stereophile

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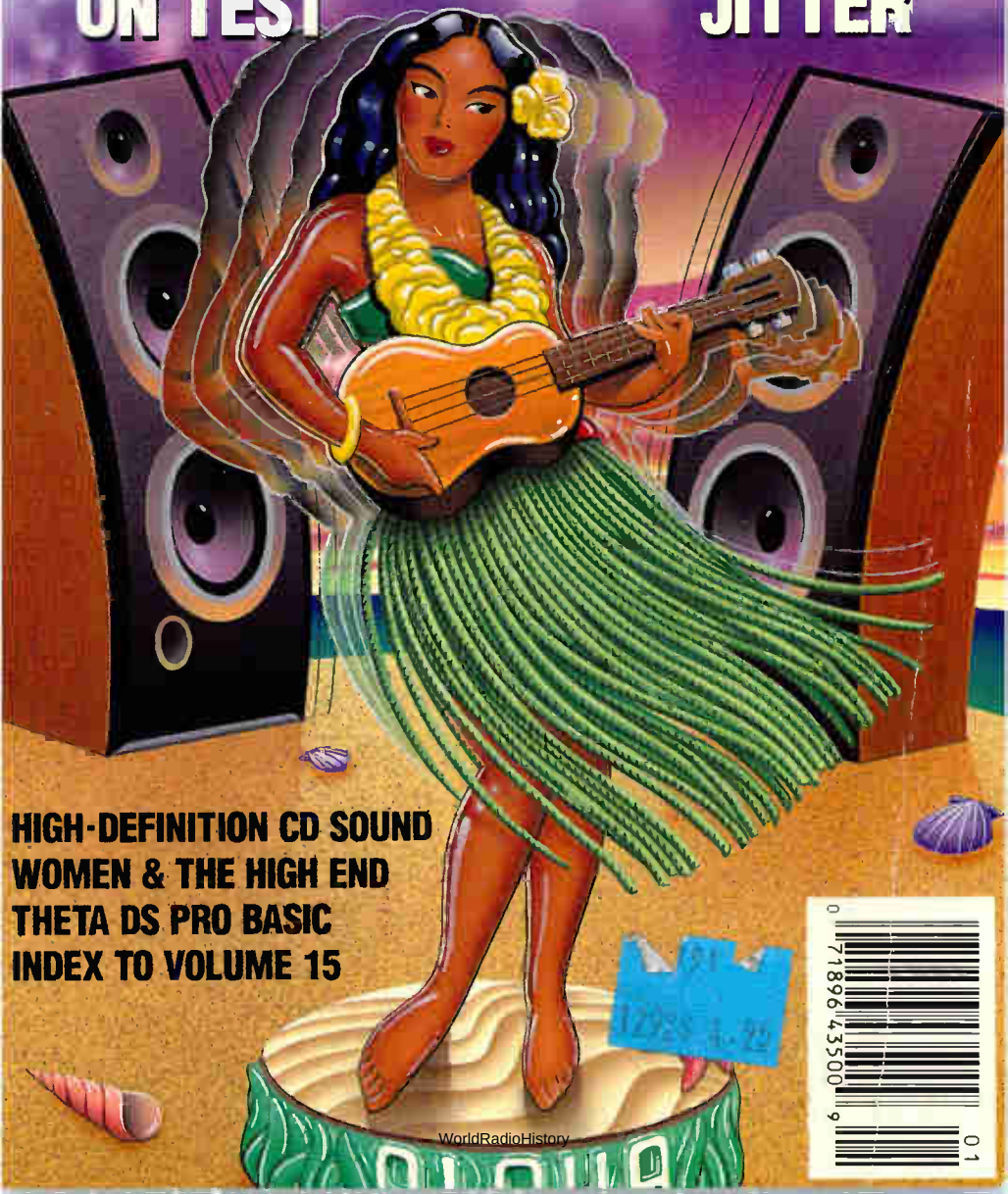
LOUDSPEAKERS ON TEST

DIGITAL JITTER



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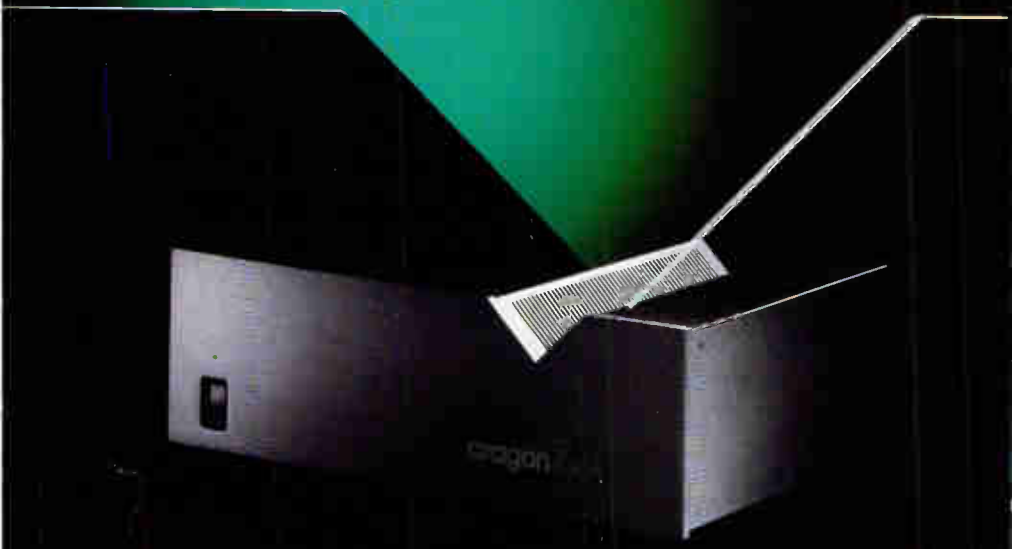
INDEX TO VOLUME 15

aragon amplifiers

the beast within the beauty



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COMING ATTRACTIONS

First, an apology for the nonappearance of Dick Olsher's do-it-yourself subwoofer project, Corey Greenberg's review of the Eminent Technology LFT-VIII loudspeaker, and my review of the Vandersteen 3 loudspeaker in this issue. Space considerations in the first two cases, and time considerations in the last, forced these articles to be held over to February.

Also appearing in February will be *Stereophile*'s third annual "Records to Die For" feature, in which the magazine's writers describe those rare records that are outstanding in both performance and sound quality, accompanied by reviews of the Linn Arkiv MC phono cartridge, Acarian Alón IV loudspeaker, Jadis DEFY 7 power amplifier, Exposure XV integrated amplifier, Meitner IDAT D/A processor, and more.

Second, some staff news. For a number of reasons, three contributing editors are no longer associated with the magazine: Arnis Balgalvis, Wallace Chinitz, and Bill Sommerwerck. Wally had been a *Stereophile* writer since this time last year; Arnie since we published his report on the Well-Tempered Turntable in Vol.11 No.3, March 1988; and Willie had written for the magazine since 1981, when he authored an SCES report in Vol.4 No.10. We wish all three

(continued on p.352)

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stereophile

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JANUARY 1993 VOL.16 NO.1

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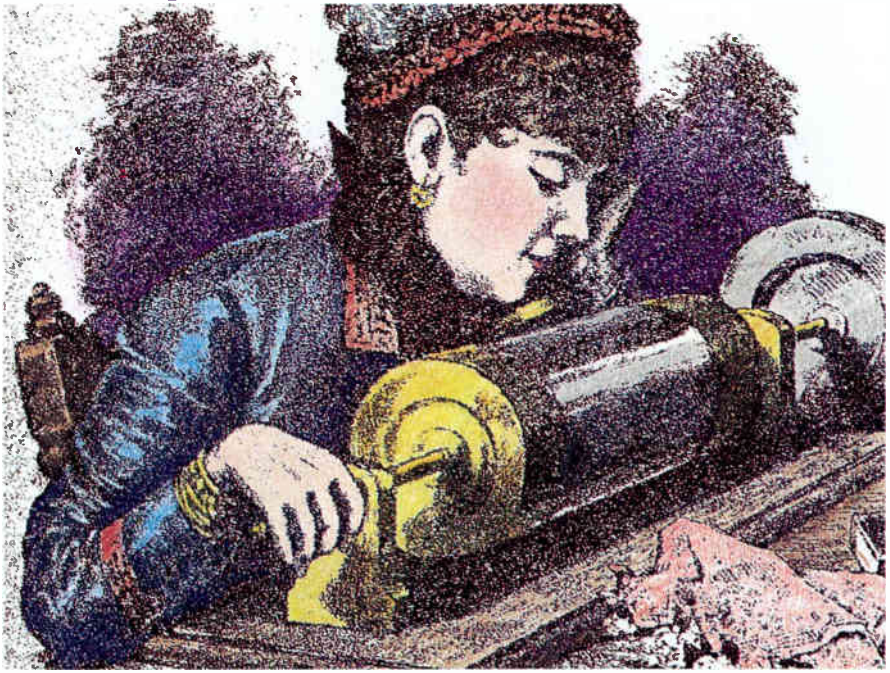
ROBERT HARLEY

Perfect Sound Forever?



"Everybody, including myself, was astonished to find that it was impossible to distinguish between my own voice, and Mr. Edison's re-creation of it."
Anna Case
Metropolitan Opera Soprano, 1915

"It is my sincerest hope that our successors regard today's pronouncements of digital audio sound quality with the same combination of humor and incredulity with which we view Anna Case's assessment of Mr. Edison's machine."
Robert Harley, Audio Writer, 1990

When I wrote that conclusion to an editorial in the January 1991 issue of *Stereophile*, I expected that it would be years or even decades before we thought of today's digital audio as being as anachronistic as the Edison cylinder. Digital audio sound quality was so far behind the best analog that I couldn't imagine a scenario in which a digitally encoded audio signal could meet or exceed analog performance in the immediate future. This pessimistic assessment was partially fostered by the grim realization

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that the world was stuck with a sampling rate of 44.1kHz and 16-bit quantization. Any wholesale improvements in digital audio would necessitate overthrowing the established standard—an unlikely prospect.

An astonishingly short two years after writing that, I can report that digital audio has taken a significant step forward in its inexorable march toward superiority over analog. The development to which I refer is called High Definition Compatible Digital™ (HDCD™). This is the digital encoding/decoding system developed by Keith Johnson and Michael Pflaumer that I described in last November's *Stereophile*. HDCD is a sophisticated analog/digital converter and proprietary encoding process that produces a digital signal compatible with all existing digital formats and hardware—including the Compact Disc. The second part of HDCD is an optional decoder that would be incorporated into CD players and digital processors. Discs encoded with HDCD will still play back on standard hardware without the decoder, and sound better than conventional CDs, but the process's full potential is realized only by playing HDCD-encoded discs through an HDCD decoder. Note that the decoder is not a requirement, but an enhancement. At the time of my first report, I hadn't heard the process and merely reported its existence.

Since that update, however, I've had a chance to hear HDCD firsthand under good conditions through an excellent playback system. During our stay in San Francisco for the Audio Engineering Society convention in October, JA and I visited Pacific Microsonics (the company formed to develop and market HDCD) for a private demonstration. The playback system consisted of the wonderful Artemis EOS loudspeakers (augmented with a pair of Keith's subwoofers) driven by a Spectral DMA-80 and Keith's own subwoofer amplifier. The source was first-generation master tapes played back on Keith's unique built-from-scratch analog tape machine. The sound was extraordinarily good; hearing Keith's first-generation analog master tapes was a real treat.

The system was set up so that we could listen to the analog tape directly, or after its output had been digitally encoded and decoded by the HDCD system. A DAT machine was in the digital signal path—with no tape in it—to confirm that the digital signal was indeed compatible with the existing CD standard of 16-bit word length and 44.1kHz sampling frequency.

THE SIGNAL AFTER HDCD ENCODING/DECODING SOUNDED *VIRTUALLY IDENTICAL TO THE FIRST-GENERATION ANALOG MASTER TAPE.*

It's one thing to compare an AAA LP with a DDD CD of the same musical event (Reference Recordings releases, for example, which I use in evaluating D/A converters), but far more rigorous to compare a digitized signal with a first-generation analog master tape—particularly Keith's high-resolution recordings. The original analog master is a much higher standard to strive for than an LP. Any weaknesses in the digital system will be more obvious when compared to such a superb source.

After getting familiar with the system by listening only to analog tape, the HDCD encode/decode system was switched into the signal path. I sat there incredulous at what I *didn't* hear: the signal after HDCD encoding/decoding sounded *virtually identical to the first-generation analog master tape.* There was an almost complete absence of the familiar digital artifacts: glare, stridency, loss of depth and space, flat sterility, congestion and hardness as level increases, homogenization of individual instrumental outlines, coarseness and truncation of reverberation decay, lack of ease, synthetic character to tonal colors, lack of textural differentiation between instruments, and a general uninvolvement in the music.

No, the HDCD conversion wasn't completely transparent—there was a slight loss of space and inner detail—but the difference was remarkably small considering that the signal was being digitized and converted back to analog. More fundamentally, however, the music had a wonderful smoothness, ease, grace, resolution, involvement, and effortlessness radically uncharacteristic of digital. I've heard preamplifier line stages that introduced more coloration than HDCD processing. Had I not heard HDCD myself, I would

WorldRadioHistory

have regarded as preposterous the assertion that an entire digital encoder/decoder could be more transparent than some high-end line-stage preamps.

The next comparison was of HDCD encoding *without* the optional HDCD decoder. Encoded discs can be played back without the decoder and still realize some of HDCD's sonic benefits. This was a fundamental prerequisite of HDCD; without backward compatibility with the huge base of existing players, HDCD would be confined to a small market of dedicated enthusiasts. The difference between standard decoding and HDCD decoding was significantly larger than the difference between the analog master tape and the HDCD encode/decode chain. Throwing the switch to standard decoding shrank the recorded acoustic, brought the presentation slightly forward, blurred the timbral and spatial distinctions between individual instruments, and sounded more "digital." Nevertheless, many of the qualities heard with the full encode/decode cycle were apparent, and the non-HDCD decoded signal was still appreciably better than that produced by conventional A/D converters.

WHENEVER HDCD'S DESIGNERS ARE ASKED ANY TECHNICAL QUESTIONS, THEY RESPOND VERY EVASIVELY.

Finally, we heard what HDCD could do when the encoder was driven by a live microphone feed. Keith played an HDCD-encoded DAT recording of the CD *Testament* (Reference Recordings RR-49CD) with full HDCD decoding. The sound was stunning, with depth, space, the ability to distinguish individual instruments from the whole, beautifully portrayed timbres, and an overall sense of ease and involvement I've never heard from digital. JA said to me later, "I can't believe we were listening to a *DAT!*" Although this HDCD-encoded disc is now available —and sounds terrific without HDCD decoding—it will be some time before any HDCD decoders find their way into high-end digital processors.

The most startling realization was that with full HDCD encoding and decoding, it will be possible to have a source for home music playback that is very nearly the equal of Keith Johnson's first-generation analog master tapes played back on his own tape machine. No, it wasn't identical, but the digitized version was stunningly close to the analog source, and orders of magnitude better than any other digital system I've heard—Sony's Super Bit Mapping included.[1] With the HDCD encoder driven by the live mike feed, however, the digital version may even be superior in some respects to the analog tape. The digital master won't suffer from modulation noise, speed fluctuations, and other problems inherent in analog tape. I'm sure the HDCD process has its own artifacts, but it remains to be seen which format's anomalies are more sonically benign. This question, however, is academic to consumers who don't have access to first-generation analog master tapes; CDs made with HDCD will certainly sound better than LPs.

How does HDCD work? That's being kept a secret. Whenever the designers are asked any technical questions, they respond with very carefully guarded—no, evasive—answers. Many key patents are still pending, and the inventors want to reap the rewards of their six-year research and development effort. The system now takes up a table top and is a *serious* piece of engineering. I speculate that the A/D converter is an oversampling type and that the processing takes place at a high sampling rate and long word length, which are then further processed to be compatible with existing standards. The process may also use techniques such as noise shaping and subtractive dither. Part of HDCD's musical performance is no doubt due to the extraordinary care taken in implementing conventional technology such as the analog stages, A/D converter, D/A converter, and just using good overall engineering. For example, the analog stage uses no printed circuit board; instead, the circuit is built in three dimensions, with the most meticulous and beautiful soldering I've ever seen. The system we heard is likely the most fully realized digital system extant.

With HDCD, digital audio has passed an important threshold: It can now hold its own with—or even surpass—analog for musical

1 See "Industry Update" in this issue for my follow-up on Sony's Super Bit Mapping technique.

Nº 30

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The Nº 30 is proof that state-of-the-art digital *and* analog technology can coexist with craftsmanship. The subject here, however, ultimately is music, and the heart of music is in the listening. To fully appreciate the quality of the Nº 30, we recommend that you visit your Mark Levinson dealer for a full audition.

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performance. What's really exciting, however, is that this level of sound quality is possible within the confines of existing format limitations—the 16-bit, 44.1kHz bottleneck foisted upon us by CD's inventors, which was all that was commercially realizable back in the late '70s.[2] This compatibility factor could make HDCD a reality for the masses, not just an esoteric system which can be heard only with nonstandard hardware.

In addition to the musical benefits, the existence of ultra-high resolution source material will energize the entire high-end audio industry. There will be much greater incentive for designers to improve their products and for listeners to upgrade their playback systems if the source contains vastly more information than had been available.[3]

Previous reports of better A/D converters and Sony's Supper Bit Mapping have been incremental improvements; HDCD is a wholesale leap forward, in my opinion. If HDCD is widely adopted by mastering studios (the reaction thus far has been very positive) and the decoders are readily available in digital processors, the benefit to the music lover and audiophile is incalculable. For the first time, consumers can play back in their homes a source that is nearly the equal of first-generation analog master tapes played on a state-of-the art tape machine. In some respects, the purely digital source made by feeding the live mike signal into the HDCD encoder may be *better* than the analog master.

The time has come for us to view the "Perfect Sound Forever" pronouncements of ten years ago as equal in absurdity to Anna Case's assessment of Mr. Edison's machine. **S**

2 When you consider that it took Sony's commercial might and the fact that Sony had the patents on the essential error-correction scheme to persuade Philips to change from their original 14-bit CD standard, you rightly shudder at what might have been. —JA

3 One drawback to all such improved-definition CD systems is that they need good DACs to realize the improvement in sound quality. As I said last month, play back an HDCD-encoded/decoded CD, or even a Sony SBM CD, on a cheap, poorly aligned CD player, and you'll still get unmusical, cheap CD sound. —JA

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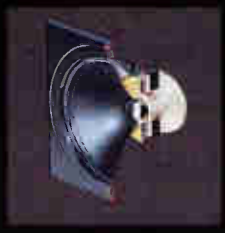

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LETTERS

We regret that resources do not permit us to reply individually to letters, particularly those requesting advice about particular equipment purchases. Were we to do this, a significant service charge would have to be assessed—and we don't have time to do it anyway! Although all letters are read and noted, only those of general interest are selected for publication. Please note, however, that published letters are subject to editing, particularly if they are very long or address more than one topic.

NO SHOW

Editor:

I have gone bankrupt and am now living on welfare. Please remove my name from your future promotional mailings. . .The only way I can attend the *Stereophile* show in March is for you to pay for my total expenses including airfare from Hartford, CT to San Francisco, hotel and meals, and miscellaneous transportation and tips. If you so wish, you may send me a cash advance of $1500, which should take care of all of my expenses. This expense would be tax-deductible for you, since you will be helping a welfare recipient enjoy a hi-fi show.

M. LIPPMAN
Millford, CT

WAY OUT BEST

Editor:

In November, Michael Ullman compared Analogue Productions' LP reissue of Sonny Rollins's *Way Out West* to the original Stereo label S7017, finding AP's to be the winner.

Being fortunate enough to own an original, I compared the two. I disagree with Mr. Ullman's conclusions. I found the original to excel in a number of crucial areas. All the reissues, including AP's, have a left-right soundstage: tenor on the left, drums and bass on the right. On the original, the drums are dead center, with cymbals extending upward. Listen to the drum solo in "Come, Gone" on AP's reissue: the drums are squeezed into the right, reduced in size and impact. On the original, the drums are centered, occupying the space of real drums and having more weight, snap, and extension. The bass on the original sounds more natural and woody. The tenor is surrounded by air. It's the original that comes closer to a live performance.

Chad Kassem should be commended for reissuing this masterpiece. If you don't own the original, Analogue Productions' is the one to buy. But only the original can transport these three masters into your home.

JAKE KAGAN
Newton, MA

RACIST?

Editor:

I was extremely distressed to see that you published R. E. Kirkpatrick's letter in your November 1992 issue because it contained the racist slur "Jap." Notwithstanding Mr. Kirkpatrick's apology for his use of profanity —and I am left to wonder whether Mr. Kirkpatrick considers a racial slur to be profanity—I thought a reputable publication such as yours would have recognized that readers of Japanese descent, such as myself, are deeply offended when reading or hearing this slur. Regardless of the merits of raucous correspondence such as this, wouldn't it better, and more socially responsible, not to dignify such letters with a response? Can *Stereophile* try in the future to promote the "can we all try to get along" spirit? Perhaps more of this spirit might have avoided the recent tragic death of a Japanese exchange student in Louisiana, from whence Mr. Kirkpatrick hails.

DONN GINOZA
Palo Alto, CA

I, too, was horrified at the coldblooded murder of

the Japanese student mentioned by Mr. Ginoza. I also abhor language like Mr. Kirkpatrick's "Jap crap." However, I don't regard my role at Stereophile *as being to impose political correctness or social responsibility upon the correspondents whose opinions I publish in "Letters." The First Amendment to the Constitution is one of the many things that enabled this country to start its existence on the right foot. The great thing about freedom of speech—one that many well-meaning people apparently misunderstand—is that it allows those holding abhorrent views to stand identified by what they say and be judged accordingly. Which is why I am a "card-carrying" member of the ACLU.*

I find the idea of "political correctness" Stalinist in its implications. Once art is judged by its conformance with prevailing political attitudes, personal freedom is halfway out the door. Take the expressed feminist viewpoint that the Rolling Stones' "Under My Thumb" from 1966 is both bad music and bad art because the lyrics imply the suppression of women. The lyrics may indeed imply that, but the song is nevertheless a great piece of music-making. Isn't it? —JA

CARING

Editor:

Stereophile is an excellent publication, both in form and in content. The discussions about objective *vs* subjective evaluation are not only germane to the world of high-end audio, but to the world at large. I'm sure it's not news to you that this distinction—objective *vs* subjective, science *vs* art, knowledge *vs* understanding—is central to the dilemma of our world.

Best of all, I think *Stereophile* is a living magazine in the sense that "the magazine" is really a community of discourse by all kinds of people everywhere. We all read and write (and buy) because we care.

BRUCE PAGE
New York, NY

PRIORITIES

Editor:

As a new subscriber, I enjoyed the first issue I received, the Test CD, and the list of "Recommended Components." I am familiar with only two recommended components: the Grado ZTE+1 and the Wharfedale Diamonds. I found your description of these two very accurate (*ie*, they sound the same to me).

After reading your comments, I wondered if perhaps you place a higher priority on soundstage than on frequency response. In the case of the Wharfedales, for instance, the lack of bass and the "nasality and boxiness" are very obvious in even casual extended listening (when one is reading, not in the nice spot, writing a paper at a desk in the wrong location, and so on). It seems to me that soundstage failings are obvious only when one is really listening. Since I suspect most folks really listen only about half of the time, I would be inclined to recommend, say, an Allison Cube or something by Boston Acoustics rather than the 'Dales. I will grant, however, that since I never had a real system that could produce a soundstage, I simply may not know what I am missing.

JON ALEXANDER, OP
Las Cruces, NM

You can't have perfection in a loudspeaker at any price; all you can do is balance flaws. While more colored than some, the little Diamond (when set up optimally) does offer reasonably good soundstaging. More importantly, it gets the pace and rhythm of music right, which is why it appears in "Recommended Components." —JA

AMP CLAMP

Editor:

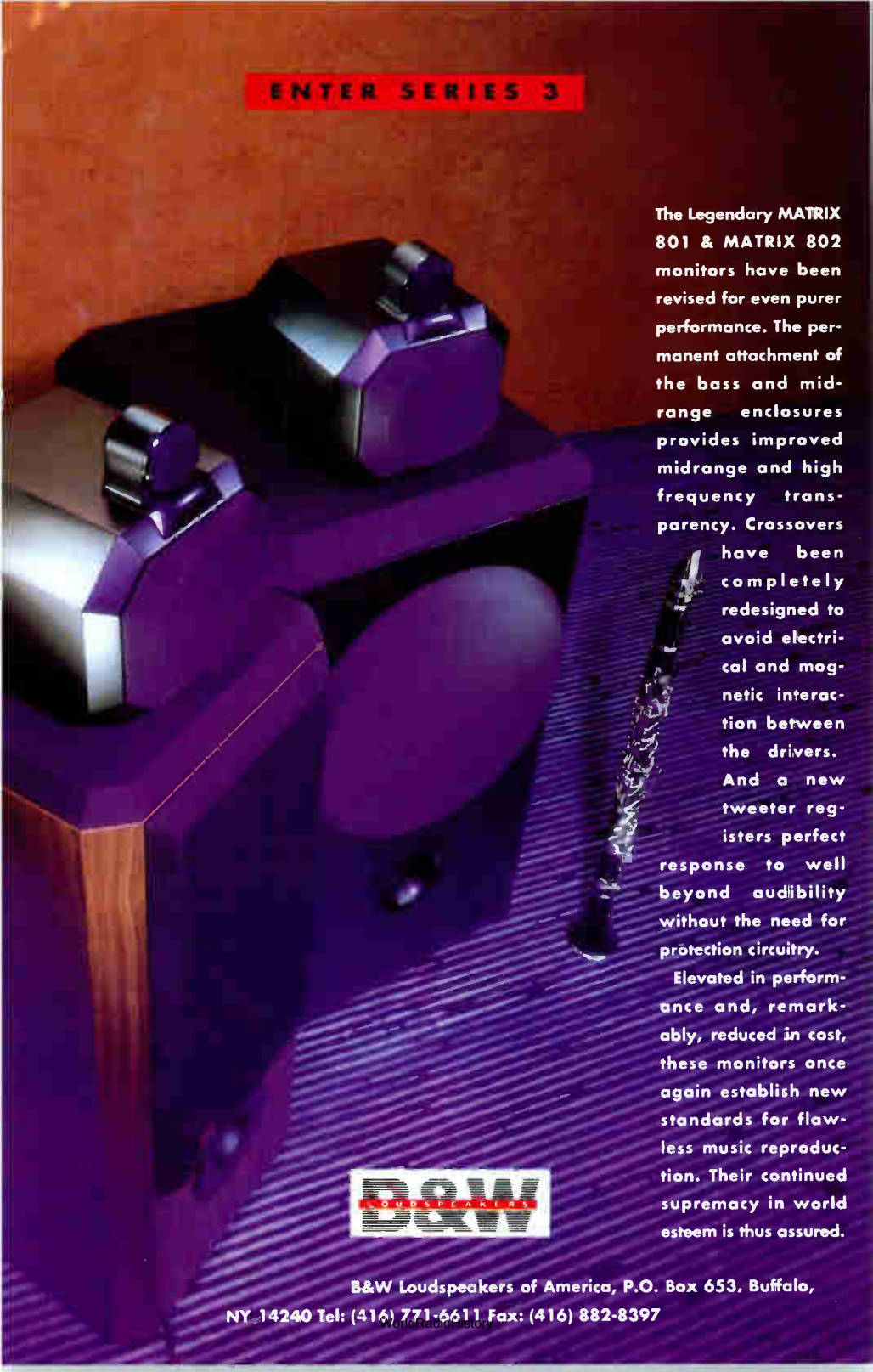
AmpClamp? I place a York 10-lb dumbbell on top of my Adcom GFA-535 to damp vibrations. Works fine. WILLIAM GUY JEGL
Upper Marlboro, MD

THE NEW TWEAK

Editor:

After reading of Clark Johnsen's discovery that degaussing a CD erases much of its harshness [November '92, p.21], I couldn't wait to try my own experiments. The first thing I tried was degaussing some of the harshest, most strident old Columbia LPs in my collection—some of the very same that were criticized by *Stereophile* long before it became politically incorrect to find fault with any vinyl. I noticed at once that much of the surface noise had been erased. Alas, though, the original harshness was compounded.

Next I tried some digitally mastered LPs, and found no audible difference (Judith Reilly should check, though, and see if this mitigates or eliminates the cracking of her turntable bearings). Finally, I tried degaussing my LP of *Stereophile*'s *Intermezzo*. I found it became audibly indistinguishable from the CD



version, save for the continued absence of the other two Op.117 Intermezzi.

Speaking personally, I don't give a pile of fetid dingo's kidneys what mechanisms may be at work here. I am concerned only with The Music. However, some of the electromagnetic energy from the degausser must be remaining in the grooves, levitating the stylus over the surface noise but creating a harshness of its own. And it's easy to see how a degausser could affect CD sound. After all, CD is an optical medium and light is electromagnetic, although much higher in frequency than the usual 60Hz degaussing field. Because of this frequency mismatch, the coupling is very small, so only a small portion of the harsh digital signal is erased. The edges of the waveform are erased, while the lower Fourier components are reinforced by the 60Hz, hence a rounder sound with more well-defined bass.

The coupling between vinyl and electromagnetism is smaller, and no doubt involves small amounts of diamagnetism and ferromagnetism in the vinyl excited by the original cutting transducer. Perhaps all our recording media are contaminated to some extent by residual electromagnetic fields. Readers may recall Mr. Johnsen's earlier blathering in *Stereophile* that shellac 78rpm records sound better than any CDs or LPs. This makes sense, since shellac has a much shorter spin-lattice relaxation time than vinyl. But the only way to completely eliminate electromagnetic interference is to go completely acoustic. If LPs are good and 78s are better, then, by extrapolation, acoustically recorded and reproduced tin cylinders must yield the most stunning reproduction known to man. Only problem, though, is that the polarity is wrong. Think about it: a compression enters the horn, creating a dale in the cylinder which, when played back, gives rise to a rarefaction in the horn. And, to quote a long-forgotten *Stereophile* writer, you can lull yourself to sleep at night secure in the knowledge that there isn't a damned thing you can do about it.

Like Johnsen, I became so fascinated by all this that I simply couldn't wait until April to write about it.

DAVID LIGUORI
Albany, NY

STICKER SHOCK

Editor:

I had always considered myself an audiophile. I had a $600, 100W integrated amp, $200 CD player, $100 turntable, and a pair of PA speakers (5½' tall with three horn tweeters, two 10" drivers, and two 12" drivers per side) that I got used for $200 from a friend. I found some wire in the garage, and thought, hell, that's good enough to connect these speakers . . . and it was free. I listened to a lot of Metal, Floyd, Doors, etc. It all sounded damn good to me, and it got loud! I was 18, had a good job and a killer system, what else was there in life? That system has lasted me nine years . . . then I read *Stereophile.*

I have been reading it since January 1992 and it's turning me into a nut, or at least that's my wife's opinion based upon my actions of the last several months. After two issues' worth of your reviews, I boldly declared—"I *need* a new system!" I made my rounds of the local high-end shops; to say I was not prepared for the price of this new system is an understatement.

First, I thought, speakers—I definitely *need* new speakers. I looked at and listened to several designs. These ranged from $1000 to $5000/pair, they all sounded pretty good . . . but $5000/pair, sheesh.

Let's move on to the pre/power stuff. That might be a little easier on me. An integrated amp is not good enough now. I must have a separate preamp and power amp. So, uh . . . what's your fancy? Tube, solid-state, hybrid? The salesman began to quote prices starting at $1000 for the preamp, $1500 for a power amp. . . hummm. . . . By the time he got that sentence out, I had gone through a serious reality check.

CD player, I said to myself. I didn't dare say the words out loud—how much more could my dream system cost? Then a demon voice from nowhere said, "Wanna move onto High End Street, buddy? Check out a transport and a D/A converter—moving expenses start at $1000 each." The voice continued, "Of course, with all this new mega expensive gear, that crap you got out of your dad's garage will just never do. You'll need new cables and interconnects." Many of these turn out to cost more than I paid for my first car.

In a shocked daze, I shouted uncontrollably: "WOW! Sounds great, how many thousand did ya say. . . I'll take it all."

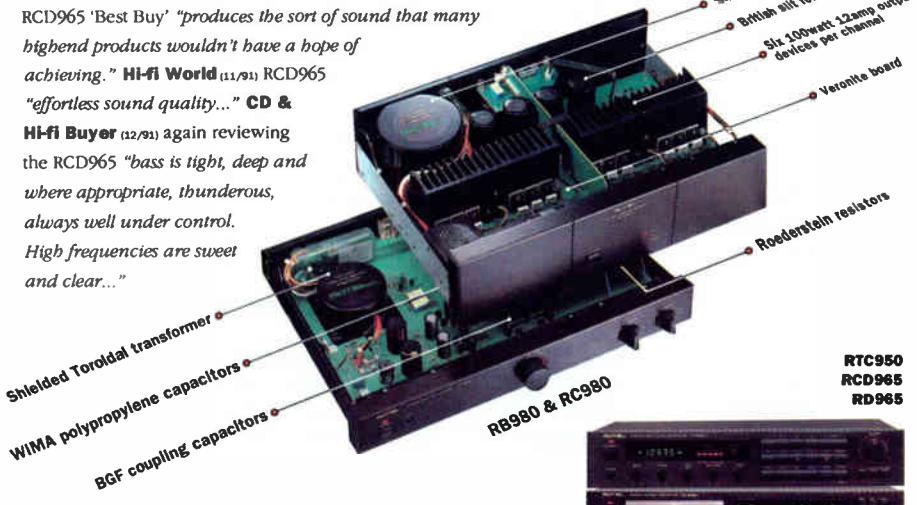
After weeks of listening to and months of reading about high-end systems, I've come to one conclusion: life was easier at 18.

BUILT FROM THE INSIDE OUT

For most, the benefits of a pre/power amplifier set-up is rarely considered as many combinations cost thousands of dollars–most are discouraged well before a demonstration. Rotel, winners of **What Hi-fi?** *"Best product of the year 1991 and Best System"* has an affordable solution. Rotel introduces the 360watt 8ohms (Bridged Mono) amplifier that can be bought in stages.

Aclaimed by **Audiophile** (11/91), the RB980 can form the heart of your audio system, it can grow as your system grows. Begin by using one RB980 with 120watts nominal per channel and then add another when you need. **Audio Review** (2/92) measured the RB980; 137watts @ 8ohms per channel, 267watts @ 4ohms per channel, 388watts @ 2ohms per channel. **Audio Review** noted, *"a really great performance. The sound quality is extraordinary for products in this price range."*

Drive your amplifier with **Remote Control** AM/FM tuner/preamp RTC950 motor-driven volume control and 20 presets or RC980 preamp with its non magnetic chassis which cancels hysteresis distortion. Whichever you select, the sound quality is going to be incredible. Also, check out the **Rotel CD** players. They have received worldwide aclaim. **Hi-fi Choice** (11/91) Rotel CD player RCD965 'Best Buy' *"produces the sort of sound that many highend products wouldn't have a hope of achieving."* **Hi-fi World** (11/91) RCD965 *"effortless sound quality..."* **CD & Hi-fi Buyer** (12/91) again reviewing the RCD965 *"bass is tight, deep and where appropriate, thunderous, always well under control. High frequencies are sweet and clear..."*



Designs developed in England by audiophile Tony Mills, Rotel amplifiers truly are *built from the inside out* using only premium parts. Selected for sound quality, resisitors and capacitors come from Germany and the UK, while special semiconductors orginate in USA. If you're on a budget then consider the Rotel RB960 power amplifier, its of dual mono design and capable of 60watts per channel in stereo. By bridging a pair of amplifiers you can feed your speakers with a stunning 180watts. **What Hi-fi?** (3/92) says, *"a thoroughly commendable performance. Great sound quality for price."*

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Six months have passed since then, and I've recovered from sticker shock. I will say there are a lot of great-sounding products out there, and some are quite reasonably priced. I thank *Stereophile* for helping me become a more critical judge of equipment and sound. I now spend many evenings tweaking my system, sitting in my sweet spot, and being completely taken with the music. Before *Stereophile*, I had completely given up on my old records. No longer: I've decided to invest in a good turntable and rediscover the hidden jewels in my record collection.

I would strongly advise budding audiophiles (I now consider myself one) to really research and listen to everything before you buy on impulse, and for Godsakes trust your own ears. I'm little more neurotic about sound than before, but this crazy ride has been really fun... H. GEDDIS JOHNS II
Cincinnati, OH

OVERPRICED TURKEYS?

Editor:

I have been a subscriber to the magazine for many years now. I have watched you grow and change, make mistakes and rectify them. *Stereophile* was my favorite magazine for many years. Unfortunately, this opinion has changed.

I always looked forward to "Recommended Components" because it gave me an idea of what to listen to when I was looking to upgrade my system. I knew with a little saving I could purchase a Class A or B component. This is now not the case. Over the years the Class A and B components have gone beyond the purchasing ability of most normal (middle-income) people. By your own survey, most of *Stereophile*'s readership owns a complete system for about $10,000, yet a Class A "Recommended Components" system will run very close to $100,000, including top-of-the-line wires. This is more than most households earn in a year. I hold the high-end publications completely responsible for this dramatic increase in the cost of various components, even allowing for inflation.

When the media gives a stellar review to a product that costs many thousands of dollars without due consideration of cost, I feel it is irresponsible. I am not saying that the reviewing of cost-no-object pieces should be abandoned, but that it should be put in its place. For example, if a power amplifier costs $17,000, is it $10,000 better than an amp that costs $7000? If it is, why? If it is not $10,000 better, then it should be stated that it is an overpriced turkey. Similarly, if a high-priced piece sounds incredible but destroys itself on every other listening session, it also should be condemned as an overpriced turkey...

The job of the high-end publications is to put like pieces, with the same approximate price, together for a group review. This does not have to occur in one issue, but could over a course of two or three. Then the reviewer should give an opinion as to which sounds the best in a given situation for the price being looked at. I feel that if this was put into operation, you would see the manufacturers look to build not a higher-priced piece, but a piece that outperforms another piece in the same price category. Now, instead of just putting in a more expensive resistor to make the unit sound better and increase its price, we may see some better engineering start to happen...

The high-end journals should attempt to work together so that all can benefit from the experience. They should lead the way without bickering among themselves. I know this sounds like Utopia. But if this could happen, then I truly feel that soon the musical experience will be as good at home as it is when I am sitting in front of a jazz quartet, or tenth-row center at Carnegie Hall.

MARK J. SPERANZA
South Hempstead, NY

LIVE OR MEMOREX?

Editor:

Last night I was finally able to perform the ultimate (for me) A/B listening test. Immediately after hearing the Buck Hill Quartet—Buck Hill (sax), Jon Ozment (piano), Carroll Dashiell (bass), and Warren Shadd (drums)—perform as part of the Montpelier Jazz Festival at the Montpelier Mansion Cultural Arts Center, I was able to purchase a CD (*I'm Beginning to See the Light*, Muse 5449) being sold in the lobby of the same four musicians playing some of the same tunes. Immediately upon arriving home, I cranked the CD up to see if I could hear a difference. All of this took 15 minutes—I live quite close to the Mansion grounds. And what do you know, I *could* hear a difference, but it was an acceptable one having a number of different and somewhat contradictory meanings that lead me to a

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from.
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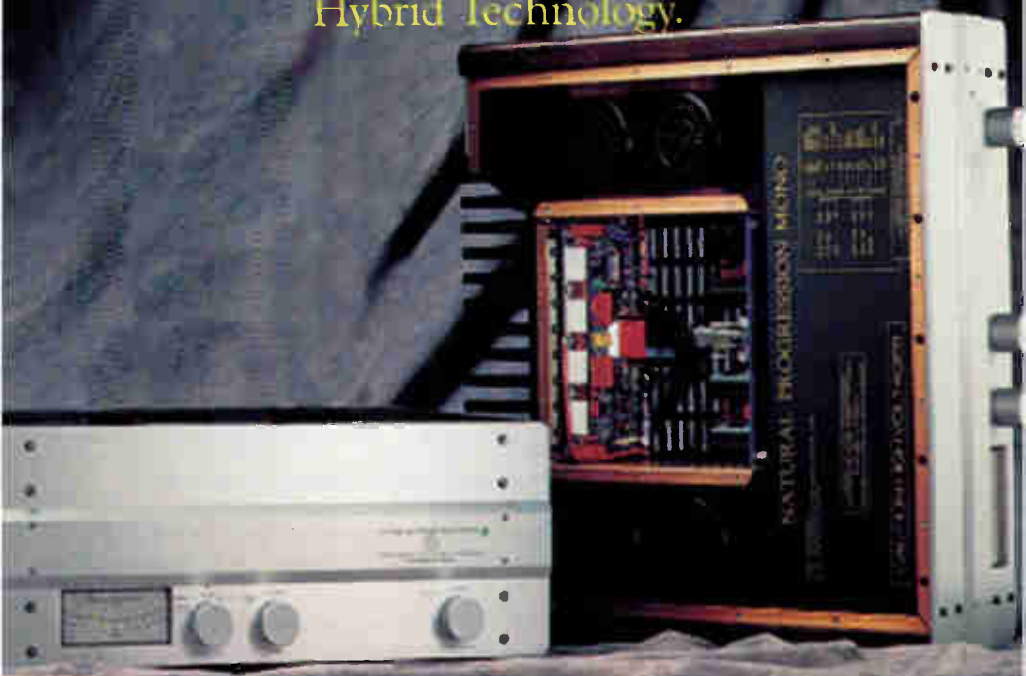

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"The UltraLink is a genuine high end product which has jumped ahead of many famous names and designs to appear close to the leading edge of digital replay..."

Martin Colloms, *Hi Fi News & Record Review*, July 1992.

"In terms of sheer transparency, revealing subtle details of the music, the PS Audio UltraLink surpasses nearly every other processor made, even those costing many times its price."

Peter Moncrieff, *International Audio Review*, No. 64, March 1992.

"No other DAC I've used (to play the Frank Martin Mass) captured this level of inner detail and vocal definition, this degree of precision, projection and sheer effortless ease both dynamically and spatially."

Jonathan Kettle, *Audiophile*, May 1992.

"In these areas – soundstage transparency and focus, portrayal of fine dynamic structure, and resolution of inner detail – the UltraLink was extraordinary and among a handful of the best processors I've heard, regardless of price."

Robert Harley, *Stereophile*, Vol. 15 No. 6, June 1992.

"The UltraLink sounds so good and offers such conspicuous value among high end D/A processors that, as much as any digital equipment can be said to be a safe buy, this has to be it... I'm buying the review sample."

Robert Deutsch, *Stereophile*, Vol. 15 No. 9, Sept. 1992.

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strange conclusion.

First, I realized that I had not gone totally deaf after 40 years of listening to both live and canned music. Second, I recognized that my far too expensive and time-consuming hi-fi actually could reveal the difference between a live performance and a reproduced one. Third, it raised a fundamental question: Do any audiophiles really and truly enjoy listening to their hi-fis immediately after going to a concert? (Perhaps a day or so later, but immediately after?) Fourth, how many performances can one see for the cost of one's audio equipment? Fifth, is it worth spending time, money, and energy on assembling a decent-sounding piece of hi-fi equipment at all?

The answer to that last question is a resounding "yes!" Although anyone, even with his eyes closed, could tell the difference between the live performance and the music being reproduced out of my system, what is remarkable is the degree to which one's mental processing is able to actually fill in the gaps in order to make waveforms coming out of one's speaker system seem like real music... If there was no way to hear Buck Hill live, it still beats the heck out of not listening to him at all.

Consequently, all those who criticize the audio industry for not fully, totally, and exactly duplicating the sound of an orchestra or band playing in their living room, should realize that for many people the audio electromechanical/optical system they have in their house, with all its imperfections, is the only way they ever will get to listen to music at all.

For most people it isn't a question of "Live *vs* Memorex." It is "Memorex *vs Nothing*."

KENNETH KULMAN
Laurel, MD

MISSING IN ACTION #1

Editor:

I have been using the Acurus DIA-100 Direct Input Amplifier by Mondial Designs for about two months. This $995 unit offers extraordinary sound and value for the money. In my 25 years as an audio enthusiast, I have heard no amp/preamp combination, for less than $3000, that comes close.

Maybe the greatest test was when I invited my wife into the music room for an audition after two weeks of setup. Upon entering, she insisted she had only enough time to listen to one song. After a series of musical requests, she left one and a half hours later offering a stream of glowing adjectives that must at least qualify the system as Class B.

For the record, the rest of my system is a Sony X777ES as a CD transport via Kimber KCAG Digilink to a Wadia X-32 D/A through MIT 330 interconnects to the DIA-100 through MIT MH750 Music Hose to Hales System Two Signatures. I know what you are thinking: "this guy's cables are worth more than the amp!" I know, but you see, this system was put together through a series of trades and used-equipment purchases, and the fact is that it works. As you say in the business, the system simply disappears and leaves nothing but pure music.

For the sake of the mid-fi audiophile community, I hope you will consider an audition of the Acurus DIA-100. JOE HARDESTY
Ephrata, PA

CG is currently working on a review of the DIA-100. —JA

MISSING IN ACTION #2

Editor:

Many months ago in "Coming Attractions" you promised a review of the Vandersteen 3 loudspeaker. I do hope that the above review will appear in this decade. AL FORMAN
Croton on the Hudson, NY

I have been working on a review of the Vandersteen 3 for almost a year. A woofer went bad in one of the first pair, meaning that the speaker missed its slot in my work schedule. I then intended to publish the review late last year, but the second samples had to be replaced due to them no longer being representative of Vandersteen's current production. I have since received revised samples; the review will appear next month. TJN is also working on a review of the Vandersteen 2Ce, which should appear in March. —JA

MISSING IN ACTION #3

Editor:

I just received my October issue and felt it was time to write...You have reviewed yet another Theta product while continuing to avoid Krell Digital products. Are you prejudiced?

All comparisons that I have made show Krell to be, dollar for dollar, superior to Theta. Comparing the Pro Basic II against the Stealth

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proved the Stealth to be much more musical. Comparing the Studio against even the Mark Levinson No.30, the Studio won. (In this comparison, the Studio did have AT&T while the No.30 was driven via coaxial.)

Play fair. Review some Krell Digital processors.

RICHARD D. DIAMOND, DDS
San Francisco, CA

Krell Digital appears to be very nervous of review coverage in Stereophile. *We did receive a Krell 64x and an MD-1 for review over a year ago, but they were returned to Krell for updating; we've not seen hide nor hair of them since. We expect to receive review samples of the latest Krell Reference D/A processor and CD turntable early in '93, however.*—JA

EXTREMELY DISAPPOINTED

Editor:

I was extremely disappointed to read in the October 1992 issue of *Stereophile* the review of the Theta DS Pro Generation III D/A processor by Robert Harley, and particularly his comparison of the Theta with the Mark Levinson No.30. Further, I was baffled by the fact that this outstanding processor was not included in Class A of October's "Recommended Components," but was relegated to Class B with a "Borderline Class A" designation (whatever that means). To even suggest that the Gen.III belongs in the same class as the other processors listed in Class B, leaving the No.30 the sole occupant of Class A, is difficult to comprehend.

I am an owner of a DS Pre Generation III, AT&T Balanced, and, frankly, have not heard the No.30. . . However, I know of at least six individuals (excluding Harley, and J. Peter Moncrieff of *IAR Hotline*) who have listened to both the Gen.III and the No.30. As you would expect, each liked different things about each processor, but concluded they were both in a class by themselves in terms of *sound* quality.

It is interesting to note that Harley and Moncrieff reached vastly different conclusions about these processors:

Harley: "Overall, the No.30 was clearly the better processor."

Moncrieff: "I've compared these two processors, and it is the Theta Generation III that is the true breakthrough. . .The Theta DS Pro Generation III simply stands head and shoulders above every other digital processor."

Moncrieff indicated in his review that he did not like the No.30's ". . . softness in the trebles. . ." This, however, would appear to be one of the principal reasons for Harley's preference for that processor, in that ". . . the No.30 clearly excelled in treble smoothness. . ." Harley's reference to cymbals having "more delicacy" on the No.30 confused me; I am not certain I have heard a "delicate" cymbal in live music.

Harley also stated that the Theta was "forward." To me, live music seems forward, or even bright, and real guitars have strings that pluck and soundboxes that resonate. Anyone who listens to live jazz can tell you that when a musician blows a trumpet, the sound will jump right out at you and almost knock your socks off. The same goes for the bass, the xylophone, and almost any other natural, non-amplified instrument. And that is how they should sound when reproduced through a home stereo system. Isn't this what Mike Moffat was trying to get at in his interview with Harley when he said, ". . . I'm shooting for the same kind of rush I get listening to live music. The goal has always been. . . to re-create live music in the listening room"?

What I found to be Harley's most extraordinary statement was that ". . . the Gen.III positioned the whole presentation slightly in front of, rather than behind, the loudspeakers." This causes me to question what else might be going on with Harley's system and his room. In my system, in which a great deal of emphasis has been placed on room acoustics, the soundstage is well behind the speakers. . .

I do not expect reviewers or even audiophiles to necessarily agree on anything. I am compelled, however, to accept Moncrieff's opinion, not because I own a Theta, but because it is consistent with the opinions of the respected individuals I referred to above. In fact, with the exception of Harley, I have not heard of one person who actually *prefers* the No.30 over the Gen.III, but I know of several who prefer the Gen.III. . .

If I could reduce the review to what I believe are its fundamentals, it seems that Harley liked the Gen.III's bass and the No.30's treble. He concluded, "Despite these tradeoffs, both processors shared some remarkable qualities not heard from other digital front ends I've auditioned." Now if he *really* means that the bass/treble differences he heard are in fact a

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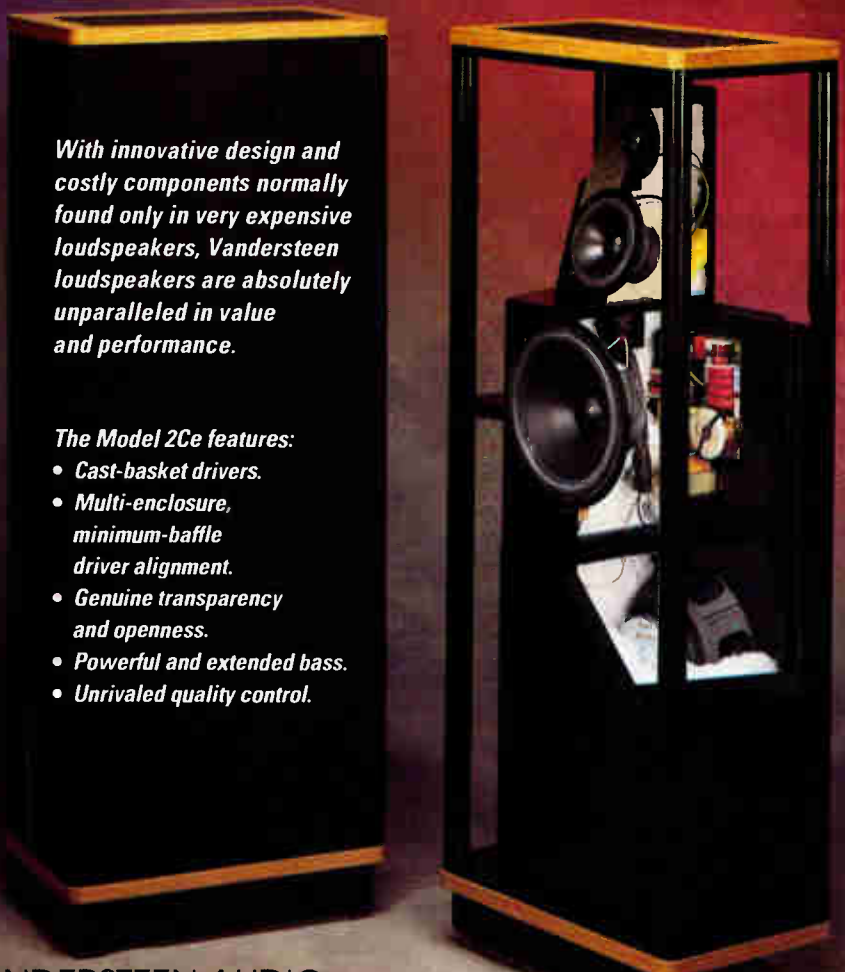

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tradeoff, and that both processors excel in other areas, should one infer that they are very close in overall performance; *ie, in the same class?* As you know, your readers rely on these classifications when making purchase decisions and, perhaps more importantly, to obtain bragging rights with their friends. I believe that in this instance *Stereophile* has done them (and Theta Digital) a disservice. . .

My friends and I all look forward to the receipt of *Stereophile* each month, and generally rush to our music rooms to read all the latest reviews, letters, and other features we have come to enjoy. Your magazine has no peer. I also subscribe to a number of other audiophile magazines in order to get a feel for other points of view. I often find myself throwing one of them—*The Audio Critic*—into the trash even before I have finished reading it. I can assure you, however, that this will not happen to the October 1992 issue of *Stereophile*, in spite of my feelings about the "Borderline Class A" matter. I hope that this classification will be reconsidered by Mr. Harley and that the Theta Generation III will be elevated to *full* Class A status, where I and a number of other people believe it belongs.

JON C. WHITEMAN
Bloomfield Hills, MI

I'm perplexed by the strength of Mr. Whiteman's conviction that the Theta DS Pro Generation III is superior to the Mark Levinson No.30, given the fact that he's never heard the No.30. Although it's natural for him to defend the product he owns, his position is not based on first-hand auditioning.

But Mr. Whiteman shouldn't feel the need *to defend the Generation III. As I made clear in my review, the Gen.III is a superb product. Rarely do I endorse products as enthusiastically as I did the Gen.III. I also agree that the Gen.III is superior to all the other processors in Class B—that is what the "borderline Class A" designation means. I didn't feel, however, that the Gen.III's performance came close enough to the No.30's to warrant a Class A recommendation. It was, however, a close call, and one that I very carefully considered. Subsequent auditioning has confirmed that judgment's fairness.*

It's my understanding that J. Peter Moncrieff's experience with the No.30 is limited. According to Madrigal, Mr. Moncrieff never obtained a review sample from them, and they doubt he could have borrowed a No.30 from a dealer during the time before the appearance of his review in IAR Hotline *64 immediately after the 1992 WCES, when very few No.30s were in circulation. Moreover, Mr. Moncrieff's playback system and associated components were not revealed in the review. Did he get the best out of the No.30? What transport and digital interface did he use? As I made clear in my review, the No.30 needs to be driven by a top-quality transport via the ST-type optical interface to sound its best. Jack English, who bought a No.30, had an identical experience to mine when trying different digital interfaces. When a reviewer doesn't specify his setup and associated components—and recordings, for that matter—it makes it difficult to judge the validity of his impressions. You may also recall that Mr. Moncrieff has also asserted in print that the PS Audio UltraLink is superior to the No.30. While the UltraLink is a superb product and a terrific bargain at $2000, it is by no stretch of the imagination the better processor.*

If Mr. Whiteman feels that Stereophile *has done our readers a "disservice" because we denied Generation III owners "bragging rights with their friends" by not including it in Class A, I must point out that such peripheral issues are irrelevant. Value judgments arrived at by* Stereophile *reviewers are concerned only with sound quality. Would Mr. Whiteman have me consider the egos of the review product's owners when formulating my conclusions about the component? Just as neither lavish build quality nor price influence a review's musical perceptions, neither can the desire to avoid "disappointing" those who already own the product under review.*

Finally, I thank Mr. Whiteman for being such an enthusiastic Stereophile *reader and contributing his opinion. I strongly suggest, however, that he compare the No.30 and Gen.III for himself. When I asked Madrigal if there were any No.30 dealers in Mr. Whiteman's area, they offered to arrange a special audition for him at a nearby store, including a comparison of the No.30 and the Gen.III.*

As more Stereophile *reviewers (and readers) gain experience with the Gen.III and the No.30, I welcome their views on the Generation III's merit.*

—RH

UNWARRANTED EXPECTATIONS?

Editor:

I fear that Peter Mitchell has raised expectations too high concerning the capabilities of digital signal processing (DSP) in the reduction of unwanted room effects ("As We See It," October '92).

Effective time-domain equalization can only be partly achieved for a single listener in a fixed position. At any location away from

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"The superiority of the Theta Generation III covers all sonic aspects, from transparency to clean purity to stereo imaging."

"...the Theta DS Pro Generation III can give you a total musical experience that you can't get anywhere else from digital."

—Peter Moncrieff
International Audio Review #64

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the "hot spot," the correction signals will cause pre-echoes to occur. This is because some of the corrective signals will arrive at the listener *before* the early reflections which they are intended to cancel. Unfortunately, the ear is much more sensitive to pre-echo than to post-echo caused by early reflections. Thus it is likely that for listening locations other than the "hot spot," time-domain equalization will result in a degradation of sound quality.

Even at the "hot spot," such a system is unlikely to be effective above about 1kHz. Above this frequency, the distance between the listener's ears becomes significant compared with the wavelength of sound. Therefore, each ear has to be considered as a different listening position.

Where active noise-control techniques can be effective is in the reduction of room modes, but this is more effectively achieved by a separate dedicated system such as the Phantom Acoustics Shadow, which can be placed at a location where sound pressure due to unwanted room modes is at a maximum (usually in the corners behind the speakers).

Another fallacy stated by PWM is that symmetrical speaker placement will lead to the maximal excitation of the lowest lateral room mode. In fact, such a placement will not result in problems from this mode if both speakers are radiating the modal frequency in-phase (as is usually the case), as each will excite the mode in antiphase with the other, causing cancellation of the mode. The Sitting Duck software can be misleading regarding this effect.

Unfortunately, the panacea for room coloration does not exist. The only really effective way to tackle such problems is by appropriate room analysis and treatment.

BOB BURNS
South Humberside, England

DCC TEMPERAMENT

Editor:

I am writing in regard to Peter van Willenswaard's test report of the prototype Philips DCC-900 ("Industry Update," Vol.15 No.9, September 1992, pp.53–61). The last paragraph of the first column on p.55 states, "By the way, no components of the original signal are omitted, and no new components (harmonic or intermodulation distortion) appear." This statement may be correct, but what about the transposition of some intervals?

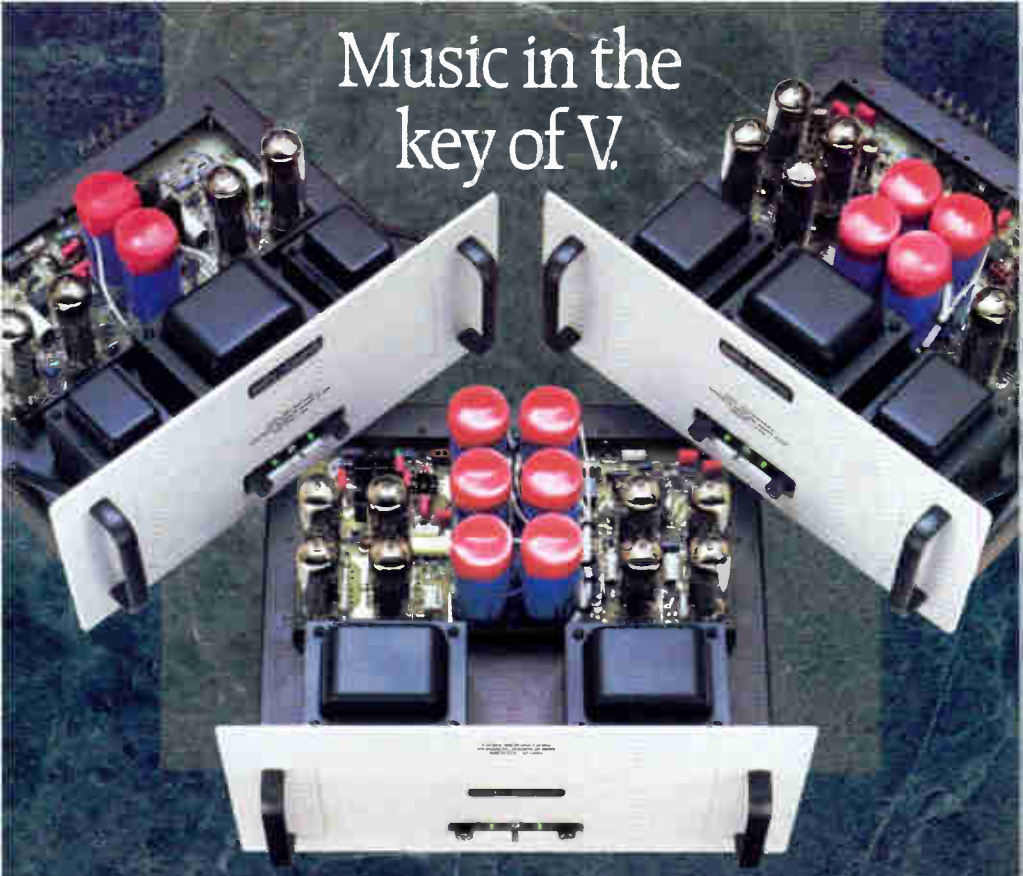
Closer observation of figs.4 and 5 (p.57) reveals this transposition. Aside from the obvious noise-floor increase, and "holes" at higher frequencies, there appears to be some frequency shifting of several sub-bands. Are these artifacts related to measurement, plotting, publication, or (Golden Ears forbid!) the processing system itself? The phenomenon noted is a downward shift of the second tones between 300 and 400Hz, another between 1kHz and 2kHz, and again between 3kHz and 4kHz. The last visible shift occurs to the second tone between 10kHz and 20kHz. These shifts are visible as differences in spacing between the AP System One–generated original and PASC–processed plots. Coincidentally, the plots of Mr. van Willenswaard's tests of three other systems reveal the same phenomenon. The Dolby AC-2 processing also illustrates a 10dB reduction of the two highest tones.

Although Mr. van Willenswaard's report was very informative, I hoped to have more questions answered. Quite to the contrary, several other questions came to mind. What results do CD or DAT show? Can the scale be expanded to observe the tones below 300Hz? (23 of the "about 30 tones" were published.) Can other tones be generated to see if any other shifting occurs? If an acoustically correct temperament is processed, will the output be correct? How about an incorrect input—what's the output? Would Eddie Van Halen's guitar sound like a MIDI-controlled tone bank? What would PASC do if Ringo sang out of tune? Last but not least, aren't data-reduction systems really playback end (music?) producers rather than reproducers?

GARY CLAUSEN
Colorado Springs, CO

I am sorry to have alarmed Mr. Clausen unnecessarily, but the downward shift of three tones between the original and the four processed plots originates from either the measurement or the plotting stages. The original shows the left-channel signal as generated by the Audio Precision; the frequencies in the other plots coincide with the right-channel signal from the Audio Precision. The inclusion of four tones (one of them is situated below 300Hz and not shown) differing slightly in frequency between the channels permits the Audio Precision to perform a fast four-point channel-separation measurement. The 30-odd multitone signal was designed to enable

Music in the key of V.



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a simultaneous measurement of amplitude and phase responses, distortion, channel separation, and noise level of a stereo pair of channels. I didn't use it for that reason, however, but solely because of the signal's complexity. I wanted to see what happened to the noise floor, if IM products would occur or if some of the tones would even be omitted in any of the data-reduction processes. In choosing the plots, I apparently selected the left-hand channel of the original instead of the right one.

As to the other questions: I certainly tried what the multitone signal looked like after it traveled through a DAT recorder, and I found no change other than a very slight increase in noise level. And yes, the scale can be expanded to below 300Hz, but nothing special happens at low frequencies with either of the data-reduction processors. If you do expand to, say, 30Hz, the spectral lines get so close to one another that the plots no longer have adequate visual resolution.

So although there seem to be digital harmonizers on the market which correct a singer's pitch (in real time!) if he or she goes off tune, DCC's PASC isn't one of them. —PvW

INSIGNIFICANT?

Editor:

After reading the letters printed in October 1992, I too find Corey Greenberg's attempts to be the Hunter S. Thompson of audio reviewing annoying. But that is not why I am writing.

I note that you have not reviewed any Linn speakers or any Linn amplifiers in recent years. It seems to me that the Intek integrated amplifier might warrant inclusion among your "Recommended Components," but it does not appear you have ever listened to it. But that is not why I am writing.

In October '92, Carl Baugher reviewed Volumes 5 and 6 of Frank Zappa's "comprehensive documentation of live recordings," which Mr. Baugher informs us is now complete. We can be thankful. More space has been devoted to the six volumes of *You Can't Do That on Stage Anymore* and the discs reviewed in November 1991, than to the entire Philips Complete Mozart Edition. Why that should be so must rank with the Grand Unified Theory as one of the unsolvable mysteries of our age.

Last December, after reading Mr. Baugher's review, I purchased a copy of *Make a Jazz Noise Here*. It is, without doubt, the worst recording in my collection. This is absolutely *awful* music. There is, I concede, some fine playing, but it is wasted on tuneless melodies, contrived arrangements, and Zappa's too-clever-by-half lyrics. In other words, nothing has changed since I first heard *Weasels Ripped My Flesh*, *The Grand Wazoo*, and *Overnight Sensation* 20 years ago. Frank Zappa is a minor artist making insignificant music which deserves to be more widely ignored.

ROD ELLARD
Delta, British Columbia, Canada

Marlisa Monroe of Philips Classics tells me that Mort Frank's two-part survey of Philips's Complete Mozart Edition was the most comprehensive coverage to have been granted that series by any magazine. Remember, too, that the Mozart Edition consists mostly of reissues of classic performances. Of the Zappa recordings Mr. Ellard mentions, none had ever before been released, and therefore required more thorough discussion than the Mozart. Whether or not Zappa is "a minor artist making insignificant music" is, of course, a matter of taste. Sorry you didn't enjoy Make a Jazz Noise Here, *Mr. Ellard.*—RL

While I respect Frank Zappa's more recent recordings, I, too, find them too clever by half to come to easy accommodation with. But his lyrical, inventive guitar playing is a different story. Zappa's two double albums of guitar solos—Shut Up 'N' Play Yer Guitar *(Rykodisc RCD 10028/29) and* Guitar *(Rykodisc RCD 10079/80)—spend much time in my CD player.* —JA

SUPPORT MITCHELL HELLER

Editor:

Have you ever enjoyed the weekly broadcasts of the Chicago Symphony Orchestra (CSO) on public radio? These are distributed via WFMT in Chicago, and for the past 23 (twenty-three!) years have been produced and engineered by Mitchell G. Heller,[1] who has also engineered many of the recent Chandos and Koch recordings of the CSO (Richard Schneider of *Stereophile* often mentions Mitchell in his reviews). In addition, I know for a fact that many companies that bring in their own people to record the CSO in Orchestra Hall (*ie*, CBS/Sony) simply mimic Mitchell's microphone placement. Why not? After this long, I doubt anyone else knows Orches-

1 Mitchell is my wife's uncle, therefore I can not claim to be completely dispassionate in this matter. But I have tried to represent the facts as I know them. Mitchell in no way solicited or suggested this effort on my part.

tra Hall better. Thus, he has a hand in many of the CSO recordings you hear.

Well, recently Mitchell was *fired* by WFMT (along with several other staff members). Why? Two reasons:

1) AMOCO, who sponsors the distribution of the recordings on NPR, is pulling funding.

2) Because of new union rules, Mitchell would become a member of the union and would be entitled to significantly better benefits, etc.

The station is clearly happy with his work, since they are now trying to negotiate a deal where Mitchell works "part-time" (for effectively the same amount of time per week) but is not entitled to benefits. If you have enjoyed Mitchell's work and appreciate the accumulated knowledge he represents, please write to WFMT and AMOCO. Perhaps if AMOCO realizes how many people listen to this program, they will reconsider their decision. Moreover, perhaps WFMT will treat Mitchell more fairly. Note that, while the economy is bad and WFMT is suffering, I am not aware that large oil companies such as AMOCO are hurting much, if at all.

Addresses: General Manager, WFMT, Three Illinois Center, 303 East Wacker Drive, Chicago, IL 60601; Mr. Laurance Fuller, CEO, AMOCO Corporation, 200 East Randolph Drive, Chicago, IL 60601.

MICHAEL J. TARR
Assistant Professor of Psychology &
Computer Science
Yale University, New Haven, CT

AN UNFORTUNATE MAN

Editor:

To Peter Reichelt ["Letters," November '92, p.20]: Peter, I wouldn't call you an elitist snob; just narrow, stupid, and, most of all, an unfortunate man. Life's that bad, huh?

JEFFREY AYLEN
Fairfield, IA

AND CHEERS TO YOU TOO

Editor:

Regarding the letter from Peter Reichelt [November '92]. Sorry, Mr. Reichelt, but I don't think you're an "elitist snob." Nope, try "idiot" on for size. "Pretentious asshole with delusions of grandeur" would also be more appropriate. I've been a music lover since I knew how to listen, and while I love classical music, I could never in a million years come out with the moronic statement that it ". . . is the only music worthy of being called music." The only form of music I do not enjoy is Country and Western, but I cannot say it's not music just because I don't like it. It's sad little narrow-minded cretins such as Mr. Reichelt who give classical music listeners a bad name. He makes people (especially the younger ones) think we're all snotty bigots who exist merely to add more hot air to the atmosphere.

I have just turned 38 and I'm frightened. If all 44-year-olds are as brain-dead as he appears to be, then I want off this planet now. No, wait a minute, there's far too much wonderful music out there that I haven't even heard yet. Guess I'll just have to continue to laugh at you and your kind. Yes, here's to Peter Reichelt, a true example of "an emotionally regressed, intellectually disadvantaged, middle-aged. . .," and in my words, "cloth-eared, self-absorbed, holier-than-thou lout."

Cheers,

PETER ATHERTON
London, Ontario, Canada

MISSING THE POINT

Editor:

Too much ink has already been spilled regarding Corey Greenberg's use of nonclassical music to evaluate high-performance components. Still, I'd like to register my disagreement with CG's and Robert Deutsch's assertion that rock music can effectively serve to pinpoint weaknesses in high-performance audio equipment. John Atkinson is obviously correct in that a component will perform the same on classical music and rock'n'roll; however, *Stereophile* seems to miss the point. While I enjoy rock music as much as CG (most of my CDs are popular/rock), this is clearly an inappropriate evaluation tool. After all, while we can strive to re-create a classical music concert, this is impossible with popular music. The signal from rock artists has invariably been extensively processed using multimiked mixes with reverb, equalization, etc.; thus such material has little relationship with a true "event." This can create exciting and engrossing recordings, but there is no true "performance" to re-create. These difficulties are exacerbated with old, poorly recorded works. As Theta Digital's Mike Moffat indicated (Oct. '92), it is important to have live

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music as a reference. . .

I continue to value *Stereophile*'s comments and ratings, particularly of loudspeakers. I also enjoy articles such as Peter Mitchell's October "As We See It" and the ones on the new, potentially flawed digital recording systems.

MARK HUFF
McLean, VA

Many classical recordings are just as likely as rock recordings to have been "extensively processed using multi-miked mixes with reverb, equalization, etc.," and thus possess as "little relationship with a true 'event.'" —RL

Yes, RL, but perhaps the classical engineers have at least tried *to get their multi-miked monstrosities to sound something like the real thing. (Although to read that in some of his recordings, pianist Glenn Gould and his producer Andrew Kazdin would put one microphone inside the piano, another at the normal distance, and a third in the balcony of the hall, then mix between them according to what they thought the dictates of the music were, raises doubts about that notion.)*

I agree with Mr. Huff that it is essential *for audiophiles to remain familiar with the sounds of real instruments and voices in real spaces. But my experience has been that as long as they do so, the type of recorded music they then choose to judge hi-fi components with becomes immaterial. In the listening tests TJN organized to accompany this month's reviews of inexpensive loudspeakers, for example, JGH (who listens only to classical orchestral music) had no problem in identifying speaker colorations on a totally artificial, totally unfamiliar rock track from the Staples Singers, while CG (who almost exclusively listens to rock, blues, and jazz) had no problem getting a handle on speaker problems during the unfamiliar (to him) Brahms and Beethoven choral/orchestral tracks used. The important point to note is that both reviewers* know what the real thing sounds like *and can therefore identify what a hi-fi component is doing wrong.* —JA

CRANKING IT IN CRACKERBOXES?

Editor:

Stereophile is one of the very few magazines I read cover-to-cover each month. Keep up the good work and count on my renewal when the time comes. But the thing which continually amazes me about the high-end press. . . is how many reviewers' comments indicate they live in apartments. Megabuck systems in crackerboxes? They must not crank it. How about the solidity of the floors and walls? Where do they get clean power? More things there are in heaven and Earth than are contained in my philosophy, for sure.

DICK GENTRY
Dallas, TX

I am surprised by Mr. Gentry's comment on high-end reviewers living in apartments. While this may be true of writers for other magazines—although I actually don't know that it is—with the exception of TJN, who is living in an apartment while his house is being built, all of Stereophile's *hardware reviewers live in houses, rented or owned. TJN currently uses* Stereophile's *dedicated listening room for his reviewing. Of the rest of the staff, RH, RD, CG, MC, JGH, JE, LL, and myself have built or converted a room so that it can be used exclusively for listening, while DO owns a second house with* two *dedicated listening rooms.* —JA

CHASTISE MR. GREENBERG?

Editor:

I was surprised to learn how much effect *Stereophile*'s reviews have on the average consumer of stereo equipment. Yesterday, while stuck in rush-hour traffic, I happened to take an off-ramp and ended up in a very nice stereo shop. The owner happened to relay to me how the review of the Counterpoint SA-100 amp [in April '91], by one Mr. Greenberg, destroyed his sales of an otherwise fine product.

It is good that someone takes the time to review equipment and make subjective comments as to its merits. But on the other hand, when a reviewer makes questionable comments that affect ordinary businesses, it's time to speak up.

I am not trying to chastise Mr. Greenberg, but rather those of your readers who are too reliant on others' opinions and not enough on their own ears. It would appear that not many people bother to read the fine print: "America's oldest and largest *subjective*-review audio magazine." Perhaps people should look up the meaning of the word "subjective."

One other point of contention: Mr. Greenberg's Vol.15 No.9 review of Nobis and Dynaco tube amps. Your subtraction skills seem to need a little work. $1695 – $995 = $700, not $500. With that great a difference in price, I fail to see why anyone would spend $700 more.

M. BUTCHER
Baltimore, MD

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GL, TJN, and I all listened to the Counterpoint SA-100 before the Stereophile *review appeared in print, and we all agree with CG's findings. Our apparent innumeracy is due to our having conflicting information over the prices of the products when the review was written. While we resolved the prices in the headings to the reviews, the $500 mentioned in the text unfortunately went uncorrected.* —JA

Elvis & the Stereo 70 II

Editor:

I admire your support of Corey Greenberg and his review of the Dynaco 70 II in September '92. As a consumer/hobbyist, I sincerely don't lose sleep over an equipment review. Admittedly, I'm more interested in the music than the chase, and maybe less insecure about my buying decisions than some. My formula for serious purchases is simple: If the component receives at least two outstanding reviews (preferably from both sides of the Atlantic), then it deserves an audition. If I had the time and opportunity for extended in-home auditions, auditions would prevail over research.

I've read several reviews of the 70 II, and all, including Corey's, are favorable. Where Corey strayed was in his refusal to give an official stamp of approval. From your magazine I've come to expect more perspective. Does the 70 II better the Class D "dreck out there"? Will Corey reveal $600 amps that will equal the 70 II in his amp test sequel?

The overall content of the 70 II review was very informative. It just seems, with a *little* editing, there would be less defending. With hindsight, I don't think Elvis would have knowingly painted himself into a corner. . . no sir. If he were alive today, he'd probably say "Leeet may otta hair!"

Wayne Millsap
Chicago, IL

Ava & the Stereo 70

Editor:

Since I own two rebuilt ST-70s, I read Corey Greenberg's review of the new Dynaco ST-70 II and the Nobis Cantabile[2] [in September 1992, Vol.15 No.9, p.121] with great interest.

It seems as if the little tube amp always generates a lot of controversy, regardless of its basic pleasant personality. . . . My two versions of the ST-70 sound quite different. One is an old stock rebuild based on the Audio by Van Alstine (AVA) *Audio Basics* article of 1982, using WIMA caps and Resista resistors with a "new" 7199-based printed circuit board. The other is the new AVA rebuild using the elevated large pcb with Panasonic caps and Transohm resistors from Digi-key and Mouser, respectively. I was able to find 6GH8A tubes from Antique Electronic Supply for $3.83 each. I did the AVA myself from the blank board, tweaked by AVA staff to use the 6GH8A instead of the 7199. Ordering parts was quite an experience; I used about five different vendors to get all the parts. Sane people should just order the AVA kit for $200. I doubt if the money saved by ordering all of your own parts is really worth the hassle.

The ST-70 is easily rebuilt, having an open chassis with easy-to-understand parts placement. I think my total price was under $300, not including new EL34s (the amp was re-tubed when I purchased it for $100). Even with a premium re-tube, I think the most one would have to pay for an ST-70 AVA rebuild with the kit ($200) would be close to $400. Add another $100 for the power-transformer replacement to use a diode bridge to replace the 5AR4. This is half the price of the Panor ST-70 II. AVA also rebuilds ST-70s for a price well under the Panor version. This cost analysis backs up Mr. Greenberg's conclusions about the price of the '70 II.

Stereophile should review the AVA version of the ST-70. It is a real alternative to the Panor version, and used ST-70s are fairly easy to find in the underground market. . . .The Ava Super 70 and the AVA Super PAS Three sound just wonderful together. It is music with the electronics absent—very transparent.

George Foster
Address illegible

The Heart & the Stereo 70 II

Editor:

I read, with great interest and relief, the letters to the editor and your response to Mr. Rapoport from Dynaco in the "Manufacturers' Comments" section of the September 1992 issue of *Stereophile.* Although I too was surprised after reading Mr. Greenberg's review of the Dynaco Stereo 70 Series II amp, I was even more surprised at Mr. Rapoport's first letter in response to the review. Letters such as this one are full of anger and emotionally written from the heart and not the head.

2 The pcb in the Nobis Cantabile looks like the Sutherland mod for the ST-70 (see *Glass Audio,* 2/89) to me.

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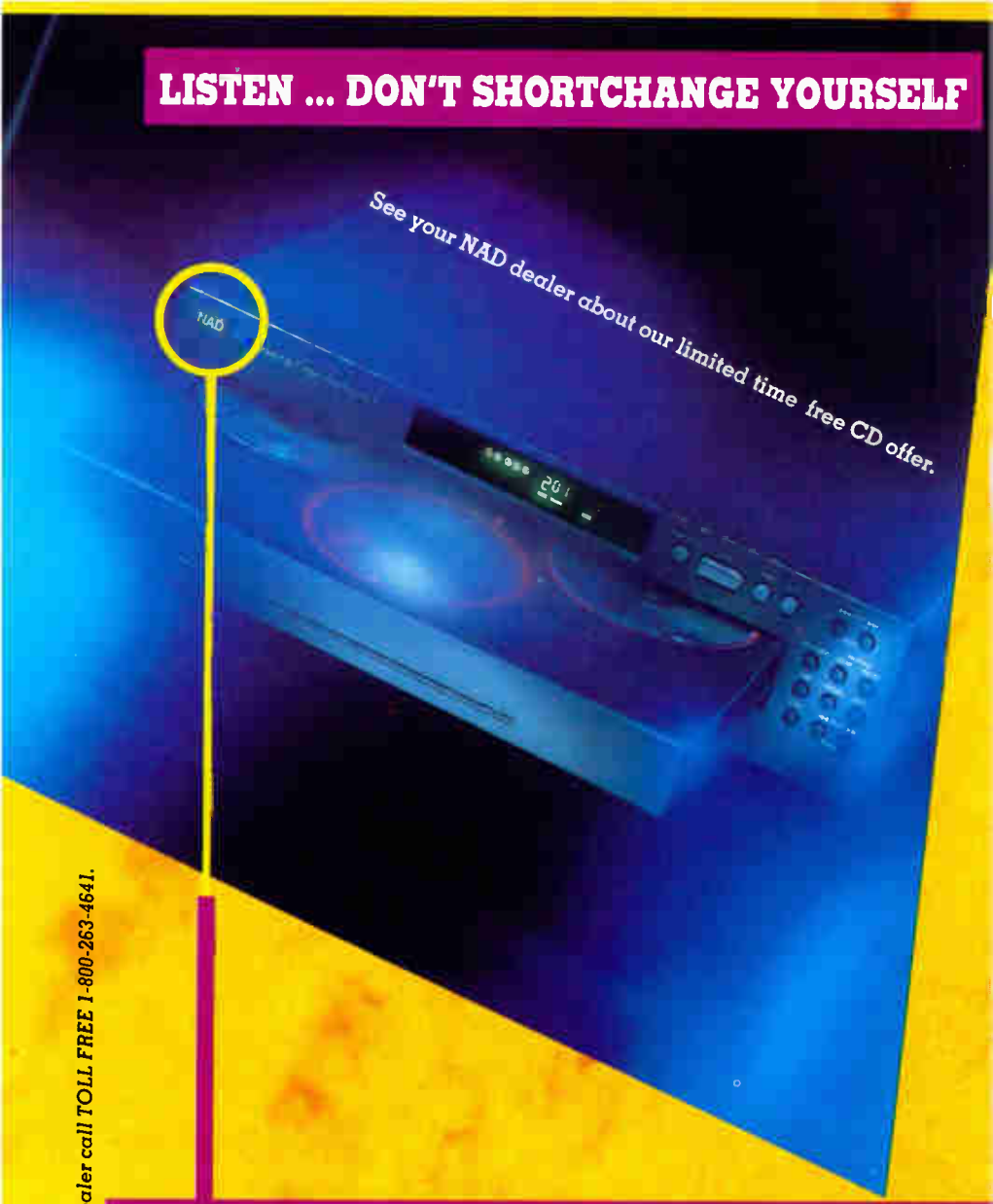

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I am writing to commend JA for his civilized response to Mr. Rapoport. Although I too question the review, I personally appreciate JA's point-by-point response to the issues that were raised without "yelling back." . . . I subscribe to audio publications to read about equipment reviews, not to read arrogant and immature responses to the very readers who are financing the publications.

In closing, thank you for responding to Mr. Rapoport with the respect and decency that everyone deserves. TERRY G. LOU
San Jose, CA

THE STEREO 70 II & AN ABUSE OF POWER

Editor:

You have lost me as a subscriber. *Stereophile* and its competitors have enormous clout. Reviews, both good and bad, have far more impact in the marketplace than they should have.

With power comes responsibility. Unfortunately, Corey Greenberg's review of the Dynaco 70 II [September 1992, p.121] was too great an abuse of power for me to tolerate.

An uninformed reader of that review would surely draw the conclusion that the 70 II is not a competitive product in its price range. This is a ridiculous assertion. But it's not just what you're saying that troubles me. It's how you say it that really shows your lack of journalistic integrity. On p.127 your reviewer states that "There's enough excellent gear for a cool thou, both tube and solid-state, that the 70 II doesn't keep pace with."

This is the audio magazine equivalent of McCarthyism. The reviewer might just as well have said, "I have here in my hand a list of amplifiers priced below one thousand dollars that are better than the 70 II, but I can't show you that list—you just have to trust me." Well, Corey, I don't trust you. I think that you're a fairly clever writer (although one whose style is not to my taste) who is in way, way over his head. But for you to write, and for your editor, John Atkinson, to allow in print such a statement, is beyond the pale. How could Panor Corp. do anything but tell you to, in effect, "drop dead"? I understand and agree with their decision to have nothing further to do with *Stereophile.*

I cannot help but wonder if *Stereophile* trashed the 70 II because it is so obviously superior to the B&K and Adcom products which it so regularly praises to the skies. Are you perhaps just protecting two of your major advertisers? That is a wild theory, but frankly, I find it no less ridiculous than your claim that the 70 II is not competitive.

You owe Panor and your readers an apology. If you still believe that, as stated in your review, there are better amplifiers than the 70 II for under a grand, you should *name them.* But of course, if you do that, anyone who can hear a 70 II and one of those "mystery amps" will realize just how little credibility *Stereophile* has these days.

MIKE BERDOS
Seattle, WA

As just about everybody in the last few months has had his say on the subject of Panor's technically flawed reissue of the classic Dynaco Stereo 70 amplifier (including Bascom King in Audio, *November '92, whose value judgments and measurements basically echoed Corey's), this correspondence is now closed. But there is one point of Mr. Berdos's to which I will respond. He asks whether CG's review findings concerning the Stereo 70 II were "protecting two of your major advertisers?" The answer, Mr. Berdos, is NO. As Robert Harley says elsewhere in this month's "Letters" column, when arriving at their value judgments,* Stereophile *reviewers are concerned only with sound quality. Everything else,* especially *whether a company advertises or not, is irrelevant.* Stereophile *gives good reviews to products whose manufacturers advertise. We also give positive reviews to companies that have never shown any sign of wanting to advertise in* Stereophile. *We give negative reviews to companies who don't advertise;* Stereophile *also gives bad reviews to companies that do, like Panor. All that matters to us is the sound, as readers will continue to discover as CG gets further down the road in his reviews of inexpensive tube amplifiers.* —JA

KUDOS

Editor:

Shure Brothers, Inc. has recently taught me that the total quality concept, as embodied in product, service, and corporate commitment, is very much alive in Evanston, Illinois even as it disappears to the fast buck in other large companies. Sparing you the details, let me just say they demonstrated that they cared very much about my satisfaction.

I started with Dynakits, Heathkits, and J. Gordon's original mag; I've been around a while. I can understand now why Shure has

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* *Audio* magazine's 35th Annual Equipment Directory, October 1992.

too. Your readers can do no better than to buy Shure. I was pretty Shure of that before; now I'm positive.

Kudos to Shure and its Service Manager, Jim Rice.

JOHN VAETH
Derwood, MD

HOLIDAY READING

Editor:

I am requesting a list of recommended books on audio equipment that would enhance my knowledge and understanding on this subject.

DAVID L. STEPPE
Raleigh, NC

Bookworm JA scoured his shelves and came up with the following list of must-read books for stereophiles, all of which are in print and should be available from specialist bookshops or from the suppliers mentioned in the text. Books marked with an asterisk (*), though too technical for the general reader, will be found rewarding by those who have a good grasp of mathematics and who want to delve deep. Reading the books in the first "general" section of the list will enable readers to understand just about everything that appears in Stereophile, *but all the books listed contain between their covers untold treasures.*

General Audio & Hi-Fi

• *Audio Anthology: When Audio Was Young*, Vols. 1, 2, 3, 4, & 5, by C.G. McProud. 1990–1992, Audio Amateur Publications. Distributed by Old Colony Sound Lab Book Service, P.O. Box 243, Peterborough, NH 03458-0243.

• *The Audio Dictionary*, 2nd ed., by Glenn D. White. 1991, University of Washington Press.

• *The Audio Glossary*, by J. Gordon Holt. 1990, Audio Amateur Publications. Available from Old Colony Book Service.

• *Bluff Your Way in Hi-Fi*, by Sue Hudson & John Crabbe. 1987, Ravette Ltd., England. Available from Old Colony Book Service.

• *Good Sound*, by Laura Dearborn. 1987, Quill, William Morrow.

• *Man of High Fidelity: Edwin Howard Armstrong*, by Lawrence Lessing (life of the inventor of FM radio). 1969, Bantam Books.

• *The New Sound of Stereo*, by Ivan Berger & Hans Fantel. 1986, Plume (New American Library).

• *Reproduction of Sound in High-Fidelity & Stereo Phonographs*, by Edgar Villchur. 1965, Dover Publications Inc.

• *The Wood Effect*, by Clark Johnsen. 1988, available from The Modern Audio Association, 23 Stillings Street, Boston, MA 02210.

Audio Theory & Measurement

• *The Audio Cyclopedia*, Glen Ballou, ed. 1987, Howard W. Sams & Company.

• *Audio Engineering Handbook*, K. Blair Benson, ed. 1989, McGraw-Hill Book Company.

• *Audio Test & Measurement*, Richard Cabot, ed. (collected papers from the 11th AES Conference, Portland, OR, May 1992). 1992, The Audio Engineering Society, 60 East 42nd Street, New York, NY 10165-0075. Tel: (212) 661-2355.

• *Fundamentals of Musical Acoustics*, by Arthur Benade. 1990, Dover Publications Inc.

• *Mastering Technical Mathematics*, by Norman H. Crowhurst. 1992, TAB Books.

• *Music, Physics and Engineering*, 2nd ed., by Harry F. Olsen. 1967, Dover Publications Inc.

• *The New Stereo Soundbook*, by Ron Streicher & F. Alton Everest. 1992, TAB Books.

• *On the Sensations of Tone*,* by Hermann Helmholtz. 1954, Dover Publications Inc.

• *The Science of Musical Sound*, by John R. Pierce. 1983, Scientific American Library (W.H. Freeman).

• *The Theory of Sound*,* Vols.1 & 2, by J.W.S. (Lord) Rayleigh. 1945, Dover Publications Inc.

• *Time Delay Spectrometry*, by Richard Heyser (collected papers). 1988, The Audio Engineering Society.

Acoustics

• *Acoustic Techniques for Home & Studio*, by F. Alton Everest. 1984, TAB Books.

• *The Master Handbook of Acoustics*, by F. Alton Everest. 1989, TAB Books.

