner makes a bit more of the music than Mackerras does, but still fails to project all of its implicit sexuality. In all other respects, the production he leads is magnificent.

Like Gardiner’s account, Kuijken’s uses period instruments and was recorded during a staged production employing highly accomplished singers. But similarities end with these shared features. Although there is nothing radically wrong with Kuijken’s direction, it lacks the virtues of the other two. For one thing, his orchestra, though not insubstantial in size, sounds scrappy, the strings often covering important material in the winds and brass. As a result, it loses some of its identity as a seventh character. Furthermore, Kuijken uses a harpsichord, not only for the recitatives, but throughout the arias and ensembles as well. This lends the orchestra a sonority that seems more suited to a Baroque concerto-grosso than to a Mozart opera. (Both Mackerras and Gardiner employ a fortepiano in the recitatives.) Then, too, there is far less variety of pacing in Kuijken’s performance than in Gardiner’s, making things seem a bit slack, and undermining the dramatic contrast between arias and the sensuality of some of them.

Nevertheless, there are some fine things here. The production’s overall intimacy is absolutely right for Così. Added embellishments, if not as florid as at frequent as those in the Mackerras version, are tasteful and contextually apt. And some of the opera’s most expressive and beautifully projected. Certainly this is a more musical, more dramatic, and more sensuous performance than the Östman account—the period-instrument version to which it bears the most resemblance. Thus, for those who enjoy a lightweight approach, Kuijken’s direction may have appeal.

But on balance, Gardiner’s offers more in terms of drama and emotional range, and certainly features a more tonally alluring and expressive orchestra. Accent’s libretto is quadra-lingual, DG’s and Telarc’s bilingual, and the latter two labels offer nearly double Accent’s number of access points. Whatever the relative merit of these new releases, there is no question that each be-speaks a level of appreciation of Così that is a relatively modern phenomenon.

—Mortimer H. Frank

PERSICHETTI: Music for Band
Divertimento, Psalm, Choral Prelude: O God Unseen, Pageant, Masquerade, O Cool is the Valley, Parable
David Amos, London Symphony Winds
Harmonia Mundi: 909792 (CD only).

One of the more enlightened releases of the year, this CD comprises all of the concert-band music composed by Vincent Persichetti over a period extending from 1949 to 1974. Although a lifelong resident of Philadelphia, Persichetti enjoyed a 40-year tenure at the Juilliard School of Music in New York. Musicians who attended his classes recall his fascination with, and his ability to describe, the formal design by which Bartók could create a highly complex 30-minute symphonic work such as Music for Strings, Percussion, and Celesta entirely out of material set forth in the first eight bars.

Persichetti’s comprehension of the formal designs of great composers is amply reflected in his own work. From the early, breezy, slightly commercial-sounding Divertimento through the deeply felt choral preludes and increasingly complex works, to the highly abstract and challenging Parable, one is struck by the combination of technical resources, tune craft, style, and wit.

Persichetti did not suffer from lack of professional recognition. Although this recording contains a few debuts, most of these works have been recorded before. The problem of Persichetti’s low profile in today’s music scene relates more to the ongoing problem of repertoire choices which tend to emphasize that which is already known to most. The band music contained in this collection continues to exist in a vacuum of college and conservatory wind and wind ensemble workshops.

That is, until now—I hope. This is a definitive collection. Conductor David Amos has dedicated the recording to Frederick Fennel, who pioneered the concept of the lean-textured wind ensemble as an alternative to the massive military bands of the Sousa era, and recorded some of these works with the Eastman Wind Ensemble for Mercury Living Presence (not yet reissued). One would expect that Dr. Fennel, still active in the field, could have pulled this off extremely well, had he chosen or been chosen to do so. It is doubtful that he could have outdone Amos with the expanded London Symphony wind group provided for these sessions.

Harmonia Mundi continues to fulfill its reputation for consistently honest, high-quality audio production. For those as yet unfamiliar with Persichetti, it’s about time. This recording is the place to start.

—Richard Schneider

RACHMANNINOFF: Symphony 3, Symphonic Dances
Marias Jansons, St. Petersburg Philharmonic
EMI CDC 5 74877 2 (CD only).

RACHMANNINOFF: Piano Concerto 3, Paganini Rhapsody
Mikhail Rudy, piano; Marias Jansons, St. Petersburg Philharmonic
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Marias separation—although from is sail worth are sensitively these not stamp sensu.

But is learned for first only sense; Karl-Bernhard von Stumpff; cello; Ochester-Akademie Hamburg; Elmar Lampson.

The Symphonic Dances open in a less impassioned mood than I would have liked, but the solos are beautifully shaped and recorded with excellent clarity and separation—although this, in itself, prevents the kind of lush tonal blending that is the essence of Rachmaninoff's sound. I liked Jansons' handling of the Waltz movement, with its sensitive rubato, but this very quality is conspicuous by its absence in the lent assai of the Finale. Here there is little magic; rather, it preempts the assertive stamp of the rest of the movement which, unfortunately, even infiltrates the Orthodox chant statement in the coda. So, a disc not entirely to my taste, but definitely worth hearing if you want a recording of these two works.

The same forces are joined by Mikhail Rudy for a quite wonderful performance of Piano Concerto 3, the work which Rachmaninoff gave for his New York debut from hand-written parts. (He had only just finished composing it when he had to set sail for the States, and so learned to play it on a dynamo keyboard during the voyage.) This truly virtuoso work is given with the greatest sense of panache by Rudy. But this is not simply a performance of empty pyrotechnics; Rudy is also in complete empathy with its sumptuous melodies and sensuous harmonies. He is the perfect partner for Jansons, too, for both give tight rhythm and articulation top priority.

I only wish the piano had been more sensitively placed and recorded—it is close and rather twangy, sounding just slightly out of tune in places. The fact that this only detracts momentarily from the performance says much about Rudy's magnetism. It is equally gripping in the Pagannini Rhapsody, the decedence of the waltz Variation XII, and the insinuating voluptuousness of the famous D-flat major Variation XVIII only two examples of some wonderfully characterful interpretation.

This disc is a priority, even for those already blessed with recordings of these fine works.

—Barbara Jahn

SCHNITTKE: Piano Trio, Piano Sonata 2, Quasi Una Sonata
Mark Lubotsky, violin; Irina Schnittke, piano; Misitlav Rostropovich, cello; English Chamber Orchestra, Misitlav Rostropovich
Sony SK 53271 (CD only). Uli Schneider, eng.; Andreas Neubronner, prod. DDD. TT: 62:33

SCHNITTKE: Violin Sonata 1, Canon, Piano Quintet, Gratulationsrombo
Mark Lubotsky, violin; Ulrike Bauer-Wirth, harpsichord; Irina Schnittke, piano; Tamaz Batashvili, violin; Grazyna Filipajtis-Lubotsky, viola; Karl-Bernhard von Stumpff, cello; Ochester-Akademie Hamburg; Elmar Lampson
Sony SK 53357 (CD only). Louis van Emmerik, eng.; Philip Walden, prod. DDD. TT: 57:43

Alfred Schnittke's work continues to enjoy major-label attention. Schnittke eschews any one "school" or method of compositional style. His expressions are, therefore, free of restrictive, theoretical bounds, and the music seems to evolve in a natural, unstudied manner. With two world-premiere recordings—Piano Sonata 2 and Trio for Violin, Cello, and Piano—to recommend it, the Rostropovich disc is of particular interest.

Rostropovich's Quasi Una Sonata is brisker than Gidon Kremer's more dramatic and deliberate live 1988 recording with the Chamber Orchestra of Europe (DG 429 413-2), but offers an equally heroic violin performance from Lubotsky. This violin/chamber-orchestra version offers a fascinating alternative to the violin/piano arrangement, which can be heard on Bis CD-527 with violinist Ulf Wallin and pianist Roland Pöntinen. The composer's pianist wife, Irina, performs the Piano Sonata 2, alternately ruminative and expansive, with great agility and expressiveness on this inaugural recording. Likewise, the Trio for Violin, Cello, and Piano—a reworking of the 1985 String Trio written to commemorate the 100th birthday of Alban Berg—is treated to a symphonic, delicately detailed interpretation by the composer's friends and family (Lubotsky, Rostropovich, Irina Schnittke).

The Congratulatory Rondo for Violin and Piano is presented here by Lubotsky and Irina Schnittke with greater brio, vigor, and intensity than the delicate, tipoezing version by Ulf Wallin and Roland Pöntinen on Bis CD-527. The remaining works are all played with enthusiasm and, presumably, insight.

Schnittke's sonics are more upfront than the

Mariss Jansons conducts two new Rachmaninoff discs with precision, sensitivity, and firm control.

and more spacious Bis recording, though both of these Sony CDs offer superb digital sound, the premiere disc benefiting further from Sony's 20-bit Super Bit Mapping technique. Both are essential additions to the Schnittke discography.

—Carl Baugher

SCHUBERT: Piano Sonatas
András Schiff, piano
Sonatas in C, D.840; in a, D.845; in f, D.571
London 440 305-2 (CD only). DDD. TT: 70:36
Sonatas in e, D.566; in a, D. 784; in D, D.850
Both: John Pekowe, eng.; Christopher Raeburn, prod. SCHUBERT: Piano Sonatas
Jenö Jándó, piano
Sonatas in a, D.784; in G, D.894
Naxos 8.55070 (CD only). Janos Bohus, eng.; Ibolya Tóth, prod. DDD. TT: 58:38

Here are three significant releases. However one ultimately feels about Schiff's performances, they leave no doubt that a commanding artist is at the keyboard. He displays remarkable control of sonority and nuance. Writing in the notes accompanying these first two releases in what is a projected cycle of the Schubert sonatas, the pianist claims that the Bösendorfer he favors is better suited to them than a more brilliant Steinway. He makes a good case for his choice. His tone is full but never clangorous, and he produces a wide dynamic range that underscores the frequent sharp contrast of loud and soft that stamps this music with Schubert's knowledge of Beethoven. Schiff is also adept at conveying the angular, craggy profile of these works that once led to their being deemed unpianistic. This is most evident in the first movements of D.840, 845, and 850. D.840 is particularly interesting—a two-movement fragment whose nearly 17-minute opening Moderato is on the grand scale of the composer's last three sonatas.

Yet for all the virtues of these performances, they sometimes seem too controlled. It is as if Schiff is either unable to permit the music to flow naturally, or is excessively concerned with suggesting "expression." This shortcoming is most apparent in some of the second subjects of first movements, where tension relaxes to 1 The original work is available in a luxuriously resonant reading by members of the Tale Quartet on Bis CD-547.
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a fault. And the labored tempo of the finale of D.850 masks the movement’s implicit playfulness. Similarly, the finale of D.566 is difficult to the point of sounding sleepy.

Still, Schiff often conveys an apt passion and intensity. And to D.571 (a verso of a movement) he brings a welcome rippling grace that alleviates our loss in its not being completed. All repeats are observed—a practice that Schiff argues for in his accompanying notes, and one that the relative unfamiliarity of this music justifies. London’s Sound of London was ominously monumental in its wide dynamic range that never overemphasizes pianissimos. Whatever the shortcomings of these discs, they have enough merit to generate interest in future releases in the cycle.

In some respects, Jandó’s approach to Schubert is similar to Schiff’s. He favors stark, sharply drawn dynamic contrasts and, like Schiff, conveys the dirge-like character of the movement of D.784, projecting its funereal ethos and cutting dissonances with, if anything, even greater intensity. But, unlike Schiff, he manages to draw a tauter line between first and second subjects, thereby maintaining tension at points where Schiff allows it to slacken.

Tonally, however, Jandó is somewhat more percussive, though never to the point of sounding unpleasant. This difference may be rooted part in the closer engineering he receives, which denies the softest passages the airy distance they have in Schiff’s recordings. And I suspect, too, that Jandó is playing a Steinway rather than a more mellow Bösendorfer.

Like Schiff, Jandó includes all repeats. Despite the length this imposes on first movements, it lends them a welcome statue. And in the initial movement of D.894, the flowing lyricism of his approach prevails to music from sounding tedium, while his explosive forte in its development section heighten dramatic contrasts and sharpen motivic profile. And to the work’s finale he brings a wonderfully playfulness.