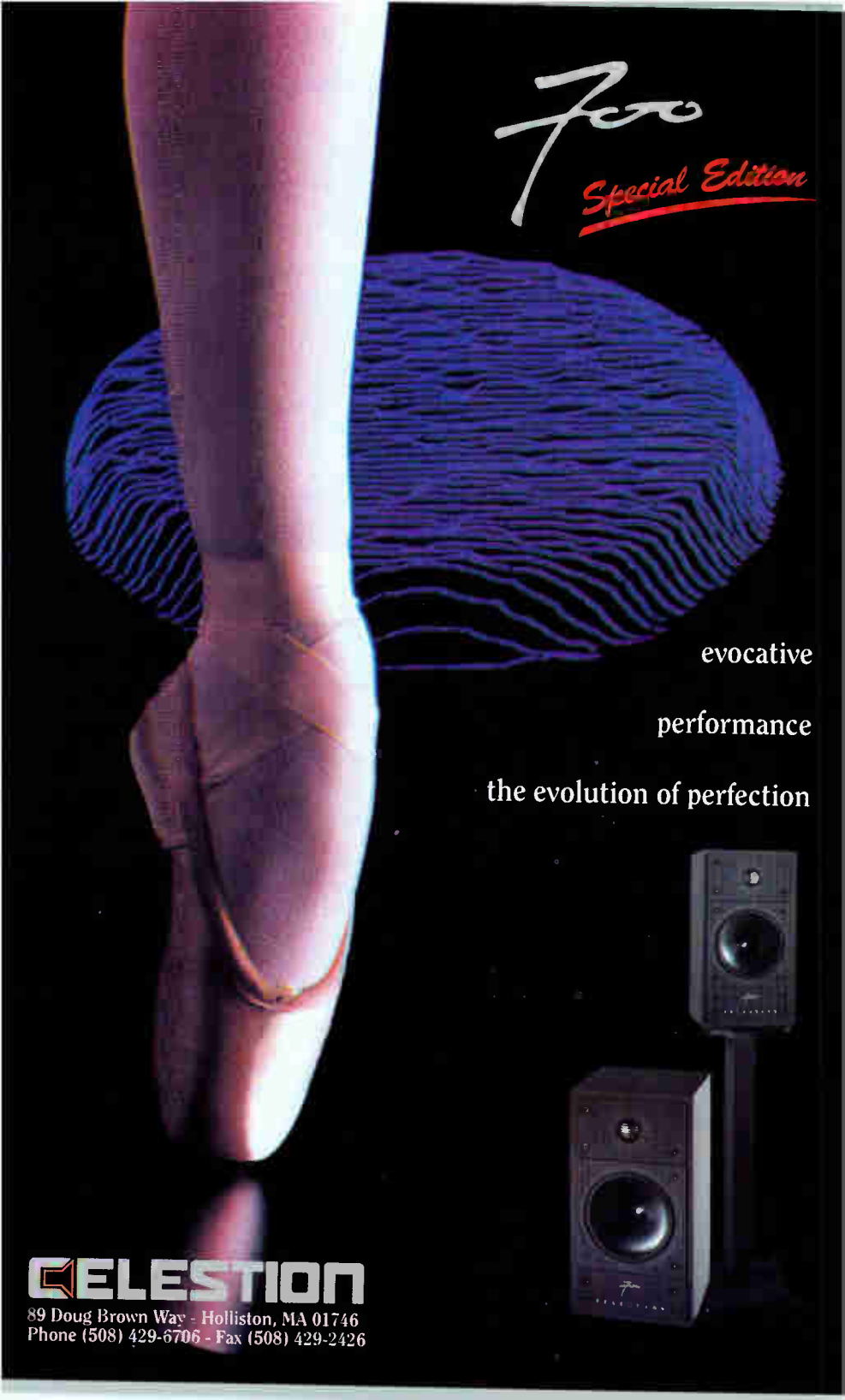
Psychoacoustics

• *The Perception of Reproduced Sound*, Soren Bech & O. Juhl Pederson, eds. 1987, Gammel Avernaes, Denmark. Available in the US from Old Colony Book Service.

• *The Sound of Audio*, Skip Pizzi, ed. (collected papers from the 8th AES Conference, Washington DC, May 1990). 1990, The Audio Engineering Society.

The LP Record

• *Disk Recording*, Vols. 1 & 2, Stephen Temmer, ed. 1980 & 1981, The Audio Engineering Society.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US: Peter W. Mitchell

Executives of record companies and the Electronics Industries Association breathed a sigh of relief at the end of October, when President Bush signed into law the bill that imposes a "royalty" tax on consumer-grade digital recorders and media, finally ending the record industry's six-year legal war against home digital recorders. Although the law will be a source of free income for major record companies, they still don't really like digital recorders. RIAA president Jay Berman is telling anyone who will listen that the combination of digital recorders and digital radio will stimulate so much off-the-air recording that record stores will suffer. Of course, doomsayers have also been saying that pay-per-view cable TV channels will kill off video rentals.

UK: Corey Greenberg

Upturned nose-sniffers on both sides of the pond will be horrified to learn that the British Broadcasting Corp. is trying to get their money back from opera star Luciano Pavarotti for a concert the BBC broadcast live from Milan, Italy, claiming that Pavarotti *lip-synched* his performance.

BBC officials learned of Pavarotti's plans to lip-synch his Milan concert the day before the two-hour concert aired on Sept. 27. BBC Radio 2 spokesperson Hester Blott said the BBC paid for the rights to broadcast Pavarotti's concert assuming it would be a live performance.

"We are trying to get some money back from the original amount paid in light of the fact that when we made our bid we assumed it was live," Ms. Blott said, adding that the radio listeners were not told that Pavarotti's voice was being lip-synched during the broadcast.

The Italian media reported that it was obvious that Pavarotti was lip-synching, as his lip movements did not match the sound of his voice.

Pavarotti was in New York performing *Tosca* at the Metropolitan Opera and was unable to be reached for comment. Reports that the opera legend would join Janet Jackson and the New Kids on the Block for the Lollapalooza III concert tour were also unconfirmed.

US: Jack English

In late October, New York high-end salon

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Sound by Singer hosted another of its "better living through audio" seminars with the North American introductions of the Apogee Grand and Mini-Grand speaker systems. The monstrous Grand, now priced at about $85,000, has been discussed and praised in *Stereophile*'s CES reports. Available in virtually any finish, this four-way, 1200-lb behemoth speaker system is the outgrowth of over two years of intensive development effort. The tweeters, midrange units, and woofers are ribbons, while each channel's subwoofer is a sealed box with dual 12" drivers. The tweeter and subwoofer amplifiers were developed jointly with Krell. Some of the many other unique features of this system include seven computers, an RS-232 computer communications port, remote-controlled active crossover, a bevy of US patents, and delivery and assembly by the electronics division of Mayflower movers.

The more realistic news for most of us was the long-awaited introduction of the Mini-Grand. While much has already been written about the Stages (Vol.13 No.8, Vol.14 No.2, Vol.15 No.4), this was the first public opportunity to audition the full Mini-Grand system—actually a pair of Stages mounted directly on new dedicated subwoofers.

The technology from the Grands' R&D has been used extensively in the development of the new crossover and subwoofers for the Stages/Mini-Grands. The subs replace the 1"-lower stands normally used with the Stages, and come with an active, external crossover. A separate bass amp is required. Each subwoofer includes two 8" drivers made by Apogee and designed to mate effectively with the Stages' ribbons. The crossover point is 75Hz, and there is a separate level control for each sub.

A complete Mini-Grand System (Stages, active crossover, stereo subwoofers) will retail for $4995. The crossover and subs can be purchased separately for $2495 and will work with all existing Stages. The subwoofer system is not intended to work with any other speakers, however.

US: Robert Harley

Readers of this column will no doubt be aware of my reports of Super Bit Mapping, Sony's new CD mastering technique. The technique reportedly provides nearly 20-bit audio quality from the 16-bit Compact Disc. After demonstrations of SBM at the Chicago Consumer Electronics Show and at Sony's Tokyo recording studios last summer, I and everyone else who heard the comparisons agreed that SBM was a significant improvement over conventional transfer technology. It seems, however, that there may be more to the SBM story than first revealed—both in SBM's technology and marketing.

At the most recent Audio Engineering Society convention in San Francisco (full report to follow next month), a Sony engineer presented a technical paper on SBM. The presentation ignited a firestorm of controversy that continued in the hallway for 45 minutes after the paper's conclusion. Many respected audio scientists questioned both the technique and how it has been represented to the audio press.

On a technical level, it appears that SBM isn't as sophisticated as was first suggested. The promises of having additional information below the 16-bit level (not accounting for dither) and a smaller quantization step size aren't quite accurate. Instead, SBM is merely a noise-shaping technique that pushes quantization noise away from the midband (where the ear is most sensitive) to the upper treble (where the ear is less sensitive). Period. Although this is a valid scheme and an improvement over no noise-shaping—pushing the noise down below what would be the equivalent of an 18-bit system, where the ear is most sensitive, results in improved resolution—a similar technique has been an integral part of the Harmonia Mundi Acoustica encoder for two years.

Much of the criticism at the AES focused on SBM's noise-shaping curve—a curve that reportedly mimics the human ear's varying sensitivity to different frequencies. Professor Stanley Lipshitz—whose former student, Robert Heddle, now works for Sony and gave the presentation—sat next to me and offered his comments throughout the paper. Of Sony's curve, he said, "I don't know what creatures that curve was designed for, but it certainly wasn't for human beings!" Dr. Lipshitz had prepared a graph comparing his own noise-shaping curve (developed over two years ago) with the SBM curve (fig.1). The Lipshitz curve shows a much lower noise floor between 2kHz and 6kHz, a region where the ear is most sensitive. According to K. Hazama, a Sony engineer involved in

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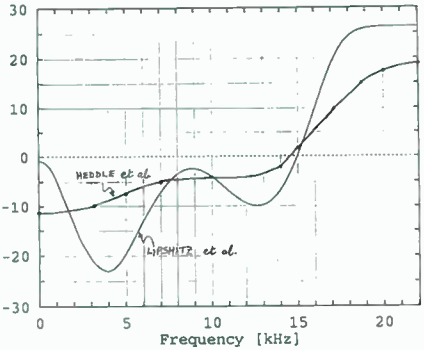

Fig.1: Comparison of Lipshitz and Heddle (Sony) noise-shaping curves. Note that both trade off a large rise in audio-band noise above 14kHz for increased resolution below. The Lipshitz curve offers the greater increase in HF noise, but more closely mimics the threshold sensitivity of the human ear and gives significantly greater resolution in the low treble where the ear is most sensitive. (Linear frequency scale, 10dB/vertical div.)

SBM development, Sony considered the Lipshitz curve (and others) but chose their own curve after extensive listening tests. The Sony curve looks less good on paper, but reportedly sounds closer to the 20-bit digital source than the other curves evaluated.

Dr. Lipshitz also objected to the fact that SBM has garnered so much attention when the idea isn't as revolutionary as press reports indicated. Lipshitz published work in this area over two years ago. His argument that the SBM curve is not optimum may be a case of differing opinions among researchers. However, his feeling that SBM has received undue media attention and hype is justified, in my view, considering that the technique has been known for some time.

Similarly, several other researchers approached me to express their dismay that SBM has gotten so much hype. Further, they objected to the Sony-supplied plots printed in my first report.[1] One graph shows a 1kHz sinewave reportedly with and without SBM. The SBM-processed waveform appears to have a much smaller quantization step size—an impossible feat when the signal ends up as 16-bit. It was publicly charged at the paper presentation that this constituted deliberate deception: the SBM waveform had been low-pass-filtered for the graph, while the non-SBM waveform had not, it was alleged. Moreover, the noise-shaping curve supplied by Sony showed only the noise spectrum up to 10kHz, hiding SBM's huge increase in noise level between 10kHz and 20kHz (see fig.1). Sony spokesperson Marc Finer went on the record to state that both 1kHz waveforms published in our report were subjected to identical low-pass filtering.

Robert Adams of Analog Devices[2] suggested that SBM-processed CDs will sound *worse* on CD players with poor low-level linearity. He argued that, in a fade to silence, the silence is no longer a static digital code with SBM. Instead, many LSBs will be toggled, continually crossing the zero transition where linearity error is greatest, particularly if the DAC's MSB trimmer is misadjusted or nonexistent. This condition will add high levels of white noise to the signal. It should be noted, however, that high-end CD players and D/A processors I've measured (including both 1-bit and R/2R ladder DACs) have shown excellent low-level linearity—usually less than <1dB error at -90dBFS and often less than <0.5dB at -100dBFS. Although Mr. Adams's concerns are theoretically valid, it seems a backward step *not* to use SBM because some users with poor-quality converters may hear more noise, thus denying the sonic improvements of SBM to more critical listeners who own even moderately good converters.

Other objections to SBM were raised at the presentation. Some criticism, however, was clearly motivated by commercial interests: one vociferous critic has a competing CD mastering system of lower quality on the market.

Another facet of the story reported to me was that SBM has been in use for nearly two years on Sony Classical productions—without even a mention on the liner notes or to the press. Indeed, Richard Schneider's "Industry Update" in last November's *Stereophile* (p.45) suggested that SBM has been in use since January 1992—and used on all titles in Sony Classical's Leonard Bernstein

1 Vol.15 No.8, p.55.

2 While at the dbx corporation, Bob Adams designed the first and, to date, the only 128x-oversampling, 20-bit, analog/digital converter. UltraAnalog bought the rights to the design and supplies the module for high-end A/D conversion applications (the Manley and Wadia ADCs, for example). It has remained to this day the only 20-bit ADC extant. Bob Adams's original engineering prototype is the heart of the Chesky/Bob Katz converter heard on all Chesky releases.

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Royal Edition series, Kathleen Battle's and Wynton Marsalis's *Baroque Duets*, and Emmanuel Ax's Brahms Variations disc. It has been speculated that SBM was conceived as an in-house technique for improving Sony's digital transfers, but was elevated to "breakthrough" status and vigorously promoted when Sony realized that they had to differentiate the sound qualities of CD and MiniDisc for commercial reasons. It could be coincidence, but SBM and MD have been promoted concurrently. According to Finer, several test CDs were made using SBM as long as two years ago, but were not commercially released in this country. He also investigated the Kathleen Battle and Emmanuel Ax master-tape genealogy and confirmed that SBM was *not* used on those titles.

Finally, it should be noted that, despite the controversy, and whatever Sony's motivation, SBM does indeed improve CD sound quality. Moreover, it is the first public acknowledgement by one of the CD's inventors that conventional 16-bit digital audio has room for improvement. How much SBM improves CD sound quality will be more apparent after we have firsthand experience of the process; Sony has invited us to transfer the analog master tape of *Stereophile*'s most recent recording project[3] to digital using SBM. It will thus be possible to hear the original analog master, the full 20-bit digital transfer, and the SBM-processed 16-bit. We may even include samples on our next Test CD so that you may judge SBM for yourself. After all, the proof is in the listening.

US: Peter W. Mitchell

Many record companies produce "sampler" CDs containing excerpts of their recordings, typically priced around $5. But the new sampler from a little company named Cedille is too good to resist: it's free. Cedille has produced a dozen recordings of classical music to date, mainly featuring keyboard instruments (piano, harpsichord, or pipe organ). Write to Cedille Records Sampler, 1250 W. Grace St. Suite 3F, Chicago, IL 60613-2865.

US: John Atkinson

At various times, we have reported on the financial troubles that have stricken Allison Acoustics, the New England loudspeaker company that manufactures the designs of Roy Allison, who was once Technical Editor of *High Fidelity* and then joined Acoustic Research. Although Peter Mitchell reported last summer that Allison Acoustics was obtaining new financing and would emerge from its government-induced bankruptcy by autumn, a failed relationship with Allison Acoustics' major foreign investor led to further problems. A decision was taken to liquidate the company in October '92. But Roy Allison's designs will endure as Edgar Villchur, the founding father of Acoustic Research, has formed a new company with Allison, to be called RDL Acoustics (for Room Designed Loudspeakers). Roy Allison will head the company as President and Chief Designer; Edgar Villchur (whose seminal 1962 book, *Reproduction of Sound in High-Fidelity and Stereo Phonographs*, is still available as a Dover reprint) will be a corporate director and act as advisor to the company. RDL hopes to have its first products on show at this month's WCES in Las Vegas. RDL Acoustics, 26 Pearl Street #15, Bellingham, MA 02019. Tel: (508) 966-1800. Fax: (508) 966-1246.

US: Larry Greenhill

As previewed in last month's report from the UK's Heathrow Penta Show, Acoustic Research is launching a line of high-end components, to be called AR Limited. The brainchild of Cello's Mark Levinson and Art Blumenthal, VP and General Manager of AR, the new partnership plans to market the AR Ltd. Amplifier, Preamplifier, Loudspeaker, and Equalizer through a "limited" dealer network—initially as few as 10 dealers in the US. Prices have been set below other high-end products of similar quality. For example, the amplifier, preamp, and equalizer will be introduced at prices below $3000 each, and the full-range loudspeaker will retail for approximately $6000.

AR recruited well-known high-end designers—including Levinson, David Day of Day-Sequerra, and Dan D'Agostino of Krell Industries—to collaborate in designing AR Ltd.'s electronic and speaker components. If successful, AR Ltd. will have created a new high-value, high-end market niche, and enabled a number of high-end designers to collaborate on common projects.

3 Robert Silverman performing piano works by J.S. Bach, Schumann, Schubert, and Chopin, recorded live in concert in Albuquerque last November.

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Robert Harley-
Stereophile-Vol. 15 No. 1, Jan. '92

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To find out more about the AR Ltd. line, I visited David Day at the AR factory in Canton, MA, where he now serves as Director of Engineering. The plant has been in a flurry of rebuilding and stepped-up manufacturing ever since Day's arrival from Chicago in December 1991, developing and bringing to market 22 new designs this year. Although he sold his high-end Davidson Roth/Day-Sequerra firm to AR's parent, International Jensen, Inc., Day has retained control of its activities. In fact, his first step was to set up his complete manufacturing facility within the AR plant.

AR's commitment to Day's direction is evident everywhere. The spotlessly clean, white Day-Sequerra assembly and test rooms are adjacent to AR's powered-speaker assembly line. David and four of his original Day-Sequerra staff produce and burn-in Day-Sequerra FM Reference tuners, a unit reviewed very favorably in these pages (Vol.14 No.12). This "clean-room" manufacturing approach comes from David's experience at Northrop Corporation, and is now being incorporated in AR's plant renovation. While engineering is temporarily housed in trailer facilities next to the main plant, a large suite of new offices, labs, sound rooms, CAD-CAM station rooms, and assembly areas is being readied.

Acoustic Research's history reaches back to 1954, when it was founded by Edgar Villchur and Henry Kloss and became known for its development of the acoustic suspension method of loading woofers. During the mid-'60s AR manufactured such early classics as the AR-3 and the LST (Laboratory Standard Transducer) loudspeaker systems. Other products included the high-current AR XA amplifier and the AR Turntable, which has become a cult item during the past decade.

From 1967 to 1989 AR was owned by Teledyne, which directed the company's total efforts toward mass-market, high-volume stores. AR's profits sagged until it was acquired by Jensen in 1989. Mark Levinson and AR first forged a business relationship early in 1986, with AR producing and supplying drivers for Cello speaker systems. Later in the relationship, Levinson was impressed with AR's newer system, the compact Holographic Imaging M-1 loudspeaker. After listening to them in his showroom, he called AR with his concept of an affordable AR high-end reference system, suggesting a collaboration between the two companies to develop the system. Levinson also suggested that AR contact David Day, who had designed, in Levinson's words, the "best tuner on the planet."

Day collaborated with Levinson to enable AR to produce the AR Ltd. version of the Cello Palette (see Vol.15 No.6). This unit has six turnover points, a three-level boost/cut (± 6dB to ± 22dB) at different parts of the audio band, and offers a selection of balanced or single-ended inputs/outputs.

Even more radical is the AR Ltd. Preamplifier. It offers two balanced inputs and a balanced output using a zero voltage gain but high-current gain topology. The AR-developed and -manufactured volume control is unique in employing a 4-section, 58-step attenuator to handle balanced sources. For compatibility with unbalanced sources, voltage gain circuitry is switched in to receive line-level audio signals from the three single-ended inputs. The gain of these three signal sources can be individually set for source-to-source level matching.

For the AR Ltd. amplifier, Day teamed up with friend and well-known high-end designer Dan D'Agostino of Krell. D'Agostino described the AR Ltd. amplifier topology as "an excellent high-current class-AB design, although quite different in topology from the Krell MDA amplifier design." Day engineered the AR Ltd. power amp—nominal rating of 200Wpc RMS into 8 ohms—from D'Agostino's schematics and breadboard prototype. The gray and silver amplifier features a rack-style faceplate, large handles fore and aft, balanced and single-ended inputs, and two paralleled speaker outputs for speaker biwiring. Internally, Day applied the same "no-wire" assembly found in Krell amplifiers, as well as a huge toroidal power-supply transformer, multiple solid-state output devices, and bolt-on channel assemblies. Set up in the listening room of the new AR Engineering suites, the AR Ltd. amplifier did an outstanding job of powering a pair of AR Classic 30 full-range loudspeakers playing the latest Lyle Lovett CD. The amps showed unusual dynamic range and woofer control. AR plans to introduce a modular CD player and FM tuner designed by Day-Sequerra, as well as additional AR Ltd. amplifiers using 100Wpc and 400Wpc modules.

The AR Ltd. Loudspeaker is a three-way system incorporating two vertically aligned 3" dome midrange drivers (highly modified

Dynaudio units) and a centrally mounted 1″ dome high-frequency unit in a so-called MTM (midrange-tweeter-midrange) or D'Appolito alignment that AR has termed SRA (Symmetrical Radiation Array). The SRA and its crossover are mounted on a multi-density baffle that rests atop the 12″ acoustic-suspension woofer cabinet. AR manufactures the woofer, which utilizes a newly developed focused magnetic structure. The crossover employs huge air-core coils, 12-gauge wiring, metalized film capacitors, and conformally coated ceramic resistors.

After the plant tour, I had an opportunity to audition the loudspeaker and preamplifier at Day's home. Although my final opinion must await much longer listening sessions, I found the AR Ltd. loudspeaker to have extraordinarily good imaging characteristics and uncanny transparency, rivaling the best electrostatics. The bass response had real depth and power, and solidity that I have only heard in the Muse Model 18 subwoofer. AR Ltd., 330 Turnpike Street, Canton, MA 02021-2703. Tel: (617) 821-2300, Fax: (617) 784-4102.

US: Robert Harley

Anyone who's heard direct-to-disc LPs knows how much better they sound than conventional records. But what happens when a Compact Disc is recorded directly, with the CD master glass cut in real time as the music is performed?

Reference Recordings, the San Francisco-based audiophile label, did just that last August. They recorded their second direct-to-CD project, following in the success of the world's first direct-to-CD recording *Dick Hyman Plays Fats Waller* (Reference Recordings RR-33DCD).[4] The new CD, *Dick Hyman Plays Duke Ellington* (RR-50DCD), will be pressed with 24K gold plating and should have appeared in stores last month.

Making a direct-to-CD master has its advantages. Recording directly on the CD master glass avoids the usual—and often sonically degrading—steps in CD master-tape preparation: digital editors, multiple digital interfaces, and several digital tape generations. Unlike conventionally made CDs, there would be no question if *this* CD sounded like the master; it would *be* the master.

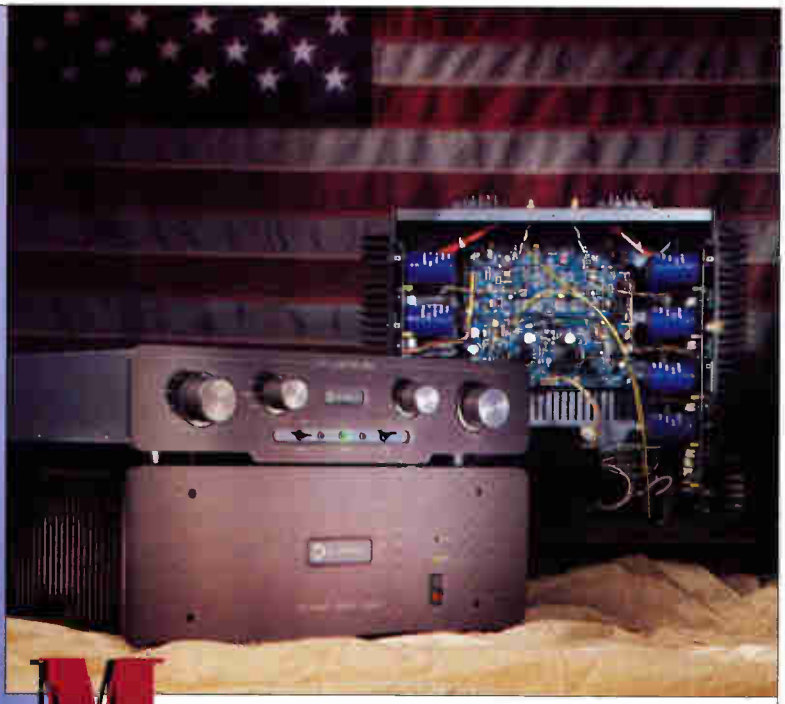
4 For a full description of how this project was done, see my feature article in Vol.13 No.1.

Direct-to-CD recording, however, presents some interesting engineering challenges. Unlike a record-cutting lathe, a CD mastering machine cannot be transported to the recording site. Not only does the CD mastering machine need to be in a humidity-controlled clean room, but it is much bigger, heavier, and vastly more complex than an LP cutting lathe.

Another obstacle to direct-to-CD recording is the need to know the *exact* start and end points of each track *in advance*. On a conventional CD master tape, a time code accompanies the audio data. This time code provides an exact timing reference for all track start and end points. The timing information is determined before the disc is cut, then input to a computer and encoded on the CD in an area called the "PQ" subcode. When you search to a track on a CD or see the elapsed time displayed, the player is reading the PQ subcode. The conventional tape-based method of synchronizing the music with the PQ subcode is clearly impossible when recording the master disc in real time as the music is performed.

The solution to these challenges was devised by producer J. Tamblyn Henderson (President of Reference Recordings) and recording engineer and audio designer extraordinaire Keith O. Johnson. Keith miked a piano in a concert hall (Santa Ana High School Auditorium in Southern California), digitized the signal, and sent it via microwave link to Disc Manufacturing Inc., a CD mastering and pressing plant 20 miles away. Because I had been involved in Reference Recordings' first direct-to-CD project when I worked at DMI (then called Disctronics), I was enlisted to work out the engineering details of decoding the signal, synchronizing the subcodes, and getting the signal on disc.

Sending the digital audio data from the concert hall to the CD mastering machine by microwave link solved one problem, but synchronizing the track start and stop times (the PQ subcodes) with the music was another matter. The answer was to use the Bösendorfer SE Computerized Reproducing Piano, invented by Wayne Stahnke. The instrument senses key motions when a person plays, digitally encodes these motions, and stores the data on a computer hard disk. The encoded key movements can then be fed to the piano, driving actuators that move the keys. The origi-



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nal performance can thus be repeatedly recreated, and by all accounts is indistinguishable from the pianist's original performance. Pianist Dick Hyman selected a program of Duke Ellington works and "recorded" them on the Bösendorfer SE well in advance of the disc cutting. The data generated (called the "piano code") could then drive an identical Bösendorfer SE in the concert hall for the direct-to-disc recording.

Now that we had a perfectly repeatable piano performance, the digital data representing Dick Hyman's playing was transferred to one track of an analog tape machine. The tape machine's other track had SMPTE (Society of Motion Picture and Television Engineers) time code recorded on it. SMPTE time code is an address counted in hours, minutes, seconds, and frames (30 frames per second). It was thus possible to identify each track's start and stop time.

A normal CD master tape was made of the piano performance with the accompanying time code. Back at DMI, this tape told us when each track started and ended, referenced to the SMPTE time code. This information was put into a computer that would generate the correct PQ subcodes and record them on the CD master disc. Note that this tape was a timing reference only, not the audio signal source.

When everything was ready at the disc cutting end, I told Tam to start the tape. Right on cue, the time code and the digital audio data came over the microwave link and the music was recorded directly on the CD glass master disc. The time code from the analog tape triggered the PQ subcode encoder, putting the correct track start points on the disc in synchronization with the music as the piano "played" itself.

While this whole endeavor may sound straightforward in principle, it was anything but in practice. The sync signal generator that was supposed to lock Keith's sending PCM-1630 to my receiving PCM-1630 didn't work, putting the whole project in jeopardy.[5] Fortunately, I discovered this a day before the cutting session. That evening (and into the early morning) was spent trying to troubleshoot the sync generator, accompanied by the sinking feeling that the project wasn't going to fly. We didn't get the box working, but Tim Jordan, the owner of the rental company from whom we had rented the sync generator, brought us a replacement early Sunday morning on a moment's notice, just hours before the scheduled disc-cutting session.

Another hitch came about halfway through the first cut: gradual, cumulative slippage between the music and the PQ subcode. The subcode encoder was triggered to begin putting out PQ subcodes by the SMPTE time code sent by microwave. Once triggered at track 1, however, the subcode encoder runs on its own clock, disregarding the incoming time code. Any variations in the analog tape machine's speed would thus cause a shift between the piano and the time code. The PQ code ran an absolute clock, while the piano code—and thus the music's tempo—depended on the speed consistency of an analog tape machine. Breck Rowell, who ran the CD mastering machine, and I calculated the error at 10 SMPTE frames (a third of a second) for each four minutes of music. We stopped the master disc, recalculated the track start and stop times based on this rough estimate, and tried again. Our calculations were remarkably close—with the exception of the last track; the music starts just before the PQ code indicates the beginning of the track. This was, however, a small price to pay for avoiding the compromises of conventional CD master-tape preparation.

Recording direct-to-CD isn't for the faint-hearted; any mistakes, flaws in the master glass, or damage to the mothers and stampers mean the complete loss of the investment in the microwave link and CD mastering time (price: in the four figures *per hour*).

Finally, there is one other aspect of this project that makes it special: *Dick Hyman Plays Duke Ellington* is one of the first CDs made with High Definition Compatible Digital™ (HDCD™). This is the digital encoding and decoding process developed by Keith Johnson and Michael Pflaumer described briefly in November's "Industry Update," and the subject of this month's "As We See It."

5 The Sony PCM-1630s were used only to format the digital audio data into a video signal for transmission via microwave, not for their A/D converters.

UK: Ken Kessler

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knows Magnum's car; who can name his amplifiers? Sam on "Cheers" wears Timberland shoes; what make of CD player does he use? So it's with nothing but admiration that I point to Linn for the Unsolicited Endorsement of the Year. More to the point, it's a result of Ivor Tiefenbrun's charitable nature rather than PR prestidigitation.

There I was, munching my Bran Flakes, when former hostage Terry Waite sat down on the TV-AM sofa. He started talking about how he'd connected with Carol Kidd, jazz singer extraordinaire and a Linn Records recording artist. Okay, obvious link coming, right? Uh, not quite.

Carol's song "When I Dream" was released in the UK last October as a single, with the proceeds to go to Y-Care Africa Appeal, a charity set up by Waite in 1984, and to Amnesty International. The song means a lot to Waite, enough for him to have listed it among his ten favorites when he appeared on "Desert Island Discs," a perennial radio fave in which celebrities choose the recordings they'd take with them to a desert isle. But how he ended up hearing the song, and how he came to record a spoken introduction for the single, is a story to warm the heart of even the most anti-Linnie on earth.

Waite recounted how he'd sat next to a fascinating fellow on a flight, years before he was incarcerated by terrorists. The man was Ivor Tiefenbrun, whom Waite described as a hi-fi manufacturer in Scotland. He recounted their interesting conversation. Flash forward to the period following Waite's release from Lebanon. Ivor sent him a letter, welcoming him back with the gift of a pair of Linn speakers. I'd like to state here that Ivor did this on the quiet, completely from the heart, and without a thought toward commercial benefit or publicity. And if I know Ivor, he's probably too dismissive/embarrassed to talk about it. But he deserves the nod from all of us.

Anyway, the letter suggested that Waite visit a Linn dealer, listen to the speakers, and take the pair home, which he did. Waite auditioned the speakers with a track chosen by the staff, Carol Kidd's "When I Dream." The lyrics moved him. The rest is history. And Ivor won unsolicited thanks from a man touched by the gesture.

If only more products were exposed to others through kindness rather than calculation. I hope Ivor's act results in a million sales for Linn. And a Linnie I'm not . . .

Now, will somebody please tell the Prime Minister to buy British? With all due respect to the Danes, I find it nothing less than disgusting that John Major was seen on national television settling down into his favorite chair after popping a CD into a *Bang & Olufsen system* from Denmark. I'm the last person to argue against freedom of choice, and B&O does have its fans, but public figures—especially political ones—should practice what they preach. I wouldn't expect the Main Dane to be using other than B&O, Gryphon, or Primare, for example. If Princess Diana could relinquish a Mercedes 500SL for some UK-made vehicle, the Major can listen to music on British gear. If any British audio manufacturers are reading this, please—picket No.10 Downing Street.[6]

Not that things are entirely gloomy for British audio, however blessedly welcome are events like the Terry Waite appearance and however unwelcome the Prime Minister's failure to Buy British. Recent belt-tightening just may leave us with a lean and fit hi-fi industry. With the Tannoy/Mordaunt-Short/Epos/Creek conglomerate now a few years old and the KEF/Celestion marriage well into the post-honeymoon era, yet another alliance has been forged which could mean a third massive British speaker multi-firm.

Verity Group PLC is a holding company with an Audio Division which now includes Mission/Cyrus *and* Wharfedale, Fane, McKenzie, and Finewood. This lineup offers a mix of domestic and professional products, loudspeakers, and electronics and even speaker cabinet manufacture. And it couldn't have happened at a better time. Mission is on a major high, their wee 760 speaker winning sales and awards like there's no tomorrow. Founder Farad Azima rescued his company from Polly Peck and the aftermath of a factory fire, restoring it to the forefront of British audio. Wharfedale, however, was looking a bit haggard. And while it wasn't exactly down for the count, a well-placed boot to the backside was in order.

In its favor, the Wharfedale name still means a lot to the buying public, and the traditional worth and good will are priceless; all the company needed was a firm hand at the helm. Azima has been appointed Manag-

6 I hear that the White House is full of Japanese equipment, but that might just be scurrilous gossip.

ing Director of Verity Audio, so it looks like a Mission-style approach is in store for Wharfedale; marketing man Jon Vizor has moved from Mission's Cambridge facility to Yorkshire to oversee Wharfedale's PR.

Wharfedale has a slightly old-fashioned image; a dose of Mission's youthful enthusiasm and aggressiveness could change this. And with their combined resources, both companies will benefit from cost savings in R&D as well as more favorable component purchases, which means higher profitability and fewer mistakes. Other potential gains are better global distribution, increased marketing might, stronger resistance to the whims of the world economy, *ad infinitum*.

As with KEF/Celestion, both companies will retain complete autonomy, right down to supporting both companies in separate factories and retention of all staff. It's still early, so I can't say how the two brands will be positioned in the market, but Mission (which will be showing a new two-box CD player at this month's Winter CES) covers the entire market up to the lower reaches of the High End, while Wharfedale works from entry-level up to mid/high-priced gear without going into the luxo-sector. Asked if the Wharfedale amplifier, launched at the Penta Hi-Fi Show in September, will still appear, Azima said that it has just gone into production and should be shipping before this sees print. As Mission has vast experience with tuners and CD players, the Wharfedale amp should find matching partners in the catalog before too long.

It will be interesting to see what happens to the aborted Leak rebirth, while Wharfedale also owns a couple of other brandnames also in semi-retirement. The potential, then, exists for a company with the scope of Harman International, able to serve the pro and domestic sectors with a number of distinct ranges.

Will we see any more alliances like the above? Quite a few independent hi-fi manufacturers remain in the UK—probably more than any other country can boast—and nothing surprises me when it comes to unlikely marriages. But I imagine the stronger electronic independents such as Arcam, Musical Fidelity, Quad, Exposure, and Naim want to stay solo, while such speaker firms as ATC, Rogers, Harbeth, Spendor, Heybrook, and the rest might not wish to join with rivals—however genuine the autonomy experienced by the brands in the above liaisons. Whether or not the parlous state of the economy forces the smaller to join together with the larger is not a question I care to answer. And somehow I can't see the bigger firms—Linn or Arcam, for example—welcoming the burdens which accompany the acquisition of another, especially a weaker brand, particularly when there aren't many gaps in the "parent" company's range.

What does seem likely are more pro/domestic pairings, as the professional sector seems almost immune to the state of the economy and can provide desirable bedfellows. Linn, Celestion, Quad, B&W, Tannoy, KEF, ATC, and others already have strong interests in either the broadcast, studio, or sound-reinforcement sectors, and could probably absorb smaller pro companies or join with like-sized pros if they so desired. Whatever happens, it looks like hi-fi—however small a part of global electronics it may be—could go the way of the automobile and computer industries, in which only the giants can survive. And, as with the automotive sector, the only independents which remain are the exotics. . .and you don't have to look far to find hi-fi equivalents of Morgan, Bristol, and TVR.

So long as they who might be giants keep in touch with their founding fathers' goals —Azima is, for example, in charge of the Wharfedale/Mission setup—I don't think it's a bad thing. Ferrari, though owned by Fiat, still makes amazing cars, and you can always irritate a Blancpain owner by reminding him that his $10,000 watch comes from the same parent organization which owns Swatch. Big doesn't necessarily preclude Good. So maybe the British specialist firms are doing what any accountant or business advisor would suggest.

Mind you, it would probably help just as much if John Major listened through Quads or Missions or KEFs or Spendors or Celestions. . .

US: Peter W. Mitchell

After writing last month's comments in response to TJN's October discussion of Dolby SR-D digital film sound, I listened to *Under Siege* (the Steven Seagal action film that critics

have described as *Die Hard* at sea). I heard it in analog Dolby Stereo at a local THX theater and in SR-D sound at the Mann Bruin theater in Westwood. Unlike the overly reverberant theaters where Tom and I heard *Batman Returns*, the Bruin theater has drapes along the sidewalls to control unwanted reflections. The THX and Dolby Digital trailers sounded fine there, nearly as good as in the large screening room at Lucasfilm's Skywalker Ranch.

Unfortunately most of *Under Siege*, like *Batman Returns*, was over-equalized, producing very bright highs, and vocal peaks were driven into obvious clipping at a few points. This basically unattractive sound was handled far more successfully by the SR-D system than by the analog optical playback. The digital sound was very clear, with clean low bass and with precise localization in all five channels. The THX presentation of the optical sound was similarly bright but clouded by intermodulation distortion; even my non-audiophile nephew, a rock musician, was offended by the ugliness of the sound. (To be fair, the THX theater may have been suffering from a deteriorating optical pickup in the projector, providing a poor basis for comparison.)

Near the end of the film the soundtrack changed. Aggressively equalized rock music was followed by a segment of orchestral sound that must have been recorded in a different studio by an engineer with healthy ears; in the SR-D presentation it sounded smooth, sweet, and remarkably natural. Perhaps my judgment was warped by the contrast, but I came away with the impression that the Dolby AC-3 compressed-digital coding used in the SR-D system may indeed be capable of serving music.

Meanwhile, there's good news for lovers of orchestral film music. Despite the popular success of scores by John Williams (notably the *Star Wars* and *Indiana Jones* series) and James Horner (*Cocoon*, *Backdraft*), the general trend in the last 20 years has been toward jazz- and rock-influenced scores played by small ensembles and/or the omnipresent electronic synthesizer. As a trade magazine said, it seemed that one-man garage studios with MIDI-controlled keyboards might zap all those soaring violins and noble French horns into history-book oblivion.

But apparently the trend is turning a corner—perhaps inspired by the splendid acoustics of the concert-size recording studio at Lucasfilm's Skywalker Sound and by the success of the Skywalker Symphony. This recording orchestra, staffed by many of San Francisco's best players, has been taping both movie soundtracks and classical repertoire. In Hollywood, two large "scoring studios" (movie jargon for symphony-size recording rooms) which had been defunct for several years were rebuilt and reopened this past fall. Paramount's Stage M can accommodate an 85-piece orchestra, while the 50-year-old Todd-AO studio can seat upward of 150 musicians in its 7000-square-foot space. Both studios are now equipped with accurate ATC monitor speakers from England, driven by Threshold and BGW amplifiers.

Pro Sound News quoted the president of Todd-AO as saying, "The trend back to live scoring is very strong now; all the major feature films have orchestral scores. They might use synthesizers as well, but the emphasis is much more on a natural, acoustic, concert-hall approach to film scoring." In the remodeling project, all of the hall's absorptive treatments were removed and replaced by acoustically "live" scattering surfaces, yielding a smooth 2-second reverberation decay like that of a good concert hall.

Hong Kong: Ken Kessler

What's this? A free copy of *Stereophile*'s second Test CD to every visitor at the Hong Kong High End Show '92? Yessir: the $15 entrance fee included not just a metal badge and a massive 230-page show guide, but a CD worth more than the fee. Now that's what I call sharp marketing, and it worked: You could barely move during the event, the second sponsored by *Audiophile* magazine. It had its share of notable debuts, despite positioning between the summer CES and the run of Euroshows (Frankfurt, London, Milan, *ad infinitum*). Two floors of the Hong Kong Sheraton provided the listening rooms and booths, and I was staggered at the amounts of software purchased by Hong Kong's audiophiles—including the best selection I've seen of mint Mercury and RCA vinyl treasures.

As with the previous Hong Kong shows,

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Dick Olsher
Stereophile *Vol 14 No 11, November 1991, on the Class A Recommended VAC PA90*

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Peter W. Mitchell
Stereophile *Vol 15 No 5, May 1992, on the installation of a VAC DAC*

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formal demonstrations were the order of the day even though 70% of the Show was of the wander-through variety. Polk, Mondial (Aragon and Acurus), Vimak, LA Audio, Alón, ATC, MBL, Sound Audio, and others had the chairs laid out for the kind of intense listening sessions rarely seen outside of Pacific Rim exhibitions.

Without doubt, the best sounds at the Show were made by the Aragon/Alón II setup, and the LA Audio tube gear driving the Hartsfields from Classic Audio Reproductions. **Aragon** used the **Alón II** to show off their new Palladium monoblocks ($4000 US/pair) and the Aurum line-level preamp ($1750 US). The Palladia deliver 100W of pure class-A power and feature mirror-imaged faceplates, the signature Aragon groove moving from extreme left to extreme right. The finish is a gorgeous titanium colour, matched in the Aurum; the latter contains what may be the sexiest, most brilliantly simple knobs ever produced. (Hard to get enthusiastic about knobs, I know, but they're the most-touched part of a system.) Also launched was the 18K preamp, retailing for just $995 US.

The **LA/Classic** demo was my first-ever opportunity to hear, in a room capable of handling the sound, an archetypal Japanese audiophile dream. LA makes tubes, while Classic's Hartsfields are huge horn systems containing JBL drivers of "a certain vintage."

Classic Audio Reproductions' Hartsfield is a huge horn system containing JBL drivers.

Never a horn fanatic (though I did enjoy certain Lowthers of yore), I was staggered by the dynamics, the sense of scale, the speed and impact. Using old Soul recordings, somehow more appropriate in terms of the equipment, I stayed in the room for half an hour—a luxury I rarely enjoy.

New to me is the **Artemics** brand, based in Hong Kong and producing some sensational tube equipment. The AS303 line amp uses an aluminum chassis, 24K gold-plated printed circuit board, gold-plated sockets, an independently shielded power supply, and a trio of 12AX7s. The AS2.2 preamp adds a tube in its external power supply, all caps are MIT, and its trio of 12AX7s are mounted horizontally to produce a slim-line look. The company's power amps are both stereo class-A triode designs, the AS40M delivering 40Wpc from four EL34s, the AS60M producing 60Wpc from four KT88s.

Another Hong Kong manufacturer, **Ben, David & Industrial**, showed the dual-mono

Impressive tube gear from Hong Kong's Artemics company.

Euterpe Precision Audio Products from Sweden showed this dual-mono line-level preamplifier.

Vimak DT-1000 transport sits atop the DS-2000 D/A preamplfier reviewed last month by AB and RH.

No.28 solid-state power amplifier, rated at 180Wpc into 8 ohms, and the 8L dual-mono preamp with outboard power supply. Yet another brand I'd not heard of before is Sweden's **Euterpe Precision Audio Products**, which showed the dual-mono L-1 line-level preamp. Inside were two completely separate toroidal transformers and separate, mirror-imaged circuitry for each channel.

Clements launched a new mini speaker called the Reference 1, sort of an Apogee-meets-LS3/5a. The enclosure uses lots of solid timber (walnut and cherry), the crossover contains only polypropylene caps, all the bits are hard-wired, and the 5" ribbon works down to 2500Hz. On show was the Limited Edition model with deluxe finish—piano lacquer, rosewood, and mahogany—eliciting more oohs and aahs than any mini since last year's debut from Swiss Physics.

Despite the digital nature of the Show—lots of laserdisc players and trick CD spinners—there was a lone analog scoop, though **Denon** collectors won't be amused. Strictly for the Japanese and Asian markets, like the 103 Gold, the Denon DL-S1 is a black beauty with an elliptical stylus, a solid ceramic body, and a mass of only 7gm. Wiring is 6-nines copper. The company has also produced a matching transformer, the dual-mono AU-S1, housed in a black aluminum extrusion and featuring a champagne front panel and gold-plated socketry; the transformer adjusts itself automatically for the correct impedance setting. It must be a real beast, because it weighs 3kg while measuring 150mm W by 71mm H by 170mm D. Each item costs 80,000 yen, and it looks like an instant sellout. Note, however, that Denon Japan has still to decide about the release of a limited-edition "swan song" turntable.

Scoop of the Show? No question: **Vimak**'s long-awaited DT-1000 transport. Housed in the same case as the company's D/A processors, the DT-1000 employs the latest Philips transport, the CDM-9 Professional, with a proprietary suspension. Processing is handled by a Motorola DSP-56001, and Vimak adds its own proprietary error processing to the CIRC software. Outputs include Toslink, AT&T ST, AES/EBU balanced, and RCA coaxial. As with the Vimak DACs, automation ports are included for future system interface possibilities. Oh, and the thing is simply beautiful. Mike Koulopoulos has threatened to launch an upmarket version in 1993, with a disc-loading system which seems like a prop from *Terminator 2*. Who knows? It might be ready for the Las Vegas CES or the next Audiophile Show. . . in mainland China.

China: John Atkinson

We have received details from Y.K. Chan, organizer of the Hong Kong show described by Ken Kessler above, of a hi-fi show he is promoting in mainland China in March. The High End Hi-Fi Show—billed as the first to be held in China, but we believe that a small show was held in Canton in 1992—will take place at the Garden Hotel, 368 Hunashi Dong Lu, Guangzhou, The People's Republic of China, from Friday, March 5 to Sunday, March 7. US companies wishing to exhibit should contact Peggy Ma at Room 203, Man Yee Building, 60 Des Voeux Road, Central, Hong Kong. Telex: (852) 524-8775. Fax: (852) 645-0746.

US: Peter W. Mitchell

Do CDs last forever, or will they gradually go bad with age? The aluminized data surface will corrode if exposed to air, so it is overcoated with transparent lacquer over which the label is printed. But while the basic technology of the CD is standardized, manufacturing details vary from one pressing plant to another. There are now about 200 pressing plants in the world, producing more than a billion discs a year. If you examine the CDs on your shelf you will find some with vertical outer edges produced by a biscuit cutter, and others with rounded, polished edges; some whose edges are bare plastic, and others whose aluminum coating covers the edge of the disc; some with a brilliant mirror-like surface and others whose reflective coating is semitransparent; some whose label is printed directly on the transparent lacquer, and others that are painted a solid color, and then overprinted with information. Each CD plant makes these design choices and deter-

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mines its own quality-control procedures, within the overall error-rate limits set by Philips. So the longevity of your CDs may depend on where they were made.

A few years ago a batch of CDs that had been manufactured in a Nimbus pressing plant went bad when acid-based printing inks ate through the lacquer and into the aluminum. This episode threw a scare into other manufacturers. Meanwhile corporations and government agencies, including the IRS, would love to substitute small boxes of CD-ROM discs for their airconditioned vaults full of bulky computer tape—but they need a guarantee that after a hundred million Social Security files have been archived on CD-ROM discs, they won't be found to be corrupted by microscopic pinholes.

Since 1988, quality-control specialists at many European CD plants have been exchanging information about their testing procedures and about factors that may affect CD longevity. They discovered, for example, that if the aluminum layer extends all the way out to the edge of a disc that has a vertical biscuit-cut edge, there is a much greater risk of air getting at the aluminum and causing it to oxidize. They learned that ultraviolet light is better for hardening the lacquer than hot air, and sorted out which printing inks to avoid and which are safe.

If many of your CDs were manufactured before this research was done, a few of them could be self-destructing right now on your shelves. But today's CDs are likely to last a thousand years under average conditions, according to Bert Gall (general manager of optical disc technology at Philips). Gall was quoted in the British magazine *New Scientist* as saying that, even under the worst environmental conditions, new CDs should be good for at least 20 to 50 years.

Such estimates are based on accelerated life tests that have been adopted as a standard procedure among European CD makers. Discs are placed in a chamber that is raised from room temperature to 120°F within 30 minutes, kept hot with 95% humidity for 12 hours, and then cooled for the next 12 hours, cycling up and down every day for a month to produce stresses that may warp the disc or separate the layers of the thin plastic/aluminum/lacquer sandwich. Finally, to ensure objectivity, different factories inspect each others' discs for flatness, data errors, or any evidence that air has reached the aluminum layer. This procedure may become part of the Philips Red Book standard for all CD manufacturing.

Japan:
Peter van Willenswaard

The impulse response, squarewave, and 20Hz–20kHz frequency response characteristic of the Legato Link Conversion system featured by Pioneer's PD-S901 CD player —see "Update," Vol.15 No.10, October 1992 —look suspiciously like Wadia's. So I took the Wadia X-32 to the lab to see what the Wadia's frequency response looked like outside the audioband. The result (fig.1) is virtually identical to Pioneer's (fig.6, Vol.15 No.10, p.63).

Meanwhile, my English colleague Paul Miller had performed an FFT spectral analysis of the Pioneer's output when playing an 11–12kHz twin-tone track from a test CD,[7] and found that the overtone spectrum consisted not of the expected 22 and 24kHz second harmonics, but of the 33 and 32kHz mirror/alias frequencies (44kHz minus 11 and 12kHz, respectively). I repeated this with a 19–20kHz twin tone. The Pioneer and the Wadia gave identical results (fig.2). According to the suggestions in the Pioneer literature, one would expect added harmonics at 38 and 40kHz (I drew these myself, in dotted lines), but the Pioneer generated non-harmonically related 25 and 24kHz mirrors. The Wadia did exactly the same thing (including the signals between 60 and 70kHz), but Wadia at least doesn't promise you anything other than reduced rejection above 20kHz, courtesy of their time-domain-optimized digital filter.

Now it could be that Pioneer's processor would work differently with more complex signals. Fig.5 in October (p.63) looked very promising, but on second thought is meaningless. The 5.5kHz (in fact 5512.5Hz, or 44,100 divided by 8) squarewave that I used in the October article was an unlucky choice, as its low harmonics lie at 16.54, 27.56, and

7 *Hi-Fi News & Record Review*, October 1992. Miller, too, points out the similarities with Wadia. And he is also very enthusiastic about the sound quality of Pioneer Legato Link CD players.

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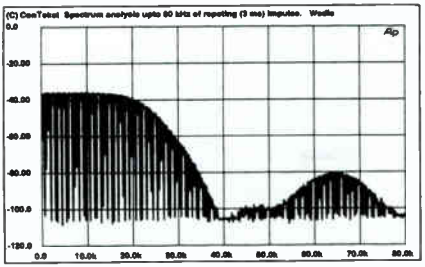

Fig.1 Wadia X-32, frequency response, DC–80kHz. Measurement signal was a repeated pulse, its 3ms spacing causing lines at a very close 300Hz interval. The envelope up to 40kHz indicates the relative amount of audio energy as a function of frequency. (Linear frequency scale, 20dB/vertical div.)

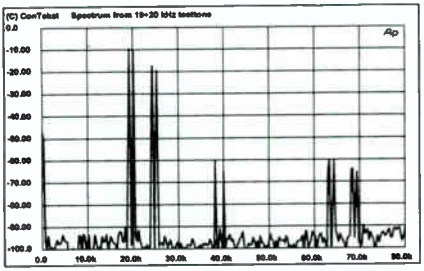

Fig.2 Output spectrum from Pioneer PD-S901 with 19–20kHz twin-tone test signal. Harmonics would fall at 38 and 40kHz (dashed lines), but what actually appears are alias mirrors against the 44kHz sample frequency, at 25 and 24kHz. (Linear frequency scale, 10dB/vertical div.)

38.58kHz, the latter two also mirror frequencies. So I tried again with a 6.5kHz squarewave from German magazine *Fono-Forum*'s test disc. This produced a curious result. Let's first look at the spectrum of the 6.5kHz squarewave as it is on the disc, measured directly at the CD players' output, before any processing (fig.3). First and third harmonics are present as expected at 6.5 and 19.5kHz, but below –80dB we see eight groups of intermodulation products. Text on the disc says the squarewave was digitally synthesized; probably they forgot to re-dither after truncating their high-bit result to 16-bit before recording it to CD.

The Wadia reproduces this accurately, and as expected adds two mirrors between 22 and 44kHz (and a few more above), as in fig.4. So does the Pioneer (I marked the squarewave components with an "X"), but it also produces 20 new frequency components of considerable amplitude—and I don't have the faintest idea where they come from. Take a look at fig.5! One would be inclined to think of clipping; digital processors *can* clip, but the 6.5kHz *Fono-Forum* squarewave was about

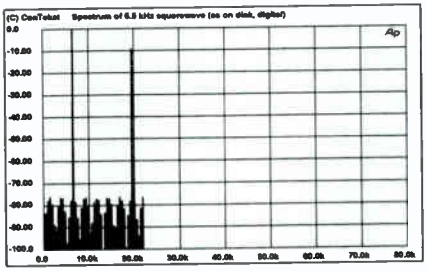

Fig.3 Spectral content of 6.5kHz squarewave on *Fono-Forum* Test CD, measured in the digital domain at the data output of the CD player. (Linear frequency scale, 10dB/vertical div.)

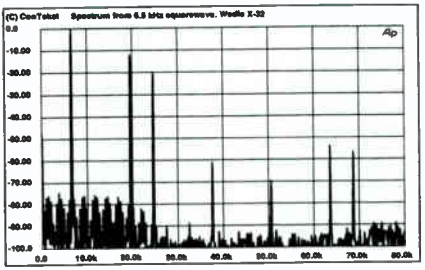

Fig.4 Output of Wadia X-32 when decoding the squarewave from fig.3. (Linear frequency scale, 10dB/vertical div.)

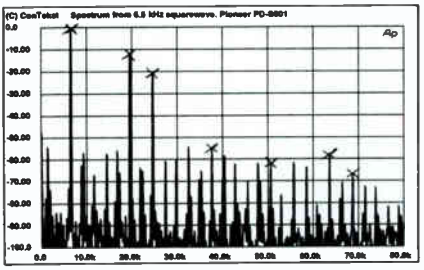

Fig.5 Output of Pioneer PD-S901 when decoding the squarewave of fig.3. The components that have a direct relationship with the squarewave are marked with an "X," and are identical to what is found with the Wadia. Where the 20 other frequency components stem from is unclear. (Linear frequency scale, 10dB/vertical div.)

Stereophile

Vol 13, No 10, October 1990

"The result was striking. "This is wonderful," my listening notes read – "a real soundstage."

...the [SL280] Signets were (and are) remarkably satisfying on a wide range of music, from the most intimate to the most bombastic."

– *Thomas J. Norton*

HiFi Heretic

Issue 14, Spring, 1991

"Superior in sound quality to many speakers costing far more, the SL260 also dazzles with its superb build quality and gorgeous cabinet finish. As such, the SL260 easily qualifies for "Best Buy" status."

– *Kent Bransford*

The $ensible Sound

Issue 43, Summer, 1991

"Gobs of bass and percussive kick...and there's great ambience and imaging.

The Signet [SL260] has more bass than the reference but preserves all the other good qualities. It almost gives the real feeling of a pipe organ – high praise for such little woofers."

– *Gregory Koster*

The Absolute Sound®

Vol 17, Issue 81, July/August, 1992

– *Neil A. Gader, Scot L. Markwell*

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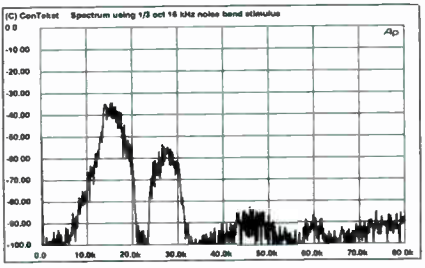


Fig.6 Output of Pioneer when playing a test track containing ⅓-octave band noise centered at 16kHz. Legato Link produces no harmonic noise around 32kHz, only alias noise around 28kHz. (Linear frequency scale, 10dB/ vertical div.)

1.5dB less high in amplitude than the Philips 5.5kHz one, and *that* produced no obvious clipping (see fig.5 in the October 1992 article).

To be sure, I tried an ordinary CD player, in fact the PD-9700, which is the predecessor of the PD-S901: no problems. So this effect is apparently unique to the Pioneer's Legato Link Conversion. Could this be related to what I heard when the thing reproduced music? Or is it an anomaly? Finally I tried a ⅓-octave noiseband centered at 16kHz, with a result along the lines of earlier experiments: mirrored noise around 28kHz and no harmonic noise around 32kHz (fig.6). Again, absolutely identical to what I got from the Wadia.

I faxed Pioneer in Tokyo. They answered that although both Wadia and Pioneer aimed at removing passband ripple from the frequency response and ringing from the time-domain response, Legato Link Conversion was "designed also to refine the frequency spectrum curve of a CD player's output. The Legato Link Conversion interpolates the elements above 20kHz calculated according as the frequency response curve of the digital filter based on the digital data recorded on the disc." Pioneer went on to explain that the results of Legato Link and Wadia's Bio-Digital Algorithm may look similar, for example in frequency response, but that their "approaches are completely different. Therefore the Legato Link Conversion can be said to be an original Pioneer technology."

Not very convincing. Until Pioneer can show me a fundamental practical difference, I am forced to regard Legato Link Conversion and Bio-Digital Algorithm as essentially the same thing.

Wadia's Jim McCullough told me at last Fall's Heathrow Penta Show that they weren't yet aware of the similarities. He said that their lawyers would certainly look into it to see if it meant a breach of patents.

What remains unchanged, however, is my high opinion of these new Pioneers' sound quality, especially at their price.[8]

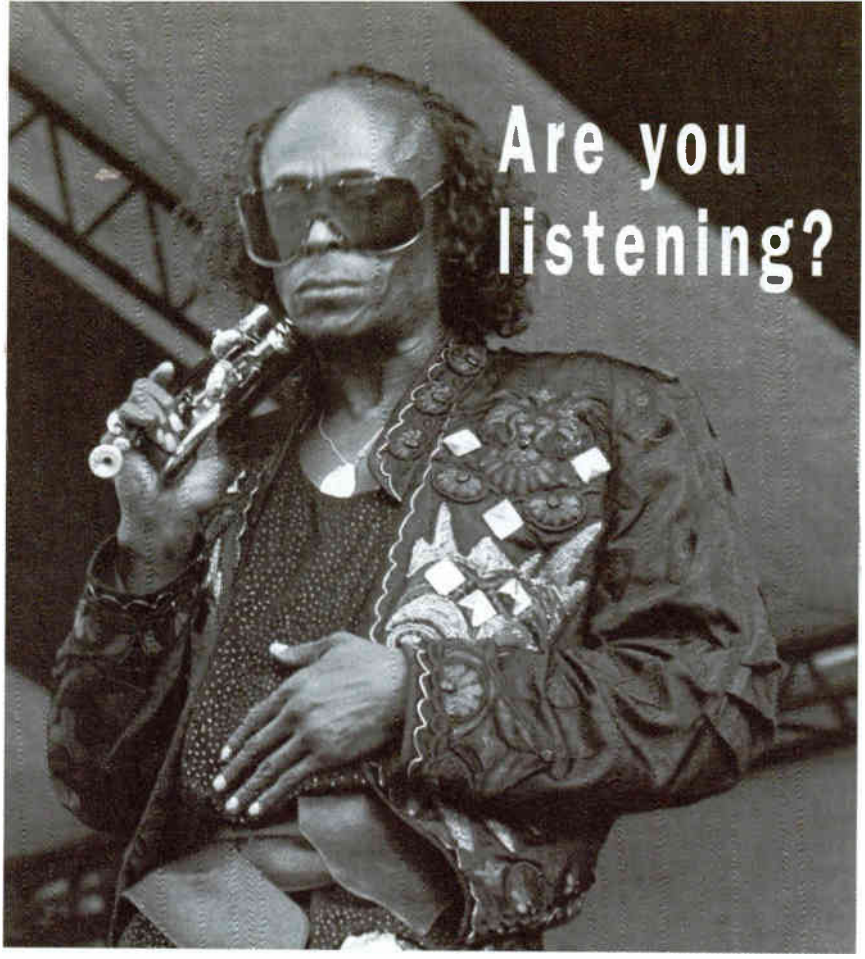
CIS: Clark Johnsen

From Russia with love, via the City of Angels, comes a fabulous press release: "Vast Historic/Artistic Audio & Video Archives Discovered by West for the First Time." The Iron Curtain rises on seven massive buildings in Moscow housing a bonanza of live music performances, from 1930 to the present, on wax, shellac, acetate, vinyl, and tape, all "undergoing restoration." They shall be released throughout the world on CD, coordinated by a Los Angeles organization called USSU Arts Group (for United States Soviet Union—an unfortunate designation, but the deal was done before the Evil Empire fell into smithereens). While the Soviets sat on this material for over 60 years, they deserve every accolade for keeping it in shape. Here are over one million hours of concerts (continuously updated), recordings never before heard in the West—or, for that matter, in the East. Soviet musical life for the last six decades soon shall become an open book.

The archives contain primarily classical music, with further thousands of popular and folk-music programs from the various "republics." The great artists appear frequently: Richter, Rostropovich, Gilels, Oistrakh, Kogan, Svetlanov, Mravinsky, Rozhdestvensky, Kondrashin, and Shostakovich with his own piano music. And the Beethoven Quartet playing Beethoven![9] Less expected perhaps are performances by Yehudi Menuhin and Georges Enesco of the Bach Double Concerto, Teatro La Scala of *Turandot* with Birgit Nilsson, and a Verdi *Requiem* with von

8 See Sam Tellig's opinion of the sound of the similar Pioneer CD-65 in this month's "Sam's Space." —JA

9 In this humble writer's opinion, simply the best string quartet of the mid-century, therefore never allowed outside the prison gates. Their Melodiya recordings, not easy to find, attest to this belief.



Miles Davis photographed by Joe Maynard "Miles" and "Miles Davis" are trademarks of the "Estate of Miles Davis"

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Karajan and Leontyne Price. For local interest there are concerts by visiting Americans, including Paul Robeson and Pete Seeger, both of whom reportedly sing in Russian. The complete list awaits release, after proper cataloging with extensive USSU support.

Not only that, those clever Russkis have audio *and video* coverage of every Tchaikovsky competition since the first in 1958, which a Texan named Van Cliburn famously won. Here we are provided a door on musical history, not only previously unopened but never even imagined. Gratefully we may assess performances and performance traditions hitherto unknown outside the now smelted-down Iron Curtain. Hard to believe, and video too! The sound? We shall see, we shall see. Rather, hear.

Sole keeper of this trove is Ostankino, formerly called Gostelradio.[10] To their everlasting credit, the management of what was once the world's largest corporation, the Soviet State, began in 1984 to refurbish its broadcast archives, doubtless already sniffing the dollar value. Cataloging and restoration operations were centralized into a new building with ex-military pilot Yuri Kornilov appointed to head a staff of 600 technicians and musicians. A supreme effort, on a grand scale, with no equivalent in the West.

Yet the newly revitalized Russia must still rely on the West for marketing expertise, hence the USSU Arts Group, brainchild of Sid Sharp,[11] President, and Russo-Canadian Tristan Del, Chairman. So far USSU has infused several hundred thousand dollars just to get the ball rolling. While the ultimate profits accruing from this deal may be inestimable, the mind reels at the possibility of 300,000 CDs of great live performances. Multiple licenses will be granted, and several major labels have expressed interest, although USSU may retain their own marque. "And a label with 300,000 instant titles could flood the market," as Kornilov offhandedly observed at a press conference in Los Angeles last October. "And of course we continue to record, so we have everything needed to be an incisive force in the record world."

Kornilov set his collection's worth at "many hundreds of millions of dollars." Less easy to guess is how much that investment could earn. But therein lies the true significance and utter fascination of this startling, historic, totally unforeseen development, which shall certainly provide a massive unlegislated, entirely voluntary transfer of cash from us to them.

Business arrangements and music aside, audio listeners may have reason to worry. *How are they handling the sound?* Sound restoration is a tricky business, with two principal branches: one preserving and/or archivally duplicating originals, the other disseminating authentic replications to the public. On the latter front, the major concern lately has been saleability, which translates into "quiet." Noise has become the bane of most home music listeners, and CD teaches zero tolerance. Thus noise reduction is now considered paramount, sonic quality be damned.[12] Shall the Russian masters be subjected to bourgeois reductionist strategies such as NoNoise, CEDAR, and Packburn? Apparently not. USSU and Ostankino instead have signed exclusive arrangements with Digiton, a Russian start-up company, to assist restoration efforts. Digiton "applies state-of-the-art noise-reduction processes developed by the former USSR Defense Ministry," apparently for use by the KGB in cleaning up surveillance tapes (all those nasty mikes in the walls).

One's heart leaps at the possibility of superior, long-lasting sonic achievement—and drops again at the likelihood of abject failure by their scraping before the altar of background silence, absent the music as well.

Ending on an upbeat note, results to date

10 "Gos" means "Government," "tel" and "radio" mean . . . well, the thing translates into PBS and NPR, our own government channels and guardians of political correctness. "Ostankino," contrariwise, appears value-neutral: "kino" means "show," and Ostan is just an area of Moscow where the transmitters are located.

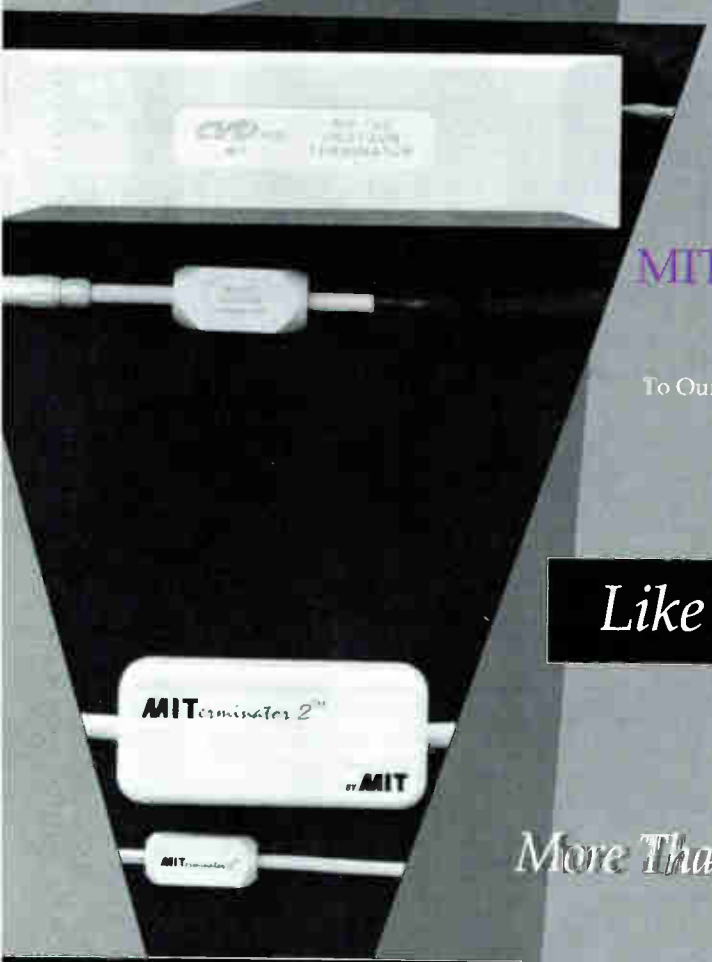
11 I spoke to Sid Sharp about the project: "This is a most incredible thing, nothing else like it. For a month I practically lived in the archives. I didn't think I was in this world!

"Melodiya has nothing to do with this, except that they once borrowed some tapes and refused to return them! We're doing something that the whole musical world will think wonderful. I thank God that this is also an honest operation, completely aboveboard, and that we can make this material available, at last, in the best shape possible. What we have here is a find like the Dead Sea Scrolls.

"Who is Sid Sharp? Well, no one really! I graduated from Curtis, played second fiddle in the Philadelphia for a while, then moved out here to LA and became concertmaster for Stokowski's Hollywood Bowl Orchestra. And I have played in various local chamber groups, and of course in the movies and television—'LA Law'!"

12 Earlier transfers from 78s *sound* far better than current ones because the latter are compressed, etiolated, and made musically uninvolving, although noticeably quieter.

Like Father



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indicate a huge success for initial releases from another new Russian company, Champion, Ltd., the ubiquitous Tristan Del, Chairman. One record, entitled *Anthology of American Music*—'50s rock'n'roll—reportedly outsells all others by 20:1, once again demonstrating the irrepressible, native interest in all things American. I spoke with Tristan Del, in Moscow, via AT&T:

[*Click! Instant connection!*]

"Hallo?"

[*In a Russian accent:*]

"Forgive, my Russian is poor, may we speak English?"

"Certainly. You say you know Russian?"

"No! Only my Russian, she *is poor!"*

"Oh! I see! Very funny!"

"Thank you! I shall drop the accent and announce that I represent the American magazine Stereophile. *I imagine you have been deluged by calls recently."*

"Not so bad. Not many got through the filter. Congratulations. Who again are you, please?"

"I'm reporting for a magazine interested in sound. Music, too, but sound primarily."

"Well, you are the first then!"

"Good! Let's begin with a question of interest to Stereophile *readers: When did the Archives begin recording in stereo? And is the 1958 Tchaikovsky Competition in stereo?"*

"Original tapes were mono, but when they hit the market you will hear stereo. We create it in such a way, as new technology affords. So when did actual stereo begin? Mid-'60s, early '70s. . . .Yes, Melodiya was earlier, but they solicited the international market. Domestically back then the Soviet Union was in mono. Actually I can't be precise, the technicians I have spoken to on your behalf, some say aye, some say nay. There may be a pleasant surprise awaiting everyone."

"Tristan, we have heard that the Soviets maintained vacuum-tube technology far longer than the West—well into the '70s, in fact—until a government edict enforced the Soviet solid-state era."

"That may be correct, I have heard same. You must however understand the isolation that here was. And the poverty. If something was working, much cheaper to keep it going than change. Like your Model T! But in this case you mention, some government department must have decided they could earn more Western cash by changing over, just as more recently to digital."

"I expect! Are you aware that many audio experts in the West regard tube sound well above transistor? And if that truly be so, then you sit on a tube-recorded legacy that lasted over a decade later than anything else?"

"Very interesting! No, I did not know. What you are saying is, things here may be even better than we think! But we have always been lucky. After the Freedom War our troops appropriated all the German equipment, very high quality then, a shining trophy! Simply extraordinary raw material, better than private companies anywhere owned for many years."

"How can you reassure us that the current administration realizes how to deal properly with the situation?"

"Well, the answer is reflective of what's going on overall. This has suddenly become a forward-looking nation. We learn to utilize resources jointly, with experts in the US and worldwide. So we look to the West for marketing and other services. Yet Russians have long history of bringing sound to the masses. You ask about Champion, Ltd.? That is effective free-market successor to Melodiya. Not the studio recording operation, but the distribution system. It rapidly has become the largest label in CIS. Advertisements on TV! Unheard-of before! Discount coupons in newspapers! All your capitalist improvements! We utilize now every method of any Western record company.

"Melodiya was under severe constraints, had to keep records down to the price of bread, limited exports to West, no marketing skillfully. Champion starts with clean slate. No nonsense, plus we treat artists and heirs—the whole copyright area—fairly, unlike Melodiya. We assign royalties properly, even though not obligated by Soviet law. Some system! State socialism means stealing something from everyone. I understand you have election soon about this same big government thing?

"Also radical new technologies be developed. We have truly gifted scientific minds, used to work for defense industry, now into sphere of market and some of them work on sound process.

"Yes, like you say, too often considerations of noise take precedence over sound. But the noises in live broadcasts! Coughing! We succeed in separating music from all external interference. Makes pure-sounding and clean

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as a whistle.

"NoNoise from Sonic Solutions? Yes, it does not work well. Lose quality! We do much better than rest of Europe, or your country, in this department. Must remember, tradition of music very old here. How to judge results? Well, may I be so bold? Let the consumer decide!

"In reply to your objection, the tendency in America, perhaps also in Europe, has been to transfer old masters onto some form of digital, then indeed toss them out. If nothing else, to save valuable shelf space. Dreadful decision! That shall never happen here. Russians have respect for history, even if not always correctly reported! Our music masters are protected by new laws. National Treasure!"

"What about this new company called Digiton?"

"Oh, another private group, do our best work! Develop special algorithms. You imply, West has no reason to expect modern sound from Russia. In reply, look at space program! Some shoddy effect, eh? Do you imagine us incapable? Now we have *New Russia*, reinvigorated, supported strictly by extraordinary employee effort. Not the case earlier, as you can imagine. I should add, wholly *willing* employee effort.

"What else does Digiton do? Design and manufacture latest, I should say futurest equipment for radio and TV stations. Quite advanced! You have no idea what the last two, three years have produced here with application of scientific skills to private sector. We worked up from simple consumer devices and down from military program. Always applying native diligence. Remember, Russia be largest country on earth and very proud of that fact, rather like your Texas, and we may brag but also we produce.

"Digiton works too on automating broadcast stations so may be operated more easily throughout wide expanse. And radio still be larger here than TV due to territory, so we have many roving audio journalists, you might say. And need to clean up their telephone calls from other zones. This is done with an expertise that exceeds, if I may say, yours in the West.

"USSU? They have sent cataloging help only, not latest American recording technology. We have actually no idea what that might be! Russians use German and Dutch equipment mostly, very little Japanese or American. And some Hungarian. What? Yes, the Hungarians have always produced really good sound, even while under Soviet domination. They have history! Largely unknown in the West, but we use them, yes.

"Why was Gostelradio name-changed to Ostankino?"

"So Gostelradio means Communist System. No one here believes that stuff any more, never did in fact. Only dupes in Cuba and Berkeley fell for it, and at Harvard! Russians know better! It was an alien imposition, I won't say by whom. Now thankfully over. Read underground, if you wish to know causes."

"What is this Anthology of American Music *that sells so well?"*

"Has made much money for us! In fact subsidized half our whole restoration effort! Simply this, your earliest rock and roll artists, nothing classical, but what we call 'classic.' Little Richard, Chuck Berry, Jerry Lee Lewis...uh..."

"Buddy Holly!"

"Buddy Holly? No, licensing problems there, but all in good time. But Aretha Franklin, the Shirelles, the Shangri-Las. . .Your early American artists, especially your very early ones, are universally beloved and renowned in Russia."

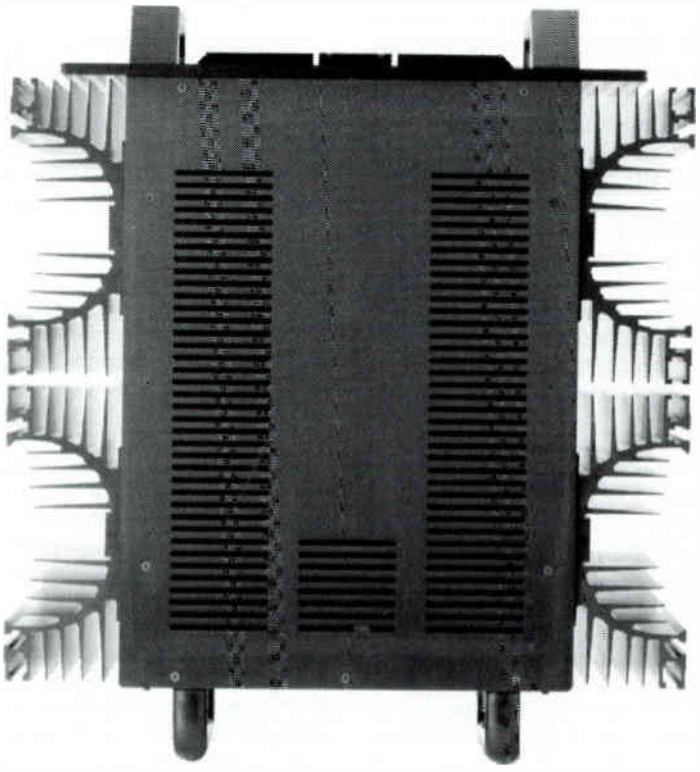
"And for good reason!"

"Yes, musically you speak. But beyond that they constitute a part of Americana never allowed over here at the time, at the tragic depths of the cold war. These artists were totally forbidden and arrive only through the scratchiest, most desperate means. You recall, there was not even cassette tape back then. Yet they were heard, however dimly, and their voices, their sound, their message of freedom guided a path to young people, however dimly. If youth here had also known of forthright contemporary American opposition to Communist oppression [*Senator McCarthy!*], they might have taken heart and overthrown the regime earlier, or died trying.

"And yes, our Anthology of American Music has vastly outsold Paul McCartney too, to answer your question. He was Melodiya, we are the Champion!"

US: Peter W. Mitchell

Digital radio arrived in my home yesterday.



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I'll have full details next month. First reaction: the sound quality is not equal to CD, but it is vastly superior to FM radio.

"Three's a crowd" seems to be the rule in format wars. Two formats may divide the market between them, but if three formats compete, two will continue to dominate the market while the third is relegated to also-ran status.

Case in point: Three systems of cable-borne digital radio have been competing to sign up local cable systems to distribute their programs. Two of them, Digital Music Express (DMX) and Digital Cable Radio (DCR), have signed up hundreds of cable companies with several million potential customers, and are continuing to grow. The third contender, Digital Planet, was unable to gain a solid foothold and has gone out of business.

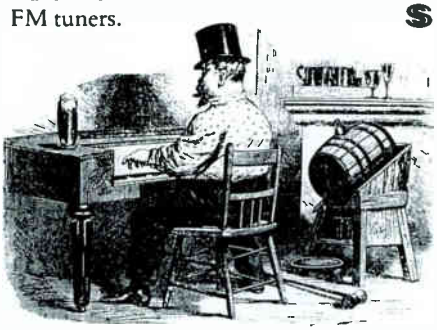
These systems use digital bit-rate compression to squeeze 19 (DCR) or 30 (DMX) stereo programs into the bandwidth normally occupied by one or two TV channels. It's an easy and economical service for cable companies to add to their lineup, because they can use fringe channels whose noise or interference would produce unacceptable picture quality. The digital codes from all of the programs, sourced from CD or DAT, are compressed and combined into a single complex signal that is distributed nationally via satellite, relayed to homes via cable, and finally unscrambled, decompressed, and decoded in a digital tuner that you buy or rent from your cable company.

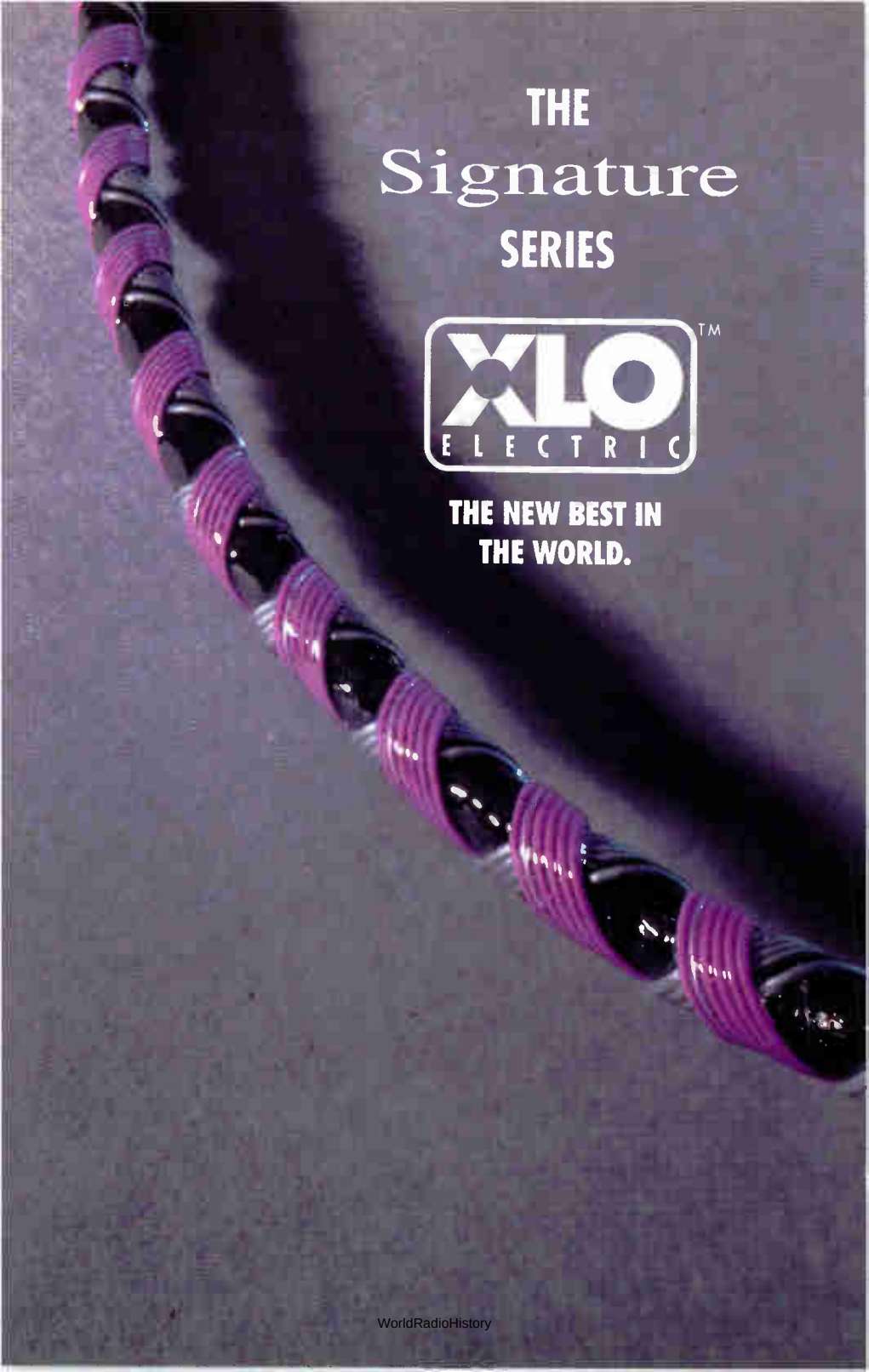
Meanwhile, the developers of over-the-air digital radio systems are continuing to refine their circuits in preparation for next spring's EIA tests to select a radio broadcast standard. The FCC is soliciting public comment on the desirability of digital radio, and it proposes to allocate space for as many as four different multi-program digital radio services that would be broadcast directly from satellites. One contender for the prize, American Digital Radio, withdrew from contention because of a lack of investment capital. Thomson/RCA has thrown its corporate support behind the European Eureka-147 system, and two heavyweight contenders have joined the fray.

NASA and the Voice of America propose to commercialize a system of satellite digital radio using technology developed at Jet Propulsion Lab (the CalTech lab that receives extremely weak signals from distant space probes and computer-processes them to extract amazing pictures and error-free data). In a demonstration last year, the NASA/VOA system relayed digitally coded NPR signals from Connecticut to a receiver in a van driving in Washington DC.

Meanwhile, AT&T Bell Labs, currently a partner with Zenith in the competition to establish a digital HDTV broadcast format, also decided to enter the "in-band" race with an adjacent-channel system that would put digital radio signals into the gaps between existing FM stations, using Bell's own method of perceptual audio coding for bit-rate compression. After 30 years of research into bit-rate compression techniques for Picturephone and video as well as audio, the engineers at Bell Labs are taken seriously when they claim to provide CD-equivalent sound at a 12:1 compression ratio.

Project Acorn reinforced its status as the apparent leader in the radio derby by successfully demonstrating systems that transmit compressed digital radio codes beneath analog AM and FM radio signals. In late August the FCC authorized experimental Project Acorn broadcasts in Cincinnati (using a 10kW transmitter at 1660kHz in the AM band) and in Urbana, IL (using a low-power test system at 93.5MHz and the University of Illinois' existing FM station at 90.9). A few days later, the AM test was reported to be a success: compressed-digital Musicam codes for wide-range stereo were transmitted in a standard AM channel. In the FM test, adequate signal strength was achieved at 43 miles. Acorn's signal-extraction processor uses a new type of "acoustic charge transport" IC developed in Urbana for military needs; it combines the technology of a solid-state LED with a radio-frequency surface-wave filter similar to the IF filters in recent FM tuners. **S**





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SAM'S SPACE

SAM TELLIG

Isn't digital grand?

Ten years of "perfect sound forever" —a full decade of audiophile angst. Armor All, green paint, CD condoms, CD stabilizers, mats, trick cables. Forgive me if I don't run over to Macy's to pay $799 to be the first kid on my block to own a Philips DCC machine. Forgive me, too, if I fail to be blown away by MiniDisc, digital compression, or, for that matter, by Super Bit Mapping.

But analog was no great shakes either (note my use of the past tense)—too tweaky even for Lars, the ultimate digital tweaker. I'll stay with my Shure Ultra 500 in an SME 309 arm on my AR turntable. (Sorry, the AR 'table is no longer available. Ditto for the Shure of Shures.)

Some people enjoy torturing themselves; others enjoy watching. This is the most sado-masochistic hobby there is. Even boating doesn't compare—although it comes close.

SURE, LEO . . .

There's my friend Leo.

He's always pooh-poohed my use of a Shure cartridge. Why don't I get a *real* cartridge—like him? Why don't I get the moving-coil of the moment?

Shure.

Even Leo's brother knows better than this. He took my advice and bought a Shure. Now he simply buys a new stylus every 1000 miles —I mean hours. Leo, meanwhile, shells out big bucks for one trendy moving-coil after another. $500, $600—that was ten years ago. Leo seems to get an average of about six months, or no more than 500 hours, from each moving-coil he buys.

I see that the Audio Note Io Signature cartridge lists for $7500. Heh-heh, Leo should get one of these.

"I have bad news," said Leo on the phone —as if one of his close relatives had died.

I knew what was coming. I could hardly contain my glee.

"What did you do, Leo, lose another uncle or lose another moving-coil?"

"It's my cartridge. Cantilever collapsed."

"Buy a Shure, Leo." (Dead, almost digital, silence.)

"I called the importer and he says it's my fault."

"Yes, it's your fault, all right. It's your fault for not buying a Shure."

"Do you think I should buy a new 'coil?" inquired Leo, ignoring my suggestion, for the thousandth time, to go buy a Shure.

"I do not! I think you should purchase the $7500 Audio Note Io Signature. Io—that's the way to go. Then you should go out and buy an Audio Note Kegon amp to go with the Io. Only $83,750, if you hurry."

I was beginning to really enjoy myself.

"I hear that [a very, very important person in high-end audio] is on his eighth sample of the - - - - - moving-coil."

Talk about torture! There's nothing I like better than to be there the very moment a cantilever collapses or an output tube blows up. I love it.

Lars finds ways to torture himself without resorting to analog.

"I have a new CD tweak," swaggered the Swede, in all seriousness. "You take this Radio Shack bulk tape eraser and . . ."

Anything you do to a CD seems to change its sound.

"VEEKH-TOR . . . I HEAR ZE DIFFERENCE!"

You add one of these little clear plastic sheets that Victor Goldstein distributes—the Har-

monix RF-11 CD Tuning Sheets ($20 per pack of eight). *Voilà*, as VEEKH-tor would say—a FORTEE-TWO PERCENT IMPROVEMENT in the sound. I svear!

"VEEKH-tor, NO SHEET. I hear ze difference."

(I was punning, but Victor let it pass.)

Put the Harmonix RF-66 Tuning Feet ($435 for a set of four) under the $800 Pioneer PD-65 and the sound tightens up, gains clarity and focus.

I mention these tweaks because the same reasons that have driven 'philes into painting their discs green and trying different kinds of "car care products" and CD condoms have also driven them into throwing big money first into CD mods, then into CD separates.

First, we experienced the Era of the Kludgemeisters.

Get rich quick

This was a great way in the mid-'80s to make money quick—before you went into desktop publishing or something else. You bought a $200 Magnavox, put in perhaps $40 worth of parts and an hour of labor, silkscreened your name on it, and sold it for $1000. One guy was charging, I think, $1500 for his "signature" version of the Magnavox CDB 650.

My favorite kludge was Lars's Mike Moffat–modded Magnavox CDB 650—the "Frankenstein." (Moffat, at least, has a sense of humor.) This was the kludge to end all kludges. To be fair to Mike, it sounded great at the time and involved a lot more than $40 worth of extra parts and a silkscreen job.

Moffat apparently saw that there was little commercial demand for Frankensteins (who would want one, save for Lars or Dick Olsher?). Thus his company—Theta Digital—started to make serious digital processors and a transport.

Processors almost drove the kloset kludgemeisters out of business. Stan Warren of Supermods and a few others are still at it, and those who have survived are probably doing a good job of offering added value.

At the time, a good kludge made sense, as much as anything in this hobby ever does. With few exceptions, such as the wonderful, tubelike Marantz CD 94 and the California Audio Labs units, single-box CD players sounded dreadful—hard, sterile, dry, steely, lifeless. You know—digital. You had to do *something*.

Growth industry

Digital separates—processors in particular—became one of the few great audio growth areas of the early 1990s. It's real easy to become a "manufacturer" of CD processors. I've known guys who've done it from their basements. Buy some boards, some chips, a faceplate, and assemble the stuff on a little worktable. ("Dinner ready? Coming, dear—I want to finish one more processor to ship to Hong Kong.")

Digital processors started off cheap—the first PS Audio units (still excellent value for money) and the Musical Fidelity Digilog. Then processors started getting expensive as everyone in the High End realized the money to be made. I know one manufacturer who's working on a $14,500 processor. Why $14,500? Because Mark Levinson charges $13,950 for the No.30, that's why.

What happens if you drop, say, $5000 or $3000 on a more modestly priced digital processor? Well, if the ads in *Audiomart* and elsewhere are any indication, if you later try to sell it you'll be very lucky to get 50¢ on the dollar, and you may end up taking only 25¢ or 30¢ on the dollar.

Meanwhile, while no one else was looking, single-box CD players—some of them, anyway—began to get better and better. There are the new single-box jobs from Linn and Naim. Good sound. I've heard them at stores, but not in my system. But we're talking pricey; purchasing a Linn or a Naim product is buying into a belief system.

Mike's processor. Dan's processor. Paul's processor. Scott's processor. George's processor. Kevin's processor. Half the people I know produce digital processors. It's so much easier to design a digital processor than it is to engineer a CD transport or an all-in-one CD player.

Dealers love processors, because now you "need" a whole category of product that you didn't even know existed before. Better yet—you also "need" an expensive "digital link" (coaxial or optical).

Another about-face from Sam

(How will he *ever* save face?)

Maybe you no longer need a digital processor at all.