In short, as he did in an earlier Naxos release devoted to the Moments Musicaux and Three Pieces, D.946, Jandó proves a sympathetic Schubertian. With this Naxos CD costing less than half of what is asked for each of the Schiff discs, it comprises an exceptional bargain. Certainly anyone unfamiliar with this once-misunderstood music should make a point of getting to know it. In their melodic, harmonic, emotional, and formal breadths, they tower over most 19th-century piano works.

—Mortimer H. Frank

SHOSTAKOVICH: Symphonies 3 & 9
Eliahu Inbal, Vienna Symphony
Deutsche Grammophon 45445 (CD only), Hiroshi Goto, eng.; Yoshiharu Kawaguchi, prod. DDD. TT: 57:20

SHOSTAKOVICH: Symphony 4
Eliahu Inbal, Vienna Symphony
Deutsche Grammophon 45381 (CD only), Hiroshi Goto, eng.; Yoshiharu Kawaguchi, prod. DDD. TT: 63:23

SHOSTAKOVICH: Piano Concertos 1 & 2, Piano Sonata 2
Elizabeth Leonskaja, piano; Hugh Wolff, Saint Paul Chamber Orchestra

Telecord 9031-73282-2 (CD only). Michael Bramm, Eberhard Sengpiel, engs.; Bernhard Muich, prod. DDD. TT: 70:27

Shostakovich’s Symphony 3, written in 1929, is a single-movement work that ends with a four-part mixed chorus singing a verse by Kirsanov that reflects the “goals of Soviet society following the Bolshevik revolution.” The preceding music is ever-changing; there is no thematic development, but different tempos suggest the individual movements of standard symphonic form. It implies that the work is non-sequential, despite its fragmentation. The VSO gives a good performance, and sonic balance of foreground and background motifs is finely tuned. But unfortunately, with the appearance of the chorus, detail is lost, and the sound becomes distorted.

Happily, the opening work on this disc, the all-orchestral Symphony 9, is, again, recorded with great clarity and razor-sharp focus. Although Shostakovich wrote that this work was to be “a symphony of victory with a song of praise,” written as it was in 1945 following the defeat of Nazi Germany in the Second World War, it turned out to be very different. Although the first, third, and final movements are lively and witty, containing large amounts of scathing parody, the second and fourth are very different propositions. The second movement’s lugubrious, sensual chromaticism that slides around in the depths of the orchestra, and the hymn-like Largo fourth, were surely risky propositions for a composer who was being watched closely after the branding of his preceding symphony as “anti-revolutionary” and “anti-Soviet.” Inbal is excellent in this work, handling changes of mood with the utmost sensitivity. I recommend this disc, if you can accept the shortcomings of Symphony 3’s last few minutes.

Symphony 4 was completed in 1936, but did not receive its premiere until some 25 years later. It is a massive work, using an enormous orchestra, and was planned during a period of euphoria following the success of the composer’s opera, Lady Macbeth of the Mtsensk District, in 1934. But only two years later, Pravda condemned both the opera and the ballet The Limpid Stream, and Shostakovich was labeled “an enemy of the people.” Sensibly, he withdrew the symphony before its scheduled first performance in December 1936, and, as the manuscript went missing during the Second World War, for many years the only proof of its existence rested on the piano-reduction score which Shostakovich himself had made. Eventually, Boris Schallmann constructed a new orchestral score from the sum of the parts, and its first complete performance was given in 1961.

This unwieldy work, with its enormous (+25 minutes) outer movements and its comparatively short, nine-minute scherzo central movement, is a compendium of forms and emotions, many of them violent. Inbal draws some wonderful playing from the VSO, both technically and spiritually. Yet, driven though it is, it somehow lacks bite and rhythmic weight, lessening tensions and concentration, and making the weight of its vast length felt by lack of contrast. Again, recording and balance are exemplary, but this alone cannot prompt a recommendation.

The First Concerto for Piano, Trumpet, and String Orchestra was completed in 1933, four months after Shostakovich finished the last of his 24 Preludes for Piano. It is a youthful, ebullient work, full of popular-music pastiche and “jazz” inflections. It needs an easy, relaxed approach, even with the tender central-movement theme. Leonskaja here is altogether too deliberate, oppressing the quixotic changes and halting the flow of this carefree music. She is better in the toccata-like passage-work of the Finale, but the forward balance of the piano in the recording never allows for a true partnership with the orchestra.

The much tighter language and construction of Concerto 2, composed in 1957 and first performed by Shostakovich’s son Maxim, suits her style much better, her neatness and precision definite bonuses here. This is also true for the Sonata 2, a serious work which she negotiates methodically and with great thoroughness. However, this is not a disc with which I urge you to look elsewhere for performances of these works. —Barbara Jahn

WAGNER: Die Meistersinger von Nürnberg
Bernd Weikl, Sachs; Ben Heppner, Walther; Cheryl Studer, Eva; Siegfried Lorenz, Beckmesser; Kurt Moll, Peeper; Deon van der Walt, David; Cornelis Kalisch, Magdalene; Hans-Joachim Ketschen, Kothner; others; Bavarian State Orchestra & Chorus, Wolfgang Sawallisch
EMI CD S 55142 (4 CDs only). Wilhelm Meister, Peter Alward, prod.; Hans Schmid, eng. DDD. TT: 4:16:42

In the space of a few years in the early 1970s the major label released no less than four recordings of Wagner’s wisest, most adult opera, Die Meistersinger von Nürnberg. Three of these—conducted by von Karajan, Solti, and Jochum—were studio recordings. The fourth was Silvio Varviso’s ponderous 1974 Bayreuth Festival document. Then nothing for almost two decades, with the notable exception of Kubelik’s passionate account on Myto (reviewed in the February 1993 Stereophile). This release was then taped in 1967. It’s been a long wait for a new take on this work, but Wolfgang Sa-
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Meistersinger

by der wallisch's Bailey, weak, perfectly watchman from ship flight by Dietrich their his without picture van der Kothner—entirely active, for proves, S... III Kusche—or Hotter that's Fischer-Dieskau been, one, that's the recent Bayreuth Lohengrin (and looking forward to her in the same role in Abbado's new DG recording, out next month), I had greatly anticipated her Eva. What a disappointment.

Studer may suffer most from it, but every one of these singers' voices sounds much thinner than I've heard them elsewhere. Engineer Hans Schmid evidently favors a distant perspective and a disembodied sound for soloists, chorus, and orchestra alike. However, I think this lack of immediacy and heft is as much Sawai..."...s fault as any knob-twiddler's. This conductor—who 30 years ago conducted the most gripping, exciting Holländer and Tannhäuser on disc, both at Bayreuth—seems to have since grown so refined and delicate in his approach to Wagner as to be downright diffident: the Karajan Syndrome at best, at worst a reversion to Kapellmeisterstum's fuzzy fluidity. The score is certainly laid bare enough here, its every sinew and artery deftly articulated and held up to Sawai...s dispassionate gaze. But in this case of vivesection, the patient comes out the worse for the cure.

Recommendations? First, the three K's: Kubelik (Myto), Keilberth (Eurodisc), and Karajan/1970 (EMI), in that order. And try Solti (London) or Karajan/1951 (EMI) before changing this one.

—Richard Lehner

ANONYMOUS 4: Love's Illusion

Music From the Montpellier Codex

Harmonia Mundi 907109 (CD only). Robina G. Young, prod.; Brad Michel, eng. DDD. TL 64:04

I would normally start a review of this sort with a disclaimer, like "French double and triple motets of the 13th century are unlikely to appeal to the average listener, with their interwoven—yet—separate texts and complex harmonic structures"; but when total musical illiterates are turning discs by Benedictine monks into crossover hits, I try to keep my mouth shut. The truth, however, is that this kind of early music is not easily accessible; I suggest listening to it first as pure sound, without attempting to follow or make sense of the lyrical and musical complexities.

For such listening, nothing could be better suited than this performance. Anonymous 4 make the most gorgeous sound you're likely to hear anywhere; their purity of intonation is certain to astonish anyone who listens, even if they don't have the technical knowledge to understand why they're so affected. Robina Young and Brad Michel have captured this sound in a recording of equally superior quality, which cannot help but enhance its effect on the listener.

All of this is not to suggest that text is irrelevant to this kind of music; on the contrary, there are considerable rewards to be found in studying these motets, with their peculiarly medieval combination of sacred-chant tenors and erotic secular lyrics, which resulted from the assimilation of the Troubadour ethos of fin amors (courtly love) into the cult of the Virgin and (later) into enormously complex religious—erotic allegories, such as those of Manesse. On all possible levels, this is a record not to be missed.

—Les Berky

BABBITT: Correspondences

CAGE: Atlas elipiticals

CARTER: Variations for Orchestra

SCHULLER: Spectra

James Levine, Chicago Symphony

DG 431 698 (CD only). Klaus Behrens, Hans-Rudolf Muller, Gregor Zielinsky, engs.; Christopher Adler, prod. DDD. TL 68:23

These four composers have represented the abstract and cerebral approach to formal music. Their task has not been to entertain or mollify, but to inform and advance the structure of music. In so doing, they've been criticized for alienating classical audiences from new music, and having created a ghetto for trained professionals and specialists. It's the music America loves to hate, with an American flag on the cover. Having made an excellent Gershvin album with these same forces, James Levine apparently felt it was time to show the opposite side of the coin.

Elliot Carter comes up the master. At age 84, Carter is the senior American composer. More than any of the others on this recording, he has acquired a degree of recognition and acceptance that transcends the complexity of his works. Although highly abstract thematically, Variations, composed in 1955, flows with a dramatic logic of ebbing and flowing emotions which more of today's listeners have learned to appreciate.

If Gunther Schuller comes up second banana in this bunch, perhaps it's because he's had so much on his plate over the years. Schuller has enjoyed a virtual renaissance—man career, starting as a youthful French
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horn player and jazz musician, to composer, conductor, administrator, and gadfly to other music administrators and performers at every level of the profession. Composed in 1958, Spectra breaks down the orchestra into constituent sections—not necessarily the usual ones. An accurately staged stereo recording is essential in order to reveal the composer’s intentions. Fortunately, the production comes through, as only DG can when its people are on a roll. Spectra is revealed as a work to be reckoned on as nearly on a level with Carter’s Variations.

A faculty member for many years at Princeton University, Milton Babbitt is known as a strict 12-tone constructionalist, and as a composer of extremely intricate music. Written in 1967, Correspondences explores the similarities and contrasts between acoustic string playing and synthesized figures on tape. This is not a piece for listeners in search of themes and melodies, but it does grow on one.

Perhaps in ascending order of magnitude, this program asks the listener how much of “a nice tune” we might be willing to sacrifice for sheer instrumental color, intriguing figuration and invention, and overall dramatics. No one on this collection has asked this question with more challenge than the late John Cage. His Atlas eclipticalis, from 1961, is an improvisational work comprising short groups of figures played by individuals and small ensembles on their own initiative, or cued by the conductor. Aside from challenging the assumptions of audiences, works of this type present musicians schooled in the skills and styles of the classics with an approach to playing which seems ungratifying in its lack of traditional musicality. Program annotator David Hamilton recognizes this problem in his references to instances of actual sabotage by some orchestras of their own performances of Cage’s music. Although sabotage is the last thing one would expect from the CSO, one can’t escape the feeling that certain players, especially in the brass, are just on the verge of cracking up. Which begs the question: Have we been taking the avant garde too seriously all this time?

On audio terms alone, this recording should turn heads and win prizes. No vacuum suckouts in the pauses in the Cage, which is as much about its pauses as its noises. The Babbitt is rendered with exquisite delicacy, and the Schuller and Carter works display the full dynamics of varied and powerful orchestration. Crank it up.

—Richard Schneider

BRUCH: Violin Concerto 1
MENDELSOHN: Violin Concerto in b

Maxim Vengerov, violon; Kurt Masur, Gewandhaus Orchester
Teldec 4509-90875-2 (CD only).
Friedemann Engelbrecht, prod.; Ulrich Ruscher, eng. DDD. TT: 75:30

MAXIM VENGEROV: Virtuoso

Maxim Vengerov, violon; Iman Golan, piano
Bazzini: La ronde des lutins; Bloch: Nigum, No.2 from Babymam; Kreisler: Scherzo capriccioso; Tchaikovsky: Scherzo, Op.42 No.2; Melodie, Op.42 No.3; Wieniawski: Polonaise No.1, Légende.

No, the world doesn’t really need another pairing of the Mendelssohn and Bruch concertos, but it does need any recording it can get on CD from the remarkable Maxim Vengerov. These discs clearly distinguish Vengerov from the profusion of young violin virtuosos that has populated the recording world in recent years. This Russian-born Israeli is truly something to behold.

What’s most impressive about him is not so much his astonishing virtuosity as his complete sense of assurance and maturity. Both concertos unfold in angelic cantabile lyricism, with effusive Romantic sweep rendered in extraordinarily clean articulation. Breathing real life into these old warhorses, Vengerov exhibits his expressive phrase-sculpting gifts with bold, singing vigor.

No less impressive is the disc of virtuoso pieces. Vengerov oversets the exhibitionist nature of many of these compositions by pouring true soul and fire into them. And in the less florid pieces, such as those by Messiaen and Bloch, he summons a deeper passion that is equally remarkable.

As if this weren’t enough, Ulrich Ruscher’s engineering is as praiseworthy as Vengerov’s playing. The sound on both discs is stunning, with a carefully measured combination of detail and ambience that’s ideal for the music. In case you haven’t guessed, I’m impressed.

—Robert Hesson

JOHN SOLUM: The Instrument of Kings

John Solum, flutes; Igor Kipnis, keyboards; Arthur Fiocco, cello


This CD is something new for me: the first audiophile-oriented recording which I prefer to recommend for the performance rather than for the sound. I had already noted John Solum’s fine flute work on the Chesky Four Seasons CD, and he demonstrates here that his previous fine playing was scarcely a fluke. He uses two very beautiful boxwood flutes on this selection of works by composers from Handel to Mozart, and draws lovely tone from both. Igor Kipnis is an able accompanist, as always, and he gets to play fortepiano here as well as harpsichord. He is relatively new to the former instrument, having recorded on it only in the last few years, but he plays with great polish and verve; both he and Solum are especially adept in their choice of ornamentation throughout. Of the seven pieces on this disc, I particularly enjoyed the Handel Sonata in G, the excerpt from Telemann’s Tafelmusik, and the middle-period Mozart Sonata in G, for which the fortepiano makes a very lovely sound indeed. Anyone who enjoys the music of the 18th century will certainly want this CD, if only because several of the works appear here in premiere versions for the flute, transposed by Solum himself.

Now for the sound: this CD and others from Ephany and similar labels definitely represent the wave of the audiophile future. The master optical discs for this recording were produced with claimed 24-bit word length and 88.2kHz sampling—I’d love to hear the originals. Of course, given the present CD standard, this degree of resolution only means that we will get the best 16-bit, 44.1kHz final product possible. Still, many of the ultra-high-tech discs I’ve heard recently, these included, have sounded far better than I’d thought possible from current-level digital.

There are, however, two problems with this Ephany disc that I cannot ignore. The first is a constant low-level hiss that is present throughout the disc. This does not appear to be a digital artifact, since it doesn’t change in level with the music; I suspect the microphone preamps are responsible. The level of noise present, though only mildly annoying on loudspeakers, is quite bothersome on headphones. Considering that Ephany advertises “lowest possible noise floor” in their literature, I think they ought to pay more than a little attention to this sort of thing.

The second problem I mention may not be a problem at all. I refer to the use of brass as a material for Ephany CDs’ reflective layer. I fall to see where the claimed greater reflectivity (if it were true, which I’m not sure about) would improve the sound of a CD. What’s important to the laser-detector system of the CD is the presence or absence of a difference in the intensity of the reflected beam? In addition, brass, unlike aluminum, is highly susceptible to reflection-impairing tarnish; I worry that the presence of any free oxygen would greatly reduce the life of a brass disc. (I’d especially like to hear Bob Harley’s thoughts on these issues.)

—Les Berkley

Show Music

SYLVIA McNAIR/ANDRÉ PREVIN: Sure Thing: The Jerome Kern Songbook

Sylvia McNair; soprano; André Previn, piano; David Finck, double-bass

Phillips 442 129-2 (CD only).
Kemo Kooistra, John Newton, eng.; Phil Ramone, prod. DDD. TT: 69:59

A recording of Jerome Kern songs by a soprano specializing in Mozart and Handel is not what I’d call a surtique. It took Kiri Te Kanawa a good half-dozen albums of this sort before she got the hang of it. And rather than being accompanied by an orchestra, which can cover a multitude of vocal sins, McNair has only a piano and double-bass.

2 As I understand it, the optical system of a CD player is essentially a very sophisticated miniaturized interferometer. The unwanted ambient light is a common-mode signal, and thus tends to be rejected by the optical detector's differential input circuitry.—Ed.

The hang of it she did eventually get—and very well, indeed, with Kiri Sings Porter (EMI Classics C42 555256).
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ERICH CLAPTON: From the Cradle

At college, an acquaintance—a jazz fan—invited me to his room to hear this amazing saxophone solo on a new LP. The solo, an introduction to a slow blues, was truly impressive, but, after a few vocal verses, it was the guitar solo that exploded into my ears and changed my life. The solo was passionate and perfectly formed, but I'd heard great solos before. What seared into my soul was the sound. It was like nothing I'd ever experienced: aggressive but controlled, somehow smooth and rough at the same time, nasty but not ugly. It embodied all the contradictions that I was beginning to find so painful yet so exciting. (I was 19—gimme a break.)

Eric Clapton's solo on "Have You Heard," from John Mayall's Bluesbreakers LP, made me put away my acoustic guitar and folk music, buy an electric guitar, crank it up, and spend a good deal of my life searching for the ugly beauty embodied in that solo. So when I say that nothing that Clapton had played before (with the Yardbirds) or since has equaled the instrumental tour de force of his work on that album, it would be easy to accuse me of bias. The fact that many guitarists agree with me indicates a grain of truth.

It must be difficult for Clapton. Having made what many consider to be a perfect record while still in his 20s, the rest of his career has often seemed like an attempted return, with varying degrees of success. Layla obviously contained great songs and heaps of emotion, but was marred by free-for-all arrangements (or lack thereof), a muddy mix, and thin guitar tone. The less said about some of his late-'70s and early-'80s work the better. The '90s brought journeyman, his best in years. That record's performance of "Hard Times" showed that, while his playing had not kept pace, Clapton's singing had improved steadily over the years. The tentative early vocal work had given way to a strong, bluesy style, affecting but unaffected.

Thus it is that the most disappointing aspect of From the Cradle, Clapton's much-heralded return to pure blues, is the black-face vocals that mar "Blues Before Sunrise" and "Hoochie Coochie Man." It seems that, once again, the man is losing his way. Just as the focused, flowing guitar of the Bluesbreakers has meandered all over the map of the last two decades, Cradle's forced vocal affections are a dilution of his other instrument.

The disc is by no means a disaster. As a sampler of blues styles from Chicago to Texas and back, it succeeds on its own terms. "Reconsider Baby," "Somewhere After a While," and "Grooin' the Blues" even offer glimpses of the guitar that turned this picker's heart inside-out. Recorded well, with a live sound and no overdubs, it would be a worthy effort for a young bluesman starting out. Too bad that, as a young man, Clapton had already defined a more powerful, personal style that From the Cradle only hints at. I guess the toughest act to follow is yourself.

—Michael Ross

IF I WERE A CARPENTER: Various
Carpenters tribute features to the Carsey Music Club, Babies in Toyland, Cracker, The Cranberries, Sheryl Crow, Dishwalla, 4 Non Blondes, Grant Lee Buffalo, Johnette Napolitano/Mark Moreland, Red Kross, Bettye LaVette, Shonen Knife, Sonic Youth, Matthew Sweet

I know, I know—another tribute album launched by a record label to squeeze every last ducat out of the publishing royalties. Still, Karen Carpenter deserves more of an epitaph than a joke about putting her picture on the spine of her next record. I was a big fan of her voice. It was a sound with all the warmth and comfort of Anne Murray (I'm serious), but with just a hint of an aching heart. It wasn't a voice that could sing the phone book and make you like it, but rose or fell on the strength of the material. Luckily, the Carpenters had the cream of the era's pop tunesmiths to skim. Burt Bacharach, Carole King, Neil Sedaka, and Leon Russell are all represented here.

The surprise is that some of the best stuff was written by brother Richard. His "Goodbye to Love" leads off the CD. Gloom king Mark Eitzel of American Music Club is the perfect singer to give this startlingly bleak song a reading that, in retrospect, resonates with an almost unbearable poignancy. Where the beauty of Karen's voice mitigated even lines like "No one ever cared if I should live or die" with some feeling of hope, Eitzel & Co. send you straight to the medicine cabinet for pills or razor blades.

Red Kross, on the other hand, does nothing for Richard's "Yesterday Once More," but makes you miss his sister singing it—a tribute of a sort, I suppose. And, lest we forget, he wrote some of the lame stuff, too. Shonen Knife performs "Top of the World" with just the dumbness it deserves.

Stereophile, December 1994
Leon Russell's "Superstar," as offered by Sonic Youth, sounds as if tuned-in from an astral broadcast, with bleeps and warbles sonically interesting enough to make me want to give their music another chance. The versions with women singing (Bette Servert, the Cranberries, 4 Non Blondes, Sheryl Crow) must fight the ghost of Karen's amazing voice. Only Johnette Napolitano escapes unscathed, largely because her voice on "Hurtin' Each Other" sounds so much like Karen's (now I know why I liked Concrete Blonde).

As with any tribute album, If I Were a Carpenter is as revealing about the honoree as the honorees. The revelation here is the daintiness of some of the Carpenters' material. Not just the aforementioned "Goodbye to Love," but "Rainy Days and Mondays" and "Solitaire," too, contain an angst that we missed the first time around, buried as it was in the syrupy arrangements and that darr voice. In the mouths of a generation raised on angst for breakfast, they sound right at home. This goes a long way toward explaining why the Carpenters were a whole lot hipper than you thought they were.

—Michael Ross

THE INCREDIBLE STRING BAND

The Incredible String Band
Hannibal HNCD 4437 (CD only). TT: 45:15 The 5000 Spirits or The Layers of the Onion
Hannibal HNCD 4438 (CD only). TT: 50:06

The Hangman's Beautiful Daughter
Hannibal HNCD 4442 (CD only). TT: 22:12

Wee Tam & the Big Huge
Hannibal HNCD 4802 (2 CDs only). TT: 87:49

Changing Horset
Hannibal HNCD 4439 (CD only). TT: 50:24

I Looked Up
Hannibal HNCD 4440 (CD only). TT: 41:30

All above: Joe Boyd, prod.; John Wood, eng. AAD.

This ultimate hippie band was perhaps the most lyrically sophisticated and musically daring group of the '60s. Twenty-five years ago, they introduced me to the sounds of more exotic instruments than any other bands you could name, and changed the very way I thought about music, sound, and poetry. All these years later, it's a rare day when some Robin Williamson lyric doesn't float through my head.

Robin Williamson, Mike Heron, and Clive Palmer founded the Incredible String Band in 1965 in Edinburgh, Scotland. The trio played and sang traditional banjo, fiddle, and pennywhistle tunes, and wrote good-humored songs that showed as much influence as originality. They were soon signed by Joe Boyd, who went on to produce their eponymous first album—a pleasant enough folkie disc and Boyd's first production gig—after which the ISB promptly fell apart. Clive went to Afghanistan, Robin to Morocco. Mike stayed home.

The following year, Robin had returned to Scotland, where he and Mike reestablished the ISB and recorded The 5000 Spirits or The Layers of the Onion. Fiddle, guitar, and harmonica were now joined by sitar, gimbri, oud, sarangi. Heron's newly discovered Caribbean stylings, and Williamson's distinctly exotic vocal techniques, mostly imported from India and Morocco. The arrangements were like nothing ever heard before—as indescribable as they were, well, incredible.

The songwriting, too, had taken a quantum leap in quality and ambition. Heron's childlike tunefulness and irresistible optimism resulted in the wisely innocent "Chinese White," "Painting Box," "The Hedgehog's Song," "Gently Tender," and the epic "A Very Cellular Song." Williamson, on the other hand, probed deeply into the dark night and bright noon of his soul with "The Mad Hatter's Song," "Eyes of Fate," and "Blues for the Muse." Most famous, though, was his "First Girl I Loved," which Judy Collins covered and turned into a folk semi-standard.