I know that, several years ago, I was one of the first hi-fi hacks to trump the idea of

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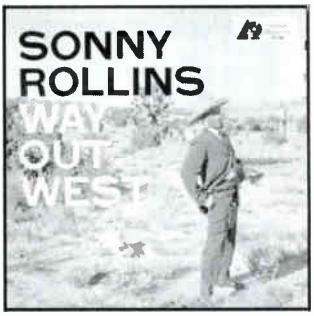

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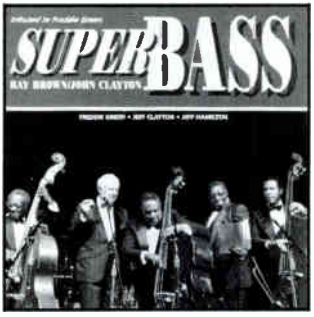

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Inner Ear - USA

- *The 3A MMC speakers sounded larger than one would expect from their size. Their high efficiency, smooth response and wide frequency range appear to be consistent with the "professional control" function assigned by the Manufacturer and they could play at amazingly high levels without sounding strained.*

Stereo Review - USA

- *Daniel Dehay's MMC are one of the most musical speakers (independent of their price) I've ever heard. When I remember it well, the MMC are the first product I reviewed, which merits to be called: sensational.*

Hi-Fi Exklusiv - Germany

- *It's tremendous bass capability is truly sensational. But it is not only what the Midi has to offer; convincing dynamics, transparency, precision and clearness could convince us without reservations. And best of all; it doesn't need expensive power sources. Then you listen and you feel blessed.*

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digital separates. Since then we've seen the boom in digital separates I've just talked about. Never underestimate the power of a bad idea whose time has come. Think of Jimmy Carter. President Clinton. Boris Yeltsin. Slobodan Milosovic. Saddam Hussein. John Major. Madonna.[1]

Just listen to the single-box $3995 Naim NA CDI (CD Integrated) player. It's terrific—detailed, dynamic, harmonically rich—and you don't have to worry about plumbing. No digital link needed. (By the same logic, I should go buy an integrated amp.)

There's something technical to be said for single-box players, too, though I'm probably not the writer to say it. It seems that once you take a digital data stream from a CD player's digital-out, or from a transport, then you should re-clock the data stream to reduce yitter—I mean, jitter. (Gad—too much time spent with Lars.)

The problem is, most of the single-box players that I've heard have, until recently, been mediocre at best.

Now, though, there are at least several players which make me change my mind. Never mind the pricey Naim, unless that's the church you attend. You have other choices. One is the rightly praised JVC XLZ-1050TN—a good example of what sometimes happens to hard-up Japanese companies when people stop buying junk. They start making good stuff! And now comes the Pioneer PD-65. . .

Missionary position

You may remember Tom Norton's review of the PD-75 in the December 1991 *Stereophile* (Vol.14 No.12)—one of Pioneer's first upside-down players. You insert the disc in the drawer, label side down, which makes perfect sense to me. That's the way you play LPs.

As for the sound, I think Tom was correct in feeling that this unbelievably sexy-looking player was somehow uninvolving. It could have been more. . .well, rip-sNorton'. Still, I thought Major Tom was a mite hard on this Pioneer. For the price, it was beautifully made and worth the money as a transport alone.

I hoped the next generation of upside-down Pioneer players would be better yet, so I sat back and waited for something to happen.

Then I heard a show on the BBC World Service (short wave). A normally oh-so-tight-assed BBC announcer was going apeshit—you could hear it in his voice—over a new digital filtering chip called the Legato Link. They played music with and without the Legato Link switched in. On short wave, of course, you could hear no difference—so it was all in my head. But the announcer seemed quite convinced that something wonderful had happened.

I called Pioneer.

Zloi malchik

Before the player arrived, there was fun to be had with my Russian comrade, Robert. He had just bought yet another expensive processor—this despite the fact that his wife's entire family was about to emigrate from Moscow and he had to foot the bill.

"Privyet, tovarish. [Greetings, Comrade.] Sell your processor. There's a new chip from Pioneer called Legato Link that's going to blow everything away."

"I heard about something like this," Robert said, with hesitation.

"It's true, vyeevshee tovarish [former comrade]. You'd better sell your expensive processor now while you can. I know you only bought it last week, but that's capitalism. Progress!"

Little did I know that I would turn out to be right.

The Pioneer PD-65 actually is one of those products that "blows away" much of the competition. It eats many other players and processors alive. "Eating alive" is another expression of the always colorful Former Comrade Robert.

"It's going to eat you alive, Comrade. And I'll have it in a few weeks. It's from Pioneer. Weren't you a member of Communist Young Pioneers when you were a kid? Spokoiny nochi, tovarish. [Good night, pleasant dreams.]"

My Russian fiancée—yes, Marina Mikhailovna and I are going to tie the knot—was listening to my side of the conversation.

"Zloi malchik," she said. [Bad boy.]

Stop killing the music

What is Legato Link?

Peter van Willenswaard had a go at explaining it last October (p.59) and has another go in this month's "Industry Update." Basically, Legato Link is Pioneer's proprietary digital

1 What? No Republicans, Sam? Have you been inviting that Bill Buckley over to your listening room again? —JA

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Pioneer PD-65 CD player with "Legato Link" D/A conversion.

filtering chip, which works more gently than the so-called "brick-wall" filters, where everything above 15kHz or so gets lopped off pretty quick.

Of course, anything that gets off a CD and out of your player above 22.05kHz is distortion—'cause that's half the sampling frequency. In other words, the Pioneer Legato Link chip does basically what Wadia's software-based digital processing does: it applies an algorithm to let out some of the distortion—in fancy talk, some of the "ultrasonic spuriae" produced above 22.05kHz. That way you don't have to start killing the music starting at 15kHz.

No one is going to buy the idea of a distortion-tailoring chip, of course, so Pioneer talks about Legato Link conversion producing "an output whose waveform is closer to that of the original music."

For me, the Pioneer PD-65 seems to lack the bell-like clarity—the purity, if you will—of certain other CD players and processors, most notably the memorably named JVC XLZ-1050TN. Don't get me wrong. I like the JVC player—I had one for several months, and it's as good as CG and others say it is. But it's different from the Pioneer PD-65—subjectively clearer and cleaner, but leaner, too.

The Pioneer has its own set of advantages.

Love that distortion!

That's precisely what we've been missing with digital. With analog, we had all sorts of distortion, which may have acted to humanize the music, make it less perfect. Now you can have custom-tailored distortion with your digital, too. . . and all for only $800 in a beautiful, sexy machine that looks like it should sell for at least $1200, and sounds like it should sell for $2000.

This *is* a great-sounding machine.

It sure is different. Different from all those dry, sterile, wimpy-sounding, castrated, steely, airless, lifeless, sexless CD players we've become used to since the introduction of perfect sound forever. Yup—the Pioneer's different, all right. It doesn't sound perfect. It sounds. . . almost human.

This player has a warmth about it; surprisingly good bass and dynamics, too, putting the lie to the idea that single-bit has no balls compared with multi-bit.

It excels in atmosphere. It's as if the musicians are alive—the way they are when analog is at its best.

Best of all, the Pioneer PD-65 has a wonderful way with transients. They sound more lifelike than I've heard with any other CD player, including some very expensive separate transports and processors. Transients are more extended, cleaner, crisper. There's more life and sparkle to the music generally . . . provided you have a halfway decent recording.

The Pioneer PD-65 will not take a dog of a recording—like the Brahms Piano Concerto 2 with Moravec (Supraphon 11 0953-2), proof that the Czechs must be holding on to their Commie-era recording equipment—and make it sound good.[2] But I've found that this player will make more recordings listenable than any other player I've had in my system.

Drawbacks?

Resolution of low-level detail is very good, but not—I believe—the ultimate. And the Pioneer PD-65 does seem to lack the bell-like clarity of those lean, clean players like the JVC XLZ-whatever-it-is, which clamp down hard so as not to spew those spuriae. But, ah. . . the warmth, the air, the sparkle.

The CD format may condemn us to live with imperfect sound forever. So adding a

2 I mention this because a *Stereophile* reader recommended it. The performance is excellent. The recording is literally the pits.

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For those of us who remember how good those records sound but also want to be able to enjoy the music of today, Kinergetics' engineers have developed the KCD-40 Platinum. The KCD-40 represents the state-of-the-art in integrated CD players. Not only does the KCD-40 employ four 18-bit DACs in a balanced/differential configuration, but it also utilizes a fully balanced and discrete analog section.

Performance, flexibility, and styling are the reasons why the KCD-40 has become the standard to which all CD players must measure up to and has thus become the favorite of the experienced music lover.

For the most demanding audiophile and music lover Kinergetics offers a masterpiece in audio engineering, the KCD-55 Ultra. Four 20-bit Ultra Analog DACs, a proprietary anti-jitter digital interface, and a differential digital and analog stage are but a few of the technical reasons why this processor has become the primary listening source of record lovers all over the world. The non-technical reason is that the KCD-55 Ultra simply sounds more like music.

KCD-55 Ultra Platinum Series

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little dirt—I mean, distortion—may be the way to make it more tolerable. It's possible to argue that Pioneer is screwing up the sound to make it sound good. Anyway, as Hans Fantel might say, the proof is in the pudding. I could pig out on this player all night.

This thing is an ergonomic beauty, too. The only thing flimsy is the drawer—not quite so tank-like as the drawer in the Pioneer PD-75. But the PD-75 lacks Legato Link, a Japanese advance that really is an advance. Also, you should know that there ain't no variable analog out—not that you'd have used it anyway.

The front of the machine is free of frivolous features. No Favorite Track Selection. No shuffle play. No programming the name of the disc so it lights up in the window. You can even turn off the digital display—with a slight improvement in sound. You can also turn off the digital-out if you're using the player's own analog-out, again with a slight improvement in sound.

As a transport, this player is a gem, although I really don't know how good it is, since the Legato Link works so well I didn't want to use the player for long with any of the processors I had on hand. Don't feel so bad that the $420 set of four Harmonix Tuning Feet works; the player is quite good standing on its own four feet. It has a neat, honeycombed, vibration-damping base. It's a very substantial machine for the money, weighing over 20 pounds.

There aren't too many times when I say, Go out and buy something. And yes, you should audition it. There are other great players—like the JVC whose catchy name I seem to forget.

But with this kind of sound quality *and* build quality available for this kind of price, I think you need to have your head examined if you buy rapidly obsolete digital separates, whatever the price. I've heard some of the best digital processors, although not in my own system. And my opinion is, CD is just not worth spending the money on.

If you have an irresistible urge to spend money, buy a great tube amp instead, like a Jadis Defy-7 or a Conrad-Johnson MV-125. Neither of those amps seemed embarrassed fronted by the Pioneer PD-65. $

HI-FI '93
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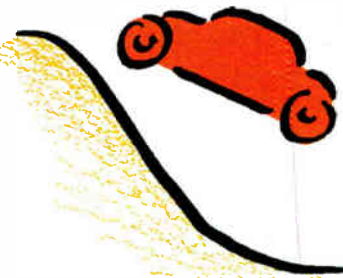

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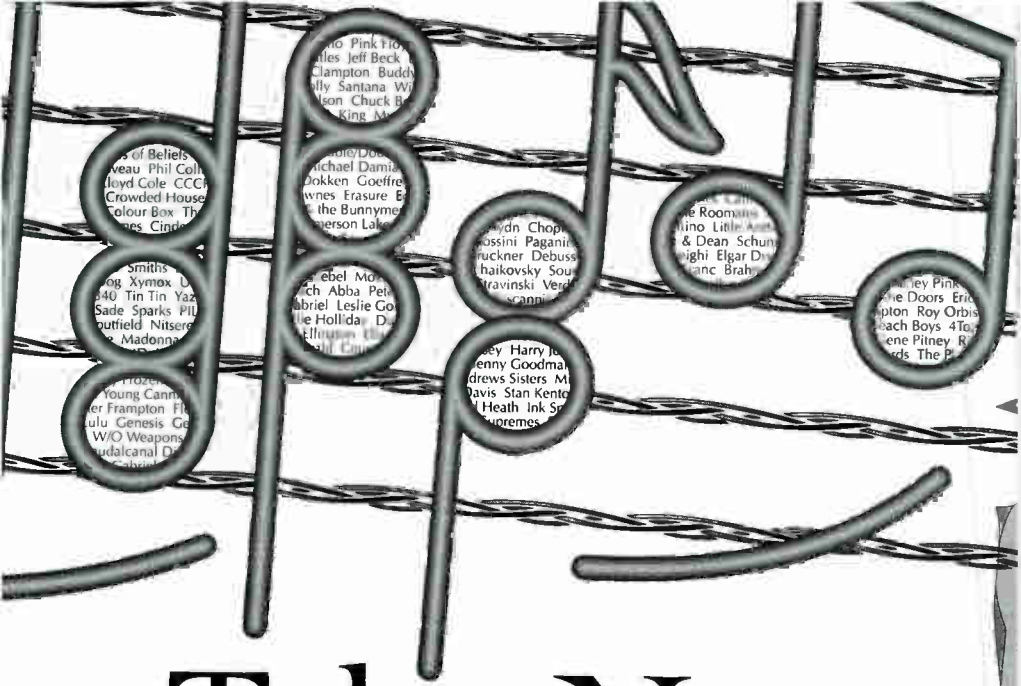

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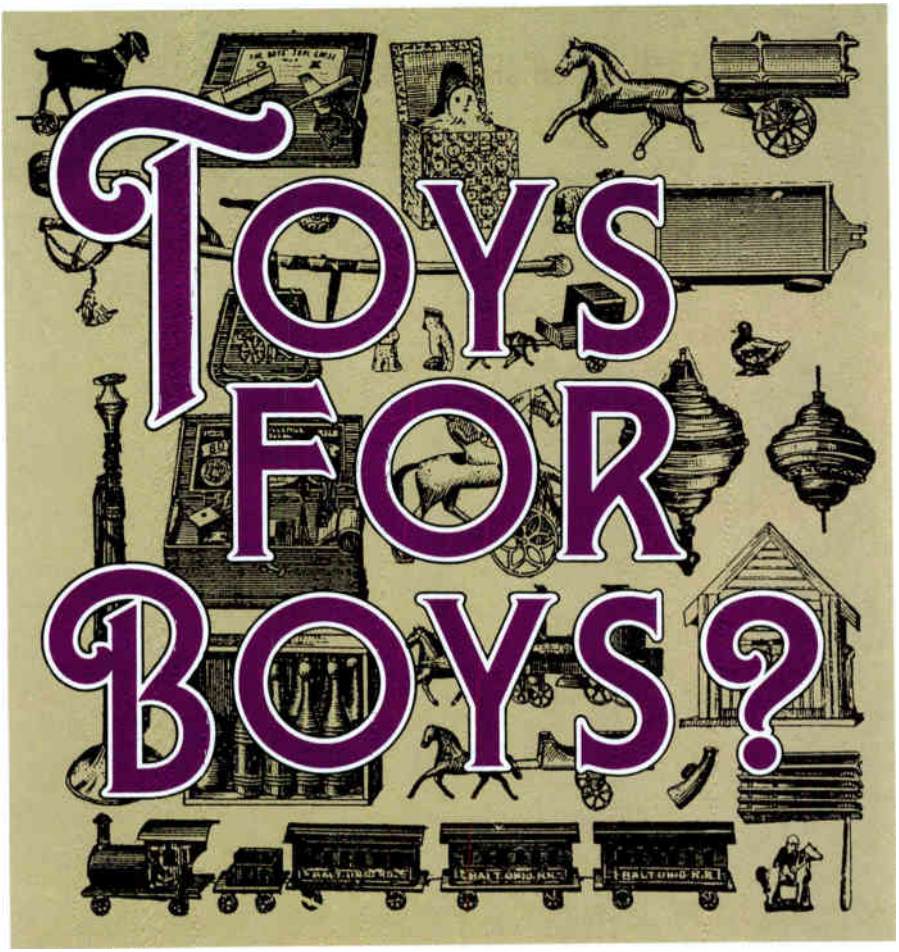


Barry Willis asks why the ***High End*** *ignores half of its potential market*

I've got a problem. It's called normal hearing. Admittedly, I didn't spend the glorious days of my youth firing artillery, humping a jackhammer, or tightening bolts with my head 6″ above a roaring V8. Which is not to say I haven't done my share of rock concerts or gone through rites of passage working the graveyard shift in nonunion machine shops. Somehow, I've survived into what I euphemistically call adulthood with my auditory apparatus intact. Through providence or good genes, my hearing remains pretty much as nature intended, extending to 14kHz, down about 6dB at 16kHz and dropping like a rock just beyond, a frequency response not unlike a good midpriced cassette deck. You could say I'm just a basic, slightly damaged adult male.

"That's great," you're thinking, "what's the problem?" The problem is this: so much of what I hear sounds way too bright. Why is it, since the dawn

of the digital age, everyone has decided to turn up the treble? Almost everywhere I go, I feel like asking, "Is it bright in here, or is it just me?" What I'm talking about varies from the relatively inoffensive glossy sheen of most commercial recordings, to the unpleasant edginess of many CD players, to the steely harshness of the average car stereo, to the excruciating, Torquemada-would-have-loved-it, *please-God-turn-it-off-I'll-confess* form of hypermodern torture called the dance club.

"TOO BRIGHT," I SAID.
"YESSSS," SHE HISSED. "MOST OF YOUR BUDDIES ARE HOPELESSLY LOST."

Unfortunately, this problem is not confined to the realm of cheap-junk hi-fi or max-SPL pro gear built for the battlefield. Recently I was trying some new, expensive, and much-praised speaker cables. They lived up to their reputation: full extended bass, great detail and imaging. My initial impression was, "Hey, these are pretty good." But the longer I listened, the more uncomfortable I became. I just couldn't relax. I was squirming in my chair when my wife, who had been working in a nearby room, peeked in the door.

"What do you think?" she asked.

"Too bright," came my unthinking reply.

"Yessss," she hissed, raising her fists in the universal gesture of victory, "I'm *so* glad you can hear that. Most of your buddies are hopelessly lost."

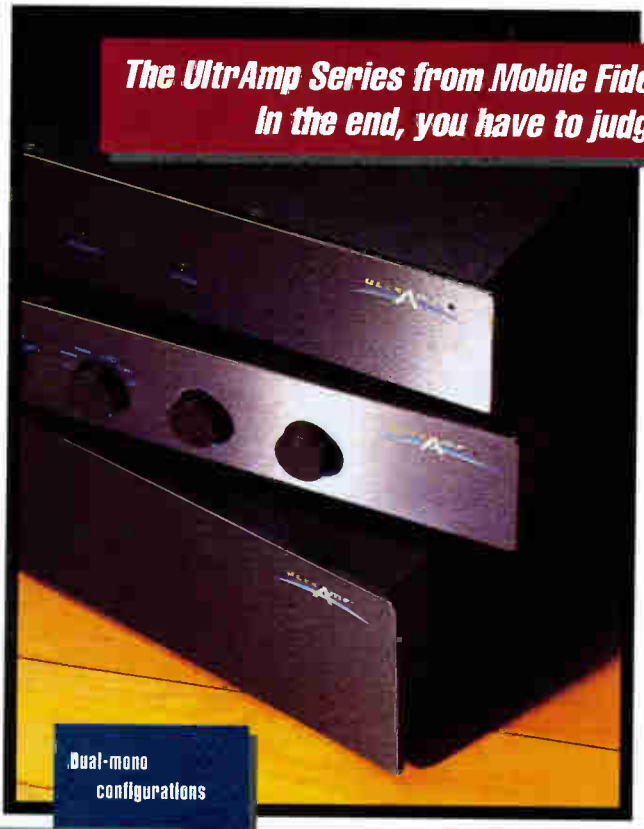
Most of my buddies fit the profile of the typical *Stereophile* reader (see John Atkinson's analysis of the last reader survey in the June '92 issue): well-educated, well-employed, with a wide range of musical tastes and a substantial investment in high-quality audio equipment. And, I'm willing to bet, some degree of high-frequency hearing loss, which inures them to sonic indignities heaped upon them by recording engineers, car-stereo installers, loudspeaker manufacturers, club owners, and sound-reinforcement professionals. (What happens to your hearing after 20 years mixing live rock'n'roll?) Conversely, to a certain extent, this hearing loss, however slight, makes them susceptible to the seductions of high-frequency augmentation, whether in the form of prerecording equalization or the lure of loudspeakers with more than a hint of sizzle. Some treble boost sounds more natural to most men, compensating for what they have lost, perhaps reminding them of what they heard in childhood before they began to experiment with firearms, power tools, motorcycles, and electric guitars.

SOME TREBLE BOOST SOUNDS MORE NATURAL TO MOST MEN, COMPENSATING FOR WHAT THEY HAVE LOST.

It is statistically well-documented that men have a higher threshold of sensitivity than women and a lower high-frequency limit. For both sexes, hearing impairments become more pronounced with age, but men are far more likely the victims. We are all familiar with the scenario of male audiophiles sitting down to enjoy music which quickly drives their wives out of the room. It isn't simply too loud—it's too hard, too brassy, too *bright*.

This difference in hearing acuity is part of the answer to Andrew Singer's question "Why isn't the high-end industry attracting more women?" (Vol.14 No.10, October '91), which was, in my opinion, one of the most intrig-

The UltrAmp Series from Mobile Fidelity Sound Lab. In the end, you have to judge for yourself.



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uing issues raised in these pages in recent months. The truth is that audio, high-end audio in particular, is a by-males, for-males industry. Products are designed by men for a target market with certain prejudices and preferences.

Who buys $20,000 loudspeakers? Wealthy, middle-aged men. Can you punch me up a graph of their hearing ability? Yep, just as we thought: a steep rolloff just past 10kHz. Can you give me a product with a rising high end? No problem. They'll sell like hotcakes. Until the wives have a listen. That top-octave resonant peak, out of hubby's reach, can induce a migraine in a female five miles away. Ah, the conundrum. What sounds lively to him is deadly to her!

Of course, one easy solution is the use of tone controls on the preamplifier which may be switched in or out at the user's discretion. Some manufacturers (Meridian, for example), recognizing the huge range in hearing abilities, room acoustics, and recording qualities, incorporate flexible, programmable tone controls into their loudspeakers. But orthodox audiophiles aren't comfortable with these, as if their mere presence was an indicator of sonic inferiority, or worse, evidence of bad taste. (Unless, of course, in a fascinating reversal of logic, the preamplifier is the *ne plus ultra* Audio Suite *cum* Palette—tone controls so good, so expensive, you can't live without them!)

There is a second, more difficult, but infinitely more rewarding solution. The first step is to salvage and protect what remains of your hearing. (Peter Mitchell's suggestions in the May '92 "As We See It" were excellent.) The second step is to *try* to learn to hear as the majority of people on the planet do: with greater sensitivity. Audiophiles train themselves to listen for subtle shadings of timbre and harmonic nuance, and love to compare experiences and impressions, but almost always in a male context. This is not to dismiss the male context; male bonding and the buddy system are probably sociobiological necessities. I'm not a "male feminist" or a born-again SNEG (Sensitive NEw-age Guy), and my idea of a good time does not include following 75 of my closest friends into the woods for a weekend of tree-hugging, drum-beating, gut-wrenching grief about our lost masculinity. I simply think the Boys' Club of Audio has ignored, to its detriment, half the population. Next time you venture into an audio store, or over to a friend's home for a listening session, take along a female companion. Don't tell her what to listen for, but instead ask her to tell you what *she*'s hearing. Be prepared for some revelations.

TAKE ALONG A FEMALE COMPANION FOR A LISTENING SESSION. DON'T TELL HER WHAT TO LISTEN FOR—ASK HER TO TELL YOU WHAT *SHE*'S HEARING.

Which leads us, class, to the second subject of today's lecture: manufacturers continually bemoaning their failure to increase sales or to open up new markets. Year after year they timidly go fishing in the same pond and come away disappointed. Hasn't anyone else noticed that we make no attempt to appeal to women? Why have we dismissed this immense undeveloped market? A little observation will show you that women aren't really turned off by technology; they buy cars and computers every day. They're not as intimidated as you think they are. But they *are* turned off by techno-nerds spouting technobabble. They're turned off by dull-as-dirt visual design. They're turned off by screechy-bright hi-fi priced way beyond their means.

O equipment maker toiling in the dark! You may think your new pretty welded-steel planar-magnetic monster will take the world by storm. I tell

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PATENT PENDING

TOYS FOR GIRLS?

I asked *Stereophile*'s female staff to choose high-end components that turned them off visually.
Here in this sidebar is the rogue's gallery of toys for boys.
—JA

NOT!

you it's got an edge harder than a brand-new hacksaw. Lift your eyes and see! Women love music and art! Pseudo-rackmount and battleship grey ain't it! Forget brushed aluminum and flat black. On the low end, forget boring boxes wrapped in fake walnut veneer. On the high end, forget temperamental, complicated systems requiring a technical expert just to initiate the turn-on cycle. Give women what they want: reliable, affordable, easy-to-use components *in a variety of colors.* Give them visually dynamic loudspeakers with interchangeable grilles and a natural frequency balance. Make it sound like music! Then sell to them directly by advertising in publications they actually read. Give them a chance to have fun with audio. What can you possibly lose?

GIVE WOMEN WHAT THEY WANT: RELIABLE, AFFORDABLE, EASY-TO-USE COMPONENTS *IN A VARIETY OF COLORS.*

Some manufacturers recognize the need for variety in the visual appeal and ergonomic designs of their products. Adcom, bless its soul, makes its offerings available in white as well as the ubiquitous black. Bang & Olufsen, always sensitive to the fact that its products must harmonize with a wide spectrum of decor, makes its television cabinets in several colors. Michaelson Audio's Chronos amplifiers, whose retro styling makes them look as if they were lifted right off the set of *Blade Runner,* not only sound gorgeous but demand to be displayed. You can't say that about many power amplifiers. And mavericks like Scientific Fidelity are carving their niches with truly *outré* works of functional audio art. But companies like B&O and Sci-Fi are exceptions; the audio industry is dominated by a "me too" mentality whose supreme tenet is Henry Ford's maxim: "They can have it in any color they want as long as it's black." This lack of imagination is the major obstacle in most marketing schemes. How can you stand out from the crowd when you make every effort to conform?

A story which appeared in the business section of the June 18, 1992 edition of the *Atlanta Journal* might drive this point home. Under the heading "Georgia Entrepreneurs of the Year" was a piece on a fellow named John C. Thorton, who had been a sales manager for a major carpet maker. One day one of his customers told him that not everyone wanted traditional rugs. He specifically said that Thorton ought to explore some designs that went well with contemporary furniture. Thorton tossed the idea around with some other buyers, who responded positively, then took it to his bosses. Quote: "They yawned."

HOW CAN YOU STAND OUT FROM THE CROWD WHEN YOU MAKE EVERY EFFORT TO CONFORM?

Mr. Thorton quit to form his own company. The banks in the carpet-industry area of north Georgia wouldn't touch him. But Thorton was convinced. He maxed out his credit to have some samples made. He borrowed from friends and associates to get his business off the ground. Then he beat the bushes as hard as he could, as cheaply as he could. He bought deep-discount airline tickets and rode the bus home on weekends. And he made sales. Last year, in a miserable economy, John Thorton's American Rug Craftsmen, Inc. did $25.5 million worth of business.

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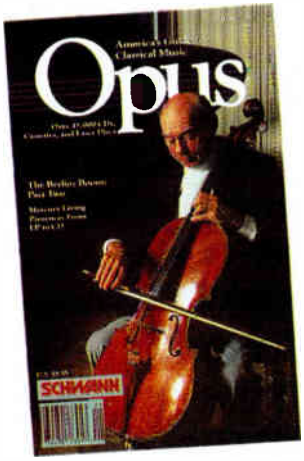

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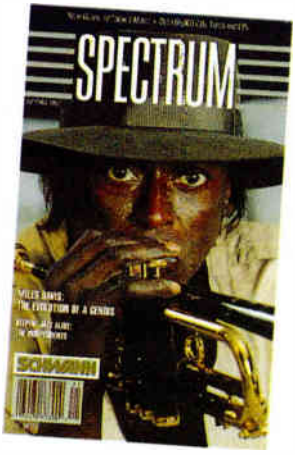

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The people who buy John Thorton's rugs might buy your products, too. But they're not going to be won by great sound alone. They're not merely buying music. They're buying furniture and art. And if you want to place your product in their homes, that's what it must be: furniture *and* art. How do you reach them? Not through the pages of *Audio & Video Interiors*, a sort of *Architectural Digest* with electronics, whose main thrust seems to be how best to conceal home entertainment gear. Try instead the upbeat, eclectic *Metropolitan Home*. See how the up-and-coming, disposable-income crowd lives now. Who reads this publication? People with highly evolved aesthetic sensibilities and money enough to enjoy them. Precisely the market you need to reach. But you won't reach them with black boxes stacked atop one another *ad nauseam*. Innovative styling will take audio out of the closet and into the living room, changing equipment from objects of consternation into conversation pieces. Make it as fun to see and feel as it is to hear. Make the Domestic Interference Factor a thing of the past.

Somehow, strolling through the typical high-end store, one has the feeling that, on some level, it's always 1963. The specter of the Dynaco Stereo 70, or the KLH Nine, or the Acoustic Research XA, or whatever seminal product it was which inspired a particular designer, seems to loom over the whole affair. Nostalgia is fine when kept in context and recognized for what it is: a function of selective memory, forgetting the bad and remembering the good. Whether our longing is for the good old days of "family values" or the glory days of "full employment" or the "full, rich sound" of a Western Electric amplifier, we need to see such longing for what it is: a long look into a cloudy rearview mirror. Nearing the edge of the 21st century, we need a visionary approach to aesthetic, tactile, and application design. We need products which will carry us happily into the future, because that is where we are going. **S**

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TT5Tsa	40"	5	was $359, *now $249.95*
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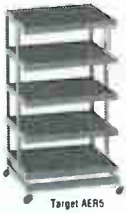
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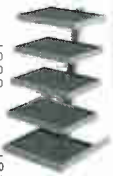
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Jitter

"How sour sweet music is
When time is broke and no proportion kept!"

With those lines from *Richard II*, Shakespeare unwittingly described a phenomenon in digital audio called "word clock jitter" and its detrimental effect on digitally reproduced music. "Clock jitter" refers to timing errors in analog/digital and digital/analog converters—errors that significantly degrade the musical quality of digital audio.

Clock jitter is a serious and underestimated source of sonic degradation in digital audio. Only recently has jitter begun to get the attention it deserves, both by high-end designers and audio academics. One reason jitter has been overlooked is the exceedingly difficult task of measuring such tiny time variations—on the order of tens of trillionths of a second. Consequently, there has previously been little hard information on how much jitter is actually present in high-end D/A converters. This is true despite the "jitter wars" between manufacturers who claim extraordinarily low jitter levels in their products. Another reason jitter has been ignored is the mistaken belief by some that if the ones and zeros that represent the music are correct, then digital audio must work perfectly. Getting the ones and zeros correct is only part of the equation.

Stereophile has obtained a unique instrument that allows us to measure jitter in CD players and digital processors. Not only can we quantify how much jitter is afflicting a particular D/A converter, we can look at something far more musically relevant: the jitter's frequency. Moreover, an analysis of jitter and what causes it goes a long way toward explaining the audible differences between CD transports, digital processors, and, particularly, the type of interface between transport and processor.

This article presents a basic primer on word clock jitter, explains how it affects the musical performance of digital processors, and reports the results of an investigation into the jitter performances of 11 high-end digital processors and one CD player. In addition, we are able—for the first time—to measure significant differences in jitter levels and spectra between different types of CD transport/digital processor interfaces.

We have found a general correlation between a digital processor's jitter performance and certain aspects of its musical presentation. The jitter measurements presented in this article were made on processors with whose sound I was familiar; in preparation for their reviews, each had been auditioned

TEAR Jitter

ROBERT HARLEY

at matched levels for at least three weeks in my reference playback system. Because the reviews of these processors have already been published, it's possible to compare the musical impressions reported to the processors' jitter performance. Although these jitter measurements are far from the last word in quantifying a digital processor's musical performance, there is nevertheless a trend that suggests a correlation between listening and measurement.

DIGITAL AUDIO DATA IS USEFUL ONLY AFTER IT IS CONVERTED TO ANALOG—A PROCESS SOMEWHAT AKIN TO TURNING GROUND BEEF BACK INTO STEAK.

This article will also attempt to dispel the popular notion that "bits is bits." This belief holds that if the ones and zeros in a digital audio system are the same, the sound will be the same. Proponents of this position like to draw the analogy of putting money in the bank: "your money," though merely a digital representation on magnetic tape, remains inviolate (you hope). There's a problem with this argument, however: unlike the bank's digital record on magnetic tape, digital audio data is useful *only after it is converted to analog*. And here is where the variability occurs. Presenting the correct ones and zeros to the DAC is only half the battle; those ones and zeros must be converted to analog with incredibly precise timing to avoid sonic degradation.

As we shall see, converting digitally represented music into analog—a process somewhat akin to turning ground beef back into steak—is far more complex and exacting than had been realized.

SAMPLING

To understand how even small amounts of clock jitter can have a large effect on the analog output signal, a brief tutorial on digital audio sampling is helpful.

Sampling is the process of converting a continuous event into a series of discrete events. In an analog-to-digital (A/D) converter, the continuously varying voltage that represents the analog waveform is "looked at" (sampled) at precise time intervals. In the

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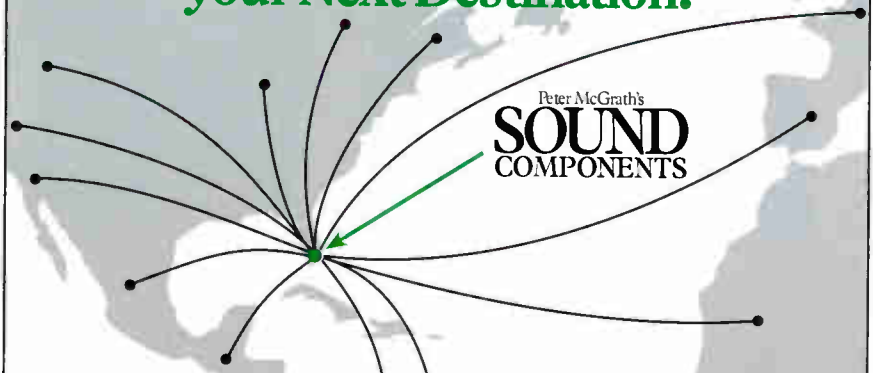

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case of the Compact Disc's 44.1kHz sampling rate, the A/D converter samples the analog waveform 44,100 times per second. For each sample, a number is assigned that represents the amplitude of the analog waveform at the sample time. This number, expressed in binary form (one or zero) and typically 16 bits long, is called a "word." The process of converting the analog signal's voltage into a value represented by a binary word is called "quantization," the effectively infinite range of values allowable in an analog system being reduced to a limited number of discrete amplitudes. Any analog value falling between two binary values is represented by the nearest one. Sampling and quantization are the foundation of digital audio; sampling preserves the time information (as long as the sampling frequency is more than twice the highest frequency present in the analog signal) and quantization preserves the amplitude information (with a fundamental error equal to half the amplitude difference between two adjacent binary values). We won't worry about quantization here—it's the sampling process we need to understand.

The series of discrete samples generated by the A/D converter can be converted back into a continuously varying signal with a D/A converter (DAC). A DAC takes a digital word and outputs a voltage equivalent to that word, exactly the opposite function of the A/D converter (ADC). All that is required for perfect conversion (in the time domain) is that the samples be input to the DAC in the same order they were taken, *and with the same timing reference.* In theory, this sounds easy—just provide a stable 44.1kHz clock to the A/D converter and a stable 44.1kHz clock to the D/A converter. *Voilà!*—perfect digital audio.

Clock Jitter

Unfortunately, it isn't that easy in practice. If the samples don't generate an analog waveform with the identical timing with which they were taken, distortion will result. These timing errors between samples are caused by variations in the clock signal that controls *when* the DAC converts each digital word to an analog voltage.

Let's take a closer look at how the DAC decides *when* to convert the digital samples to analog. In fig.1, the binary number at the left is the quantization word that represents the analog waveform's amplitude when first sampled. The bigger the number, the higher the amplitude. (This is only conceptually true—in practice the data are in twos-complement form, which uses the most significant bit or MSB at the start of the word as a sign bit, a "1" meaning that the amplitude is negative.) The squarewave at the top of fig.1 is the "word clock," the timing signal that tells the DAC *when* to convert the quantization word to an analog voltage. Assuming the original sampling frequency was 44.1kHz, the word clock's frequency will also be 44.1kHz (or some multiple of 44.1kHz if the processor uses an oversampling digital filter). On the word clock's *leading* edge, the next sample (quantization word) is loaded into the DAC. On the word clock's *falling* edge, the DAC converts that quantization word to an analog voltage. This process happens 44,100 times per second (without oversampling). If the digital processor has an 8x-oversampling digital filter, the word-clock

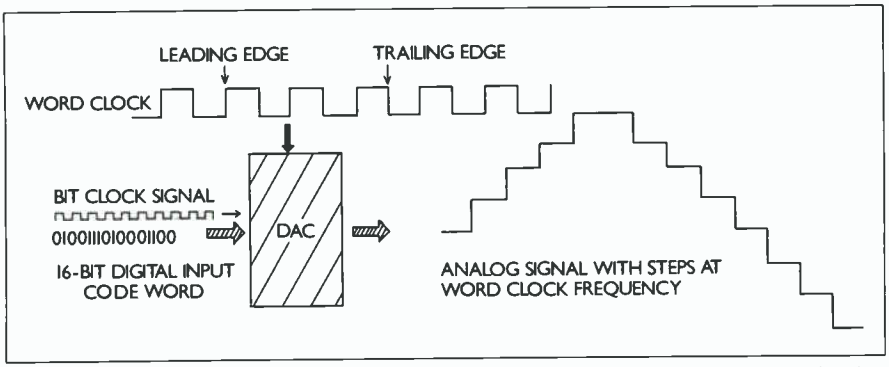

Fig.1 The word-clock signal triggers the DAC to output an analog voltage equivalent to the input digital word.

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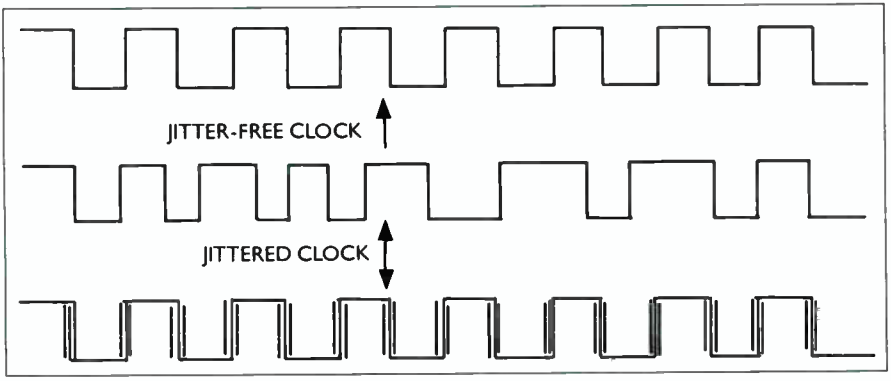


Fig.2 Word-clock jitter consists either of a random variation in the pulse timing or a variation which itself has a periodic component.

frequency will be eight times 44,100, or 352.8kHz.

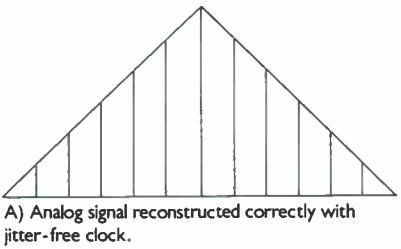
It is here at the word clock that timing variations affect the analog output signal. Specifically, clock jitter is any time variation between the clock's trailing edges. Fig.2 shows a perfect clock and a jittered clock (exaggerated for clarity).[1]

Now, look what happens if the samples are reconstructed by a DAC whose word clock is jittered (fig.3). The sample amplitudes—the ones and zeros—are correct, *but they're in the wrong place!* The right amplitude at the wrong time is the wrong amplitude. A *time* variation in the word clock produces an *amplitude* variation in the output, causing the waveform to change shape. A change in shape of a waveform is the very definition of distortion.

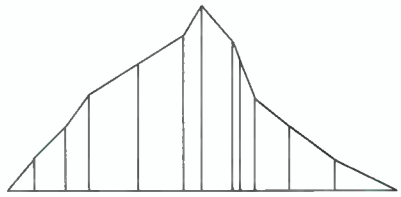
THE RIGHT AMPLITUDE AT THE WRONG TIME IS THE WRONG AMPLITUDE.

Remember, the word clock tells the DAC *when* to convert the audio sample to an analog voltage; any variations in its accuracy will produce an analog-like variability in the final output signal—the music.

There's more. Clock jitter can raise the noise floor of a digital converter, reducing resolution, and can introduce spurious artifacts. If the jitter has a random distribution (called "white jitter" because of its similarity to white noise), the noise floor will rise. If, however, the word clock is jittered at a specific frequency (*ie*, periodic jitter), artifacts will appear in the analog output as sidebands on either side of the audio signal frequency being converted to analog. It is these periodic artifacts that are the most sonically detrimental; they bear no harmonic relationship to the music and may be responsible for the hardness and glare often heard from digital audio.



A) Analog signal reconstructed correctly with jitter-free clock.



B) Analog signal reconstructed with jittered clock. (Exaggerated for clarity). Although all the samples have the correct amplitude, because they occur at the wrong time, the reconstructed signal has the wrong shape.

Fig.3 Analog waveform is reconstructed correctly with a jitter-free word clock (top); word-clock jitter results in a distortion of the analog waveform's shape—distortion!

1 Although some DACs convert on the leading edge, most convert on the trailing edge. Whichever type is used, the effects of jitter are identical.

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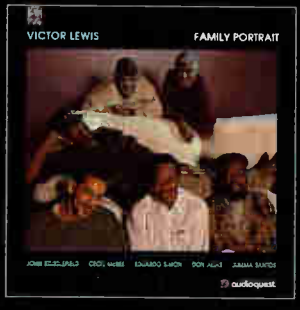

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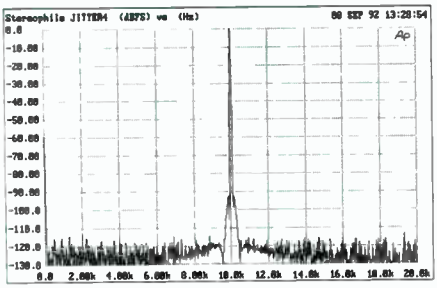

Fig.4 Audio-band spectrum of jitter-free 16-bit digital data representing a 10kHz sinewave at 0dBFS (linear frequency scale).

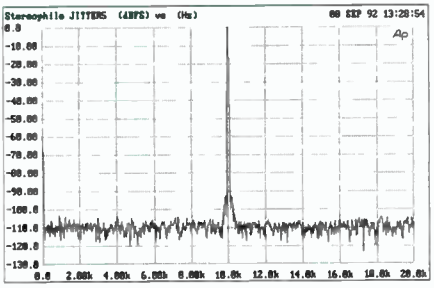

Fig.5 Audio-band spectrum of 16-bit digital data representing a 10kHz sinewave at 0dBFS afflicted with 2ns p-p of white-noise jitter (linear frequency scale). Note rise of approximately 12dB in the noise floor compared with fig.4, representing a significant 2-bit loss of signal resolution.

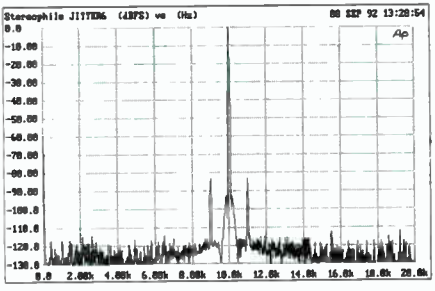

Fig.6 Audio-band spectrum of 16-bit digital data representing a 10kHz sinewave at 0dBFS afflicted with 2ns p-p of sinusoidal jitter at 1kHz (linear frequency scale). Note addition of sidebands at 9kHz and 11kHz compared with fig.4, though noise floor remains at 16-bit level.

These principles were described in JA's computer simulations of the effects of different types and amounts of jitter in Vol.13 No.12; I've included three of his plots here. Fig.4 is a spectral analysis of a simulated DAC output when reproducing a full-scale, 10kHz sinewave with a jitter-free clock. Fig.5 is the same measurement, but with two nanoseconds (2ns or 2 billionths of a second) of white jitter added—note the higher noise floor. Fig.6 shows the effect of 2ns of jitter with a frequency of 1kHz. The last plot reveals the presence of discrete frequency sidebands on either side of the test signal caused by jitter of a specific frequency. The amplitude of these artifacts is a function of the input signal level and frequency; the higher the signal level and frequency, the higher the sideband amplitude in the analog output signal.[2]

How much jitter is audible? In theory, a 16-bit converter must have less than 100 picoseconds (ps) of clock jitter if the signal/noise ratio isn't to be compromised. (There are 1000ps in a nanosecond; 1000ns in a microsecond; 1000μs in a millisecond; and 1000ms in a second.) Twenty-bit conversion requires much greater accuracy, on the order of 8ps. 100ps is one-tenth of a billionth of a second ($1/10^{10}$s), about the same amount of time it takes light to travel *an inch*. Moreover, this maximum allowable figure of 100ps assumes the jitter is random (white) in character, without a specific frequency which would be sonically less benign. Clearly, extraordinary precision is required for accurate conversion (see sidebar).

2 The accuracy of these simulations was confirmed by Chris Dunn and Malcolm Hawksford in their AES paper "Is the AES EBU/SPDIF Digital Audio Interface Flawed?," presented at the 93rd AES convention. Copies of individual papers are available for $3 each from the Audio Engineering Society, 60 East 42nd St., New York, NY 10165-2520. Ask for preprint #3360 (C-1).

The Timing Problem

For the mathematically inclined, the signal/noise ratio (SNR) in a digital system is affected by time-base jitter in the following manner:

$$SNR = 20\,Log_{10}\left[\left(\Delta t \cdot 2 \cdot \pi \cdot F \cdot \sqrt{\left(2F_0/F_s\right)}\right)\right]^{-1}$$

where:

Δt = rms jitter
π = 3.1416
F = Signal frequency
F_0 = Bandwidth of noise measurement (20,000Hz)
F_s = Sampling frequency (352,800 for 8x oversampling)

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Where does clock jitter originate? The primary source is the interface between a CD transport and a digital processor. The S/PDIF (Sony/Philips Digital Interface Format) signal that connects the two has the master clock signal embedded in it (it is more accurate to say the audio data are embedded in the clock).

THE ONLY POINT WHERE JITTER MATTERS IS AT THE DAC'S WORD-CLOCK INPUT.

The digital processor recovers this clock signal at the input receiver chip (usually the Yamaha YM3623B, Philips SAA7274, or the new Crystal CS8412). The typical method of separating the clock from the data and creating a new clock with a phase-locked loop (PLL) produces *lots* of jitter. In a standard implementation, the Yamaha chip produces a clock with 3–5 nanoseconds of jitter, about 30 to 50 times the 100ps requirement for accurate 16-bit conversion (the new Crystal CS8412 input receiver in its "C" incarnation reportedly has 150ps of clock jitter). Even if the clock is recovered with low jitter, just about everything inside a digital processor introduces clock jitter: noise from digital circuitry, processing by integrated circuits —even the inductance and capacitance of a printed circuit board trace will lead to jitter.

It's important to note that the only point where jitter matters is at the DAC's word-clock input. A clock that is recovered perfectly and degraded before it gets to the DAC is no better than a high-jitter recovery circuit that is protected from additional jitter on its way to the DAC. Conversely, a highly jittered clock can be cleaned up just before the DAC with no penalty.[3]

LOGIC INDUCED MODULATION (LIM)

There are two other significant sources of jitter in D/A converters. The first mechanism was recently discovered by Ed Meitner of Museatex and Robert Gendron, formerly a DAC designer at Analog Devices and now at Museatex. This jitter-inducing phenomenon, called Logic Induced Modulation (LIM), was discovered only after Meitner and Gendron invented a measurement system that revealed its existence. This measurement tool, called the LIM Detector, reveals not only how much clock jitter is present in a digital processor, but also displays its spectral distribution when connected to a spectrum analyzer or FFT machine. The jitter's *spectral content*—and whether or not it is random or composed of discrete frequencies—is much more important sonically than the overall *amount* of jitter. Two digital processors could each claim, say, 350ps of jitter, but the processor whose word clock was jittered at a specific frequency would likely suffer from a greater amount of sonic degradation than the other processor which had the same RMS level of random jitter. More on this later.

THE JITTER'S SPECTRAL CONTENT IS MUCH MORE IMPORTANT SONICALLY THAN THE OVERALL AMOUNT OF JITTER.

It's worth looking at Logic Induced Modulation in detail; the phenomenon is fascinating:

LIM is a mechanism by which the digital code representing an audio signal modulates (jitters) the clock signal. If a digital processor is driven by the code representing a 1kHz sinewave, the clock will be jittered at a frequency of 1kHz. Put in 10kHz, and jitter with a frequency of 10kHz will appear on the clock. Remember, jitter with a specific frequency is much more sonically pernicious than random-frequency jitter.

Here's how LIM is generated. In an integrated circuit (IC), there are many thousands of transistors running off the same +5V (usually) power-supply rail. When an IC is processing the code representing a 1kHz sinewave, for example, those thousands of transistors are turning on and off in a pattern repeating 1000 times per second. The current demands of all those transistors turning on together modulates the power-supply rail *at the frequency of the audio signal.* Just as the lights in

3 It should be pointed out that jitter affects the clock in an A/D converter just as much as in a D/A converter. Once a signal has been digitized by an A/D converter, however, there is no way of knowing if the sample values the converter has created have been skewed by clock inaccuracies. It is thus possible to have a perfectly jitter-free D/A converter, yet still have compromised sound because of jitter in the A/D converter.

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–Guy Lemcoe, *Stereophile*, November 1992 (Vol. 15, No. 11)

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a house dim momentarily when the refrigerator motor turns on, the +5V power-supply rail droops under sudden current demand from the chip's transistors. The analog audio signal thus appears on the IC's power-supply rail.

IT IS POSSIBLE TO AC-COUPLE A HIGH-GAIN AMPLIFIER TO THE DIGITAL POWER-SUPPLY RAIL AND HEAR THE MUSIC THE PROCESSOR IS DECODING.

Now, the transition between a logic "0" and a logic "1" occurs at the leading edge of a squarewave. The precise point along the leading edge at which the circuit decides that a "1" is present is determined by the power-supply voltage reference. If that voltage fluctuates, the precise *time* along the leading edge at which the circuit recognizes a "1" will also fluctuate—in perfect synchronization with the power-supply voltage modulation. This uncertainty in the timing of the logic transitions induces jitter on the clock—*at the same frequency as the audio signal the IC is processing.* Put in the code representing 1kHz and the IC's power supply will be modulated at 1kHz, which in turn causes jitter on the clock at 1kHz. According to Meitner, it is possible to AC-couple a high-gain amplifier to the *digital* power-supply rail *and hear the music* the processor is decoding.

This astonishing phenomenon was discovered quite by accident after Meitner and Gendron designed the device to display the jitter's spectral distribution. When they put in a 1kHz digital signal, the jitter had a frequency of 1kHz with its associated harmonics.[4] [5]

There is another mechanism by which clock jitter correlated with the audio signal is created. This phenomenon, described by Chris Dunn and Dr. Malcolm Hawksford in their paper presented at the most recent Audio Engineering Society convention (and alluded to in the Meitner/Gendron paper), occurs in the AES/EBU or S/PDIF interface between a transport and a digital processor. Specifically, they showed that when the interface is band-limited, clock jitter with the same frequency as the audio signal being transmitted is produced in the recovered clock at the digital processor. Although this phenomenon produces the same type of signal-correlated jitter as LIM, it is a completely different mechanism. A more complete discussion of Dunn's and Hawksford's significant paper can be found in my AES convention report in next month's "Industry Update."[6]

MEASURING CLOCK JITTER

Museatex has made the LIM Detector available to anyone who wants to buy one. *Stereophile* jumped at the chance (see sidebar).

First, you have to open the processor's chassis and find the DAC's word-clock pin with a conventional oscilloscope and probe. The probe hooked up to the word-clock signal is then connected to the input of the LIMD and the LIMD is tuned to that word clock using preset frequency settings. To look at the spectrum of any processor's word clock (up to 20kHz), we fed the LIMD's analog output to our Audio Precision System One Dual Domain to create FFT-derived spectral analysis plots. A one-third-octave analyzer can also be used, though this gives less frequency resolution, of course. If the output of the LIMD is connected to an RMS-reading voltmeter, the overall jitter level can be read as an AC voltage. Knowing how many millivolts are equivalent to how many picoseconds of jitter—the LIMD output voltage also depends on the sampling frequency—allows the jitter to be easily calculated.

The measurements of digital-processor clock jitter included in this article thus include the processor's overall jitter level expressed in picoseconds and a plot of the jitter's spectral distribution. The latter is scaled according to the RMS level—0dB is equivalent to 226.7ns of jitter—so that spectra for different processors can be readily compared.

4 Meitner and Gendron presented a paper at the 91st AES convention called "Time Distortions Within Digital Audio Equipment Due to Integrated Circuit Logic Induced Modulation." See footnote #2 for ordering information.

5 To say this is astonishing is an understatement. When Bob and I first looked at the spectrum of the word-clock jitter in a particularly poor-sounding D/A processor when it was fed the digital code representing a 1kHz sinewave and found a strong 1kHz component, we were flabbergasted. Our flabber was even more gasted when we changed the frequency represented by the code and found the jitter component to change accordingly. —JA

6 This is the same paper referenced in footnote #1.

Before getting to the measurement results, a quick description of how the LIMD works is useful. Like all brilliant inventions, the technique is simple and obvious—*after* you've been told how it works.

A jittered clock can be considered as a constant carrier signal which has been frequency-modulated (FM). The jitter components can therefore be separated from the clock by an FM demodulator—just like those found in all FM tuners. In the LIMD, once it has been correctly tuned to the word-clock frequency, an FM demodulator removes the clock signal, leaving only the audio-band jitter components—which can be measured as a voltage or output for spectral analysis.

I have no doubt that many manufacturers of the digital processors tested for this article will question the test methodology and results. Some claim extraordinarily low jitter in their products—claims that were not confirmed by my measurements. This disparity can arise because there is no standard method of measuring jitter. When I'm told by a manufacturer that his product has "less than 70ps of jitter," my first question is, "How do you measure 70ps?" The response is often less than adequate: "We calculate it mathematically" is a common reply. Moreover, some jitter measurements attempt to measure jitter indirectly—as a function of the rise in the noise floor, for example—rather than looking directly at the word clock.

At any rate, if the absolute levels presented in this article are in error, the relative differences between processors will still be correct. If anyone can demonstrate a better method of measuring jitter, I'm all ears.

Politics

When JA and I first learned that the Meitner/Museatex LIM Detector was available for purchase, we were tremendously excited by the possibility of using it to measure jitter in digital audio processors and report the results in *Stereophile*. We were, however, aware of the political implications of buying a test-measurement system from a manufacturer who makes digital processors and competes with other manufacturers of digital processors. It is possible for a manufacturer to devise a test of questionable worth on which his product performs well but makes other products look poor? Even if the test system were technically valid, is it fair to measure products using an instrument developed by a manufacturer of one of the products tested?

Although some manufacturers may cry foul, we decided that: 1) the LIMD has a firm technical foundation, 2) it was too important a tool to allow political considerations to prevent our using it, and 3) it is available for a *very* reasonable price to anyone who wishes to purchase it.

The first point, that the LIMD was technically valid, was supported by the fact that Meitner and Gendron presented a paper at a recent AES convention on LIM and the LIMD. Their principles were thus subject to scientific scrutiny and peer review. In addition, the Dunn/Hawksford paper referenced in the article further suggested that spectral analysis of the recovered clock jitter was a useful method of assessing jitter in D/A converters.

Second, buying the LIMD allowed *Stereophile* to better serve our readers by significantly increasing our ability to assess the technical performance of the products we review. Moreover, the LIMD provides the means to continue exploring the possible relationship between measurement and listening. If the sound is different, then signals are different—we just need to know what signals to measure. The LIMD is a powerful ally in the quest to measure the differences we hear; witness the difference in measured jitter between coaxial and Toslink interfaces, for example.

Finally, the LIMD can be bought by anyone—including competing manufacturers—for a fraction of the price of other, less useful jitter-measurement instruments. At the price Museatex is charging ($2000), their motivation is clearly to improve the overall state of digital audio, not exploit their invention for financial gain. If this article prompts other designers to use the LIMD and reduce jitter in their products, the result should be better-sounding D/A converters for everyone.

—Robert Harley

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Results

The test procedure was as follows: an FFT-derived spectral analysis was performed on the processor's clock jitter (the LIMD output) when the processor was driven by the digital code representing a 1kHz sinewave at six input levels ranging from 0dBFS to -90dBFS. The FFT plots show energy *vs* frequency. The spectral analysis was repeated with the processor under test driven by digital silence (all data words are zero), a 1kHz squarewave, and a 10kHz sinewave at 0dBFS (full scale). The LIMD output was then connected to a true-RMS voltmeter and the jitter voltage measured with all the signals described above. The processors were all driven from the same transport (a JVC XLZ-1010) via the same digital interconnect.[7] Because it would be impossible to publish nine plots for each product, I've selected the most interesting from each, usually the worst performance. If two graphs are printed, they are the usually the best and worst from the processor.

Before looking at the tested processors' jitter, let's acquaint ourselves with what to look for in these plots and see how the jitter is correlated with the audio signal.

Fig.7 is the Forté F 50 DAC's jitter spectrum when driven by the code representing a full-scale, 1kHz sinewave. Though the level is extremely low—20ps—note the spike at 1kHz and multiples of 1kHz—2kHz, 3kHz, 5kHz, 7kHz, 11kHz—indicating that the DAC's word clock is being jittered at 1kHz—the same frequency as the test signal. Now look what happens when we drive the same processor with the code representing full-scale sinewaves of 4kHz (fig.8) and 10kHz (fig.9). These plots clearly demonstrate that the jitter is correlated with the analog signal represented by the digital code—the music. Moreover, the jitter present at the DAC's word clock is also influenced by the input signal level. Fig.10 shows the Forté F 50 DAC's spectrum when driven by the code representing a 1kHz, -70dBFS signal. Note how the jitter's spectral distribution varies

7 The Audio Precision System One's digital signal generator had so much jitter that it significantly skewed the results, necessitating using a CD transport and test disc.

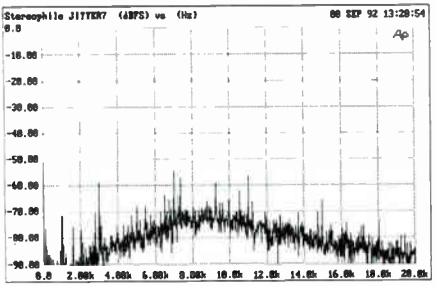


Fig.7 Jitter spectrum, Forté F 50 DAC processing 1kHz sinewave at 0dBFS (linear frequency scale, 0dB = 226.8ns, 1% of the 44.1kHz word spacing of 22.7μs). Note strong components at 1kHz—the signal represented by the data!—and its harmonics.

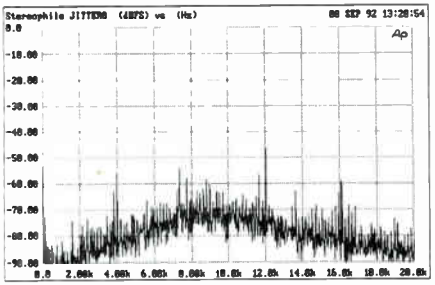


Fig.8 Jitter spectrum, Forté F 50 DAC processing 4kHz sinewave at 0dBFS (linear frequency scale, 0dB = 226.8ns). Note strong components at 4kHz, 12kHz, and 16kHz.

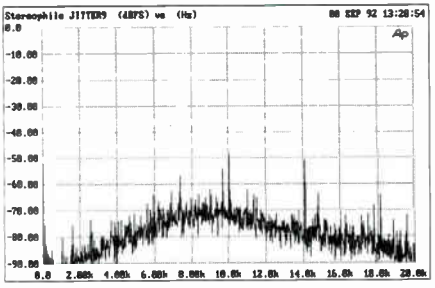


Fig.9 Jitter spectrum, Forté F 50 DAC processing 10kHz sinewave at 0dBFS (linear frequency scale, 0dB = 226.8ns). Note strong component at 10kHz.

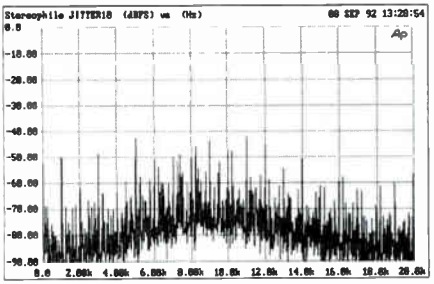
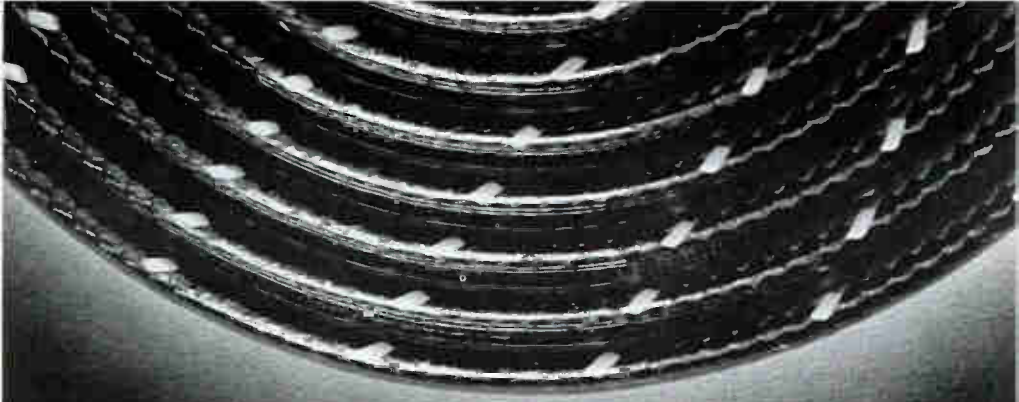


Fig.10 Jitter spectrum, Forté F 50 DAC processing 1kHz sinewave at -70dBFS (linear frequency scale, 0dB = 226.8ns).



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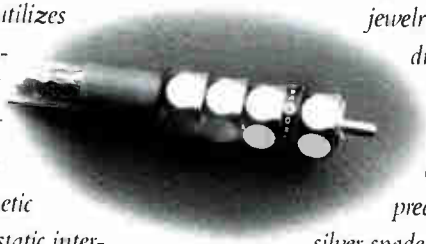

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Table 1

Product	Jitter in ps—Best Case	Jitter in ps—Worst Case	# of Spikes > 10dB Above Average Level—Best Case	# of Spikes > 10dB Above Average Level—Worst Case	Amplitude in dB of Three Highest Spikes—Best Case	Amplitude in dB of Three Highest Spikes—Worst Case	Input Receiver
Bitwise Musik System Zero	1,971	2,819	3	23	21	23	Yamaha YM3623B
CAL Sigma	425	440	9	17	23	27	Crystal CS8412 ("C")
EAD DSP-7000*	168	210	8	26	16	21	Crystal CS8412 ("C")
Forté F 50 DAC	20.1	25.3	10	40	14	28	Philips SAA7274
JVC XLZ-1010	51	713	1	43	14	37	None
Mark Levinson No. 30	218	384	7	43	16	32	Custom
Meitner IDAT	78	82	0	0	4	5	Custom
PS Audio Ultralink	139	177	11	41	18	28	Yamaha YM3623B
Sumo Theorem	1,248	25,920	6	51	21	27	Yamaha YM3623B
Theta Generation III	172	378	1	3	9	17	Crystal CS8412 ("C")
Vimak DS-2000	34.8	34.9	10	22	19	20	Crystal CS8412 ("B")
VTL Reference	540	992	1	24	12	20	Yamaha YM3623B

*In 8x-oversampling mode

IT ISN'T JUST THE JITTER LEVEL THAT MATTERS, BUT HOW MUCH OF THE JITTER ENERGY IS CONCENTRATED AT SPECIFIC FREQUENCIES.

as a function of input level.

To best assess the various aspects of each processor's jitter performance, I've organized the data gathered (over 130 FFTs and a similar number of voltage measurements) into Table 1. The following information is presented:

- Jitter level in picoseconds, best case;
- Jitter level in picoseconds, worst case;
- Number of spectral spikes that rise 10dB or more above the overall level, best case;
- Number of spectral spikes that rise 10dB or more above the overall level, worst case;
- Average level of three highest spikes, best case; and
- Average level of three highest spikes, worst case.

The "best" and "worst" cases refer to each processor's best and worst performance, which varied with the input signal level. In each of these measurements, the lower the numbers the better the performance. (Keep in mind that 1000ps equals one nanosecond.)

The average level of the three highest spikes is an expression of the peak-to-average ratio—how high the spikes rise above the average level, expressed in dB. Remember, the spikes indicate that the jitter has a specific frequency, a condition more sonically degrading than jitter with a random frequency distribution. It isn't just the jitter *level* that matters, but how much of the jitter energy is concentrated at *specific frequencies*. Note that the spikes contribute very little to the RMS level. It should also be recognized that processors with very high levels of clock jitter but no spikes on the FFT may still suffer from periodic jitter; the spikes could be buried beneath the very high average level.

It was fascinating to look at the clock jitter present in digital processors with whose sound I was intimately familiar. As I saw patterns emerging between the processors' musical characteristics and their jitter performance, I began to predict the jitter level and spectrum just before attaching the probe to the DAC's word clock. So strong was the correlation between certain aspects of the processors' sonic presentation and jitter characteristics that my predictions often came close to their measured performances.

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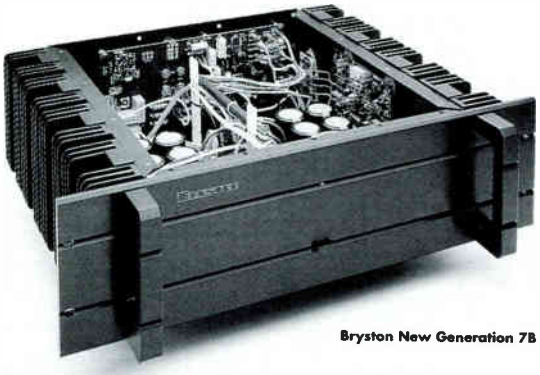

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Generally, processors with none or only a few discrete frequency spikes—like the CAL Sigma shown in fig.11—are missing low-level detail, but don't sound metallic and hard in the treble. They can also sound smooth but somewhat uninvolving. Processors with a large number of discrete jitter components—the Forté F 50 DAC seen in fig.10—tend to sound forward and etched, and present brittle textures. Those rare processors with low jitter levels *and* absences of periodic jitter tend to sound the best. These are overly broad generalizations—there are *many* more factors that influence sound quality than jitter—but an overall trend was nevertheless suggested by the measurements and auditioning.

The California Audio Labs Sigma, reviewed in October 1992, had a reasonable level of jitter (425ps, fig.11) and was also relatively free of discrete-frequency jitter components, particularly at lower levels. This corresponds to my general model of the correlation between jitter type and sound quality: the Sigma had a smooth treble, soft bass, and a loss of low-level detail. Conversely, the Forté (also reviewed in October 1992), with many discrete-frequency jitter components, tended to be aggressive, analytical, and brittle in the mids and treble.

The Meitner IDAT (to be reviewed next month) had very low jitter (78–82ps) and exhibited a complete absence of LIM and interface-induced discrete-frequency jitter components (fig.12). This is not surprising in light of the fact that the IDAT was designed with the aid of the LIMD, an advantage not previously available to designers of the other processors tested. The IDAT uses a custom input receiver and features two stages of Museatex's C-Lock clock-jitter reduction circuit, one of them just before the DAC. The IDAT was also unique in that the jitter spectrum was virtually identical regardless of input-signal frequency or amplitude. (It should be noted that, at its 8x sampling frequency, this level of jitter is near the LIMD's noise floor.)

The Theta DS Pro Generation III was also very good, with a low overall jitter level (172–378ps) and few discrete components. Like many of the processors tested, the Gen.III was much better behaved at high input levels. Fig.13 is the Gen.III's worst performance, with an input level of –90dBFS.

Although the Mark Levinson No.30 (reviewed in February '92) had low jitter (218–384ps), these figures were higher than expected considering the No.30's custom input receiver and superb sound quality. At full scale, the No.30 had very few spikes, but showed an increasing number of periodic jitter components as the input level decreased. Compare the No.30's spectrum at full scale (fig.14) and at –90dB (fig.15). Because it

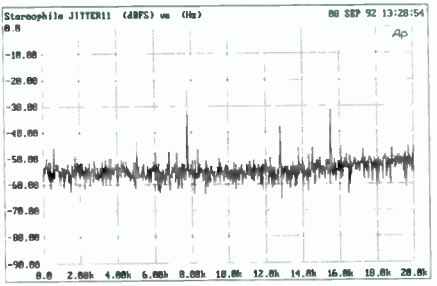

Fig.11 Jitter spectrum, CAL Sigma processing 1kHz sinewave at –20dBFS (linear frequency scale, 0dB = 226.8ns). Jitter mainly random noise, with only a few discrete components.

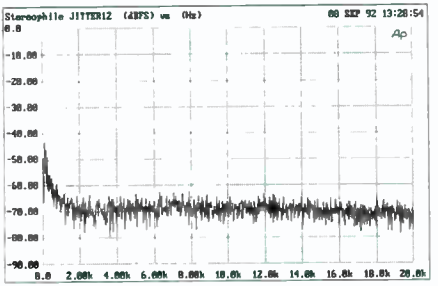

Fig.12 Jitter spectrum, Meitner IDAT processing 1kHz sinewave at –90dBFS (linear frequency scale, 0dB = 226.8ns). Jitter very low in level and almost completely random in character.

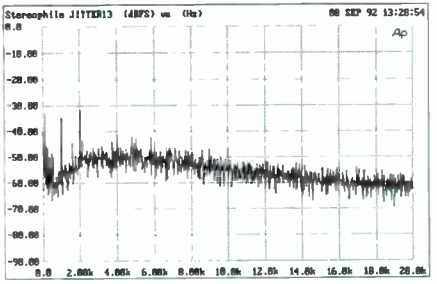

Fig.13 Jitter spectrum, Theta DS Pro Generation III processing 1kHz sinewave at –70dBFS (linear frequency scale, 0dB = 226.8ns). Jitter very low in level, with just two data-related components (these still very low).

wasn't practical to get inside the temperature-controlled towers that house the DACs, I measured the No.30's jitter at the pin of the chip driving the ribbon cable that connects the DAC board to the main board. If the No.30 does have a reclocking circuit next to the DAC (the best place for it), the processor's actual jitter performance could be much better than that presented here. The No.30's clock signal is balanced but it was only possible to measure one half of the signal. This will also make the No.30 look worse.

Despite my negative feelings about its sound quality, the Vimak DS-2000 (reviewed last month) had astonishingly low levels of jitter: just 34.8ps compared with their specified 50ps. However, although the jitter might be thought to be random in nature, there are a number of discrete low-amplitude spectral lines visible below 6kHz (fig.16). These measurements were made right at the DAC's word-clock pin. Interestingly, the word clock was even cleaner when measured where it enters the analog board, indicating that these discrete components are introduced after the input receiver. Compare fig.16 (the word-clock jitter spectrum at the DAC) with fig.17 (the jitter spectrum measured at a test point just after it enters the DAC board). However,

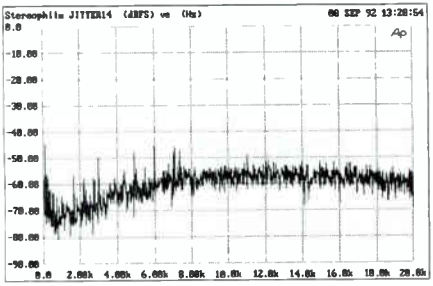

Fig.14 Jitter spectrum, Mark Levinson No.30 processing 1kHz sinewave at 0dBFS (linear frequency scale, 0dB = 226.8ns). Jitter very low in level, with a few discrete components. Note absence of data-related 1kHz component.

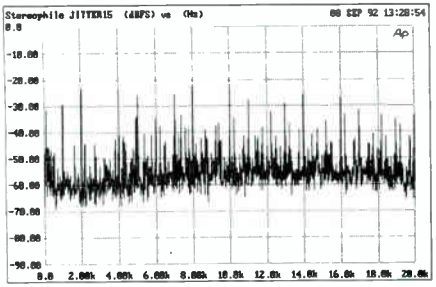

Fig.15 Jitter spectrum, Mark Levinson No.30 processing 1kHz sinewave at –90dBFS (linear frequency scale, 0dB = 226.8ns). Many more data-related components in jitter compared with fig.14, but overall level still quite low.

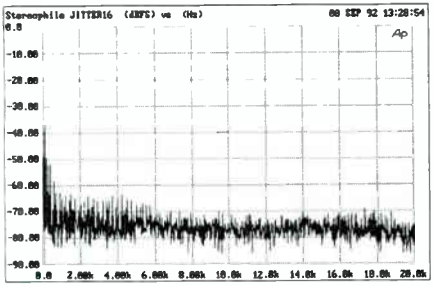

Fig.16 Jitter spectrum, Vimak DS-2000 processing 1kHz sinewave at 0dBFS measured at DAC (linear frequency scale, 0dB = 226.8ns).

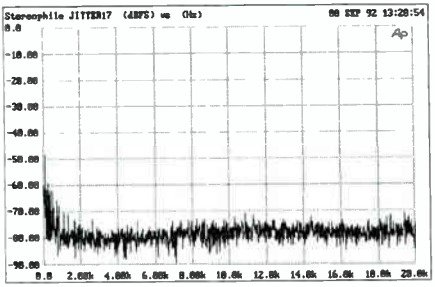

Fig.17 Jitter spectrum, Vimak DS-2000 processing 1kHz sinewave at 0dBFS measured at word-clock test point (linear frequency scale, 0dB = 226.8ns). Even lower jitter level than fig.16, and now more random in nature.

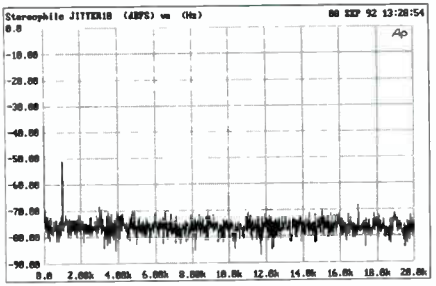

Fig.18 Jitter spectrum, Vimak DS-2000 processing 1kHz sinewave at 0dBFS with "C" version of Crystal CS8412 input receiver (linear frequency scale, 0dB = 226.8ns). Lower level of jitter than fig.16, but now a discrete, data-related 1kHz component apparent.

the DS-2000's jitter level and spectral distribution varied very little with input frequency or input level, remaining very low in all cases. As with all the other Vimak graphs, figs.16 and 17 were made with the DS-2000 driven by 1kHz, 0dBFS data.

Out of curiosity, I replaced the DS-2000's standard Crystal CS8412 "B"-version input receiver with the chip's newer, lower-jitter "C" version, borrowed from an EAD DSP-7000. The jitter was reduced at the DAC to 31ps, down from 34.8ns with the "B" version. The DS-2000's jitter spectrum is shown with the stock "B" chip (fig.16) and with the "C"-version input receiver (fig.18). Note the replacement of the many discrete lines in fig.16 with a 1kHz spike in fig.18.

Switching the "B" and "C" chips in the EAD DSP-7000 had a much more profound effect—suggesting that EAD's circuitry is better designed to resist jitter-inducing phenomena *after* the input receiver. Note that the DSP-7000 features the better "C" chip as standard. With the "C" chip, the DSP-7000's jitter was extremely low (168–210ps). With the "B" version, the jitter increased nearly fivefold, to 896ps. Note that in the Vimak DS-2000 the jitter decreased by about 10% with the better input receiver, but decreased by five times in the DSP-7000 with the "C" chip.

The DSP-7000's plot (with the "C" chip) is shown in fig.19 (worst case at –70dBFS). Overall, the DSP-7000 had very good jitter performance. Note that these measurements were taken with the DSP-7000's internal switch set to 8x-oversampling. The jitter halved at 4x, as would be expected. Here's why: if the jitter amount stays the same and the clock frequency is doubled, the jitter becomes a higher proportion (double) of the signal. This is perhaps one reason why the DSP-7000 sounds better in 4x-mode.

The PS Audio UltraLink (reviewed in June 1992) had very low jitter of 139–177ps, this surprising in light of the fact that it uses the most jitter-prone receiver chip, the Yamaha YM3623B. Although the jitter spectrum was smooth when driven at full scale, there was a significant increase in both the number and amplitude of discrete-frequency jitter components as the input signal dropped (worst case was –70dBFS, shown in fig.20). Nevertheless, its jitter performance was excellent and among the best measured.

Because a CD player has no S/PDIF interface between the transport and processor, one would expect it to have low jitter at the DAC. This was indeed the case with the JVC XL-Z1010TN CD player. It had an astonishingly low 51ps of jitter and a very clean spectrum when driven by a full-scale signal. However, the player showed a significant rise in jitter level and an increasing number and amplitude of spikes as the input level was reduced. The 51ps figure increased to 713ps at –90dBFS. These plots are shown in fig.21 (at 0dBFS) and fig.22 (at –90dBFS).

I was eager to measure the XL-Z1010TN (reviewed in April 1990)—it uses a jitter-reduction circuit called the "K2 Interface" (described in my "Industry Update" in Vol.12 No.9). By comparing the jitter measurements before and after the K2 Interface, I could assess the K2's efficacy. Unfortunately, the word clock going into the first stage of K2 is 44.1kHz, a frequency that cannot be ana-

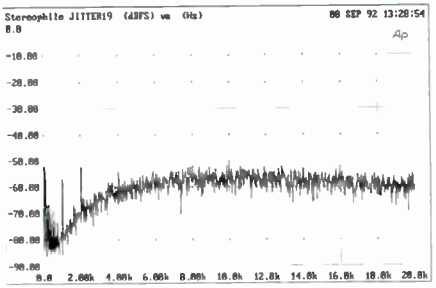

Fig.19 Jitter spectrum, EAD DSP-7000 processing 1kHz sinewave at –90dBFS (linear frequency scale, 0dB = 226.8ns). Very low jitter level, better below 4kHz than above. Data-related components present at 1kHz and 2kHz, but still low.

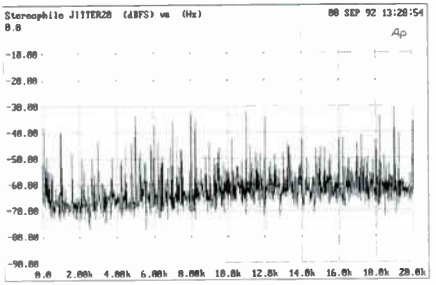

Fig.20 Jitter spectrum, PS Audio UltraLink processing 1kHz sinewave at –70dBFS (linear frequency scale, 0dB = 226.8ns). Many discrete components, but overall jitter level quite low.

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lyzed with the LIMD (it is designed for the more common oversampling systems). An analysis of the XL-Z1010TN CD player was instructive, however, in that it showed the effects of LIM alone, rather than LIM combined with the interface-induced, signal-dependent phenomenon described in the Dunn and Hawksford paper referenced in footnote 2.

The VTL Reference processor (reviewed in December 1990), which uses a similar receiver topology and the same Yamaha chip as the UltraLink, had a higher overall jitter level (540–992ps) than the UltraLink, but fewer discrete-frequency components. Also similar to the UltraLink, the VTL had better performance at high input levels (fig.23, 0dBFS), with the worst performance at –70dBFS (fig.24). Incidentally, the PS Audio UltraLink had a nearly identical spectrum at 0dBFS to the VTL at the same amplitude. Fig.23 is thus representative of the UltraLink with a full-scale input signal.

With 51 jitter components rising 10dB or more above the overall level, the Sumo Theorem (reviewed in October 1992) had the highest number of periodic components of the units tested. Moreover, these components were high in level, particularly when driven by low levels: –70dBFS in particular (fig.25). This was surprising in light of the Theorem's excellent performance in the listening room. At high input levels, however, the Theorem's jitter spectrum looked substantially better (fig.26). The Theorem's jitter level varied enormously with input level; at full scale I measured 1248ps of jitter, and at –70dB (worst case) I measured 20 times that value (25,920ps). Despite my enthusiasm for the Theorem (I called it the best converter under $1000 in my review), I did criticize its tendency toward a slightly analytical and dry

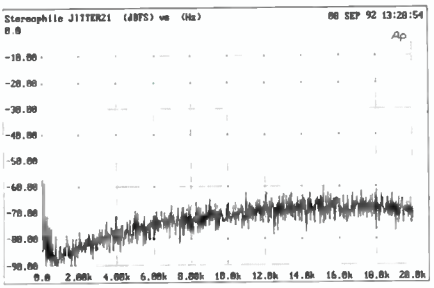

Fig.21 Jitter spectrum, JVC XL-Z1010TN CD player processing 1kHz sinewave at 0dBFS (linear frequency scale, 0dB = 226.8ns). Astonishingly low jitter following word-clock processing by proprietary "K2 Interface."

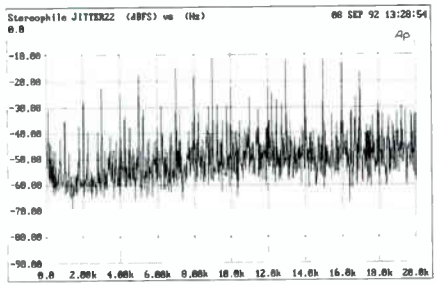

Fig.22 Jitter spectrum, XL-Z1010TN processing 1kHz sinewave at –90dBFS (linear frequency scale, 0dB = 226.8ns). Much higher level of jitter compared with fig.21, and strong components at 1kHz and its harmonics, this despite "K2 Interface" processing.

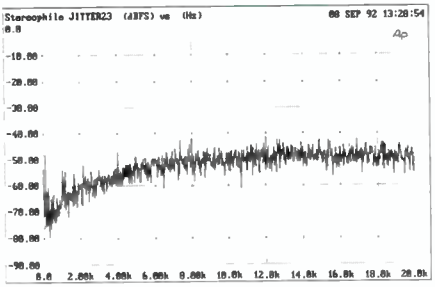

Fig.23 Jitter spectrum, VTL Reference processing 1kHz sinewave at 0dBFS (linear frequency scale, 0dB = 226.8ns). Low level of jitter, mainly random in nature. Jitter spectrum of PS Audio UltraLink processing 1kHz sinewave at 0dBFS identical.

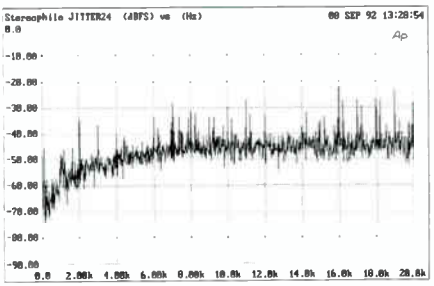

Fig.24 Jitter spectrum, VTL Reference processing 1kHz sinewave at –70dBFS (linear frequency scale, 0dB = 226.8ns). Low-level data brings up level of jitter, but still basically random in nature.

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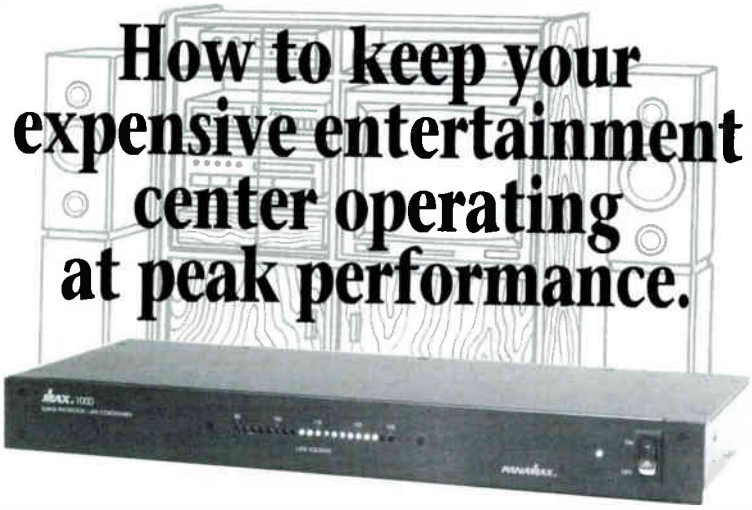

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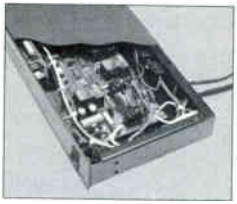

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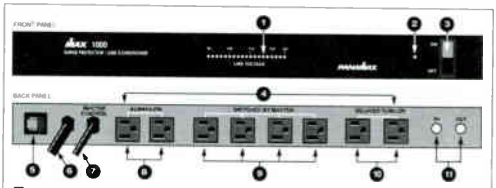

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treble, particularly in relation to the smoother but less detailed CAL Sigma—which had fewer discrete-frequency jitter components and a lower RMS jitter level. (Sumo has reportedly reduced the Theorem's jitter.)

The last processor measured was the Musik System Zero (reviewed in September 1992). At full scale the Zero had a smooth spectrum, with very few spikes and an overall jitter level of between 2.0 and 2.8ns. It maintained this performance until –50dBFS (worst case), where the number and amplitude of the periodic jitter components increased dramatically. The Zero's jitter spectrum is shown when driven by a full-scale signal (fig.27) and at –50dB (fig.28).

Once I got going with the LIMD, I found all sorts of things to measure. First, I wanted to see if there was a measurable difference in the clock jitter at the DAC when a processor was driven via a coaxial cable or Toslink optical interconnect. Critical listeners agree that the Toslink sounds substantially inferior to coaxial—an assertion that brings scorn from the "bits is bits" mentality. Fig.29 is the Musik System Zero's jitter spectrum when driven by data representing a full-scale, 1kHz squarewave (a test signal that exacerbates the number and level of discrete-frequency jitter components) via a coaxial interconnect. Fig.30 shows the jitter spectrum under the same measurement conditions, but when the processor was driven through the lower-bandwidth (6MHz) Toslink optical interconnect. Note the significant reduction in both the number and amplitude of periodic jitter components in fig.29. This is the first "objective" evidence I've seen that digital audio interfaces sound different.[8]

Finally, I measured the effect of the Audio Alchemy Digital Transmission Interface

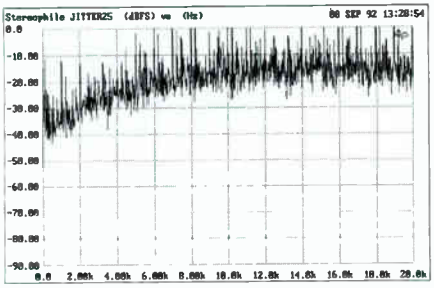

Fig.25 Jitter spectrum, Sumo Theorem processing 1kHz sinewave at –70dBFS (linear frequency scale, 0dB = 226.8ns). High level of jitter with many discrete components.

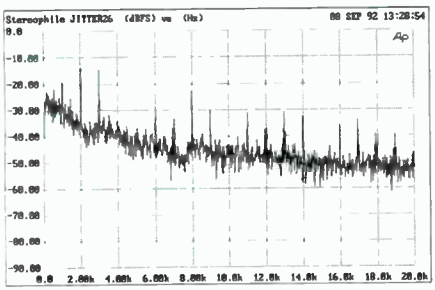

Fig.26 Jitter spectrum, Sumo Theorem processing 1kHz sinewave at 0dBFS (linear frequency scale, 0dB = 226.8ns). Increasing data level to 0dBFS drastically reduces the level of jitter.

8 I recently encountered a past president of the Audio Engineering Society to whom I send *Stereophile*. When I asked him if he'd been reading the magazine, a bemused look came over his face. The source of his amusement, he told me, was reports in *Stereophile* about differences in sound between digital interfaces and interconnects, an idea he considered the height of subjectivist absurdity. When asked if he had ever *listened* for himself to different digital interfaces, he admitted he hadn't, and had no plans to.

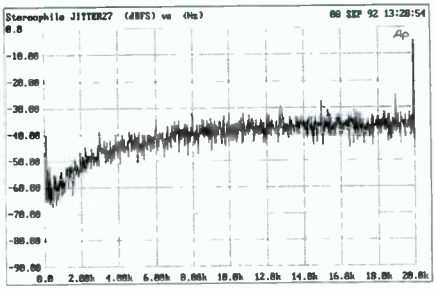

Fig.27 Jitter spectrum, Bitwise System Zero processing 1kHz sinewave at 0dBFS (linear frequency scale, 0dB = 226.8ns). Medium level of mainly random jitter (but note components at approximately 19kHz and 20kHz).

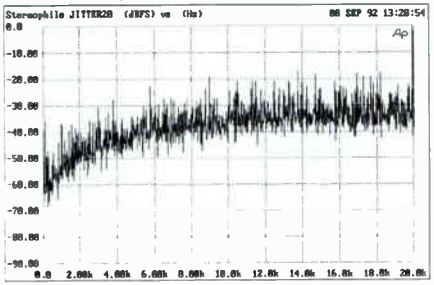

Fig.28 Jitter spectrum, Bitwise System Zero processing 1kHz sinewave at –50dBFS (linear frequency scale, 0dB = 226.8ns). Reducing the data level brings up the overall level of jitter.

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(DTI) on clock jitter. The DTI is an inexpensive $349 reclocking device inserted between a CD transport and a digital processor that reportedly reduces jitter in the data stream. Using the Sumo Theorem driven by a full-scale, 1kHz squarewave, I compared the jitter spectrum without (fig.31) and with (fig.32) the DTI. As claimed, the DTI does indeed reduce jitter in the data stream, evinced by the reduction in periodic jitter component amplitude of an astounding 25dB. In addition, the number of jitter components rising higher than 20dB above the overall level was reduced from 11 components without the DTI to just three components with the DTI. In short, the Audio Alchemy Digital Transmission Interface produces a measurable reduction in a digital processor's clock jitter where it counts—at the DAC. A full review of the DTI will appear shortly.

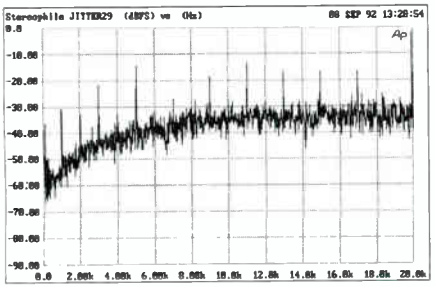

Fig.29 Jitter spectrum, Bitwise System Zero processing 1kHz squarewave at 0dBFS via coaxial data link (linear frequency scale, 0dB = 226.8ns). Note presence of data-related components at squarewave odd-harmonic frequencies.

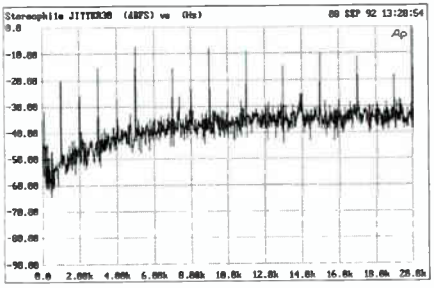

Fig.30 Jitter spectrum, Bitwise System Zero processing 1kHz squarewave at 0dBFS via Toslink optical interconnect (linear frequency scale, 0dB = 226.8ns). Note significant increase in level of data-related odd-harmonic jitter components with the lower-bandwidth data connection.