Then, in 1968, joined by Rose Simpson and Licorice McKechnie, the ISB produced three masterpieces in quick succession: The Hangman's Beautiful Daughter, Wee Tam, and The Big Huge (the last two released as a double album in the UK, and now in Ryko's twoffer as well). Williamson had now fully emerged as the band's visionary bard in "Waltz of the New Moon," "Three Is a Green Crown," "Job's Tears," "Maya," "Ducks on a Pond," "Lordly Nightshade," and "The Half-Remarkable Question." These are densely written, almost Blakcan parades of the human comedy passing by in motley: a carnival of archetypes with the getting of wisdom always the goal. From "Maiyaa": In time her hair grew long and swept the ground / and seven blackbirds carried it out behind / He bore the holy imprint of her mind / as green-foot slow she moved among the seasons. And from "Koceoadi There": Listen: a woman with a bulldozer built this house of now / carving away the mountain whose name is your childhood home / we were trying to buy it, buy it, someone was found killed there, all, bones, dry bones / Earth, water, fire, and air / met together in a garden fair / put in a basket bound with skin / if you answer this riddle you'll never begin.

The balance began to slip a bit on Changing Horsets and I Looked Up, Williamson altogether abandoning anything resembling traditional song structure to write 16-minute-long epics in which music was sacrificed to his ever-thornier lyrics. Heron continued to provide lovely tunes, but, unleavened by Williamson's tartness, Heron's innocence began to shift from the childlike to the childish—like McCartney without Lennon. Still, there's plenty to love on these two discs, particularly Heron's a cappella "Sleepers, Awake!" and Williamson's truly impressive "Creation" on Changing Horsets, and Heron's "Black Jack Davy," "This Moment," and "Fair As You" on I Looked Up.

ISB concerts of the '60s were more like medieval festivals than folk/rock concerts. Those audiences sat at the band's feet seeking no less than instruction in the care of their souls; as often as not, they came away suffused with the glow of exaltation. It's easy to ridicule such seeming love-feast/feast of valour vantage point of our own '90s. More to the point is that the musical/philosophical/poetic substance of the ISB's music is even more valuable today—because rarer than it was then.

Williamson in particular invented not only a soaring, swooping vocal technique in which to sing his thorny lyrics, which go down in the ear with astonishing effortlessness; but also a more or less instrumental style to support it all, in which the harpsichord lies down with the sitar, and both are serenaded by the kazoo. On first listen, one is amazed at the ISB's gulliness to try absolutely anything. On subsequent hearings, the fact that almost every one of their inspirations works seems downright miraculous. The facts that the ISB could only just play most of their scores of instruments, and that their vocal styles and qualities were, well, unique, almost never mattered. Regardless of their lack of polish or chops, there are true grace, magic, and insight to be found on every one of these six albums. On the central four, there's nothing but.

Rumor has it that these master tapes were in poor shape when producer Joe Boyd dug them up for this disc's reissue series. They sound the CDs sound no better than my 25-year-old LPs (which have seen better days); at worst, they sound downright distorted—especially Hangman, which sounded harsh enough on LP. But as the same rumor has it that the later ISB master tapes—for U, Liquid Acrobat as Regards the Air, etc.—are so deteriorated as to be unusable, I guess we're lucky to have these at all.

If you've never heard the Incredible String Band, pick up Hangman or Wee Tam & the Big Huge. I can't guarantee that these albums will change your life; I can promise that you'll never listen to the marriage of words and music—here sounding as inevitable as it is unlikely—in the same way again. Koceoadi there.

—Richard Lehnert

LYLE LOVETT: I Love Everybody

MCA/Curb MCAD 10808 (CD). Lyle Lovett, Billy Williams, prod.; Nathaniel Kunkel, Gil Morales, eng. AAD. TT: 53:01

I don't know if it's because he's been hanging out with Robert Altman or because he's
Lynyrd Skynyrd goes acoustic! Yup. Endangered Species is the album's name. Hear and believe.

Russ Kunkel's drum set and John Leftwich's upright bass (also prominently featured on Rickie Lee Jones's *Pop Pop*) on "I Think You Know What I Mean," and you'll put your copy of the Sheffield Drum Record into early retirement. Yes, you too can impress your friends with real music. So stop fretting about your interconnects and buy a copy. Or two.

One caveat, Lyle lovers: While you can't tell from the copyright dates, the truth is that most of these songs have been rattling around in Lyle's trunk for a while, written back in the days when he was still hanging out in Nashville and writing songs. So don't consider *I Love Everybody* a full-fledged comeback until Lyle cooks up a new batch of new songs that approach this level of quality. Still, it's a good omen that he had the humility to dig out these Lutece leftovers, and the good sense to record them in a way that lets them speak for themselves. Maybe it's time I took another look at McCabe and Mrs. Miller. Or Pretty Woman.

—Allen St. John

Endangered Species is a radical departure from the Lynyard Skynyrd of old: an acoustic compilation of new original material and redone early Skynyrd songs. Considering the original band's rep as being second only to the Who in unmanageability, I can't imagine the late Ronnie Van Zandt doing anythigng acoustic. After all, he's the one encouraging everyone to "turn it up" at the beginning of the original version of "Sweet Home Alabama."

But even on this completely unplugged set, Skynyrd '94's new material remains true to the band's rural Southern roots: "Hillbilly Blues" describes the plight of a backwoodsman having to take a job in the city to support his family. You can take the electric out of the guitar, but you can't take the red out of the neck.

Older songs include "Down South Jukin'" and "Saturday Night Special," with Elvis's "Heartbreak Hotel" thrown in for good measure. The inclusion of a revamped version of "Sweet Home Alabama" (Skynyrd's early-'70s breakthrough hit) should come as no surprise; what is a surprise is how well the song responds to acoustic treatment. By slowing the beat slightly and employing simple production values, Skynyrd has transformed what used to be a Southern rock anthem to an easy-going ballad that should see some airplay in its new form.

Johnny Van Zandt takes over brother Ronnie's vocal chores, and while Johnny doesn't have Ronnie's vocal range, he sometimes sounds eerily similar—even down to Ronnie's phrasing. Original members Billy Powell (piano) and Gary Rossington (guitar) have lost nothing over the years—their work is as inspired and innovative as anything they've ever done (the original band's final album, *Street Survivors*, comes to mind). Ed King, another original Skynyrd who'd left the band before that late-70s plane crash, shines on the mandolin on "The Last Rebel" and "Hillbilly Blues," while bassist Leon Wilkeson and drummer Owen Halp keep the whole shebang moving along.

Evidently, you can't keep a good band down. Ronnie would be proud.

—Steve Stoner

THE NEVILLE BROTHERS: Live on Planet Earth

A&M 21454 0225 2 (CD). Neville Brothers, prod.; Mike Napolitan, Dave Throemer, engs. DDD. TE: 71:02

Some bands just aren't served well by records. With the exception of the truly exceptional *Foyo on the Bayou*, the recordings of the Neville Brothers have never lived up to the reputations of their live shows—even on their previous live recordings. On disc or tape, the Brothers lose their continuous energy and quality—the hallmarks of their concerts.

*Live on Planet Earth*, which finally offers the authentic stench of a Neville Brothers

Stereophile, December 1994
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concert, is a funky brew blending Art's raging keyboards, Charles's sax—which straddles R&B, jazz, and rock—and Cyril's guitar, musical evil, all juxtaposed by Aaron's totally sublime voice.

Aaron gets more of a workout in this context than he ever would in his recent ballad-drenched solo work. He gives every tune a flat-out performance, imbuing such tracks as "Sister Rosa," which came off flat and preachy on Yellow Moon, with powerful internal life. This doesn't banish superfli be, like Aaron's lovely but extraneous "Amazing Grace," or the sermon that ends the show, but far less of this album seems dispensable.

Part of the group's appeal stems from their versatility. These guys have been playing more different kinds of music for more years than they probably care to count. So a stunning instrumental like "Her African Eyes," Charles's showcase, segues neatly out of "Yellow Moon"'s funky reggae gumbo. Their gritty, funky medley of classic-rock standbys—"Love the One You're With," "You Can't Always Get What You Want"—nearly flows into the gospel-meets-reggae combination of "Let My People Go" and "Get Up, Stand Up."

The boys/Walors song illustrates the Brothers' awareness of the reggae roots that traveled the tradwinds in broadcasts from New Orleans to Jamaican radios in the '50s and '60s. Their take on "One Love," hooked into Curtis Mayfield's "People Get Ready," while true to the originals, gains new strength in the Nevilles' blending of them—not to mention Aaron's soaring high notes. Yet tunes like "Congo Square" and "Voodoo" fall squarely into the New Orleans funk groove with which the Brothers have indelible connections.

The sound is excellent, every piece cutting through the mix without the mud that often mars live recordings. This archetypal live band finally gets the recorded clarity it deserves. —Hank Bordowitz

MARK O'CONNOR: Heroes

It must be fun to actually live out your fantasies, even if they're only your musical ones. On this disc, Nashville hot-hand fiddler Mark O'Connor gets to duet with everyone he wants to. He's just hot enough that it works most of the time, but if I were him, I wouldn't much care if it did or not. I mean—Vassar Clements and Doug Kershaw and Buddy Spicher and Bill Monroe, for Gawd's sake! It'd be worth it just to pick up the ethereal vibrations or whatever from these guys, even if you never released the CD. I'm glad he did, though, for the chance to hear Monroe still pickin' like a champ, and the true grass roots from the Boys, to hear the fine "Jerusalem's Ridge" with Kenny Baker. And whatever nasty things I may have said about Pinchas Zukerman, I have to admit that he and Liz Phair proves just how whip-smart she is—and beats the second-album jinx—on her new album.

O'Connor had tears in my eyes with Jay Ungar's "Ashokan Farewell" (which you'll remember from Ken Burns's Civil War series).

And what a supporting cast: Jerry Douglas doing some great dobro work on "House of the Rising Sun," vocals from Travis Trit and Johnny Cash (!), and Roy Huskey, Jr. with his upright bass that always manages to sound right, no matter who's playing lead. We even have duets with Jean-Luc Ponty (I didn't like it) and L. Shankar (it grew on me), to show how far O'Connor can (mostly) stretch. Sound varies from listenable to good—it could have been a lot more natural—but we're here for the fiddlin'. But where was Johnny Cunningham, anyway? —Les Beekley

LIZ PHAIR: Whip-Smart

If there's one thing Liz Phair understands, it's how people see her. Whip-Smart, the follow-up to the critic's love orgy Exile in Guyville, begins with a one-night stand in the making, complete with a frank discussion of the home-theater aspects of alternate sexual positions, set to the dulcet piano strains of chopsticks. But just as this Bret Easton Ellis vantage is about to get down and dirty, it ends abruptly. "I drop him off and drive on home / Because secretly I'm timid." Popus interruptus, Liz Phair style.

And while she'll be damned if she'll let anybody else define her, Phair is actually far from timid. Whip-Smart advances the idea, first posited on Exile, that she's fair play for women to talk about men the way the vice has versed for years. Propelled by a slightly grunchny guitar, a song like "Volcano" combines a girl-group "he's so fine" sensibility with a guy-group "shut that thing" reality check. The results are startling: "Your lips are sweet and slippery / Like a shrimp's bare ass."

But while Phair has made "sexually frank" rock criticism's Phrase of the Month, Whip-Smart is far more restrained linguistically than Exile. Phair picks her spots; after all, just one "fuck" in a song exiles it to the alternative ghetto: no airplay, no videos, no Letterman. But Ms. Liz is a one-track pony: the title track—in which she suggests locking her son up Rapunzel-like in a tower—is at once hilarious, thought-provoking, and rated PG. Most importantly, its reggae-tinged beat is absolutely addictive. Except for the occasional "fuck like a volcano," your mom could sing along with Whip-Smart while baking a batch of Toll-House cookies.

Indeed, it's Phair's way with a hook, coupled with her neo-preppie pseudo-perkiness, that sets her apart from the rest of the girlgroup. Her user-friendly surfaces may seem to buy into the system, but her message is Nice Girls Do. That's more subversive than anything an outsider like Courtney Love can conjure.

This accessible subversiveness has made Phair rock's first post-feminist star. Because a) she's no longer a critic's darling—she's made the New York Times Magazine and the cover of Rolling Stone; and b) she seems to take her equality for granted. She uses those sexually frank phrases like her birthright, and believes in her bones that objectification's neither a four-letter word nor a one-way street. Whether she likes it or not, this is Gloria Steinem's legacy.

The production on Whip-Smart is a big step from the bedroom-tape feel of Exile. "It sounds like a real record," says RL, and we have to agree. The songs are fleshed out, and her singing is more self-assured (and at least bears some relationship to key). The sound is respectable; it's just not as distinct, and the highs don't send the neighborhood dogs running for cover. Whip-Smart is also available on vinyl; I give the LP a slight edge in terms of image specificity and dynamics, but the CD gets the nod for bass and convenience.

But while Whip-Smart is formidable in its own way, Exile's best moments—cuts like "Fuck and Run" and "Divorce Song"—were so effective because they were (or at least sounded) both frank and confessional. It's toughly the difference between opening The Feminine Mystique and a diary fresh from under the mattress. I miss that. On the second of her many albums, Liz Phair has evolved into a spokeswoman with all the rights and responsibilities thereof—which means she's got to be a little more careful about what she says. But, honest to Amy Grant, we could do worse. —Allen St. John

R.E.M.: Monster

It's really hard to dislike an album that starts out with a cut called "What's the Frequency, Kenneth?" But not impossible. Monster is the kind of album—loose,
loud, and gimmicky—that's made by a band with nothing to lose. Maybe that's because all the R.E.M. guys still have their day jobs down at the Stop 'n Shop. Or maybe it's because they're richer than God and get better rotation on their videos. But I think that if Michael Stipe tried to peddle Monster as a demo tape, he'd still be looking for a contract. Yeah, I know that I once upon a time wondered in print why the band that made "Radio Free Europe" can't rock out anymore. I guess now I know.

The bottom line is that Monster was probably more fun to make than it is to listen to. The album has a what-the-fuck feel, seemingly inspired by guitarist Peter Buck, that you may find charming. I found it annoying. The band's formidable way with a hook hasn't completely disappeared, but it's buried beneath tons of layered guitars and vocals recorded (literally) through a Walkman. Monster reminds me of nothing so much as U2's Achtung Baby—no, Geor gians can't pull off high camp, but it has that same kind of oh-we're-very-big-stars-so-this-isn't-a-joke—it's-an-artistic-de parture casualness.

I can see it now—Michael Stipe as Mephisto.

Sonically, it's about what you'd expect: If one digital reverb is good, let's try five! If Spinal Tap turned the guitars up to 11, let's turn ours up to 13! In case you didn't get the hint, Kavi Alexander has nothing to worry about.

Monster is Reason No. 1,293,587 why you should be careful what you wish for. Ah, how I longed for the band that motored their way through "Femme Fatale" and "Walk, Don't Run" at the Aragon Bawlroom back in 1983. Um, can you just stick to the Concept Album About Death thing, guys? Let's put it this way: When they're trying to be serious, they channel Van Morrison; when they're trying to have fun, they channel Jim Morrisson. That's an insult.

—Allen St. John

SEAL: Seal


UK producer Trevor Horn (alarming, the vocalist behind The Buggles) will have his little joke: not only was the first release by UK pop phenom Seal ("just Seal") eponymously titled Seal; so is the second, recorded and released some three years after the first. Run VFR here, for the "new Seal" (6'4", black, and so frighteningly but touchingly facially disfigured he's either survived the world's worst case of chicken pox or gone through ritual scarification with a chisel) has shaved his head and poses, à la modern dancer Bill T Jones, au naturel.

By his voice, however, shall you know him. Variously calling to mind Lou Rawls on acid (Bring It On) and Pete Townshend in his Empty Glass incarnation, Seal's range and delivery curl effortlessly around complicated, jazz-influenced melodies, rhythms, and programming, making it all sound easy. Think Joni Mitchell and Don Juan's Reckless Daughter and you won't be far wrong; Mitchell's repaid Seal's enthusiasm by guesting on "If I Could"; also guesting is guitar legend Jeff Beck, plus a host of A-list studio players. The home team includes Gus Isidore (who co-wrote most of the tracks), Jamie Muhoberac, and Wendy and Lisa (Melvoin and Coleman, the keyboard combo behind Prince).

As befits a guy who, with cohort Adams, was initially best known for 1990 dance hit single "Killer," Seal's got a fine upper register; here, Horn has vastly extended his singer's repertoire and capability for dramatic delivery by pressuring him to use his entire range.

Still, Horn will be Horn, and his other "little joke"—a speaker-blowing squawk kicking off the album that sends cats flying and first-time listeners scrambling for the volume control—gets your attention.

---

R.E.M. turns in a Monster of an album that maybe doesn't roar as loud as it should.
Once. (If I were taping this, I’d edit it out.)

Despite getting great reviews in what the reviewers are pleased to call “the fascist press” (Rolling Stone, Spin), there’s a lot of depth to this album. Musically, it repays repeated listening; lyrically, the songs open up somewhere between scat and allusion. Seal supplies no lyrics, with the happy effect that the listener who approaches this like Mahler or Mingus becomes fully absorbed, a participant in what’s a lot more like a mature and fully developed song cycle than a pop LP. The most immediately outstanding tracks are “Prayer for the Dying,” which could bear some relevance to the recent film of the same name about The Troubles in Ireland but reminds me a lot more of Fata Morgana, choreographer Dan Waggoner’s meditation on the loss of a loved one to HIV; and “Kiss From A Rose,” which begins by ringing some changes on musica antiqua.

Nominate and accomplished, Seal (shaved head) is a lot more substantial than an ambitious PR campaign would have you believe; I suppose you could dance to some of it, but you’re best advised to just listen.

—Beth Jacques

POPS STAPLES: Father Father

When one thinks of the Staples Singers, it’s daughter Mavis’s sensual voice that comes to mind. Often overlooked is the swamp guitar and keening tenor of progenitor Roebuck “Pops” Staples. In fact, it was Pops’ funky grooves that separated the Staples from their gospel contemporaries, and helped propel them to the top of the um, pops. Whether the septuagenarian Staples can do it on his own remains to be seen. With Father Father, his second outing for Pointblank, Pops offers a mixture of the sacred and the secular, often in the same tune. While the man of “Glory, Glory” goes home to Jesus, the one in “Simple Man” waits for a housebreaker with a 12-gauge shotgun.

The Staples have always dealt with the troubles of their times, and Father Father is no exception, with lyrics about babies born on crack (the title track), joblessness, and homelessness (“Hope in a Hopeless World”). Pops’ answers—self-improvement and the Lord—aren’t new. What makes them go down so easy are Southern soul rhythms rarely heard anymore outside of Malaco records.

Sonically, Father Father is a problem. Staples’ reedy voice, never powerful to begin with, has grown less so with age. None of the producers, including Staples himself, seems able to bring out its potently haunting quality. Cooder, going for stripped-down instrumentation, smothers it with reverb, while Pops and daughter Mavis (Bubbles) lose it in cluttered arrangements.

Pops Staples may age, but his message doesn’t. All he needs is a sonic support system that will allow people to hear it.

—Michael Ross

TRAFFIC: The Low Spark of High-Heeled Boys
Mobile Fidelity UDCD 609 (CD). Steve Winwood, prod.; Brian Humphries, eng. AAD. TT: 40:22
ERIC CLAPTON: Just One Night
Mobile Fidelity UDCD 2-608 (2 CDs). Jon Astley, prod., eng. AAD. TT: 89:06

The Low Spark of High-Heeled Boys may have been the first acknowledged audiophile-quality rock record. It was ubiquitous at hi-fi shops during my first year of college—and this was at a time when stereo salesmen never auditioned systems with the music of my generation. Curious about how well, sonically, it had weathered the 20 years since its release, I compared Mobile Fidelity’s CD reissue to an original pressing of the LP.

Clearer and cleaner than the original, Mo-Fi’s GAIN™ System remastering reveals more about the recording—good and bad—than the LP. (Island SW-9306) does. The sound quality varies from track to track, depending upon whether the song was constructed through multi-tracking (“Hidden Treasure,” “Light Up or Leave Me Alone”), or recorded live in the studio as an extended jam (the title track).

At its best, the sound is relaxed, detailed, and true—although some of the studio practices of the time (such as removing the trap set from the room acoustic with a dead-sounding isolation booth) mar an otherwise fine recording. At its worst, the disc illustrates the perils of early-'70s in-the-studio construction of songs—ie, wandering vocal images and heavy-handed use of artificial reverb and flanging effects. Improved? Definitely. Worth revisiting? Your call, based on your affection for this music—a transitional effort moving Wood away from his rock roots toward his more mature, jazz-tinged, slow-tempo balladry.

Clapton’s Just One Night, a later release, sounds more natural overall—which makes sense, as it’s a recording of one evening’s concert at Tokyo’s Budokan Theatre dur-
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### RECTIFIERS

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<th>Tube</th>
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<td>12AX7 SLN (Y)</td>
<td>$50</td>
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<td>5881 Sylvanian</td>
<td>$48</td>
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<tr>
<td>12AX7 LN (H)</td>
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<td>Quicksilver GLA</td>
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<td>Sonic Frontiers SFD- 2</td>
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Top-quality modern-looking audio racks feature a unique one-piece "bleeder shakes" welded steel frame with 14" x 18" shelves and spiked wood point feet. A super-stream 3" x 7" bump surrounds all shelves.

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PS racks have extra large 21.5" shelves for big equipment.

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Model 46, 6 shelves, 21" tall with 6.25" between top 3 shelves & 8.3" above lowest shelf. $655.00/Black. $725.00/finish.

Model 47, 7 shelves, 21" tall with 6.25" between top 3 shelves & 8.3" above lowest shelf. $831.00/Black. $939.00/finish.

Model 49, 9 shelves, 21" tall with 6.25" between top 3 shelves & 8.3" above lowest shelf. $985.00/Black. $1189.00/finish.

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Target TSSA: 37" tall with 18.5" between the 3 shelves, was $320, now $299.95

Target TSSA: 40" tall with 8.5" between the 5 shelves, was $325, now $269.95

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Designed to match Standesign's Posts or Designer feet by equipment racks.

reg $185, now $149.95

Reg $245, now $199.95

Reg $295, now $249.95

Reg $345, now $289.95

I'd like my own, please. (I own audio racks on the floor. And guess what? No 'too 'audio racks do improve the sound quality. And they really don't drop out)." -Jim G., Moline, September 1992
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Rega Planar 2 turntable has the features you'd expect from a British turntable—including innovative sound. Planar 2's unique combination of high grade materials ensures minimum resonance. Our in-store sale includes Rega RP-2 turntables, a single-piece arm design designed to minimize structural movement. We also include a factory-tested Rega Blue Point high-output moving magnet cartridge. Sumiko's Gary Greenberg calls the Blue Point "one of the best, if not the best" value in high and audio!

Rega Planar 2 turntable with RB-250 arm and Sumiko Blue Point cartridge, reg $575, now only $499.95!
DUNLAY & DUNTECH  

Editor:  Keith Gustavsson visited with us here in Colorado Springs the day after he attended the Stereophile Show in Florida. We renewed old acquaintances and had a lovely, friendly two-day visit. You can imagine our shock and disappointment when we received the October issue of Stereophile containing its false, misleading, and deceptive letter ["Manufacturers' Comments," p.286]. Joan and I can only assume the letter was precipitated by the considerable success which Dunlay Audio Labs (DAL) has enjoyed with its new products and, perhaps, by the apparent lack of success achieved by Duntech Audio since I left the company during October 1991.

To correct the more glaring misrepresentations and false information contained in his letter, I would like your readers to be aware of the following documentable facts:

1) In mid-1990, the six-member Board of Directors of Duntech in Australia voted unanimously to establish a manufacturing facility in the United States to manufacture the entire Duntech Audio line of loudspeakers, starting with the "Black Knight" model, as a means of saving the considerable shipping costs from Australia to North America. A second reason was to obtain additional capital for corporate expansion that was then unavailable in Australia.

2) The Duntech Audio operation in Utah was certainly not "independent of the Australian one in every way," as stated by Mr. Gustavsson. In fact, Mr. Scammell, the Board Chairman of the Australian company, was also the Board Chairman of the Utah company. And, as is well-documented in correspondence, the intention of the Australian Board of Directors was to establish a joint, shared, computer-based accounting system, with on-line service between Australia and Utah. I was to remain as Managing Director (President) of the Australian company, and anticipated dividing my time equally between Adelaide and Salt Lake City.