The Meitner LIM Detector opens many additional measurement possibilities that were beyond the scope of this article. For example, it is now possible to explore how sensitive a particular digital processor is to transport quality, measure the jitter between different combinations of transports and processors with different interconnects, assess jitter-reduction devices (the Audio Alchemy DTI, for example), and measure the effects —if any—of such CD tweaks as rings, green paint, the Laser Illusions Spatial Filter, and other products. I'll have a report in the second installment of our jitter explorations.

Summing up

Minute timing variations in a digital audio system produce an analog-like variability in the final analog signal's fidelity. The belief that if the ones and zeros are the same, the sound must be the same, is thus exposed as, at best, naïve.

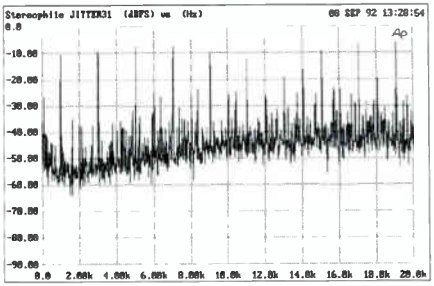

Fig.31 Jitter spectrum, Sumo Theorem processing 1kHz squarewave at 0dBFS (linear frequency scale, 0dB = 226.8ns). Note presence of data-related components at squarewave odd-harmonic frequencies.

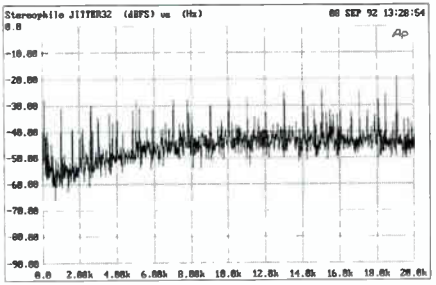

Fig.32 Jitter spectrum, Sumo Theorem processing 1kHz squarewave at 0dBFS via Audio Alchemy DTI (linear frequency scale, 0dB = 226.8ns). Note significant decrease in level of data-related odd-harmonic jitter components.

Meitner LIM/Jitter detector/demodulator. The input is connected to the word-clock signal of the device under test; the output consists of an FM-demodulated audio-band signal representing, and proportional in level to the amount of, the time jitter in the word clock.

Moreover, there seems to be a broad correlation between a digital processor's measured jitter performance and certain aspects of its musical presentation. This measurement technique is a powerful tool for exploring the reasons *why* things like interconnects between transport and processor sound different. Because we can measure differences in a well-established source of sonic degradation—clock jitter at the DAC—with different digital interface types (coax *vs* Toslink, for example), we are well on the way toward scientific justification of the subjective differences we hear. **S**

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With these amps being within $500 of one another, I initially had to assume that the Solid One was the eventual replacement amplifier for the SA-100. After all, the SA-100 was merely an update of the venerable SA-12 of many moons ago. And, well, you know how long things stay the same in this industry, once a product truly starts to penetrate the market it's time to get rid of it because newer and improved is always perceived as better than tried and true. Fortunately, that's not the way Counterpoint tends to do business, and I was way wrong regarding the demise of the SA-100. These two amplifiers have a purpose for being, even in the same line of audio products, as I will explain.

THE SOLID ONE.

The times they are a changn' at Counterpoint. The times they are a' full of transistors. Say hello to the Solid One amplifier, it's new and there is not a vacuum tube in sight; no glowing glass, no orange radiance, and no bias pots to trim. It runs hot though, at least in the high bias mode (bias is adjustable), as hot running amplifiers have become sort of a tradition at Counterpoint. For years, I've felt that an amp was not running up to its potential if you could peaceably rest your hand on the heatsinks during operation and not hear the hissing noise of burning flesh. Especially with MOSFET output devices, which seem incapable of burning off the mist without a very high output bias. Well, the Solid One does not use MOSFET output devices, but, it runs real hot and it sounds real good.

The interior of the One is laid out beautifully. Down the center of the chassis, from front to rear, the transformer and power supply filter caps are shielded on all sides by a steel turret- At first I thought this a way to hide a wimpy power supply (Suspicious, aren't I?). I couldn't have been more wrong, as the One turned out to be one of the hardest 'runners' I've seen in a long time. On either side of the steel "Tunnel of transformer" are the transistorized circuit boards that handle predriver duties and the four bipolar output devices per channel referred to above. As I said, these bipolars run hot, hot to the point that Counterpoint provides an internal switch to lower the output bias if ventilation is a problem. Problem is, the bias reduction adds an ever so slight veil to the sound. When it comes to making a decision between cooling or accuracy, that's easy; make me sweat and give me those wonderful melodies - I left the bias up! And let me make this perfectly clear, the physical construction of the Solid One is like a rock, and should cook for years without difficulty. This is an extremely well built amplifier....

.**THE SOUND OF A SOLID ONE**. Figure it out for yourself: Low negative feedback, relatively high damping factor, high bias bipolar output section, shielded heavy duty power supply, and straightforward board design utilizing quality parts throughout. There is no reason for this design not to sound good, and it does sound good, and with a wide variety of loudspeakers. Without hesitation, I would use this amp to drive the Chapman T-7's, NEAR-50M's, any Fried speaker, the Taddeo Monitors, Dana's, Nobis, and just about anything else out there. No load that I could throw against it caused it distress. But more than that, it's powerful. Never in my experience has there been a 100 wpc amp with more guts and moxie...

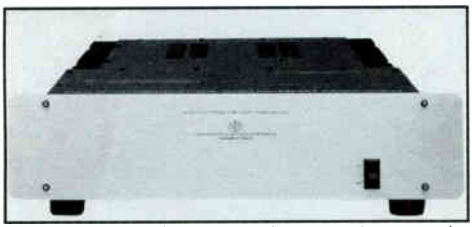
Listen to the way the Solid One snaps left, right and center into place. No indecision here. If an instrument is panned to left-center, that's where it is baby. And there is no fence jumping of center images--mono signals are dead center and as tight as a new pair of shoes; just the way they are supposed to be. Excellent matching of parts and close channel to channel tolerances make for a wonderful sense of balance from left to right. This is an amplifier that is extremely well rounded in its performance and construction. For persons seeking out reliability and a breath of the high end on a budget, the Solid One may turn out to be the universal amp of the 90's.

SO WHY WOULD ANYONE NEED AN SA-100?

Have you heard of synergy? For reasons only partly understood, the combination of certain components will sometimes result in an overall performance that seems to exceed the performance capabilities of each individual product if it were used in combination with something else. I hope that makes sense to you, because the SA-100 is one of the those products that may sound pretty average in some systems and just plain stellar in others.

The SA-100, depending on how it is used, can make you curse or cry happy tears depending on

the system it's used in - particularly the loudspeakers. For you see, any amplifier that avoids the use of even 1 dB of negative feedback in its output stage, and has a damping factor of around 8 is going to be speaker dependent to a large degree, especially in the bass. It all has to do with output impedances, woofer Q, and things like that. With its all tube predriver section, no negative feedback and super high bias MOSFET output section, the SA-100 has more in common with a high output tube amplifier than it does a transistor amp, except you don't have to replace or bias output tubes and the SA-l00 can deliver a fair amount of current into 4 ohm loudspeaker loads. As a matter of fact, this amplifier thrives on 4 ohm loudspeakers of high efficiency to the point that with the right cable and a few tweaks, it may convince you that there is no need for any other amplifier, so pure is its midrange and natural its timbres. With the Focus loudspeaker from Legacy, interconnects from Maughan and Music Metre, Maughan speaker cables (the Apex seem to work well also), and the Musical Designs preamplifier, friends that came over to listen could only sit for so lorig before they had to express sheer delight at hearing recorded music in an almost entirely new way. Some fumbled for check books, some refused to leave until way into the night, and others just wanted to relive all the old recordings in their collections; so powerful is the musicality of this system. Listening for long periods of time can result in an experience that borders on the addictive, drawing one in so completely that it's a jar to the nerves when the music stops - a withdrawal of sorts. **The SA-l00 can make it happen.**



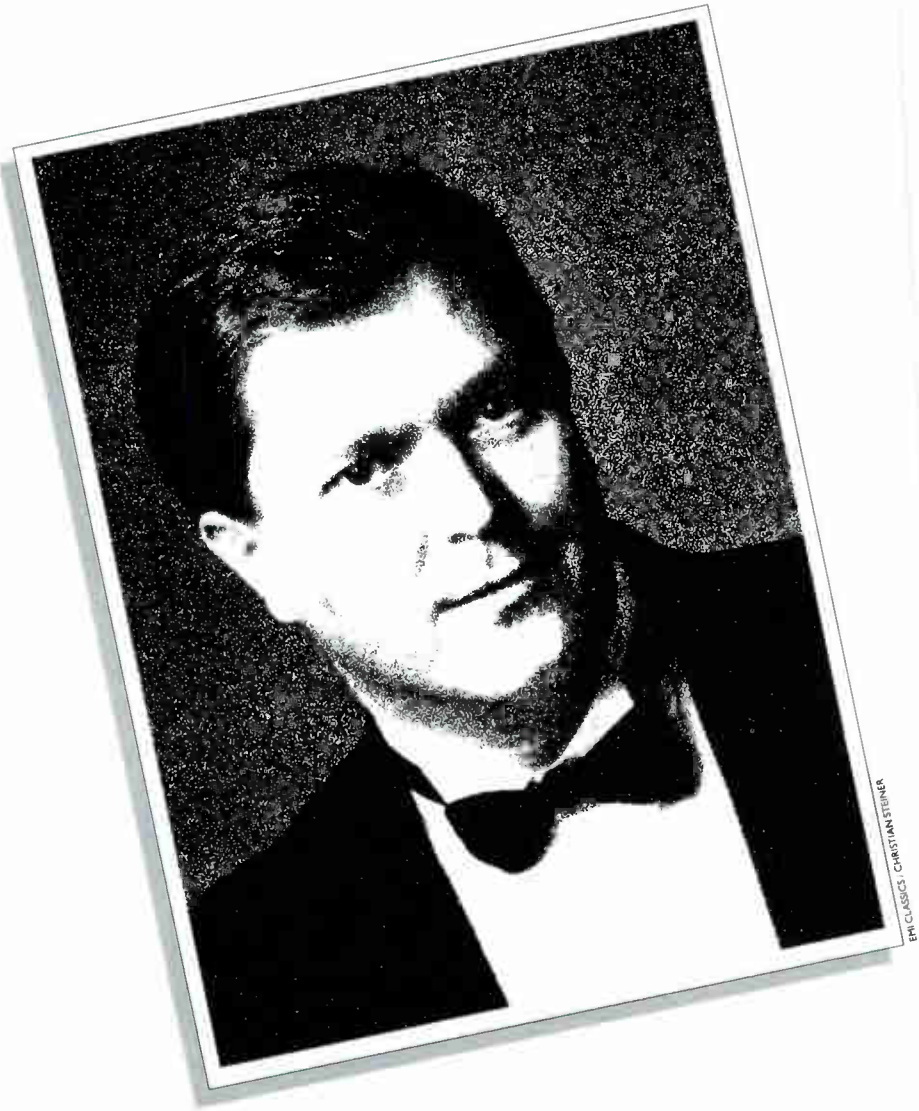
The midrange, that is, from the upper bass to the lower highs, is of the quality that most people dream of, but seldom achieve. At times it seems intensely accurate, stripping away layers of grain while maintaining an amazing focus from front to rear. Of all the amplifiers reviewed in the last four years, none, not one, has been able strip away from the sound the detracting electronic artifacts that we take for granted as being a natural part of the music... that is until now with the SA-l00. At last, dynamic compression and the blurring associated with almost all other amplifiers that you can buy are gone....

I don't recommend this amplifier to everyone. It doesn't work with all loudspeakers. With the inefficient Mirage M-1, the SA-100 sounded slow and over extended at the frequency extremes, and it still has some difficulty coping with the load presented by the Magnepan MG 3a. This is not a universal amp in the way that the Solid One is, the Sonogy Is, and the Parasound HCA-2200 or 1200 are. This amp is for the audiophile that dreams of transporting reality into his or her home on a budget. This amplifier is for the person who is willing to work hard and long at putting together a group of seemingly unrelated components that work as a whole to create a system capable of recreating music. This amp is for the person who is willing to face setbacks and incompatibilities in the hope of someday realizing something close to absolute transparency at a reasonable cost. This amplifier is not for the person who lacks patience or expects everything to work perfectly the moment it is plugged in. The SA-100 will make you sweat.

MUSTS. If you desire to critically audition the Counterpoint SA-100, a few things must be done first. Make sure the amp has been on about an hour before listening... **Power cords:** Because the hole to the IEC connector is too small for all of the custom power cords, all listening was done with the supplied 14-3 cord. It's a fine cord, so don't lose sleep over not having the latest and the greatest connecting the amp to the wall outlet. The "Wonderful" cord now being imported by Parasound worked equally well.

CONCLUSION. If there is an affordable amp capable of being all things to all purists, it is the Solid One. And while it doesn't have the power of the Parasound 1200, or its versatility, I don't recall the 1200 being quite as free of veiling or as spatially correct. The One is aimed more at the high-end headbanger and less at the videophile or surround-sound user who might desire more power and control. **And then there Is the SA-**100, which, In some systems, offers a glimpse of perfection through the midrange, but with a price to pay. A genuine dream machine with the Focus and Maughan speaker wires. but a dud dude on Sireno's Mirage M-I's and AudioQuest Clears, the SA-100 performs at optimum with high efficiency, low Q loudspeakers In the 4-8 ohm range. I applaud Counterpoint for having the gumption and the audacity to produce an amp that dare go for it all, to touch the raw nerve of the performance for under $1400. Yes, it's somewhat tweaky, persnickety and down right choosy of the speakers and preamp you pair it with, but, its also incredibly accurate - and I mean accurate, ie. true to its source - in the midrange, to the point where I am forced to reconsider the precision of some of the amplifiers reviewed earlier in this audioletter.- - MGD

FROM PARSIFAL



EMI CLASSICS; CHRISTIAN STEINER

TO SHOW BOAT

ROBERT DEUTSCH TALKS WITH CONDUCTOR JOHN MCGLINN

With his landmark 1989 recording of Show Boat *(reviewed in Vol.12 No.4), John McGlinn has established the musical theater's equivalent of the "authentic instruments" school: the attempt to re-create what classic and now-forgotten musicals sounded like when first presented, including use of the original orchestrations, singing/playing in the style of the period, restoring cuts, and deleting later additions to the score. McGlinn was in Toronto recently to conduct the Toronto Symphony, Elmer Iseler Singers chamber choir, and his own quintet of soloists (Kim Criswell, Cris Groenendaal, Jeanne Lehman, Keith Bernardo, Lydia Milá) in four concert performances of the music of Cole Porter and Jerome Kern. He also brought with him from New York a cold of gargantuan proportions. Interviewed in his hotel room during the afternoon break between concerts, McGlinn—whenever he wasn't coughing, wheezing, or clearing his throat—proved exceptionally articulate, with wide-ranging knowledge of music and the theater. The first question I asked him was about how he got into doing what he does.*[1]

IT TOOK A LOT OF KICKING AND SCREAMING JUST TO GET ACCESS TO THESE SCORES.

John McGlinn:

It was really a question of satisfying personal curiosity. I was so intrigued. First of all, these scores were so inaccessible five or ten years ago that if you wanted to see what the original orchestration of a Cole Porter show looked like, you couldn't find out—if they had them, they wouldn't show them to you. So it took a lot of kicking and screaming just to get access to the material. (That's not true in all cases; the Cole Porter people have actually been great, and I've had a wonderful relationship with Jerome Kern's daughter, Betty, who has given me access to everything.) I became more and more interested in what these shows sounded like when they were new. Certain people will say, "Oh, golly, he's just a curator of ancient museum pieces . . ."

Robert Deutsch:

Do people say that?

JMcG: Some do. I think those are people who haven't actually been to the concerts or listened to them, because what I found more and more is not that the style is old and dry and academic, but that the original arrangements have this incredible energy to them. They were daring. Some of these arrangements were very full of little orchestral details. People like Hans Spialek took pride in what they were doing. They didn't just slap down some

1 Thanks to my wife, Beverley, for her help in transcribing this interview.

utility arrangement that would serve any purpose. I think the reason these arrangements are so effective, apart from the technical skill of them and the fact they are so crystal-clear and never cover the voices, is that they had to serve a dual purpose. The first was that they had to be an orchestration of a song, then the song had to serve its purpose within the play it was written for, so the arrangements had to be much more mood-specific within the dramatic context of the play. So they're much more specific in terms of emotional effect, in terms of highlighting words and phrases, instead of those garden-variety Las Vegas Nelson Riddle kinds of things that all sound the same.

I'VE ALWAYS WORSHIPPED AT THE ALTAR OF THE COMPOSER, NOT THE ALTAR OF THE PERFORMER.

Now people are going to say, "he's knocking Nelson Riddle again, he's knocking Ella Fitzgerald, he's knocking Frank Sinatra," and I'm not. My point is that I've always felt that whenever most of those people perform a song, the performance is more about the performer than about the song. The song is a horse for them to ride, a skeleton for them to hang their personalities on. But I've always worshipped at the altar of the composer, not the altar of the performer. Now sometimes they coincide, they go hand in hand. Certainly, someone like Fred Astaire was no way short on personality, nor was Ethel Merman. You actually listen to Ethel Merman's old recordings from the '30s, recorded at the time she was doing these songs on stage, and they are vibrant, they are alive. You follow the music. . . she's singing what's on the page.

RD: *She also didn't have all the "Ethel Merman" mannerisms in those days.*

JMcG: That's right. Those things crept in over the years, and to a certain extent, yes, she did become a caricature of herself.

RD: *But she still had the voice.*

JMcG: Yes, she did. But you'll find that those mannerisms were kept very carefully in check, even in a show like *Gypsy*, because she was directed away from them, and in one or two cases, songs were written to exploit them. But, you listen to her recording of "I Get A Kick Out of You," and, just like Kim [Criswell], who is also a belter, she sings it in a real half-soprano. Merman had a really pretty upper-head-voice soprano register when she was in her 20s. It's just that she made so few recordings back in the '30s compared to the recordings most people know her by. Go back and listen to the acoustic Al Jolson recordings. And, yes, there are all the Jolson mannerisms, but he's singing with an enormously full-throated baritone.

RD: *He could fill a theater without amplification, which, of course, they didn't have back then.*

JMcG: Sure. They all could; they all had to. Fred Astaire, who had a tiny little voice, could. And you listen to his acoustic recording with Adèle, you can hear that he's putting more power in his singing than in his Hollywood years when he's right up there by the mike. And the orchestrations were designed to let the voices through.

RD: *Have you ever heard later arrangements that you prefer to the originals?*

JMcG: Never heard one yet. Now sometimes, in the case of movie songs, because of the needs of the film, the song is served within the context of the film, but not for concert music. A really good example is "Long Ago and Far Away." It's a beautiful song, but I haven't done that in concert yet, or recorded it, but I'll get around to it. When I do, I'm going to have to have an arrangement made, because in the film it's never really sung as a set piece. It's a very

light, thrown-away kind of piece. What I'll do is take the bits that exist in *Cover Girl* and give them to Russell Warner and say, "This is what they did in the film; keep to this sort of style and mood, but I need a verse; I need a beginning and an end." So you try to stick within the parameters. But in terms of doing Broadway scores, I've never heard one that's been equaled by later arrangements.

RD: *What about variations in tempo, and the use of* rubato*? I noticed during the rehearsal that in one of the numbers the pianist initially played the introduction to one of the numbers* rubato*, and you stopped him, saying "no* rubato*."*

JMcG: Oh, I know, that was probably the intro to "I've Told Every Little Star." Well, there are old recordings to show what is and what is not stylistically accurate, and it changes from decade to decade. If you're going to do Kern, 1917, you don't swing those eighth-notes; he was writing ragtime. But by the time you get to *Very Warm for May*, by then we were into the swing era, and eighth-notes were swung. I'm for what is appropriate for the period in which the piece was composed. But styles changed so rapidly between 1915 and 1945, it's like three or four arranging styles. First, it was very Victor Herbert and Gilbert & Sullivan—oompah, oompah—I mean, "Bullfrog Patrol," and some of these other early Kern things could have been orchestrated by Offenbach or Sullivan.

RD: *Your recent recordings have been of more modern stuff:* Kiss Me, Kate, Annie Get Your Gun. *Is that because the record companies want what's marketable?*

JMcG: Well, yes, it absolutely is. It's a simple reality of life, and I don't fault them at all. I've got my short list of things I want to do, and they've got their short list of things they want to see done. Of course, they want *Oklahoma!*, *South Pacific*, *West Side Story*; they want the ten shows they heard of when they were children. They've never heard of anything else, and, of course, it's the mentality, "If I've not heard of it, it can't be any good."

I'VE NEVER HEARD A BROADWAY SCORE THAT'S BEEN EQUALED BY LATER ARRANGEMENTS.

RD: *And people won't buy it.*

JMcG: "And if I haven't heard of it, neither has anybody else." And, to a certain extent, I cannot fault them. And even less now in these recessionary times. So, they let me do *Show Boat*. Now, you can say *Show Boat* is a big, classic work; of course, they would let me do *Show Boat*. But they let me do it my way—they let me do three CDs' worth.

RD: *That had never been done before.*

JMcG: And with all this extra material, they spent twice as much on it. When they first thought they were going to record *Show Boat*, they thought they were getting one CD of "songs we all know and love." They had never met me, you see, and they didn't know what they were in for. And then they let me do *Anything Goes*.

RD: *Were they really surprised; were* you *surprised how much of a success* Show Boat *was?*

JMcG: I had no idea it was going to be like that. I had no idea at all. Very gratifying. Then *Anything Goes*, which they let me do in the face of—

RD: *—two new recordings.*

JMcG: Well, one at the time, and the London one about to happen. So then I figured, they've indulged me twice now. So then we did *Kate*; then we did *Annie*. We were to have done *Oklahoma!* this year, but for various reasons best known to the Rodgers & Hammerstein organization, they elected, at the eleventh hour, to withdraw the rights. Which actually, as it turned out, proved to

be a blessing in disguise, because it allowed me to record a show that, in less of a crisis situation, they might not have let me do, which was *Brigadoon*.

RD: *You've finished that, have you?*

JMcG: Yes. I'll say it out loud to the world, *Brigadoon* is my favorite show. I mean, *Show Boat* I admire and revere, and it was my child for ten years and all that, but in terms of where I've lived, in that dark, secret place inside, *Brigadoon* is my favorite show. They had the sessions planned, and when *Oklahoma!* had to be pulled they had to fill up those sessions somehow. So now they have a couple of big classic shows in the catalogue, and now, this year, I get to do my pet project.

RD: *Which is. . .*

JMcG: *Love Life*. Kurt Weill and Allan Jay Lerner. And what's really interesting about it—this was an accident, because we hadn't planned this at the time—is that *Love Life* is the show Lerner wrote immediately after *Brigadoon*. So *Brigadoon*, which is the bright and hopeful side of love, is followed by *Love Life*, which is the dark, despairing, realistic view of relationships. These shows came out of the same man within a two-year period; this is really, really frightening. [*EMI has since shelved the* Love Life *project.—Ed.*]

RD: *After that they'll want* The Sound of Music, *or equivalent.*

JMcG: Or equivalent. And, frankly, they have a right to. The other record we made this year is already in the can. It's called *Broadway Showstoppers*. EMI doesn't know how to market it yet. It's not a crossover album. It's all the gang. It's Cris [Groenendaal], Kim [Criswell], Brent Barrett, George Dvorsky, and Davis Gaines. It's my troupe. I don't know if they'd want to hear themselves described as "my" anything, but, I mean, it's *our* troupe.

RD: *What do you look for in singers?*

JMcG: That's easy: personality, intelligence. Intelligence that manifests itself in knowing how to handle words and diction. No wobble. That's big. *No wobble!* Up-front vocal projection, right from here [*points to face*], with richness and clear diction. People who know how to put words across without sacrificing vocal quality. It's actually quite a lot to ask for; I say it flippantly, but they're hard to find. Most young American "opera" types, you know, coming on. . . [*singing in grandiose "operatic" style*] "You are the promised kiss of springtime. . ." I say, "That's very beautiful vocally, but can you sing it now as though it were your native language, with the kind of vowel formation that you would use if you were speaking it in casual conversation?" You don't know how difficult that is.

RD: *It's hard to do.*

JMcG: It's very, very hard.

RD: *Pop singers do it, but they don't have the tone; they don't have the volume.*

JMcG: Yes, and they can't pop out a high A. So you need to have both. And you *can* have both. There are people who can do both. I also strive for a certain economy in performances. I'm constantly hauling people back from mannerisms, and not taking enormous pauses and ritards and holding notes for no effect other than "See how long I can hold this note." You hear that all the time in revivals, in what I call the "Goodspeed[2] Syndrome." You know, they think the material can't possibly hold up on its own, so they inject it with every foreign influence they can to, hopefully, hold the audience's attention. I just don't think you need to do that.

RD: *Have you seen the Goodspeed production of* Most Happy Fella *that's on Broadway now?*

JMcG: I have not yet, although I'm terribly, terribly eager to.

2 The Goodspeed Opera House, in Goodspeed, CT, specializes in revivals of lesser-known shows. The Summer '92 schedule includes *It's A Bird. . . It's A Plane. . . It's Superman!*, *Paint Your Wagon*, and *Animal Crackers*.

RD: *I love the piece, but I didn't like the production very much. I'd prefer a more operatic version, and I want to hear the orchestra.*

JMcG: Yes, I haven't heard it, so I can't say anything. I know that Frank Loesser commissioned this two-piano arrangement for off-Broadway, but I know that piece, and I know what that piece is about, and I do not believe that Frank Loesser, in his heart, preferred to hear two pianos rather than a 50-piece orchestra doing "My Heart Is So Full of You." Please, it's an Italian opera.

RD: *Right. And even Spiro Malas, who has the voice, wasn't using it very much.*

JMcG: It's a big piece full of big passions. I just think *Most Happy Fella* is an extraordinary work.

RD: *Is that a show you'd like to record?*

JMcG: We've talked about it many times. They won't let me. In fact, we had a talk about it just three days ago.

RD: *Why not? There's no modern recording.*

JMcG: Nobody's ever heard of it.

RD: *Goodspeed doesn't think so. New York City Opera doesn't think so. Sony Classical recently re-released the original cast recording, so they obviously don't think so.*

JMcG: When I say "nobody's ever heard of it," that's not me, that's their feeling. Yes, I know who I'd like to record it with . . .

RD: *As Tony?*

JMcG: José Van Dam.

RD: *He does have the right kind of voice for it.*

JMcG: It's the right kind of voice; he's a wonderful actor; he does dialogue very well. It's an amazing piece, and I would love to do it, but I'll also tell you that, mono apart, the Sony/CBS recording would be pretty hard to top. I had not listened to that recording in quite a number of years; I almost wore out a set of LPs I had when I was in high school and college, and then, as other things came into my life, I just didn't go back to it for a long time. When the CDs came out, I took the phone off the hook, unplugged the answering machine, drew the blinds . . .

RD: *It's not for casual listening . . .*

JMcG: No, it's not. And I didn't follow the score or anything. I just turned off the lights and sat in the dark, put on Act I, and just listened to it; played it straight through, both CDs. I was a wreck. I was just a wreck. Not having to get up and turn over LPs in the middle of it, to get these acts in unbroken sequence is . . .oh, my Lord! It's extraordinary. One of these days . . .

RD: *Which brings us back to my initial question. How did you get into this? Did you wake up one morning and say to yourself, "I think this is what I'll be doing. This will be my career"?*

JMcG: It was more gradual than that. When Houston Grand Opera did their production of *Show Boat* about ten years ago, I called them and said, "You're doing *Show Boat*, and you should do it the way you did *Porgy and Bess*. You should put all the cut stuff back in, and blah, blah, blah . . ." I was nobody. Nobody had ever heard of me. I was a starving musician, and they hired me to restore the score. They still ended up cutting a lot; they didn't do anything like a complete restoration, but it was a beginning. As a result of that, I got to work on the Broadway revival of *On Your Toes*, again not as a conductor, just as a consultant. And I started conducting in '85 when I persuaded Carnegie Hall to let me do three Kern shows in concert. That was the beginning. From the attention and reviews of that, EMI heard about me and asked me to meet with, and basically to audition for, Kiri Te Kanawa for her Gershwin album. She approved of me, and we did that. As a result of the success of that album, they said they'd like me to do some shows. "What would you like to do first?" and I said, "*Show Boat*, please." It went on from there.

I WILL NEVER WRITE ANOTHER NOTE OF MUSIC. I HAVE NOTHING TO SAY. THERE'S ENOUGH MUSIC IN THE WORLD THAT YOU SHOULDN'T CLUTTER UP PEOPLE'S ATTENTION WITH STUFF THAT YOU DON'T NEED TO HAVE WRITTEN.

RD: *Have you always had an interest in doing musicals?*

JMcG: No, it was an accident. I was trained as a classical serialist composer, and in opera. My first avocation and training was as an opera singer; my education was very classical. No show music at all. I mean, I sang Bach.

RD: *Where was this?*

JMcG: At Northwestern. I think of myself—nobody else does—but I think of myself as a classical musician. It was private enthusiasm that led me to get involved with this material. I would love to be doing *Werther* somewhere, or *Meistersinger*, or whatever, and, hopefully, eventually, I will. But it's gonna be difficult to jump over that fence now because people have me pegged. But that's just something that you accept. It gives me something else to work on after I'm 40. There are so many things I still want to hear. It's just not all I want to do with my life. And I'd like to produce a movie or two before I go. I'd like to do some work in television.

RD: *Do you still have the ambition to compose?*

JMcG: No. I will never write another note of music. I have nothing to say. The moment I started conducting, whatever I had inside of me that needed to get out, came out. I think, if you don't have anything to say, don't write. There's enough music in the world that you shouldn't clutter up people's attention with stuff that you don't need to have written. I don't need to compose any more. And I don't miss it. My friends were at me for years, "Oh, you've got to go back to writing, you wrote such pretty music." And I go, "Yah, yah, yah."

I KNOW VERY FEW CONDUCTORS WHO GENUINELY LIKE EACH OTHER.

But I'm doing something that nobody else is doing, certainly not to the extent that I am, and with certainly nothing like the commitment that I have. Let's face it, the nature of being a conductor is, you must assume you can do it better than anybody else. Otherwise, what can drag you out in front of 3000 people and a 100-piece orchestra and make those people do it *your* way? That's why most conductors hate each other's guts, because by the nature of what you do, you must feel that you know more about it than they do. It's like putting a group of cats in a sack together. It really is true. I know very few conductors who genuinely like each other. You may grudgingly respect their work, but you don't want to be in too close a proximity to them. It's not an attractive profession at all.

RD: *What kind of music do you listen to when you're just listening for pleasure?*

JMcG: A great deal of opera. Almost entirely classical. I'm working my way through all the Haydn string quartets. It's my goal this year to really learn those; there are so many. I've got a two-bedroom apartment, and all the walls of two of those rooms are filled with CDs. And the show collection takes up a small part of it. People come in and expect to see the world's greatest show-music collection. It's not true. I love operas of every conceivable kind. The first operas I ever learned were by Wagner, when I was ten or eleven. That's what got me interested in music. I heard *Das Rheingold*, and I was lost after

that. I taught myself German. All through high school what I listened to mostly was the *Ring* and *Tristan* and *Parsifal*. Just obsessed with them. I could sing those operas backwards and forwards from memory by the time I was 17. My parents thought they had a crazy child. I've been to Bayreuth—that's what I do. I very much think it informs what I do with show music, because I think of them as art songs. To me there's no difference. I've said very often, I don't see a lot of difference between Jerome Kern and Schubert.

DID SCHUBERT WRITE ANYTHING MORE EXQUISITE THAN "TILL THE CLOUDS ROLL BY?" THERE'S A LOT OF ARTIFICIAL SNOBBERY ABOUT THESE THINGS.

Now, I'm not going to say that Kern had anything like the structural capability. Kern could never have written a symphony. He could never have dealt with sonata form. But if you're just thinking of a 32-bar song, did Schubert write anything more exquisite than "Till the Clouds Roll By?" Schubert wrote some pretty exquisite stuff, but there's a lot of artificial snobbery about these things.

RD: *I've seen an interview with you in* TheaterWeek, *where you were quoted as saying that Andrew Lloyd Webber's* Aspects of Love. . .

JMcG: Oh yes, "the most important opera since *Peter Grimes*!" That was a stray remark in the middle of a four-hour interview and that's the only thing they picked out. Well, I *love Aspects*, and I'll say it out loud. I think it's a great work. It's cunningly structured. That quartet in the second act, when George can see that Alex is falling in love with his daughter and the four of them stand there—they just voice their thoughts—it's an opera! Just little things like his gift for melodically memorable cells that are repeated over and over again so that the recitative can sit on them. I know a lot of people hate *Aspects of Love*. One of the things I've learned to give up as I work more and more with this sort of music is the notion that you can please or convince or convert anybody. You can't. I used to get very angry with people who didn't agree with me, and I finally realized that that was a total waste of energy. It didn't change anything.

RD: *Do you like the rest of Andrew Lloyd Webber's works?*

JMcG: I like *Phantom*. I mean, it's a preposterous story, but I do like *Phantom*. I don't care for most of the earlier rock stuff. I like certain songs in *Cats*; I think "Bustopher Jones" is a great number; I think the train cat is just wonderful, and the old theater cat.

RD: *How about Sondheim?*

JMcG: A god. A god. Doesn't need any elaboration. It's all been said. Every wonderful thing that's ever been written about him, just put them into my mouth and I second them.

MISS *SAIGON* IS A WORTHLESS SCORE.

RD: *And Schönberg/Boublil?*

JMcG: I like a lot of *Les Miz*, the second act especially. I was horribly disappointed with *Miss Saigon*. I think it is a worthless score. Lazy, insincere, contrived. I thought this would be one of the most lush and romantic and deep pieces, and when I saw it in London at Drury Lane I was horrified. Horrified. I just hated it, and I hate it to this day. It has obviously touched a great many

people; I am simply allergic to it.

RD: *What else* would *you like to record?*

JMcG: The short list? The ones at the top of the list I've all gotten to do: *Show Boat*, *Sitting Pretty*. Never thought I'd ever get to hear *Sitting Pretty*, much less record it.

RD: *It's a wonderful score.*

JMcG: I'm so proud of having done that.

RD: *How has that sold?*

JMcG: It's sold *very well*. First of all, the reviews were so unexpected, because it's such a little, unimportant piece. But what's been extraordinary is the fact that more and more people, when they talk to me, say "We love all your records, but the one that really gets us is *Sitting Pretty*, and the *train song!*" Everybody loves the *train song*, "The Enchanted Train." That song has been my favorite in the show, but, you know, I get attached to some strange songs that mean something personal to me for private reasons that nobody else could share. But there's something about that song; it's the notion of being carried home to somebody that's waiting for you. That strikes a very deep chord in a lot of people. "Down by the gate, I shall listen and wait / Oh! How excited I'll be! / And how I'll cheer it each night when I hear it / Bringing you back to me."

RD: *Doesn't have a bad tune, either.*

JMcG: It's a beautiful tune! You read Wodehouse's lyrics and then you couple them to Kern; they're like two inert chemicals which, when you put them together, become actively explosive. Because, even though the tune is very pretty, when you put those words to it, it suddenly packs an emotional wallop. You take what could be called these innocent, cutesy-poo lyrics of Wodehouse, and couple them to Kern's music, and it infuses them with truth and depth. They were an amazing team.

RD: *I like* Very Good Eddie, *too. I saw the Goodspeed production of that on Broadway and found it very charming.*

JMcG: It's a swell piece. I'm starting to do a lot of songs from that in concerts coming up this year: "Babes in the Wood," "Isn't it Great to be Married." One of these days I'll do it at Carnegie Hall and Jason Graae will play Eddie. Jason Graae *is* Eddie. . .

RD: *Other recording plans?*

JMcG: *1600 Pennsylvania Avenue.* Oh boy, do I want to do that. We do two numbers on the EMI *Showstoppers* album. I want to do *Music in the Air*, also *The Cat and the Fiddle*. . .

RD: Very Warm for May?

JMcG: Very, very, very much. There are problems there. I would love to do it, and Betty Kern is very eager to see it recorded. There are rights problems with one of the other owners, who'd just as soon see that show swept under the rug and not be a reminder of Oscar Hammerstein's ignominious failure with that show. It's very lightweight; it's not a show of any substance. But, oh, what a beautiful little intermezzo it is.

RD: *Any other modern shows? How about* Carousel*?*

JMcG: I've conducted *Carousel*; I did it for Chicago Opera theater, and the world certainly needs a good recording; whether I'm the person to do it. . . I would love to do *Carousel*. But, you know, *Carousel* doesn't *need* me. *The Cat and the Fiddle* needs me. Who's gonna take care of the runts of the litter if I don't? Nobody. Everybody wants to do *Carousel*. Everybody wants to do *Oklahoma!* Everybody wants to do *The Sound of Music*. So, great; they don't want to do *Lucky*. They're certainly not going to sit there and give up their social life to copy the parts themselves, which is what I do. I want to do these things because I want to hear them. S

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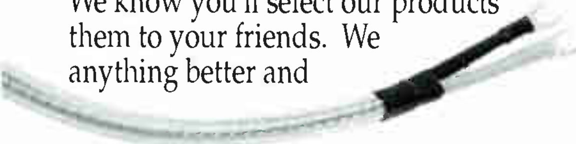

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Dick Olsher

Jadis JPL line-level preamplifier

Line-level preamplifier, with 4 general pairs of inputs, 1 CD pair of inputs, and 1 tape loop. Voltage gain: 35dB at 1kHz, for line-level inputs. Dimensions: 17" (430mm) W by 7" (170mm) H by 11.8" (300mm) D. Weight: 29 lbs (13.2kg). Serial number of sample tested: 305. Price: $5395. Approximate number of dealers: 16. Manufacturer: Jadis, Villedubert, France. US Distributor: Fanfare International, Inc., 500 East 77th St., New York, NY 10021. Tel: (212) 734-1041. Fax: (212) 734-7735.

In its comparatively few years in the marketplace, the line-level preamplifier appears to have established commercial parity with its full-function big brother. That this was inevitable was clear as far back as the mid-'80s. The advent of the CD and the proliferation of digital sources argued for a modular approach to preamp design. In such an environment, line-level sources (*eg*, DAT, CD, even analog tape) deserve special attention.

After a yearlong scrutiny of the state of the art of line-stage design, two underlying principles suggest themselves. First, the Gods, in having decreed that man shall labor long and hard in search of the perfect preamp, must surely be crazy. In the trek toward sonic perfection, mistakes are frequently made. The attempt to coax the signal from the program source and nurture it to its full musical potential is fraught with labor pains. Like the political process, the audio signal is subject to corruption. Small sins early in the chain may become capital offenses by the time they reach the loudspeakers.

That there is only a handful of great-sounding preamps out there (line-level or otherwise) *is* evidence *prima facie* of the difficulty in caring for the audio signal at its formative stage. Aided by these few centurions of sonic truth, the music can bloom, filling

the soundstage with the fire, drama, and power that only live music can communicate. Too often, however, the preamp sinks the ship, and the "illusion of live" descends from the realm of the plausible into the realm of yellow cling peaches. Most preamps can hope to simulate the flavor of a fresh peach only to the extent afforded by the canned variety.

Second, I feel it essential for a preamp to incorporate the magic of the vacuum tube—especially where digital source material is concerned. In my experience, the ultimate sound of any CD player or digital processor is dependent upon the type of associated line-level stage. If you doubt this for even a moment, I invite you to audition the Theta DS Pre Generation III processor/preamp in my listening room. Through the DS Pre's own solid-state line-level stage, the sound quality deteriorates to the point that the bloom and dynamic breadth of the music are largely squashed. The resultant harmonic textures are convincingly solid-statish, the overall effect being to subdue the vital link between perception and belief. Route the DS Pre's analog output from Tape Out to a good all-tube preamp or even a good hybrid design, and the sound quality changes dramatically for the better. The illusion of a real musical event ebbing and flowing before my ears becomes enormously heightened. For whatever reason, it's clear (to me at least) that digital sources require a tube buffer prior to the power amp. This is yet another manifestation of "Futterman's First Law of Audio": Thou shalt use a vacuum tube as early in the amplification chain as possible.

"Wait a minute," I hear some of you complaining. "If you're so hot about tubed preamps, why has the Threshold FET-10/e line stage lasted so long in your reference system?" Good question. Let me remind you that nothing is sonically right if it's harmonically wrong. And my master tapes have long told me that the FET-10/e line-level preamp really got the upper-midrange/lower-treble tonality right. This is the frequency range that makes or breaks soprano voice, and the Threshold didn't let me down. But deep in my heart I knew that its mastery over soundstaging and dynamics was less than perfect. Memories of the Conrad-Johnson Premier Three periodically flooded my consciousness. The way the C-J sculpted image outlines was a sound to behear. Certainly, no solid-state preamp—including the Threshold—came close in this respect.

The final straw was my exposure to the Convergent Audio Technology SL-1 preamp (reviewed last month by Jack English). During the several weeks the CAT resided in the system, I connected with the music like never before. My level of sonic expectation would never again be the same. The CAT showed me that harmonic integrity, palpable imaging, and dynamic range *can* be bundled together in one package.

It was into this environment that the Jadis JPL made its grand entrance.

Technical Details

The Jadis JPL is a thing of beauty, a beguiling French damsel. The gold inner fascia set off against the chromed chassis finish looks positively luscious. Sitting as it did amid some pretty drab-looking neighboring gear in Bright Star Audio's "Rack of Gibraltar," Lesley had no trouble at all picking it out.

"Oh, what's that?" she asked.

"That *there*, my love, is the El Dorado of preamps."

Having looked over the JPL's schematic, it's difficult for me to objectively identify the source of its sonic magic. The design, by Jadis's André Calmettes, is pretty conventional. The four line-level inputs and one tape loop are routed through three 12AX7 dual triodes.[1] Voltage gain on the order of 35dB is provided by the first two 12AX7s, which are cascaded together. The final tube in the chain, used as a cathode-follower buffer stage, allows the use of long cable runs to the power amp without the danger of treble roll-off. There's also a dedicated CD input that uses a single 12AU7 as a buffer stage (unity gain). This input is DC-coupled to the 12AU7's grid, while the regular line inputs are AC-coupled via a 1µF capacitor. The quite beefy power supply deploys solid-state bridge rectifiers followed by a capacitive filter network. As a final touch, active regulation is provided for the tube plate voltages.

A large circuit board accommodates the entire active signal path, and construction quality and part selection appeared to be

1 Some readers were concerned by Mike Moffat's dissing of the 12AX7 last October. Rest assured, gentle stereophiles, that a designer of talent can wring magical sound out of anything that conducts electricity. —JA

nothing short of excellent. Stereo volume and balance pots adorn the front face. The mute switch—an especially useful feature for someone like me—allows record and interconnect cable changes without adjustment of volume. The unit mutes automatically for a couple of minutes when powered up. For best sonic results, Jadis recommends that the unit be left on continuously.

So where does the JPL's magic live? In my opinion, it's in the details: the power supply, the selection of passive parts, and the execution of the circuit. You meter-readers out there—you know who you are, you whose *modus operandi* can be summed up in the motto "parts is parts"—please take note: As H. A. Hartley put it many years ago, the sonic difference between a Stradivarius or an Amati and a mass-produced fiddle is literally in the stuff of which the instruments are made. Ditto for the difference between a Steinway and a Yamaha. It's not easy to measure sonic differences between violins or pianos, yet the musical ear has no problem at all in instantly resolving such differences. Build the same circuit with Radio Shack parts and with premium parts selected on the basis of active listening tests. Those who feel that the Radio Shack version would sound as good as or even better than the audiophile alternative are directed to read Ben Duncan's "Harmonic Convergence" article in the October 1992 *Stereophile* (p.78), where he discusses the measured results of just such an experiment.

Sonic impressions

The JPL spent its time exclusively in my reference room, where it was complemented by the Sound-Lab A-1 ESLs and a variety of power amplifiers, most notably the Air Tight ATM-3 (review forthcoming) and the Fourier Components Sans Pareil OTL monoblocks (reviewed in June '92). I tried CD program material with both the CD and line inputs. At least with the Theta DS Pre Generation III, I found the line input to give me a fuller palette of dynamic shadings, so I stuck with the line input for the duration of the evaluation. I also used the JPL in conjunction with the Threshold FET-10/e phono preamp for all of the analog listening sessions. The JPL did benefit from being left on continuously, particularly in terms of detailing and textural purity. Still, I'm a bit nervous about leaving tubes to cook indefinitely. Tubes are thermionic devices, depending for their operation on electron emission from a very hot cathode surface. The mere act of electron emission means slow but sure disintegration of the emissive surface. It pains me to think of all those premium tubes suffering so.

Memorable first impressions happen occasionally in this business, but nothing like this. It would not be an exaggeration to say that I had to pick my jaw up off the floor. I was immediately and overwhelmingly won over by the Jadis.

The most startling aspect of the Jadis's performance was how it re-created the dynamic range of live music. Whether it was a solo instrument such as Taj Mahal's National steel-bodied guitar (*Recycling the Blues & Other Related Stuff*, Columbia 31605) erupting in full force from soft to loud, or a full orchestra revving up in a crescendo of orgasmic proportions, the energy release was sudden and startingly real—volcanic, if you will. I never felt that the Jadis was holding back or blunting the power and rise-time of orchestral peaks. I've never heard a preamp so convincingly delineate the dynamic range from soft to very loud. I was confident at all times that the Jadis was releasing 100% of what the program material had to offer.

Where the Jadis wove its magic most effectively, and where its dynamics mattered most to me, was in its portrayal of solo instruments. The dramatic bite of a soloist immersed in the ambience of a sympathetic hall was beautifully conjured up within the confines of the soundstage. The bloom of the spatial outlines, the modulation of a singer's chest, together with the sudden release of breath, were all captured with a realism that approached that of live music. The shock of hearing Lesley's voice reproduced on "Jazz Me" (*Lesley*, ViTaL Records) with almost its full dynamic range intact—essentially as I had heard it in the recording studio—still reverberates through my psyche.

The illusion of live was greatly facilitated by the JPL not only because of its inherent sense of dynamic gradation, but also because of its soundstage transparency and mastery over the elements of spatial resolution. The sense of transparency was so strong that at times I felt as though the Starship *Enterprise*'s Scottie had beamed me right into the original performance space. That, together with inci-

sive spatial outlines, liquid phrasing, and purity of harmonic textures, helped me transcend the reality of the situation. The seemingly empty space between and behind the A-1s was now populated by phantom musicians.

It takes some mental gymnastics to involve body and soul in so blatant an illusion and to allow the music to communicate effectively. The Jadis was able again and again to establish a blend of aural cues that allowed me to be teleported into the essence of the music. Image outlines were palpably focused. Massed voices were naturally resolvable, without the smearing or blending of spatial detail so common to a host of preamps.

The degree of spatial focus, and to a lesser extent the liquidity of harmonic textures, turned out to be functions of the brand of tube used. (Of *course* I had to experiment. Does a bear poop in the woods?) Victor Goldstein of Fanfare International was kind enough to provide me with genuine Telefunken and Siemens 12AX7s, and samples of a special run of Yugo 12AX7s per Jadis specs. I also tried a number of Chinese 12AX7s, including the Golden Dragons; to top off the fun and games, I included some 5751s from my own secret stash.

The preamp appeared to be voiced around the stock Yugo tubes, as none of the Chinese tubes worked well—at least as a direct substitution for the gain stages (the two tubes closest to the front panel). All of the Chinese tubes sounded bright and somewhat coarse through the upper midrange. By comparison, the stock tubes sounded smoother and quite a bit darker. Some have accused the JPL of being colored on this basis alone. The Jadis/Yugo specials were smoother, sweeter, and more romantic yet. My favorite 12AX7 turned out to be the Siemens. Victor told me not to bother trying to hunt these down, as he'd bought out the whole lot of what are new original stock (NOS). With the Siemens (Victor only sent a pair, so I left the cathode follower alone), the presentation was gorgeously detailed, yet effortless, with a flair for harmonic purity.

However, none of the 12AX7s, including the Siemens, yielded as tightly focused a presentation as my gold-pin Sylvania 5751s—at least before the arrival of the Ensemble TubeSox. Understand that the 5751 (sadly long out of production) has a lower mu than a 12AX7 (70 *vs* 100), and as such does not represent a direct substitution for a 12AX7. Gain and possibly circuit feedback may be affected. I say "may" because modern 12AX7s have had a hard time meeting their mu spec anyway. Being lower in microphonics typically gives the 5751 a sonic advantage which translates into cleaner and sweeter harmonic textures and less spatial fuzz. Note, however, that not all 5751s are born alike. Most past production was churned out by General Electric (selected samples are fine), the rest by RCA (usually not as rugged or as clean-sounding) and Sylvania (in my experience, the best-sounding).

With the arrival of the Ensemble TubeSox, matters changed considerably. Slipping the Sox over the Siemens tubes instantly snapped the soundstage into much tighter focus. So attired, the Siemens took on the spatial precision of a 5751 while retaining its inherently lush harmonic voicing through the midrange. The ultimate tube complement I settled on included the Siemens for the gain stages and a Golden Dragon 12AX7 for the cathode follower. That's right—without the Golden Dragon, the extreme treble lost air and sounded a bit closed-in.

The next best tube makeup that is readily available would include the Jadis-branded Yugo 12AX7s but replacing the standard output follower with a Golden Dragon 12AX7. I should emphasize that imaging precision suffered with the stock tubes, as did tonality through the upper octaves. Harmonic textures were a bit darker and shut-in compared with the real thing.

As far as resolution of detail, there was plenty. The JPL poured forth low-level detail with the sparkle and naturalness of a mountain spring. *None* of this information was artificial, as is often the case with an overly etched and bright preamp, where detail is zinged out with sufficient ferocity to singe one's eyebrows. The JPL did not hammer out detail synthetically, but resolved it the old-fashioned way: by clearly enunciating transients, quick attack followed by tightly controlled decay. It was possible to delineate the decay portion of transients all the way down into the noise floor of the recording. This greatly enhanced the sense of being there.

Bass performance was dependent on the choice of partnering power amp. However, even under the best of circumstances, deep

bass extension failed to match that of the FET-10/e line stage. There was plenty of punch and kick-ass intensity on display, but deep bass information below 40Hz just wasn't retrieved as well. There was no difficulty in controlling the mid- and upper-bass regions. James Leary's solo on "Summertime" (on the *Lesley* album) was as tight and defined as I'd heard it in the Studio. James's unusually sure and expressive fingering really digs down. None of this is lost on the JPL. It resolved bass detail as well as any solid-state preamp I've heard.

What It All Means

Though we sometimes take for granted that the basic "language" of our measurements is clear to all of our readers, letters to the editor tell us that this is not the case. Periodically, then, we will attempt to explain exactly what our measurements are and what they purport to show. Though those with technical training may find our explanations a bit simplistic, they're aimed at the reader who lacks such experience.

Perhaps the simplest type of audio product is a basic, line-level preamplifier like the Jadis discussed in the accompanying review. Such devices accept line-level signals: *ie*, a signal with little current flow, typically in the high millivolt to low volt range. They deliver a usually amplified line-level signal, generally to a power amplifier. Such devices are shielded from the interface problems inherent in transducers at the driving (phono cartridges) and receiving (loudspeakers) ends.

JA explained last month (December 1991, p.65) what is meant by the output, or source, impedance of a device and how we go about measuring it. The input impedance is measured with similar indirection. Using a fixed input voltage (usually 100mV) at a frequency of 1kHz, the output or source impedance of our Audio Precision Dual Domain System One test device is set to 25 ohms (50 ohms for a balanced output/input lash-up), and the output voltage of the device under test (DUT) is measured. Then the source impedance of the test set is changed to 600 ohms and another output voltage measurement is made.

A simple computer program written by JA takes these measurements and calculates the DUT's input impedance by comparing the relative voltage "drop" between the two source impedance settings. The output impedance of a source and the input impedance of a DUT act as a voltage divider. Assuming the voltage of the source remains unchanged, the higher the input impedance of the DUT relative to the output impedance of the source, the higher the voltage appearing across the input of the DUT—up to the point where the DUT input impedance is so large that it effectively swamps the output impedance of the source, the latter becoming a negligible part of the total. At this point, effectively, there is no voltage divider effect, and the full output of the source appears across the input of the DUT.[1] The output voltage of the DUT—which is where we take our reading—is directly proportional to the voltage seen at the input of the DUT (changed only by the fixed gain of the DUT). By comparing the two output voltages taken at two known source output impedances, Ohm's Law gives the DUT's input impedance.

The higher the input impedance of the DUT, the *smaller* the change in the voltage readings at the two source impedances, the 25 or 600 ohm source output impedances becoming ever more negligible in providing any voltage division with the input impedance. Thus, the less precise the reading becomes. For example, in the case of the Jadis JPL, for the left channel from the CD input we measured 652.8 mV output for a 600 ohm source impedance and 653.3mV output for a 25 ohm source impedance. This computes to an input impedance of 750,695 ohms. A simple *1mV* change in the 600 ohm reading, to 651.8mV, would result in an impedance calculation of *249,832 ohms*. Fortunately, the stability and accuracy of the Audio Precision's readout is much better than 1mV, but even a 0.1mV error will change the result by 100k ohms. Fortunately the readings are much more ac-

1 This point is never truly reached, of course. Sort of like the old paradox of covering half the distance to your destination with each step, thereby never reaching it. You get pretty close, though.

But it buried transistorized wonders in its ability to project the authentic size and weight of, say, cello or double bass. The fundamental range of these instruments was fleshed out with lifelike tonality.

A POINT OF REFERENCE

Because the Audio Research LS-2 line-level preamp has been highly touted in the press, including a rave review from our own Bob Harley, I very much wanted to pit the Jadis against it. Being a known quantity, the LS-2

curate at the lower, more common, input impedances.

The frequency-response measurement on the Audio Precision is quite straightforward. Like most measurements on this device, the Audio Precision sweeps across the frequency band automatically, one channel at a time, to provide the graphs seen in the charts. The crosstalk measurement is a little more interesting. Each channel is measured separately. The left-to-right crosstalk is a measure of the output from the right channel when a known signal is fed into the left channel and the latter's input is shorted to minimize noise in the reading. L-R crosstalk is measured in dB below the level of the output from the driven channel. The crosstalk is also a swept measurement, the Audio Precision again sweeping across the range automatically once the test is initiated. Practically all of our crosstalk measurements show a poorer separation (or increased crosstalk—two sides of the same coin) at higher frequencies. This is largely because normal capacitive coupling between channels is stronger at high frequencies where the two channels share a common chassis and their circuits are physically close together.

The measurement of total harmonic distortion plus noise (THD+noise) is also straightforward on the Audio Precision once the proper setup is established. The primary consideration of the latter is arranging the grounds between the DUT and the Audio Precision to minimize the contribution of noise and hum. Again, the Audio Precision performs a sweep across the frequency band, automatically plotting out the result.

Polarity is checked by feeding a positive pulse—actually a positive raised-cosine signal from a test CD—into the DUT and observing the output on an oscilloscope. DC offset is measured at the output of the DUT with its inputs shorted. Gain is a simple calculator computation based on a set input and the resulting output. And the input and output levels for 1% distortion are easily read from the output display of the Audio Precision using any of its THD+noise test modes.

Given reasonable frequency response, distortion, and crosstalk results, the major item of measurement interest to most users is probably the DUT's input and output impedances. In the case of a preamp or other similar line-level device, conventional wisdom calls for the highest possible input impedance and the lowest possible output impedance. It is common engineering practice to have the input impedance of the next device in the chain be considerably greater than the output impedance of the preceding device. There is no magic ratio at which everything becomes "right," but the rule of thumb is an input impedance of at least ten times the source impedance.[2] Less than that, and adverse sonic effects grow more likely. A low output impedance will also generally minimize frequency-response aberrations caused by the characteristics of the cable feeding the next device in the chain—be that a power amp or another line-level component. **—Thomas J. Norton**

2 The only high-end manufacturer espousing a different theory is the Jeff Rowland Design Group. They prefer *matching* input and output impedances for maximum *power* transfer. This will work only if the first device in the chain can furnish adequate current; matched source and load impedances result in considerably more current flow between the source and the load than is usually the case with low-output/high-input impedance hookups—as well as a 6dB loss of effective gain. The Rowland preamps are clearly designed to operate in this manner; most preamps are not. I haven't been convinced of the need for maximum *power* transfer between line inputs and outputs. What we're trying to provide is an accurate *voltage* to the input of the second device in the chain. But Rowland believes in the technique enough to provide optional output and input impedance settings on their preamps and power amps, which practice allows for such matching.

would provide a reference point by which to judge the Jadis's sound quality and value.

Prying the LS-2 out of Bob's hands wasn't easy. Finally, a window of opportunity opened. Bob was off for a week in Japan, and consented to ship me the unit for a quick listen. At last the two did battle.

Although I felt the LS-2 to be an excellent value at its price point, it was also clearly outclassed by the JPL. For starters, the LS-2 veiled the soundstage, reducing the sensation of being able to see far into the hall. It also failed to delineate spatial outlines as convincingly as the Jadis. Image outlines lacked either the 3-D palpability or the precision of focus afforded by the Jadis, proving fuzzier and more difficult to resolve through the LS-2.

The upper mids and lower treble were grainier and not as sweet as with the Jadis, especially in the upper registers of soprano voice. The Jadis navigated this whole range with much cleaner and purer harmonic textures. Treble transients were comparatively smeared through the LS-2, the JPL doing a much better job of caressing and unfolding transient attack and decay.

Finally, the LS-2 could not match the JPL's verve. The LS-2 blunted the release of energy, robbing the music of some of its dramatic intensity. I know that all of this sounds bad for the LS-2, but I emphasize that, on an absolute scale, the LS-2 is a very good line stage. It just suffers in comparison with a unit as sonically supreme as the JPL.

Cosmic Don, a good friend and a human being in touch with the great spirits that roam the cosmos, happened to be present for one of these shootout sessions. He liked the LS-2, but after hearing what the JPL could do, he nodded his head wisely, his arms thrust forward, and laid bare his gut feelings. Don is a man of few words, but they cut right to the core of the matter. Don felt that the JPL was simply more informative and spatially much crisper. Since Don is never wrong in such matters, I could only nod my head in agreement.

The only challenge to the Jadis I know of comes from the CAT SL-1. From my experience with the CAT's line-stage section, I judge it to be competitive with the JPL, but not quite the JPL's equal in propelling dynamics forward from soft to very loud. Neither is the CAT, in my estimation, as vivid in its portrayal of the soundstage.

Final thoughts

Merci and bravo, Jadis. I've waited a lifetime for a product like the JPL. For all the sonic happiness it's given me, I am sincerely grateful.

If ever I scale Mount Olympus, I'm sure that the JPL will be there, in the company of the Gods Themselves, crazy or not. This is one of those rare products guaranteed to dramatically improve your system. Be prepared for a dynamic eruption that will nudge you much closer to the illusion of live music.

—Dick Olsher

Measurements from TJN

The output impedance of the Jadis JPL at its line output measured 990 ohms left, 1000 ohms right, with the level control at maximum; lower settings of the control changed this measurement by only a few ohms. The input impedance at the CD input was very high—this is generally desirable, as it minimizes the effect of the source's output impedance—measuring 750k ohms in the left channel at maximum gain, somewhat higher in the right channel and at lower settings of the level control. At such high readings, the absolute accuracy of the measurement is rather unreliable; a very small change in the output voltage readings on which the calculation is based can result in a large change in the result (see sidebar). The important point here is that the input impedance of the Jadis at the CD input is unlikely to be a factor in matching to other components. The input impedance at the auxiliary inputs was far lower: 37.5k ohms in the right channel, slightly higher in the left. The latter is more typical, and still unlikely to cause problems with most sources. The output impedance at the tape output was 1.4k ohms regardless of the source impedance feeding the preamp, indicating some kind of buffering at the tape outputs.

The JPL is non-inverting at both its tape and line outputs; its DC offset measured an inconsequential 0.1mV on both channels from all outputs. The gain (input to line output) measured lower than specification at 16.3dB from its CD inputs and 19.3dB from its aux inputs.

The JPL's frequency response (fig.1) was taken at the CD input with the level control at maximum gain. At unity gain (approximately 11 o'clock on the level control through the CD input) the response dipped slightly

at higher frequencies (not shown), but the change was small: less than –0.1dB at 20kHz and –0.2dB (L) and –0.35dB (R) at 50kHz. The response through the aux inputs (not shown) was even flatter, with zero rolloff visible at 10Hz and even less rolloff above 20kHz at unity gain (10 o'clock level setting with the aux inputs) than that observed under the same conditions from the CD input. Measurements taken at several different gain settings showed excellent tracking of the level control, never worse than 0.1dB difference between channels down to a level of 10dB below unity gain.

The JPL's crosstalk (fig.2) at unity gain is just slightly less than at full gain, much of the difference due to noise. Crosstalk through the aux inputs is a bit better than that through the CD inputs. Even the latter, however, is more than acceptable, if somewhat greater than typically seen with a solid-state preamp.

THD+noise *vs* frequency is shown in fig.3. The distortion for the CD input is slightly higher, but still very good. Observing the 'scope trace of the distortion product showed the latter to be primarily second harmonic plus noise from the CD input, and primarily noise from the aux input.

Finally, the Jadis would accept a signal level of 1.47V at the CD input before reaching 1% THD+noise (with an output of 9.606V). At the aux input, 5.6V could be input to the JPL—with an astonishing 51.6V output—before a reading of 1% THD+noise was reached.

As with many tube preamps, the JPL's slightly high output impedance, though not high enough to be a serious concern, suggests that some care should be taken in matching it with a power amp. The Jadis JPL's overall measured performance is first-rate.

—Thomas J. Norton

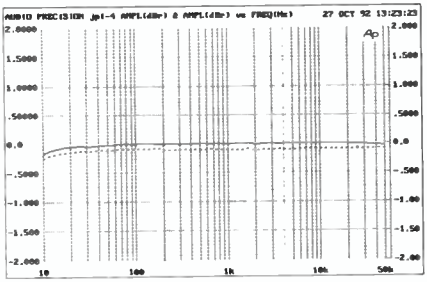


Fig.1 Jadis JPL, small-signal frequency response, CD input, volume control at max (right channel dashed, 0.5dB/vertical div.).

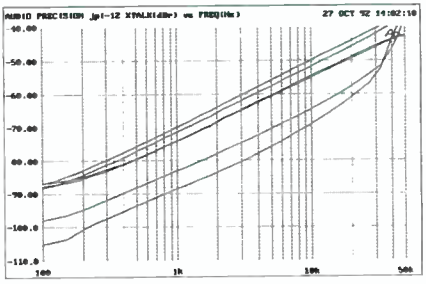


Fig.2 Jadis JPL, crosstalk, from top to bottom: L–R CD input, unity gain; R–L CD input, unity gain; L–R CD input, full volume; R–L CD input, full volume; L–R aux input; R–L aux input (10dB/vertical div.).

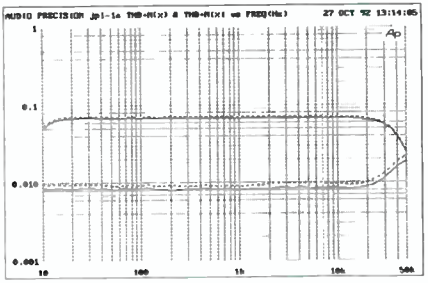


Fig.3 Jadis JPL, typical THD+noise *vs* frequency from CD input (top) and aux input (bottom) (right channel dashed).

THETA DS PRO BASIC II DIGITAL PROCESSOR

Corey Greenberg

Theta DS Pro Basic II D/A processor

8x-oversampling, 18-bit digital processor. Frequency response: DC–21kHz. S/N ratio: 108dB. Output impedance: 2 ohms. Output level: 3.4V RMS. Inputs: 3 coaxial on RCA jacks, AT&T and Toslink optional. Digital output: 1 S/PDIF on RCA jack. Analog output: unbalanced RCA standard, balanced XLR optional. Weight: 16 lbs. Dimensions: 10" W by 2¼" H by 12⅞" D. Warranty: 10 years parts and labor, limited. Price: $2000 (options: balanced outputs, $400; AT&T optical input, $400; Toslink (?!) input, a mere 75 clams). Approximate number of dealers: 80. Manufacturer: Theta Digital Corporation, 5330 Derry Ave., Suite R, Agoura Hills, CA 91301. Tel: (818) 597-9195. Fax: (818) 597-1079.

I get a kick out of Obs. No, not obstetricians; I mean *objectivists*. You see, the audio world is split down the middle between the objectivist camp and the subjectivist camp—the Obs *vs* the Subs. Obs are people who sew nametags into their underwear and worship David "All Amplifiers Sound The Same" Clark; they don't believe in audible differences between things like amplifiers, preamps, and cables. Tell an Ob he'll get better sound if he puts spikes under his speakers and he'll launch into a Jimmy Swaggart–style harangue about the Evil Audiophile Conspiracy, a secret trilateral cabal of manufacturers, dealers, and designers who've joined forces to dupe poor unsuspecting music lovers into buying expensive, totally unnecessary audio gear.

Once, an Ob told me that speaker stands were just plain HOOEY, that paying $100 for rigid, spiked, steel stands was a complete waste of money. I asked him where he had his speakers.

"Oh, one's sitting on top of an empty cardboard box, and the other is underneath my glass dining room table."

You get the picture.

Subs, on the other hand, be *us*. We don't dismiss things we have no firsthand experience of; we try lots of stuff and go with what works. We know from *experience* that speaker stands, and the damping material you stick on top of them, can make all the difference between getting good sound and getting *great* sound; JA even went to the trouble of running a battery of measurements to see if and how a speaker cabinet's vibrations are affected by stands and damping materials (Vol.15 No.9, p.162). But even *this* wasn't enough for the Obs. One told me, even after reading JA's article and seeing all the graphs depicting markedly different cabinet vibrations with different stands and interfaces, "So what? Stands *still* don't make a difference."

And so it goes.

But of all the fraudulent audiophile cons like speaker stands, cables, and AC line conditioners, nothing makes an Ob sputter his Ovaltine through his Van Dyke like *digital processors*. I've seen Obs ball up into tight fetal crouches, then explode with rage at the mere mention of digital processors.

"*You don't need separate digital processors!!*" they scream. "*The ones built into the players are PERFECT I tell you!! PERFECT!!!*" Ob-groupie Howard Ferstler even wrote, in his anti-audiophile rant *High Fidelity Audio/Video Systems: A Critical Guide for Owners*: "If you buy an outboard mounted unit, chances are that any changes you hear will be the result of deteriorated performance."

Sh'yeah. That's just what *I* thought the first time I heard a Theta.

NOT!

Theta's original DS Pro Basic was, for me, the turning point where digital got really, *really* good. At the time, the $12,000 Stax was the biggest rooster in the chicken shack, but that kind of money makes my eyes glaze over. For $2000, the original Basic was a landmark product, and single-handedly raised the stakes for affordable digital playback. Way back in Vol.13 No.8, RH called the Basic "the best digital processor I've heard at *any* price, except for the $12,000 tubed Stax DAC-X1t," and I snagged his review sample the first chance I got.

The original Basic gave me many happy months of terrific sound, driven by everything from a Rotel RCD-855 to Theta's own Data transport; when Theta announced the all-new DS Pro Basic II, an entirely new design for the same price as the older model, I wondered what they could possibly do to make things better. And when I *heard* it . . .

LITTLE MR. MOFFAT HASN'T BEEN SITTING ON HIS TUFFET

From the outside, the basic black Basic II looks identical to the original, the only difference being the smaller red LEDs used for the input and signal-lock indicators on the front panel. The new Theta retains the original unit's front-panel toggle switches for input selection and 0/180° polarity inversion, while the Basic's rear end sports a gaggle of Tiffany-

style gold RCA jacks: two coax inputs, a digout coax jack for hookup with a DAT deck or a CD-R recorder, and the two analog audio outputs. For another 400 clams, you get your two gold-pin Neutrik XLR jacks for balanced audio output; kick in another $400 and an AT&T optical input jack pops up at the other end of the row, ready for a good dollop of Optigue.

Look *inside*, however, and any resemblance to the original Basic ends. Theta's new DS Pro Basic II, like their flagship Gen. III, is a totally new design, not merely an improved version of the original Basic. Chief among the advancements are a new Crystal CS8412 input chip ("C" release) with much less jitter than the original Yamaha 3623. Most importantly, Theta's famed software-based digital filter has been updated to a higher-performance algorithm than its predecessor's, and the socketed ROM chips keep the Basic II ever-updateable in the event of ever-better filters in the ever-evolving world of the ever-tinkering Mike Moffat.

Whereas the old Basic featured an Analog Devices AD-1860 18-bit DAC per channel, the Basic II uses Burr-Brown's new dual 18-bit PCM-67 DAC, a new "hybrid" chip that combines a conventional 10-bit R-2R DAC that operates on the upper 10 bits, and an advanced single-bit DAC with noise-shaping to convert the lowest 8 bits; Burr-Brown claims this hybrid chip offers the best of both worlds. Good news also is that, unlike the original Basic's AD-1860 DAC, the Burr-Brown chip doesn't require an MSB trimpot to achieve optimum low-level linearity. The only other digital processor I know of that uses the PCM-67 is the Sumo Theorem, which got a hearty thumbs-up from Digital Lad in Vol.15 No.10.

While most manufacturers offer "pseudo-balanced" outputs by simply applying the unbalanced analog signal to XLR pin 2 and inverting it for pin 3, the Basic II is true-balanced all the way back to the digital data stream; when you order the balanced option with the Basic II, Theta duplicates the entire signal path from DAC to analog stage. As the PCM-67 is a stereo DAC, each channel uses a single PCM-67 to generate a true-balanced audio signal, with each half of the DAC handling either the + or – half of the balanced signal; the digital data stream is inverted for one of the PCM-67's two digital inputs.

Theta chose to balance the signal all the way back to the DACs for two very important reasons. As a balanced signal path derives the audio signal from the *difference* between the + and – halves, any radiated clock noise, RF, or other floating nasties will automatically cancel out in balanced operation. Second, any distortions and nonlinearities inherent in the PCM-67 DAC will also cancel if the balanced outputs are used. Keep in mind that neither of these advantages will be realized if the unbalanced RCA outputs are used; when used unbalanced, the inverted signal from the DAC and analog stage is ignored.[1]

The Basic II's analog section has been upgraded from original Basic's, with a PMI/Analog Devices AD829 high-speed op-amp for the I-V converter and the beefy PMI/Analog Devices BUF-03 high-current buffer to handle the output drive. As the balanced version of Basic II doubles the analog stage, a total of four each of the AD829s and BUF-03s are used, one set for each ± phase of the left and right audio signals; the single-ended Basic II has two each of these chips.

Peeling back the lid confirmed Theta's claim that the Basic II is a totally new unit and not just the original with a few added improvements. While the separate power supplies for the digital and analog sections remain the same (aside from beefier 3300μF caps in the analog supply *vs* 2200μF jobs in the old Basic), the rest of the board has been totally revamped. Layout and parts quality are as good as it gets in the High End, with precision polystyrene caps and *muy expensivo* Vishay bulk-foil resistors used throughout the analog stage.

System

The Basic II has been my main digital vein for the past several months, used with the following gear: Aunt Corey's buffered passive preamp and the Melos SHA-1 for unbal-

1 Mike Moffat told me a way to get the benefits of the balanced outputs with an unbalanced preamp: this involves making up an unbalanced cable with XLRs at one end and RCAs at the other, with the signal conductor soldered to XLR pin 2 and the shield/ground soldered to pin 3, pin 1 left floating. As long as the Theta is the only piece of gear fully grounded —that is, plugged into the AC without a cheater plug—this method is supposed to take advantage of the distortion-canceling advantages of the balanced outputs and sound better than running the Theta from the unbalanced RCA outputs. Whatever the reason, in *my* system, the sound was total distortion, especially in the bass. Of course, my system is probably the one in a billion that won't work with this special hookup, so let me know if you have better luck with yours.

anced, and the Classé DR-5 Mk.II preamp for both unbalanced and balanced operation; VTL Deluxe 225 and Aragon 4004 Mk.II amplifiers; Theta Data and Data II digital transports; the mighty Muse Model 18 active subwoofer; ProAc Response 2, Spica Angelus, and Eminent Technology LFT-VIII speakers; balanced and single-ended Kimber KCAG interkonnekt, 4AG speaker kable, and Kimber AC Power Kords; AudioQuest silver Lapis interconnect; and Power Wedge AC line conditioners.[2]

The analog setups used to compare the processors with LPs were a Linn LP-12/Lingo/Trampolin/Ekos/Klyde, and a Well-Tempered Record Player fitted with Sumiko's Blue Point Special cartridge. The Grado HP-2 headphones, driven by the Melos SHA-1 headphone amp, were also used for a lot of the listening like when I wanted to hear whether Elvis was wearing Royal Crown or Georgia Peach pomade when he sang the title track off his *Reconsider Baby* (RCA PCD1-5418) blues CD.

Sound

I guess it's not going to shock you that I dig Theta's Basic II; would I use something for four months if I thought it *sucked?!* No, the new Basic II KICKS ASS, and shakes up the whole digital equation for how good a sound you can expect for this kind of money. As long as I've been listening to it, I'm *still* amazed at the sheer gulf between good budget-reference gear like the $800 JVC XL-Z1050 player and the $400 Audio Alchemy DDE, and the level of performance I hear from the Theta DS Pro Basic II. It's *not* just "a little bit better" than standard digital playback, believe me; listening to the same CD on the Audio Alchemy DDE and then the Theta is like hearing a concert from outside the arena and then walking inside to *really* hear what's going on.

The new Basic II is, aside from their own Gen.III and the Levinson No.30, the most balanced-sounding digital processor I've heard at any price. While most processors have a readily identifiable tonal signature, the Basic II offers an extremely neutral and chameleon-like presentation that changes dramatically and correctly with every CD it decodes. If the disc is smooth and warm, that's what you'll hear if the rest of your rig is up to the Theta's snuff; if you slap on the Stooges' *Raw Power*, you're going to hear every bit of the edginess and distortion that led Bowie to hand in his producer's credentials. Slip in a Chesky and the walls of your listening room disappear; crank up almost any major-label release and suddenly the soundscape collapses into a flat screen stretched taut between the speakers. What I'm trying to tell you is, the Theta is one of the most truthful and honest digital processors I've yet heard, right on the heels of the Gen.III and the No.30 in offering the listener a lion's share of those *muy expensivo* processors at a fraction of their cost.

The Once and Future Basic

Comparisons with the Theta's original DS Pro Basic are inevitable. As I said before, the Basic II is a totally new design, not just an improved "mod" of the original Basic circuit, so I hauled out the same Basic that RH reviewed in Vol.13 No.8 for comparison. Levels were matched by playing the 1kHz tone off *Stereophile*'s Test CD 1 and measuring the AC voltage across the speaker terminals; as the new Basic's output level is a good deal lower than the original unit's, this was *muy importivo*. The Basic II's output level was also a bit lower than the PS Audio UltraLink's, so the appropriate adjustments to the volume control were made for this comparison, too, although if I hear Sam Tellig's thick'n'rich voice intone "Please set playback level accordingly" one more time, I may have to stalk and kill him.

I'm not going to tell you it was a blowout, because that would be an understatement. The new Theta was clearly in a higher league, making the older processor sound grainy and slow by comparison. As stunning as the improvement was when I first compared the original Basic to run o'the mill CD players, that's how dramatic the difference was between the old and new Thetas. The original Basic's tendency toward hardness was largely absent from the Basic II, whose high end was clean, clear, and free of the original's slight grain and roughness. The crashing cymbals on RH's drum track off *Stereophile*'s Test CD 2 were far cleaner and better defined with the

2 I almost want to call the Power Wedge a necessary partner to the Basic II; the Theta sounds *significantly* more open and three-dimensional when plugged into one of these excellent AC line conditioners, even though the Theta has its own small line filter built into its IEC AC receptacle. The difference is *not* subtle, so go on; give your Theta a Wedgie.

Basic II than with the original Basic, with less hashiness and a better delineation between successive crashes.

Bass, too, was much improved, and it didn't take mondo woofato organ CDs to hear the difference. Even though the original Basic still has a very clear and well-defined bottom end, the Basic II is much better. Holy butt-bumping music like King Floyd's "Groove Me" off the *Atlantic Rhythm & Blues* collection, and the badder-than-Shaft "He Bite Me"[3] off The Meters' *Good Old Funky Music* (Rounder CD 2104) was so much more powerful with the Basic II. The heavy bass-drum-guitar grooves locked in so much more tightly and viscerally with the new Theta in the chain, I can't believe that opera-loving Mike Moffat doesn't have just a *little* bit of Hot Buttered Soul chugging through his veins!

But it was in the rendition of space that the new Theta *really* wiped the old. CD after CD, the entire soundstage opened up so obviously and dramatically that I found myself pulling CDs out of the rack I hadn't listened to in years, to see if *they* had "hidden space" too. Even the Dead's *Terrapin Station* (Arista ARCD 8065) came to life; although this is one of the least successful CD transfers in my collection compared to the original LP, the Basic II endowed it with a sense of dimensionality and depth that was much closer to the LP than when decoded with the original Basic. Mickey and Billy's percussion barrage on track 6, the extended "Terrapin Suite" (side 2 of the LP), was a lot closer to the original dimension and soundscape I hear on the LP. Although the Arista CD still suffers from a general "closed-in" character compared to the original record, the Basic II went a long way toward bringing it back to life.

Enter the UltraLink

OK, so the new Basic kills the old in every possible dimension. But how does it compare to its similarly priced competition? As Digital Lad tagged PS Audio's $2000 UltraLink as his first choice in a digital processor under 2k, I asked PS Audio to lend me an UltraLink so I could compare the two overachievers.

I should note that while the UltraLink comes with balanced outputs as standard equipment and the Theta's balanced outputs add $400 to its price, the method in which each processor derives its balanced outputs is significantly different. The UltraLink employs a single stereo 20-bit UltraAnalog DAC for both channels, and splits the DAC's analog outputs into + and – signals *after* the DAC converts the digital signal into analog.

As I described earlier, the Theta splits its digital stream *before* the DAC, with each PCM-67 DAC decoding the + and – halves of the balanced digital signal. Theoretically, this results in cancellation of both clock-signal artifacts riding on the output signal and other distortions inherent in the DACs themselves. Throughout these comparisons, both the Theta Basic II and the PS Audio UltraLink were driven by the Theta Data II's AT&T optical output.

Taken from their unbalanced outputs into either the Melos SHA-1 or Classé 5 preamp, the two processors' distinctly different characters were obvious and striking. The UltraLink excelled in the areas of HF smoothness and clarity, while the Theta was much more dynamic, as well as far more rock-solid in the low end. The UltraLink was the picture of politeness, while the Theta rocked the house. If the two processors were pianists, they'd be Bill Evans and Little Richard; even though I dig the *Quintessence* record RH bought me last time we hung in Austin, I never saw Bill Evans play the piano by leaping into the air with a whoop and crashing down on the keys with his butt, and in *my* book, playing the piano with your butt trumps introspective chord clusters *hands down!*

Unlike RH, I didn't hear any of the excessive midrange forwardness he reported, but then it's also possible that the Theta, my only point of reference to the UltraLink at the time, has a similar forwardness. Even so, with any combination of the gear I listed earlier, I never felt that either processor's midrange was too prominent or pushed forward; comparing well-transferred CDs like the MFSL gold *Slowhand* and AudioQuest's *Luke and the Locomotives* to their vinyl counterparts, both processors did an excellent job of preserving the spectral balance of the original recordings. While it's entirely possible that com-

3 When I'm sliding on my fox-fur coat and my purple feathered gaucho hat on my way to the Players' Ball, I like to listen to this cut to get my backfield in mo-tion, dig? Solid![4]

4 Sorry about that momentary lapse into fly-talk; I was just watching reruns of "Good Times," and all that lowdown funky dialogue from the white Jewish writers got me in a slinkified mood. It shan't happen again.

ponent interactions could have accounted for the UltraLink's midrange forwardness noted in Bob's review, I didn't hear it. On my own "Eden" recording, the guitars had the correct midrange timbres with either the PS Audio or Theta processor.

But while the UltraLink struck me with its utter cleanliness and smoothness through the midrange and high end, extended comparison with the Theta showed it to be a little *too* smooth. This is a characteristic I've heard from UltraAnalog-based processors in general, like the Levinson No.30, ARC DAC1-20, and VTL Reference; while these processors are arrestingly smooth and clear at first listen, I find them to subtly "clean up" every CD they're fed, even if the CD isn't that clean to begin with.

Unless you're intimately familiar with the sound of a recording *before* its conversion to digital, though, it's impossible to say whether the UltraAnalog-based processors are actually more accurate than others or, in fact, impose their own sonic signature on the music. Turning again to my "Eden" recording, I have to say that the sound of this track with the Basic II in the chain was much closer to the sound of the original analog two-track master than the UltraLink, which rendered the purposefully distorted Stratocasters as much less hot and aggressive than the original master. Interestingly, Bob Deutsch also noted this "cleaning-up" of "Eden" in his "Follow-Up" of the UltraLink in Vol.15 No.9, but as he hadn't heard the original master tape, RD understandably assumed that the UltraLink was "stripping away" distortion to get to the real sound of the track. As it turns out, the UltraLink *did* make "Eden" sound cleaner than the Theta, but it was the Theta which came closer to re-creating the original sound of the track, not the UltraLink.

Still, the Theta wasn't perfectly neutral either. With both processors taken from their unbalanced outputs, I felt the Theta's highs to be slightly harder and less open than the UltraLink's. Even though its performance in this area was leagues ahead of the original Basic, the new Theta still retained a bit of bite in the upper midrange and high end that showed up most dramatically in head2-head comparisons with the Linn and Well-Tempered analog rigs. If all you're used to is the sound of more run o'the mill digital playback like the Rotel and Adcom players and you get a chance to hear the Basic II, you'll think I'm insane. But compared to both the sound of the UltraLink and good analog, the Theta did have a very slight but noticeable hardness in the upper mids and highs.

Balanced output amendment

Then I tried the Theta's balanced outputs into the Classé's balanced inputs. *¡DIOS MIOS!* The Basic II sounds *substantially* better when run balanced, virtually across the board, even in areas where it already sets new standards for performance in its price class. If the unbalanced comparison between the UltraLink and the Basic II was close, the balanced match-up was no contest; taken from their XLR jacks, the Basic II easily edged the UltraLink.

The slight hardness I heard from the Theta when used in unbalanced configuration was totally absent; in fact, the balanced Basic II sounded no less smooth and liquid through the mids and highs than the UltraLink, which sounded identical in either single-ended or balanced mode. The improvement that balanced operation made to the Theta, however, was dramatic. Basslines were stronger, the tight low end throughout Los Lobos' killer new *Kiko* gaining a sense of effortlessness that exceeded even the high mark set by the Theta's unbalanced jacks. And not only was the bottom end stronger and deeper, but it became much better defined in terms of pitch and intonation; in fact, the improvements in the Theta's bass when switching from unbalanced to balanced were very similar to those I heard when I switched from the Linn LP-12's Valhalla board to the outboard Lingo power supply; an already great low end became *awesome.*

While already wide and well-defined, the Basic II's soundstaging capabilities swelled to the bursting point when I switched over to balanced hookup. On the "Angels With Dirty Faces" track off *Kiko*, there are handclaps and shaker sounds that appear beyond the right and left speaker positions, respectively; the handclaps, in particular, are pretty far outside the right speaker if your system can "do" this kind of thing.[5] Over the UltraLink, the soundstage was extremely well-defined, but the handclaps and percussion were only slightly to the outsides of the speakers. With the Theta, on the other hand, these sounds moved several feet beyond where the

UltraLink had placed them, giving the whole presentation a much larger, more dramatic perspective. Other "outside" images that were consistently farther outside the speaker positions with the Basic II were the solo vocalist on JA's Elgar recording on *Stereophile*'s Test CD 2, and *especially* the "Well done!" at the very end of JA's Chopin recording on Test CD 1; I have never heard this voice sound as far beyond the left speaker as with the Basic II in the chain.

Depth, too, was an area where I felt the Theta edged the UltraLink. As strong as the PS Audio processor is at fleshing out the sound of well-recorded CDs from front to way, way back, the Theta consistently outdistanced its rival. Track 2 on *Kiko*, "Wake Up Delores," features the rhythm guitars of David Hidalgo and Cesar Rosas right up front and panned hard left and right, with Louie Perez's drum kit set farther back in the mix in the center of the soundstage. Whereas the UltraLink portrayed these disparate instruments as clearly defined in space from the rear of the soundstage to the front, the Basic II gave much more of a sense of real musicians in a real space; the triangle of air between the two guitars and the drum kit was much larger and more believable than with the UltraLink. The Theta's ability to re-create a vast and vividly defined soundscape with the appropriate recordings is unbelievable, in my experience equaled or exceeded only by two processors: Theta's $5400 Generation III and the Levinson No.30.

In overall ease, the balanced Basic II was, again, superior to the UltraLink. While the two processors are very competitive when run single-ended, the margin becomes much wider when they're run balanced; the UltraLink's sound doesn't really change when you go to balanced operation, while the Theta becomes vastly better from A to Z. Either one of these two units is in the top five best digital processors at any price, but the balanced Theta was clearly a cut above the UltraLink.

I think the most telling account of any audio component is the type of music you tend to subconsciously "match" it with to show off its best attributes. When I've got a piece of gear here for review, I naturally gravitate toward the recordings in my collection that will demonstrate what it can and can't do; the intrinsic character of the gear under review always seems to "call out" for certain kinds of music after I live with it for awhile.

With the UltraLink in the chain, I found myself listening to more sedate, audiophilesque recordings like Clapton's *Unplugged* and the Cowboy Junkies' *The Trinity Session*, digging the crystalline clarity and soothing relief from digititis that are the UltraLink's strong points.

With the Theta, though, I cranked up the Zeppelin, Dan Baird's hot new *Love Songs for the Hearing Impaired*, and the Red Devils' almighty *King King*, as well as the rhythmically intense *Kiko*. The Basic II just has so much more pace, slam, timing, whatever British appellation you want to tag it with; the Theta's got rhythm like no other digital processor I've heard except the Gen.III. And as my listening diet consists of mostly groove-heavy music, I was never really happy with the sound unless I had the Theta hooked up.

Switching to the terrific-sounding UltraLink was never disappointing, but the whole "feel" of the system changed dramatically, and music that depended on a strong sense of rhythm just didn't come across as viscerally as with the Theta. If my tastes ran more toward softer, gentler types of music, I'd probably prefer the PS Audio processor.

They don't. The Basic II is a digital processor after my own monkey bone!

The built-in upgrade path

What with the digital world undergoing massive and daily upheaval, a lot of audiophiles are understandably cautious about parting with anything over $500 for a digital rig for fear that something a lot better and a lot cheaper is just around the corner. And for the most part, I couldn't agree more! Digital *is* moving fast, and yesterday's $12,000 Stax processor is today's $3000-or-best-offer ad in *Audiomart*. Thankfully, the Theta Basic II presents an interesting way around this queasiness—the built-in upgrade path.

What you do is this: Say you've got a Rotel CD player, or a JVC, Adcom, whatever; as

5 And if you futz with your system and *still* don't hear the handclaps outside the right speaker position, don't sweat it! This is one of those audionut "extras" that only reviewers and other sickos care about; it's cool man cool when your system can resolve this kind of thing, but hardly grounds to get uptight if it can't.

Sicko Tip: try hanging rugs on your sidewalls from the speaker plane to your listening seat; speaker-spray off the sidewalls is the #1 enemy of "outside" images, followed by poor inter-speaker response. If the handclaps won't go past the right speaker after you put up the rugs, then by all means shut the garage door and start the Cordoba.

long as it's got a coaxial digital output, you're fine. GO AHEAD AND BUY THE BASIC II. And pay the extra $800 for balanced outputs and AT&T while you're at it, even if you can't use either for the time being (don't worry—you will soon enough). When you hear the across-the-board improvements the Theta brings even when driven by a run o'the mill CD player's dig-out jack, you'll flip your lid and catch it like those Frisbee dogs at the beach.

A couple of months go by; ready for even *better* sound? Instead of buying a new processor, buy the Theta Data II transport with AT&T.[6] Suddenly, your system's got balls, depth, slam—it's too good to be true! *Everything*'s much, much tighter in focus, and the sense of space around and behind your speakers sets a new high-water mark. *Surely* it can't get any better than this.

Well, your name's not Shirley. Now, just when you think the Theta sounds as good as it possibly can, get yourself a balanced preamp. You don't need to get a balanced amp too—just the preamp, so you can run the Theta's balanced outputs instead of the RCAs you've been using since you bought the wonderful thing. And this is when you literally won't believe you're hearing the same $2800 Basic II you bought all those months ago.

An upgrade path of leaps and bounds to keep you hopping, and all built into *one* digital processor; is that the coolest or *what?*

Measurements from TJN

The output impedance of the DS Pro Basic II measured between 1 and 2 ohms at the unbalanced outputs at 20Hz, 1kHz, and 20kHz, and slightly higher at the balanced outputs—between 2 and 6 ohms. In neither case should there be impedance matching problems with any associated component we are aware of. The maximum output level of the DS Pro Basic II was 2.1V at the unbalanced outputs, 4.2V at the balanced, both figures closer to those of most other processors than the very high output levels of some of Theta's other products. DC offset measured 0.3mV (L) and 0.1mV (R), both balanced and unbalanced. The output of the Theta was noninverting, with pin 2 positive in the balanced configuration. It had no difficulty locking on to all standard sampling frequencies (32kHz, 44.1kHz, 48kHz).

The frequency response of the Pro Basic II is shown at the top of fig.1, the de-emphasis error at the bottom, displaced by 1dB for clarity (balanced output; unbalanced is essentially the same). Neither requires comment. The stereo crosstalk for the balanced output (fig.2) is closely matched between channels,

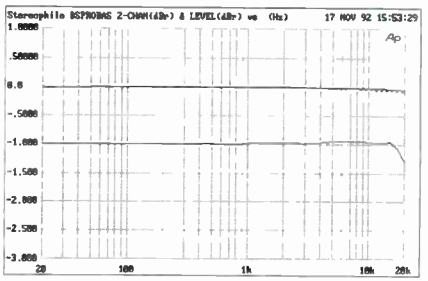


Fig.1 Theta DS Pro Basic, frequency response (top) and de-emphasis error (bottom) from balanced outputs (right channel dashed, 0.5dB/vertical div.).

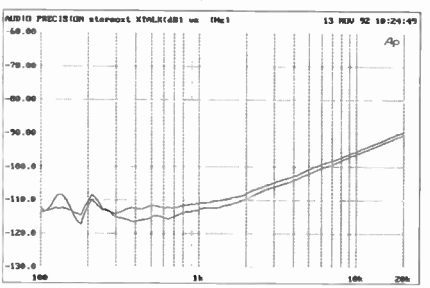


Fig.2 Theta DS Pro Basic, crosstalk from balanced outputs (10dB/vertical div.).

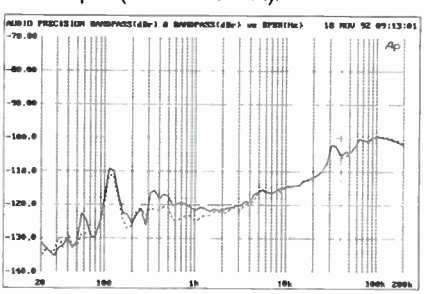


Fig.3 Theta DS Pro Basic, spectrum of silent track, 20Hz–200kHz with noise and spuriae, balanced outputs (⅓-octave analysis, right channel dashed).

6 If you've already got a Data I and you've only got $400 to spend, I definitely recommend getting your transport updated to Series II status instead of adding AT&T. When I got my AT&T'd Data back from being updated to Series II, I found the sound of the new Data driving the Basic II via a coax hookup to be clearly better than AT&T hookup with the Series I. Of course, Series II *and* AT&T is the best-sounding combo by far, but if you must choose between getting your Data fitted with AT&T or Series II innards, go for the Series II first.

and better than –110dB below 1.5kHz, which is excellent. The typical decreasing separation at high frequencies is caused by capacitive coupling between channels. In the unbalanced mode, the crosstalk was asymmetrical, with the R–L leakage being lower above 1kHz than R–L. Both are still more than acceptable, with the crosstalk in the better channel actually lower than in the balanced mode. Fig.3 shows the spectral analysis of the balanced output of the Theta with an input of "digital silence." A power-supply–related spike, still low enough in level to be essentially inaudible, is evident at 120Hz, with a smaller spike at 60Hz. The broad rise in ultrasonic noise is presumably due to the PCM-67's noise shaping. At the unbalanced output (not shown), the noise levels were generally 2–4dB higher above 1kHz, and slightly *lower* in the "hum" region, with the 60 and 120Hz spikes effectively disappearing.

Fig.4 shows the results at its balanced outputs of the Theta decoding a –90dB, dithered 1kHz sinewave. The 120Hz power-supply

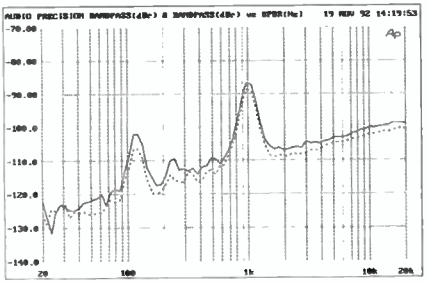


Fig.4 Theta DS Pro Basic, spectrum of dithered 1kHz tone at –90.31dBFS with noise and spuriae, balanced outputs (⅓-octave analysis, right channel dashed).

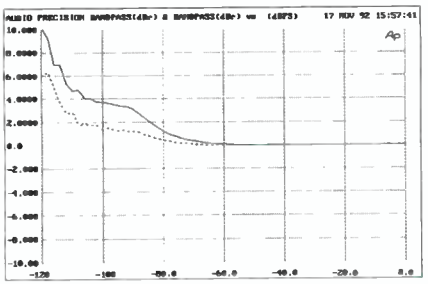


Fig.5 Theta DS Pro Basic, departure from linearity, balanced outputs (right channel dashed, 2dB/vertical div.).

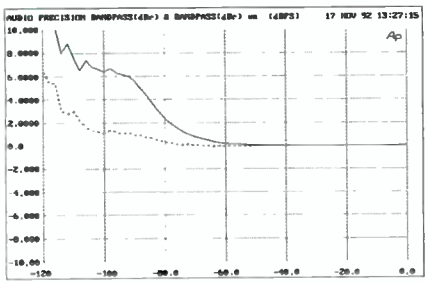


Fig.6 Theta DS Pro Basic, departure from linearity, unbalanced outputs (right channel dashed, 2dB/vertical div.).

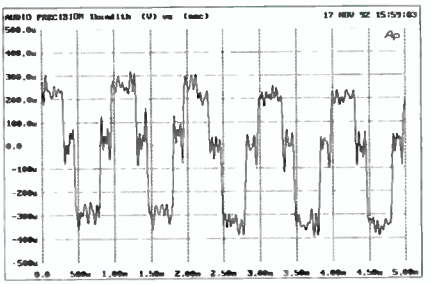


Fig.7 Theta DS Pro Basic, waveform of undithered 1kHz sinewave at –90.31dBFS. Note good "stairstep" shape as wave toggles between +1 and –1 LSBs and 0.

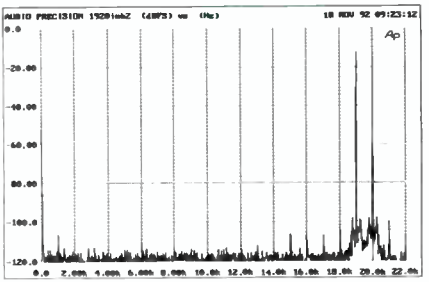


Fig.8 Theta DS Pro Basic, HF intermodulation spectrum, DC–22kHz, 19+20kHz at 0dBFS. (Linear frequency scale, 20dB/vertical div.)

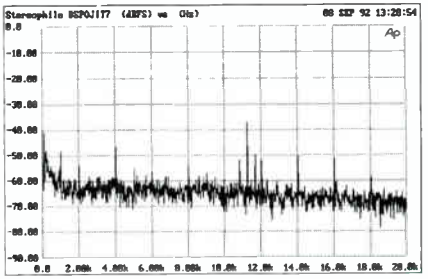


Fig.9 Theta DS Pro Basic, word-clock jitter spectrum, DC–20kHz, when processing 1kHz squarewave at 0dBFS. (Linear frequency scale, 5dB/vertical div., 0dB = 226.8ns.)

noise is still visible, as are some low-level artifacts above the 1kHz signal frequency. Note the slight differences in the level of the -90dB tone between the channels. The curve for the unbalanced output (not shown) is similar, with two exceptions. First, the low-frequency power-supply noise visible in fig.4 effectively disappears. Second, and surprisingly, there is a larger difference in the level of the tone between the channels. The latter is more easily seen in the plots of linearity error *vs* recorded level, figs.5 (balanced) and 6 (unbalanced). Note that while the right-channel nonlinearity (dotted curve) is nearly the same, balanced or unbalanced, the left (solid curve) is noticeably worse in the unbalanced mode. The right-channel nonlinearity is very good—not exceptional by today's top standards, but certainly nothing to complain about, either. The left is mediocre, especially in the unbalanced mode. I suspect that in the balanced mode, which uses a separate DAC for both hot and cold signals, the ultimate summing of the analog signals cancels some of the DAC's inherent linearity error. In the unbalanced mode, what you get in the way of error is what the DAC delivers.

A 1kHz, -90dB undithered sinewave from the Theta is shown in fig.7. The stairstep nature of this wave is quite well reproduced, better than from most processors, though with a little asymmetry. Like the response from Theta's flagship DS Pro Generation III, the response of the Pro Basic II's reproduction of a 1kHz squarewave is typical of processors using linear-phase digital filters. The result of driving the Theta with a combined 19+20kHz signal at full scale (0dB) is shown in fig.8. The results shown are for the balanced output. All of the artifacts are well down in level, with the 1kHz difference tone at less than -90dB.

Finally, the Pro Basic II's level and type of jitter were measured using the procedure outlined by Robert Harley elsewhere in this issue, driving one of the Basic's coaxial inputs from a JVC XL-Z1010 CD player. The Theta's measured level of RMS jitter was pretty low and ranged very little, from a maximum of 147.8ps when decoding a 1kHz sinewave at -10dBFS, to a minimum of 131.7ps for a -90dBFS 1kHz sinewave. The spectrum of the jitter was also quite random, though there were a few discrete frequencies present. Fig.9 shows a typical spectral analysis of the jitter, taken by demodulating the 8x-oversampling word-clock signal (352.8kHz) at the appropriate pin of the Burr-Brown PCM-67 DAC while the chip was processing a 1kHz squarewave signal at 0dBFS. (The 0dB reference in this graph is equivalent to 226.7ns of jitter, 1% of the word-clock period.) The 11,250Hz component was always present in the jitter, though the 2kHz-spaced tones came and went according to the level of the data being decoded. Note the relatively low level of the data-correlated 1kHz component.

Altogether, the measured response of the DS Pro Basic II was very good, only the left-channel linearity marring an otherwise excellent result. **—Thomas J. Norton**

Conclusion

Theta's new DS Pro Basic II is one of the greatest bargains in high-end audio; for only $2800 for the balanced version with AT&T, it nips mightily at the heels of the very best digital playback at any price. In terms of rhythmic strength and sheer dynamic slam, I rank the Basic II, when used with its balanced outputs, right up there with the best I've heard: Theta's own Gen.III. It clearly belongs at the top of Class B in our "Recommended Components," eclipsed only by its more expensive sibling.

Mike Moffat and the rest of the Theta mob have hit again on what makes good digital tick; their new Gen.III and Basic II processors are extraordinarily musical, effortlessly dynamic, and possess the best bottom end in digital today. If you can't quite see clear to spending five grand and up on a digital processor (or even if you can), the Theta DS Pro Basic II is a must-audition. The similarly priced PS Audio UltraLink is an excellent-sounding product, but if *I* had $2000 to spend on a digital processor, the Basic II would definitely be the one I'd buy.

Forget "highly recommended"; the Theta DS Pro Basic II RULES!

—Corey Greenberg

Professional Audio Systems Studio Monitor 1

Dick Olsher

Two-way, bi-amplified monitor, with external active crossover. Frequency response: -3dB at 37Hz, ±2dB to 20kHz. Phase response: varies less than ±10° from 100Hz to 10kHz. Nominal impedance: 8 ohms. Maximum continuous SPL at 1m: 128.5dB for the pair. Power handling (continuous): 30W for the tweeter, 300W for the woofer. Recommended amplifier power: 100W minimum, tweeter; 300W minimum, woofer. Dimensions: cabinet, 25" H by 19.5" W by 18.5" D; crossover, 19" W by 10" D. Weight (speaker cabinet): 95 lbs each. Serial numbers of samples tested: 1131 L & R. Price: $4800/system. Approximate number of dealers: 12. Manufacturer: Professional Audio Systems, 660 North Twin Oaks Valley Road, San Marcos, CA 92069. Tel: (619) 591-0360. Fax: (619) 591-3602.

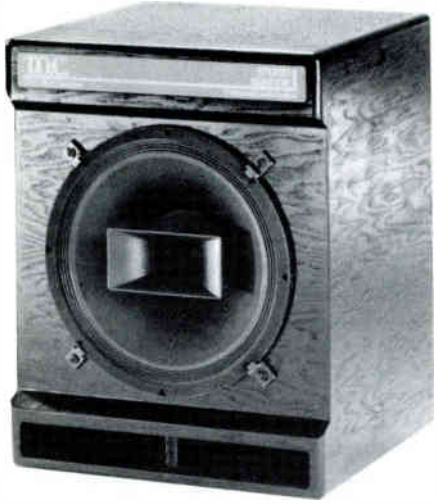
The older I get, the more my views align with those of J. Gordon Holt. For as long as I've known him, he's consistently dodged audiophile manna. I'm sure that, for JGH, hell on earth would be to be chained in front of a pair of gutless audiophile-grade minimonitors with an endless supply of rock'n'roll CDs.

Gordon has often said that horns are the way to go, with their high dynamic range, though their tonal balance may not always be what is required by an audiophile. When I read a rave review of the Professional Audio Systems Studio Monitor 1 in *Mix* magazine, therefore, it seemed that this would be the studio monitor that could work when judged by audiophile criteria.

For the music lover, the world begins with authentic tonal balance. The concert-hall experience is predicated on the power and majesty of the orchestra. The fundamentals of the instruments, the effortless ebb and flow of the orchestra's power range, are what most impress. Imaging precision? Not really. It's impossible to resolve individual violins or to pinpoint a woodwind solo. Treble information? Think again. Other than the occasional raucous brass passage, treble detail in the concert hall is far different from that portrayed by the typical audiophile tweeter. Etch and sizzle are *not* attributes of the live experience. Audiophiles often wonder, after one of their rare visits to a concert hall, where all the treble went. In the hall, it is the clarity, power, and coherent wave with which the bass and midrange are launched that communicate the essence of being there. Symphonic music, jazz, and even pop ultimately lose the concert-hall imprint by being reproduced through tonally unbalanced speakers.

The Monitor Experience

So—can a studio monitor work in an audiophile setting, but bring its own virtues to bear on the music? Although no physical law prohibits a studio monitor from having audiophile appeal, by the nature of its design philosophy it is usually doomed to such a fate. The design priorities of a studio monitor are far different from those of a domestic loudspeaker.



Professional Audio Systems
Studio Monitor 1 loudspeaker

In brief, a home speaker should be fun and involving. Its presentation should be easy on the ears (*ie*, texturally smooth), and believable to the point of conjuring a plausible illusion of the real thing. That means a transparent soundstage with precise spatial resolution that yields a feel for the space of the recording, timbral accuracy, retrieval of low-level detail, and, most important, the ability to convey the rhythmic drive of the music together with the dynamic bloom that gives live music its dramatic bite.

Studio monitors are intended for a far more specific task. Think of them as tools for dis-

cerning the tonal balance of a particular take for the purpose of post-production equalization, or the relative balance between instruments for optimizing mike placement, or for revealing intonation problems, extraneous noises, and poor edits. Their cardinal design priorities are high spl output at low distortion levels, and accuracy of tonal balance. The issue of reliability is crucial in professional environments, where equipment downtime means lost wages.

It is thus incumbent upon a studio monitor to be as perfect a transducer as possible—at least from 40Hz to 15kHz. For nearfield monitoring, deviation from flat should not exceed ±3dB—at least over a narrow window on-axis. For midfield monitoring, the power or polar response of the monitor through the mids should be fairly uniform—the optimum dispersion pattern being dependent on the room and acoustical treatment—but in general should not be less than the directivity of actual musical instruments.

Finally, we come to the criterion of ultimate sound pressure level. *Wireless World*'s "Cathode Ray" columnist succinctly defined the problem many years ago: "Unless sound is reproduced at the same level as the original, the balance of tone cannot be the same as in the original, no matter how 'high-fidelity' the equipment." But many engineers seem to want to monitor recordings at levels that far exceed what is appropriate for the scale of the music. Granted, extraneous noises and intonation problems are easier to resolve at higher spls, but how can anyone possibly get a realistic fix on the tonal perspective of, say, a symphony orchestra recording monitored at peak spls approaching 120dB, when concert-hall peaks rarely exceed 103dB? Not only that, but prolonged exposure to such levels leads to a permanent upward shift in the auditory threshold.

There appears to be a syndrome in which hearing-impaired recording engineers clamor for more and more dynamic headroom, hence the trend toward the use of extremely efficient loudspeaker drivers that can safely generate the required volume—but that usually don't sound too good. This sacrifice of sound quality for efficiency has given studio monitors a bad reputation.

Technical Details

The PAS Studio Monitor 1 is a two-way system with several innovative touches. The driver complement consists of a 15" paper-cone woofer built by PAS, and a TAD TD-2100 1"-throat compression driver (with a 2"-diameter beryllium diaphragm) coupled to a 30° by 60° constant-coverage horn. The horn is mounted coaxially with the woofer in the space normally reserved for the woofer's dustcap to best approximate an acoustic point source. Electronic time delay is used to compensate for the mismatch in acoustic centers of the two drivers. The technique, which PAS calls Time Offset Correction, or TOC,™ minimizes acoustic interference between drivers in the overlap region near the crossover point. Having aligned the acoustic centers of the drivers, PAS goes one step further by providing linear-phase crossover filters to maintain a constant group delay over most of the system's bandwidth. The external active crossover module provides fourth-order high- and low-pass filter networks at 1.2kHz.

The attention paid the time-domain behavior of the Studio 1 should not be surprising, considering that Larry Doran, main man at PAS, was also responsible for UREI's well-known Time Align series of studio monitors.

My sample of the crossover module was designated "The Mastering Lab Modification." In an apparent effort to improve the circuit's sonics, Doug Sax and Steve Hazelton, of Hollywood's The Mastering Lab, had modified the standard module to reduce the gain and shorten the circuit path. The mod was apparently so successful in increasing the depth and transparency of the soundstage that, according to Larry Doran, the Mastering Lab version is just about all that's sold now.

The crossover module also controls the woofer's response through a technique called Active Parameter Modification (APM). The APM circuit actively controls the woofer's "Q" to enable the use of an overdamped, high-efficiency woofer in a fairly small enclosure. The resultant sixth-order bass alignment is said to generate an extended, well-defined low end. To work properly, APM requires a bass amp with between 26 and 32dB of gain. Amps with gains of less than 26dB will cause a reduction in deep bass response due to excessive damping, while a gain in excess of 32dB will cause low-frequency oscillation.

Pots on the front panel of the crossover module allow adjustment of the input, woofer,

and tweeter levels for both channels. All input and output connections are located on the back panel. Both signal inputs and amp outputs are XLRs with the nonstandard polarity of pin 3 hot. Every piece of high-end gear with balanced connections I've seen is wired according to the IEC/ANSI convention of pin 2 hot. Avoidance of a polarity reversal when using such components with the PAS system thus requires the use of special balanced cables with pins 2 and 3 reversed at one end.

A signal ground lift is located to the left of the rear panel. In the up position, the ground lift is activated. This is *not* an AC ground lift; it merely connects or disconnects pin 1 of the input from chassis ground, providing a means for minimizing ground-loop hum.

Getting Ready to Boogie

The Crown Macro Reference seemed a natural choice of bass amp because of its incredible bass extension and control. It also offered the gain required by the PAS APM circuit. The tweeter was driven by both the Air Tight ATM-3 and the Melos Plus Series "Triode" 400W monoblocks.

All interconnects consisted of balanced Canare mike cable terminated so as to preserve the polarity of the signal through the system. The cable run from the Jadis JPL preamp to the crossover module was terminated with an RCA plug at one end whose center pin was wired to pin 3 of the XLR connector at the other end. I used Ensemble Hotline and Cardas speaker cables for the LF connections, Space & Time RSC cable for the HF connections.

With a setup of such complexity, I fully expected a ground-loop hum problem. To my amazement, everything clicked right away. However, when I later changed amps, from the Air Tight to the Melos, I had to work a bit to eliminate a hum.

The speaker cabinets were stand-mounted midfield so as to place the axis of the tweeter at ear level.

The critical system adjustment revolves around the woofer/tweeter balance. Because in a professional environment this adjustment is likely to be made using instrumentation (*eg*, a real-time analyzer)—something PAS recommends anyway—I decided to use ATI's Loudspeaker Measurement System (LMS). I measured the frequency response of both

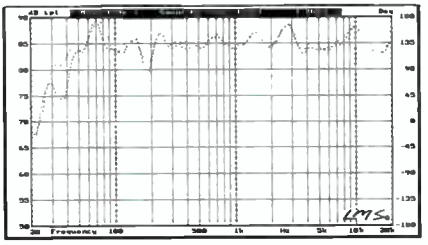


Fig.1 PAS Studio Monitor 1, Left and Right ⅓-octave smoothed in-room responses on horn axes at 1m, woofer/tweeter balance set for auditioning.

channels on-axis at 1m from the front baffle, and smoothed the response using a ⅓-octave bandwidth. The LF/HF balance pots were adjusted to obtain the responses for the right and left channels shown in fig.1. I settled on this tonal balance for the duration of the listening tests. Note that the response is far from smooth through the critical upper midrange, with a peak centered around 3kHz. Below 50Hz there's a significant difference between channels, the right channel exhibiting a dip in the 30–45Hz range; the cause of this is most likely room modes.

Listening Impressions

Yes, Virginia, horn-loaded systems *can* image well. The catch is that the drivers must be properly time-aligned. I was an eyewitness to a convincing demonstration of this by Dr. Bruce Edgar, a Contributing Editor to *Speaker Builder* magazine and a horn designer of note. During the 1992 *Stereophile* High End Hi-Fi show in LA, the good doctor invited me to audition one of his designs at a local audiophile club. In a very large room, his three-way system of horn-loaded tweeter and midrange drivers and a direct-radiating woofer in a large enclosure threw a spacious soundstage with great conviction. Image outlines were solidly focused in space. There was no confusion about spatial resolution. Outlines bloomed like the real thing.

To a degree, the PAS followed in the Edgar Horn Wonder's footsteps, the soundstage unfolding with a panoramic vista and solid instrumental focus. Yet not all was well in the Land of Oz. Under the best of circumstances —*ie*, the Sound-Lab A-1 electrostatics I reviewed in November '92 driven by the Futterman OTLs—the soundstage is lit up, as if a giant searchlight had illuminated its four corners. It becomes possible to resolve all

layers of the depth perspective and to follow the decay portion of transients into the noise floor of the hall. The feeling of being in an actual hall under these conditions is so strong that it becomes child's play to teleport the mind to another time and dimension.

To ease oneself into the Twilight Zone via the PAS Studio Monitor 1s was more difficult. Soundstage transparency through the lower mids was reduced sufficiently to hinder acceptance of the illusion. Instrumental voicing through this region was also somewhat muddled, lacking in clarity. Whether or not the veiling and diminished enunciation were caused by the breakup of the 15″ woofer cone is open to discussion. To my mind, however, pushing a 15″ cone to around 1kHz is asking for trouble. The radial and tangential breakup modes must be severe enough to color the entire midrange. An 8″ cone would have done better in this regard, but then it wouldn't have been nearly as sensitive in the bass. The design compromise appears to favor sensitivity over clarity.

It was the veiling, in combination with diminished spatial bloom, that effectively locked me out of the soundstage. The spatial impression of live instruments wasn't static, ebbing and flowing in a manner dependent on the body or sounding-board resonances. Take the violin, for example. The strings' vibrational energy is passed through the bridge to the body, where it is reinforced in a frequency-dependent fashion. The directional pattern and spatial impression of the violin vary with the note played. The same effect can be produced by a trained voice, as the chest of the singer comes increasingly into the act in the lower registers. The PAS glossed over these sorts of nuances.

The final blow came in the area of dynamic contrasts. Even though the PAS could play very LOUD, I was left unconvinced by its portrayal of dynamic shadings from soft to loud. The startle factor just wasn't there. It was as though the PAS was a bit slow out of the blocks. And by the time it picked up steam, the dramatic jolt of the music had dissipated. I knew it was in trouble when Muddy Waters (on *Muddy Waters: Folk Singer*, Chess CH-9261) failed to communicate effectively. This is the *blues*, brother, and the blues needs a transparent spatial perspective in which to weave its spell. The urgency wasn't there; the mood failed to touch me. I just couldn't step into the original space and time as I usually do with this recording.

Ditto for Herbie Mann and Cissy Houston on "Cajun Moon" (*Surprises*, Atlantic SD-1682). "Cajun Moon, where does your power lie?" asks Cissy enticingly, and through the PAS monitors, this turned out to be a moot question. The sensuous sweep of the music should latch onto your soul. Here, the urgency and power of the music were, at best, only suggested.

The tonal balance was full-bodied but with a constantly *bright* tinge. The upper mids and lower treble sounded a bit rough and metallic. Not metallic as in heavy metal, but as in the sound of Reynolds Wrap. Tear off a piece of aluminum foil and crinkle it next to your ear. That sort of flavor permeated the PAS's upper registers. Violin overtones—Itzhak Perlman performing the first Bruch Violin Concerto, EMI ASD 2926—were messed up as grain and glare were substituted for sheen and sweetness. The best demonstration of how artificial the tweeter sounded involved turning off the bass amp and listening to the tweeter alone. If I were to EQ this speaker by ear, I'm sure that the tweeter level would be turned *way* down.

With the upper mids and lower treble tinted bright and metallic, it was no wonder that the timbre of female voice was off-base. Joni Mitchell (*Blue*, Reprise MS-2038) sounded rough through the upper registers and lacked sufficient sweetness. Lesley (*Lesley*, ViTaL CD 011) suffered a similar fate. Not only did her image lose a sense of spatial bloom and convincing palpability, but the purity and sunshine inherent in her upper registers were largely gone. The resultant timbre sounded very much as if Lesley had a megaphone strapped around her mouth. But I was there in the studio during the sessions—she didn't use a megaphone.

Although there wasn't much deep bass, the mid- and upper-bass regions sounded full-bodied and remarkably detailed for a large woofer cone. Taj Mahal's upright "John Henry's fiddle" (*Recycling the Blues & Other Related Stuff*, Columbia 31605) projected a realistic tonal balance and plenty of detail—something very few speakers have been able to do. Bass lines were readily resolvable, and possessed decent speed. However, major bass transients, like timpani whacks, lacked low-frequency slam.

MEASUREMENTS FROM JA

Having spent many of my formative years listening to professional monitoring speakers—before I joined the English magazine *HFN/RR* in 1976, I worked for some years as a professional musician—I was fascinated to get one under the measurement microscope.[1] The open architecture of the PAS Studio Monitor 1 also made it possible to do a little more investigation than is usually possible with a consumer speaker. Looking first at the loudspeaker's sensitivity, this was at least 15dB higher than the audiophile speaker norm, 2.83V giving a B-weighted sound pressure level of 104dB at just over a meter on-axis. The PAS Monitor 1 will give decent levels in a typical domestic room with just a few milliwatts. On the other hand, ground-loop hums and amplifier noise will be ruthlessly revealed by such a sensitive speaker.

The individual drive-unit impedances are shown in fig.2. The tweeter reveals its horn-loading by the series of peaks and dips below 2kHz, these due to reflections from the ends of the horn. The sometime severe electrical phase angle in this region is offset by the high magnitude of the impedance. Throughout the rest of the unit's passband, the value only drops slightly below 8 ohms, a benign load. The woofer also presents an easy load to the driving amplifier, the minimum value being around 7 ohms in the lower midrange and at the port tuning frequency of 30Hz. Note the wrinkles in the plot between 200Hz and 350Hz; these will be due to cabinet resonances. Using a a PVDF accelerometer,[2] I found that, indeed, the cabinet sidewalls and back panel ring severely in this region (fig.3). This may not be audible, however, as the woofer's drive signal is incorporated in some kind of negative feedback loop. It's possible that the active crossover will compensate for the effect of this resonance, therefore. If not compensated for, however, it could well contribute to the lower-midrange veiling noted by Dick in his auditioning.

Turning next to the acoustic performance of the raw drive-units, the tweeter's quasi-anechoic on-axis response is shown in fig.4, while that of the woofer can be seen in fig.5.[3] The tweeter's raw output is characterized by a series of peaks and dips below 4.4kHz, and a 6dB-sloped-down response above that fre-

1 The drive-unit impedances were measured using our Audio Precision System One; all other measurements were performed with the DRA Labs MLSSA system, using a calibrated B&K 4006 microphone and an EAR preamplifier. —JA

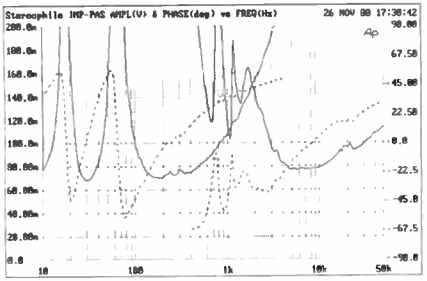


Fig.2 PAS Studio Monitor 1, electrical impedance (solid) and phase (dashed) of woofer and tweeter (2 ohms/vertical div.).

2 See *Stereophile*, June 1992, p.205; and September 1992, p.162. —JA

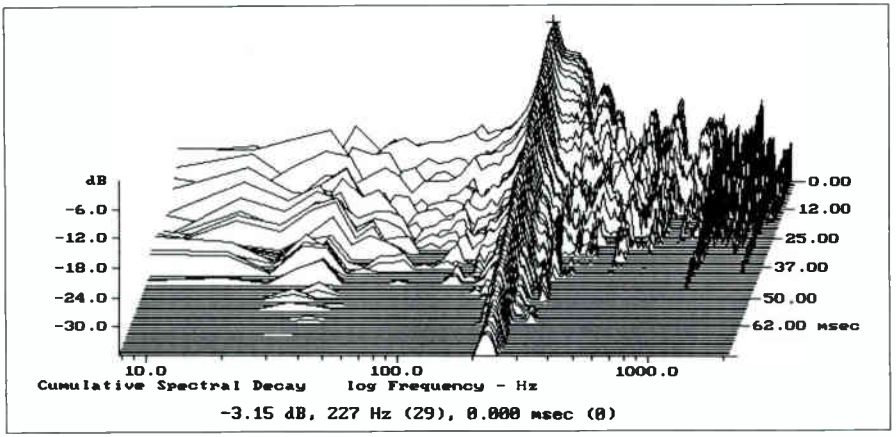


Fig.3 PAS Studio Monitor 1, cumulative spectral-decay plot of accelerometer output fastened to center of cabinet rear wall. (MLS driving voltage to speaker, 7.5V; measurement bandwidth, 2kHz.)

quency to 21kHz, above which the output drops like a stone. The woofer actually appears quite well-behaved up to 1kHz, but with a bad series of breakup modes above that frequency, the worst of which lies at 2kHz. Its fundamental low-frequency performance appears rather over-damped, with a -3dB point at 65Hz and the expected null in its output at the port tuning frequency. The port's output, measured in the nearfield, is also shown in fig.5: note the broad region covered, but also the severe peak in its output at the cabinet resonance frequency around 230Hz.

What has the PAS design team done in the crossover to solve the problems of the raw drive-units? Fig.6 shows the electrical response of the high-pass and low-pass sections. The woofer output shows a little peaking at 35Hz, with then some gentle response tailoring before the crossover around 1kHz. The ultimate low-pass roll-out is fourth-order, 24dB/octave, giving good rejection of the woofer's breakup behavior at 2kHz. The tweeter drive signal (which appears to be passive) rolls out below 2kHz, again with a fourth-order slope, with some strong response tailoring in the top two octaves.

The result can be seen in fig.7, which shows the individual responses of the two drive-units, coupled with the nearfield responses of the woofer (below 200Hz) and the port. The woofer's output has been extended and flattened to give, in conjunction with the port output, a -6dB point around 28Hz—pretty good for a speaker of this size and sensitivity. Note, however, that the peak in the port's output at the cabinet resonance frequency remains strong. Dick mentions a "veiling" in the lower midrange; I'd be surprised if this didn't also add a "woody" or "hooty" quality on male speaking voice. Note that the woofer's 2kHz breakup mode has been well suppressed, now lying some 13dB below the reference level at 500Hz. This is confirmed by the cumulative spectral decay or "waterfall" plots of the woofer before (fig.8) and after (fig.9) equalization.

3 I used a Mark Levinson No.27.5 power amplifier to drive the PAS for these measurements, with one channel powering the tweeter, the other the woofer. The low-frequency signal was taken from the power amplifier to the PAS crossover, a second set of terminals on the rear of the crossover then feeding the woofer itself. —JA

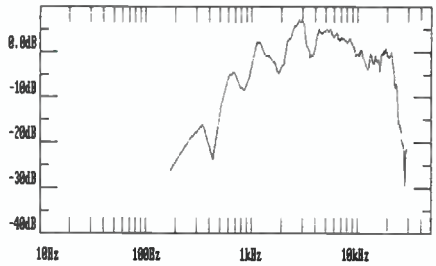


Fig.4 PAS Studio Monitor 1, acoustic output, corrected for microphone response, of unequalized tweeter without crossover.

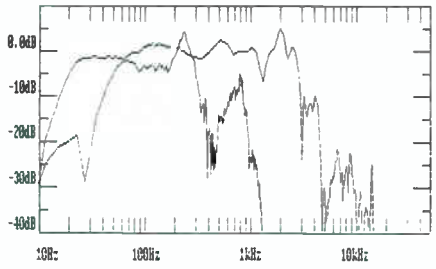


Fig.5 PAS Studio Monitor 1, acoustic output, corrected for microphone response, of unequalized woofer without crossover, with nearfield woofer and port responses plotted below 200Hz and 1200Hz, respectively.

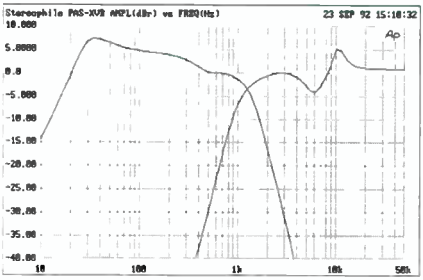


Fig.6 PAS Studio Monitor 1, electronic crossover high- and low-pass electrical responses.

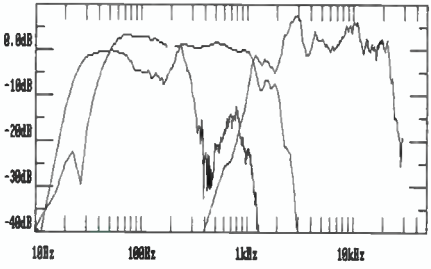


Fig.7 PAS Studio Monitor 1, acoustic crossover between equalized drive-units on tweeter axis at 45", corrected for microphone response, with nearfield woofer and port responses plotted below 200Hz and 1200Hz, respectively.

The picture is less rosy for the tweeter. Although its balance after equalization averages out as being quite flat in its passband, there is still a huge peak centered on 3.1kHz and

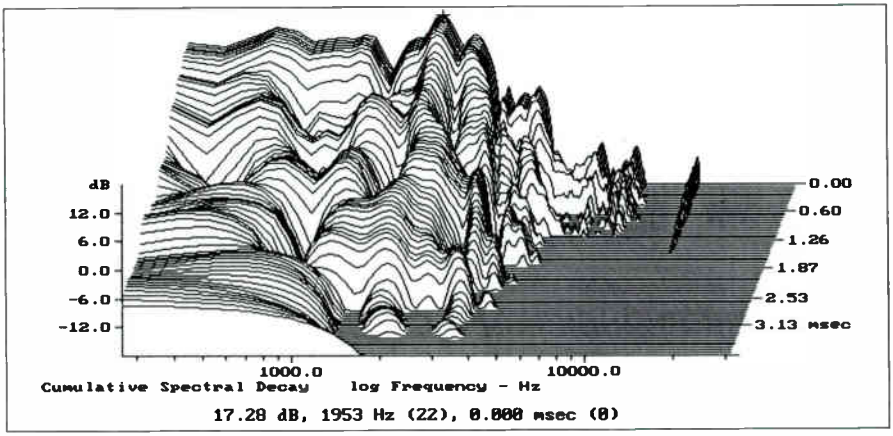


Fig.8 PAS Studio Monitor 1, cumulative spectral-decay plot of unequalized woofer at 45".

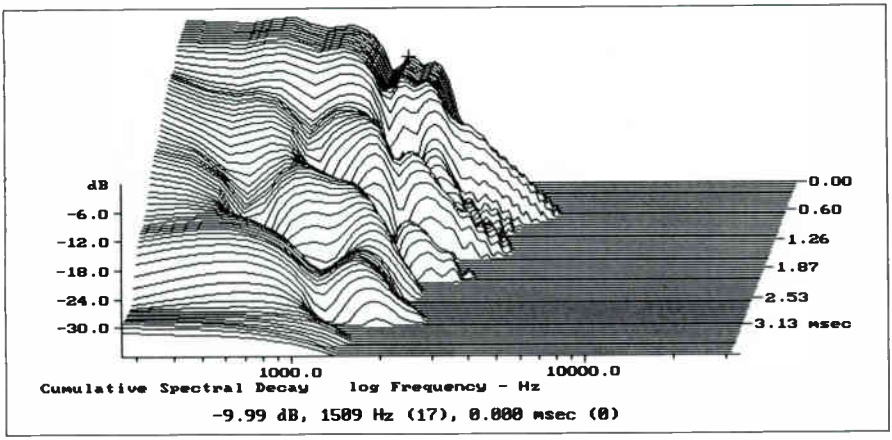


Fig.9 PAS Studio Monitor 1, cumulative spectral-decay plot of equalized woofer at 45".

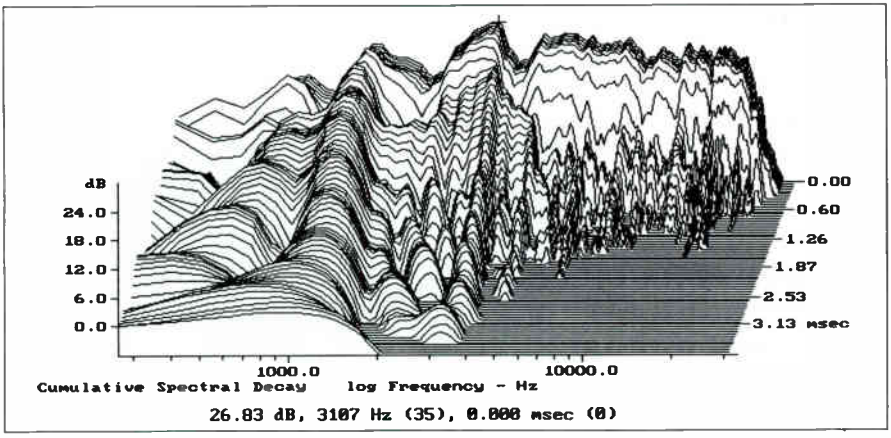


Fig.10 PAS Studio Monitor 1, cumulative spectral-decay plot of unequalized tweeter at 45".

another at 10kHz. Looking at the "before" and "after" waterfall plots (figs.10 and 11), it can be seen that the problem is caused by a resonance, probably due to the horn. The crossover filter has flattened the top two octaves and suppressed the lower resonance at 1kHz, but has left the one at 3.1kHz alone, as can be seen in the waterfall plot for the complete loudspeaker (fig.12). Here is the brightness, the metallic quality that Dick perceived. Some listeners may like the way this presence-region spotlight will show up recorded detail—this is a "monitor" speaker, after all—but it's still a significant design flaw, in my opinion. This TAD tweeter really needs to be crossed over two octaves higher, around 4kHz, if these problems at the bottom of its passband are not to color the overall sound. As the 15" driver used by PAS can't be used above 1kHz, these two drive-units really need to be used with a midrange drive-unit to get a tonally neutral balance.

Summing up all these individual graphs, the Monitor 1's on-axis response, averaged across a 30° horizontal window, is shown in fig.13, married to the nearfield low-frequency responses. While the octave-to-octave balance is impressively flat, you can't escape that presence-region peak no matter how you fiddle with the respective woofer and tweeter level controls on the crossover.

In the time domain, the HF and LF drivers are connected with the same polarity, with the initial peaks in their impulse responses occurring at approximately the same time, as can be seen in figs.14 and 15.[4]

Finally, figs.16 and 17 show the speaker's

4 The drive-units are absolute-polarity correct. The implication that they invert polarity in these two graphs is due to an inverting mike preamplifier being used. —JA

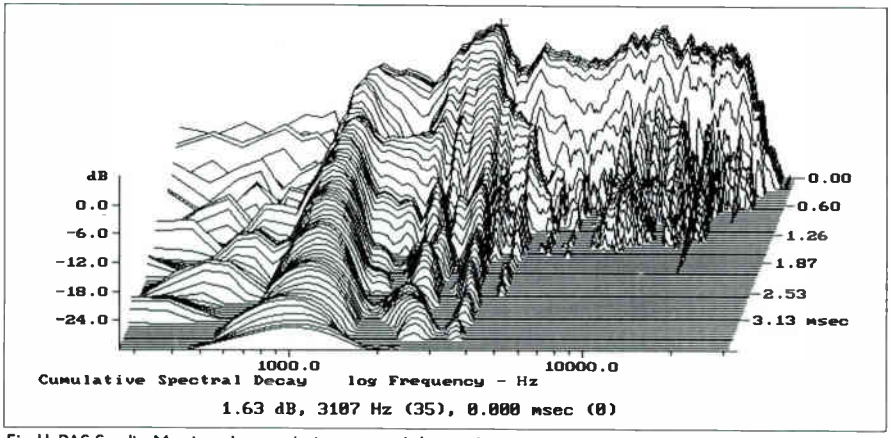


Fig.11 PAS Studio Monitor 1, cumulative spectral-decay plot tweeter on midrange axis at 45".

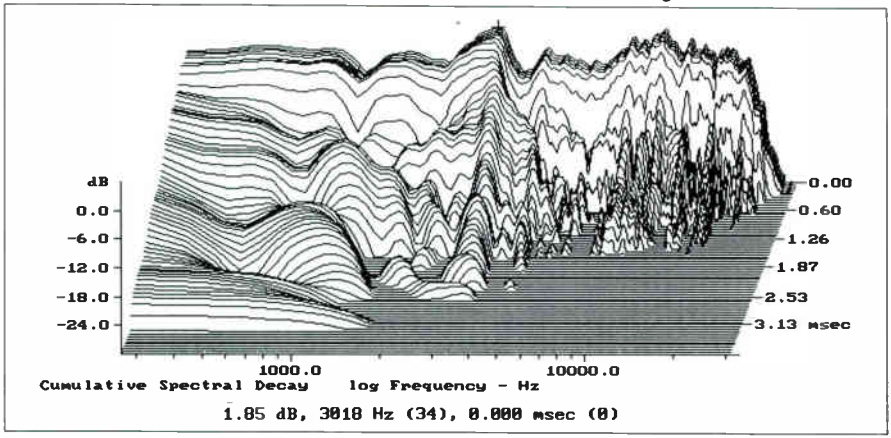


Fig.12 PAS Studio Monitor 1, cumulative spectral-decay plot of equalized speaker on horn axis at 45".

dispersion in the horizontal and vertical planes, respectively. The tweeter horn maintains reasonably good dispersion up to 30° off-axis, but beyond that, its output in the top two octaves falls off rapidly, as does the woofer output. Vertically, the speaker maintains its response off-axis within the woofer dimensions, but the tweeter's output falls off rapidly above and below the woofer. In the recording studio, this limited vertical dispersion in the treble will be a good thing. Most monitors are positioned above and behind the mixing console, meaning that the engineer and producer will be subject to very strong reflections from the console. By making the speaker quite directional in the vertical plane, the treble content of that reflection will be reduced, lowering its deleterious effect on the speakers' imaging. —**John Atkinson**

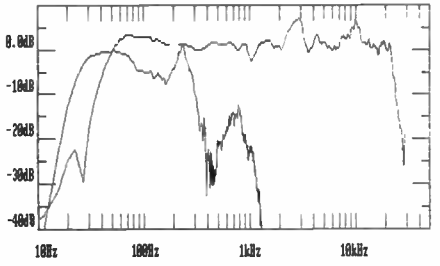


Fig.13 PAS Studio Monitor 1, anechoic response on horn axis at 45" averaged across 30° horizontal window and corrected for microphone response, with nearfield woofer and port responses plotted below 200Hz and 1200Hz, respectively.

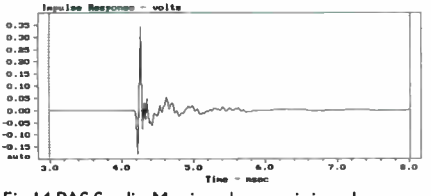


Fig.14 PAS Studio Monitor 1, on-axis impulse response of tweeter 45" from front baffle (5ms time window, 30kHz bandwidth).

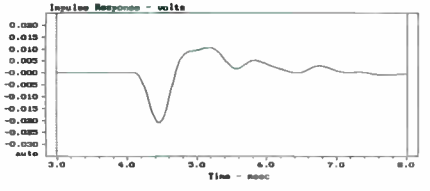


Fig.15 PAS Studio Monitor 1, on-axis impulse response of woofer 45" from front baffle (5ms time window, 30kHz bandwidth).

DO SUMS UP

I'm not prejudiced against horns or high-efficiency designs *per se*. I fully believe that very sensitive speakers open the door to the use of some of the best-sounding power amps money can buy: low-power tube amps. Nevertheless, the PAS Studio Monitor 1 left me very much earthbound, its sonic presentation failing to transcend the medium. The ascent from "canned" to a palatable illusion of "live" is the sort of minor miracle every piece of high-end gear strives for. Few such units succeed in furthering the illusion, but those that do keep me excited in my quest for the *Gestalt* of live music in the home.

I've lived with loudspeakers that could not play very loud (*eg*, the old Quad ESLs), yet kept me entranced for hours. The ability to throw a spacious, transparent soundstage is, to me, a prerequisite for launching the listener into the original space and mood of the music.

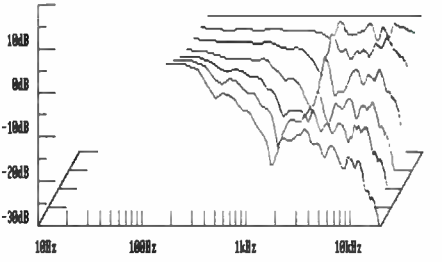


Fig.16 PAS Studio Monitor 1, horizontal response family at 45", normalized to response on tweeter axis, from back to front: reference response; difference 15° off-axis, 30° off-axis, 45° off-axis, 60° off-axis, 75° off-axis, and 90° off-axis.

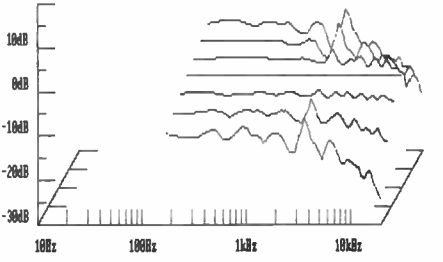


Fig.17 PAS Studio Monitor 1, vertical response family at 45", normalized to on-axis response, from back to front: response difference 7.5° above cabinet top, difference level with cabinet top, difference level with top of woofer, reference response, difference level with top of port, difference level with bottom of cabinet, difference 7.5° below cabinet.

The old Quad ESLs (the only *real* Quads, as far as I'm concerned) could open a transparent window onto the soundstage. The PAS Studio Monitor 1s, for all of their volume, could not. They appear to have sacrificed transparency and spatial resolution in their quest for efficiency. The veil and reduction in dramatic breadth imposed by the PAS effectively locked me out of the soundstage. I was aware of the tools that, ultimately, they are. So there I sat, with nothing to distract me from the speakers' artificiality and peakiness in the upper octaves.

Though I respect the design sophistication and integrity evident in the PAS Studio Monitor 1, it appears that I'm not yet ready for the studio monitor experience.

—Dick Olsher

Boxed In

Our continuing saga of small, inexpensive loudspeakers struggling to make a name for themselves—by Thomas J. Norton, with measurements by John Atkinson and product descriptions by Robert Harley.

It's a fact of life: Small, inexpensive loudspeakers proliferate like rabbits. In this, our third go-round of blind, panel listening tests in an 18-month period on a bunch of these bunnies, we have yet to run out of manufacturers, let alone models. With the eight new models listened to this month, the total comes to 23 loudspeakers from 23 different manufacturers. Only 306 to go.[1]

What remained the same?

Our listening sessions this time around were very similar to those on the last two tests. Each loudspeaker was auditioned in multiple group sessions held over several days. Each day, all eight loudspeakers were auditioned individually with the same selection of CD-derived program material. Only one loudspeaker was set up in the room at any one time, with yours truly (TJN) changing the loudspeakers between sessions. The loudspeakers were concealed behind a screen of grillecloth which covered one entire end of the listening room. The panelists did not know which speakers were set up at any given time, except for the initial, or "reference" model (see below)—this *not* one of the models under test.

Panelists were required to leave the room between sessions while the loudspeakers were being changed. Each loudspeaker's grille was removed to eliminate what would otherwise be a double layer of grillecloth between drivers and listeners. In the case of the Genesis Genre II, which is specifically designed to work with its grille frame in place, the cloth was peeled off the frame and the latter replaced. The frame then seemed prone to rattle against the front baffle. While this was not noticed in the limited listening done prior to the panel tests, several blobs of Blu-Tack placed between frame and baffle prevented this from affecting the results.

As before, the location of the tests was *Stereophile*'s 20′ by 15.5′ by 9′ listening room, with the loudspeakers set up facing down the room's long axis. The loudspeaker location (which was the same for each loudspeaker) was chosen using Snell's CARA/LEO room setup program. The listener locations were chosen similarly, to the extent practicable, allowing for the fact that three rows of listeners would be required, none of which could be too close to the loudspeakers, too close to the back wall, or too short of leg space. There are inevitable compromises in a panel session such as this, given that only one or two listeners can ever really be in optimum listening seats at the same time.

Except for the Genre IIs, which Genesis prefers to have facing straight ahead, the loudspeakers were toed-in and aimed at the center of the second row of listeners. The height of the seated listeners was taken into consideration as much as possible, with chairs selected to place each listener's ear-height as close as possible to 43″. This is somewhat higher than the average listening height in an upholstered chair or couch, but fairly typi-

1 Counting up the number of loudspeaker manufacturers represented in the latest *Audio* directory. This doesn't count those in the DAK catalog or Wal-Mart.

Table 1

	Dana 2f	Genesis Genre II	Jamo Concert II	Paradigm Compact Monitor
Design:	Floor-standing	Floor-standing	Stand-mounted	Stand-mounted
Drivers: Tweeter	1" aluminum dome	1" planar ribbon	1" dome	1" aluminum dome
Woofer	8" woven carbon-fiber cone	6" polypropylene/Kevlar cone	6.5" cone	6.5" polypropylene cone
Frequency response:	40Hz–20kHz ±3dB	53Hz–34kHz ±3dB	40Hz–20kHz ±3dB	40Hz–20kHz ±2dB
Bass-loading:	Sealed-box	Sealed-box/series C	Reflex	Reflex
Sensitivity:	89dB/W/m	87dB/W/m	88dB/W/m	88db/W/m
Recommended minimum amplifier power	20W	50W	40W	15W
Crossover frequency:	1.9kHz	3.2kHz	2kHz	2kHz
Nominal/minimum impedance:	8/8 ohms	4/4 ohms	8/3 ohms	8/4 ohms
Dimensions:	43" H by 11" W by 6" D	35" H by 9" W by 14" D	16" H by 10" W by 10" D	16" H by 9" W by 12" D
Finish:	Wood veneer (oak)	Wood veneer (finish optional)	Wood veneer (finish optional)	Wood veneer (finish optional)
Weight:	27 lbs	50 lbs	20 lbs	22 lbs
Serial numbers of samples tested:	n/a	139905/139909	6325920760/1	A21056/A21057
Price:	$495/pair	$799/pair	$798/pair	$600/pair
Approximate number of dealers:	Factory direct	50	95	256
Manufacturer/Distributor:	Dana Audio	Genesis Technologies, Inc.	Jamo Hi-Fi USA, Inc.	AudioStream, Division Bavan Corp.
	P.O. Box 1	953 S. Frontage Rd. West	425 Huehl Rd., Bldg. 8	M.P.O. Box 2410
	Austin, TX 78767	Vail, CO 81657	Northbrook, IL 60062	Niagara Falls, NY 14302
Tel:	(512) 454-3233	(303) 476-3012	(708) 498-4648	(416) 632-0180
Fax:	(512) 320-1821	(303) 476-3518	(708) 498-1948	(416) 632-0183

cal of ear height in the director's chairs used. Each loudspeaker's height was adjusted to place its optimum axis—previously determined by measurements taken at just over a meter from the loudspeaker—as close as possible to 43". The listening panel was cautioned not to slouch, but, short of walking around with a stick during the sessions, this is difficult to enforce. Fortunately, the optimum axis of each loudspeaker should be somewhat less critical at normal listening distances, though this will vary with the design of each loudspeaker. Obviously, the intent here was not to measure ear height with a micrometer and place each listener's head in a vise, but to at least attempt to account for an important variable too often ignored.

The control, or "reference" loudspeaker was the Spica SC-30, a high finisher in our last panel session (the samples used here were the updated versions which RH comments on in his individual audition). By "reference" we do not mean the state of the art, but a solid performer for the price—a solid Class D loudspeaker. The Spica was auditioned as a known at the start of each day's sessions. Following the Spica, each of the new contenders was run through its own session in the blind. In addition, the Spica was inserted in the random order of review loudspeakers and auditioned again, this time in the blind. There were thus ten sessions on each day: the Spica twice (once as a known, once blind), and the eight loudspeakers under test.

Prior to the formal sessions, an optimum listening level was determined for the Spicas for each piece of program material. This was then converted to an equivalent level for all of the other loudspeakers—for each piece of program material—using their known sensitivities, which JA had measured. The actual level adjustments during each session were made prior to each piece of program material with the Rowland Consummate preamplifier, whose front-panel readout of volume level makes it uniquely suited to this application. The Consummate and its less expensive sibling, the Consonance, are, in fact, the only consumer electronics devices I know of suitable to the task. Running such a test would be unacceptably tedious with any other means of matching levels, and would require either using a fixed playback level for each loudspeaker regardless of the demands of each piece of program material—a serious compromise, in my judgment—or measuring and setting the level before *each* program selection. The latter would soon drive any listening panel (and tester) to distraction.

As in our previous blind panel surveys, all of the program material was in stereo except for the first two: pink noise and JGH's speaking voice. Panel members were cautioned not to provide verbal or body clues as to their reactions to the sound, so as not to influence others. Each panel member scored each loudspeaker on a 0–10 scale for each piece of program material, and was also provided space on his score sheets for specific comments. A score of "10" was reserved for the best that could be envisioned—no room for improvement. A score of "0" indicated that the sound

Table 1

	Rogers LS2a/2	Signet SL2608/U	Spectrum 208C	Spendor S20
Design:	Stand-mounted	Stand-mounted	Stand-mounted	Stand-mounted
Drivers: Tweeter	0.75" metal dome	0.75" aluminum dome	0.75" dome	0.75" soft dome
Woofer	6" polypropylene cone	6" polypropylene cone	8" doped paper cone	6.5" polypropylene cone
Frequency response:	80Hz-20kHz ±2dB	35Hz-25kHz (no tolerance)	29Hz-20kHz ±2dB	70Hz-20kHz ±3dB
Bass-loading:	Reflex	Reflex	Reflex	Sealed-box
Sensitivity:	86.5dB/W/m	87dB/W/m	90dB/W/m	84dB/W/m
Recommended minimum amplifier power	15W	20W	30W	20W
Crossover frequency:	3.5kHz	3kHz	3kHz	4kHz
Nominal/minimum impedance:	unspecified	8/6 ohms	6/5 ohms	8/unspecified
Dimensions:	14" H by 9" W by 8" D	16" H by 8" W by 13" D	26" H by 15" W by 10" D	15" H by 8" W by 10" D
Finish:	Vinyl (finish optional)	Vinyl (black, wood-grained)	Vinyl (black, wood-grained)	Wood veneer (finish optional)
Weight:	13 lbs	21 lbs	45 lbs	21 lbs
Serial numbers of samples tested:	14764A/B	01590/1	200241/2	341/342
Price:	$550/pair	$450/pair	$595/pair ($679 oak)	$1049/pair
Approximate number of dealers:	60	100	61	30
Manufacturer/Distributor:	Audio Influx Corp.	Signet	P&W International Corp.	RCS Audio International
	P.O. Box 381	4701 Hudson Dr.	1021 Nevada St.	3881 Timber Lane
	Highland Lakes, NJ 07422	Stow, OH 44224	Toledo, OH 43605	Verona, WI 53593
Tel:	(201) 764-8958	(216) 688-9400	(419) 698-9975	(608) 833-6383
Fax:	(201) 764-8479	(216) 688-3752	(419) 698-3667	(608) 829-2686

could not be worse.

I set up the test, compiled the data and comments, and wrote much of what you're reading here. Robert Harley wrote the physical descriptions of the loudspeakers and John Atkinson measured all of the loudspeakers—using a Mark Levinson No.27.5 amplifier, a calibrated B&K 4006 microphone, EAR mike preamplifier, PVDF Transducers accelerometer, DRA Labs MLSSA analysis system, and the Audio Precision System One. (Although JA had performed the measurements before the listening tests so that TJN could set each speaker up optimally, he didn't plot out any of the graphs or write up the measurements until all the listening had been done.) In addition, each panel member took home one pair of loudspeakers (two for RH) to provide an individual assessment under more familiar conditions. They did *not* know the identities of the speakers they had listened to blind when they performed their sighted listening.

What was different?

In our last two panel tests, we ran the sessions over two days. This time, we ran three days of primary tests, and a fourth with just one listener—yours truly. In previous tests, I had scored along with the rest of the panel—though I was the only one who knew the identity of the loudspeaker behind the curtain. This time, I simply ran the test and did not fill out score sheets on the three primary days. On Day Four, JA ran the tests with me as the only scorer. Thus, *all* of the scores included in the totals this time were blind.

The listening panel on the three main days consisted of J. Gordon Holt, John Atkinson, Corey Greenberg, Jack English, Robert Harley, and Dick Olsher. Not all members participated on each day. On Day One we had JGH, JA, JE, and RH. On Day Two all participated, and on Day Three, all but RH. There were three rows of seats: one seat in row one, two in row two, and three in row three. Each panel member occupied the same seat on each day he participated: JGH in the front center, JE second row left, RH second row right, CG back row left, JA back row center, and DO back row right. Thus, each member's perspective was the same on each day he attended. On Day Four, my day in the hot seat, I centered my seat in the middle row, straddling the positions of the two seats that had been there on Days One through Three.

In our previous tests, the drapes had been drawn on the windows in the wall behind the loudspeaker locations. This time they were left open, compensating at least somewhat for the acoustic damping caused by the presence of up to seven people in the listening room. Heavy plastic covered the windows to keep daylight from defeating the purpose of the screen hiding the loudspeakers.

Instead of the previous kludge of various stands and Tiptoe-like devices used to raise the loudspeakers to an appropriate height, a large sheet of 0.75"-thick MDF was cut into rectangular pieces of an appropriate size to fit under the loudspeaker stands. These were assembled into thicknesses varying be-

tween 0.75″ and 3″, including a pair just under 3″ thick which were hollow in the middle and loaded with sand and lead shot. Two Celestion Si stands of different heights —their pillars filled with lead shot and sand—were used. The MDF shims, when needed, were always used at the bottoms of the stands, with the stands' spikes resting on the MDF and Tiptoes between the MDF and the floor. An appropriate combination of shims and stands was used to raise each loudspeaker to the appropriate height. Blu-Tack was used to fasten the loudspeaker to the stands. In the case of the two floor-standing loudspeakers included in the tests, the Dana 2fs were used directly on the floor (their natural tilt-back insuring the proper listening axis), and the Genesises were placed on a Hales stand with MDF shims.[2]

This time around we used broadband, B-weighted sensitivities to equalize the loudspeakers' relative playback levels. A growing body of evidence points to the latter as giving the best subjective level match. It's not possible, of course, to get an absolute subjective match by this—or any—method for components with significantly varying frequency responses, but it has been shown that B-weighted sensitivities show a better correlation with the best subjective level matching than other possible choices.[3]

Just before the start of the sessions proper, the panel members listened to each program selection over the Spicas at the predetermined levels to judge whether or not the chosen level was appropriate to the program material. Only a few changes were required, these then applied to the relative levels for all the loudspeakers. There was one exception to this: No change was permitted to the level of the last selection—an excerpt from a Malcolm Arnold overture (see the program description further on). It had previously been determined that two of the loudspeakers —the Spendor and, to a lesser degree, the Rogers—could not reproduce this material, with its challenging bass-drum rolls, at as high a level as the other loudspeakers. Above a certain, relatively modest level, the Spendors' woofers would bottom out. The playback level to be used with this selection over the Spendors was finally determined by increasing the level gradually, noting the level at which the Spendors first showed distress, then backing off slightly. The playback levels of the other loudspeakers on the Arnold selection were then deliberately restrained to the same relative level. The result was that, for the Arnold, the overall level was several dB lower than what might have otherwise been chosen for the most realistic dynamics. But it still proved to be a useful selection.

Music

On our first panel test, the program material was played directly from CD. On the second, the selections to be used were transferred to DAT. This time, since the Meridian CD-R recorder (reviewed in November '92) was on hand, all of the selections were recorded on a CD-R. The music chosen was all nominated by the panel members themselves. Five of the musical selections, plus the pink noise and JGH's speaking voice, were repeated on each day of the tests. Three more musical selections were included, these changing each day. This provided some day-to-day consistency, while insuring variety and the maximum opportunity to play each panelist's recommendations—though not all of the latter could be used. (JGH, taking exception to having to judge his own speaking voice, was advised to simply score it as a generic voice; none of the loudspeakers were low enough in coloration for this to be a problem.) The program material consisted of excerpts from the following on all three days:

1) Pink Noise (mono, left loudspeaker only), from *Test CD 1*, Stereophile STPH 002-2, band 4.

2) JGH's speaking voice (mono, left loudspeaker only), from *Test CD 1*, Stereophile STPH 002-2, band 5, index 19.

3) Acoustic Drum Solo, from *Test CD 2*, Stereophile STPH 004-2, band 3.

4) "Traffic Jam," from James Taylor's *JT*, CBS CK 34811.

2 Normally the Genesises would be placed on the floor and tilted back to place the listener on the appropriate axis. A little thought will show that such an arrangement cannot generally provide the right axis over three rows of listeners—only raising the loudspeaker can do that. Either setup involves a compromise with this many listeners; raising the loudspeaker changes the floor-woofer interface, and tilting it back risks changing the response in the woofer-tweeter region for listeners not on the correct vertical axis, with some resulting change in the spectral balance. The results seem to show that our chosen compromise did not act to the detriment of the Genesises.

3 "A Comparison of Some Loudness Measures for Loudspeaker Listening Tests," Ronald M. Aarts, *Journal of the AES*, Vol.40 No.3, March 1992.

5) Scarlatti's *Seven Arie con Tromba Sola, No.3, Con voce festiva*; Kathleen Battle and Wynton Marsalis, from *Baroque Duet*, Sony SK 46672.

6) Elgar, *Dream of Gerontius*, Part 1 (conclusion); Christopher Brown, Oundle & District Choral Society, St. Ives Choral Society, St. Neots Choral Society, Huntingdonshire Philharmonic. From *Test CD 2*, Stereophile STPH 004-2, band 13.

7) Arnold, *The Smoke*; Malcolm Arnold, London Philharmonic; from *Arnold Overtures*, Reference Recordings RR-48CD.

Excerpts from the following were added to the above on the days noted:

Day 1

8) Bach, Sonata in e for Flute, Harpsichord, and Cello, BWV 1034; Gary Schocker, flute; from Chesky CD46.

9) Brahms, *Ein Deutsches Requiem*, "Wie lieblich sind deine Wohnungen"; Otto Klemperer, Elisabeth Schwarzkopf, Dietrich Fischer-Dieskau, Philharmonia Chorus & Orchestra; from EMI Classics CDC 7 47238 2.

10) Handel, *Theodora*, Chorus of Heathens: "Venus laughing from the skies"; Nicholas McGegan, Chamber Chorus of UC Berkeley, Philharmonia Baroque; from Harmonia Mundi HMU 907060.62.

Day 2

11) Robert Lucas, "Ramblin On My Mind," from *Usin' Man Blues*, AudioQuest AQ-CD1001.

12) The Staples Singers, "Respect Yourself," from *Stax Greatest Hits*, Stax VDP-1110 (Japanese import).

13) Stevie Ray Vaughan, "Tin Pan Alley," from *Couldn't Stand the Weather*, Epic EK 39304.

Day 3

14) Beethoven, Symphony 9, 4th movement; René Leibowitz, Royal Philharmonic; from Chesky CD66.

15) Chopin, Nocturne, Op. Posth.; Midori, violin; Robert McDonald, piano; from *Midori Live at Carnegie Hall*, Sony SK 46742.

16) Crash Test Dummies, "Superman's Song," from *The Ghosts That Haunt Me*, Arista ARCD-8677.

Equipment

The playback system used in this test, while a bit more, ah, high-end than would usually be used with loudspeakers in this price range, was chosen to give them the opportunity to perform at their best. The CD-R played on a Proceed PDT 3 transport and decoded by a Mark Levinson No.30 D/A converter (linked by an AT&T optical connection) comprised the program source, feeding a Levinson No.27.5 power amplifier through the Rowland Consummate preamplifier. The preamp to power amp link was Cardas Hex-link (balanced); the loudspeaker cable was AudioQuest Dragon Hyperlitz. None of the loudspeakers were bi-wired, as not all of them allowed for this.

Additional observations

Judged by the ongoing results of our panel surveys, inexpensive loudspeakers continue to have problems with the quality of their hookup terminals. One or more terminals on the Jamos, Genesises, and Spectrums either stripped or came loose, leaving us with banana plugs as the only hookup option. While none of the terminals were subjected to undue force, readers should always exercise care when tightening *any* connections. Still, I'd like to see manufacturers exercise more quality control in this area.

This time around I also checked the screws and bolts holding the drive-units in place on all of the loudspeakers prior to the listening tests. Most were satisfactory, but some required a modest tightening. While this might be something an owner can easily check for him- or herself, *I cannot recommend caution here strongly enough*. A slip of a screwdriver—perhaps pulled by the magnet's stray field—can destroy a drive-unit; excessive tightening can actually bend some driver frames, thus damaging the drivers. And a few loudspeakers use a soft mounting to isolate the driver from the cabinet. If in doubt, check with the manufacturer.

Finally, all of the loudspeakers were broken-in prior to the auditions for at least 11 hours with FM inter-station noise played back at moderate levels.

Results—at last

The data were compiled in a number of ways. To give some idea of how each loudspeaker did on various program selections, the loudspeaker *vs* program scores are given in Table 2.

In the more significant matter of how each

Table 2 Loudspeakers vs Program

Dana 2f	Genesis Genre	Jamo Concert II	Paradigm Compact Monitor	Rogers LS2a/2	Signet SL260B/U	Spectrum 208C	Spendor S20	Spica SC-30		Music Average
3.38	4.72	4.42	4.67	4.41	4.28	4.34	4.13	4.53	Pink	4.32
3.09	4.69	4.84	4.31	4.47	4.16	4.28	4.06	4.66	JGH	4.28
2.75	5.59	4.92	4.78	4.88	4.56	5.20	4.30	4.83	Drumset	4.65
2.92	5.89	4.69	4.86	4.78	4.75	5.16	4.27	4.94	J. Taylor	4.69
2.56	5.53	4.23	4.80	4.88	4.59	4.88	4.14	5.00	K. Battle	4.51
2.11	5.56	4.30	4.84	4.66	4.56	4.97	3.91	4.48	Elgar	4.38
2.25	5.52	4.56	4.94	4.86	4.55	5.14	4.31	4.70	Arnold	4.54
3.56	5.56	5.25	4.44	4.44	5.13	4.88	5.50	5.63	Schocker	4.93
2.88	5.94	4.94	4.56	3.88	5.00	4.75	5.50	5.19	Brahms	4.74
3.63	6.19	4.94	4.44	4.13	5.00	4.50	5.56	5.31	Handel	4.85
3.00	4.86	4.43	4.57	4.32	3.89	4.68	3.29	4.93	R. Lucas	4.22
2.79	4.86	4.07	4.21	4.43	3.43	4.71	3.29	4.89	Staples	4.08
2.64	5.21	3.89	4.39	4.82	3.86	5.21	3.36	5.14	Vaughan	4.28
3.10	5.50	4.10	4.70	5.10	4.40	4.50	3.90	3.40	Beethoven	4.30
2.40	5.50	4.70	5.00	5.40	4.50	4.90	3.90	4.20	Violin	4.50
2.30	5.70	4.70	5.40	5.30	4.50	4.80	3.80	3.70	Dummies	4.47

loudspeaker did overall, the numerical scores are shown below just prior to the panel comments for each loudspeaker. The overall score is the average for each of the 16 scores given to each loudspeaker over all four days, *including* the score given by TJN on his solo-audition day. The three scores in parentheses are for each of the first three days (obviously *not* including, in this case, TJN's scores on Day Four). Since the order in which a loudspeaker is auditioned may affect its score, the order of the unknown loudspeakers was different on each day. Table 3 shows each day's order of auditioning.

Table 3 Order of Auditioning

Day 1	Day 2	Day 3	Day 4
Spica (open)	Spica (open)	Spica (open)	Spica (open)
Rogers	Spendor	Genesis	Spendor
Signet	Rogers	Dana	Signet
Spica	Jamo	Jamo	Dana
Genesis	Spica	Spectrum	Genesis
Dana	Spectrum	Paradigm	Spica
Paradigm	Signet	Spendor	Spectrum
Jamo	Paradigm	Rogers	Paradigm
Spendor	Dana	Signet	Jamo
Spectrum	Genesis	Spica	Rogers

Dana 2f: $495/pair

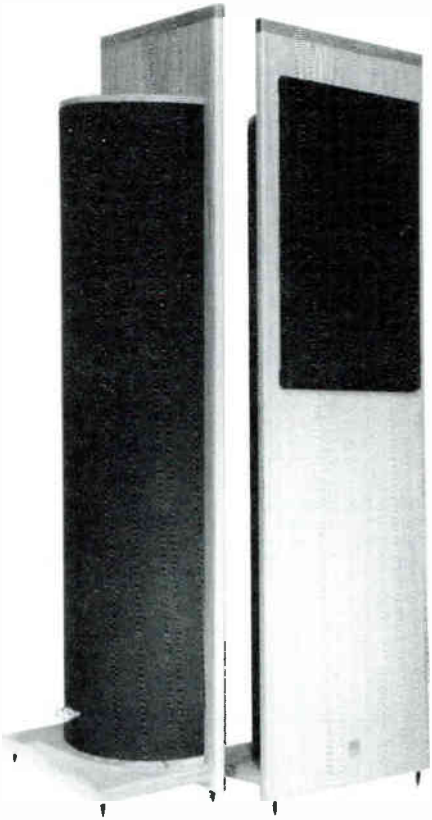
The Texan Dana 2f is the most unusual-looking loudspeaker of the group, with its wide front baffle and semi-cylindrical enclosure. The floor-standing unit uses an 8" Dana-designed woven carbon-fiber woofer and a SEAS H-398 aluminum-dome tweeter in a sealed enclosure. The drivers are crossed over at 1.9kHz with first-order slopes. The crossover features solid-core, hand-soldered wiring and a single pair of gold-plated binding posts. A second pair of binding posts for bi-wiring is available for an additional $25.

Cabinet finish is excellent for a $500 pair of loudspeakers. The ¾"-thick MDF front baffle is veneered with real oak and has solid oak trim. In addition, the semi-cylindrical enclosure's top and bottom panels are solid oak.

Listening Tests Panel Score: 2.77 (3.40 : 2.83 : 2.63). Comments ranging from "raucous" (twice), "sizzly" or "sizzle" (six times), and "awful" (once) punctuated JGH's written comments on the Danas. At the same time, he commented on the good to very good low-end weight—but "mediocre [bass] articulation." He thought that the Brahms sounded like it had "exaggerated scrape flutter," and the Handel was "relentless." He remarked on the lack of an extreme top end, combined with a tizzy quality on the Elgar chorus.

On Day One, JE remarked on the Danas' "terrible overall sound," and though not quite so harsh on Days Two and Three, he was still quite critical of the results. He thought the upper bass heavy, noting that "some mid-bass notes really jump out at you." He observed that the Elgar didn't break up on peaks, and that the system was "moving some air," guessing correctly that it had a larger bass driver than many of the other contenders. But he thought it harsh and "muddled" when loud, and though he thought the Arnold had a "thunderous bass," he thought it "poorly defined."

JA commented that "you can't sell this colored a loudspeaker in these days of low-cost



Dana Model 2f loudspeaker

measurement systems," adding on Day Three that the good bass extension could not make up for the "poor clarity in both the bass and midrange, peaky highs, poor soundstaging, and excessive coloration." He thought his Elgar recording "confused," an "unintelligible mess" with "poor depth, good bass extension, but a messy, muddy midrange." He commented negatively on the midrange on other selections as well.

"Ouch," said RH as he commented on the Kathleen Battle recording over the Danas: "voice peaky, glare in upper mids." He noted a lack of top-octave response in a number of places, and a "thick bass with no pitch definition" on the Handel. His drum recording was "horribly colored. . .cymbals lack air. . . trashcan-lid cymbals, very colored, horrible." He found the overall sound "truly offensive."

DO commented on the "veiled stage" and "congestion," noting the "shouty upper registers" on the Battle and indistinct vocal lines on the Taylor. He thought the drum recording sounded "bad!" (clearly *not* using the slang sense of the word), with "poor pitch definition and jumbled rhythm."

CG didn't like them quite as much, describing the Danas as "distorted, satanic, awful, pathetic garbage; nothing in real life sounds this dull. As for the speakers' *bad* points. . .THESE *SUCK!!!!*" He gave the 2fs his lowest scores on each day.

TJN scored them even lower. "Very colored, nasal mids, muddy low end; only highs [by which he meant the top octave] save it from disaster," he wrote. "Drums have a cold," he remarked on the drum solo; "smeared, woolly sound," on the Stevie Ray Vaughan; "just awful" on the Kathleen Battle. "Usual critical phrases do not apply," he said. "I'm speechless; this was a *long* session."

While not every panelist scored the Danas last, they were consistently rated at or near the bottom, and finished last going away.

Clearly, the Dana 2fs came in for some severe remarks on the panel sessions. The design has serious problems and cannot compete with the other models tested here.

JGH comments on the Dana 2f: One of the prime directives we received prior to our panel tests was that we were to avoid (at all cost!) any overt reaction to what we heard. There was to be no sighing, oohing, aahing, grunting, beating of breasts, conducting, retching, head-bobbing, foot-tapping, or other cues to those around us as to how we felt. I broke the rule once by sticking my fingers in my ears, but I couldn't help myself; it was an act of self-preservation. This week, in the privacy of my own home, I found myself doing the same thing. Again. And again. And again.

To be as charitable as I can, I must say that the Dana 2fs are not engaging loudspeakers. Even though they're better balanced than many in their price range, throw a respectable soundstage, and have rather nice low-end weight and detail, they are also brash, sizzly, and rough—all of which are failings I have never, in 108 years of picky-picky listening, learned to tolerate. Yes, I have argued in these pages and elsewhere that, because live music often sounds brash, a system should be capable of reproducing that quality—when the music demands it. But the Dana 2fs sound brash on *everything*.

This isn't a case of a struggling new manufacturer experiencing teething pains; Dana has been around for at least three years, and their Model 1 has been well received in these pages.

What I heard from the 2fs, both in Santa Fe[4] and in Boulder, sounded like a severe ringing resonance in the lower highs, at what I guesstimated to be around 3kHz. This imparted an irritating "shish" coloration to almost everything played through them, and exaggerated sonic garbage like disc ticks and pops (absent from the Santa Fe sessions, where everything was from CD), digital quantization noise, and analog tape hiss and scrape flutter. I was not enchanted.

Since I have been occasionally booby-trapped by vagaries of room acoustics and personal electronics, leading me to wrongfully condemn what later turned out to be perfectly acceptable loudspeakers, my tendency these days, when confronted with truly miserable sound, is to dilute the verbal vitriol as a means of covering my ass. But what I heard at home from the Dana 2fs sounded so much like what I heard in Santa Fe—in a different room with different electronics (but some of the same program material)—that I feel pretty confident what I was hearing was the loudspeakers and not another booby trap.

I knew *Stereophile* had already run the contending speakers through our usual tedious battery of sophisticated tests, but as I had not yet learned of the results, I ran a few tests of my own: plain-vanilla frequency-response measurements, using my trusty little Neutrik 3201 Audiotracer.[5] Regardless of what arcane aberrations Melissa turns up, my test results were quite sufficient to explain what I heard: a broad dip centered at 2kHz followed by a 6dB peak at 4kHz and a 5dB dip at 7.5kHz. (My 3kHz guess for the peak was close, but didn't win the cigar.) Enough said.

Now that I've pretty much trashed the Dana 2f, I should add (not too apologetically) that it isn't really a *bad* loudspeaker. *Au contraire*, it does many things quite nicely.[6] But as far as I'm concerned, its one major shortcoming is severe enough to constitute a fatal flaw. There's no point in wasting further space discussing niceties like soundstaging (very good), resolution (fair), HF extension (not too good), or the ability to throw an image above the height of the speakers (not tested), when the system can't even get the sounds of real instruments right.

How anyone could seriously offer $500 loudspeakers like these in Aunty Domino 1992 is beyond my ken.[7] Didn't the Dana people even *listen* to them? Oh, well . . .

On the rating scale we used for the panel sessions, I would give the Dana 2f a 2.5. Grudgingly. **—J. Gordon Holt**

JA measures the Dana 2f: The Dana's impedance magnitude (fig.1) is plotted on a wider scale than usual, due to it rising above 20 ohms above 4kHz. This is an easy speaker for an amplifier to drive, though its sensitivity was one of the lowest in the group, at around 2dB less than the Spica on B-weighted pink noise. The sealed cabinet is tuned to 52Hz, revealed by the sharp peak and the 0° phase angle at that frequency. Note the wrinkle in both amplitude and phase plots in the upper bass, indicating some kind of resonance problem at this frequency. Fig.2, taken with an accelerometer fixed to the front baffle just below the woofer,[8] does indeed reveal a strong cabinet resonance at 125Hz, with a stronger one at 453Hz. The lower resonance will confuse upper-bass pitch definition, something that was noted during the auditioning, while the upper one will compromise midrange clarity.

Turning to the way in which the Dana's sound changes for off-axis listeners, fig.3 shows the behavior in the vertical plane, fig.4 that in the horizontal plane. In both cases the off-axis responses are normalized to the tweeter-axis sound, meaning that *only* the

4 When JGH auditioned the Danas in Boulder, he was not aware of the identities of the speakers he had listened to in Santa Fe. Nevertheless, with a speaker as colored as this Dana, the concept of blind listening tends to collapse, because it *is* so identifiable by ear alone. During his blind listening session, in fact, Tom Norton successfully identified six of the eight loudspeakers under test, presumably because of the training effect of his sighted exposure to their sounds on the previous three days. **—JA**

5 20Hz–20kHz sweep, 1/3-octave warble tone, 50cm/s pen speed, average of three samples at 1, 2, and 3 meters on woofer/tweeter midpoint axis. Film at 10:00.

6 To paraphrase another well-known reviewer: If you like this kind of sound, you'll like this loudspeaker.

7 It's beyond my barbie too, for that matter.

8 For all the cabinet resonance tests, the speaker was placed on upturned German Acoustics cones, which allows all the various modes to develop to their fullest, and excited with a 2kHz bandwidth MLS signal at a level of 7.55V RMS. In general, Blu-Tack does the best job of reducing the amplitude of cabinet resonances—see *Stereophile*, September 1992, p.162.

changes are shown. (The response on the tweeter axis therefore appears as a straight line in both graphs.) Both figures indicate the Dana's sound to change enormously off-axis. Vertically, there appears to be a big crossover-region suckout on-axis which fills in above and below the tweeter. (The chosen axis for the listening tests was above the tweeter, which offered the flattest response, though, as indicated by the panel comments, this still wasn't very flat.) Laterally, the suckout also fills in, though the off-axis treble is characterized by peakiness. This speaker should not be used too near reflecting sidewalls if its sound is not to be rendered even brighter than it already is.

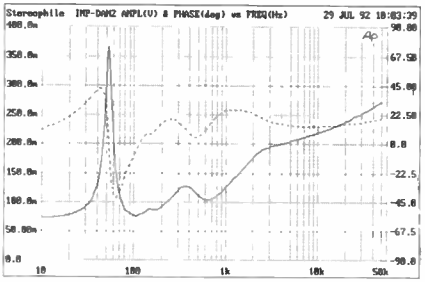


Fig.1 Dana 2, electrical impedance (solid) and phase (dashed) (5 ohms/vertical div.).

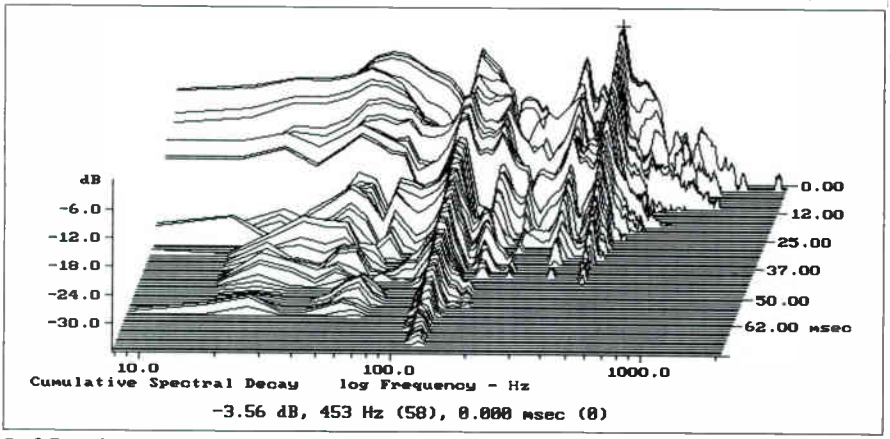


Fig.2 Dana 2, cumulative spectral-decay plot of accelerometer output fastened to front baffle 6" below midrange unit. (MLS driving voltage to speaker, 7.5V; measurement bandwidth, 2kHz.)

Fig.5 is a composite of the tweeter-axis response[9] averaged across a 30° window (on the right) and the bass response measured in the woofer's nearfield with the microphone almost touching the cone. This graph is nicely correlated with the listeners' comments: a slightly underdamped but quite extended bass tuning; a forward midrange; a drastic loss of energy in the low treble, followed by a severe presence-region peak; and a flat high treble that is nevertheless plateau'd down by 5dB. Boominess and brightness are coupled with depressed highs, while the combination of an upper-midrange suckout with a peak just above invariably endows a speaker with a "nasal" or "cupped-hands"

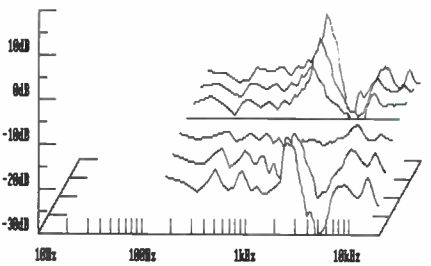


Fig.3 Dana 2, vertical response family at 45", normalized to response on tweeter axis, from back to front: response difference 7.5° above top of baffle, difference level with top of baffle, difference midway between tweeter and baffle top, reference response, difference level with top of woofer, difference on woofer axis, difference 7.5° below woofer axis.

9 I place the speaker under test on a stand so as to place its tweeter about halfway between the listening room's floor and ceiling and midway between the side walls. As does Martin Colloms in his speaker measurements for *HFN/RR*, I then construct an acoustic "black hole" on the floor between the speaker and microphone out of graded layers of acoustic foam and fiberglass damping material. This kills the floor reflections from both tweeter and woofer, meaning that the primary reflection in the MLSSA's calculated impulse response is that of the tweeter from the ceiling, which arrives about 4ms after the direct sound. This 4ms anechoic time window results in a measurement valid down to 300Hz or so.

coloration, I have found.

Turning to the time domain, fig.6 shows the Dana Model 2f's impulse response, which, as JGH predicted, is severely afflicted with ringing. The cumulative spectral-decay or "waterfall" plot calculated from the impulse response (fig.7) reveals this ringing to be due to a massive resonance just below 4kHz, which is probably due to the large, stiff woofer cone going off like a bell. This drive-unit would probably work well in a three-way design if used below 1kHz. In a two-way speaker, it results in truly dreadful sound.

To sum up these measurements, the Dana 2f marries what appears to be a good tweeter to a totally unsuitable woofer in a cabinet afflicted with severe resonance problems. That the designer has been aware of his creation's brightness is indicated by the fact that the level of the tweeter has been reduced by a significant amount. But as the brightness is due to the woofer, *not* the tweeter, all that this padding down of the tweeter has achieved is to make the 2f sound dull and airless in its top two octaves, adding to its subjective woes.

Surprisingly, given the unanimity of the negative reactions Dana's Model 2f received from *Stereophile*'s reviewers under blind conditions, this speaker has been positively reviewed elsewhere. One writer[10] even stated

10 Martin G. De Wulf in *Bound For Sound*, issue 4a/92, a review that was reprinted as an advertisement in *Stereophile*, Vol.15 No.8, August 1992, pp.114–115, and elsewhere.

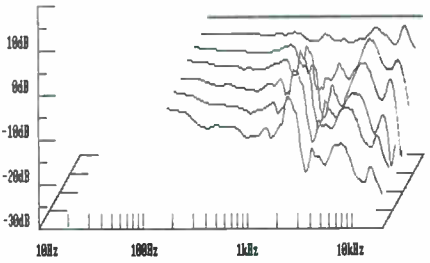


Fig.4 Dana 2, horizontal response family at 45", normalized to response on tweeter axis, from back to front: reference response; difference 15° off-axis, 30° off-axis, 45° off-axis, 60° off-axis, 75° off-axis, and 90° off-axis.

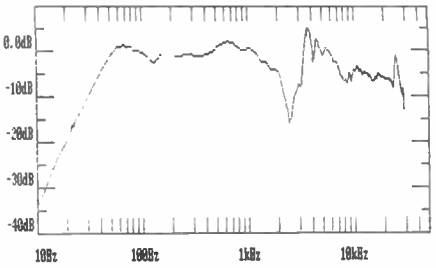


Fig.5 Dana 2, anechoic response on tweeter axis at 45" averaged across 30° horizontal window and corrected for microphone response, with nearfield woofer response plotted below 200Hz.

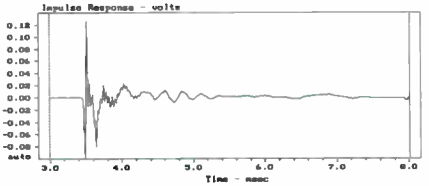


Fig.6 Dana 2, impulse response on tweeter axis at 45" (5ms time window, 30kHz bandwidth).

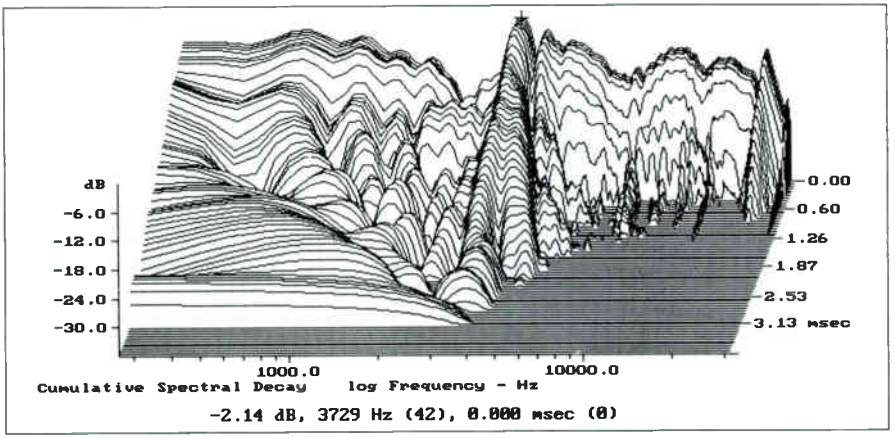


Fig.7 Dana 2, cumulative spectral-decay plot on tweeter axis at 45".

that it was "one of the ten best values in all of audio," and that it "sets a new standard for floorstanding two-ways under $1000." Sadly, the 2f *does* set a new standard, I feel—one for very poor value for money.

Spendor S20: $1049/pair

The British-made Spendor S20 is a small sealed-box, two-way system employing a 6.25" woofer and Scanspeak ¾" soft-dome tweeter. The Spendor-made woofer features a "homopolymer" polypropylene cone. Crossover frequency is a high 4kHz, implemented with air-core inductors and metal-film caps. The network is mounted directly on to the input terminals.

A high-grade fiberboard called Medite forms the enclosure. Layers of bitumen panels, a damping agent, line the enclosure's interior. Input terminals are bi-wired pairs of 4mm banana jacks.

Listening Tests Panel Score: 4.12 (5.45 : 3.48 : 3.90). JGH was clearly very impressed with the Spendors on Day One, when they were auditioned second from last. He found the Elgar to have "excellent weight and tonality," with "very realistic brass." He liked the definition, yet on the Taylor noted that "nothing irritates." While his scores for the Spendors dropped on Days Two and Three, they were still above average for all his scores on Day Two, just marginally below average on Day Three. Overall he liked the sense of impact on the drum solo and the brassy cymbals on this track. He thought the brasses on the Arnold okay, the LF weight fair to good, but commented on the "congested fortes." His negative comments were not severe, however, and the Spendors, while never his absolute top choice, did finish near the top in his numerical rankings.

Spendor S20 loudspeaker

JE was less upbeat, though he was more favorably inclined on Day One. In that session, he liked the spaciousness and depth on the Brahms and the "dynamic, full-bodied" quality of the Handel. While he felt that the Taylor "lacked detail resolution," he liked the "big sound." Still, he found the Elgar and Arnold "uninvolving" and "powerful but disappointing." These negatives on the latter selection continued on Days Two and Three, where he found the Elgar to break up on peaks (a comment he also made on Day One), with an "unintelligible chorus" on the Elgar and a lack of clarity on the Arnold. "Not visceral," he said of the latter on the last day. He found the treble attenuated on the drum solo, and the midbass/lower midrange very uneven on the Kathleen Battle. He rated them below average overall.

JA placed the Spendors near the bottom overall, though he rated them higher on Day One than on Days Two and Three. On Day Two particularly—when they were auditioned second—he brought out his heavy guns. "Poor space, flat soundstage, no depth," he remarked on the Arnold, and heard "a confused mess in the lower mids" on the drum solo. He found it to have a "big, slow bass, peaky mid-treble, depressed top octave," and "poor intelligibility" on that day, calling it "a loser!" On Day Three he was a bit more upbeat, but still focused on the "low midrange problems that obscure clarity" (Crash Test Dummies), "messy" quality (drum solo), and "very peaky low treble" (Battle). Again, he was less critical on Day One, but still commented on an "uninvolving" sound.

RH commented on a honky lower-midrange coloration and lack of clarity on the Lucas, noting also "no top octave, no clarity." He felt that the Elgar sounded hard at high levels on both days, the Battle "hard" with some "upper-mid glare." He noted

lower-midrange colorations and criticized a "one-note" bass. DO found a "chesty coloration" to JGH's voice, a shouty quality to the upper registers on the Battle, and "hard upper octaves" on the Elgar. He did like them better on his first listen, however (the second day's sessions), when he gave them fairly good grades on the final orchestral selections, praising the "sweep of the orchestra" on the Arnold. Still, his well-below-average scores did not reflect a great deal of enthusiasm.