3) Contrary to the implications contained in Mr. Gustavsson's letter, I had no part in the management of the Duntech operation in Utah. It was managed by a President chosen by the Australian Board of Directors, with the approval of Joan and myself as members. I preferred, at the time, to serve as Director of Technology Development for the Utah operation, leaving the day-to-day management to a President and the staff he chose. Unfortunately, the key staff personnel he chose did not possess relevant experience matching that in the "sample" job descriptions I had provided him while I was still in Australia. Nor did their salaries conform to anticipated maximum levels. As a direct result of their inexperience in manufacturing and marketing audiophile loudspeakers, the Utah operation descended into a slow but certain spiral of decline.

4) To put an end to rapidly rising financial losses, I was eventually forced to "take the bull by the horns," terminate the employment agreements of the Utah management staff, and dissolve Duntech Audio (USA). (This was accomplished with little cooperation or assistance from what we thought were our Australian friends and allies.) In the end, I was personally faced with having to cover total losses approaching $1 million. (The exact amount was unknown at the time because key members of the Utah staff managed to "erase" all of the company's financial records from the computer in the accounting department.) Mr. Scammell assisted us financially by covering one Utah bank debt for $300,000, in return for our agreeing to transfer to him the majority of my shares in Duntech Audio (Australia), leaving me with only a 20% ownership. This agreement further provided that I accept responsibility for all other debts of the Utah operation, including very substantial legal fees. The agreement also gave Duntech Audio (Australia) a license to use the technology and products I had designed up to that time, but left me free to start a new company under a new name (now Dunlavy Audio Labs), develop new technology, and design and sell products based upon that technology. A friendly and cooperative (but competitive) relationship was to exist between our two companies (as it has until now).

5) The comment by Mr. Gustavsson that "...while Duntech Audio had no legal obligation to do so..." is not true. We decided to cover genuine warranty claims on the Black Knight loudspeaker for US customers..." presents the reader with distorted and misleading information. Any claims for repair of Black Knight loudspeakers under provisions of Duntech's warranty would have been the responsibility of the "entire" company before the signing of the subject agreement, since really only one company with two divisions existed. For example, before its closing, Duntech Audio in Utah frequently assisted with warranty repair claims for loudspeakers made in Australia. Fortunately, the use of nearly burnout-proof drivers and crossover parts in the Black Knight reduced legitimate claims under the conditions of the warranty to a virtually nonexistent level. Further, very few Black Knights were produced in Utah after the signing of the agreement.

6) Mr. Gustavsson states that Duntech has borne a string of imitators over the years, and implies that DAL is one of them. As the designer of the entire Duntech line (except for their new, small PCL-25 model), I can assure Mr. Gustavsson that DAL's new loudspeaker models are not imitations of theirs, nor do they incorporate the same technology. Indeed, for anyone versed in loudspeaker technology, it should be obvious that DAL's products represent a significant advancement in loudspeaker and crossover technology.

7) My departure from Duntech Audio as its founder, owner, Managing Director, and designer was not without sadness and sorrow. But such events seem to always happen for the best. Perhaps Duntech Australia now possesses a new energy and direction which will carry them to new heights of achievement. For myself and my wife Joan, it has provided us with a new company and an opportunity to develop and produce what we sincerely believe are documentably the world's most accurate and technologically advanced audiophile loudspeakers—at an affordable retail price. It is our goal to continue with this formula.

8) With respect to Mr. Gustavsson's comments regarding the efforts of Messrs. Davis, Cohen, and Wilde, I look forward to their future loudspeaker development efforts as being those of a friendly and welcome competitor.

Thanks to the staff of Stereophile magazine for providing the opportunity to present the true facts concerning Duntech Audio and myself.

JOHN DUNLAVY  
CEO, Dunlavy Audio Labs

MERIDIAN 508

Editor:  Thank you, Sam, for a great review! Actually, this is the first time I have seen a review where the writer doesn't criticize the sound; instead he is criticizing the silk-screen legend on the front, the advertising, the shape of the buttons (when is a button not?), etc.
Beyond the sound, Sam brings another perspective: "Meridian was one of the first high-end manufacturers to commit seri-
sously to CD." That commitment has re-
mained steadfast since 1983. Ten years on, we still aim to make the best players—and the 508 is the finest of the lot.

We are obviously not alone in that view. Sam says: "The sound is . . . ravishingly beautiful . . . a naturalness that I've never heard before in my system with digital."

Perhaps I should end with a warning to potential customers. Two out of three re-
viewers of the 508 liked it so much they ended up buying it for themselves—Sam included. Only dare to audition this piece if you think you can afford it!

Bob Stuart
Chairman & Technical Dir.
Meridian Audio

**Sennheiser HD580**

Editor:
Thank you for allowing Sennheiser to sub-
mit our new HD580 dynamic headphone for review. It's refreshing not to have to spend paragraph after paragraph trying to undo unintended factual errors committed during the course of a review; we are pleased to say that all of your information regarding our HD580 is correct, and your enthusiasm made quite a few of us blush here at the office!

It is a testament to persistence that, after 25 years of making headphones, Senn-
heiser was able to spawn this fine product. We are pleased to hint that we have taken steps to be sure the Duofol composite dia-
phragm technology used in our HD580 will be seen elsewhere in the future.

Mr. Phillips is absolutely correct in reporting that the HD580 will not sound its best plugged into a portable device, but we did make the efficiency high enough to allow some fun to be heard. Best results are achieved through a dedicated head-
phone amplifier.

My personal peak headphone experience was blasting off from Berlin's Tegel airport at sunset, window seat, in a Lufthansa 747, with Pat Metheny blasting through my HeadRoom Supreme amplifier into my own '580s. Work just didn’t seem so hard at that moment.

Thank you for the very flattering review, and please let us know how we can be of service in the future.

John Biever
Manager, Consumer Products, Sennheiser

**Flatline 175**

Editor:
We thank Russ Novak for his persistence in getting the most from the Flatline 175s. As our customers have found over the last four years, by working with the total room/
speaker/component interface, you will get a wonderfully rewarding emotional expe-
rience from our ribbon hybrids. Since RN received his review, we have made sev-
eral design improvements, including in-
creased cabinet bracing and reinforcement of the crossover panel. We look forward to providing future Flatline owners with the same degree of pleasure that RN experienced.

Otis Perkins, Lewis Muratori
Flatline Design

**Arcam Alpha 5 AMP/Tuner**

Editor:
It is refreshing to read Wes Phillips's explo-
ration of the extremes of high-end audio. Arcam's Alpha-series entry-level compo-
nents often get overlooked because of the very things that make them so attractive:
their low prices. Wes discovered that it is easy to confuse high-end with high-priced.

*Stereophile* has closely followed and de-
tailed the inflationary tendencies of high-
end pricing and its effects. Lately, after a
period of stagnation partly the result of
industry price inflation, the high-end in-
dustry has experienced a resurgence. Arcam builds products that are traditionally con-
sidered high-end, like our $1800 Delta 100
cassette recorder (Stereophile, October 1994), and also products that we call budget high-
end. We believe that these budget high-end products are a spark that fuels part of the
rebirth of high-end and our industry as a whole. Quality, budget-priced goods attract new devotees, like Wes's friend Bill, to our community's quest for great sound and music enjoyment. Although, judging by the "Letters" section, your readership sometimes seems violently split by high-
end vs budget gourmet reviews, we think
mixing the big-buck guns with the small-
change sleepers expands the horizons of the
High End and all of us who enjoy reading about it.

Wes Phillips's experience with the Arcam Alpha 5 integrated amplifier, as a secondary system to a mono-kilobuck reference sys-
stem, reminds me that ultra-high-end sys-
tems are sometimes harder to enjoy just
because we expect so much from them. I'm not sure if I find hyper-expensive systems analytical-sounding because they are, be-
cause I'm analyzing them more, or both.

Wes finds joy not just in listening to the Arcam Alpha 5 amp, but also in turning
people on to music and the Arcam's afford-
able hi-fi sound and reproduction capabilities.

Wes points out a substantial difference in the sound of the Alpha 5 when using the "direct" switch. When activated, this switch not only eliminates the tone-control poten-
tiometers and circuitry, but also cuts out the balance pot. Tom Norton notes that the
tone controls are subtle in their operation. We often use the tone controls to tailor a subtle loudness contour for low-level lis-
tening. At lower levels, some purity becomes less of an issue for most listeners because they are usually in the background-music
mode.

A few minor corrections: The Defeat button that turns the phono stage into an auxi-
liary input is only available on the
$599 Alpha 6 amplifier—the 50W, remot-
able big-buck big-5. Wes blows on the Arcam the "Briteceiver" moniker that we gave the Alpha 5 amp/tuner promo-
tional combination, whereas Audio Influx is actually the guilty party. (Sorry, we couldn't resist.)

Tom Norton's measurements find the
Alpha 5 to be somewhat sensitive to 4 ohms
or less. This is one reason we recommend
Arcam amps be used with speakers that
have stable impedance curves and nomi-
nal impedances of 6 ohms or greater.
This is especially important if running speakers A and B simultaneously.

Don Scott's analysis of our Arcam Alpha 5 tuner, the other half of the "Briteceiver"
combination, is a fair one. Although the
Alpha 5 is not a station magnet, it is made
to sound especially well with solid incor-
ing signals. For station hounds using either
our Alpha or Delta tuners, we recommend a
good outdoor antenna and the Magnum
FM Power Sleuth, a signal pretuner and
gain booster that seems to yield excellent
results.

Most people who buy the Alpha 5 tuner, even in this modestly priced combination,
will listen to a favorite station at length. The
tuner's design reflects compromises intended to favor this serious FM listener. Arcam had
given the Alpha 5 tuner characteristics that
result in a sound that is less fatiguing than
other tuners in its price range. This long-
term listenability results in the compromises
—mainly reduced selectivity— noted by
Mr. Scott.

The Alpha 5 tuner uses a straightforward
19kHz notch filter and a two-pole low-
pass. Our more expensive, removable, Delta
280 tuner includes an extra 38kHz notch which removes most of the extra hash beamed out by some FM stations.

Even though we offer the Alpha 5 tuner in our "Briteceiver" package, we find that
most people are now buying stand-alone
integrated amps. This is a change that
moves the US market toward the patterns
of other countries. The acceptance of the
integrated amplifier here is the result of
more retailer interest and understanding, consumer revulsion to media format (ie, constant news and commercial interrup-
tion), the introduction of cable resident
music services (covered recently in Stereo-
philie), and increased commuting times (while getting there is not the same as getting there). In the end, the customer who buys our Alpha 5 amp often puts the saved "tuner money" toward a better CD
source, like our Alpha 1 CD.

Michael Zeugin
Audio Influx Corporation

**Vac Renaissance Seventy/Seventy**

Editor:
Thank you, Stereophile and Jack English, for
the "five gooseloup" rating. It is humbling and
gratifying that Jack understands the path we have taken in the design of the Renaissance Series, as well as the ultimate destination. Music is a profoundly emo-
tional experience, and it is our goal to imbue
its reproduction with the breath of life, the
"you were there" kind of reproduction.

A new-version Golden Dragon 300B did not arrive in time for Jack's audition. These provide subtle but significant im-
provements in all areas, most notably in
The World’s Best HiFi Happens To Be The World’s Best Home Theatre.

"... the Meridian Music Surround System... just flat blew me away..."
No matter what music CD I handed over, I strongly preferred the sound of the system in Meridian’s music surround mode over straight two-channel stereo... what I’ve been hungering for ever since I got into this stupid hobby." COREY GREENBERG, STEREOPHILE VOL. 17, NO. 9, SEPTEMBER 1994

"... the first surround system John Atkinson has actually waxed enthusiastic about." J. GORDON HOLZ, STEREOPHILE VOL. 17, NO. 5, MAY 1994

"The best Home Theater sound at the show was found in the one room without...video." ROBERT HARLEY, STEREOPHILE VOL. 17, NO. 4, APRIL 1994

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extreme frequency definition and jump, as noted by owners and recent reviews.

Again, thank you for taking the time to listen to music through the Renaissance Seventy/Seventy, and for the kind, enthusiastic words for a product which hopefully helps us all see more clearly the true reason for our shared passion.

KEVIN M. HAYES
Valve Amplification Company

API POWER WEDGES
Editor:
We were delighted to find our Power Wedges once again reviewed in the pages of Stereophile. Our delight was exceeded only by our surprise at seeing our products compared with AC-treatment systems costing over ten times as much!

Although we disagree with Dick Olsher on several technical points, we certainly concur regarding the paramount importance of AC power conditioning. We're not so sure, however, that most audiophiles are able to plunk down more than $10,000 for a "definitive" system such as his. And we wish we had included the Power Link AC power cord, since quality power cords are an integral part of any complete AC-conditioning system.

Ever since we built the first Wedge, we've endeavored to offer audiophiles a variety of effective and affordable power-conditioning products. The Stereophile 1992 "Accessory of the Year" award received by the Power Wedge Model 1 is one indicator of our success in meeting that goal; even more important is the fact that thousands of audiophiles have found that their Wedges, Power Enhancers, and Power Links greatly enhance the performance of both their source components and their amplifiers.

Thanks for listening.

LES EDELBerg, GERRY DAUNT
Audio Power Industries

BOB YOUNG AUDIO BYLUX
Editor:
Bread! Finally, audiophiles learn what the different power-line conditioners sound like and how the effects of the many types compare. Dick Olsher's review was badly needed, and should be the definitive one for a long time.

We are very pleased indeed that our Bylux Dedicated Line Filters were included in such a world-class system. It should set a new standard.

Reviews like this are what make Stereophile indispensable. Many thanks to Dick for his efforts and kind words.

Bob Young
Bob Young Audio

MIT Z-SERIES
Editor:
We would like to thank Stereophile and Dick Olsher for his thorough review of the MIT Z-Series power-line treatment system. We are very happy indeed that Dick enjoyed the improvements those products brought to his reference system, and have only two brief comments on his findings:

Unmentioned in the review is the fact that MIT's Z-Series units all contain MOV voltage-spike protection. A repackaged Z-Series, to be introduced soon, will also offer surge protection to components plugged into it.

Second, had we provided Dick with a second Z-1 Impedance Stabilizer for his dream power-line system, we believe the results would have been even better (at about half the price of the unit he used in its place)—a cleaner, more accurate sound as a result of the patented, transformerless Z circuitry. We recommend two Z-Stabilizers for systems with dual-mono amps. When using two, be sure that both front-panel switches on the Z-1s are turned to the "A" position. We encourage customers to experiment with the entire Z-Series, as each audio component adds its own power-line disturbance.

After three years in production, we are reworking repackaged and improved versions of our current Z-Series. The circuitry, hence the sonic performance, will remain much the same, though we are adding additional protection. We will also offer an all-in-one version for customers who want the complete system in a single chassis.

Thanks, too, to Dick Olsher for bringing to the attention of Stereophile's readers the fundamentally important subject of the effects of power-line disturbance on the audio system.

James D. Hassi
Richard Marsh
VP Sales & Marketing
Engineer
CVTL, Manufacturers of MIT products

SEAKAY LINE ROVER
Editor:
Being selected to be a member component of Dick Olsher's power-conditioning Dream Team is gratifying! As Dick observed, the Line Rover can function in conjunction with other power-conditioning devices, and he has optimized his system's performance by using the Line Rover and the MIT Z-1 together. Nevertheless, for the reader's system, we believe that experimentation is necessary to determine which, if any, the Line Rover is to tie-in to the Line Rover, and whether or not benefit is achieved by adding other conditioners.

Experimentation is necessary because the character and degree of waveform distortion and phase mismatch are variable and dependent on the types of electrical loads on-line at the time of audio system operation, as well as other causative factors identified by Mr. Olsher. (Offloading loads may originate from nearby industrial sites, the host facility/house, or the audio system itself.) Because it is precisely the existence of this distortion and mismatch that enables line conditioners (and most power cords) to cause the improvements they do, it follows that the relative effectiveness of any line conditioner (or combination of line conditioners) on audio-system performance becomes a function of the time of day, the locality, and the designs of individual hi-fi components.

Accordingly, the optimum setup for Dick Olsher's system in Santa Fe or Los Alamos may not be the same for his colleague's system in the same area; nor for his isolated system, in a nearby office where one Line Rover customer, after experimenting and hybridizing multiple units, including the Z-1, settled on two Line Rovers—a trend that has become popular among our more zealous clients. (Our experience to date is that most Line Rover owners conclude that a single unit, with no other line conditioning, works best. Most also recognize that an additional level of performance is often achievable by adding a second unit.)

One caution pertaining to mixing conditioners: It is prudent not to place a line conditioner having serial magnetic chokes in the same circuit as a Line Rover, with its proprietary USES® parallel magnetic choke. There is potential for resonance effects that could damage certain audio components. Seakay can advise callers of conditioners known to have serial chokes.

Pertaining to the use of hospital-grade receptacles: After much testing and a lot of assistance from Line Rover aficionados Bob Crump, Harry Burstein, and Scott Trude, Seakay has concluded that better audio effects are achieved using Eagle™ brand receptacles. The grasping/holding capability is phenomenal, and the conducting material is a purer form of copper than in the hospital grades, in which the material is alloyed to limit the potential for sparking (a requirement for the oxygen-rich hospital environment). Accordingly, our standard LR-1200 model now includes the Eagles. However, we will gladly incorporate the hospital grades (at no extra cost) should a client so desire.

More power to the music!

Clay Morse
President, Seakay Management Corp.

ENSEMBLE ISOTRANS
Editor:
We congratulate Dick Olsher on his glorious victory over the power-line gremlins, whose dark, dirty work still goes unchecked in too many places. It is good to see DO declare that "the conversion of any line-conditioning system is the isolation transformer." Ensemble has long seen the necessity to address the AC side of a hi-fi system, introducing its Isotrans isolation transformer in late 1989 and the EM1/RFI-shielded Powerlux cable last year. As Ensemble has always wanted to have all (not only its American) customers benefit from using the Isotrans, it comes fitted with both male and female IEC 320 sockets, the only internationally accepted standard, as found (in its male form) in most electric gear with an input socket. The Ensemble Isotrans operates on 120V or 230V, and 50 or 60Hz line frequency. It is therefore a truly international product.

Dick Olsher's power-line victory, on the
With the introduction of the Signature Collection, Dunlavy Audio Labs has virtually set a new standard for loudspeakers, regardless of price. The DAL SC-I is a truly affordable, compact reference loudspeaker designed for demanding studio and home music systems. Its performance totally belies its price. Simply put, the SC-I is the world's most accurate and musical loudspeaker in its class. High efficiency, combined with a very flat and largely resistive impedance curve, allows ideal coupling with affordable amplifiers.

Audition the amazing SC-I at Glenn Poor's Audio Video and discover why many of the world's most respected recording and mastering studios have chosen Dunlavy Audio Labs loudspeakers as their reference monitors.
ever, Steve apparently overlooked a key element in the construction of the Levitation Rack. This factor is the Zorbex installed between the outer upright frame and the steel angles to which the support wires are attached. Zorbex, a highly resilient plastic foam, has outstanding vibration-absorption properties which, incidentally, eliminate any need to fill the uprights with sand or lead shot. It is this Zorbex that tames floor-borne resonances and prevents them from affecting the components mounted within the Levitation Rack.

2) The magic blocks on which go between the component and support wire are made from a rare variety of ebony grown only in Gabon, West Africa. Inasmuch as it is quite expensive, we did, in fact, experiment with other woods and materials. Nothing, however, comes close to this remarkable wood's unique ability to impart a wonderful clarity to the sound of components.

We, too, are concerned about the deci-


dation of rain forests. However, according to the Gabon Mission to the UN, licenses for harvesting the ebony grown there are limited and are issued only on condition that a new tree is planted for every one that is cut. This prevents the species from becoming endangered. Anyway, most of this ebony, prized for its tonal qualities, is used by manufacturers of musical instruments; i.e., castanets, clarinets, oboes, fingerboards for violins and such. The "magic blocks'" account for a minuscule amount of the harvest.

Thank you for your laudatory and in-


sightful review.

RAY SHAB
President, Arcici

BILLY BAGS
AMPLIFIER STANDS
Editor:
We want to thank Stereophile and Steven Stone for the review of just a few of the products that we manufacture today! When we decided a few years back to pursue the high-end market in audio and video component racks, we originally developed a few standard models to handle most of those components in the market. But, even with that, we found more and more individuals wanted a component rack to handle their specific needs—no two systems are exactly alike. And aesthetics are important! As a result, our custom—ie, made-to-order—component racks now comprise more than 65% of what we manufacture. Being a Design Firm, we pay close attention to the details of design. Our "open-air" component rack systems emphasize just that—from "hiding" our welds, to our special milling machines which allow the steel crosspieces to take on the "look" of molded steel, to incorporating our TRUSS System into the frames.

We also give our customers a choice in the steel finish (wrinkle-black or "clear" over brushed steel, with two new finishes to be introduced at CES in January), and a choice in the laminate used for the tops and shelving. Since Steve Stone originally reviewed our component racks, we have added two more colors (for a total of six) for the tops and shelves: Desert Sand and 'Tropical Jade' (don't you just love "designer" colors?). Also, we now have modular-designed systems which offer adjustable shelving and the ability to add to or alter a customer's rack system when new components are added.

Our growth in A/V component rack systems is the result of a commitment to quality, and a strong belief in the adage that there will always be demand for high quality!

BILLY BAGS Design
P.S. Steve: Just how many black-velvet paintings of Elvis do you have????

YAMAMURA CHURCHILL
Editor:
We would like to thank Stereophile for running a photo of the Yamamura Systems Dioniso loudspeaker in its coverage of the Chicago CES [September, p.67]. Steven Stone erroneously dubbed it the "Chur-

chill" speaker. The name of our UK operation is Yamamura Churchill, hence the confusion. By the way, Yamamura Churchill will be opening its showrooms this fall at Wardour Castle in Wiltshire, a short distance outside London. The trip will be worthwhile just to take in the beauty of the countryside and to view this magnificent specimen of Georgian architecture.

The Dioniso is a single-driver, full-range, crossoverless, multi-horn design. It is constructed of an inner fiberglass shell that is covered with cork both inside and out. It has a frequency response of ±3dB at 27 cycles. [Sensitivity] is better than 100dB. The Dioniso can be driven with a minimum of 2W.

As to Steven Stone's tongue-in-check award for "The Most Unusual-Looking Loudspeaker that Almost Didn't Work," we experienced some damage in shipping and were forced to ship replacement drivers overnight from London. Those who were there in the last hours of the Show were treated to a rather interesting demonstration. I encourage Stereophile readers to contact me for a personal demonstration or to plan to visit us in the "Orly" room at the Stereophile Show next April to see if the Dioniso "almost" works.

JOSEPH M. COHEN
Yamamura Systems, USA

BAG END ELF SUBWOOFER
Editor:
In the August issue, Peter W. Mitchell wrote rather complimentarily about the ELF sub-

woofer system we have recently introduced, and I would like to thank him very much. As this is a fundamentally different approach to bass reproduction, and new to your readers, I think it is important to clarify one aspect of Mr. Mitchell's description: There is nothing inherent in the ELF that rolls off the low bass. Quite the contrary: the bass response is extended perfectly flat all the way down to 8Hz. The integrators apply approximately

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WorldRadioHistory
50dB of gain (or reduction, depending upon how you look at it) from 10Hz to 200Hz, and continue above 200Hz as well. While this requires four times the cone excursion as the frequency lowers each octave, a typical ELF speaker is very efficient at its upper limit (95dB/W/m), and therefore has a long way to go before excursion limits its performance. Of course, the bottom sonic octave (20–40Hz) and the final subsonic octave (10–20Hz) can tax the system if played at a level beyond its capabilities. As with any loudspeaker, a fundamental decision must be made to either play the system within its SPL capabilities, and add equipment to achieve a higher SPL, or operate the system into overload or protection mode. These three choices are identical for all subwoofer systems. Our first choice is to operate the system within its capabilities, or add equipment as required to achieve the low-frequency limit at the level required. The dynamic low-frequency reduction circuit, or "Concealment," is intended to be used only when an unexpectedly large signal arrives, or you have intentionally chosen to drive the system beyond its capabilities. The Concealment feature is a final protection prior to amplifier and speaker overload, and provides a much more pleasant sound compared to either system overload or other protection design.

**Jim Wischmeyer**

**Bag End Loudspeaker Systems**

**Dunlavy Audio Labs SC-I**

**Editor:**

We are indebted to Stereophile for an excellent and well-written review of one of our products. As a designer and manufacturer of high-end audioophile products intended to represent the true cutting edge of new technology, it is satisfying to know that a magazine of wide-intentioned and competent editorial staff concerned with the needs of both manufacturers and their customers. In this regard, we believe that Stereophile serves a serious need that many magazines might wish to note and better emulate.