CG's interest in the Spendors perked up somewhat on Day Three (his second day of listening), though he'd disliked them the day before—a lot. He noted a "breakup in mids, no air, low dynamic ceiling" on the Lucas, and "boxy, one-note bass, lumpy lows," and "department-store speaker sound" on the Staples Singers. He found the Stevie Ray Vaughan to have a "muffled sound, especially through the midrange," and the drum solo to have "congested mids" and a "hyped midbass." He also found that the Spendors could not take the strain on the *Gerontius* at the levels demanded; the lower-level Arnold was better, though his reaction was still not very favorable. He did like the Spendors better on Day Three, but his scores in general were higher on that day. He still noted the strain at higher levels, with congestion noted on the Beethoven, the Elgar, and the drum solo. "Off-putting edginess," he commented; "sounds strained when pushed even moderately."

TJN liked the weighty brass on the orchestral selections, but also thought the Spendors tended to strain and blare at higher levels. He felt that the rather over-full mid- and upper bass, combined with a general lack of air, contributed to a shortage of overall transparency and detail.

While its negatives don't stand out to the same degree as the Dana's, the S20 seems significantly more colored than one might expect from this company's track record. A major problem appears to be power handling; indeed, the Spendor combines the lowest sensitivity here with the smallest woofer (effective diameter). Even putting aside the fact that the S20 was the most expensive of the group, the overall result was disappointing.

CG comments on the Spendor S20: I Blu-Tacked the Spendors on top of the heavy metal Target RS2 stands I normally use with the ProAc Response 2s I've been having a torrid affair with lately, bi-wired with Kimber 4AG to either VTL Deluxe 225 or Aragon 4004 Mk.II amps. Analog source was a Linn LP-12/Trampolin/Ekos/Lingo and Linn's new Klyde cartridge I've got for review. Digital source was a Theta Pro Basic II driven via a coax link of Kimber KCAG by a Creek CD-60 CD player pressed into service as a transport while the Data was back at Theta for servicing. Preamp was the cool-man Melos SHA-1 headphone amplifier, kable was Kimber KCAG, and everything was plugged into Power Wedges which, although JA claims they make things sound blacker, did nothing to render Dr. John's recent *Goin' Back to New Orleans* CD (Warner Bros. 26940-2) as anything but the same "black like me" shtick Mac's been dishing out for years.[11]

I have to admit, I was really looking forward to hearing these baby Spendors in my listening room. Spendor's big S100s had knocked me out when JA and I used them as monitors during the transfer of my "Eden" track to the second *Stereophile* Test CD in John's listening lair. I thought they sounded a lot more musical and a lot less "hi-fi" than the *muy expensivo* speakers John was also using at the time (I won't reveal their name, but it rhymes with "snot-guppies"). And as the li'l S20 sports the same ¾" Scanspeak tweeter and a slightly modified version of the same 6" polypropylene mid/woofer used in the S100, I had high hopes for these midgets from o'er the pond.

I wasn't disappointed. These baby Spendors are musical, refined, and clearly several notches above the ragtag group of speakers they were grouped with that fateful weekend in Santa Fe. They have some serious limitations which I'll describe later, but for the most part, the S20s are vewwy Bwiddish and vewwy, *vewwy* musical![12]

Unlike most teensie-weensies I've heard, I don't think these little Spendors need to be situated close to the rear wall to give up the

11 RL sent this to me for review, but it's just too pathetic to waste your time and our space with. Dr. John is an extremely talented musician and a walking encyclopedia of musical folklore, but I've had about as much of his blackface *faux*-voodoo "Night Tripper" bullshit over the years as I can stand. *Goin' Back to New Orleans*, ostensibly a travelogue of Crescent City musical styles past and present, is *The Color Purple* version of N'Awlins music, and is a serious drag if, like me, you down wid dis stuff lak a *crazy man* y'all.

12 Peter Cooke rules.

bass; they sounded perfectly and suitably fat placed way out into the room 90" from the rear wall and 28" from the sidewalls, with enough bottom end to do Willie Weeks's godlike P-Bass justice on my *Donny Hathaway Live* LP.[13]

The S20's overall balance is very similar to the big S100: warm, open, laid-back in the high end, but above all, *liveable*. The S20s, like the ProAcs and other well-designed speakers, sound right at home no matter what kind of music you feed them; whether it was Los Lobos' GREAT new *Kiko*, Clapton's *Unplugged*, or *Hendrix in the West*, the baby Spendors delivered the goods, never once sounding like "maybe this record isn't *quite* what the designer had in mind when he was voicing these speakers." OK, so the Spendors couldn't "do" Nirvana's *Nevermind*. So what? Name me five Audiophile-Approved speakers selling for a cool thou that *can*! No, the baby Spendors won't be the new darlings of the Seattle hardcore music scene, but if you can get by on less-than-live levels, these are some mighty good little speakers.

Comparing the $1050 Spendors with the only slightly larger but *way* more expensive $3000 ProAc Response 2s was interesting, and I have to say that while the li'l S20s were no real match for the ProAcs, neither were they embarrassed by the showdown. The ProAcs had better bass and more of it, a clearer midrange, a more neutral balance in the high end, and a greater overall sense of living, breathing space around and through the room. However, the Spendors weren't as far behind as I'd have thought, sounding less neutral through the midrange than the ProAcs but not offensively so; the Fairfield Four's great new gospel disc, *Standing in the Safety Zone*, came across as less vividly *real* than with the ProAcs, with a more distant and slightly more hollow midrange. The raised inner lip on the cabinet front also gave the S20s' soundfield that "jiggly" feeling if I moved my head even slightly across the soundstage, and detracted from a real separation of the soundstage from the two little wooden boxes propped up on the big black stands.[14] I also found that the Spendors' more shut-in treble demanded that they be fired straight at my face to get the most realistic highs, unlike the brighter ProAcs, which sound best toed slightly outward. When you listen to the Spendors, make sure you sit them high enough, or tilt them back enough that you're listening on the axis of the tweeter and below. This is where I found the S20s to sound the best in the midrange, so I tilted the Target stands back a bit by propping the front of their bases up with a large Tiptoe.

What *don't* the S20s do? Rock and Roll. The bass range is very tight and will boogie right along, but take these li'l guys up above moderately loud and they doth protest verily loudly. At reasonable levels the S20s actually sound surprisingly warm, not at all like the typical anemic minimonitors they resemble; the massive Target stands were undoubtedly a big help here, as even *raw tweeters* seem to have good bass extension when sitting on these ungodly-heavy thangs. But take the Spendors up into what I consider even *minimum* rock-approved levels and they start burping like the babies they are. The S20's smaller sealed woofer doesn't *begin* to offer the same kind of extension, output capability, and sheer gut-punching *slam* of the pseudo-vented driver in the ProAc Response 2, so you really can't wick these guys up like you can with the ProAcs; these are British minimonitors that really *act* like British minimonitors.

I first hooked up the Spendors to the VTL Deluxe 225 tube amps, and while the sound was very pleasant and easy, I was reminded of Sam Tellig and his experiences with the big S100s and the VTLs: Sam felt that the match was too creamy-gooey smooooth for his taste, opting to drive the Spendors with a solid-state Krell amp to restore some bite to the sound.

Same with the S20s. The sound with the VTLs was smooth man smooth, but the high end was tilted down and the midbass was too fat, lending male voices like the Fairfield Four's a heavy, tubby quality.

13 I *finally* found a good used copy of this utterly perfect record for $25, a mere pittance I was only too happy to drop for this amazing live set of some of the most incredible edible soul music ever. Now JA can reach among his old LS3/5as, Vox AC-100 guitar amp, and *Clockwork Orange* droog outfit in the Atkinson family vault behind the poster for Sam Shepard's *Fool for Love*—a photo of Elvis french-kissing some girl—and retrieve *his* copy of *Donny Hathaway Live*; I'VE GOT MY OWN AGAIN!!

14 The supplied grilles employ two thin strips of felt that lie on either side of the tweeter when fitted to the cabinet, but there are still diffraction-causing lips surrounding the mid/woofer and the top and bottom areas around the tweeter. I thought the baby Spendors sounded much better without these grilles in place, which also tend to further darken the high end.

As it turns out, I did *not* have a Krell on hand to try with the Spendors; the odds of *me* getting a loaner amp from Dan D'Agostino are about as generous as those of Lyndon LaRouche becoming our next President. However, I *did* have a D'Ag-D'Esigned amplifier on hand in the form of the Aragon 4004 Mk.II, so I swapped the big VTLs out for the Aragon.

Now *that* was more like it! Now the S20s had some air to spare, although the high end was still more laid-back than the ProAcs. And the lumpy bass, too, had been banished, with voices sounding much more natural and less tubby than with the tube amps. Does this mean the Aragon is a better amp than the VTLs? *No*; only that it's a good bet that the ProAcs were designed with tube amps taken into consideration, while the Spendors were probably voiced with good solid-state amplification.

At $1050/pair plus stands, the little Spendor S20s come into some serious competition from many larger, more full-range speakers. For around the same price of the S20s and good stands, the $1275 Spica Angelus and $1250 Thiel CS 1.2 will play much louder without strain, as well as digging a bit deeper into the low bass. But if you absolutely positively *must* own a pair of British minimonitors at least once in your audiophile life, I'd choose the S20s over the LS3/5as any day for the most liveable British babies on the market. Just remember: cloth diapers save the environment. —**Corey Greenberg**

JA measures the Spendor S20: With Laura and I currently producing our brood, we're still debating the cloth *vs* disposable diaper question. Cloth diapers seem more environmentally friendly—until you factor in the energy used in washing and rewashing them. Perhaps not having babies at all is the way to save the environment! But the Spendor is what I should be discussing in these pages: its impedance magnitude and phase are shown in fig.8. Like the Dana 2f, the S20's magnitude has been plotted on a different scale, due to it rising above the usual 20 ohm upper bound above 1100Hz. Again, this will be an easy speaker for an amplifier to drive, the impedance not dropping below 6 ohms. The sealed box is tuned to 52Hz, which implies reasonable extension for such a small enclosure. Although the sensitivity is only about 3dB lower than that of the Spica SC-30, the S20's bass extension appears to have been achieved at the expense of poor power handling, the latter consistently bothering the listeners under blind conditions. The

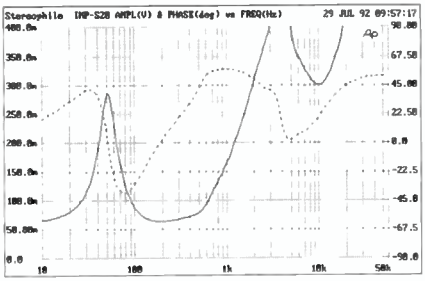


Fig.8 Spendor S20, electrical impedance (solid) and phase (dashed) (5 ohms/vertical div.).

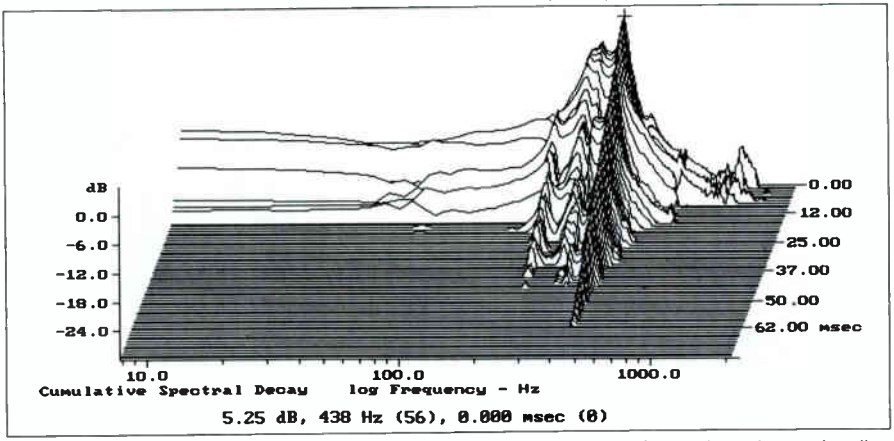


Fig.9 Spendor S20, cumulative spectral-decay plot of accelerometer output fastened to cabinet sidewall. (MLS driving voltage to speaker, 7.5V; measurement bandwidth, 2kHz.)

S20's cabinet has one strong resonant mode, as can be seen from fig.9, which will probably be a contributing factor to both the lack of midrange clarity and the "chestiness"

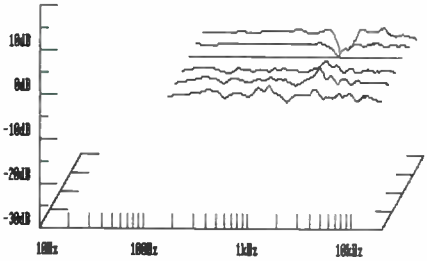


Fig.10 Spendor S20, vertical response family at 45", normalized to response on tweeter axis, from back to front: response difference 7.5° above cabinet top, difference level with cabinet top, reference response, difference midway between tweeter and woofer, difference on woofer axis, difference level with base of cabinet.

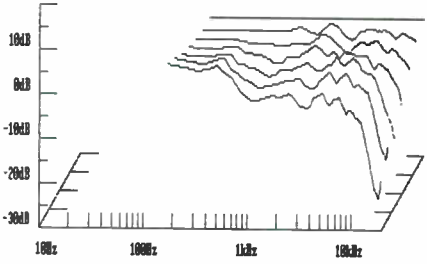


Fig.11 Spendor S20, horizontal response family at 45", normalized to response on tweeter axis, from back to front: reference response; difference 15° off-axis, 30° off-axis, 45° off-axis, 60° off-axis, 75° off-axis, and 90° off-axis.

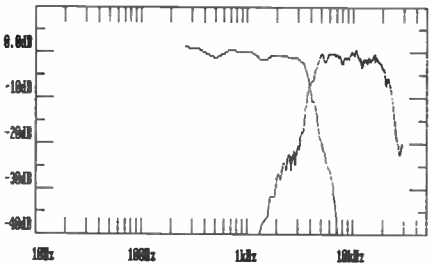


Fig.12 Spendor S20, acoustic crossover between woofer/midrange unit and tweeter, corrected for microphone response.

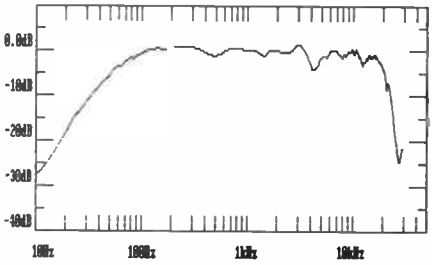


Fig.13 Spendor S20, anechoic response on tweeter axis at 45" averaged across 30° horizontal window and corrected for microphone response, with nearfield woofer response plotted below 200Hz.

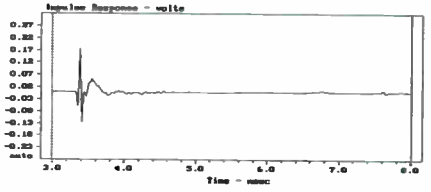


Fig.14 Spendor S20, impulse response on tweeter axis at 45" (5ms time window, 30kHz bandwidth).

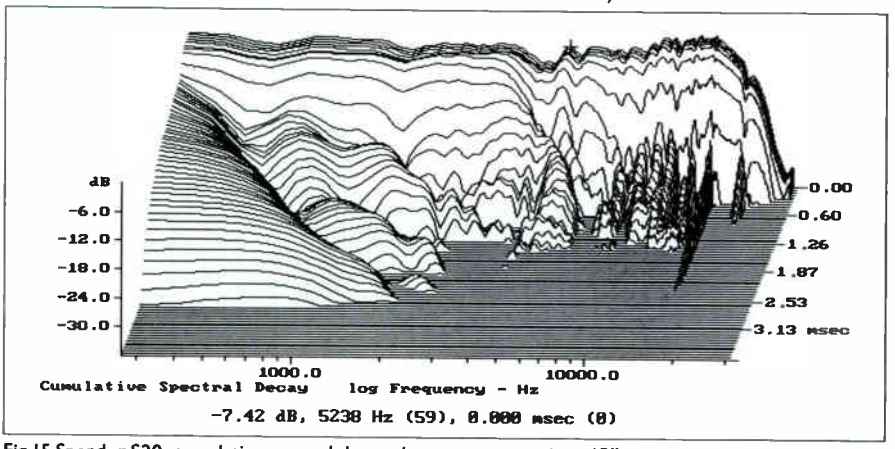


Fig.15 Spendor S20, cumulative spectral-decay plot on tweeter axis at 45".

noted in the listening tests.

In the vertical plane (fig.10), the S20 offers almost textbook dispersion: only minimal changes in balance as the listener moves off-axis between the cabinet top and bottom; with then a suckout appearing at crossover for standing listeners. In the lateral plane (fig.11), this Spendor offers a smooth roll-off in the treble as the listener moves to its side. This rolloff may be too severe in the top octave, as some of the listeners in the well-damped *Stereophile* listening room did note a lack of air and HF extension to the sound. In less-damped rooms (or rooms with fewer listeners), this may not be a problem.

Textbook, too, is the acoustic crossover between the drive-units on the tweeter axis (fig.12). Both drive-units are around 7dB down at the specified 4kHz crossover point with rapid subsequent rollout slopes. The overall response on the tweeter axis, averaged across a 30° lateral window, is shown to the right of fig.13. There is a little bit of raggedness at the crossover point, and the top octave is subdued, as noted in the listening tests. To the left of fig.13 is shown the Spendor's bass response, measured in the nearfield. The level-matching between this and the quasi-anechoic response above 200Hz can only be approximate, but it does suggest a slightly over-warm balance. The low-frequency extension is excellent for such a small speaker, however.

There are no surprises in the S20's impulse response (fig.14), the lazy bump after the initial pulse being due to the high-order crossover filters used, while the waterfall plot calculated from this impulse response (fig.15) is exceptionally clean. There is just one problematic mode to be seen at the bottom of the tweeter's passband, which might contribute to the occasional hardness noted in the Spendor S20's sound. The speaker's basic problem, however, seems to be that the designer's decision to trade off sensitivity and power handling in favor of bass extension significantly handicapped it in the blind tests, where it was being asked to play too loud too much of the time. Under more carefully limited loudness conditions, as CG noted, this speaker may work well enough to justify its highish price.

Signet SL260B/U: $450/pair

Because of the popularity of the Signet

Signet SL260B/U loudspeaker

SL260 and SL280 (the latter was favorably reviewed by TJN in Vol.13 No.10), the American company decided to offer the same loudspeakers and musical performance in less expensive cabinets. Audiophiles now have the choice of the wood-veneered SL260 and SL280 or the vinyl-covered SL260B/U and SL280B/U.

The SL260B/U uses a 6" Vifa woofer with a cast magnesium basket, polypropylene cone, and butyl rubber surround. The ¾" aluminum-dome tweeter is sourced from SEAS. These are crossed over at 3kHz with air-core inductors and polypropylene capacitors. Internal wiring is 14-gauge multi-strand oxygen-free copper.

The SL260's enclosure is made of ¾" MDF (side walls and rear panel) and 1" MDF (front baffle). A ½"-thick internal brace is placed between the woofer and tweeter, connecting the front baffle, side walls, and rear panel. The cabinet walls are lined with 1⅛"-thick open-cell acoustic foam. In addition, a U-shaped section of the acoustic foam surrounds the woofer rear, preventing the back wave from reflecting off inside cabinet walls and returning through the woofer. The Signet line is distinguished by the unusually shaped foam surround to the tweeter. A sin-

gle pair of gold-plated, five-way binding posts provides signal connection.

Listening Tests Panel Score: 4.43 (5.12 : 4.02 : 4.49). JGH found the Signets rather dark and lifeless on the first two days. "Distant," he wrote of the Arnold. He commented on some grundge and confusion with the Elgar, a recessed, dark, and lifeless quality to Kathleen Battle's voice, and a "raucous, sizzly" quality on the drum solo. But his opinion took a turn for the better on Day Three. He didn't much like the results on the Beethoven, with congestion on the crescendos, but thought the sound opened up in later selections. He commented favorably on Day Three on the excellent LF weight and good detail on the Arnold.

JE found the drum solo "nicely dynamic," but commented on two days on a "muffled" quality to James Taylor's voice and a lack of "bass clarity and missing detail elsewhere" on the Battle. Still, he rated the Signets just a hair above average, noting that their shortcomings were "essentially ones of omission," and "subtractive." Still, he found them "uninvolving" and "boring," though "nonoffensive."

JA rated the Signets above average overall—in fact, he gave them his third highest overall score. "At last some highs," he commented on Day One on hearing the pink noise. (Sitting in the middle at the back, he was experiencing all the speakers via the broad shoulders of JE and RH.) Though he found them "rather lean-balanced" and "tilted up in the highs," further on he felt them to have "good clarity and definition overall," with "reasonable LF extension" and a "good sense of image depth." That was on Day One. He liked them less on Day Three, when they were auditioned eighth. Then he found them "very clean but lean," adding, "maybe I'm tired, but I have less tolerance for this balance than I did before."

RH found the balance a little "whitish," but liked the "tight bass" on his drum recording. Despite commenting on the Signets' slightly bright balance, he found them to have "good pitch definition" and a "tight, fast, and clear" quality. He commented favorably on their good sense of space, and though rating the Signets higher on Day One, found them "uninvolving" on Day Two, when he scored them almost a point lower. Overall, however, he scored them above average.

DO rated the Signet down for (to quote his comments on the Beethoven) "lean balance and bass, lightweight, lacking dynamic drive, congests on choral passages." He found the sound soft, and lacking in transparency, drive, punch, and energy.

CG found the upper mids recessed and the overall sound bland. He felt the guitar on the Stevie Ray Vaughan "very colored," and the bass there "slow" with "muffled mids" and a "thick mid and upper bass."

TJN found the sound to be "rather top-heavy," the midbass a bit woofy, and the midrange slightly colored (nasal). Still, he found the low bass on the Arnold decent, along with a good sense of air and delicacy on the Kathleen Battle. Overall, he rated the Signets marginally above average.

With the Signet we reach the great "middle ground" of the survey. Although they finished seventh overall, the Signets were only 0.3 points below the third-place Spicas—0.3 points in an overall average for all of the loudspeakers of 4.46—putting them a rather insignificant notch below average. The panelists' comments and scores reflect this. While still garnering criticism—remember that the listeners here listen largely to much more ambitious loudspeakers than those surveyed—the SL260B/Us still received a reasonable amount of favorable comment.

DO comments on the Signet SL260: In *The Road Warrior*, George Miller's awesome action flick, a young Mel Gibson fights it out with a bunch of brain-damaged punks over a crazed post-nuke landscape for rare and precious gasoline. In the realm of inexpensive loudspeakers, the fuel that keeps *me* going is listenability.

It is extremely difficult to salvage respectable sonics from a pair of inexpensive drivers and a flimsy cabinet. Typically, the necessary constraints of budget loudspeaker design force designers into making unpleasant choices, the result often a speaker that screams, shouts, sizzles, fizzles, or in some other way actively irritates. A perfect transducer is, of course, out of the question at this price point, so the trick is to settle for a design whose main faults are sins of omission rather than of commission. Sacrificing bass extension in favor of midrange smoothness might be a step in the right direction. So would set-

tling for restricted but quality treble reproduction instead of overly generous and poorly controlled highs.

Give me liberty, freedom of speech, and a good midrange. This country is obsessed with the frequency extremes. Have we forgotten that the soul of the music rests in the midrange? A 10″ woofer crossed-over to a 1″ dome is asking for trouble. As with the Signet, I would prefer a decent 6″ woofer for its smoother mids and a more seamless transition to the tweeter.

That the Signet distinguishes itself in being quite listenable is, therefore, no small accomplishment.

I auditioned the Signet 260 atop 20″ Chicago Speaker Stand stands in my reference room. The speakers were toed-in so that their axes crossed at the listening seat. Both the Fourier Sans Pareil and Electrocompaniet AW-250 power amps were used in the evaluation, together with Space & Time RSC speaker cable and Expressive Technologies IC-1 interconnects.

My first and lasting impression of the Signet was of a smooth, detailed midrange. For example, Anna Maria Stanczyk's fiery rendition of the Chopin *Scherzo* (*Stereophile* Test CD 1, track 10) was reproduced with no resonant colorations. The bass heft of the piano was diminished, but the middle registers were cleanly and evenly enunciated.

The soundstage was quite spacious, program material permitting, with excellent lateral localization of instrumental outlines. Image outlines were nicely focused in a reasonably palpable fashion. What was missing, however, was total soundstage transparency. A slight veil reduced my vision from 20/20 to perhaps 20/40, and prevented me from seeing far into the soundstage. The net effect was a reduction in the feel for the space of the original recording venue.

The perceived tonal balance was decidedly on the lean side of reality. The weight and heft of double bass were diminished, as was the sense of an orchestral foundation. In general, the range below 100Hz sounded anemic. There was no deep bass to speak of, and the lack of bass punch robbed the drum solo on track 3 of *Stereophile*'s Test CD 2 of convincing visceral excitement. Yet what was left of the midbass and the upper bass was tightly defined. It was easy to follow bass lines, and note rhythm and pitch changes. What this boils down to is typical minimonitor performance, favoring bass quality over bass quantity. Bass lines were better defined with the solid-state Electrocompaniet AW-250 amplifier, though image palpability and soundstage depth were better with the Fourier Sans Pareil. To its credit, the Signet resolved quite well the sonic differences between these amps.

The Signet's re-creation of the music's dynamic contrasts was far above the norm. Both Elgar's *The Dream of Gerontius* (*Stereophile* Test CD 2, track 13) and Beethoven's Symphony 9 (Chesky CD66), excerpts of which were used during the listening-panel sessions, sounded far more dynamic than they did via the Spica SC-30 for example. Not that the Signet blew me away on orchestral works—there was notable congestion during loud passages—but at least it was able to kick-start itself into going from soft to moderately loud with conviction. In this respect, digital program material gave the Signet far less trouble than did vinyl. Being a bass-reflex design, the woofer cone loses damping about an octave below the cabinet resonance. In the case of the Signet, that means below 20Hz. That's not a problem with CDs, because they don't contain subsonic garbage. With vinyl, however, significant cone pumping set in, together with an increase in the projected stress level. This argues for the use of a subsonic filter if you plan to use these speakers much with LPs.

The treble range didn't sound exactly neutral, but at least it didn't cross the line separating the tolerable from the noxious. The frequency response between 4 and 10kHz rose slowly in relation to the midband to a maximum of 5dB at 10kHz. I'm tempted to say "Very clever!" to the folks at Signet, as this is the sort of treble balance popular today with the average audiophile. As a consequence, the presence region sounded a bit souped-up, which helped the upper registers of female voice to project forward through the fabric of the soundstage. Treble transients were somewhat etched, lending an unnatural edge to brushed and struck cymbals. This argues for careful matching of ancillary equipment. A hot-sounding front end in conjunction with a hard solid-state amp would push the Signet over the edge. Vacuum tube gear (the stuff that glows in the dark) would be a safer bet with the SL260.

All in all, I judge the Signet to represent a pleasant sonic surprise in its class. Unlike its hordes of competitors, Signet's SL260 is capable of effectively communicating the essence of the musical message. That it can accomplish this without wearing the listener down in either the short or long run evinces a level of performance uncommon at its price point. —Dick Olsher

JA measures the Signet SL260B/U: The SL260's impedance magnitude and phase are shown in fig.16. The port tuning of 42Hz is indicated by the saddle of 7.2 ohms at that frequency. Its B-weighted sensitivity is 1.5dB greater than the Spica, and the speaker is, overall, an easy load. The only frequency where there is a large electrical phase shift, 3kHz, coincides with a large amplitude, 20 ohms. The wrinkle at 32kHz is the tweeter's resonance, while that around 400Hz is probably due to a cabinet resonant mode. Looking at a waterfall plot of the side wall vibrations (fig.17) reveals just one strong cabinet mode, at 470Hz.

Fig.18 reveals that the SL260 is moderately sensitive to changes in vertical listening height, the optimal axes lying between the tweeter and woofer. A crossover suckout appears above the top of the cabinet and also below the port. Laterally (fig.19), the Signet has a well-controlled rolloff in the treble. Reflections of the speaker's sound from side walls will not be disturbingly colored, therefore, while those bothered by an excess of high-frequency energy can adjust it to some extent by not toeing-in the speakers to the listening seat. Note that the listeners were almost universally bothered by the Signet's excessive treble; to the right of fig.20 can be seen a broad peak between 4kHz and 20kHz in the tweeter-axis response, this averaged

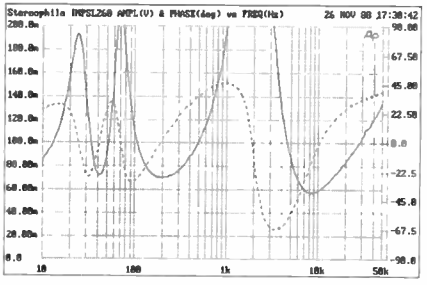


Fig.16 Signet SL260, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

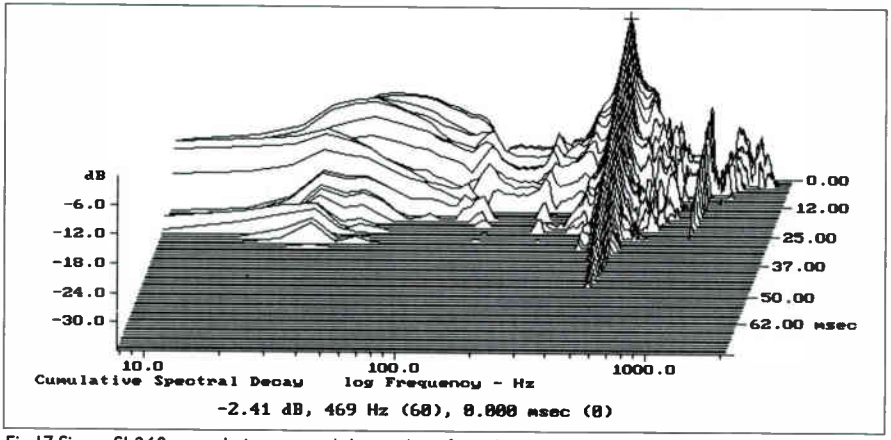


Fig.17 Signet SL260, cumulative spectral-decay plot of accelerometer output fastened to cabinet sidewall. (MLS driving voltage to speaker, 7.5V; measurement bandwidth, 2kHz.)

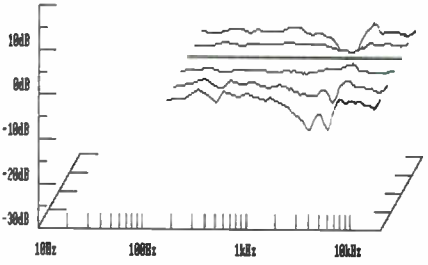


Fig.18 Signet SL260, vertical response family at 45", normalized to response on tweeter axis, from back to front: response difference 7.5° above cabinet top, difference level with cabinet top, reference response, difference on woofer axis, difference on port axis, difference level with cabinet base.

across a 30° window.

The left of fig.20 shows the separate nearfield responses of the port and woofer, the former centered at 42Hz and coincident with the null in the woofer's output at that frequency, as it should be. Given the listeners' comments on the speaker's lean bass balance, it may be that this graph is a little optimistic. Note, however, that the port has some kind of resonance centered between 700 and 800Hz. While no specific listening comments tie in with this problem, perhaps it contributed to those concerning an "uninvolving" sound. Perhaps.

The impulse response (fig.21) is typical of the type, while the waterfall plot (fig.22) shows a couple of minor treble resonances but is otherwise clean. There again, however, is that excess of treble energy which bothered some of the listeners more than others.

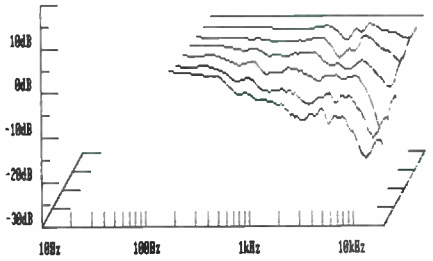


Fig.19 Signet SL260, horizontal response family at 45", normalized to response on tweeter axis, from back to front: reference response; difference 15° off-axis, 30° off-axis, 45° off-axis, 60° off-axis, 75° off-axis, and 90° off-axis.

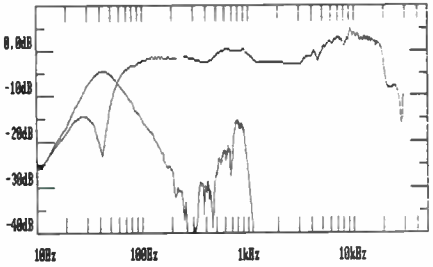


Fig.20 Signet SL260, anechoic response on tweeter axis at 45" averaged across 30° horizontal window and corrected for microphone response, with nearfield woofer and port responses plotted below 200Hz and 1kHz, respectively.

JAMO CONCERT II: $798/PAIR

The Jamo Concert II, a two-way reflex design with a 6.5" woofer and 1" dome tweeter, is the smallest of three speakers in this Danish company's Concert Series. The woofer is designed and manufactured by Jamo and the tweeter is sourced from Philips. Crossover frequency is 2kHz. The Concert II's enclosure is unusual in that the front baffle is molded in a single piece from Jamo's patented Non-Coloration Compound™ (NCC™), a highly compressed material impregnated

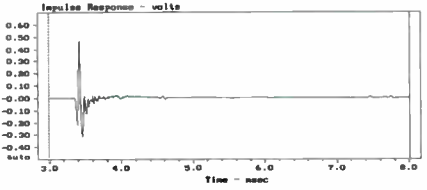


Fig.21 Signet SL260, impulse response on tweeter axis at 45" (5ms time window, 30kHz bandwidth).

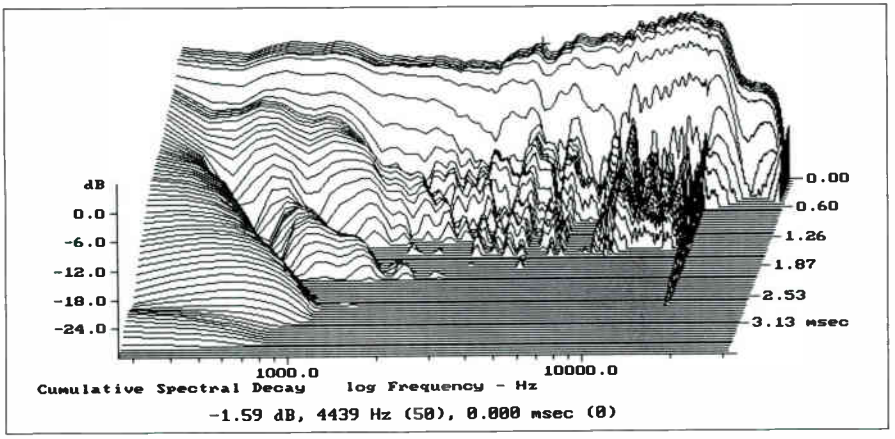


Fig.22 Signet SL260, cumulative spectral-decay plot on tweeter axis at 45".

with a resonance-damping agent. The rest of the 25-liter cabinet is made of particleboard finished in real wood veneer—a lovely mahogany—with rounded edges. The unobtrusive grille is held in place by magnets to achieve a close fit to the baffle and minimize diffraction. Cable connection is via a single pair of gold-plated five-way binding posts.

Listening Tests Panel Score: 4.54 (4.96 : 4.26 : 4.81). JGH's reaction to the Jamos was consistent on all three days. In brief: light-balanced with a lack of body. Sitting at the front, he found the Beethoven "shattery, harsh, violins steely," and the Crash Test Dummies and James Taylor very sibilant—though he did like the sound of the Dummies' cello. He felt that the drum solo had good impact, with appropriately brassy but "searing" cymbals. On the Elgar, he found the "chorus sizzly, brasses light but [with] good blat. Little depth, congested choral *ffs*. Tizzy. Organ weak, fair detail."

JE, though his scores weren't low (particularly on Day Three), was nonetheless apparently put off by the tonal balance. On Day One he summed up: "sharp, harsh when loud, [with a] narrow stage." On Day Two he wrote, "the sharpness would become fatiguing; my ratings just kept going down slowly with each successive passage," and on Day Three concluded, "there were things I really enjoyed with this speaker, but the sibilance on vocals was always intrusive."

JA apparently was able to get past the tipped-up balance—remember he was sitting at the back—though he criticized it nonetheless. On Day One he thought the "bass well-tuned, doesn't boom," but thought the balance "too lean for some tastes." On Day Two, though, he stated that "I initially liked the treble emphasis, but its charm wears off with extended listening (but it does endow the speaker with a good sense of space and clarity). A small reflex box with a too-sensitive tweeter." And on Day Three, though he continued to praise the "excellent clarity" and noted "delicious soundstaging, detail, [and] space" on the Arnold, the excessive highs continued to bother him. "If the tweeter could be padded down," he concluded, "this might be a winner."

RH also commented on the tizzy treble, calling it the Jamo's "biggest liability." He praised the "good clarity and soundstaging,

Jamo Concert II loudspeaker

excellent pace and rhythm, and good bass extension," but found it to be, ultimately, "lightweight" and (on Day Two) "uninvolving."

DO liked the Jamos on his first listen (Day Two), praising the "good drive and pitch definition" on the drum solo and "convincing depth perspective" on the Arnold. He, too, noted the "lightweight balance," and some congestion and distortion on loud passages in the Elgar, but only on the Battle did he note that the "treble [was] a bit bright." On Day Three, however, he rated the Jamos lower, noting sibilance, grain, and a bright lower treble on several selections. "Upper registers indelicate," he noted on the Battle. But he still praised its "good resolution of massed voices" on the Elgar and the fine spatial resolution on the Taylor. Overall, DO rated the Jamos well above average.

CG also noted a too-tipped-up sound, but seemed to find the uptilted balance "boring" rather than irritating. "They don't boogie," he noted. According to his scores he liked them a little better on the final day, but his comments reflected the top-heavy sound.

"Guitar very crisp," he noted on the Crash Test Dummies, "but already bright vocal is made unfortunately more so." On the drum set, he found that the sound "doesn't fall apart amid the heavy battery, but still too bright. Highs too prominent," he concluded.

TJN thought the Jamos relatively uncolored except for their tipped-up balance. "Nice space around guitar, but lacks foundation and solidity," he wrote of the Stevie Ray Vaughan. On the Elgar, he thought the "good detail and air around chorus a plus," but found the overall sound "still rather congested and thin." And on the drum solo, he found the sound "quick, but bright, fizzy, and sizzly. Lots of detail, but smears badly on peaks."

Based on the comments and scores, the main characteristic keeping the Jamos from a much more positive reception was their tipped-up balance.

JE comments on the Jamo Concert II: While I'd seen many of Jamo's aesthetically splendid advertisements, I really knew nothing of the company or its products—I thought they made just a couple of different speaker models. Then I paged through the October 1992 issue of *Audio* and found listings for 29 different Jamo speakers, ranging from the $349 three-piece satellite-subwoofer Compact System to the $9000/pair Oriels. Turns out that this well-established Danish manufacturer has been successfully selling loudspeakers, primarily in Europe, for over 20 years.

I began my home audition of the Concert IIs by substituting them for the ProAc Response Three Signatures in my reference system. (Koetsu Pro IV, Versa Dynamics Model 1.2, Magnan Vi tonearm cable and interconnects, Theta Data, Altis digital cable, Mark Levinson No.30, CAT Signature, ARC Classic 150s, and dual Tice Power Blocks with Titans.) Hooked up to a pair of bi-wired runs of XLO Type 5, the comparison was, as should have been expected, less than flattering. The Concert IIs lacked deep bass extension; were harmonically thin, excessively sibilant, and a bit too hard, bright, and harsh; lacked overall clarity; suffered from restricted dynamics; and sounded boxy. On the other hand, they presented a satisfyingly wide and deep soundstage, and handled with great skill the complex QSound effects on Roger Waters's *Amused To Death* CD (Columbia CK 47127).

But a small two-way box costing a fraction of the Signature's $10,000 tag *should* have comparatively limited low bass and dynamic range; the comparison was hardly fair. Having so penalized the Concert IIs, I shifted the balance in their favor by listening to the IIs *vs* the highly praised, price/performance-leading, $199/pair PSB Alphas, still using the rest of my reference system.

The Concert IIs still disappointed. The little PSBs had more even, more extended bass, though it was a bit less well defined; better lower-treble/upper-midrange performance, with diminished vocal sibilance and cymbal splashiness; a harmonically fuller, more prominent midrange, especially obvious on vocals; slightly greater dynamic contrasts; and significantly more air and space in the soundstage and around individual performers. Neither speaker won any prizes for resolution of detail. While the Jamos presented a deep stage with adequate width, very stable placement of performers, and a satisfying mid-hall perspective, they sounded boxy, lightweight, uneven in response, and hot and hard overall.

In my third test I relied as best I could on my memory of the blind listening comparisons, with the help of a copy of the CD-R from the panel sessions that TJN had sent along. Listening to the pink noise in stereo, the image was very stably centered between the Concert IIs, which seemed very well matched: no sounds favored either speaker, and none seemed to come directly from the cabinets themselves. This confirmed my general impression that the Concert IIs did indeed present a good soundstage with stable placement, no obvious wander or vagueness, and a pleasing (to me) mid-hall perspective with sounds developing behind the speakers.

Unfortunately, my negative impressions were also confirmed. JGH's voice sounded very boxy, and the remaining CD-R tracks proved equally disappointing. Bass sounds (acoustic and electric basses, kick drums) were very lightweight, midrange sounds (voice, sax, piano) were thin, and trebles (cymbals, triangles, string overtones) were hard. Resolution of detail, especially during loud and complex passages, left a great deal to be desired; things got very confused and congested. Dynamic contrasts were re-

stricted, and spaciousness was consistently missing (*ie*, on the Midori recording). The more I listened, the less I liked the Concert IIs.

It would have been easy to simply stop listening at this point, but I'd heard things I liked in the speaker, primarily its soundstaging abilities. I'd also noticed that I enjoyed the sound of the speakers more when I stood up, which raised my ears above the tweeters' axis. After many trials and tribulations, I ended up with the speakers mounted upside down on a pair of the wonderful Target R2 stands (the third stand I'd tried), which put the tweeter well below ear level. I spread the speakers much farther apart, closer to the side walls, and aimed them directly ahead—no toe-in. Surprisingly, there were no audible differences with the unusual grillecloths on or off (I listened to the IIs extensively both ways). I also replaced my CAT/ARC combo with the Lectron JH 30 and matching phono stage (which is not the equal of the integrated amp), and changed from the XLO to ARC LitzLine 2 speaker cable.

All of these changes worked to improve the Concert IIs' performance. Soundstaging remained their strong point, with greater width and no loss in depth, placement, or perspective, though spaciousness did not improve. Although I might have given up floor reinforcement for the bass, the combination of the Target stands and sidewall reinforcement more than compensated, resulting in improved bass extension. Getting much farther off-axis (horizontally and vertically) from the tweeter improved the overall tonal balance as well as making the hardness less intrusive. Since dynamics and resolution of detail were poor to begin with, neither area suffered with the switches in electronics, cables, and placement. However, the softer tonal presentation of the Lectron/LitzLine 2 combo definitely worked to the IIs' advantage.

Virtually all of the Jamos' characteristics were obvious on such large-scale orchestral works as Shostakovich's Symphony 7 (Mstislav Rostropovitch, National Symphony, Erato 2292-45414-2). The orchestra was stably placed on a stage that spread from speaker to speaker and had good depth. I seemed to be transported to a seat just forward of mid-hall. Certain sections of the orchestra (*eg*, woodwinds) sounded fine, while most others (*eg*, strings) sounded harmonically thin. Dynamics and deep bass were restricted, and the sense of spaciousness was minimal.

The Jamos' ability to do a wonderful job with some sounds was puzzling. An example of this was the organ from Lena Horne's and Gabor Szabo's *Watch What Happens!* (Jazz Heritage 512799X). While this instrument sounded fine, vocals were boxy and sibilant, drums were distant and obscured, and the bass line was muddy and weak.

The Jamos were much easier to live with in my final setup and continued to offer very good soundstaging, their most glaring faults tamed but not eliminated. The speakers had become easier to listen to, but never became musically involving. In spite of being well made, attractive, and (apparently) carefully thought out, I don't see them as sonically price-competitive in the US High End.

—Jack English

JA measures the Jamo Concert II: Fig.23 shows the Jamo's impedance magnitude and phase. Though the former drops below 5 ohms in the mid-treble, this should not present good amplifiers with problems. The port can be seen to be tuned to 42Hz, the lowest note of the double bass. The slight wrinkles around 200Hz are due to a cabinet resonant mode, as revealed by fig.24, the waterfall plot of the side wall's vibrations, though this is not that high in absolute terms.

Vertically, the Concert II is relatively uncritical in terms of finding the optimal axis, though as fig.25 shows, listening above the cabinet or below the woofer both result in a suckout in the crossover region. Laterally (fig.26), the treble rolls off in quite a controlled manner, though the restricted disper-

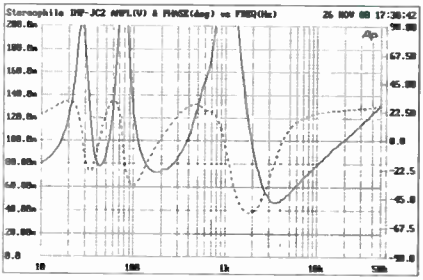


Fig.23 Jamo Concert II, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

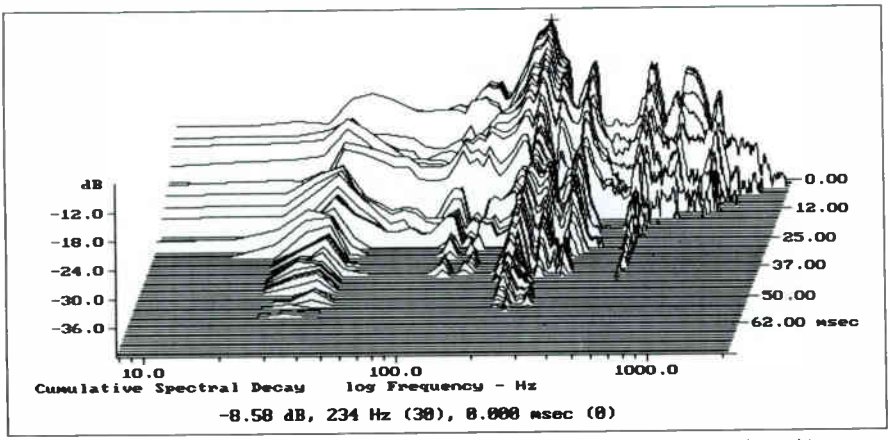


Fig.24 Jamo Concert II, cumulative spectral-decay plot of accelerometer output fastened to cabinet sidewall. (MLS driving voltage to speaker, 7.5V; measurement bandwidth, 2kHz.)

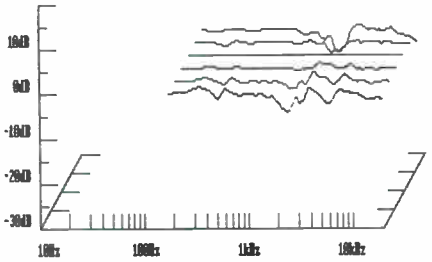


Fig.25 Jamo Concert II, vertical response family at 45", normalized to response on tweeter axis, from back to front: response difference 7.5° above cabinet top, difference level with cabinet top, reference response, difference midway between tweeter and woofer, difference on woofer axis, difference 7.5° below woofer axis.

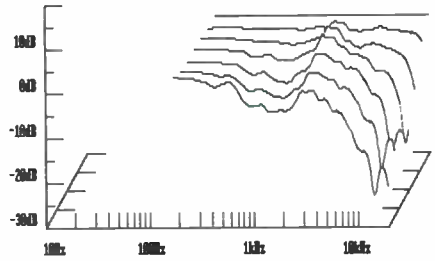


Fig.26 Jamo Concert II, horizontal response family at 45", normalized to response on tweeter axis, from back to front: reference response; difference 15° off-axis, 30° off-axis, 45° off-axis, 60° off-axis, 75° off-axis, and 90° off-axis.

sion of the woofer at the top of its passband results in an off-axis peak centered at 3kHz. The Jamo should be sited well away from side

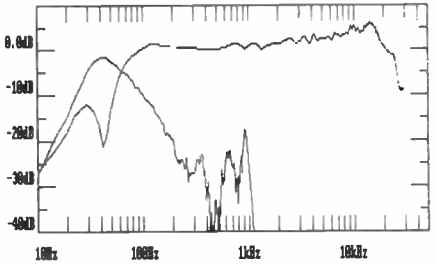


Fig.27 Jamo Concert II, anechoic response on tweeter axis at 45" averaged across 30° horizontal window and corrected for microphone response, with nearfield woofer and port responses plotted below 200Hz and 1kHz, respectively.

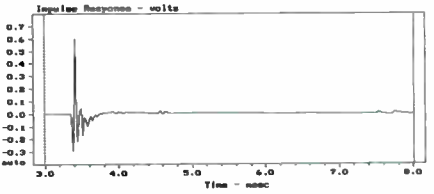


Fig.28 Jamo Concert II, impulse response on tweeter axis at 45" (5ms time window, 30kHz bandwidth).

walls, unless they are very absorptive, to avoid the sound becoming too bright or aggressive. (Brightness tends to be due to an excess of energy in the low- or middle-treble, not to a tilted-up response.)

The main problem *Stereophile*'s listening panel had with this Jamo, however, was its excessive top-octave balance. The response on the tweeter axis, averaged across a 30° horizontal angle, is shown to the right of

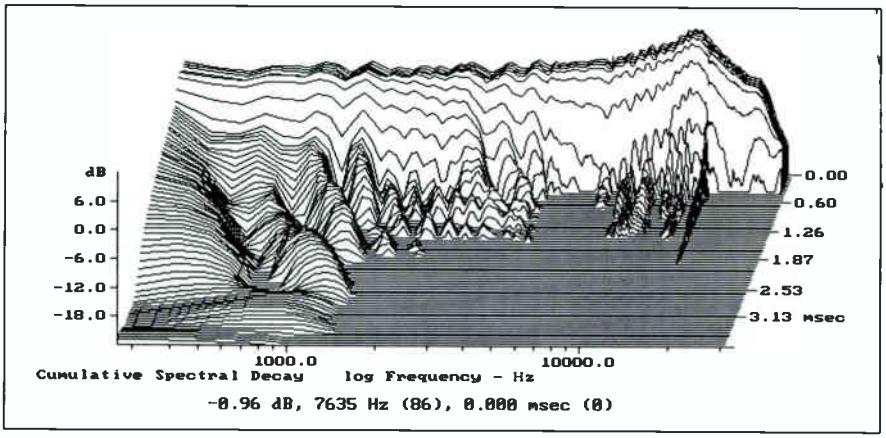


Fig.29 Jamo Concert II, cumulative spectral-decay plot on tweeter axis at 45°.

fig.27. This, as expected from the auditioning comments, is tilted-up, gently and evenly rising by 6dB from 1kHz to 16kHz. A normal tone control couldn't do anything about this problem, but the "tilt" control featured by the Quad 34 preamplifier would do a good job of correction, allowing the speaker's excellent performance in other areas to shine through. To the left of fig.27 are the Jamo's nearfield port and woofer responses, which imply a response rolling out below 70Hz or so. Note that, like the Signet SL260, there are a couple of peaks in the port's output between 600Hz and 1kHz, perhaps due to pipe resonances of some kind.

The Jamo's impulse response on the tweeter axis (fig.28) was clean, as was the corresponding waterfall plot (fig.29). If this speaker were equalized to be flat, Jamo would definitely have a winner on their hands. As it stands, however, prospective owners should be prepared to embark on the kind of odyssey outlined above by Jack English to get a well-balanced sound from it.

Rogers LS2a/2: $550/pair

The Rogers LS2a/2 is a cousin of the famous LS3/5a BBC studio monitor. This two-way British design features a Rogers 6.25" polypropylene woofer mated to a ¾" metal-dome ferrofluid-cooled tweeter. A six-element network crosses over at 3.5kHz with third-order slopes.

The ported enclosure is made of particleboard, with an MDF front baffle. Black or simulated walnut vinyl coverings are available. A single pair of binding posts will accept lugs, bare wire, or 4mm banana plugs.

Listening Tests Panel Score: 4.69 (4.26 : 4.54 : 5.24). JGH gave the Rogers mixed grades, liking it better on Day One. He noted some strain on the Elgar, but thought the bass fair in extension and detail (he estimated the former to be about 50Hz). But he found the overall sound a bit "laid-back." He noted some "tizziness" and "sizzly voice," also on the Elgar, and though he thought the brass fair to good on this selection, he also mentioned "some strain" and "poor inner detail." He remarked that the drum solo was "a bit hard" but had fair to good impact, and noted that the Arnold was "very distant, almost confused. . .easy on the ears but undetailed." Still, he praised the "good LF weight."

JE thought the LS2a/2s were "lacking in depth and spaciousness," with a "dark tonal balance." He also felt them to be very slightly sibilant (a common complaint of his with most of the loudspeakers here). He found them inoffensive but uninvolving.

JA was not taken with the Rogers on Day One, but liked them better each day. On Day One he felt they produced a "big sound with a vivid balance, but too colored and confused-sounding to get a recommendation from me." On Day Two, however, he tempered this, calling the Rogers "a miniature with restricted dynamic range but good clarity," and by Day Three was saying, "I like this one if it isn't played too loud." He noted "hardness at high levels" on the drum solo, but noted the "low coloration." On the Midori he noted that the Rogers "gets the

Rogers LS2a/2 loudspeaker

balance between violin and piano right. . . this is a good tweeter." Though he observed "some congestion at highest levels" with the Elgar, he commented on the "excellent clarity and image depth."

RH's scoring reflected a somewhat below-average result. He noted an annoying resonance in the upper bass, but thought the extension in the lows better than that of the Spicas. He was bothered on Day One by some tizziness in the highs, and noted that the sound "falls apart on peaks" and was "confused and congested" on the Elgar. The latter comments tied in with others' observations of the Rogers' dynamic limits.

DO rated the Rogers considerably higher on his second exposure to it. While noting some congestion on the Elgar on Day Two (his first day), and rather "tepid" overall dynamics, he did rate the latter as better than the Spica, and felt that the Rogers had a "reasonable sense of dynamic *contrasts*" (TJN's italics). He thought the Rogers rather lacking in air and uninvolving on his first day; "needs a wake-up call," he remarked on the Stevie Ray Vaughan. But on Day Three he felt the drum-solo reproduction was "head and shoulders above the pile in rhythmic drive and precision," liked the revealing of "vocal nuances" on the Battle, and the "nice clarity and stage transparency" on the Taylor.

CG rated the Rogers above average on both days, but liked it better on his first day (Day Two). He did comment on Day Three, however, that he was getting "pretty fatigued" by the time we got to the Rogers (seventh), but here also agreed with several others on the dynamic limits of the LS2a/2. "A little rough when the going gets tough," he noted on the Beethoven, also feeling the speaker to be "dynamically limited" on the Elgar. On his first listen (Day Two), however, he rated it well above average, praising the Stevie Ray Vaughan: "a little thick in the mid-bass, but good articulation. Guitar snaps *right on*. Really good vocal. Soft on top end." He found the drum solo to produce a "great big sound, still a little soft on top but no serious problems otherwise. Real dynamic." On the Elgar he noted, "if these are cheap, they're a steal."

TJN also gave the Rogers good grades. He noted a slight boxiness on JGH's voice, but not on the musical tracks. He also noted the slight warmth and upper-bass emphasis that had bothered RH—most evident on the male vocals. And he also found the sound to congest slightly on peaks—particularly so on the drum solo and the Elgar. The right woofer was also heard to bottom slightly on the Arnold. But he noted a good sense of depth in the chorus on the Elgar, and a fine sense of three-dimensionality and space on the drum solo, commenting on the "clean, airy high frequencies" and the slight warmth which "does not intrude."

Like the other middle finishers, the Rogers was liked by some panelists better than by others. Its restricted output capability seemed to be its major liability; only the Spendor was more seriously handicapped in this respect.

RH comments on the Rogers LS2a/2: The Rogers LS2a/2s were auditioned on Celestion 24″ spiked and lead-shot–filled stands, with Blu-Tack at the speaker/stand interface. The stands placed the Rogerses' tweeters directly on-axis with my ears at the listening position. The loudspeakers were placed well away from the rear wall in my 14.5′ by 21′ dedicated listening room.

In addition to the usual amplification—Audio Research LS2 line stage, Vendetta Research SCP2B phono section, Mark

Levinson No.23.5 and VTL 225W Deluxe monoblocks—I drove the Rogers with the Exposure XV, a 40W integrated amplifier from England (review to come next month).[15] The analog front end was a heavily modified Well-Tempered Turntable and Arm; the digital source was a Theta Data II transport driving the $15,000 Meitner IDAT (also to be reviewed in February) via ST-type optical link. Interconnects were Monster Sigma, Expressive Technologies IC-2, and AudioQuest Diamond. Loudspeaker cables were 8' runs of bi-wired AudioQuest Sterling/Midnight, or Exposure's own cable when using their integrated amplifier.

Following Rogers's recommendations, the LS2a/2s were toed-in so that their axes crossed just in front of the listening chair. I found, however, that imaging improved with the loudspeakers pointed more toward me, just enough so that I could see the outside edges of both cabinets. This positioning made the center image more solid and better defined.

I had a largely favorable, but decidedly mixed, impression of the Rogerses; they did some things remarkably well but had some obvious faults. On the plus side, the LS2a/2s had superb soundstaging and the ability to throw a well-focused presentation before the listener. The impression of instruments existing in space was exceptional, greatly adding to the LS2a/2s' appeal. I also enjoyed the Rogerses' laid-back and somewhat distant perspective. The music seemed to exist behind the loudspeakers, particularly in the mids. The Rogerses were the antithesis of aggressive, forward, and brash—all qualities I valued in them. Moreover, they had a nice sense of openness and ease.

Perhaps the best aspect of the LS2a/2 was its natural presentation of midrange timbres. The levels of coloration through the midband were remarkably low, although I can't say that about other parts of the spectrum. There was a noticeable prominence in the upper mids/lower treble that exaggerated sibilance. It wasn't a spitty "ssss" sound on vocals, but rather an emphasis on "ch" sounds, which is lower in frequency. This coloration could also be heard on Red Rodney's fluegelhorn on *Then and Now* (Chesky JD79); some notes in the upper register became a little ragged and edgy.

Another liability of the LS2a/2 was a midbass resonance that was nearly constantly audible on some music.[16] Some loudspeakers have narrow resonances that are only occasionally excited (ascending or descending left-hand piano lines are particularly revealing of this), but the Rogers had an overall high level of coloration in the midbass. It was particularly apparent on bass guitar played in a high register, which produced more of a boxy drone than clearly articulated individual notes.

The LS2a/2 also lacked bass extension and dynamics, sounding polite and refined rather than visceral. On music that needs power and punch in the bass—Buddy Guy's *Damn Right I've Got the Blues* (Silvertone 1462-2-J), for example—the Rogerses didn't cut it. This music tended to reveal their weaknesses—lightweight balance, lack of extension, restricted dynamics—without fully exploiting the Rogerses' wonderful soundstaging and uncolored midband.

Finally, the LS2a/2s wouldn't play very loudly. As the volume increased, it was apparent that they were having trouble. In fact, one woofer began buzzing after a session of only moderately loud listening.

Despite these limitations, I liked the LS2a/2. They were easy to listen to, lacked coloration through the all-important midrange, and had a beautifully portrayed sense of space and bloom. Recommended more for lighter music than for rock and electric blues.

—Robert Harley

JA measures the Rogers LS2a/2: The LS2a/2 is quite sensitive—about the same as the Spica—and is an easy load for an amplifier to drive, as can be seen from its plot of impedance amplitude and phase *vs* frequency (fig.30). This graph also reveals the port tuning to lie at 50Hz, rather higher than with some of the other speakers reviewed. The slight glitch in the amplitude trace coincides with a very strong cabinet resonance (fig.31), this presumably the cause of the muddiness

15 If you're thinking of buying electronics under $2000, you may want to read my forthcoming review of the $1295 Exposure XV first.

16 I used an LS2a/2 as the "foldback" speaker during the recording sessions for our next album with Canadian pianist Robert Silverman. (Speaking through the Rogers, which was placed about 10' from the Steinway, I "slated" each take and spoke to Robert when necessary.) I found this upper-bass problem audible on the sound of my voice when I listened to the session tapes. **—JA**

that disturbed RH and the boxiness that TJN noted on JGH's speaking voice.

The Rogers is quite critical regarding vertical axis; fig.32 shows the changes in response referred to that on the tweeter axis. Sit too high and there will be a strong suckout in the crossover region due to the two drive-units being effectively out of phase in this region on this axis. Laterally (fig.33), the off-axis response trends are reasonably well-controlled, though with some top-octave peakiness which might correlate with the "tiz-

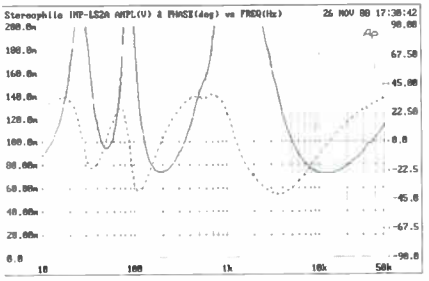


Fig.30 Rogers LS2a/2, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

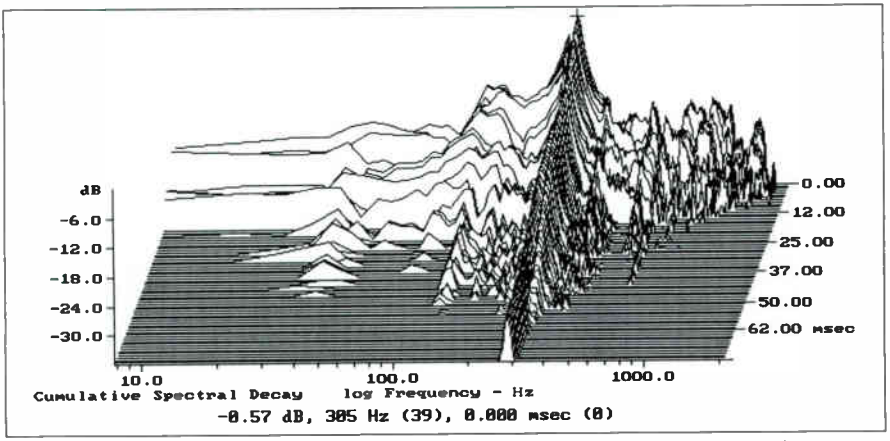


Fig.31 Rogers LS2a/2, cumulative spectral-decay plot of accelerometer output fastened to cabinet sidewall. (MLS driving voltage to speaker, 7.5V; measurement bandwidth, 2kHz.)

ziness" noted by some of the listeners.

On the tweeter axis, the response (shown to the right of fig.34) is reasonably flat through the mids, though there is some unevenness in the low treble on this axis. Referring back to fig.32 shows that the dip above 2kHz fills in below the tweeter axis: the flattest overall response will probably be obtained on the woofer axis, which means using *very* tall stands. The top octave is shelved-down in this graph, which is averaged across a 30° horizontal window; this ties in with JE's comment on the LS2a/2 having a "dark" tonal balance, CG's finding it "soft on top," and DO's feeling its sound lacked "air," these listeners sitting off the main axis. But on-axis, TJN, JGH, and JA all liked the Rogers' highs. The slight raggedness in the mid-treble presumably contributes to the spitchiness RH noted on sibilants.

The left of fig.34 shows the speaker's port and woofer responses measured in the near-field. The woofer rolls off below 100Hz, leaving the port to handle pretty much all the

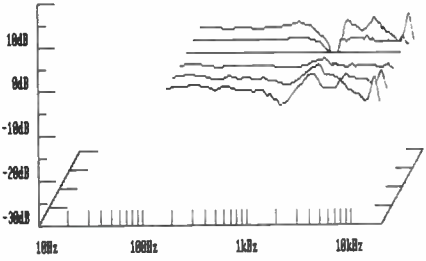


Fig.32 Rogers LS2a/2, vertical response family at 45", normalized to response on tweeter axis, from back to front: response difference 7.5° above cabinet top, difference level with cabinet top, reference response, difference midway between tweeter and woofer, difference on woofer axis, difference level with "Rogers" badge.

midbass region. Nevertheless, although RH noted the Rogers' limited extension in his sighted listening, no one was disturbed by the lack of bass in the blind tests, only by the limited dynamic range.

In the time domain, the LS2a/2's impulse

response (fig.35) is unexceptional and the waterfall plot (fig.36) relatively clean, apart from some mid-treble hashiness.

Paradigm Compact Monitor: $600/pair

The Paradigm Compact Monitor is the smallest loudspeaker in the Canadian company's "Monitor" line. The 6.5" woofer is coupled to a 1" metal-dome tweeter in a small but deep ported enclosure. Both drivers are designed and manufactured by Paradigm. The woofer has a die-cast aluminum chassis and a mineral-filled co-polymer polypropylene cone. The tweeter features a pure aluminum dome joined to a treated textile suspension, which reportedly pushes the first breakup mode well beyond audibility. The third-order network crosses over at 2kHz.

The enclosure is made of high-density composite hardboard, with the front baffle and internal brace made of MDF. Using two dissimilar cabinet materials reportedly results in better distribution of cabinet resonances. A damping material developed by Paradigm, called CO-SPUN™ fiber, absorbs internal standing waves. The Compact Monitor's enclosure is finished in oak, walnut, or black ash veneers. The two pairs of gold-plated, five-way binding posts are conveniently staggered to make bi-wiring easier.

Listening Tests Panel Score: 4.70 (4.62 :

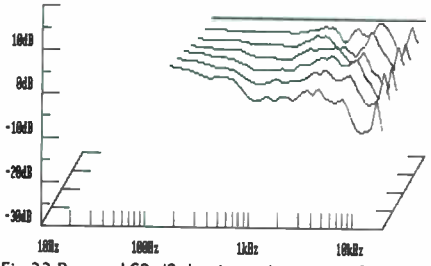


Fig.33 Rogers LS2a/2, horizontal response family at 45", normalized to response on tweeter axis, from back to front: reference response; difference 15° off-axis, 30° off-axis, 45° off-axis, 60° off-axis, 75° off-axis, and 90° off-axis.

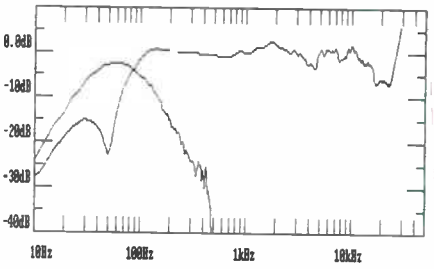


Fig.34 Rogers LS2a/2, anechoic response on tweeter axis at 45" averaged across 30° horizontal window and corrected for microphone response, with nearfield woofer and port responses plotted below 200Hz and 500Hz, respectively.

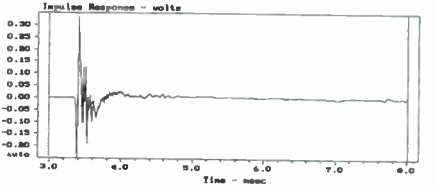


Fig.35 Rogers LS2a/2, impulse response on tweeter axis at 45" (5ms time window, 30kHz bandwidth).

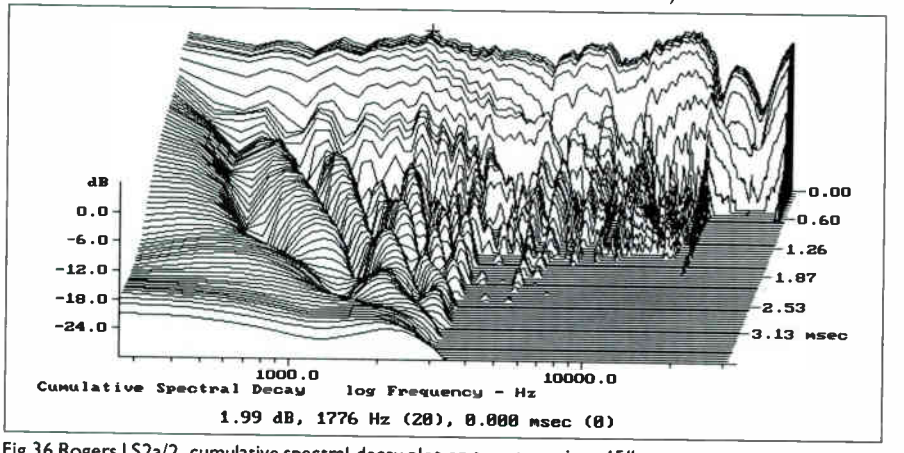


Fig.36 Rogers LS2a/2, cumulative spectral-decay plot on tweeter axis at 45".

4.42 : 5.15). JGH found the Paradigms to have good impact on the drum solo, with fair to good articulation, but felt the sound to be rather "raucous" on Day One. He consistently liked the sound of the brasses on the Elgar, but noted some congestion on peaks. He thought the detailing fair, and was favorably impressed by the "surprising LF weight" on the Arnold, though his feelings about the LF detailing were mixed.

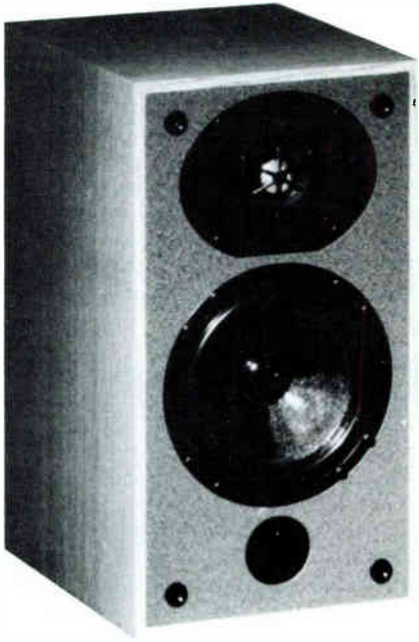
JE also commented on the "impressive bass extension" and "powerful bass" on the Arnold, but otherwise thought the sound on this selection to lack air. "Makes a great recording sound rather average," he remarked. He thought the drum solo "not clear, not rhythmic," and remarked on excessive sibilance on a number of selections. He felt that the Paradigm was "much more satisfying on the classical tracks and far less appealing on the rock tracks," and in general found the sound to be "inoffensive" but "boring."

JA in general thought the sound rather average or below on the first two days, but was considerably more upbeat about the Paradigms on Day Three. On Day One he thought the sound "too warm," with "confined lower mids." He remarked on the lack of "space and clarity" on the Brahms, but found the sound "not unpleasant." On Days One and Two he remarked on the low end, particularly with the Arnold. "Bass drum goes deep but doesn't boom," he noted, with "trouser-flapping low frequencies." But he also felt the bass was perhaps too heavy, the overall sound "slow but warm." He thought the Taylor "too chesty," with "bass too heavy, highs rolled off." On Day Three, he found the sound more pleasing, remarking on the "warm, big sound, but good clarity" on the Battle. He still noted the over-warm quality, commenting on "some lower-midrange overhang" on the drum solo and the "too warm, perhaps" quality on the Elgar, but he finished off by calling the Paradigm "an all-around good performer."

RH rated the Paradigms just about average overall. He, too, found the "top octave rolled off," and disliked the "lower-mid [and] upper-bass coloration." But he did remark that "bass rolls" on the Arnold. He thought the treble somewhat hard on some selections, and in general remarked, "not bad until there is lots going on and it gets loud." He found the Compact Monitor "uninvolving."

DO, on the other hand, was favorably disposed toward the Paradigms on both days. He liked the "detailed presentation" and "good bass lines" on the Taylor. He found the massed voices to be "reasonably well resolved" on the Elgar, though he longed for "more lower mids, please." He liked the result on the Arnold, noting the "easy ebb and flow of lines" and the "nice depth perspective and decent dynamic bloom." His comments were definitely weighted toward the positive.

CG was put off a bit by the warm bass. He noted on the Stevie Ray Vaughan that the bass was "really too full, heavy," and the "guitar a bit lacking in snap." But his negative comments on his first exposure were fairly mild. Overall, he thought the sound okay, but it didn't have "the focus of one or two I've heard already, including the Spica [as recalled from its open audition]. If this is the Spica, please fire me." On the last day, however, his opinion of the Paradigm bounced up considerably. He even got involved in some of the selections he didn't like. "This loudspeaker, unlike most, rewards closer scrutiny," he noted, adding on the Beethoven that, "for the first time today, I was sorry that Tom cut this track off so soon." He remarked that the Paradigms were "extremely well balanced



Paradigm Compact Monitor loudspeaker

for the group. I like it. Swings really well, although only the *JT* [among the musical selections on Day Three] has even a *bit* of swing."

TJN noted "good depth" on the Elgar, although "not a lot of transparency," and found the brasses to have "good weight" if sounding "slightly buzzy." He remarked on the weight and strength of the slightly soft bass, and felt the sound to be "punchy" on the Stevie Ray Vaughan and the drum solo. But he also consistently remarked on excess warmth and, in passing, on a small degree of boxiness.

Though the panelists remarked at several times on their uninvolving quality, the Paradigms did not irritate—this is not faint praise in an inexpensive loudspeaker. They also earned praise for their deep bass, which appeared to be liked as well as, or better than, that of any other contender.

RH comments on the Paradigm Compact Monitor: I auditioned the Compact Monitor with the same ancillary equipment and listening room described in my report on the Rogers LS2a/2. The 24" Celestion spiked and lead-shot-filled stands placed the Compact Monitors' tweeters at 38", 2" above my ears when I'm sitting in my listening chair.

When we drew names to see which loudspeakers we each would take home, I ended up with two models that couldn't be more different. In contrast to the Rogers, the Paradigm Compact Monitor had *tons* more bass, was very dynamic, and would play much louder without strain. While I welcomed some of these qualities, the Compact Monitors introduced some significant tradeoffs.

First, the Compact Monitors had too *much* bass. The sense of weight was nice after the Rogers' thinness, but I ultimately found the Compact Monitor's bass tiring. In addition to being bloated and slow, the balance was just too heavily tilted toward the low end. This bass, a constant reminder that I was listening to loudspeakers, at times sounded like a noise going on beneath everything, unrelated to the music. I enjoyed, however, the Paradigm's greater extension and dynamic punch.

The Compact Monitors were also much more forward and aggressive than the Rogerses, though they lacked the latters' sense of depth, presentation size, and resolution of spatial information. The music was more immediate and visceral than subtle and refined. Some listeners may prefer this lively quality, but I found it fatiguing. The upper treble was also a bit on the hot side, cymbals sounding more forward and synthetic than through the Rogers. Although the upper treble was a little tizzy, the lower treble was somewhat dark, imparting a closed-in sound to some instruments. Conte Candoli's fluegelhorn on one of my own jazz recordings lacked the sense of air and openness I hear on other loudspeakers. Moreover, the instrument had a decidedly coarse quality, rather than the smooth liquidity rendered by the Hales System Two Signatures and, to a lesser extent, the Rogers LS2a/2.

Although the Compact Monitors threw a solid center image, the soundstage tended to be congested and flat. There wasn't the sense of individual instruments hanging in space heard with the Rogerses. Instead, instrumental outlines tended to congeal, particularly at high playback levels. Depth was also lacking, the Compact Monitors tending to present all the musical information toward the front of the soundstage.

In short, there was little to like about the Paradigm Compact Monitors other than their very deep LF extension for their size. They're difficult to recommend when I can think of many similarly priced loudspeakers I'd rather own—the Spica SC-30 and TC-50, NHT 1.3, and Phase Tech PC-80 come to mind. I don't think I could live with either the Rogers's or Paradigm's limitations, but if forced to chose one, I'd pick the Rogers for its better soundstaging and lower coloration through the midrange. I also found the Rogers more musically involving.

—Robert Harley

JA measures the Paradigm Compact Monitor: The Compact Monitor demands to be used with a good amplifier due to its value of 4.5 ohms in the upper bass (fig.37), a region where there is much musical energy. Apart from that drop, however, the impedance is relatively high. The port is tuned to a low 33Hz, while slight glitches at 10kHz and 27kHz are presumably due to tweeter resonances. The cabinet side wall featured one main resonance, at 530Hz (fig.38), although the listeners didn't appear to detect

this as such.

Strangely, the Paradigm had very wide vertical dispersion, as can be seen from fig.39, which shows the *changes* in response for off-axis listeners referenced to the response on the tweeter axis. Basically, as long as you're sitting so that your ears lie between the top of the Paradigm's cabinet and the bottom, you will get pretty much the same balance. Laterally (fig.40), things are more critical, the speaker's tonal balance getting rather peaky in the low treble once you get off-axis, though the high treble becomes progressively rolled off in a well-controlled manner.

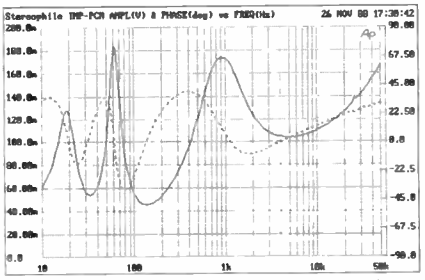


Fig.37 Paradigm Compact Monitor, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

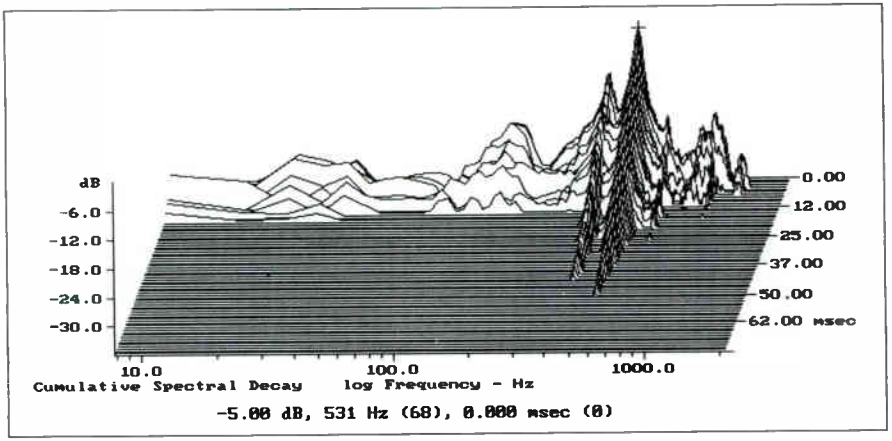


Fig.38 Paradigm Compact Monitor, cumulative spectral-decay plot of accelerometer output fastened to cabinet sidewall. (MLS driving voltage to speaker, 7.5V; measurement bandwidth, 2kHz.)

Looking at the individual responses of the two drive-units (fig.41), the acoustic crossover seems a little lower than the specified 2kHz, with asymmetric slopes. The woofer seems to roll out cleanly after a slight peak at 800Hz, but the tweeter is less smooth at the bottom of its passband, with a slight peak at 2kHz. The overall response, averaged across a 30° lateral window, is shown to the right of fig.42. Both peaks can be seen, leading to a light raggedness in the low treble which might well correlate with the comments made above about "coarseness," "hardness," and "raucousness." The typical metal-dome tweeter peak can be seen around 25kHz in fig.42, but note the severe peak coincident with the impedance glitch at 10kHz in fig.37. I could hear this as a strong "whistle" superimposed on the noise-like MLS signal while I was performing these measurements, but to my surprise, it appears from the blind tests that I didn't pick it up on music. JE, however, did remark on the Paradigm's excess sibilance, and in his sighted listening, RH noted that he was bothered by the Compact Monitor's "hot" and "tizzy" upper treble.

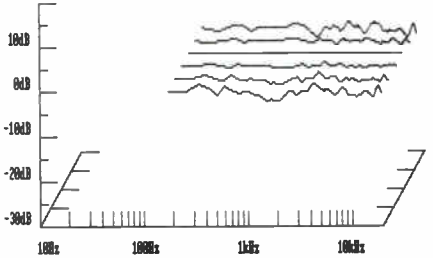


Fig.39 Paradigm Compact Monitor, vertical response family at 45", normalized to response on tweeter axis, from back to front: response difference 7.5° above cabinet top, difference level with cabinet top, reference response, difference midway between woofer and tweeter, difference on woofer axis, difference on port axis.

To the left of fig.42 are shown the nearfield responses of the port and woofer. It comes as no surprise after the panel's comments on this speaker's strong but rather bloated bass response that the woofer tuning appears to be rather under-damped. The port covers a wide range and there is a strong null, perhaps due to a pipe resonance, at 750Hz. Both the Paradigm's impulse response (fig.43) and the corresponding waterfall plot (fig.44) are dominated by the tweeter ringing.

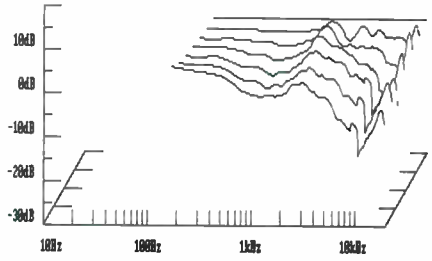


Fig.40 Paradigm Compact Monitor, horizontal response family at 45", normalized to response on tweeter axis, from back to front: reference response; difference 15° off-axis, 30° off-axis, 45° off-axis, 60° off-axis, 75° off-axis, and 90° off-axis.

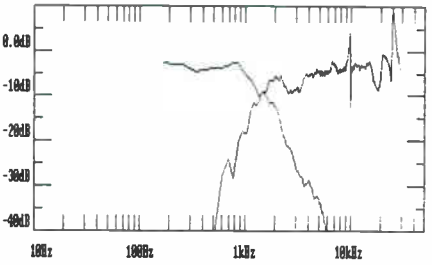


Fig.41 Paradigm Compact Monitor, acoustic crossover between woofer/midrange unit and tweeter, corrected for microphone response.

Spica SC-30: $399/pair

For a complete description, see May 1992, Vol.15 No.5, p.171, but briefly, the Spica couples a Peerless cone tweeter with an 8" paper-cone woofer in a reasonably large

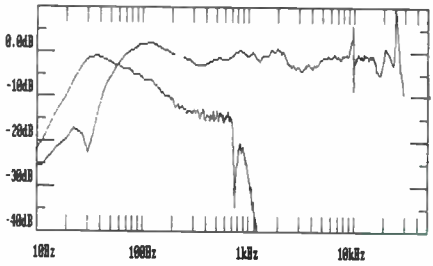


Fig.42 Paradigm Compact Monitor, anechoic response on tweeter axis at 45" averaged across 30° horizontal window and corrected for microphone response, with nearfield woofer and port responses plotted below 200Hz and 1kHz, respectively.

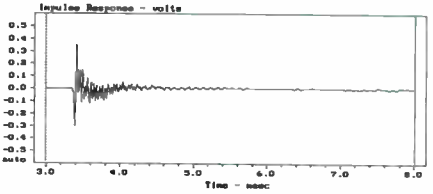


Fig.43 Paradigm Compact Monitor, impulse response on tweeter axis at 45" (5ms time window, 30kHz bandwidth).

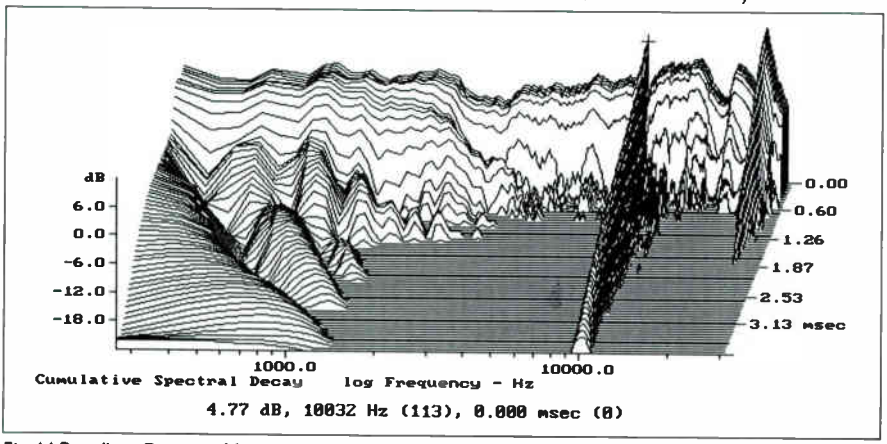


Fig.44 Paradigm Compact Monitor, cumulative spectral-decay plot on tweeter axis at 45".

cabinet. The SC-30 was also *Stereophile*'s "Budget Component of 1992" (see December 1992, p.7). The optimum listening axis is *below* the woofer, which means using the speaker on very high stands or upside-down on stands of normal height.

Listening Tests Panel Score: 4.73 (5.38 : 4.95 : 3.83). Though not specifically reviewed in this survey, it's worth noting that the Spicas' first-place finish in our last survey, combined with their high placing here, indicates that Spica is certainly doing something right with the SC-30s. Had they not fallen down on the last day—when they were auditioned last and the law of averages and panel weariness probably caught up with them—they might well have finished higher (the second-placed Spectrums bettered them by only 0.1 point).

Since this version of the Spica is slightly updated from the one which ran through the panel test last time (though RH commented on the two versions in his individual comment in that May 1992 report), we include below the measurements on this latest version. (The measurements published last time were for the version auditioned by the panel in that evaluation.) Also see TJN's comments on the Spectrums for some additional commentary on the Spicas.

JA measures the Spica SC-30: Despite the change in woofers compared with our original review samples, the Spica's impedance plot (fig.45) appeared identical to that of the original (*Stereophile*, July 1992, p.174, also fig.45). The only real difference was that the sealed-box tuning frequency was now 57Hz rather than 55Hz, an inconsequential difference. The measured frequency- and time-domain performance was also basically identical to those of the earlier sample, so I won't repeat them here. Readers should refer to the earlier review.

However, note the glitch just below 300Hz in both amplitude and phase traces in fig.45. This coincides with strong resonances in the SC-30's cabinet, as can be seen from fig.46, which shows the sidewall behavior. There are actually two strong resonant ridges around 300Hz, the upper one at 313Hz (indicated by the cursor position) and a lower one at 297Hz. These modes undoubtedly contribute to the "woodiness" that typifies the Spica's lower midrange. On the other hand, this, plus the rather warm balance and a slightly ragged low treble, are the only real criticisms that can be made.

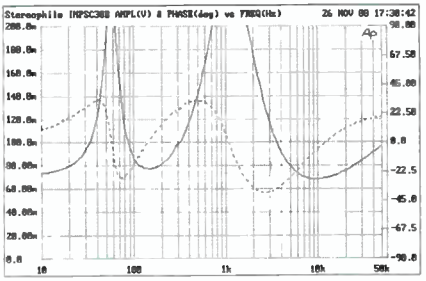


Fig.45 Spica SC-30, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

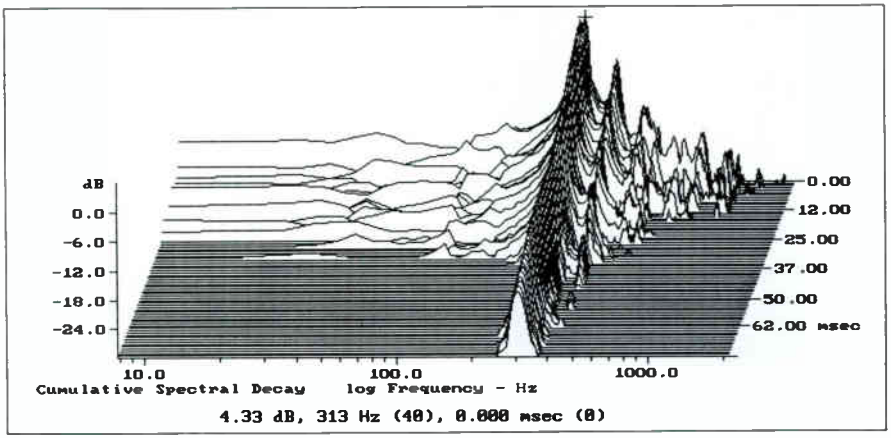


Fig.46 Spica SC-30, cumulative spectral-decay plot of accelerometer output fastened to cabinet sidewall. (MLS driving voltage to speaker, 7.5V; measurement bandwidth, 2kHz.)

SPECTRUM 208C: $595/PAIR

"Unorthodox" best describes the Spectrum 208C. This loudspeaker consists of an 8" woofer in a reflex enclosure with a ¾" dome tweeter hanging by elastic bands in front of the woofer. This variation on the coaxial principle reportedly isolates the tweeter from cabinet resonances and results in a "crisp, clean, and *airy* high-end," according to the manufacturer's literature (Spectrum's italics). The woofer is made in Kentucky by a company called Credence, and uses a liquid PVC-impregnated paper cone. Although the tweeter (purchased overseas from an undisclosed source) is described as a dome, it is more like a "W"-shaped cone. This choice of tweeter was dictated by its having to be small enough to hang in front of the woofer.

Also unusual is the very high crossover frequency of 7kHz (first-order slopes).

Spectrum 208C loudspeaker

According to the 208C's designer, the tweeter's output rises below 7kHz when mounted in free space instead of a baffle. Rolling off the woofer above 3kHz but not bringing in the tweeter until 7kHz reportedly results in an overall flat response.

The reflex enclosure is made of ¾" high-density flake board, and a diagonal internal brace runs between the rear panel and front baffle. The 208C is available in black ash or light walnut vinyl laminate.

Listening Tests Panel Score: 4.83 (5.01 : 5.14 : 4.57). JGH consistently rated the Spectrums highly. His scores were lowest—though still above average—on Days One and Two. On Day Three, however, he praised it extensively. On the negative side, he noted some congestion on peaks on the Arnold, with a "slight tizz" and "not great detail overall." But he praised the "good brasses" and the "excellent LF heft." "Awesome!" he exclaimed of the Arnold on Day Three. He praised the "wide dynamic range" and "good slam" on the drum solo, the effortless vocal on the James Taylor, and Kathleen Battle's natural voice. "*I like it*," he remarked on the Beethoven.

JE was less upbeat. He thought the "rhythm was lost" on the drum solo, noted some "confusion" on the Elgar with some massed vocal sibilance, and on some selections thought the "trebles attenuated." He did comment on the "impressive bass" with the Arnold, but overall thought the Spectrums about "average," noting that he heard "nothing offensive, nothing special."

JA rated the Spectrums highly on Day Two, less well on Days One and Three. At their best, he thought them to have "good bass extension, over-warm lower mids, some treble problems, but very appealing presentation." On Day One, he "initially found [it] colored, but grew to quite like it." On Day Three, however, he was less upbeat. He was bothered by "congestion at high levels" and "treble hardness." He felt the dynamic range to be "severely limited . . . develops a grainy sound, a hardness in the lower treble when driven hard. Superficially promising but ultimately fatiguing."

RH thought his drum recording had "good weight—tight" on the Spectrums. But he, too, thought the sound "a little grainy," treble "hard," and "lower treble rough." DO

thought the Elgar "thick-textured," with "poor resolution of massed voices," and noted "congestion and glare during peaks." Similarly, on the Beethoven, he thought the upper mids "grainy," with a "loss in image specificity, aggressive when chorus gets loud." He felt the Arnold had "reasonable tonal balance," but felt a "loss of dynamics."

CG liked the Spectrums on his first day, but had a change of heart on his second. He thought the sound "a little hot," but noted on the Stevie Ray Vaughan that the "highs [were] a little tizzy, but again, good, fluid bass. This is *mostly* what the track sounds like." He felt there was a shortage of low bass on a number of cuts, but on the Arnold remarked, "Waitaminute! There *is* some low bass! Where did it come from? It was AWOL on the Elgar cut." On his last day, however, he consistently criticized the midrange: "Overly dark, closed-in sound, boxy, muddled, veiled; not a very friendly, open sound."

TJN rated the Spectrums below average. He, too, noted the "nasal, slightly boxy" quality. On the Elgar, he commented, "Not a lot of transparency, kind of thick, two-dimensional." But on the Arnold he noted the "strong and fairly tight, deep" bass. He thought the highs a "touch crude. . . slightly coarse," and summed up: "OK, slightly below-average though strongest low-frequency [response] overall."

Indeed, the strong bottom end of the Spectrums seemed to sway a few panelists. It was definitely something of a sleeper; despite the misgivings of some, those who liked it liked it enough to push its overall score up near the top.

TJN comments on the Spectrum 208C: I did my solo listening to the Spectrums in the *Stereophile* listening room—the same room used in the panel tests. Most of the playback system remained the same as in the panel sessions, except for the power amp and loudspeaker cables. For the latter I used Symo cables, single-wired (bi-wiring is not an option on the Spectrums). Amplifiers were the Forté 4 and Krell KSA-250, though the Levinson No.27.5 from the panel auditions was briefly brought into the mix.

The Spectrums were at a decided disadvantage in my listening sessions, as I'd done most of my listening during the previous three weeks to the Koss ESP/950 and Stax Lambda Signature headphones, both of which are vastly less colored than any inexpensive loudspeaker—probably less colored than *any* loudspeaker. The Spica SC-30s, however, had recently been returned by CG—he'd been using them as a reference for his Spendor S20 review—and I was able to refer to them as needed in my evaluation of the Spectrums.

I followed my usual procedure of not looking at the scores or comments made on the Spectrums—either by me (in my own blind session) or by others—prior to doing my own open listening. Judging from my impressions during the three days of blind listening, in which I was not scoring but was running the test and therefore knew what was behind the curtain, the Spectrum had a big, full, and weighty—if somewhat overfull—balance. This sometimes came as a relief, at least in the short term, after a string of leaner-sounding—if perhaps more accurate—candidates. At one point I felt that the Spectrum, while not doing anything terribly well, was not doing anything terribly badly either.

Some, though not all, of that feeling remained following my later, open auditioning of the 208Cs. Tonally, the balance of the Spectrums remained full, though not dull. There was a degree of sparkle to the top end, though I stop short of calling them airy or open-textured. Bass extension was good for a loudspeaker at this price, but bottom-end definition was rather mediocre. There was noticeable but not disqualifying coloration through the midrange which varied considerably with program material: subtle and easy to ignore with some (but not all) simple material, more closed-in and boxy when the going got hot and heavy.

Whether due to a lack of power or simply to a more laid-back quality, the Forté 4 was less effective than the Krell KSA-250 in bringing the Spectrums to life. The Forté's softer, sweeter sound and less well controlled bass were just what the Spectrums did *not* need. My observations relate primarily to driving the Spectrums with the Krell.

I never really warmed up to the Spectrums. Their problems seemed focused in three areas: bass clarity (particularly through the mid and upper bass), upper-midrange/lower-treble hardness, and soundstaging.

An attempt to get bass extension at the

expense of bass clarity is a common "mistake" in low-priced loudspeakers.[17] A lack of clarity here can muck up the overall sound, throwing any hope of transparency and inner detail out the window. This is often the reason why a loudspeaker can sound reasonably open when bass content is low or the program textures simple, but ponderous at other times.

So it was with the Spectrum. Its rather lively cabinet made me wonder if some of the confusion that mounted as bass content and/or program complexity increased could be placed in this quarter, but it was difficult to precisely pin down the source of the problem. Again, simple material with limited bass content came over reasonably well. But crank up the activity—with the complex textures of *Mokave* (AudioQuest AQ-CD 1006), *Arnold Overtures* (Reference Recordings RR-48CD), or The Chieftains' *An Irish Evening* (RCA 09026-60916-2)—and the lack of transparency became obvious.

I noted early on in my auditioning that moving my head a few inches to the left or right resulted in noticeable balance shifts with the Spectrums—the so-called "vertical venetian-blind" effect. This may have been due to diffraction from the front baffle or to the configuration of the tweeters, suspended just slightly off-center relative to the woofers. Diffraction has been a well-recognized problem for years now, and most loudspeaker manufacturers have minimized the widths of their front baffles (among other things) to reduce it. The real estate on the front face of the 208Cs is large, however; the cabinet is considerably wider than it is deep.[18] Perhaps for these reasons, and perhaps also because of the full character of the bass region (which can obscure detail critical to image focus), the Spectrums' soundstage was initially rather confused. It was acceptable at times, but at others less so, and overall was never better than "okay"—an expression which was perhaps the most exciting to be found in my listening notes. Increasing the toe-in did help by significantly reducing the venetian-blind effect. The soundstage was then generally acceptable, but never quite matched that of the Spicas.

I've left the lower-treble/upper-midrange hardness until last. Like the above problems, it was present to varying degrees, depending on the program material. But as the level increased, vocals, particularly female vocals, would harden, percussion would become a bit splattery, strings taking on a rather grainy quality. This was not a serious problem at modest levels, but because the Spectrums handled power quite well generally, the lower-treble glare could become annoying well before the rest of the range ran out of steam. In addition to the lower-treble brightness, the region just below this—somewhere in the upper midrange, I would guesstimate—seemed reticent, lending a curious lack of weight to the treble region. The upper treble was acceptable—open, as I've said, without actually being airy. There was also an audible but not distracting tizziness which I found no more objectionable than that from most other loudspeakers in this price range which I have heard.

I was rather disappointed in the Spectrums. There are some interesting ideas at work here, particularly the attempt to create a concentric two-way system at a reasonable cost. And the designer has made an attempt to produce a fairly large—and large-sounding—loudspeaker without charging the customer an arm and a leg. Did I expect too much from them? Remember, I'd been listening to *expensive*, high-performance headphones just before auditioning the Spectrums.

—Thomas J. Norton

TJN comments on the Spica SC-30: To answer this question, I pulled out the Spica SC-30s. The Spicas were not dissimilar to the Spectrums in the bottom end—neither sounded wimpy or lean, but both were rather lumpy in the bass. Which you'll prefer at any given moment will depend heavily on what the program material is doing. Perhaps the Spica was a bit less warm overall, but neither loudspeaker was a "find" in terms of its bottom octaves. The Spicas, more forward in the midrange, had a more up-front sound, and they were subjectively a bit less extended on top than the Spectrums. Neither loudspeaker really provided a taste of the High End, but something clicked for me with the Spicas which did not with the Spectrums. Every-

17 Quotation marks surround "mistake" because this is often an intentional design decision. Big bass sells.

18 While this is purely an aesthetic judgment, the Spectrums look quite top-heavy and ungraceful perched atop the 19", single-pillar Celestion stands used for the listening tests, a height needed to put this listener's ears on the correct vertical axis: just above the tweeter.

thing just seemed to come together, despite their apparent flaws. I didn't care for their forward midrange, but they lacked the upper-midrange, lower-treble emphasis of the Spectrums.

Jennifer Warnes's voice on *The Hunter* (Private Music 01005-82089-2) had less lower-treble bite on the Spicas. Their bass, despite the comments above, was a bit less prone to become muddled than that of the Spectrums as the level and complexity of the program material increased. The best cuts from the *Star Trek VI* soundtrack (MCA MCAD-10512), which had been indistinct through the Spectrums, were definitely more open through the Spicas. The same was true of the complexities on *Mokave*, which sounded more like the fine recording it actually is over the Spicas. And while their soundstaging did not live up to the reputation of Spica's more expensive models, it still gelled for me in a way in which the 208Cs' soundstage did not.

We're not talking feast or famine here; the Spicas did not work miracles, and each loudspeaker had its share of colorations. But I got more enjoyment out of listening to the Spicas, and was less inclined to shut them off and go read or watch TV. The Spicas are less expensive; if I were spending my own money, I'd choose them over the Spectrums.

—Thomas J. Norton

TJN returns to the Spectrum 208C: After writing the preceding paragraph, I finally looked at the results of the panel tests and noted with interest that the Spectrums finished near the top. Though some of the points which bothered me were noted by several of the panelists, there is no denying the overall positive judgment. I obviously digressed from the group in my blind scoring also, where I rated the Spectrums seventh—but only slightly below my overall average score. It's entirely possible that you won't be bothered by the characteristics which led to my reservations. The Spectrum 208Cs' showing certainly makes them worth your attention.

—Thomas J. Norton

JA measures the Spectrum 208C: The Spectrum's port is tuned to a low 29Hz, as revealed by the saddle in the impedance amplitude curve at that frequency (fig.47). With a value that drops only slightly below 8 ohms in the upper bass and remains above 15 ohms above 550Hz, the 208C is *very* easy for an amplifier to drive. It is also quite sensitive: at least 2dB more so than the Spica, for example. TJN noted above that its big,

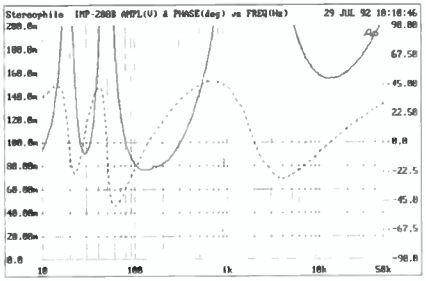


Fig.47 Spectrum 208C, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

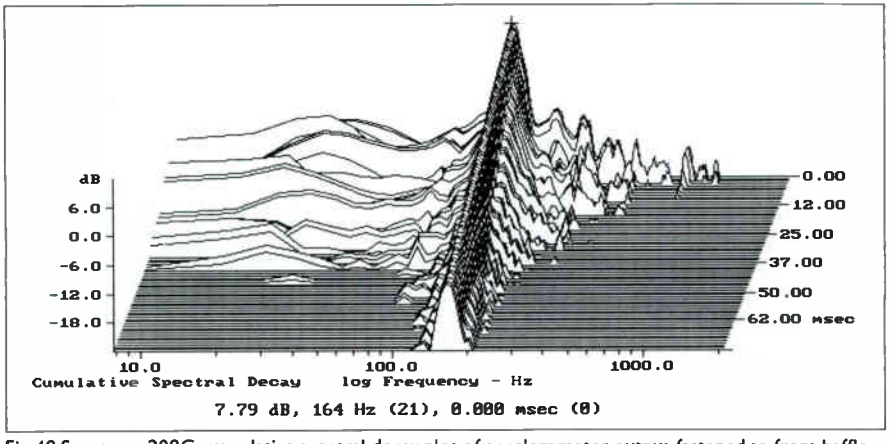


Fig.48 Spectrum 208C, cumulative spectral-decay plot of accelerometer output fastened to front baffle below woofer. (MLS driving voltage to speaker, 7.5V; measurement bandwidth, 2kHz.)

relatively unbraced cabinet was lively. A glitch in the impedance curve can be seen around 160Hz and, as can be seen from fig.48, which shows the vibrational behavior of the speaker's front baffle, the cabinet does ring like a bell at 164Hz. This will definitely compromise the speaker's clarity in the upper-bass/lower-midrange region and interfere with its presentation of bass rhythms, as the listeners noted.

Turning to the spatial characteristics of the Spectrum's sound, fig.49 reveals that its tonal balance changes very little as the listener moves up and down in front of the baffle. As long as you're facing the woofer's general

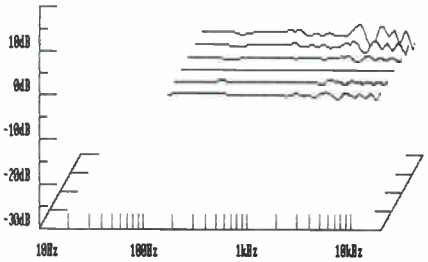


Fig.49 Spectrum 208C, vertical response family at 45", normalized to response on tweeter axis, from back to front: response difference 7.5° above cabinet top, difference level with cabinet top, difference level with top of woofer, reference response, difference level with bottom of woofer, difference 4" below woofer.

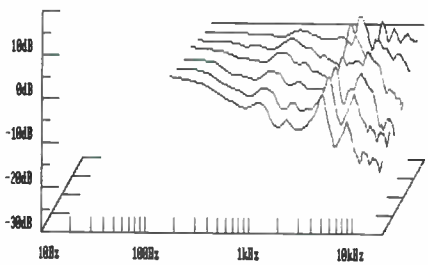


Fig.50 Spectrum 208C, horizontal response family at 45" inboard of tweeter, normalized to response on tweeter axis, from back to front: reference response; difference 15° off-axis, 30° off-axis, 45° off-axis, 60° off-axis, 75° off-axis, and 90° off-axis.

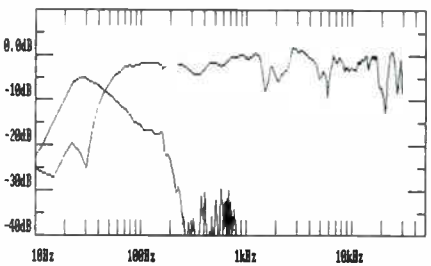


Fig.51 Spectrum 208C, anechoic response on tweeter axis at 45" averaged across 30° horizontal window and corrected for microphone response, with nearfield woofer and port responses plotted below 200Hz and 800Hz, respectively.

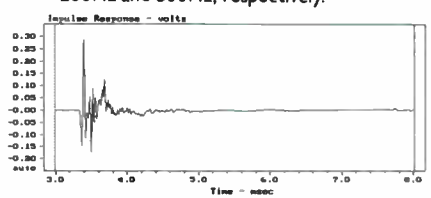


Fig.52 Spectrum 208C, impulse response on tweeter axis at 45" (5ms time window, 30kHz bandwidth).

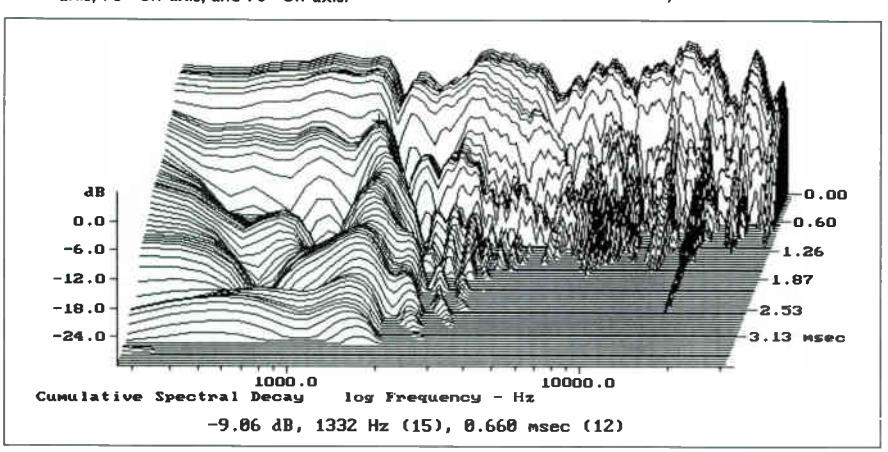


Fig.53 Spectrum 208C, cumulative spectral-decay plot on tweeter axis at 45".

vicinity, you'll get a reasonable tonal balance. In the lateral plane, the sound does get a little ragged once you move more than 15° off-axis, however. Fig.50 shows the changes in the speaker's response up to 90° off the tweeter axis on the tweeter side of the baffle. It can be seen that a large peak at 4kHz appears off-axis. The off-axis responses on the other side of the baffle (not shown) were better behaved, suggesting that the tweeters should be arranged to be on the inside edge of the speakers. To the left of fig.51 are shown the nearfield responses of the port and woofer. As the listeners found, the 208C offers good bass extension, the woofer crossing over to the port around 45Hz.

Looking at the on-axis response, averaged across a 30° horizontal angle on the tweeter axis (fig.51, right-hand side), the basic response trend is flat throughout the midrange and treble, broken up by a ragged lower treble and a suckout just below the crossover point. The crossover frequency is perhaps too high for an 8″ drive-unit, I feel, giving rise to the untidy performance in the woofer's top two octaves. Certainly the listening panel was bothered by the Spectrum's performance in this region, while TJN found it to sound "hard" in his sighted listening.

The impulse response (fig.52) is untidy, giving rise to a rather hashy-looking waterfall plot (fig.53). Perhaps most important in this graph is the resonant ridge at the cursor position, 1.3kHz. This is probably a woofer cone breakup mode and will add hardness to the speaker's sound at high levels.

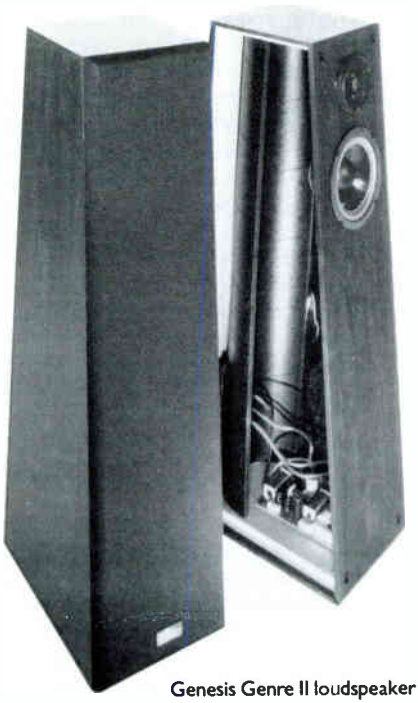
All in all, rather unprepossessing measurements, but the listening test results suggest that the balance of measured problems has been fairly skilfully arranged, resulting in an overall sound that many listeners will find appealing.

Genesis Genre II: $799/pair

The Genre II is an attempt to bring the performance of Genesis's more expensive loudspeakers to an affordable price point. Many of the components and techniques found in their IM-5200 (reviewed by TJN in Vol.14 No.10) have been incorporated into the Genre II. The loudspeaker is an all-out effort to achieve the best performance for the least money.

Unique to the Genesis line is their 1″ circular ribbon tweeter. The extremely low-mass ribbon was designed by Genesis and built in a Canadian factory. The woofer, also designed by Genesis, is a 6.5″ polypropylene/Kevlar injection-molded unit. The drivers are crossed over at 3.8kHz with a very sophisticated, computer-designed network. In addition to using custom-made film and foil capacitors, the networks are optimized to work with the sloping front baffle to provide time alignment between drivers. The crossover is also LC-tuned to present a constant impedance to the amplifier, regardless of frequency.

The big story, however, is the Genre II's unusual internal construction. Although the Genre II looks like a convention box loudspeaker, it uses a cylindrical, wound wood-fiber internal chamber to reduce standing waves and cabinet resonances created by parallel surfaces. The idea behind this unusual configuration was to achieve the performance of a cylindrical enclosure without the high cost of finishing a curved surface. The cabinet exterior, including the sloping front baffle, is made of ¾″ MDF and finished in rosewood or black vinyl. Two pairs of five-way binding posts are provided for bi-wiring.



Genesis Genre II loudspeaker

There is a lot of impressive design and technology in the Genre II for an $800 pair of loudspeakers.

Listening Tests Panel Score: 5.37 (5.87 : 5.23 : 5.36). "Getting there!" remarked JGH, as the Genesis came up fifth on the final day of listening. While he thought the organ on the Elgar a bit weak (mainly on Day Three) and wanted more impact on the drum solo, his comments were definitely upbeat. While he felt the cello to be light on the Battle, he thought Wynton Marsalis's trumpet "great!" on the same recording. He found the brass to be very good on the orchestral selections, if a bit lacking in the real instruments' raw qualities, and thought the top end to be open and airy. "Immediate, gnarly," he commented on the Stevie Ray Vaughan, and "cymbals sound like brass," on the drum solo.

JE fell for the Genre IIs in a big way on the first day, commenting on the "wide soundstage" and "good feeling of space" on the Brahms. He noted the "excellent depth and feeling of dynamics" on the Elgar, and a rather "sweet-sounding" quality on the Battle. He liked it less on succeeding days, noting an "uneven, ill-defined bass" on the Stevie Ray Vaughan, some sibilance on the Battle and *Gerontius*, and a rather soft extreme top. But he still rated it well above average.

JA also rated the Genesis highly, particularly on Days One and Three. On Day One he commented: "rough when loud, like virtually every one of this group," but noted that it was the "most dynamic we've heard yet"—the Genre II was auditioned fifth that day—with a "smooth top." Day Two found him noting that it sounded like a minimonitor with a "well-defined, not very extended bass and a slightly forward if neutral balance. Let down by poor lower-midrange clarity and restricted dynamics." On Day Three he mentioned a forward mid-treble which could make the sound too hard at high levels—though without becoming "bright"—but also noted the "excellent clarity and soundstaging."

RH liked the "good space" on several selections, noting that the Battle "didn't get screechy." He also commented on good dynamics and clarity. Still, he liked it better on Day Two; on Day One he ultimately thought it "not offensive yet not involving," but on Day Two he thought it "a notch above most of the others, easy to listen to."

DO thought the "treble a bit coarse," but noted "very good bass definition" on the drum solo. He liked the "good mid projection" and "forward drive" on the Taylor, and the "reasonably smooth upper registers" on the Battle. He was less favorably inclined toward the orchestral selections on Day One, but upped his scores noticeably on Day Two. While he thought the "deep bass deficient," he noted the "nice spread, smooth mids (though dryish upper mids), and decent dynamics" on the Beethoven.

CG gushed on Day Two (his first day of auditioning), noting that "this is a real good speaker, joining #3 [the Rogers] as [one of] the two best speakers of the group, which means I'll get neither to review, of course." (The Genesis was auditioned last on Day Two, which means CG had heard them all when he made this remark.) His scores were a bit lower on Day Three, but still well above his average. He thought the "top end a little hot" on the Crash Test Dummies, but good overall. On the drum solo he thought the top end needed to come down a hair, but CG's criticisms were, here and elsewhere, uncharacteristically mild. (It should also be noted that since the Genre IIs were aimed straight ahead, listeners located left or right of center would receive more on-axis information on their side, contributing to a slightly tipped-up balance at that position.)

TJN also rated the Genre IIs above average, feeling that they had some excess midbass warmth, but were "reasonably open and transparent, hold up well on crescendos," had "a good soundstage," and "don't offend." The verdict of the panel on the Genesis Genre II was quite clear—and quite positive. And while we used a "stand" with the Genre IIs for the reasons discussed, in normal use you won't need stands for them—a significant saving.

JA comments on the Genesis Genre II: It didn't take too long to get these floorstanding speakers to sing in my system. I tried a couple of different room placements—the speakers seemed relatively uncritical—fitted the spikes to pierce the rug, and adjusted them so the speakers didn't rock, hooked them up to Audio Research Classic 120 monoblocks with bi-wired runs of AudioQuest Diamond/Clear, and slipped Clifford Jordan's excel-

lent *Live at Ethell's* CD (Mapleshade MHS 512629A, reviewed in September '92) into the Proceed CD player I'm currently using as a transport to drive a Meitner IDAT via a length of AudioQuest Digital Pro. (The grilles, which surround each drive-unit with a slight conical flare, were left on.)

The previous pair of speakers I'd been using[19] had presented a diffuse, unstable soundstage, with both a phasey quality to the sound and a distinct discontinuity between the midrange unit and tweeter. By contrast, Clifford Jordan's saxophone was there in the room with the Genesises, seamless from its lower-register honks up to the squeaky falsetto region that a tenor makes it own. The Genres presented a stage that was pleasingly palpable, accurately traced without being over-etched.

With the speakers toed-in to the listening seat, however, there was too much top-octave energy, which added a wispiness to the balance, emphasizing the sizzle of ride cymbals and the sound of the breath escaping from Mr. Jordan's lips around the sides of his reed. I therefore pointed the speakers almost straight ahead for the rest of my listening, this giving the most natural treble balance, although at the expense of the ultimate image-slicing ability. There was still a slight emphasis of tape and microphone hiss, but not to the extent that I was bothered by it. The exact degree of toe-in/not-toe-in to tame the Genre's top octave will depend on your room, its furnishings, and how far away you sit from the speakers.

Vertically, the optimal listening axis seemed a little fussy, pink noise acquiring a hollow character above the tweeter axis. The axis recommended by Genesis is actually just below the tweeter, which is just 29" high. As my listening chair puts my ears almost exactly 36" from the ground, I tried tilting the speakers upward a little with the spikes. But when you listen to these speakers at a dealer's, make sure you aren't sitting too high if you want to get a fair audition.

Once I'd optimized the speaker placement, the speaker's treble seemed extremely clean and free from resonant hash and hardness. I've only heard this circular "ribbon" tweeter once before, in the Genesis IM-5200 mini-monitor that TJN reviewed in October '91; in that speaker, it was a little too tilted up for my tastes. In the Genre, it offers a musically natural-sounding, glare-free treble that impressed me more the more I listened to the speaker. Intending to spend just an afternoon with the Genres, I ended up using them for over a week.

The midrange, too, sounded generally clean and uncolored if listened to below the tweeter axis. Again, listen too high and the sound is less good, acquiring a moderate "eee" character. Recorded piano sounded perhaps a little too clangorous in absolute terms—as if there was some slight upper-midrange peakiness—though the differences between the various mikes and miking techniques that Robert Harley and I experimented with before we did our latest Robert Silverman piano recording[20] were easily audible. Treble instruments in general were reproduced with very natural-sounding tonal colors.

The lower midrange was the least satisfying region of the Genre's performance. There was a cloudiness to the sounds of tenor instruments like the cello and bassoon that, while adding a not unpleasing warmth some of the time, definitely impeded the speaker's transparency in this region. Piano, too, sounded too warm in the region around Middle C (262Hz), while the speaker's imaging was less precise in this frequency region, there being a slight pulling of central images to the sides. Bass guitar also tended to sound too gruff, with too warm a quality. Listening to the Genre's front baffle and side walls with a stethoscope revealed a couple of very prominent resonances, which presumably correlate with the speaker's lack of clarity in this region. Without Tom Norton's Blu-Tack between the grille frame and the baffle, these resonances were strong enough to rattle the grille.

The Genre's bass was reasonably extended, the 50Hz warble tone on the second *Stereophile* Test CD being easily audible, though significant distortion could be heard at high levels on the 40Hz warble tone. This made bass clarity somewhat dependent on playback level. In general, the quieter the speaker played, the better defined were bass instruments. Dan Kolton's double-bass on the first *Stereophile* Test CD already sounds quite

19 See *Stereophile*, December 1992, p.164.

20 Featuring works by Schubert, Schumann, J.S. Bach, and Chopin, this two-LP, two-CD set will be released, God willing, in May.

indistinct, as he played the instrument with almost a stroking attack. Played at high levels on the Genre, it tended to become too much of a generic-sounding bass-boom sound, even though at low levels it actually had good weight and reasonably good definition.

Dynamically, the Genre sounded rather polite, laid-back. The drums on Test CD 2 lacked a little impact, for example, though the snare drum and cymbals sounded quite delicious. But the recorded acoustic on this Bob Harley recording was very well reproduced, with a good sense of depth. And the choir on my *Gerontius* recording on the same CD was set well back, as it should be. In fact, the ability to throw an excellent sense of space on appropriate recordings was a major point in the speaker's favor.

To sum up the Genre's report card, therefore: a little fussy when it came to deciding on the optimal listening axis; excellent soundstaging and depth; excellent treble quality; generally a natural-sounding midrange, though a little peaky in the upper reaches and too warm at the bottom of the mids; reasonable bass extension for a speaker in this price range; dynamics limited by lower-midrange congestion and midbass distortion; and good treble and midrange clarity offset by a hooty, rather confused quality in the lower midrange and the occasional tendency for some instrumental images to "splash" to the speaker positions at some frequencies. Nevertheless, I enjoyed my time with this one; I suspect you will too.

One final point: The Genre's terminal posts are not that strong; Tom Norton had already broken one post off before I set the speakers up, and I broke another while tightening it with a nut driver. Though the hole is large enough to take large-gauge cable, this does weaken the post's mechanical integrity. Take care.

—John Atkinson

JA measures the Genesis Genre II: The Genesis was one of the more sensitive speakers reviewed in this group. Though its impedance amplitude (fig.54) only varies between 4 and 8 ohms from 70Hz to 50kHz, it does drop to 2.5 ohms in the midbass. Under-powered amplifiers or receivers specified only into 8 ohms are best avoided, therefore. The box appears to be tuned to a high 85Hz or so, but note the rise in impedance below 50Hz. This is due to a large-value series capacitor in the woofer feed that extends and flattens the response of an overdamped sealed-box alignment. (See Dick Olsher's Zap subwoofer project in the next issue for further details of this kind of bass

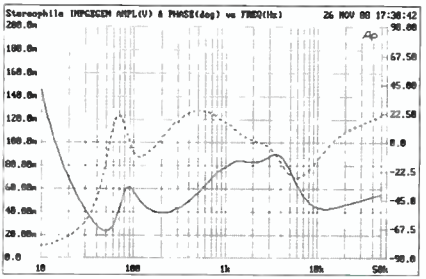


Fig.54 Genesis Genre II, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

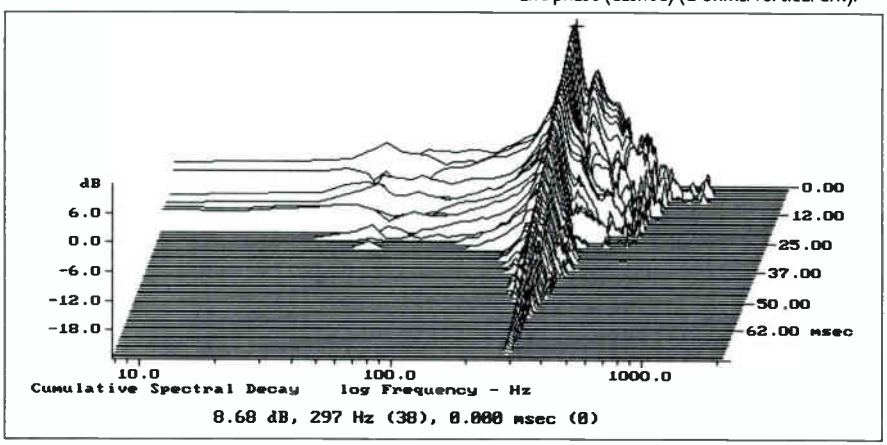


Fig.55 Genesis Genre II, cumulative spectral-decay plot of accelerometer output fastened to front baffle 6" below woofer. (MLS driving voltage to speaker, 7.5V; measurement bandwidth, 2kHz.)

alignment.) There is a slight wrinkle in both traces at 300Hz which, as can be seen in fig. 55, is due to a major cabinet resonance at this frequency. This is particularly noticeable on the Genre's front baffle and will be a major contributing factor to the speaker's lack of lower-midrange clarity. There are also minor modes present at 480 and 500Hz on the sidewalls, but these don't appear to be present on the baffle.

The Genesis is very critical when comes to choosing the optimum listening axis. This is shown in fig.56, which shows the changes in response to be expected when a listener moves above or below the 29"-high design axis. Move much above or below that axis and the sound will become hollow. Laterally, the high treble rolls off smoothly with increasing off-axis angle (fig.57), though the off-axis balance does get a bit peaky in the mid-treble at extreme angles.

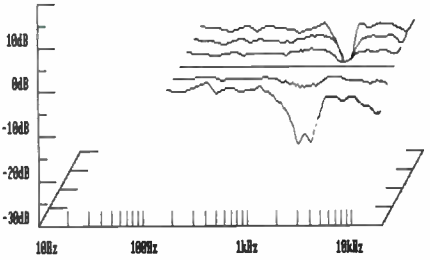


Fig.56 Genesis Genre II, vertical response family at 45", normalized to response on listening axis 29" from ground, from back to front: response difference 7.5° above cabinet top, difference level with cabinet top, difference on tweeter axis, reference response, difference on woofer axis, difference 20" from ground.

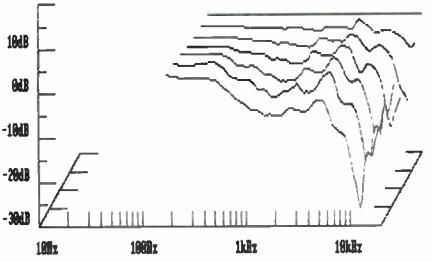


Fig.57 Genesis Genre II, horizontal response family at 45" inboard of tweeter, normalized to response on listening axis, from back to front: reference response; difference 15° off-axis, 30° off-axis, 45° off-axis, 60° off-axis, 75° off-axis, and 90° off-axis.

Fig.58 shows the individual responses of the two drive-units, measured on the listening axis. There is a broad overlap between the two units in the octave from 3kHz to 6kHz, with then steep rollout slopes. The tweeter has a sharp rise in its top octave, which can also be seen in the on-axis response averaged across a 30° horizontal angle (fig.59, right-hand trace). Though there are a couple of small peaks in the upper midrange (which will probably add hardness at high levels) and the crossover region is a mite untidy, the overall response trend is pretty flat. By comparing fig.59 with fig.57, it becomes apparent that not toeing the speakers into the listening seat, which means that the

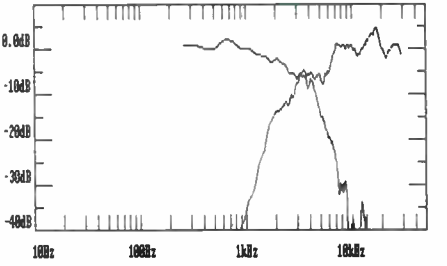


Fig.58 Genesis Genre II, acoustic crossover between woofer/midrange unit and tweeter, corrected for microphone response.

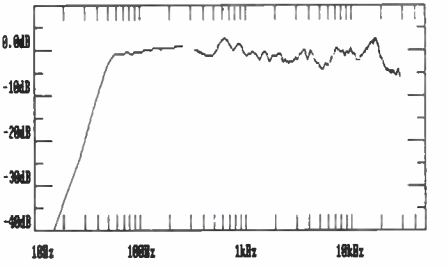


Fig.59 Genesis Genre II, anechoic response on tweeter axis at 45" averaged across 30° horizontal window and corrected for microphone response, with nearfield woofer response plotted below 200Hz.

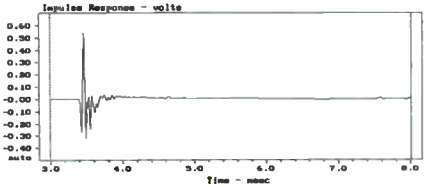


Fig.60 Genesis Genre II, impulse response on listening axis at 45" (5ms time window, 30kHz bandwidth).

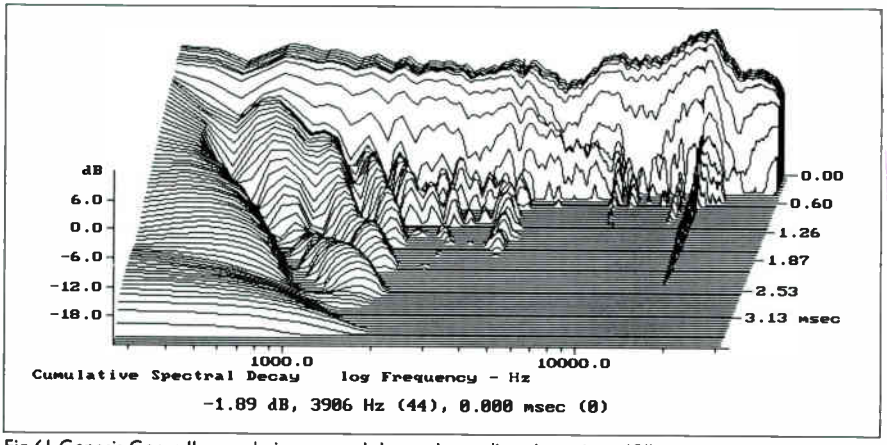


Fig.61 Genesis Genre II, cumulative spectral-decay plot on listening axis at 45".

listener sits between 15° and 30° off-axis, will flatten the Genre's top octave. As TJN noted earlier, the members of the listening panel who were not on the room's median line—RH, JE, CG, and DO—would have received more than their fair share of the Genesis's high treble, which is why they were more bothered by it than those sitting off the speaker's direct axis—JGH, JA, and TJN.

The speaker's bass response, measured in the woofer's nearfield, is shown to the left of fig.59. It is virtually flat to 50Hz, with then the expected 18dB/octave rollout—a textbook example of this type of alignment. The 50% greater speed of the rollout compared with a sealed-box alignment helps explain why some of the listeners thought the Genre's bass to be lightweight. It gets less reinforcement from the room below its turnover point.

The Genre II's impulse response (fig.60) is clean, as is the associated waterfall plot (fig.61). Here is part of the reason for this speaker's high score: It gets the midrange right. Note again the top-octave rise on-axis in this plot, however, and the cursor is positioned at a very minor problem at 4kHz.

What is not shown in these graphs, however, is the speaker's limited dynamic range in the bass region, something that was widely noted during the listening tests and that I noted on pure and warble tones at high sound pressure levels during my sighted listening. If you play organ or synthesizer music at high levels or have a penchant for house music, you should pass the Genesis by. But all other things considered, these are an excellent set of measurements that go some way toward explaining the subjective success of this relatively inexpensive speaker.

Individual Preferences & Conclusions

The overall average for all of the loudspeakers

Table 4 Reviewer Individual Statistics

Reviewer	Average Score All Days[1,2]	Top 4 Choices (with scores)		Bottom
JGH	4.92	Spectrum	(6.13)	Dana
		Genesis	(6.05)	
		Spendor	(5.40)	
		Spica	(5.28)	
JE	4.75	Spectrum	(5.05)	Paradigm
		Genesis	(5.03)	
		Jamo	(4.92)	
		Signet	(4.83)	
JA	4.85	Genesis	(5.82)	Dana
		Jamo	(5.58)	
		Signet	(5.45)	
		Spica	(5.33)	
RH	4.69	Spica	(5.55)	Dana
		Genesis	(5.34)	
		Spectrum	(5.25)	
		Signet	(5.20)	
DO	4.21	Paradigm	(5.15)	Dana
		Genesis	(4.93)	
		Rogers	(4.93)	
		Jamo	(4.75)	
CG	3.25	Genesis	(5.20)	Dana
		Paradigm	(4.55)	
		Rogers	(4.35)	
		Spectrum	(3.50)	
TJN	3.74	Spica	(5.25)	Dana
		Rogers	(4.60)	
		Paradigm	(4.55)	
		Genesis	(4.25)	

NOTES:
1 Not all reviewers attended three sessions (see text).
2 Open-session scores for the Spica SC-30 not included in overall averages.
Overall combined average score, all reviewers, all sessions: 4.46.

on all of the program selections was 4.46. If we consider only the program material which recurred from day to day, the overall average was 4.48. (The largest spread for any given loudspeaker between these two statistics was 0.09.) And if you consider all of the program material and throw out the high and low scores, the overall average was 4.58. Interestingly, the overall average in our last panel test was 4.48.

Table 4 shows the top four choices of each panelist—along with his least favored loudspeaker. It also shows his overall score and the scores he gave to his favorites.

Those inclined to believe that a test such as this is inconclusive will find comfort in the result that, individually, every loudspeaker except the Dana showed up on one or more favorite lists. But a clear favorite certainly emerged. The Genesis Genre II, though the top choice of only two of the panelists, finished on *everyone*'s top four lists—the first time this has happened in our panel reviews. The Spectrum also placed on four of the seven top four lists, garnering two first-place votes. And the Jamo, Paradigm, and Signet finished on three of the lists.

The fact that the Signet and the Jamo finished seventh and sixth, overall, reflects just how close the middle group was. Relatively inexpensive design tools are tightening up the race at all levels of loudspeaker design—good news for the consumer. **S**

POSTSCRIPT

Jack English examines the results of the three inexpensive speaker surveys

The three blind listening panels conducted by *Stereophile* to date—in Vol.14 No.7, Vol.15 No.5, and this month—have differed in meaningful ways. For example, though some reviewers have remained constant, others have varied from panel to panel, as well as from day to day within panels. The source for the first session was CD, the second DAT, and the third CD-R. The musical extracts used also varied (though pink noise and JGH's speaking voice were common to all three sessions). Nonetheless, the overall procedures, listening room, and major system components remained the same. More importantly, key reference speakers were used in each panel test.

The Snell Type K/II was an entrant in sessions 1 and 2. No matter what else changed, the K/II was a constant. Under the first session's blind conditions, the Snell received an overall score of 4.73. In the second blind session, the Snell was given an overall rating of 5.13, resulting in a difference in rating of 0.40 being given to the same speaker in the two sessions. There are a number of reasons for this difference, not the least of which is that in a blind listening test, the scoring tends to reflect the overall achievement of all the test speakers. If one session featured a larger number of less competent designs than another, the same speaker would tend to be rated higher. Additionally, the substitution of something like a different amplifier will move all the scores in one session up or down compared to another session. Arguably, therefore, this 0.40 scoring difference could be added to the overall scores of all the speakers in the first session to take into account such session-specific variables.

The Spica SC-30 was evaluated under blind conditions in sessions 2 and 3, resulting in ratings of 5.12 and 4.73, respectively, giving a difference of 0.39. Using the same rationale as above, this difference of 0.39 could be added to the scores of all the speakers in the third session.

Using these adjustments—0.40 added to all the scores from the first session, 0.39 added to all the scores from the third session—the scores for the Snell and Spica are made equivalent. Crudely speaking, these adjustments (though not statistically pure) act to minimize the effects of the non-controllable variables from session to session. Using these adjusted ratings, the relative ranking of all 23 loudspeakers auditioned in the three sessions is shown in Table 5, while a graph of the price/performance relationships is shown in fig.62. A number of meaningful conclusions can be drawn:

• There is no linear price/performance relationship. In other words, there was no guarantee that the higher the price, the better the loudspeaker performance. However, fig.62

does indicate a very different phenomenon. The lower-priced speakers ($600 and below) are, with a few exceptions, very tightly bunched. This means that the overall performance of lower-priced speakers tends to be similar. [*This* doesn't *necessarily mean that they sound identical; rather that the balance of compromises that need to be made to produce a speaker in this price region tend to result in similar overall quality.—Ed.*] By contrast, the more expensive loudspeakers in the group tended to sound less similar. A wider range of performance tradeoffs is apparently available at the higher price points.

• With a few exceptions noted below, most of the test speakers received very tightly bunched overall ratings.

• Three speakers have emerged from the first three group reviews as "losers": the Dana 2f, Tannoy 609, and Nelson-Reed 5-02/CM (although the last was not intended to be used on stands away from boundaries, as it was in the blind tests). All have easily identifiable tonal balance and/or coloration problems in the midrange or low treble, reinforcing J. Gordon Holt's dictum that if a speaker designer doesn't get the midrange right, superb performance elsewhere is irrelevant.

• A group of five speakers—Dick Olsher's Black Dahlia Mk.II, the a/d/s/ SAT 6, Spendor S20, Mirage M490, and JBL XPL-90—ranks below the group average. What is surprising about this group is that it includes the two most expensive speakers in the entire survey. Note, however, that two of this group, the Spendor S20 and Mirage M490, did much better in the sighted listening tests, suggesting that with care taken over matching equipment and, in the case of the Spendor, listening levels, they are capable of more than they achieved blind.

• The "Best Buy" speaker after the first three panel tests is the $440/pair PSB 40 Mk.II (since discontinued; replaced by the PSB 400, to be reviewed soon). Its performance surpassed that of everything costing below $800/pair—nearly twice its price.

• The clear "winner" in terms of overall performance is the wonderfully satisfying Epos ES11. It stands apart from the other loudspeakers auditioned blind, the only speakers to come close being first the Genesis Genre II, then the PSB 40 Mk.II. **—Jack English**

Table 5

Speaker	Adjusted Overall Rating	Price Per Pair
Dana 2f	3.11	$ 495
Tannoy 609	3.21	$ 599
Nelson-Reed 5-02/CM	3.28	$ 650
Black Dahlia Mk.II	4.51	N/A
a/d/s/ SAT 6	4.54	$ 800
Spendor S20	4.55	$1,050
Mirage M490	4.69	$ 600
JBL XPL-90	4.71	$1,300
Signet SL-260 B/U	4.88	$ 450
Pinnacle PN8+	4.90	$ 460
B&W DM310	4.90	$ 499
KEF Q60	4.95	$ 599
Jamo Concert II	4.96	$ 800
Wharfedale Diamond IV	5.05	$ 400
Rogers LS2a/2	5.09	$ 550
AR Spirit 152	5.12	$1,000
Spica SC-30	5.12	$ 399
Snell Type K/II	5.13	$ 465
Paradigm Compact Monitor	5.13	$ 600
Mordaunt-Short MS3.30	5.18	$ 459
Spectrum 208C	5.24	$ 600
MB Quart 490 MCS	5.27	$ 849
Icon Lumen	5.32	$ 795
PSB 40 Mk.II	5.57	$ 440
Genesis Genre 2	5.75	$ 800
Epos ES11	6.06	$ 850
Averages	**4.87**	**$ 625**

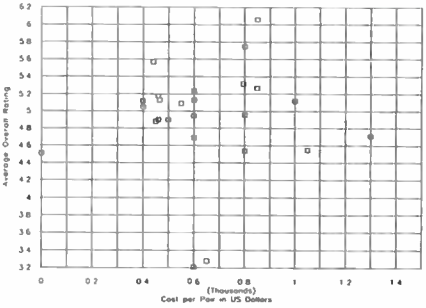


Fig.62 *Stereophile*'s inexpensive loudspeaker listening tests, overall rating plotted against cost per pair in US dollars.

THIEL CS2 2 LOUDSPEAKER

John Atkinson

Three-way, passive bass radiator-loaded (reflex), floor-standing loudspeaker. Drive-units: 1" (25mm) metal-dome tweeter, 3" (76mm) cone midrange unit, 8" (203mm) double-surface, plastic-cone woofer, 6" by 9" (155mm by 229mm) elliptical passive bass radiator. Crossover frequencies: 800Hz, 3kHz. Crossover slopes: first-order, 6dB/octave acoustic. Frequency response:

33Hz–27kHz ±3dB, 35Hz–20kHz ±2dB. Phase response: minimum ±5°. Time response: 150μs, –20dB. Sensitivity: 86dB/W/m (2.83V). Nominal impedance: 4 ohms (minimum 3 ohms). Amplifier requirements: 50–250W. Dimensions: 42" (1067mm) H by 12" (305mm) W by 13" (330mm) D. Weight: 70 lbs (32kg) each. Serial numbers of units tested: 561 & 562. Price: $2250/pair (East Coast), $2290/pair (West Coast) in amberwood and black wood finishes (teak, oak, and walnut finishes available for no extra charge; rosewood, add $650). Approximate number of dealers: 52. Manufacturer: Thiel Audio Products Co., 1026 Nandino Boulevard, Lexington, KY 40511. Tel: (606) 254-9427. Fax: (606) 254-0075.

"A good big'un will always beat a good litt-l'un" is as true in the world of loudspeakers as it is, say, in the world of car engines. Once you've driven a car with a big, torquey, low-revving V8, small-capacity, high-revving engines, no matter how quick they can make the car go, seem buzzingly inelegant. Similarly, as I've listened to a number of tiny boxes in the last few months, I felt the need to spend some time with full-range speakers. Over the next few months, therefore, I'll be reviewing a handful of speakers with more-than-minimonitor pretensions.

Thiel CS2 2 loudspeaker

The subject of this month's review, the Thiel CS2 2,[1] was introduced in 1991 as a replacement for the Kentucky company's CS2, favorably reviewed by Anthony H. Cordesman (at that time a *Stereophile* contributor) in Vol.8 No.6 (1985), and by Larry Archibald in Vol.12 No.1 (January 1989). The usually fussy Sam Tellig wrote last April (Vol.15 No.4) that the CS2 2 sounded so good that he "couldn't find anything wrong with them" and rated them "a steal."

Superficially, the CS2 2 resembles the CS2 in being a floor-standing three-way design with a sloped-back front baffle and a crossover exclusively featuring first-order, 6dB/octave slopes, something that has been a feature of Thiel's "Coherent Source" loudspeakers since 1978. In the details, however, it is a completely different beast. Rather than the fabric-dome HF unit, the 2 2's tweeter is the same 1" aluminum-dome unit, custom-made for Thiel by Vifa in Denmark, as used in Thiel's flagship CS5. This has a wide roll surround and a short voice-coil in a long magnetic gap to obtain sufficient dynamic range—the unit offers up to ±1.5mm excursion—to allow the use of a first-order crossover filter. The midrange driver is a smaller-diameter 3" cone unit, handling just two musical octaves, from 800Hz to 3kHz. Because of the shallow filter slopes (see Sidebar), however, this driver must be well-behaved at least an octave to either side of its limited nominal passband.

1 The CS2 2 was originally the CS2.2 (two point two), but under the threat of a lawsuit from Bose, who had trademarked several decimal numbers for speakers of their own, including "2.2," Thiel replaced the decimal point with a space. This is curious on two points. First, my reference books imply that simple numbers cannot be trademarked; second, I can't see how anyone would confuse a Bose speaker with one from Jim Thiel. I suspect that in cases like this, the corporation with the larger legal and financial resources is the one liable to get its way.

The woofer is an 8" cone unit with a unique double diaphragm. A conventional cone with a slight flare is bonded at its center and circumference to an exterior straight-sided cone (fig.1), resulting in a diaphragm that, though it has increased moving mass, is much stiffer than usual. This results in good, resonance-free behavior up to 3kHz; as the woofer in the CS2 2 only handles the range up to 800Hz, its rollout above that frequency is clean. Much attention has also been paid to the woofer's motor system. A long coil moves in a short magnet gap to ensure consistency of drive force for coil positions well away from the center. The magnet has specially shaped pole pieces that keep the magnetic field symmetrical about the coil's center position; it also ensures a constant amount of iron within the coil regardless of its position. In addition, there are copper rings around the magnet's center pole. All these techniques make for a dramatic reduction in distortion.

The CS2's reflex port has been replaced in the CS2 2 by a passive bass radiator. This is an elliptical 6" by 9" flat diaphragm mounted just below the woofer which acts in just the same way as the tuned slug of air in a port to extend the speaker's response downward in frequency. Unlike a port, the radiator blocks internal cabinet resonances from reaching the outside world.

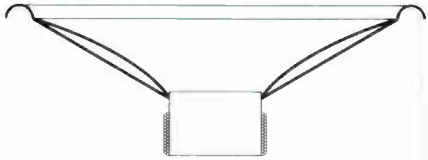


Fig.1 Thiel CS2 2, profile of woofer diaphragm.

As implied in the Sidebar, a first-order crossover involves rather more than a single series or shunt element in the feed to each drive-unit. The CS2 2's crossover involves 26 elements implemented with 35 parts, including custom-made polystyrene capacitors, and air-cored inductors wound with low-oxygen copper. Electrical connection is via a pair of 5-way binding posts underneath the speaker's base.

First-Order Filters: Panacea or Pain?

As mentioned, the Thiel CS 2 2's crossover features first-order, 6dB/octave slopes. Many audiophiles state, without specifying why, that first-order slopes are "the best." A first-order crossover is unique in that it offers the minimum phase error through the crossover region between the two drive-units, hence the best time-domain behavior (least ringing and overshoot). The drive-units also work in phase outside of the crossover region in a time-coherent manner; *ie*, they are both in phase and in time-step with the input signal. More complicated crossover filters, such as the popular fourth-order Linkwitz-Riley, allow the drive-units to be in phase in the crossover region, but at the expense of the overall time coherency: the drive-units may have the same acoustic polarity, but only because one has had its phase rotated through 360°; it therefore lags the input signal by that amount of phase shift.

The downside of first-order crossover filters is that they offer the lowest out-of-band rejection of any. An octave above or below the nominal crossover frequency, the driver's output has only been halved (reduced by 6dB), compared with a fourth-order filter's reduction in output to just 1/16 (reduced by 24dB). Any drive-unit problems that are nominally out of its passband—a tweeter's fundamental resonance, a woofer's cone breakup modes—will therefore still affect the sound quality of a speaker using a first-order crossover. The drive-units must therefore be much better behaved overall than normal.

Second, what matters is the ultimate *acoustic* slope of the crossover filter after being transduced by the drive-unit. Merely driving a woofer through a series inductor will not in itself result in a first-order rollout if the driver itself inherently rolls out with a 6dB/octave slope above the crossover region, which is often the case. The ultimate slope in this case will be 12dB/octave, and the design will no longer be time-coherent. In a speaker using a true first-order crossover, the drive-units must therefore maintain their flat response well beyond their nominal pass-

The CS2 2's cabinet is also surprisingly complex for a speaker in this price range. The 2"-thick front baffle is sloped back to align the drive-units so that they sum correctly on the listening axis. This black-painted baffle is fabricated from two layers of 1"-thick fiberboard, contoured with computer-controlled woodworking equipment to surround the midrange and woofer with a shallow flare and to present no sharp diffractive edges anywhere in the vicinity of the tweeter and midrange unit. The baffle's rounded edges are continued in the grille frame; the speaker is intended to be used with the black cloth grille in place. The cabinet is finished in real wood veneer—Thiel responsibly makes use of farmed exotic woods—and is extensively braced to minimize panel resonances. The midrange unit is loaded with its own braced cylindrical sub-enclosure.

All things considered, the CS2 2 is superbly constructed and finished. If its sound even halfway lives up to its finish, Thiel has a winner on its hands. We shall see if it does.

Review context

Amplifiers used during the preparation of this review included pairs of Mark Levinson No.20.5 and Audio Research Classic 120 monoblocks, while the preamplifier was first the Melos SHA-1 headphone amplifier, then a Melos 333 linestage, with a Mod Squad Phono Drive EPS handling LP signals. These were provided by a a Linn Sondek/Trampolin/Lingo/Ekos/Troika setup sitting on an ArchiDec table, with the Troika subsequently replaced by Linn's new Arkiv phono cartridge (review to appear soon). Digital source components included the VTL Reference D/A processor driven by a Meridian 602 transport via Mod Squad Wonder Link, replaced by the Meitner IDAT (and for one brief, wonderful moment, the Mark Levinson No.30) driven by a Proceed PDT 2 transport via AudioQuest Digital Pro. Analog master tapes were played on my ReVox PR99. Interconnects consisted of 1m lengths of AudioQuest Diamond between digital processors and preamps; 15' lengths of MIT 330 between preamps and Classic 120 power

band. In addition, the drive-units' impedance must not vary too much with frequency from its nominal value, as this, too, will, affect the ultimate slope.

Third, because of the shallow rollout slopes and the fact that the drivers are, of necessity, vertically separated in space, a speaker using first-order slopes will have an overall frequency response critically dependent on listening axis, due to the very broad overlap between adjacent drivers. The distance from the listener's ear to each of the drivers must be equal for their outputs to add up in a time-coherent and flat-amplitude manner; if not, there will be nulls in the amplitude response at the frequencies where the difference in distance equals one half-wavelength.

Another way of looking at this is that two drive-units used one above the other on a flat baffle, crossed over with first-order filters and connected with the same electrical polarity, will have a listening axis downtilted from the horizontal (by about 15° for a typical two-way design). Reversing the electrical polarity of the tweeter will tilt the main response lobe *up* by the same amount, implying that the speaker would then sound and measure okay on a shorter-than-normal stand. The time-coherent nature of the first-order crossover would, however, be compromised.

A designer intending to use first-order slopes must therefore choose the listening axis, then carefully slope or step the speaker's front baffle (or place the tweeter below the woofer) so that the outputs of the drivers do indeed sum correctly in both time and frequency domains on that axis.

I hope it is obvious that deciding to design a speaker with a first-order crossover is not the simple business that many audiophiles feel it to be of just using a single series element in the feed to each drive-unit. Nevertheless, in the hands of a talented, careful designer—Jim Thiel, Richard Vandersteen, and Robin Marshall of Epos are probably the leading practitioners—such a speaker can be arranged to have flat frequency response *and* time-coherent performance. —**John Atkinson**

amplifiers; and 15′ lengths of balanced AudioQuest Lapis with the new AudioQuest XLR plugs between the Melos 333 and the Levinsons.

My room measures approximately 19′ by 16.5′, with a 9′ ceiling. The wall behind the speakers is faced with books and LPs, while further book- and CD shelves occupy the positions on the sidewalls where the first reflection from each speaker would occur. The room is carpeted and there are also patches of Sonex foam on the ceiling to damp the first reflections of the sound. The other wall has RPG Abffusors 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. 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 200ms from the upper bass to the mid treble, falling to 150ms above 10kHz. The Thiels were used on their carpet-piercing spikes.

Sound

From the very first note of the very first record played via the Thiels, I was bowled over by the ease of the speaker's sound. Whereas I had found the earlier CS2 to have had rather an unforgiving, uptilted treble, the new speaker sounded effortlessly smooth throughout the midrange and treble. This was provided I didn't listen on my feet. Standing upright at the listening position with pink noise playing revealed the speaker to sound hollow and sucked-out on this unrealistically high axis. Slowly lowering myself revealed a comb filter coloration—the kind of phasing sound effect used on the Doobie Brothers' "Listen to the Music"—that moved down in frequency until I was just below the Thiel's midrange axis, when its effect was minimal. As the brain is excellent at detecting rates of changes in phenomena, this is actually a good way to determine the optimum axis for a speaker with first-order crossovers: play pink noise and move up or down until you no longer hear the suckout change its frequency with your position.

On that rather low optimum axis, which, with my listening chair, entailed me having to prop the front of the speaker up slightly with a German Acoustics brass cone, the speaker still sounded a little on the bright side, though not to the degree that it interfered with the music. Remember that brightness is more a function of a component's low-treble performance, not its extreme highs. In fact, all the way through my listening notes I made no critical comments whatsoever about the Thiel's top two octaves. The CS2 2's tweeter didn't call attention to itself in any way, neither adding an excess of sibilance nor sounding dark or rolled-off.

Substituting the balanced Levinson monoblocks for the unbalanced Audio Research amps made the speaker sound more bright, which limited the ultimate loudness despite the solid-state amps' greater power. The residual grain on my *Dream of Gerontius* recording on the second *Stereophile* Test CD was also accentuated a little through the Levinson, though whether this was due to the amplifier or the AudioQuest cables is hard to say. The bass also sounded less rich with the Mark Levinson No.20.5s, which was a benefit on LP-sourced material. CDs, however, sounded best with the Audio Research adding a little low-frequency flesh to their bones.

The bass of the CS2 2 was in general excellent, having good extension and reasonably good control. Kick drum on Robert Harley's drum recording on Test CD 2 was tight, with appropriate weight. There was no difficulty in hearing when bass guitarists using 5- or 6-string instruments made use of the contrabass register, Jimmy Johnson dropping an octave on the word "long" to drive the chorus along in the second cut on James Taylor's 1991 LP *New Moon Shine* (Columbia 46038). The pedals on Vol.4 of Jean Guillou's stroll through Bach's complete organ works (Dorian DOR-90151) also had a satisfying purr.

However, this CD did reveal the Thiel's Achilles' heel—a limited dynamic range in the bottom audio octave. Though the F-Major Toccata reproduced cleanly to levels approaching 100dB, the following fugue (which appears to have some formidable subsonic content) bottomed out the passive radiator at the same level, forcing me to jump up out of my chair and reduce the volume a couple of notches. Checking the woofer and radiator performance with both pure and ⅓-octave warble tones at about a 2W level (giving in-room spls between 84 and 92dB, depending on frequency) revealed clean,

effectively distortion-free sound down to 31.5Hz. Below that frequency, however, the passive radiator huffed and puffed, even at this low-power input. Unlike the air in a port which has a large excursion ability and only limits a speaker's dynamic range when its velocity becomes so high that the wind noise swamps the music, a passive radiator can only move so far and no more.

I must stress that it was only on organ recordings with extreme recorded pedal levels that I noticed this problem. Nevertheless, it is something which prospective purchasers of the CS2 2 should check out. It may well be that the larger and more expensive CS3.6 would be better suited to some audiophiles' needs, particularly if they want to regularly play Guillou's *Pictures at an Exhibition* organ transcription (Dorian DOR-90117) at high levels. The mondo pedal tones in track 2 of this disc resulted in extreme woofer excursions at around 12V RMS input (nominally 36W), even though the big, higher-frequency climax at the end of the track was handled cleanly at 17V or so. To put this limitation into perspective, I was never bothered by it on orchestral music. Even my copy of the classic Solti *Rheingold* (Decca SET 382/4), which I was pleased to find still free from ticks and pops, sounded out without problem.

I did notice that the midrange unit underwent relatively large excursions during high-level organ pedal passages, due to the limited rollout of the first-order crossover allowing bass leakage into the unit. Nevertheless, I couldn't hear any untoward effect on the music, the ear being quite insensitive to Doppler distortion.

Moving up in frequency, and again making the proviso that the listener must sit on or just below the midrange axis, the midband was superbly clean and free from coloration. Again, there is hardly any mention of midrange problems in my listening notes. Piano, for example, which tends to throw problems at the top end of a woofer's passband into sharp relief, was very evenly reproduced throughout the upper midrange and low treble. The Thiel is one of the best speakers I have auditioned in this respect, regardless of price. There was an occasional suggestion of lower-midrange congestion, though this was very music-specific. Though the bass guitar on the Test CD 2 was very clean, for example, Richard Lehnert's voice announcing it acquired a little bit of a boxy quality. And some of the more densely scored passages in Brahms's third piano sonata on *Stereophile*'s *Intermezzo* album (STPH003-1) acquired a little trace of extra mud.

When it came to imaging, the CS2 2 was a champ. Central images were tightly defined in space, without the splash to the sides at some frequencies that afflicts lesser speakers, while images could be heard well to the outside edges of the speaker positions with appropriate recordings. Depth, too, was well-defined, and good recordings were reproduced with an excellent sense of space. The choir on my *Gerontius* recording, made with a SoundField microphone, was placed well behind the orchestra and baritone soloist, as it should be, while the drums on Test CD 2 spatially sounded like a real set of drums. Only on the psychoacoustically treated LEDR height test tracks on the first Chesky Sampler CD (JD37) did the Thiels offer less then excellent performance, the images stubbornly refusing to move significantly above the speaker positions.

It was in the area of midrange and treble transparency that the Thiel perhaps scored its most longlasting impression. Whether it was the edits in the aforementioned *Rheingold* that producer John Culshaw had thought would go unnoticed; the edits in the aforementioned *Intermezzo* that I had thought would be imperceptible; the differences between the Super-Bit-Mapped "Sony Legacy" reissues of Miles Davis's *Kind of Blue* and the Brubeck Quartet's *Time Out* and the earlier "Columbia Jazz Masterpieces" CD releases; the disconcerting lurch in tape speed (did someone lean against the analog machine while mastering the CD?) 50 seconds into the von Suppé *Poet and Peasant* overture on the Alexander Gibson *Concert Tour* album[2] (Chesky CD62)—all stood revealed by the Thiels. Such was the overall clarity of the Thiels that I found them invaluable in audi-

2 Just before the cello enters with the "I've Been Working on the Railroad" theme. I grew up on these performances, recorded by the premier English RCA team of Chuck Gerhardt and Kenneth Wilkinson, which were originally released in the early '60s as part of the *Reader's Digest*'s *Adventures in Light Classical Music* boxed set—so I regard them as definitive. Buy this Chesky, as well as the others in the same set: René Leibowitz's *Evening of Opera* (CD61) and *Portrait of France* (CD57). I must respectfully disagree with J. Gordon Holt's rather fainthearted praise of the latter in this month's "Record Reviews" section, therefore. It is much better than he says, even *Bolero*.

tioning all the rehearsal, session, and concert tapes we had made of pianist Robert Silverman for the next *Stereophile* album. I could hear every little detail of the sound, from the difference in perspective of the piano given by the differing microphone arrangements we'd tried, to the small audience, traffic, and distant plane sounds that would perhaps go unnoticed though lesser speakers, and, most important, to the musical differences between the different performances.

Yet this revelation of tiny details in the sound wasn't achieved in the thrust-under-your nose manner of "professional" monitors (like the PAS Studio Monitor 1 reviewed by Dick Olsher elsewhere in this issue), nor was it in the over-etched, "ruthlessly revealing" manner of, say, the original Martin-Logan CLS or even Thiel's earlier CS2. The CS2 2 was always listenable, its clarity never achieved at the expense of the musical balance. If you think about it, this is about the highest praise a speaker can get.

Measurements

Fig.2 shows the CS2 2's electrical impedance amplitude and phase, measured using the magazine's Audio Precision System One. Like all Thiel speakers, the value varies very little across the audio band. Note how low in amplitude the bass humps are. Apart from the bass, where the radiator tuning is apparent at a low 28Hz, the minimum value is 3.5 ohms at 120Hz, and the maximum 5.2 ohms at 4.3kHz. Although the CS2 2 requires an amplifier capable of driving 4 ohms, its sound will not change significantly in the midrange and treble as the amplifier output impedance changes. A *very* slight glitch in the amplitude trace can be seen at 300Hz, which indicates some kind of resonant problem at this frequency.

I inadvertently zapped our MLSSA board with static during the preparation of this review, meaning that I wasn't able to look at the spectrum of the cabinet's resonant behavior. Though it appeared to be very well-behaved overall, there is a strong mode present around 315Hz. The sidewalls and cabinet rear seemed reasonably inert to a stethoscope, but this mode could be strongly detected on the front baffle between the midrange unit and woofer. Interrupting the 315Hz warble tone from the second *Stereophile* Test CD while listening to the baffle with a stethoscope revealed it to add a resonant decay in the ensuing silence. This might contribute to the occasional sense of

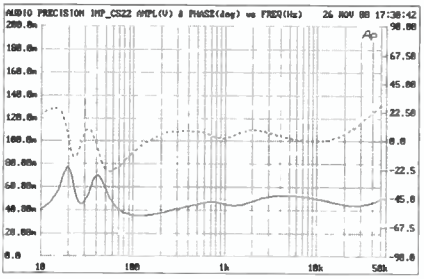


Fig.2 Thiel CS2 2, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

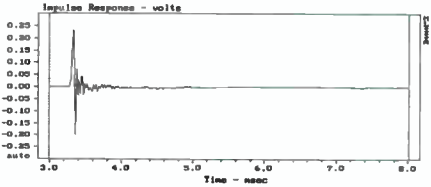


Fig.3 Thiel CS2 2, impulse response on midrange axis at 45" with grille on (5ms time window, 30kHz bandwidth).

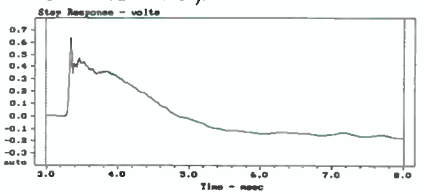


Fig.4 Thiel CS2 2, step response on midrange axis at 45" with grille on (5ms time window, 30kHz bandwidth).

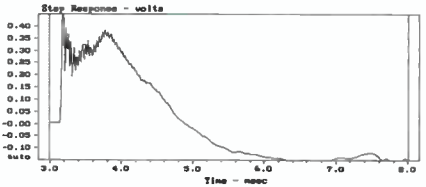


Fig.5 Thiel CS2 2, step response on tweeter axis at 45" with grille on (5ms time window, 30kHz bandwidth).

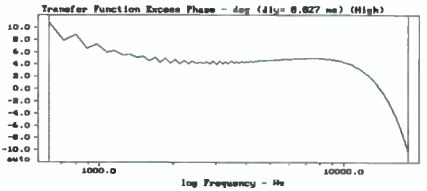


Fig.6 Thiel CS2 2, excess phase on midrange axis at 45" with grille on.

lower-midrange congestion I noted on some music, though it lies too high in frequency to smear the sound of the tom-toms on Robert Harley's drum track on the second *Stereophile* Test CD, which sounded very clean.

Fig.3 shows the Thiel's impulse response on the midrange axis with the grille in place, calculated by DRA Labs' MLSSA system using a B&K 4006 microphone calibrated to be flat when used on-axis up to 30kHz.[3] The time-coherent nature of the speaker on this axis is indicated by the relatively slow rise-time (this due to the midrange and tweeter outputs arriving at the microphone simultaneously), with then only a minimal degree of overshoot on the other side of the time axis. The ultrasonic ringing is due to the tweeter but is quite well-suppressed. The impulse response can also be displayed as a step response, the output of the speaker when presented with a DC voltage. The ideal shape should resemble a right triangle, a perpendicular step away from the time axis followed by a sloped line back to it, due to the speaker (which is basically a high-pass filter) not being able to reproduce DC.

The step response of the CS2 2 on the midrange axis is shown in fig.4. The shape is excellent, with the initial sharp spike being due to the tweeter *very* slightly leading the midrange unit at this microphone position and perhaps being slightly too high in absolute level. Moving the microphone up to the tweeter axis gave a double-humped step response (fig.5), with the tweeter's output now definitely arriving at the microphone before that of the midrange. Just below the midrange axis appears to be where the speaker will sound its best.

Another way of looking at a speaker's time coherence is to examine, not its phase response as such, but the phase deviation left over when that due to the speaker's departure from a flat amplitude response is removed. In a minimum-phase system—one that has just the right amount of phase deviation for its frequency response, an electrical tone control circuit, for example—the phase and amplitude responses are related mathematically by the Hilbert Transform. Subtracting the Hilbert-transformed amplitude response from the measured phase response will leave what is called the "excess phase"; *ie*, the speaker's departure from a true minimum-phase system. The Thiel's excess phase on the midrange axis at 45° can be seen in fig.6, meeting ±2° limits from 1kHz to 12kHz and ±10° limits from 600kHz to 18kHz. While superb, this is still less good than the Thiel specification, but it is hard to ensure that the microphone is exactly on the right axis. There will also be an inevitable error in my measurement due to the windowing of the impulse response to eliminate room reflections. (That I didn't get rid of a very small reflection is evidenced by the slight ripple in the excess phase trace.) Nevertheless, this is actually amazing performance for a loudspeaker, especially one designed within reasonably tight price constraints.

From the impulse response, the MLSSA system can calculate a speaker's cumulative spectral-decay or "waterfall" plot, which shows how its frequency response changes as the exciting impulse dies away. A perfect speaker would show a straight line (representing its frequency response) that immediately dropped into the floor of the measurement. Fig.7 shows that the first 12dB of the Thiel's die-away is very clean. After that, there are few resonant modes noticeable in the low treble—the cursor is positioned at one of the longer-lasting ones at 4.4kHz, which is probably a residual mode from the midrange cone—but the overall performance is again excellent, contributing to the ease of the CS2 2's sound.

Fig.7 (which hasn't been compensated for the microphone's departure from a flat response) suggests a slight treble prominence in the 2 2's balance. This is also apparent in fig.8, which shows the midrange-axis response averaged across a 30° horizontal window and adjusted for the microphone's error. There is a slight uptilt to the sound on this axis from 1kHz to 10kHz, which might be expected to add "air" to the speaker's balance but also to veer near brightness, as was found during the auditioning. The slight depressions on this axis, centered on 800Hz and 3kHz, are presumably due to the individual drive-units not quite adding correctly on this axis. As suggested by the step response, fig.3, just *below* this midrange axis is probably optimal. To the left of fig.8 are shown the responses of the woofer and passive radiator, measured with the microphone almost touching the center of each diaphragm. The

3 See *Stereophile*, October 1991, Vol.14 No.10, pp.205-206.

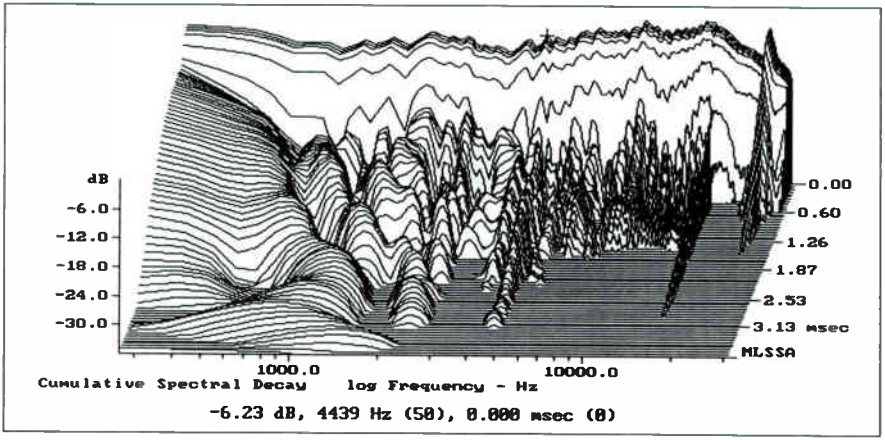


Fig.7 Thiel CS2 2, cumulative spectral-decay plot on midrange axis at 45".

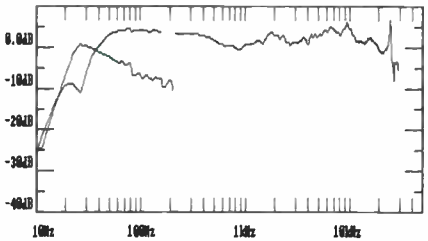


Fig.8 Thiel CS2 2, anechoic response on midrange axis at 45" averaged across 30° horizontal window and corrected for microphone response, with nearfield woofer and port responses plotted below 200Hz.

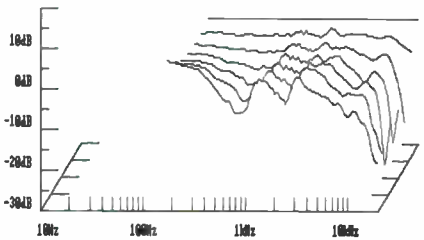


Fig.9 Thiel CS2 2, horizontal response family at 45", normalized to response on midrange axis with grille on, from back to front: reference response; difference 15° off-axis, 30° off-axis, 45° off-axis, 60° off-axis, 75° off-axis, and 90° off-axis.

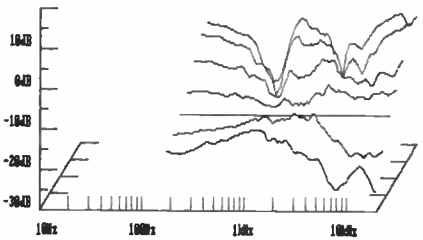


Fig.10 Thiel CS2 2, vertical response family at 45", normalized to response on midrange axis, from back to front: response difference level with cabinet top 42.5" from ground, difference 38" from ground, difference on tweeter axis 35" from ground, difference level with top of midrange, reference response 30.5" from ground, difference 27" from ground, difference level with top of woofer 22" from ground.

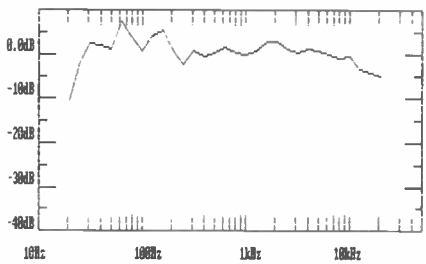


Fig.11 Thiel CS2 2, ⅓-octave, spatially averaged in-room response.

woofer can be seen to extend down to 50Hz or so, with the passive radiator covering the octave below that frequency.

Fig.9 shows the changes to be expected in the Thiel's response as the listener moves to the speaker's side. (Only the changes are shown, which is why the on-axis response appears as a straight line.) The 2 2's dispersion is reasonably even up to 30° to its side, with the high treble output rolling off smoothly off-axis. Notches in the speaker's output appear at the crossover frequencies for extreme off-axis angles, but these are irrelevant unless you site the speakers close to bare reflecting sidewalls, in which case the sound

might become a little bright. In the vertical plane (fig.10), the speaker's dispersion is more uneven, as might be expected from its use of first-order crossovers (again, just the changes in response are shown). A standing listener will receive a sound afflicted with severe suckouts at the crossover frequencies (top or rear curve). Sitting on the tweeter axis results in rather a bright balance, while sitting just above the midrange axis accentuates the response uptilt. Sitting on or just below the midrange axis (about 31" off the ground) gives the flattest, smoothest measured response, but sit too far below and the sound will become rather rolled-off in the highs, accentuating the brightness region below.

Finally, fig.11 shows how these dispersion measurements add up in the listening room. (To derive this curve, I use an Audio Control Industrial SA-3050A ⅓-octave spectrum analyzer with its own microphone to take 20 ⅓-octave spectral responses of left and right speakers individually across a 72" by 20" window centered on my listening seat. I then average these spectra with a slight weighting toward the listening position. This has proven to give quite good correlation with the subjective balance in my room.) The Thiel's bass extends down to below 30Hz in-room but is rather lumpy, the effect of room modes not being entirely removed by the spatial averaging. The midrange is smooth above that region, as is the treble (though slightly downtilted). There does appear to be a slight degree of prominence in the midrange unit's passband which would make the speaker a little fussy in being partnered with amplifiers that are themselves rather bright.

Summing up

This was a hard review to write. Normally, the critic ends up with a shopping list of faults that he just has to assemble into some kind of logical order. In the case of the Thiel CS2 2, however, it seemed that the longer I listened for flaws, the less I heard—an enjoyable task for the music lover, but a frustrating one for the professional reviewer. At its price, the CS2 2 is a sonic bargain. Beautifully finished, with a sound that is smooth, tonally well-balanced, and extended at both extremes, it is musically one of the most satisfying loudspeakers I've heard. Its main drawbacks are the slight tendency to brightness, which will lead to care having to be taken in choosing a matching amplifier—the Thiels and the Audio Research Classic 120s were a marriage made in heaven—and the limited dynamic range in the low bass. Unless you mainly play organ or synthesizer music, or want your high-end speakers to double for high-level disco party use, however, this should not be a problem. The CS2 2 is a "good big'un" for less than you would pay for a good pair of minimonitors with their stands. Highly recommended. $

F O L L O W - U P

RoomTunes

If you read Guy Lemcoe's breathless review of Michael Green's RoomTune acoustic treatments last March in Vol.15 No.3, you were probably as curious as I was whether: a) these products can truly produce the sonic wonders he described, or b) maybe Guy needs to get out more. To find out for myself, I called Michael Green to ask him for a team of tan 'Tunes to try in Texas *toute de suite*.

Before he sent me his products, Michael wanted to analyze my room in order to find the best combination of his various RoomTunes for my particular listening environment. He even offered to fly to Austin at his expense and do it in person, but I ix-nayed *that* plan; if *you* buy some RoomTunes, *you* don't get no personal visit from Mr. Tune himself, so why should I? I just faxed my room dimensions and other related info to Michael, and he made suggestions about the 'Tunes I needed and where to set them up.

In Michael's opinion, my 19.5' by 11' by 8' listening room needed a set of four CornerTunes, two pairs of EchoTunes, and four pairs of the floor-standing RoomTunes. Although experimentation was to be expected, I was to start with the four CornerTunes stuck up in each of the upper wall/ceiling corners, an EchoTune at the top-middle of each wall, a RoomTune in each wall/floor corner, and the remaining four RoomTunes either behind my couch or behind the speakers. That's a *butt*-load of 'Tunes, though; I decided to start small, and listen to each level of 'Tuning before adding more 'Tunes.

Up went the CornerTunes, held in place with thumbtacks once I found that the double-sided tape Michael includes with his 'Tunes tore the paint off my walls if I tried to remove it. This step had a large effect on the sound of my room: much less lively than before, the sound of my system was rendered smoother and quicker, and image specificity improved dramatically. Hand-claps, one of the best ways to diagnose the inherent "sound" of any room, revealed a large reduction in the "ping"-iness of my untreated room. The four simple triangular pillows, costing only 80 clams a set, turned out to be the biggest improvement of the whole RoomTune family; and I highly recommend them to anyone trying to tame a 2 Live Room.

The EchoTunes were a mixed bag. I didn't get a chance to audition them by themselves (I'd already installed the CornerTunes), so I don't know how effective they are solo. I will say, however, that their contribution toward improving the sound of my room was, at best, marginal compared to that of the CornerTunes. I could hear a difference with the EchoTunes up on the walls, *maybe*, but it wasn't a big deal. I ended up keeping a pair of them, one on the wall behind my head and one on the right-hand wall.

The floor-standing RoomTunes, though, had a *huge* effect. Maybe *too* huge. I did as Michael advised and stuck one in each corner, along with two RoomTunes, both behind my couch and behind and between the ProAc Response Two speakers, but in front of the Muse Model 18 subwoofer. The sound, from my listening seat, was real good. I didn't hear any drastic changes to the sound, but it did seem smoother and cleaner in the bass than before. Then I put on *The Commitments* soundtrack, and—

WHERE'S DA BASS?!!! I'm telling you, the bassline had *vanished*. *Gone*. Sure, I heard something down there in the same general key, but it didn't sound like the Fender P-Bass on the record, or the '62 cream-colored reissue I have on hand to plug into my Bassman for "The Leo Test." Record after record, CD after CD confirmed that the six RoomTunes had done TOO GOOD a job sucking up bass energy in my room; they sucked the blood right out of my rig! The mighty Muse Model 18 was sending out Bass Of The Gods, and the gaggle of RoomTunes was eating all of it up before it had a chance to boogie my oogie.

Removing the two behind the speakers helped a tiny bit. Eighty-sixing the ones behind my sofa did the same. But I finally had to take out the two RoomTunes in the corners behind me before the sound would solidify with any real power and weight. I tried using just two RoomTunes in the corners behind me, but while this did bring back the bass, the system and room as a whole sounded and imaged better with the lone pair of RoomTunes in the corners behind the speakers.

So what was the net effect of the four CornerTunes, two EchoTunes, and two RoomTunes? A definite improvement in the smoothness and definition of my system and room, but not what I'd call a "transformation." The basic character of my room remained, but the effect of the RoomTune family was to smooth out the rough edges to render a more neutral, less boomy listening environment.

Why GL saw God and I didn't is easily explained, and you can test this for yourself absolutely free: moving your speakers around to different locations in your room will have the *single greatest effect* on the sound of your system, bar none. Bigger than cables, tube amps, VTA, and Blu-Tack between your butt cheeks combined. Treating your room with absorptive/dispersive material will tame its general sonic character, but it will not eradicate or negate its effect on the modification of the speakers' output. Unless you go all out and make your room an anechoic chamber (in which case it would suck for listening to music in with real-world speakers), your room will still generate a reverberant soundfield around you and your speakers. The only way to "improve" the sound is to move your speakers *and* your ears *out* of that reverberant field, and closer together toward the center of the room, which happens to be *exactly* what Michael Green did when he moved GL's listening seat and speakers much closer together than Guy'd had them before. No wonder Guy felt the sound had been transformed; it *had*. But you can do it too, for free, just by moving your speakers and your listening chair away from the room's walls and closer together, to form what's called a "near-field" listening environment. And when you do, you'll start hearing your speakers, *any* speakers, in a new, more accurate light.

Does this mean I discount the contributions of the RoomTune products? Not in the

slightest; they are highly effective at taming the rough edges in the sound of your room. It's just that throwing them up into the four corners of your room will *not* make you see God; you have to *also* move your speakers and listening position around to get *that* high. Try using Sitting Duck Software's "Listening Room" computer program if you want to get it the rightest and the fastest.[1]

My recommendation is to first order the set of four CornerTunes; these give the biggest improvement of the family by far. *Then* if your hanclaps still sound ping-y, get some EchoTunes and see if that helps. *Then* if your speakers overload your room with bass, try just a single pair of RoomTunes;[2] if you think you need more, *then* get another pair. I strongly advise you *not* to buy a whole mess of floor-standing RoomTunes before you actually have them set up in your room and hear what they do; these things don't look very imposing, but they really soak up da bass. For starters, less is definitely more.

The RoomTunes are a help, not a panacea. They are not a replacement for proper speaker and listener placement. Before you give your long green to Michael Green,[3] make sure your house is in order. **—Corey Greenberg**

NELSON-REED 8-04/CM LOUDSPEAKER

Some weeks ago, I had a chance to listen at some length (in a friend's Denver home) to the latest version of the 8-04/CM, which had been vigorously faulted in my original review (Vol.15 No.3) for its remarkable lack of low end. It now appears the problem—which was to do with the wrong woofers being paired to the wrong crossover configuration—has been completely solved.

The current version has all the fullness and body that the original lacked, with no loss of the startling aliveness and dynamic range that made the latter's LF deficiencies even more galling than they would have been in a system that was mediocre in other respects. The bass I heard was quick, detailed, smooth, and viscerally tight, sounding pretty much flat down to what I would guesstimate to be a bit below 40Hz. (This sounds deeper than it looks on paper.) Bass drum was knock-your-socks-off stupendous!

Used with a Sonic Frontiers SFS-80 power amp, Audio Research SP9 II preamp, Rotel 965 CD player, and EAD D/A converter, the 8-04/CM produced the most musically satisfying and *realistic* sound I had heard in my friend's home.

On the basis of that audition, over a period of several hours (with a variety of originally acoustical program material), it is clear that Nelson-Reed has solved the 8-04/CM's bass problem. I must revise my original unenthusiastic assessment of the 8-04/CMs, therefore, and state that they are now worthy of a solid B rating in our "Recommended Components" list. I urge acoustically oriented listeners to take a chance on these, because few competitively priced systems I've heard can equal them for sheer musical realism.

I use the word "chance" here because N-R has very few dealers, preferring to sell direct (with an unconditional refund-if-not-delighted guarantee). That means you probably won't be able to audition them before you buy. And, depending on your other components, you may not be enchanted by the 8-04/CMs the first time your hear them. Why? The 8-04/CMs hew right down the middle in terms of forwardness. They can sound rather lifeless with laid-back electronics—and just the same with aggressive-sounding electronics. The trick, of course, is to find the associated components that strike exactly the right balance (no pun intended). On the other hand, these speakers can sound so good with the right electronics that it may be wise to trust them (and me, by implication), and experiment with different electronics until you get them to stand up and bark, rather than throwing up your hands in instant disgust and sending them back after a quick listen. Isn't that what high end is all about anyway? But of course.

The 8-04/CMs now cost $3695/pair, and shipping is included. Order them from Nelson-Reed, 15810 Blossom Hill Road, Los Gatos, CA 95030. If you ultimately opt to return the speakers for a refund, you pay for the shipping. **—J. Gordon Holt**

1 Reviewed by TJN in Vol.13 No.12, The Listening Room is available from Sitting Duck Software, P.O. Box 130, Veneta, OR 97487, Tel: (503) 935-3982, for $47.50 (PC), $67.50 (Macintosh).

2 And if your speakers were designed to make use of the room's contribution to reinforce the bass, as were my Spica Angeluses, you probably shouldn't use any floor-standing RoomTunes at all. The Spicas need all the help they can get, and sounded emasculated in my room with even a single pair of RoomTunes.

3 RoomTunes etc. are available from RoomTune, P.O. Box 57, Sugarcreek, OH 44681. Tel: (216) 343-3600. Fax: (216) 343-8700.

BRYSTON 4B
POWER AMPLIFIER

Due to logistical problems in getting the $2095 Bryston 4B power amplifier back from Larry Greenhill in sufficient time, we couldn't include the measurements of the amplifier in the same issue as his review (Vol.15 No.5). We elected, therefore, to provide these measurements in the "Follow-Up" you are holding in your anxious hands at this very moment.

The input impedance of the Bryston measured just over 33k ohms at the balanced inputs, just over 47k ohms at the unbalanced. Measured voltage gain into an 8 ohm load was 30.2dB in either configuration. (Normally, there is 6dB greater gain in a balanced configuration.) The measured output impedance of the Bryston was under 0.06 ohms at or below 1kHz, increasing to a maximum of 0.13 ohms at 20kHz, which is still very low. DC offset measured 16.3mV in the left channel, 16.7mV in the right. Signal/noise (wideband, unweighted at 1W into 8 ohms) measured 67.7dB balanced, 75.4dB unbalanced, an unexpected result perhaps caused by additional circuitry in the balanced configuration. The 4B was noninverting with pin 3 of the balanced input configured as the positive leg, pin 2 the negative, this the opposite of the IEC recommended practice.

Fig.1 shows the frequency response of the 4B through the unbalanced input. There is a slight but inconsequential difference in ultrasonic rolloff into 4 ohms compared with 8. Through the balanced input (not shown), the rolloff at the very top end was slightly less—a maximum of –0.7dB at 50kHz (2W into 4 ohms). There was also slightly less rise in the frequency response at 20kHz through the balanced input, but we're talking here of a matter of 0.1dB. The 10kHz squarewave response is shown in fig.2. The Bryston has a short risetime with a *very* slight overshoot at the leading edge, this perhaps correlating with the slight rise at 20kHz into 8 ohms.

Fig.3 shows the crosstalk for both the balanced and unbalanced inputs. Though the worse performance is for the left-to-right crosstalk from the balanced input (output

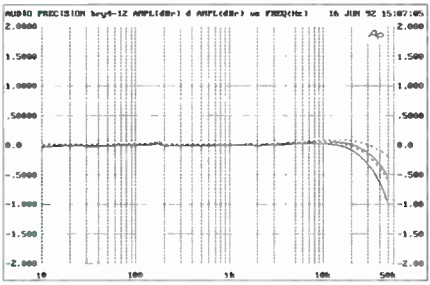


Fig.1 Bryston 4B, frequency response at 1W into 8 ohms and 2W into 4 ohms (right channel dashed, 0.5dB/vertical div.).

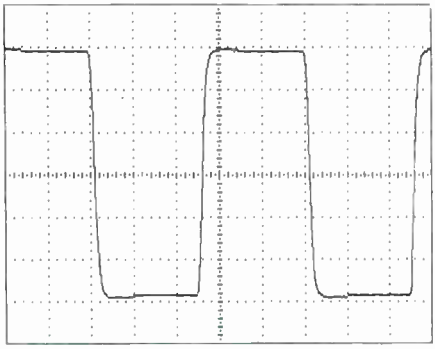


Fig.2 Bryston 4B, 10kHz squarewave at 1W into 8 ohms.

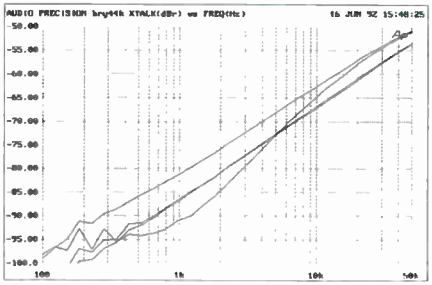


Fig.3 Bryston 4B, crosstalk, from top to bottom: L–R balanced input, R–L balanced, L–R unbalanced input, R–L unbalanced (5dB/vertical div.).