Since John Atkinson's review is quite complete and accurate in an overall sense, I have only a few observations to share with readers.

First, John's perception that the bass end of the SC-I sounds a bit on the "lean" side in his listening room may be true in the context of the acoustical properties of his room and/or the locations of the speakers and the listening position within the room. His observations might also be attributed to comparing the low end of the SC-I with the often exaggerated bass response typical of ports and enclosures or designs employing underdamped bass alignments.

Our own experience, gained from an average of some 10 visitors per week to our plant who evaluate the sound quality of our loudspeaker models in a well-damped listening room (24'W by 14'D by 8'H), is quite different from John's. We always begin with the SC-I and, using the same recorded material, progress to successively larger models, ending with our SC-VI. I would estimate that at least three out of every four listeners guess that they are listening to either our larger SC-III or SC-IV models rather than the "miniature" SC-I.

However, as a designer well educated in the limitations imposed by the laws of physics, I have not been able to extract the full sound of a giant concert drum from an efficient loudspeaker as diminutive in size as the SC-I without using a port, passive radiator, or underdamped bass alignment, all of which inaccurately reproduce bass transients.

With regard to the 95dB loudness "speed limit" John attributes to the SC-I, I can only add that the speaker was designed to represent the best possible combination of overall accuracy, efficiency, and low-end bass extension vs. size. Originaly, the SC-I was conceived and designed to fill the need for a highly accurate, dependable, and efficient "nearfield reference monitor" for use in high-end recording and mastering studios (a job it has been doing nicely for more than a year). There was never any intention for the SC-I to compete with less-accurate loudspeakers with respect to super-loud playing and bass-end whomp. We sincerely believe, from the incredible level of SC-I sales (and a very large number of highly favorable comments from satisfied customers), that the loudspeaker meets its design goals. We also agree with John's comments that "A speaker like this is an essential reviewing tool," and "If more recording engineers used monitor speakers as accurate and revealing as the Dunlavy SC-I's, they wouldn't be so pedantic about bits being bits."

John's measurement of resonant modes in the walls of the loudspeaker enclosure may or may not be of help to him in making a comparison with the amplitude of the sound directly radiated by the drivers. As such, it is virtually impossible to determine the audibility of such resonant vibrations based upon merely knowing their existence without knowing their farfield amplitude. At DAL, we assess the radiated amplitude of cabinet modes by a method called "time-domain spectrometry," which permits us to move a distance/time-of-arrival "window" across the relevant external front and side surfaces of the enclosures. Since this window can be made as narrow as an inch, we can accurately determine the ratio of the sound radiated by the drivers to the sound radiated by the vibration of enclosure boundaries. With respect to the SC-I, such vibrations have been reduced by internal bracing and damping to a level well below audibility throughout the audio spectrum.

John's comments about the impedance of the SC-I are well taken: the modulus of impedance vs. frequency is extremely flat and well-behaved, as well as being almost entirely resistive over the entire audio spectrum. This very flat curve of impedance, in conjunction with a much-higher-than-average sensitivity (90–91dB/2.83V), allows
the SC-1 to be fed by most credibly designed tube and solid-state power amps.

With respect to the off-axis response of the SC-1, it has been our experience that the SC-1 is one of the very few loudspeakers that permit a listener to move up and down from the seated position or around the listening room without perceiving more than small changes in spectral balance, much of which can be simply attributed to the acoustical energy reflected from the room boundaries. We encourage prospective buyers to do this test and compare the results with those of any competitive loudspeakers, regardless of price.

In closing, we sincerely thank John and the staff of Stereophile for their excellent effort in assessing the merits of the SC-1, and agreeing with its status as a "reference tool" for those discriminating users requiring the most accurate reproduction available from a loudspeaker of small size (and at an affordable price). John Dunlavy
CEO, Dunlavy Audio Labs

Spica TC-60
Editor:
Thanks for the excellent review of our TC-60 speaker, my latest attempt to coax a quart of juice out of a pint jar. John Atkinson did an amazingly good job of delineating the many tradeoffs involved in this (and any other) design. It is such a relief to have been reviewed by someone who actually has a real understanding and appreciation of what goes on under the veneers.

It is also a joy to be working with Richard Schram, Rúc Mancuso, and everyone else at Parasound Products. Working with people who are as capable and enthusiastic as they are makes this a marriage made in, well, Alaska...

Regarding the leading-edge peak in the step and impulse responses, I recall from our conversations that JA's measurements are corrected for microphone magnitude irregularities, but not for phase errors. The ½" B&K mikes have significant phase error at high frequencies, lagging 40° at 10kHz and fully 80° at 20kHz. The first ¼ millisecond of JA's time-domain graphs would all look better behaved if this error was corrected. In fact, he may be making things worse by correcting the magnitude only.

I wish the TC-60's lobing behavior above the listening axis were better; it is an unfortunate consequence of the Bessel-based crossover function. But, given that this is the only significant compromise, I believe I can live with it for now, and hope to improve upon it in future products.

John Bau
Design Engineer, Spica

Spica TC-60
Editor:
When the Spica TC-50 debuted over a decade ago, the high-end press heralded the scientific foundation of its unique design as the major contributor to its astonishingly accurate reproduction. Many thousands of TC-50s are still in service, and you don’t have to look very far to find a serious listener who had—or still has—them. It’s also amazing that, years later, others have not been able to improve upon, much less fully comprehend, John Bau’s landmark design for the TC-50.

John Atkinson’s thorough and overwhelmingly favorable review of our new TC-60 is history repeating itself. His report gives a glimpse into the approach of this unorthodox but uniquely gifted designer. Read it carefully and you’ll gain a valuable understanding of why the TC-60 sounds so musical and natural, and also of why it’s such an important new product, bound to redefine value over the next decade.

For a little over a grand, including industrial-strength Gravity stands, Spica TC-60s give fresh meaning to the motto appearing on New Mexico license plates: “Land of Enchantment.”

Richard Schram
President, Parasound Products

Audio Alchemy
VAC-IN-THE-BOX
Editor:
The multi-page Audio Advisor ads appearing in both the August and September issues of Stereophile have an error I would like to correct.

In the description of Audio Alchemy’s new VAC-in-the-Box compact outboard phono stage, these ads state that this circuit was designed by John Curl. This is not true. Although John Curl has been involved in the design of many fine audio products, including some of the finest preamp phono stages, John was not involved in the design of the VAC-in-the-Box.

We apologize to John Curl, and to anyone who may have been misled by this inaccurate description. Anyone who may have purchased a VAC-in-the-Box from Audio Advisor based on this inaccurate description should immediately contact us and request a refund.

Again, my sincerest apologies to John Curl for this error.

Wayne Schuurman
President, Audio Advisor
P.S. Ooops, there’s another mistake in the ad I’d like to correct. On the third page of our advertisement, under the heading “The Latest High End Audio—And Video—Power Line Conditioners,” we describe the 18-outlet Audio Power “Super” Wedge as having “6 unswitched and 6 unswitched outlets for source components.” This should, of course, read “6 switched and 6 unswitched outlets.”
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CLASSÉ 70 AMP, new, $900; Philips DAC-960 D/A, $400; JPS+ I Phono speakers, $2500, (615) 877-0174.


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last month I described some of the intents and goals of Stereophile's review process; this month I'd like to talk about how we meet those goals.

We acquire products for review in a variety of ways: reviewers hear them at trade shows or at a friend's house and request them from manufacturers; manufacturers call to see if we'll accept a product for review; manufacturers send product unsolicited (highly recommended); or we read commentary in other publications and become interested.

We have some firm ground rules:
• All submitted products must be production units, not prototypes (samples from the second production run or later are recommended).
• Manufacturers must have five or more dealers in the US, with few exceptions (e.g., widely advertised mail-order, with a money-back guarantee; fewer than five dealers, but very prominent ones in major population centers).
• Every product we receive is taken to be a product for review. (We do not undertake private consultancy.)
• Every unbroken sample we audition is included in the final review, even if we later hear a sample that sounds better.
• We assume a sample is broken only if the problem is obvious: eg, loud hum, intermittent sound, sparks and fire, one channel obviously different from the other, or the like. We specifically will not call a manufacturer known for good sound just because the submitted sample sounds bad; otherwise, those manufacturers would be getting second chances the others don't, based simply on reputation.
• Manufacturers have the right to set up a piece of equipment in one of our listening rooms to show us how it works, and to make sure it survived its journey. This right may be difficult to exercise—we barely have the time for even two manufacturer visits a month—and may well not take place in the actual reviewer's listening room; but it does allow the manufacturer some insight into our evaluation methods and listening conditions.

The manufacturer's visit is intended for him or her to verify the product's operation and setup in our circumstances, and to afford an opportunity to explain design philosophy, technology, features, history, suitable associated equipment, etc. Our job during these visits is to learn as much as we can, and to verify that, whatever our observations of the product's performance, it's what the manufacturer intended and expected. Occasionally we'll ask leading questions to verify that the product is performing correctly, but we strive to avoid offering value judgments while the manufacturer is visiting—that's the province of the review itself.

Once the visit, if any, is over, the review process is closed to the manufacturer until they receive the preprint of the edited review. Many manufacturers expect feedback on the review's progress, but our reviewers are prohibited from offering it (though, as you've been able to read in these pages, they are imperfect in observing this prohibition—to the detriment of their future as reviewers). Again, our job is reviewing, not design or consultation.

The manufacturer will hear from us before completion of the review if the product breaks; we'll request a second sample, and report on both. Also, a reviewer may request clarification about the product's operation, design, or history. Sometimes the manufacturer changes the product during the review period; we accept the new sample and report on both.

Once the manufacturer receives a review preprint, many things can happen: factual errors (such as price, phone number, circuit-design details, history of production) are corrected; a "Manufacturer's Comment" may be submitted; or they may appeal to us for submission of a second sample, since the negativity of our review must have been caused by a defective sample. Whether we accept submission of a second sample depends upon the legitimacy of the manufacturer's argument, as determined by J.A. Normally, there has to be some evidence that the product actually was defective: measured noise substantially higher than the specifications, for instance, or description of a manufacturing problem discovered just a week before. JA is normally generous, but he must also be skeptical; otherwise, we would have to do every negative review at least twice.

Two options are completely unavailable to the manufacturer: suppression of the review, or alteration of its value judgments (except for addition of our experience of a second sample). Reviews, once written, are published. Sometimes a second sample requires some addendum to the original review. Sometimes publication of the review is delayed for one or two months (this happens for a variety of reasons, including simple lack of space). All reviews, though, are published, no matter the commercial implications, legal action, or loss of friendship which may result.

Stereophile, of course, accepts advertising; you may have wondered if advertising ever affects reviews. The answer is no. Never.

This question is substantially answered simply by reading this magazine, observing the results. Advertisers get good reviews and bad reviews; non-advertisers get good reviews and bad reviews.

Our reviewers are interested in hi-fi products and music, not advertising; most of them are substantially unaware of which products are advertised in Stereophile. Our advertising representatives never discuss the subject of reviews with our writers and editors, and pressure for any specific kind of review is never brought to bear on a reviewer.

Manufacturers do, of course, know if they have a product in for review; but they almost never know when that review will be published until they receive the review preprint (long past ad—copy deadline)—and even then, they may be surprised when the review is put off for another issue or two.

Our advertising reps don't know which products are being reviewed in a particular issue until they get their photocopy of the issue after it's been sent to the printer. Ads are simply not sold on the basis of what reviews are in the magazine.

Long ago decided that the only way for a magazine of integrity to deal with the impact of negative reviews on advertising sales was to simply ignore it. I've never had even a second thought on the subject.

—Larry Archibald

1 There have been two exceptions, and not in the direction readers might assume: First, in the case of the Polk RTA 11 loudspeaker (Stereophile, March 1990, Vol.13 No.3, p.142), JA and I felt that Polk was attempting to reach our audience through advertising without being willing to submit a product for review and risk the consequences. Accordingly, we bought one of their popular models and reviewed it because they were an advertiser. The review was negative, and Polk subsequently stopped advertising.

Second, Velodyne had just signed a long-term advertising contract when we received their DF-661 loudspeaker for review. Our initial audition persuaded us that the review was certain to be negative, so we published the review in the next possible issue (Stereophile, June 1994, Vol.17 No.6, p.75). We were sure that Velodyne would want to cancel their advertising upon seeing the review, and we would have felt uncomfortable accepting their money knowing how negative the review was going to be.
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