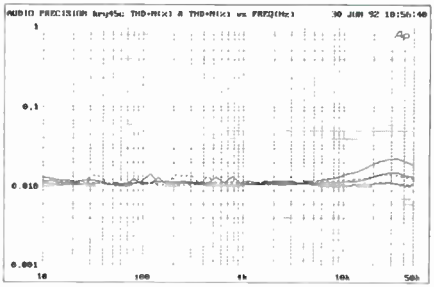


Fig.4 Bryston 4B, unbalanced input, THD+noise *vs* frequency at, from bottom to top: 1W into 8 ohms, 2W into 4 ohms, 4W into 2 ohms (right channel dashed).

from the right channel for an input to the left), the differences are unlikely to have any audible consequences. The increase in crosstalk with increasing frequency is a typical result of capacitive coupling between channels.

Fig.4 shows THD+noise *vs* frequency for the unbalanced mode. The results for the balanced input (not shown) were only marginally different—above about 5kHz, the differences between the balanced and unbalanced inputs were less than 0.001% (with the unbalanced higher). Below that, the *balanced* readings were higher by the same amount, but without the slight roughness noted below 1kHz in the plot shown. The waveform of the THD+noise, not shown, was random in nature at these levels, the absence of obviously dominant harmonics implying that the traces in fig.4 are mainly noise.

The spectrum of the 4B's output when driving a 50Hz signal into a 4 ohm load at 267W (⅔ power) is shown in fig.5. The distortion components here are well down in level—in the worst case greater than –100dB, or 0.001%. Fig.6 shows the spectrum of the 4B's output when reproducing a combined 19+20kHz signal at 193W output into 4 ohms (just below visible signs of clipping at this frequency). The highest artifact here is at about –85.6dB at 21kHz: 0.005%. The corresponding data for an 8 ohm load (at 136W, not shown) are comparable if in general slightly higher; for example, 0.008% at 21kHz and 0.006% at 1kHz.

The Bryston is a powerful amplifier, rated at 250Wpc into 8 ohms (24dBW) and 400W into 4 ohms (23dBW) on a continuous basis. The THD+noise *vs* level curves for the 4B are shown in fig.7. Note that the maximum output drops for a 2 ohm load, implying that the amplifier is current-limited. The actual discrete clipping measurements were 254.1W/254.4W (24dBW, left/right, 110V line), both channels driven, and 271.5W (24.3dBW, 113V line) with a single channel driven into 8 ohms; 356.5W/351.7W (22.5dBW, left/right, 108V line), both channels driven, and 373.1W (22.7dBW, 111V line) with a single channel driven into 4 ohms; and 218W (17.4dBW) into 2 ohms, one channel driven. The last reading, especially, was somewhat unstable, changing as the amplifier significantly heated up over the brief period in which a driving signal was applied.[1]

Altogether, the Bryston 4B's measurements were excellent—as one would expect of a modern, solid-state amplifier designed for high power, low distortion, and a low output impedance. —Thomas J. Norton

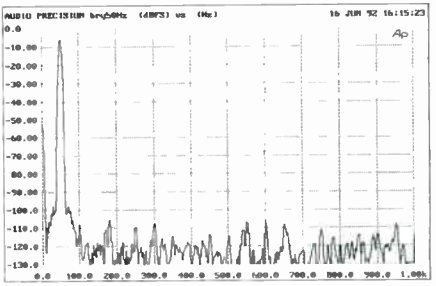


Fig.5 Bryston 4B, spectrum of 50Hz waveform, DC–1kHz, at 267W into 4 ohms (linear frequency scale). Note very low level of all harmonics.

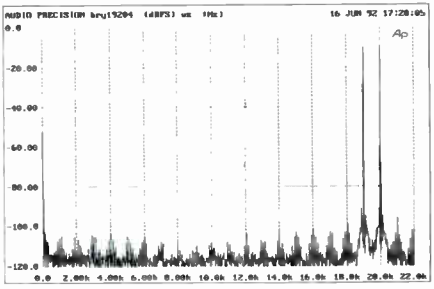


Fig.6 Bryston 4B, HF intermodulation spectrum, DC–22kHz, 19+20kHz at 193W into 4 ohms (linear frequency scale).

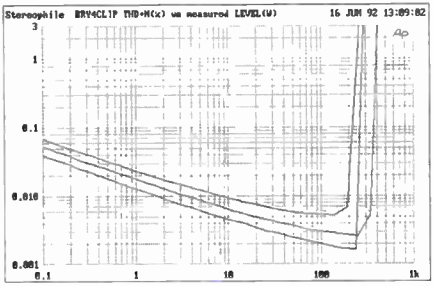


Fig.7 Bryston 4B, distortion *vs* output power, from bottom to top at 100W, into 8, 4, and 2 ohms.

1 Note that the reference for our dBW ratings is the voltage that gives rise to 1W into 8 ohms power. This is equivalent to 2W into 4 ohms and 4W into 2 ohms. A perfect amplifier would therefore have the same dBW rating into any load—an easy paradigm to grasp. Though TJN's figures would appear to indicate that the Bryston didn't quite reach its 23dBW 4 ohm specification, we do not hold the wall voltage constant in our measurements, feeling that this more accurately reflects the situation to be found in our readers' homes. With a constant 120VAC source, the 4B would most probably put out more than 400W into a 4 ohm load. —JA

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Steve Glatzl, Manufacturers Representative and Victor Moorhatch, Regional Sales Manager.
Introducing: 701 Receiver, 705 Receiver, 505 CD Player, 502 Carousel CD Player.

ADCOM
Rob Ain, Vice-President of Marketing.
Introducing: GCD-600 CDPlayer, GFA-2535 Multi Channel Amp.

MONDIAL DESIGNS LTD.
Anthony Federici, Preident.
Introducing: Aragon Aurum - Class A balanced preamp, Aragon Palladium - Class A mono block amp.

P.S. AUDIO INC.
Randy Patton, President.
Introducing: 200 Delta amplifier, Ultralink processor, Superlink II processor.

CARDAS AUDIO
George Cardas, President and Scott Brooks, Sales Marketing Manager.
Introducing: High Speed Data Transmission Cable, Golden Five C

SONUS FABER (Sumiko)
Stirling Trayle, National Sales Manager and John Hunter, Director of Sales and Marketing.
Introducing: Sonus Faber Minima Amator, The Sonus Faber Line "Real World Mini Monitors".

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12:00noon - 8:00pm

JBL CONSUMER PRODUCTS, INC.
Eli Harary, General Manager Specialty Products
Introducing: For the First time in New York...the new JBL Synthesis II Home Media System.

RUNCO INTERNATIONAL
Joe Frattasi, Zone Sales Representative.
Introducing: IDTV, ARC-4, Cinema Pro-750, LSR-1 Laserdisc Player.

PIONEER AUDIO/VIDEO ELITE
Michael Healy, Zone Vice-President and Tony Hartin, Zone Product Trainer.
Introducing: PRO-106/PRO-96/PRO-76 Rear Projection Monitors, LD-S2 Laserdisc Player, VSX-95 Dolby Pro-Logic Audio/Video Receiver, PDS-95 CD Transport.

MARANTZ USA
Orion Hopper, Products Specialist.
Introducing: CDR-1 Recordable CD Player, AX1-1000 Audio Computer, DD-92 DCC Deck, DD-82 DCC Deck, AV-500 Dolby Pro-Logic color picture-in-picture preamp.

FOSGATE AUDIONICS
Charles Wood, President and Steve Glatzl, Manufacturer's Representative.
Introducing: Model 4 Dolby Prologic Surround Sound Procesor, Model 5 Dolby Prologic Surround Sound Processor.

AUDIO POWER INDUSTRIES
Les Edelberg, President.
Introducing: API Power Line Conditioners 110/112/113/114/116/122, Power Enhancer 1

SNELL ACOUSTICS
Jon Herron, National Sales Trainer
Introducing: Snell Home THX Loudspeaker System, Snell Multi-Media, Lucas Film Home THX Products

WEDNESDAY, JAN. 27TH

12:00noon - 8:00pm

KRELL INDUSTRIES, INC.
Dan D'Agostino, CEO, Dean Roumanis, Vice-President and General Manager, and Steve Portacarrero, National Sales Manager.
Introducing: an exciting array of new products to be announced.

WILSON AUDIO SPECIALTIES, INC.
Company representative to be announced.
Introducing: The Dream System.

B & W LOUDSPEAKERS
John McIntosh, National Sales Manager
Doug Henderson, N.Y. Representative
John Chen, N.Y. Representative
Introducing: Matrix 803 Series III - setting new standards in dynamic loudspeaker design

DAY SEQUERRA
David Day, President and Paul Pilot, Day Sequerra Sales Manager.
Introducing: FM Studio II, FM Urban Antenna.

APOGEE ACOUSTICS INC.
Jason Bloom, President.
Introducing: Apogee Grand, Apogee Mini Grand.

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THURSDAY, JAN. 28TH

12:00noon - 8:00pm

KRELL DIGITAL
Dan D'Agostino, CEO and Joe Samut, Vice-President of Operations.
Introducing: Reference 64X, DT-10LD Transport, Studio II D/A Converter.

CONRAD-JOHNSON DESIGN, INC.
Lewis Johnson, Vice-President, Tor Sivertsen, Director of Marketing and John Reagan, Sales Manager.
Introducing: Premier Nine Vacuum Tube D/A Converter, Premier Ten Vacuum Line Stage Preamp, Premier Eleven Vacuum Tube Amp.

MARTIN-LOGAN LTD.
Jerry Stoekigt, Director of Marketing and Sales.
Introducing: Aerius speakers.

THETA DIGITAL
Neil Sinclair, President and Ed Dietermeyer, East Coast Sales Manager.
Introducing: Datalite transport.

HALES AUDIO
Paul Hales, President.
Introducing: Hales System One Speakers.

AR LIMITED ELECTRONICS BY ACOUSTIC RESEARCH
David Day, Director of Engineering, Paul Pilot, Sales Manager, and Elliot Schwartz, National Sales manager.
Introducing: Model Two preamplifier, Model 200 power amplifier, Spectral Equalizer, Model Four CD Player, Model Five tuner, LLS3 speaker system.

ROCKPORT TECHNOLOGIES
Andrew Payor, president.
Introducing: Rockport's System III Sirius Turntable

FRIDAY, JAN. 29TH

12:00noon - 8:00pm

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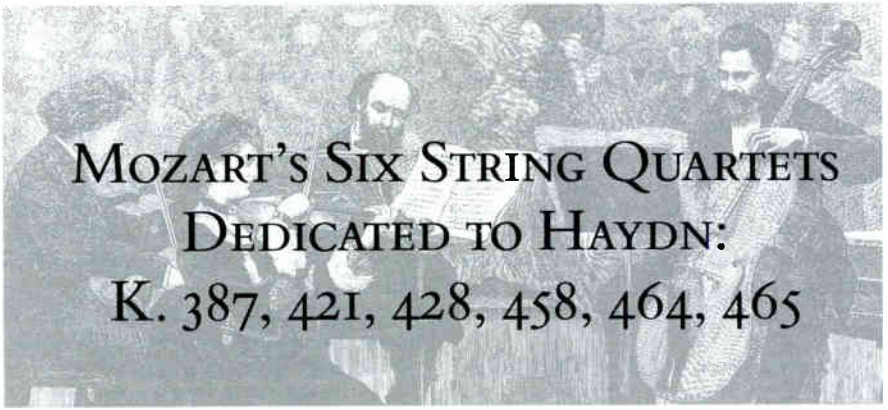

MOZART'S SIX STRING QUARTETS DEDICATED TO HAYDN: K. 387, 421, 428, 458, 464, 465

In a dedicatory letter dated September 1, 1785, the 28-year-old Mozart wrote the 53-year-old Haydn:

> A father who had decided to send out his sons into the great world thought it his duty to entrust them to the protection and guidance of a man who was very celebrated . . . and who, moreover, happened to be his best friend.
>
> In a like manner I send my six sons to you, most celebrated and very dear friend. They are, indeed, the fruit of long and laborious study.

Haydn, who was as much the "father" of the string quartet as of the symphony, had heard the last three of these "sons" eight months before the Mozart letter was written. Deeply moved by them, he told Mozart's father: "Before God and as an honest man I say to you that your son is the greatest composer known to me. . . He has taste. . . and the most profound knowledge of composition." Rarely have the arts inspired such warm and openly expressed admiration between contemporary giants.

Equally remarkable are the six masterpieces Mozart dedicated to his friend. They stand as his first mature efforts in the genre, and abound in all sorts of miracles. For one thing, there are the allusions to Haydnesque style: clipped, terse motifs pregnant with development possibilities; shocking shifts in tonality such as the sudden C-major-to-E-flat plunge in the finale of K.465; and recapitulations that do not always contain perfect mirror images of expositional material.

And to such Haydnesque features Mozart added his own compelling stamp: the juxtapositioning of terse motifs against *cantabile*, operatic melody; the boldest of chromatic colorations and harmonic leaps incorporated with a grace and fluency that disguised their brashness, creating in the process a tonal motion seemingly unfettered by harmonic gravity; and an economy in which every note and every rest has purpose and point.

In short, these quartets boast an extraordinary compositional virtuosity and emotional range that exemplify—in the broadest sense of the term—the *wit* that lies at the core of Viennese Classicism. And because of this, these works are, in their own way, as demanding of performers as, say, the quartets of Bar-

tók. With Mozart, everything is exposed so that there is nothing to hide behind. All voices must be heard, and a failure from one of them will immediately be audible.

Then, too, there is the revisionist attitude toward works such as these that has emerged in the last two decades. Once viewed as being exemplars of Classical repose and decorum, they have come to be seen (far more accurately) as bold, passionate, vibrant expressions boasting an intensity and harmonic range equal to or surpassing some of the 19th century's lushest creations. But Mozart's lushness and sensuality always remain self-contained and governed by exemplary taste.

And it is such taste and self-containment that performers must complement in bringing these scores to life. Too much rhythmic freedom and structure crumbles; too wide or intense a vibrato and melodies cloy; too slow a pace in *andantes* or *allegrettos* and a movement may stagnate. In addition, musicians must (as Mozart expected of them) draw inferences about dynamics, phrasings, and tempo modifications so as to animate and vivify what might otherwise sound bland and casual.

No ensemble recorded all six of these quartets during the 78rpm era. The earliest complete cycle to be available currently was originally produced in 1950 and 1953 by the Budapest Quartet, and only recently reissued on CD by Sony Classical in superb transfers made by Dennis D. Hooney (SM2K 47219). Unique among all the sets under consideration here in that it excludes all exposition repeats, it is (as a result) the only one to contain these six works on two, rather than three, CDs. In their day, these performances were taken as paradigms of Classical poise and elegance. Doubtless they display an aristocratic grace and polish, but compared to readings of more recent vintage, they now seem excessively cool and detached, lacking the fire, intensity, and tension other groups have suggested.

A giant stride toward removing Mozart from the powdered-wig propriety that was once deemed stylish was made in 1961, when the Juilliard Quartet recorded this music. With an appropriately lean tone, observation of all exposition repeats, and the playing of grace notes on (rather than before) the beat, this cycle (long out of print) offered a far more expressive, emotionally wide-ranging Mozart. In most respects its virtues are duplicated in a currently available Juilliard remake (Odyssey MB3K 45826). Here, as before, astringent tone, sharply drawn dramatic contrasts, and a stark toughness prevail and—save for a few instances of marginally slower tempos—illustrate the remarkable consistency of style that has marked the Juilliard's work for nearly half a century, despite first violinist Robert Mann being the only remaining charter member of the group. As a mid-priced edition, this set comprises unusual value.

Offering even greater value, perhaps, is the budget-priced edition featuring the Hungarian Quartet (Vox CD3X 3009). Long-time collectors may recall this unsung group's distinguished traversal of the Beethoven quartets for EMI. In these 1972 Mozart recordings, the same merits abound: tempos are unhurried yet pointedly animated: the music's melodic and harmonic richness is conveyed, its complex texture well-defined. Admittedly, the Hungarian's tone is rather coarse and not helped by the close, boxy sonic perspective. Still, these are musical, stylish readings. Some exposition repeats are omitted, mostly in finales, but also in the opening movements of K.458 and 465.

A throwback to the Budapest's approach can be heard in the playing of the Quartetto Italiano (Philips 422 512-2): cool, elegant, and patrician. But the 1960s sound is harsh, and some of the music's incipient wit and joy are concealed beneath the polished surface of the execution. There is no denying the Quartetto Italiano's proficiency, even its frequent musicality, but it does not convey the buoyant exuberance and stark drama that stamp these works. And when one considers that the three CDs containing these performances are part of an eight-disc set devoted to all of Mozart's string quartets, the cycle simply becomes non-competitive.

Non-competitive for different reasons are the mid-'70s recordings of the Melos Quartet (DG 415 870-2). This is a cycle that improved as it progressed, the playing growing more aptly taut and intense in the last four of these works, passages in K.465 being tossed off with pointed, eruptive brusqueness. Had such a style been sustained from the start, this mid-priced set might have offered stiff competition to the Juilliard edition.

Dating from roughly the same time are cycles of the Smetana and Talich Quartets.

The Smetana's was recorded in 1975 and (K.421 and 458) 1982. Only this later pairing found its way onto CD, an earlier LP set, let it be noted, having included 1972 recordings of the two scores redone later. At present, none of these recordings is listed in *Schwann Opus*, but it seems likely that the six digital productions will be reissued. They are worth having. The Smetana may lack some of the thrust and toughness of other groups, but it plays with a robust sonority, impeccable balances, and the kind of aristocratic elegance typical of the Budapest, but enhanced by more forceful attacks and a sharper contouring of motivic profile. Only an occasional breath-pause injects an awkward moment or two in this admirable set.

Less robust in sonority than the Smetana and less astringent in tone than the Juilliard, the Talich Quartet (Calliope 9241/43) delivers intelligent, somewhat understated performances. Tempos are neither especially fast nor unusually slow, and a dramatic undercurrent is conveyed, not so much by extremes of dynamics or phrasing as by exceptionally clean articulation that suggests a drama growing from within rather than being imposed from without. Only in K.421 do things seem a trifle too cool, lacking, for instance, the eerie gloom conveyed by the Juilliard. The Talich observes all first-movement repeats, but confines repeats in finales to K.387 and 428. The set, however, becomes an unusual bargain in that it includes three additional works: Mozart's Quartet K.156 and Violin Sonata K.301, and the Haydn Quartet Op.74 No.3. In the sonata the Talich's first violinist, Petr Messiereur, suggests a later-day Joseph Szigeti in his grasp of structure and biting tone. Throughout this set, the digital transfers of analog originals are excellent.

Also superbly transferred is the 1979 cycle of the Chilingirian Quartet (CRD 3362-64, each of the three discs available individually). Here the style is gentle, rather small-scaled in its narrow range of dynamics and tempos, and relatively sweet-sounding in its lean but thoroughly modern tone. Technically, the Chilingirian is first-rate, both in intonation and judicious balancing of Mozart's intricate polyphony, the prominence and buoyancy given the cello in K.464 being a prime case in point. For some tastes the Chilingirian's tempos may prove too broad, but, like the Talich, it generates liveliness with clean articulation. Furthermore, the group proves especially sensitive to the music's harmonic daring and bold chromaticism. This may not be the set for those seeking a driving, vibrant style in this repertory, but the music can surely sustain the Chilingirian's suaver, more *cantabile* style.

Considerably less attractive is the style of the Prazak Quartet (Nuovo Era 6829/31). Technical proficiency notwithstanding, its playing is overly refined in its excessive legatos and genteel round edges; in addition, an overly prominent first violin made all the more obtrusive in its cloying vibrato runs utterly counter to the Mozartean matter. The "sound" of this group, *qua* sound, is often very beautiful, but sometimes it is simply too beautiful, conveying little of the music's wit and vibrance. In short, this is Mozart the old-fashioned way: prettified, sweetened, and somewhat emasculated.

In the execution of the Mozartean Quartet of Salzburg (Vivace E-317), Mozart is interred. The readings are gentle to the point of spinelessness, meandering along blandly. In part, this impression is rooted in inferior articulation lacking dynamic inflection, suitable balances, and musical phrasing. Even at mid-price this set—skimpily produced with no annotations, or even an identification of the group's personnel—is far too expensive for what it offers.

Four additional cycles (Takács, Mosaïques, Artis, and Emerson) complete this survey. All have considerable merit and, being of recent vintage, command more detailed discussion. In many respects the Takács's readings (Hungaroton HCD-12983-85) comprise an eclectic approach. On the one hand the group hardly seems aware of the stylistic revelations that have sprung from the period-instrument movement: grace notes are played ornamentally *before* the beat rather than (as was done in Mozart's day) melodically *on* it, and first violinist Gábor Takács does not hesitate to let his vibrato throb when he deems it fit. Yet against these anachronistic traits, the group projects a virile Mozart. Faster movements have a crisp fleetness made all the more expressive by inflected dynamics and immaculate articulation. And drama is heightened by the Takács's readiness to relax where suitable, heightening the contrast between the music's operatic and instrumental characters. Particularly noteworthy in this regard is the

finale of K.458, where a tasteful rhythmic freedom enriches expression without damaging structure. And in K.421, the Takács suggests an agitated, eerie intensity that goes to the heart of this demonic score.

Two technical shortcomings may prevent this set from gaining wide appeal: harsh tone, rooted, I suspect, more in engineering flaws than in deficient execution; and the occasional intrusion of breathing, to the point where it sounds like a fifth instrument. In all other respects this is a commanding set. In addition to the now commonly observed exposition repeats, the Takács includes a repeat of the development and recapitulation in the first movement of K.421.

Recorded between 1988 and 1990, the Artis cycle (Sony Classical S3K 46552) may well be—sonically at least—the finest of all the sets under discussion. The perspective is close, intimate, yet never claustrophobically larger than life, and is free of even a hint of harshness. Only a few obtrusive breaths from the musicians prevent a seeming sonic perfection. Interpretively, too, these readings are distinguished. Despite its brief international career of only seven years, the Artis shows a maturity not always matched by more seasoned players. Its tone is sweet, but never excessively so, and a spit-and-polish precision produces finely focused textures, crisp, slashing attacks, and dead-center intonation. In many respects the Mozart of the Artis is redolent of Toscanini's approach to the composer: slow movements that flow unsentimentally and crisp, chiseled allegros tempered by subtle modulations of pulse that heighten expression. The Artis may miss some of the skittish Haydnesque humor in the finale of K.428, and be a little too free rhythmically in the finale of K.465 (where, incidentally, an exposition repeat is omitted), but this is a masterful traversal that anyone having a prime interest in sound may well consider as a first choice.

A first choice of a very different kind is provided by the Mosaïques Quartet (Astrée 8746, 8748). As a period-instrument group, it is not, strictly speaking, competitive with others considered here. But the ensemble offers some of the finest "authentic" approaches to Mozart that I have ever heard. None of the nasal, honking harshness often typical of the vibrato-free period-instrument sonority is present, and the spooky tonal purity that ensues proves especially well-suited to the music's chromatic passages, serving as a reminder that there is a tortured otherworldliness in Mozart often fudged in many performances. Tempos are well-chosen, with allegros that sound faster than they actually are as a result of clear articulation, an articulation that also lends unusually sharp focus to texture and motivic profile. Phrasing, to be sure, is slightly eccentric in its angularity, creating a craggy toughness that some may find objectionable, but others may find refreshingly musical.

There are many high points here: the muted, understated brooding in K.421 contrasted to a few sudden outbursts of demonic starkness; the terse unity in the variation movement of K.464, where a single tempo italicizes the contrast of mood from one variation to another; a freedom from sentimentality in slow movements; and, above all else, a responsiveness to the music's broad emotional range. Voicing is exemplary throughout, exposing details often veiled in other performances. Dynamics receive scrupulous attention, *fortes* sometimes having a Beethovenian brashness; intonation is squarely on target, and rhythm is supple yet secure. All repeats, including those of developments and recapitulations, are observed. To the Mosaïque's credit, however, gratuitous repeats in the reprises of minuets (favored by many authenticists) are avoided. A final virtue is the sonic excellence of these (individually available) discs. Note, too, that only four of the six quartets in this cycle have been released; given their sustained excellence, those to come (K.428 and 458) should prove equally compelling.

Compelling, too, is the newly released set featuring the Emerson Quartet (DG 431 797-2). Begun in 1989 with K.458 and 465, it was completed two years later and bespeaks this still relatively young group's talent, taste, and technical panache. In recordings of exceptional musical sound lacking the harshness often attributed to digital productions, the Emerson projects a Mozart stripped of decorum and gentility—a Mozart at once bold and intense yet lyrical and graceful, and a Mozart made all the more dramatic with slashing accents, precise attacks, and judicious balances that preserve the music's rich polyphonic fabric. Here, too, is a blend of the traditional and the modern in performance style.

Portamento, for instance, is used more liberally than is common today (could this be an influence on violinist Eugene Drucker of his father, who had been a violinist in the old Busch Quartet?). At the other extreme is a tonal purity reflecting the impact of the period-instrument movement. Indeed, some passages, executed as they are with almost no vibrato, suggest the sonority of the Mosaïque.

Every performance in this set is distinguished, allegros crackle, slow movements —even when lingered over—are not distended, and minuets have a bite that transcends courtly elegance. And there are many magical moments, a prime example being the opening of the finale of K.387: soft and mysterious, almost ethereal, and made all the more dramatic juxtaposed to the crisp, vibrant articulation that ensues. Only a few breath-pauses mar what may well be *the* modern-instrument version to own if one is owning only one. A welcome bonus is the inclusion of a fragment of a rondo originally planned for K.464. And let it be added that, unlike other critics, I fail to hear how the Emerson's practice of having the two violinists alternate in the first chair produces a style of playing lacking personality.

A closing note: Out of curiosity I pulled the December 1957 issue of *Schwann* from my shelves to ascertain how the situation regarding the recording of these quartets has changed in the last three and a half decades. Selecting that issue was not arbitrary. It was one year after the bicentennial of Mozart's birth and thus incorporated the spate of recordings of his music released the previous year. In short, it was an analog of 1992, the year after the bicentennial of his death, which produced another spate of Mozart recordings. Interestingly enough, only two integral editions of the "Haydn" Quartets were listed: the Budapest cycle discussed here, and an inferior one by the Barchet Quartet. In addition, no individual work among the six was represented by more than a half-dozen recordings.

Obviously, today's situation is markedly different, and we are the richer for it. Skeptics may argue that duplication of the repertory on disc has created ludicrous redundancies in the catalog. But the wide range of virtues in so many of the divergent recordings considered here serves as a reminder of the ambiguity central to all great art, and of how Mozart's "Haydn" Quartets, as such art, defy a single "correct" interpretation. $

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EXCHANGE

RECORD REVIEWS


DAVID PERRY


IRENE YOUNG

Joe Henry (left) is backed by the Jayhawks on *Short Man's Room*, his very impressive new album and January's "Recording of the Month" (p.292). The Turtle Island String Quartet (right) delights and instructs in equal measure on three recent Windham Hill CDs (p.287).

CLASSICAL

BERNSTEIN: ***Concerto for Orchestra ("Jubilee Games")***
ROREM: Violin Concerto
DEL TREDICI: ***Tatoo***
Leonard Bernstein, Israel Philharmonic (*Jubilee*), New York Philharmonic (Rorem, Del Tredici); Gidon Kremer, violin (Rorem)
DG 429 231-2 (CD only). Hans-Peter Schweigmann, eng. (Del Tredici, Rorem); Karl-August Naegler, eng. (Bernstein); Hans Weber, prod. DDD. TT: 72:00

Leonard Bernstein's last in-concert recordings of American repertoire took place at Avery Fisher Hall in November 1988. Bernstein recorded his own piece in Tel Aviv during concerts in June 1988 and April 1989.

Someone at DG has concluded that if a little DSP is good, more must be better. Too bad; the artifice does call attention to itself. Neither Avery Fisher Hall nor the Mann Auditorium are as capacious as portrayed here. DG has come dangerously close to spoiling a great and important recording.

David Del Tredici is fond of variation, paraphrase, and is a brilliant orchestrator. The *Tatoo* of the title refers to rhythmic signaling, not body art. *Tatoo*, a very jazzy and joyfully cacophonous work, contains a generous helping of Paganini's 24th *Caprice*. A contemporary of John Corigliano, Del Tredici may yet emerge as the leading composer of this new period in which we find ourselves.

With Copland, Bernstein, and most recently, William Schuman having passed from the scene, we are left with Ned Rorem, at an incredibly youthful 69 years, as our senior American composer. The Violin Concerto is more a suite of character studies in song and dance form than a concerto in the virtuoso or symphonic senses. A prolific songwriter, Rorem hints that much of this music may be inspired by texts, but in a game he loves to play, he's damned if he'll give us a clue as to what these texts may be. No matter; this lightly scored, delightful, and touching work is beautifully and sympathetically played by Gidon Kremer.

In turning at last to Bernstein's own final symphonic piece, we reach a kind of watershed, not only in Bernstein's career, but in our own lives as Bernstein observers. Bernstein's relationship with Israel and the IPO, with which he held the position of Conductor Laureate,

dates back to the fading days of Britain's Palestine Mandate, as well as appearances during the 1948 War of Independence. *Concerto for Orchestra* had its origins as a two-movement commemorative for the 50th Anniversary of the Israel Philharmonic. The original title, *Jubilee Games*, has been retained as a subtitle. Upon premiering the early version with the IPO in 1986, Bernstein quipped that if he'd live long enough, he would complete the work for the State of Israel Jubilee in 1998. Apparently, something told him not to wait.

With so much talent flying in so many different directions, Bernstein the composer was prolific in neither quantity nor quality. But setting aside obvious hits like *West Side Story*, *Fancy Free*, and *On the Town*, a common thread keeps turning up in his work: the need to express his Jewish heritage. Lenny was nothing if not a self-ordained rabbi.

Judaism could not exist without numerology, so in celebrating this auspicious anniversary, Bernstein employs an ingenious series of numbers games based on the relationships of 50, 7, and 18, in virtually every style of music developed in the 20th century: aleatory, minimal, serial, conventional dance-suite style, a theme and variations for odd pairings, and in closing, a sung benediction on the familiar Numbers 6:24–26. The work is exuberantly optimistic without being naïve. Bernstein has apparently seen beyond the tortured moral and political climate of the Middle East, in which Israel's own conduct has become a subject of controversy. *Jubilee Games* speaks to Israel as the social and cultural utopia its founders hoped it would become. Best of all, while not "inaccessible," it is a piece that does not give up all its features easily. Jack Gottlieb's liner note is very helpful, but don't enslave yourself to it before hearing the work. Refer to it as you learn the *Games*.

The IPO plays this music with a sense of ownership which makes it truly theirs, but *Jubilee Games* is too great a work to be theirs alone. Bernstein's final work is a world-class masterpiece, uncluttered by endearing flaws or embarrassing self-indulgence. It is sobering to consider the possibility that *Jubilee Games* may be the last great piece to be written in the 20th century. **—Richard Schneider**

BEETHOVEN: Symphony 3,* *Coriolan* & *Fidelio* Overtures
Fritz Reiner, Chicago Symphony
RCA 60962-2 (CD only, *mono). Lewis Layton, Joseph Wells, engs.; Richard Mohr, prod. ADD. TT: 60:26

After a short-lived mono LP release, the Reiner "Eroica" makes its CD debut after a 35-year hiatus. Recorded in December 1954, this recording was contemporaneous with such legendary Reiner stereo tapings as the Strauss *Heldenleben* and *Zarathustra*. Rumors of a stereo master of "Eroica" and plans to issue it drifted around RCA for years. When they couldn't find the stereo, they would reissue the Munch/BSO instead, not because it was a particularly vital and compelling "Eroica," but because it was in stereo.

RCA still hates the "M" word in print, but at least they're reissuing the mono treasures. Today's collectors have probably chosen their favorite vintage "Eroica" performances from Weingartner, Furtwängler, Walter, Toscanini, Klemperer, Szell, and perhaps even Karajan and Bernstein. Since the Reiner "Eroica" has resided in a shadowland of rummage sales and public library sell-offs, many of today's collectors have been scarcely aware of its existence until now. Make no mistake about it: this is an "Eroica" to hear, to probe, and to purge yourself of a whole day of mindless BS. Reiner's recording, mono though it is, clears the decks like no other.

The two overtures, in stereo, are cloned from the CD production of the Reiner Beethoven 5/Schubert "Unfinished." A furiously bitter *Coriolan*, instead of the usual lugubrious and demented one, is scrubbed clean of the sludge which afflicted it on vinyl. However, it is much too shrill, and needs remastering by today's musically literate teams using the most up-to-date equipment. The same goes for the brilliant and energetic *Fidelio* overture. RCA should not clone the work of hacks.

Sonically, "Eroica" is fresh gourmet fare, while the overtures are canned peas. C'mon, RCA, how much more would it cost you to do the *whole* thing right? **—Richard Schneider**

BLOCH: Works for Piano & Orchestra
Concerto Symphonique for Piano & Orchestra, *Scherzo Fantastique for Piano & Orchestra*, Concerto Grosso No.2
Micah Yui, piano; David Amos, London Symphony
Laurel LR-851CD (CD only). Dick Lewsey, eng.; Hershel Burke Gilbert, prod. ADD. TT: 68:33

In 1973 Laurel began recording the unjustly neglected string quartets of Ernest Bloch. The momentum has carried over to many of the composer's other compositions, resulting in this latest collection, which features the first recordings in 27 years of two compelling works for piano and orchestra. Completing the disc is an almost equally rare recording of the Concerto Grosso No.2. What's most striking about this release, however, is not the reintroduction of seldom-played music eminently worth hearing, but that the music has been performed with such obviously deep commitment and affection.

Pianist Michah Yui reveals a mastery of the late-Bloch *angst*-ridden idiom. In the three-movement *Concerto Symphonique*, the power of

this 19-year-old's technique is clearly revealed, despite the subordinate role her instrument plays compared to the typical piano concerto of earlier eras. The composition has a decidedly martial aspect almost throughout its 40 minutes, and treats the piano in a highly percussive manner. Although Yui's playing is bold and brash, it never oversteps the bounds set for it within the context of the score. In the slow, evocative *calmo* section of the second movement, the young Tokyo native also reveals an admirably graceful touch. Conductor David Amos, himself a proselytizer for overlooked composers, sets a fittingly menacing mood for the piece, eliciting crisp phrases and great esprit from the superbly polished LSO.

The *Scherzo Fantasque*, a brief one-movement work, is more of a showpiece for the pianist than is the *Concerto*, and its jaunty, playful rhythms and extraverted outer sections come as bright relief from the latter's stern mood. It, too, is rendered here with character and enthusiasm. The quieter central episode again reveals Yui to have a fine lyrical touch to complement the power exhibited in other sections.

With the Concerto Grosso No.2, we're in entirely different territory. Composed in 1952, more than a decade after the above works for piano and orchestra, this is unabashed neoclassicism—or, to be more precise, neo-Baroqueism. A very affecting piece, it is poised and balanced, the writing for the string-quartet concertina in appropriate proportion to the rest of the orchestra. Rhythms move with the surety and grace typical of the Baroque. In the final movement, Bloch discloses himself more openly as the modern composer he was, but the style remains a fitting part of the whole. The playing is lively and vigorous throughout.

As good as these performances are, the sound quality is every bit their equal. Each section of the orchestra is clear and distinct without standing unnaturally apart from the overall tonal fabric. A nearly ideal balance is struck between soloists and orchestra, and the sound of the massed strings in the Concerto Grosso is distinguished by a rich warmth that, for once, never obscures individual voices. This disc is worth seeking for its outstanding recorded sound alone, let alone its long-overdue repertoire selection and inspired performances.

—Robert Hesson

BRAHMS: Piano Sonata No.3 Op.5
SCHUBERT-LISZT: Seven Song Transcriptions
Dmitri Bashkirov, piano
MCA AED-10284 (CD only). Edvard Shakhnazarian, Votali Ivanov, engs. DDD. TT: 58:21

My first recollection of the Georgian-born (1931) Bashkirov was a miscellaneous Melodiya disc from the 1960s, which contained, among other works, some beautifully played Schumann. Although Bashkirov does not appear to have performed much in the West and is still based in Moscow as a member of the faculty at that city's Conservatory, this one-time student of Alexander Goldenweiser is, I assure you, one exceptional pianist. His Brahms is characterized by appropriate romantic gestures, a wide dynamic scale, superior but not facile technical equipment, and a temperament that precludes neither poetry nor drive. If the Brahms is impressive and competitive with many of the finer recorded performances, Bashkirov's rendition of Liszt's arrangements of seven Schubert songs is little short of remarkable, and the major reason for this rave response. The pianist captures the mood and atmosphere of each song quite perfectly, bringing to the scores a lyricism that is not only couched in vocal terms, but whose effect is frequently touching. As one example of Bashkirov's abilities, sample the light-hearted humor he brings to "Hark, hark, the lark," an absolutely delectable interpretation. That's the good news; the bad is that the Russian-made recording, though exceptionally clean, is uncomfortably close and resembles the boxed-in sound of radio-studio acoustics. We do not even discuss soundstage. None of this, I hasten to add, is sufficiently irritating to reject this disc, especially as the ear eventually does adjust, but I do wish that more palatable technologies had been used.

—Igor Kipnis

BRITTEN: Orchestral Music
Four Sea Interludes from *Peter Grimes*; Suite on English Folk Tunes, "A time there was. . ."; Courtly Dances from *Gloriana*; *The Young Person's Guide to the Orchestra*
William Boughton, English Symphony Orchestra
Nimbus NI 5295 (CD only). DDD. TT: 57:43

BRITTEN: Orchestral Music
Simple Symphony, Variations on a theme of Frank Bridge, Prelude & Fugue
Thomas Furi, Camerata Bern
Denon 81757 9409 2 (CD only). Holger Urbach, eng.; Yoshiharu Kawaguchi, prod. DDD. TT: 49:22

BRITTEN: Orchestral Music
Four Sea Interludes and Passacaglia from *Peter Grimes*, *The Young Person's Guide to the Orchestra*, Variations on a Theme by Frank Bridge
Andrew Davis, BBC Symphony
Teldec 9031-73126-2 (CD only). Tony Faulkner, eng.; Christopher Palmer, prod. DDD. TT: 67:37

If you're looking for an easy introduction to Benjamin Britten's music, then William Boughton and the ESO have certainly put together a package of straightforward and instantly attractive pieces here. But the Four Sea Interludes from *Peter Grimes* demand of the players a high degree of technical skill if the beauty of Britten's mood painting is to be appreciated; in the ESO's performance of the second, coordination of the chugging chords gets slightly out of sync, and the fourth, depicting the storm,

is neither ferocious nor luminous enough in its changing moods.

The Suite on Five English Folk Tunes, and the Courtly Dances from *Gloriana*, have plenty of rhythmic vitality and elegance, but I was disappointed by the soft focus Boughton adopts for *The Young Person's Guide to the Orchestra*. By contrast, Andrew Davis and the BBC SO give a scintillating performance of the piece; it becomes a work of some substance in its own right rather than just music originally written for an educational film entitled *Instruments of the Orchestra*.

Davis's Four Sea Interludes are also extremely well handled: the strings are immaculately coordinated, the woodwinds are agile, and the brass perfectly in tune. Control is perhaps just a little too tight when excitement should engender a more spontaneous approach, but this is a small price to pay under the circumstances.

Written as "a tribute, with affection and admiration" for his teacher and mentor, Britten based the Frank Bridge Variations on a theme taken from the second of the older composer's Three Idylls for String Quartet. Although scored for strings alone, they reveal an amazingly dextrous imagination for a young man of 23, and brought Britten early international recognition. Davis and the BBC Symphony again give a careful and precise account that can be enjoyed *per se*, but which sounds lacking in passion and intensity when compared with the performance by the Camerata Bern.

This Swiss ensemble attacks the work with vigorous articulation and great dynamic vitality, and has a rather meatier tone than the BBC strings. Although I like the boldness of their performance, its swagger and confidence are somewhat atypical, and intonation can sometimes be raw. The Camerata completes its disc with two other works for string orchestra: the earlier Simple Symphony of 1934, and the Prelude and Fugue, written some nine years later and scored in 18 parts, originally for the express purpose of giving the 18 members of the Boyd Neel Orchestra, who premiered it, scope to display their technical prowess. The Camerata's interpretation of the former work certainly has the aura of English music about it, but this is more in the style of Peter Warlock than of Britten himself. The Prelude and Fugue is less successful still, losing sight of Britten's fingerprints in its attention to formal detail. This is not a disc, then, that says much about Britten's identity, and William Boughton and the ESO are simply not up to the standard required at times—try Andrew Davis for authenticity if the program is right.

—Barbara Jahn

FRANCHETTI: ***Cristoforo Colombo***
Renato Bruson, Cristoforo Colombo; Roberto Scandiuzzi, Don Roldano; Rosella Ragatzu, Isabella, Iguamoto; Marco Berti, Don Fernan; others; Hungarian Radio Chorus, Frankfurt Radio Symphony Orchestra, Marcello Viotti
Koch/Schwann CD 3-1030-2 (3 CDs only). Michael Horwath, prod. DDD. TT: 2:39:11

This opera, composed for the 1892 quadricentennial of Columbus's first voyage to the New World, was first performed in Genoa, then heard at La Scala, Hamburg, Prague, Barcelona, Monte Carlo, and Philadelphia. There have been occasional revivals, but it has failed to win a place in anything like the standard repertoire. Franchetti was a very popular composer in his day, but his all-over-the-place, end-of-century grandness-without-really-being-special simply doesn't wash now. He's good but not distinguished, something like Boito with hints of Wagner, but not as bad/good as Giordano or Cilea, both of whom had a way with glorious, catchy melodies.

That said, I found a good deal of this opera captivating in a large, brassy sort of way. The best moments are, in fact, the big ones involving chorus and ensemble. On the other hand, Colombo's endless death scene is pretty hard to take—like Massenet's Don Quichotte, but three times as long and lacking in pathos. The opera moves from Salamanca, where Colombo gets permission for his voyage; to aboard the Santa Maria, where the disgruntled sailors are about to mutiny just as land is sighted; to Mexico, where the Indians are suffering under the Spaniards, who send Colombo back to Spain as a prisoner; to Spain, years later, as Colombo dies. The first act has a certain grandeur and majesty, and the second really heats up to an exciting, everyone-sings-loud climax. The opera falls off after that, with generic exoticisms in Act III (in Mexico), and the dull epilogue.

Great baritones have been drawn to the title role—Ruffo, Amato, and Stracciari, to name three. Renato Bruson's Colombo towers, catching every nuance; he's quite rightly the centerpiece. Every so often he sounds a bit older than he should for the part, but he's really a terrific singer. Bass Roberto Scandiuzzi sings Roldano's music with a nice snarl (it's he who mistreats the Indians), and tenor Marco Berti joins soprano Rosella Ragatzu for the third-act love interest. (Ragatzu is also the acceptable Queen Isabella of Act I.)

Orchestra and chorus are superb, and the engineers have apparently bound and gagged the audience—they're nowhere within earshot. I would have liked the orchestra a bit more forward—it has nice, deep textures—but it's certainly good enough. The accompanying booklet has essays, text, and translations, pictures and biographical notes about the performers, a list of cueing points, and a synopsis. I partic-

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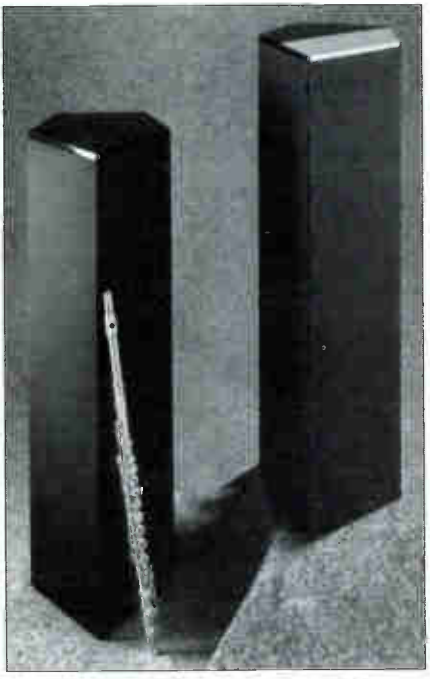

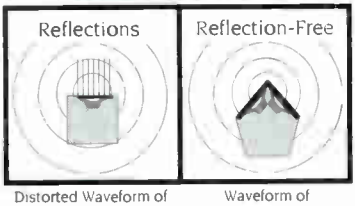

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Peter W. Mitchell
Stereophile
Vol. 13 No. 4, April 1990

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ularly like the following description of cueing point 10 on CD 1: "Un uomo che piange" (Zerlina-Masetto-Coro). Was somebody pulling someone's leg?

Yes, this is for specialists, and it will probably sink again as last year's quincentennial fades into memory, but I'm glad I got a chance to hear it, and have returned to it a few times already. You could do worse—much worse—and the good moments are really good.

—Robert Levine

HANDEL: *Messiah*
Joan Rodgers, soprano; Della Jones, mezzo-soprano; Christopher Robson, countertenor; Philip Langridge, tenor; Bryn Terfel, bass-baritone; Collegium Musicum 90, Richard Hickox
Chandos 0522/23 (2 CDs only). Tim Oldham, prod.; Richard Lee, eng. DDD. TT: 2:20:51
HANDEL: *Messiah*
Karen Clift, soprano; Catherine Robbin, mezzo-soprano; Bruce Fowler, tenor; Victor Ledbetter, baritone; Boston Baroque, Martin Pearlman
Telarc CD-80322 (2 CDs only). James Mallinson, prod.; Jack Renner, eng. DDD. TT: 2:12:02
HANDEL's *Messiah: A Soulful Celebration*
Reprise 26980-2 (CD only). Norman Miller, Gail Hamilton, Mervyn Warren, co-prods. ADD. TT: 76:09

The catalog already has a *Messiah* for every taste. As I pointed out in my "Building a Library" roundup in December 1991, the territory can be divided into a few different types which represent fundamentally different approaches to the piece. Both Richard Hickox's and Martin Pearlman's fall into the period-instrument camp. The third recording, a clever Soul version performed by dozens of black pop musicians, falls in a category all its own; more on it below.

Conductors Hickox and Pearlman came to period performance by different roads. Hickox had a conventional career with the London Symphony Chorus and several orchestras before becoming involved with Collegium Musicum 90, a period group. He has also continued his association with later music, achieving particular success in the choral-orchestral repertory of 20th-century Britain (Holst, Britten, Elgar). Pearlman, on the other hand, has concentrated exclusively on period instruments, both as harpsichordist and conductor of the Banchetto Musicale, which was the predecessor of Boston Baroque. Both Pearlman and Hickox use performing forces close to what we expect for period groups. Pearlman has 24 instrumentalists (strings: 5, 4, 3, 3, 1) with a chorus of 21 (6, 5, 5, 5, with no male altos). Hickox is slightly larger: 31 instrumentalists (6, 6, 3, 3, 2) and a chorus of 24 (8, 5, 5, 6, including 2 male altos).

Pearlman uses the standard four soloists, though nowadays in period performances it's more common to divide the alto numbers and give the ones Handel arranged for castrato to a male countertenor. Perhaps this was a deliberate choice; Pearlman's alto, Catherine Robbin, sounds almost like a male alto in her lower register, which sounds hollow and lacking in chest. Hence her "Refiner's Fire" is only warm, and other sections sound too low for her (even more so at lowered baroque pitch). My disappointment in Robbin is all the more curious since she is the one soloist who has extensive recording credentials, including a Beethoven Ninth with Hogwood, *Missa Solemnis* with Gardiner, and lots of Handel. Soprano Karen Clift has an attractive, chirpy voice with ample agility, which should be just right for her big solos ("Rejoice Greatly" and "I Know"), but tempos are too fast for her to show much personality. In fact, both women seem uncomfortable with Pearlman's quick pace. A good singer can do wonders with pieces like "Rejoice Greatly" or "He Was Despised," but at these speeds there simply is no room for nuance. In the case of "He Was Despised," Pearlman's orchestral introduction is so "pert" it almost sounds jolly. Bruce Fowler has a pleasant, even, tenor voice, but it remains dark on top and never opens up; the result is satisfactory without being very exciting. Much the same can be said for baritone Victor Ledbetter—an attractive voice that stays closed, threatens to wobble, and lacks sufficient heroism to be interesting and distinctive. One positive aspect to Pearlman's soloists is their apt and interesting ornamentation; these decorations become an agreeable part of the style, not an overlay we'd just as soon do without.

Hickox's soloists make a stronger impression than Pearlman's. Most impressive is bass-baritone Bryn Terfel, whose rich, burly timbre (so different from the light baritones we commonly hear these days) brings an authoritative quality to his solos. His breath supply during the runs in "The Trumpet Shall Sound" seems unlimited; best of all, Terfel is always an interesting singer. Tenor Philip Langridge has recorded the piece twice already, both on wonderful versions: Marriner's re-creation of the 1743 London performance (Argo 421 234-4, cassette only); and Mackerras's exciting English-language version of the Mozart orchestration (RCA 7786). Here Langridge is as fine as ever, light and honey-toned, with clean runs in a brisk "Ev'ry Valley." Mezzo Della Jones has a light, almost "pretty" voice that is wonderful in pieces like "He Shall Feed His Flock." Her passage into chest voice, though, is rough at times, and she toughens up in the low tessitura of "He Was Despised" (done quite slowly, by the way: 12:20 *vs* 8:20 for Pearlman!). Countertenor Christopher Robson does a creditable job with the castrato numbers, though his "Refiner's Fire" is unlikely to instill much fear. Finally, soprano Joan Rodgers delivers wonderful, rich tone in "I Know," as well as clean runs in "Re-

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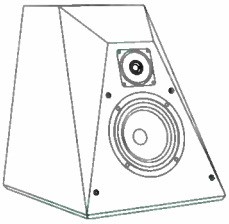

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joice." Her contribution is certainly a positive one, even if she does not erase the memories of other singers in these solos. In short, Hickox's soloists make the better team, though with the possible exception of Terfel they do not challenge the most memorable singers in *Messiah*.

Choral work on both sets is very fine, though again I would award the palm to Hickox. In Pearlman's version every chorus seems a bit faster than Hickox, and the effect is, I admit, exhilarating. And yes, I know virtuosity is an important and legitimate feature of this style. Once the admiration for the singers' agility wears off, though, you aren't left with much else. Some of the articulations call too much attention to themselves. In "Hallelujah" the separation of the final "t" in "omnipotent" from "reigneth" is perfectly in place, but why do I find myself focusing on it? Pearlman's choral work is wonderfully precise with interesting articulations, but the gravity of the text is seldom plumbed. It has the effect of light entertainment, perfectly rendered.

With Hickox the virtuoso pieces ("For Unto Us," etc.) are fast without speed ever seeming the goal, and big movements like "Hallelujah" are allowed a sense of majesty. Hickox has looked carefully at movements like "Behold, the Lamb of God," which can sound like an exercise in overdotting, and made us consider the meaning of the words. The sense of dramatic urgency, so important particularly in Part II, is aided by keeping the pauses between numbers very short. Some may feel, though, that Hickox takes his textual consciousness (or should I say his religiosity?) too far in "Worthy is the Lamb," which is more solemn than ceremonial. Like John Eliot Gardiner (Philips 411 041) and Nicholas McGegan (Harmonia Mundi 907050.52), he takes the second appearance of "Worthy" (A-major) softly, which I doubt Handel ever did in his own performances. (In Pearlman's version *neither* statement has monumentality.) Hickox's "Amen," taken much slower than Handel's "allegro" marking, confirms that he sees a devotional side to *Messiah* alongside Handel's theatricality.

Sonics are very good on both issues. Telarc (Pearlman) has a close perspective, with everything "right there." On Chandos, everybody sounds about 10′ farther away. In both recordings the chorus sounds larger than a group of 24 or 31 would in a typical concert hall. Likewise, reverberation and "space" suggest the studio, not the concert hall. Neither gives a clear sense that the chorus is placed behind the orchestra and not in the same plane. Soloists are up front on both versions, and balances are fine. Either would serve as an example of a fine studio job, though I slightly prefer Telarc's immediacy.

Of the two, then, Hickox is the one to have. Among other period-instrument versions, I would mention Trevor Pinnock's (Archiv 423 630), which is a little slower than Hickox's and has slightly preferable soloists (excepting John Tomlinson, who is no match for Bryn Terfel).

And what about the *Soulful Celebration* of *Messiah*? The impetus for this recording came from Norman Miller, who manages several gospel artists, and Gail Hamilton of Choice Management in Nashville. They sought, with the help of Mervyn Warren, to present the thematic material of *Messiah* (actually about half of it) in various idioms of Black music. The overture, subtitled "A Partial History of Black Music," contains references to African music, spirituals, ragtime, Gospel, and so forth, and the arias and choruses use Handel's melodies rearranged—rewritten, actually—as contemporary Soul music. Some touches are humorous, like the opening of "Every Valley," which is with traditional orchestra (ECO, to be exact), but breaks off after the first word into a duet for Lizz Lee and Chris Willis, with a rap section by Mike E.

While there are far too many artists to mention every one, the soloists include Dianne Reeves ("And the Glory"), Patti Austin ("But Who May Abide"), Tramaine Hawkins ("And He Shall Purify"), Howard Hewitt ("Behold, a Virgin"), Stevie Wonder ("O Thou that Tellest," with neat background from Take 6), Al Jarreau ("Why do the Nations"), and Tevin Campbell ("I Know"). Groups include the Boy's Choir of Harlem, the Richard Smallwood Singers, the Yellowjackets, the Sounds of Blackness, and the Clark Sisters. Some pieces hold fairly consistently to the originals ("But Who May Abide," "Behold a Virgin"), while others ("And He Shall Purify") lose Handel at the first turn. Each piece has its own performers, with lots of different arrangers, engineers, and recording locations. The concluding "Hallelujah," conducted by Quincy Jones, brings most of them together.

A Soulful Celebration is a wonderfully creative enterprise and extremely well carried off. I doubt many lovers of the traditional *Messiah* will get the point, or care to, and I also doubt many buyers of this CD will be encouraged to try Hickox or Pearlman. What this CD does tell me is that Handel's music need not be a museum piece—the emotions and eternal verities in *Messiah* are as important to us as to any earlier generation. And all that tends to make me impatient with scholar/musicians whose focus is on things like execution of ornaments instead of the emotional communication possible with wonderful music.—**Paul L. Althouse**

MAHLER: Symphony 1
Jean-Claude Casadesus, Orchestre National de Lille

Fall 1992

A Quarterly Update on AudioQuest

INSIDE

Audio Quest

The Low-Down

Expo 92, Seville, Spain: Yes, it was worth waiting two hours to get into the Canada pavilion here at the Worlds Fair. The reason for this most gruesome wait is simple--the word was out that the new 48 frames per second high-definition IMAX film was "something to see."

The movie screen was a staggering 19m x 26m (62 ft. x 85 ft.); the definition and detail -- the tremendous amount of information -- made a 70mm print of your favorite epic movie look like a 19" TV. All this fantastic hardware and software offered an incredible glimpse into lives and places we can't go ourselves.

The viewing experience was fantastic, it was fun. Unprecedented visual accuracy was used to inspire human emotion, and yet, for all the power and might projected by an Artic ice-breaker coming straight at you, it was not believable. No one turned and ran for fear of getting crushed. The unbelievability of the experience didn't stop the film from being a complete success. The two million people who stood in line for two hours or more enjoyed what the film did for them; there was no reason to dwell on the limitations.

"So what does this have to do with audio?"

The phenomena I have tried to describe is that accuracy is a means more than an ends. By using an extraordinary level of technical accuracy, the high-definition IMAX system enhances its ability to trigger human emotion. Its ultimate failure to truly represent reality was never an issue in the viewers mind.

Audio systems also employ varying degrees of accuracy in their attempt toallow the listener to appreciate the emotion and sensuality of music. Accuracy in an audio system is the most predictable means of executing this noble task.

Bill Low reflects on the nature of music reproduction

In some significant ways a reasonable audio system is more believable than the image on an IMAX screen, and yet such believability does not guarantee audio satisfaction. The absolute facts are that an audio system is never perfect -- enter *subjectivity* and *compromise*.

"The purpose of an audio system is ... to carry your emotions where you want to go."

"Why is everbody in audio saying something different?"

Mankind has constructed various philosophies as a means of coping with phenonmena which do not conform to physical absolutes. *Some* audio thinkers believe that audio does not require a philosophy because there is an absolute reality we are trying to reproduce. They are correct about the absolute goal, but wrong about the need for a philosophy!

Since perfection in audio does not exist there must be an audio philosophy which helps us cope with imperfection.

Audio philosophy is understanding the role of subjectivity in prioritizing imperfections, in accepting compromises wisely.

Some audio thinkers believe any opinion is as good as any other -- that it is all subjective -- they are wrong! Since there is an absolute goal of ultimate accuracy the role of subjectivity must be confined to a path (or a million lane freeway) which points toward this ultimate goal.

"So what does all this really mean?"

The purpose of an audio system is to be a vehicle to carry your emotions where you want to go--no matter what type of music you enjoy.

For the audio manufacturer, this means that scientific method must be employed in order to facilitate awareness of all possible imperfections (distortions) and to reasonably control and choose (juggle) the imperfections in order to arrive at a mixture that does the least harm. Scientific method means gathering all possible emperical data -- especially from listening!

For the audio listener, this means: don't think about the equipment, don't second guess the technology of a specific product -- just listen and judge its performance in the only way that counts -- are you having fun?

So go out and have some fun! Look for stores that listen to equipment before they buy, look for products whose existence is based on their audio qualities and not their marketing or packaging, and look for salespeople who will sit down and listen to you while they really try to help you get a handle on equipment values, and look for equipment that is a nuetral, honest vehicle for your music. Then forget the equipment and enjoy some music!

Forlane 16643 (CD only). Jean-Marc Laisne, prod.; Ivan Pastor, prod. DDD. TT: 54:12

MAHLER: Symphony 1

Claudio Abbado, Berlin Philharmonic

DG 431-769-2 (CD only). Klaus Hiemann, eng.; Christopher Adler, prod. DDD. TT: 54:43

In any *Schwann Opus* catalogue you'll find over 30 recordings of Mahler's Symphony 1, so you can see why we reviewers find most new issues a bit unnecessary. These two CDs come as a bit of a surprise, for each is distinctive even in a very crowded field.

The virtue of Casadesus's reading is that it doesn't take itself too seriously. The first movement is dreamy and breezy (though not so breezy as the 10:40 timing listed on the back cover: it's actually 15:40). The prominent woodwinds and nasal French brass fit this conception well. It figures that a French orchestra will not be at its best playing a German dance, so the *Ländler*-based II has little peasant bounce and almost no sentimentality. But the ONdeL's delicacy is consistent with Casadesus's treatment of the symphony, and also suited to Forlane's crystalline recording.

III opens with an excellent bass solo, bleak and plaintive rather than tormented. A sense of French sardonicism continues through a central section redolent more of a boulevard café than a Jewish wedding. IV begins explosively, the musicians really digging in and having a good time. Casadesus's Apollonianism resurfaces in the transparency of the string counterpoint around 15:00, with crisp rather than rounded articulation.

Despite its faults and idiosyncrasies, Casadesus's reading is rare in doing the familiar both differently and well.

An even bigger surprise is the unbuttoned performance by Abbado and the Berlin PO. The contrast from earlier BPO efforts is apparent with the opening notes—the live recorded sound, while hardly ravishing, is warm and atmospheric with a respectable soundstage, very different from the clinical sterility DG favored during the Karajan years.

Abbado's flexible, graceful tempi through the opening are also not what I would have expected from the BPO of a few years ago. II is ebullient and sweet, and III, glory be, is played with considerable schmaltz, capped with a central trio section of almost lullaby calm. (To think that I never considered the BPO to be a great Mahler orchestra!) The finale, while hardly full of hairpin turns and dynamics *à la* Bernstein or Scherchen, is quite exciting—a joyous hero shouts its conclusion, but without neurosis.

Readers ought to check this one out. It would even make a fine first recording of the symphony for a budding collection, though I recommend Litton on Virgin Classics even more highly.

—Kevin Conklin

MOZART: *Don Giovanni*

Renato Bruson, Don Giovanni; Sona Ghazarian, Donna Anna; Gertrud Ottenthal, Donna Elvira; Nicola Ghiuselev, Leporello; Giuseppe Sabbatini, Don Ottavio; Patrizia Pace, Zerlina; Stefano Rinaldi-Miliani, Masetto; Franco de Grandis, Commendatore; Köln Radio Orchestra & Chorus, Neeme Järvi

Chandos CHAN 8920/22 (3 CDs only). Michael Horwath, Heiner Müller-Adolphi, prods. DDD. TT: 3:00:58

I can't imagine why anyone other than members of the cast and their relatives would want to own this particular *Don Giovanni*, especially given the fact that there are, by my count, 26 other available recordings, some quite wonderful. For that matter, I can't imagine why Chandos chose to record it, although Bruson and Järvi are important artists. There's nothing new to be heard here, the drama never really comes to life, and one gets the feeling of the provinces—more specifically, a recording studio in the provinces.

I'm not saying that listening to this is the aural equivalent of rubbernecking—it isn't actually bad. In fact, all of the singers are good singers, and Järvi is a fine conductor. But he's way off base in Leporello's opening moments—it's terrifyingly bad, with galumphing rhythms and singing and every word underlined like a mime show. It takes a while to recover from the shock. Järvi picks up at the entrance of the Don and Donna Anna, albeit in a strange, stilted, cinematic way, but it doesn't sound right, and makes the listener uncomfortable. Furthermore, Mozart wouldn't have recognized the odd *accelerando*. There's clumsiness elsewhere as well, such as Donna Elvira's entrance after "La ci darem la mano," which is awkwardly late (the engineers may be equally at fault here).

There are some exciting, well-focused moments—Ghazarian's "Or sai chi l'onore" and the second-act sextet—but the recording never coheres as a performance. And Bruson, normally a smooth, classy singer, sounds awkward, old, and dumb—not a good combo for the Don. Ghiuselev is too obvious as Leporello, and Sabbatini has a tight vibrato which I don't like, though he draws a fine Ottavio. Ottenthal is okay as Elvira, but that's not enough; Pace is a very good Zerlina, and the two remaining men are good.

The recording is adequate in a big way—sort of like the orchestra. You get the point; go for Giulini or Davis. This one won't satisfy you.

—Robert Levine

RACHMANINOFF: *Symphonic Dances*, *Vocalise*

Donald Johanos, Dallas Symphony

Athena SLSW-10001 (LP). Analog Productions APCD-006 (CD). David Hancock, eng.; Thomas Mowrey, dir.;

Chad Kassem, exec. prod.; Doug Sax, mastering eng.
AAA/AAD. TT: 39:59

Donald Johanos's performances of these works are not the suavest or most lyrical I've heard, but they're certainly the best-sounding. Both were recorded at a single session in February 1967, which makes their sound all the more remarkable. Instead of the wiry edginess of most recordings made then, these have a rather soft top, suggesting that the mikes may have been ribbons or electrets, and if there were more than a single pair, there's no evidence of it. In fact, except for the extreme high end, these sound remarkably like the more successful of my own orchestral recordings. The *Symphonic Dances* have great dynamic range, but both recordings do show their age; compared with the best contemporary symphonic recordings, they're a little pinched and deficient in body, as though the 200–1000Hz range is slightly depressed, and the massed strings are almost on the edge of turning steely, although on my present system they never quite do.

The *Dances* rely heavily on the trombones, but here they're barely evident. This sounds more like the result of performance balances rather than something the mikes would do. (In fact, I've *never* heard mikes that had weak lower midrange.) A little judicious EQ could have corrected this, but Doug Sax is not the kind of engineer who would stoop to such hanky-panky. Which is why I like to keep an octave equalizer handy, ready to switch in when I suspect the benefits of improved tonality might outweigh the cost in other areas.

I'm sure there are better performances of these available, but I don't know the field well enough to name them (I'll leave that to Ms. Jahn). This remastered recording (originally released on Turnabout) will probably stand as the best-*sounding* recording of them for a while, at least, but both works are popular enough that I would not be at all surprised to see them recorded by Telarc or Reference, at which time a reassessment of this release will be in order.

Both CD and LP were, of course, mastered from the original analog tape, but even so, I was surprised at how very similar they sounded. While some of the criticisms of CD (ambience, low-level detail) have been valid, the claim that LPs sound rich and smooth while CDs sound brash and harsh jes' ain't true. If you choose a phono front end that makes LPs sound like open-reel tapes, rather than one that just offsets your loudspeaker colorations, parallel CDs and LPs can sound much more alike than you may have imagined possible.

Both versions have the same playing time, but a 40-minute CD seems somehow a bit skimpy in these days of the routine 70-minute disc. **—J. Gordon Holt**

STRAUSS: Suites from *Der Rosenkavalier* & *Die Frau ohne Schatten*, *Burleske* for piano & orchestra
Carol Rosenberger, piano; Gerard Schwarz, Seattle Symphony
Delos DE 3109 (CD only). John Eargle, eng.; Adam Stern, prod. DDD. TT: 67:40

STRAUSS: *Ein Heldenleben*, *Macbeth*, Serenade in E-flat
Gerard Schwarz, Seattle Symphony
Delos DE 3094 (CD only). John Eargle, Andrew Dawson, engs.; Adam Stern, prod. DDD. TT: 73:20

STRAUSS: *Don Quixote*, *Till Eulenspiegel*
János Starker, cello; Leonard Slatkin, Bavarian Radio Symphony Orchestra
RCA 09026-60561-2 (CD only). Peter Jutte, eng.; Wolfram Graul, prod. DDD. TT: 55:56

The continuing partnership of Schwarz and Delos in Strauss recordings is going from strength to strength. Sonically, both discs are excellent; detail and focus are spot on, the acoustic of the Seattle Opera House having been extremely well handled. I very much like Schwarz and the Seattle's laid-back but stylish approach to the *Rosenkavalier* Waltzes; nothing is hurried or over-characterized, and while the Waltzes work well enough as a Suite, here they never lose their identity as part of the opera's larger scheme.

This also applies to the symphonic fantasy from *Die Frau ohne Schatten*, although the piece is a very free reworking of some of the operatic themes, often with their keys revamped. However, it, like the opera, is driven by a similarly compulsive dramatic tension that shapes the work.

The early *Burleske* for piano and orchestra—written when Strauss was only 21—may seem a strange bedfellow here, but it works very well, dispelling the absurd machinations of operatic plot with its lively wit and vitality. Carol Rosenberger does it great justice, playing with a panache relevant to the easy confidence of this youthful work. An excellent disc, if you're looking for this combination.

Schwarz's *Heldenleben* is fabulous, a real force to be reckoned with, and easily meeting the fierce competition in the bulging catalog headon. It's rhythmically exciting, lyrically sensuous, and sensitively paced. The final climactic chord is an apt summation, both of the work as a whole and of the quality of performance that has preceded it. Coupled with the early and less substantial tone poem *Macbeth*, which is nonetheless given an outstandingly endearing performance of equal commitment and momentum, and the even earlier, idyllic *Serenade* for 13 wind instruments in a gently bucolic performance, this again is a disc of great value.

I was less taken with Slatkin/Starker's *Don Quixote* with the Bavarian RSO, although every aspect of its presentation bespeaks reams of care and consideration. Here is a typically smooth, sophisticated performance from conductor and

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orchestra, but that, for me, is its failing. This Quixote is tired and sleepy, not quixotic in an extravert sense; he is a character to be pitied here, one at the nadir of existence whose pride must be seriously wounded by others watching his feeble efforts. I was frankly bored, and although the virtuosity of *Till Eulenspiegel* is to be admired, it still did not involve me.

—Barbara Jahn

Classical Collections

Return of Son of Dorian

HANDEL: Italian Cantatas
TELEMANN: Trio in F
VIVALDI: Cantata "All'ombra di sospetto"
Julianne Baird, soprano; Philomel Baroque Orchestra
Dorian DOR-90147 (CD only). Randall Fostvedt, prod.; Craig D. Dory, *et al*, engs. DDD. TT: 54:39

THE BALTIMORE CONSORT: *Watkins Ale*
Music of the English Renaissance
Dorian DOR-90142 (CD only). Douglas Brown, prod.; Craig D. Dory, *et al*, engs. DDD. TT: 67:38

DOWLAND: Works for Lute
Ronn McFarlane, lute
Dorian DOR-90148 (CD only). Douglas Brown, prod.; Douglas Brown, Brian C. Peters, engs. DDD. TT: 66:50

POMERIUM MUSICES: *The Wannerist Revolution*
Pomerium Musices; Alexander Blachly, dir.
Dorian DOR-90154 (CD only). David H. Walters, prod.; Craig D. Dory, *et al*, engs. DDD. TT: 63:07

JULIANNE BAIRD: *English Mad Songs and Ayres*
Julianne Baird, soprano; Colin Tilney, harpsichord; Alison Mackay, viola da gamba
Dorian DOR-90105 (CD only). Pierre Lacasse, prod.; Craig D. Dory, eng. DDD. TT: 51:13

You know, they can't even keep up with early music releases over at *Fanfare*? With hundreds more pages of record reviews than *Stereophile*, of course, they do a fine job, but they do fall behind. It's the fault of all these little labels, people with names like Marco Polo and Nuova Era and Erato and Sony (whoops, Sony *Vivarte*), who are really dedicated to all this old stuff. Here are five excellent examples from the good folks up in Troy,[1] NY.

The first disc features Philadelphia's best-known Baroque ensemble, Philomel, whose small size works well for these intimately scaled pieces. Julianne Baird sounds wonderful as usual, with beautiful tone throughout her range. I think she sounds better live in a smaller hall, but the recorded balance here is very good. Philomel's co-founder Elissa Berardi contributes some superb flute and recorder playing throughout the disc, especially on *Nell dolce dell'oblio*, which displays a lovely contrast between the voice and the recorder. Baird's handling of recitative, as in the melancholy and affecting *Alpestre monte*, is uniformly fine, and her singing is amply supported by Philomel's delicate sonorities. There is strong competition from Emma Kirkby and the AAM under Hogwood (L'Oiseau-Lyre 414 473-2), but I think I prefer the smaller scale of Baird's performance. Kirkby is the more forceful of the two ladies, but Baird appears to have more shades of *piano*, if you will, and both sopranos ornament gorgeously. Dorian's sound is far more transparent than the older London/Decca.

Going back two centuries or so, we find the Baltimore Consort once more exploring the territory between "folk" and "art" musics with a collection of English Renaissance works, the result being both lively and provocative. We are given a number of country dance tunes, well-played with a strong sense of rhythm. In the vocal works, soprano Custer LaRue sings very beautifully, if perhaps with a touch of affectation. (She has a lot of good clean fun with the title track, one of the best-known bits of Elizabethan bawdry.) I've been listening to a lot of versions of "The Three Ravens" (aka "The Twa Corbies") lately, and LaRue can be proud of hers even if no one yet matches Glenda Simpson. The Balts' arrangement of this workhorse is very interesting in itself, with its initial plucked viols.

The Consort even plays some Dowland here (the most serious of the works performed), making it sound as if it were written for "broken" consort. There is particular attention paid throughout this disc to the all-important issue of ornament in Renaissance music. It should be noted that even dancers in the 16th century were expected to "ornament" the basic steps of a pavane. I also enjoyed the folky sound of the bandora, which appears quite often on this CD—the opening of track 13 could be Leo Kottke. From everything I hear, the Baltimore Consort is helping to build a new audience for Renaissance music. Good for them!

Reflecting the Baltimore Consort's interest in the English Renaissance, we have a disc by member Ronn McFarlane playing works of that seminal English lutenist-composer John Dowland. This would make an excellent introduction for those unfamiliar with Dowland (if anyone fits that category these days). McFarlane plays with the same sensitivity and style he displayed on his disc of Scottish lute works (see Vol.14 No.2, p.199), with his by-now-expected tasteful and flowing ornamentation. McFarlane is certainly one of the finest of the new generation of lutenists, as virtuosic as any, but never losing the underlying musical thread. Even if there are too many Dowland records out there at the moment (can there be?), this one is highly recommended. Besides, I somehow seem to have missed hearing Dowland's arrangement

1 The story I heard is that some classicist got to name all the stops on the NY Central rail line.

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of "Fortune my foe," beautifully played here, and McFarlane renders "Tarletone's Rissurection," that ultimate (for me) test of lute technique, perfectly.

The Pomerium Musices disc features some beautiful singing by a group I had not yet heard, although they are alleged to have recorded for Nonesuch. Their disc of late-16th-century sacred and secular works is dominated by Gesualdo da Venosa, as any exploration of Wannerist style must be. I prefer the works of the late 15th and early 16th centuries, but there's no question that Wannerism, with its association of eroticism and chromaticism, is one of the more fascinating -isms. If you absolutely detest dissonance, of course, this is not for you, but if you're unafraid of 20th-century music, then this ought not to scare you either. The Pomerium Musices lacks the personal intimacy with Gesualdo that the Hilliard Ensemble seems to have, but I find their use of female voices very effective.

Last is another Julianne Baird disc, a rerelease (I think) of one of her earliest Dorian projects. I liked this a lot on first hearing (at Chestnut Hill Audio, on Merlin 4B-pluses driven by ARC electronics), but on more critical listening I find it something of a mixed bag. Baird's decision to employ a "cockney" accent[2] on "Bess of Bedlam" is unfortunate, to say the least. Kirkby on London/Decca blows this version away. Otherwise, there is the usual delight to be found in Baird's ornamentation, if she does lack some of the fire she brings to later Dorian issues. Her rendition of John Blow's "Lysander I pursue" is superb, and makes the disc worth owning, but I'd definitely go for the Handel if I were on a budget. This CD is also transferred at a much lower level than the others—I needed to switch in my line amp.

What can I say? Another bunch of winners from Troy. We are definitely living in a target-rich environment for early-music lovers.

—Les Berkley

PORTRAIT OF FRANCE

Saint-Saëns: *Danse Macabre*; **Pierne**: *March of the Little Soldiers*; **Gounod**: *Faust* Ballet Music, *Funeral March of a Marionette*; **Ravel**: *Bolero, La Valse*; **Debussy**: *En Bateau, Prelude to the Afternoon of a Faun*; **Offenbach**: Overture to *Orpheus in the Underworld*

René Leibowitz, Orchestre de la Society des Concerts du Paris, London Concert Orchestra (*Faun*)

Chesky CD57 (CD only). Keith Wilkinson, eng.; Charles Gerhardt, prod. ADD. TT: 71:43

These are uninspired but satisfying performances of some Gallic warhorses, characterized by competent playing (with only occasional ragged ensemble), appropriate tempos, and nice phrasing.

The 1960 recordings are good, but there's no question about them having been mastered last year; they sound dated. They have nice low-end heft and pretty good depth and breadth, dynamic range is adequately wide, and there's no evidence of multimiking hijinks (like zooming spotmikes), but the sound is slightly dry and a bit metallic.

An interesting program of justifiably popular symphonic music, but you may want to skip the *Bolero* if you've heard the damn thing as often as I have.

—J. Gordon Holt

2 On the same lines, why do Americans believe a bad stage Cockney accent imparts an archaic quality to speech? They do it at all the Renfairs, and it sounds ridiculous.

Show Music

RAGS: Studio Cast

With: members of the Original Broadway Cast; London Musicians Orchestra; Eric Stern, cond.

Music by Charles Strouse, lyrics by Stephen Schwartz

Sony SK 42657 (CD only). Keith Grant, Ben Rizzi, engs.; Robert Sher, prod. ADD. TT: 70:08

When presented on Broadway, *Rags* was touted as a sort of sequel to *Fiddler On the Roof*: the story of Jews who escaped from persecution in Russia only to find another set of problems, societal and personal, in the New World. Joseph Stein, who wrote the libretto for *Fiddler*, performed the same task for *Rags*, but *Rags* was scored by Charles Strouse and Joseph Stein rather than Jerry Bock and Sheldon Harnick. *Rags* received mixed reviews and not-too-enthusiastic audience response. It was nominated for a Tony Award as best musical, but the show had actually closed by the time of the awards ceremony.

As a recording project, *Rags* went through some trials and tribulations of its own. First of all, there was the basic question of whether the recording of a non-hit (let's not call it a flop) show would be commercially viable. Then, leading lady Teresa Stratas, acclaimed in her role, became unavailable. (Stratas is generally known as a prodigiously gifted but "difficult" artist.) Julia Migenes—who, ironically, was in the original cast of *Fiddler*—stepped in to sing the Stratas role.

With all this as the background, nothing would please me more than to be able to report that the recording of *Rags* represents triumph over adversity, with one of the best theatrical scores of the past decade. (I've read at least one review to this effect.) However, as much as I've tried to like this recording, I find it difficult to warm up to. It kept reminding me of a comment in Moss Hart's *Act One* (my favorite theatrical memoir), about an early version of what was to be his first big hit, *Once in a Lifetime*. When asked to put his finger on what was wrong with the show, Sam Harris says, "I wish, kid, that this weren't such a noisy play."

Rags is a noisy show. The contrast with *Fiddler* is startling: in *Fiddler*, a spirited number like "To Life" provides a change of pace in what is basically a lyrical score; *Rags* seems like one long "To Life." It's "nervous" music, with a hard, driving quality that is perhaps effective on stage, but makes for a tiring listening experience. Migenes doesn't help much: she seems removed from the character's feelings, and, disconcertingly, she switches between an operatic soprano and a Streisandesque pop sound. Stratas, "difficult" or not, is a singing actress in a very different league, and her participation is sorely missed. The rest of the cast is generally competent, with Judy Kuhn doing a particularly effective rendering of the title song. No complaints about recording quality.

There are few enough recordings of new musicals that I feel badly about giving one an unfavorable review. I know of many show music fans whose response to *Rags* has been much more positive than mine; I certainly encourage the reader to buy the CD (it's only money) and listen for him/herself. Just don't blame me if, while listening to *Rags*, you keep wanting to put on *Fiddler*. **—Robert Deutsch**

Jazz

DAVID LIEBMAN: ***Classic Ballads***
David Liebman, soprano sax; Vic Juris, acoustic & electric guitars; Steve Gilmore, bass
Candid CCD79512 (CD only). Kent Heckman, eng.; David Liebman, prod. DDD. TT: 53:69

Most jazz ballads unfold over the steady swish of a drummer's brushes, or the steadying sound of a hi-hat. David Liebman's trio doesn't include a drummer, and its bass player, Steve Gilmore, rarely walks in time. Liebman's ballad performances have, as a result, an oddly disembodied quality that is not displeasing: they are lyrical and searching, satisfying except in the rare moments when the trio sounds rhythmically disorganized.

In one case, "Dancing in the Dark," they're *too* organized. This Arthur Schwartz/Howard Dietz tune moves slowly to a climactic high note, Liebman playing the ballad over a Latin vamp provided by Vic Juris. For some reason, the combination of Liebman's slow ascent and Juris's stolid accompaniment is deadening: Juris's vamp seems to linger behind sullenly, pulling backward like a reluctant child on a walk.

But mostly, Liebman's trio hits the mark, having found a fresh approach to wonderful old songs. The tunes were evidently suggested by Liebman's mother-in-law Natalie. "Skylark," "My Funny Valentine," and "Stella By Starlight" are among her favorites, as well as "Out of Nowhere," "If I Should Lose You," and "Angel Eyes." Listening to *Classic Ballads*, I'm reminded of something pianist Dave McKenna told me: he plays great songs so that, even when he isn't improvising well, he's left the audience with something satisfying. Luckily, on this disc everyone improvises well: Liebman plays with a mellower tone than in his days with Miles Davis, and Juris and Gilmore solo lyrically. The recording places them closely together. The imaging is reasonably precise, except that the electric guitar is spread out. That's a typical problem with band recordings featuring electric guitars; it should discourage no one from listening to *Classic Ballads*, an often enchanting collection. **—Michael Ullman**

GLENN PHILLIPS: ***Echoes, 1975–1985***
Snow Star/ESD 80612/622 (2 CDs only). Glenn Phillips, Tad Bush, Rodney Mills, John Wood, Ovie Sparks, Jim Hicks, Rich Head, John Tyler, George Pappas, engs.; Glenn Phillips, prod. AAD? TT: 2:27:13
GLENN PHILLIPS: ***Scratched by the Rabbit***
Snow Star/ESD 80432 (CD only). George Pappas, eng.; Glenn Phillips, prod. AAD? TT: 36:36

At about the time that CDs arrived, allowing up to 70-some minutes of music, I reached a point in my life where I found less and less pop music that stood up to so much uninterrupted listening. Maybe it's me, maybe it's the music. Anyway, along came *Echoes*, a ten-year, two-CD retrospective of guitarist Glenn Phillips, and I find myself glued to the stereo for 2:27:13 with nary a twitch.

A ten-year retrospective of Glenn *who*? While most of us wonder what Madonna, Bruce, or Michael (or Nirvana, Ice-whatever, or Billy Ray whomsoever) are doing next, some artists, like Mr. Phillips, are doomed (lucky?) to release eight records in relative obscurity.

I admit my own previous knowledge of Phillips was limited to one substance-abused listening to the Hampton Grease Band's lone album, *Music to Eat*, more than 20 years ago. While I'd be lying if I said that I remember it vividly, I do recall feeling that I was hearing something not-of-its-time.

Glenn Phillips's guitar playing was not of that time, or of any other. *Echoes* gives us excerpts from his first solo album, *Lost At Sea*, that have the swing of Southern Rock (understandable —the time was 1975, the place Atlanta, Ga.), but it's Southern Rock *sans* blues. Imagine "In Memory of Elizabeth Reed" without the harmony guitars, played by Sonny Sharrock rather than Duane and Dicky.

In 1977, with Punk in full rage, Phillips released *Swim in the Wind*, with tunes like "Vanity," a track that would nestle comfortably into any 1992 Knitting Factory compilation. Also, "Sunspots," a samba with banjo and clarinet.

Phillips didn't need punk to do-it-himself; he'd already DIH two years before, self-recording and -releasing *Lost At Sea*. His intensity and rawness, going back to the Grease Band, show that he was punk when punk wasn't cool (apologies to Barbara Mandrell).

If I seem to be saying that the music of Glenn Phillips is timeless—well, I am. What's most amazing about *Echoes* is that, with all the diversity of the music and the sounds (he wrings more tones out of fewer effects than anyone this side of Jeff Beck), there's a remarkable consistency of vision. The Phillips of 1985 doesn't sound markedly different from the Phillips of 1975. Like a B.B. King or a Bill Frisell, his style and sound don't change—they just keep getting better.

In the large, well-annotated and -illustrated booklet, Phillips writes that, after his father's death, he wanted to "create music that would retain its meaning over the years, regardless of trends and fashion." *Echoes* is ample proof that he has succeeded. This is heartfelt, energetic, technically impressive music that transcends time and categories.

"Scotland," the last tune on *Echoes*, is also the first tune on *Scratched by the Rabbit*, Phillips's latest release and, to my mind, his least successful. It's not a bad record by any means: "Scotland" is a majestic dirge, Phillips's guitar recalling Adrian Belew's. But where Belew would do a letter-perfect impersonation of a bagpipe, Phillips's sound merely alludes to it, retaining its own personality. Unfortunately, it's downhill from there.

Phillips has flirted with pop structure in the past. His rhythms have been basic rock or pop, his melodies simple, even folkish. His power comes from undercutting this with the sheer rawness of his tone and the controlled dementia of his improvisations. The rawness of the recordings helped by taking the pop out of its usual slick production context. (Fans of recording-verité will love *Echoes*, recorded low-budget, live, and well.)

Scratched by the Rabbit is not a state-of-the-art '90s production by any means, and that's the problem. Aside from "Scotland," the tunes and the somewhat cleaner sound conspire to place this release somewhere in late-'70s/early-'80s pop-land. Yes, it sounds (*gasp!*) dated! True, Phillips's guitar tone and improvisations remain brilliant and unique as ever, but it's sort of like hearing Tom Waits sing your Top 40 favorites of ten years ago. Interesting concept for one or two tunes, but 36:36. . .?

What next for Phillips? Well, in my fantasy, The Red Hot Chili Peppers hire him, fire their singer, and make a record that overtakes Grape Jam or Pearl Fishers or whoever's on the charts. In the real world, since he looks more like Prof. Irwin Corey than Axl Rose, this is unlikely. Suffice it to say that, with unique instrumental voices high on the endangered species list, I won't let 20 years go by before I check out Glenn Phillips again. **—Michael Ross**

JIMMY SCOTT: *All the Way*

Jimmy Scott, vocals; Kenny Barron, piano; Ron Carter, bass; Grady Tate, drums; John Pisano, guitar; David "Fathead" Newman, sax; orchestra arranged by Johnny Mandel, Dale Oehler, & John Clayton

Sire 26955-2 (CD only). Tommy Lipuma, prod.; Al Schmitt, Dave Reitzas, engs. AAD. TT: 47:12

In the '50s, which saw the beginning of his recording career, diminutive vocalist Jimmy Scott was known as "Little Jimmy Scott." His publicity photos showed him huddled in over-sized suits, looking almost lost, but his nickname may have come as well from his high, boyish tenor.

His career has been spotty. After getting his start in the Lionel Hampton band, he made a batch of singles in 1952, and then from 1955 to 1960 recorded fairly regularly for Savoy and King. Ray Charles, a fan of Scott's, recorded him for his own Tangerine Records in 1962, but the album was withdrawn, and there was nothing until an Atlantic album in 1969. After a second Atlantic album went nowhere, Scott stopped singing.

In the '80s, he began performing again, and Scott's fans will be heartened at his recent successes. Scott has received tributes from Ray Charles and others, has appeared on television, gotten laudatory press, and has received a first-class production on *All the Way*, his comeback album.

It's a bandwagon I can't quite jump on. Scott has an unusual voice, high but not thin. He also has a bleating vibrato and a mannered delivery that strikes some listeners as particularly moving. On ballads such as "Angel Eyes," he takes impossibly slow tempos and still manages to slip behind the beat. At times I can follow him; elsewhere he sounds extravagantly affected, as in the delay before he sings the lyric "all the way." His long tones don't sound attractive to me, either, though I believe I can hear what musicians find fascinating in Scott: the way in which he rearranges the melody of "Embraceable You" or "Someone to Watch Over Me."

Scott receives excellent support from the band throughout. Ron Carter's bass is beautifully recorded, and both Kenny Barron and David Newman solo exquisitely on this album. The strings, relatively indistinct and unplaceable, sound as if overlaid on the core group. Besides that, the production is admirable. So is Jimmy Scott's fortitude. Now if I only liked his voice a bit more. . . **—Michael Ullman**

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Windham Hill Jazz 01934 19141-2 (CD only). Darol Anger, David Balakrishnan, prods.; Brian Walker, eng. DDD? TT: 51:16

TURTLE ISLAND STRING QUARTET: *On the Town*

Darol Anger, David Balakrishnan, violin; Katrina Wreede, viola; Mark Summer, cello; with the Billy Taylor Trio: Billy Taylor, piano; Victor Gaskin, string bass; Bobby Thomas, drums; plus: David Ramey, guitar; Bill Douglass, string bass; Vince Lateano, drums

Windham Hill Jazz 01934 10132-2 (CD only). Darol Anger, David Balakrishnan, TISQ, prods.; Brian Walker, eng. ADD. TT: 56:40

Composer/arranger/violinist David Balakrishnan and his Turtle Island String Quartet have impressed me a lot in the past, and *Spider Dreams* is no letdown. In his informal, engaging liner notes, Balakrishnan anticipates the categorical imperative of most record reviewers (inc. yrs. trly) by describing his compositions with such phrases as "a symphonic bluegrass funk groove" and "your everyday garden-variety jazz/Indian/bluegrass/classical mixture."

Well, ha-ha, but he's right: TISQ is creating some of the most consistently interesting, entertaining music for string quartet being performed today. Parallels with the Kronos Quartet and its many Klones are obvious but superficial. Despite Kronos's copious commissions, hipnik Lou Reed wardrobe, and forays into repertoire long considered—when considered at all—out of bounds for string quartets, they remain an interpretive group only. TISQ, on the other hand, not only compose and arrange with equal talent, but on track after track prove their ability to rare back and let fly with true improvisational swing. Compare, for example, Kronos's performance of Hendrix's "Purple Haze" with TISQ's of Robert Johnson's (and Cream's) "Crossroads" (on *Skylife*): the former is a delightful knee-slapper of a curiosity; the latter *cost* something.

Spider Dreams consists of two suites; the first is the title composition, for multiply-overdubbed "jazz string orchestra." This is a true suite, seven movements stylistically, thematically, and harmonically linked, all parts played by TISQ and guest bassist Edgar Meyer (who bows some amazingly slippery solos). The music is almost as seamless as it is unpredictable, flowing with natural logic from bluegrass to late classical to Indian to contemporary (if always tonal) conservatory styles. Though hardly as profound or pared-down as the quartets of, say, Beethoven, Bartók, Mozart, or even Reger—or, for that matter, as lush as the chamber music of Brahms or Dvorák—*Dreams* easily bears repeated listenings. Balakrishnan's refreshing lack of pretension and ready compositional wit, coupled with the panache and spirit of the TISQ itself—not to mention the individual players' polyglot improvisational styles—offer hours of unique listening pleasure.

The second suite, *The Iron Fist of Fashion*, in two movements for string quartet and big band, is quite different. In the brief introduction, the 12-piece Bay Area Jazz Composers Orchestra sounds alternately like Charlie Haden's Liberation Orchestra and the final years of Keith Jarrett's American Quintet. They lurch quickly into a modal, polyrhythmic chant punctuated by short breaks in the styles of both George Russell and the Klezmorim. Tod Dickow's tenor solos are mindful of Dewey Redman in all the best ways, and the rhythm section of Jones, Moore, and Biggs, though not very imaginative in the first movement, picks up in the second. *Iron Fist* is not as successful as *Spider Dreams*, perhaps because it tries to do too much in too short a time. Had Balakrishnan stretched out a bit, the BAJCO could have contributed more, and Balakrishnan could have sewn the seams a bit more tightly. Nevertheless, for a piece whose primary impetus was to let strings and big band play together with the former getting to play "the cool parts" for a change, it's anything but tedious, if a bit episodic; I was surprised at how quickly it was over.

As far as I can tell, the recording is DDD (Windham Hill has evidently joined the pack in no longer posting SPARS codes), and, like almost every WH recording I've ever heard, sounds as if no one there has ever heard real instruments in a real space. The booklet says "Digital assembly by David Balakrishnan and Mark Boddeker." Couldn't have said it better myself: the strings are closely miked, very dry, their tight little individual ambiences mixing like oil and water—rather, sand and clay. Not a recording for those who favor natural string tone.

1991's *On the Town*, which somehow fell through a crack in the reviewing schedule, was recorded and mixed live to analog two-track; it sounds even worse than *Spider Dreams*. Billy Taylor's piano is so tinily, toyishly tinny he should sue; sounds like the black keys are just painted on. And cellist Mark Summer has intonation problems. *That* said, however, there is some excellent music on this album of jazz standards from between the wars. TISQ seems inspired to its most inventive arranging and playing by the Gershwin, Porter, and Berlin tunes here; *On the Town* contains incredible variety, and almost unbroken delight. Throughout, and with almost sadistic glee, TISQ seems

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to relegate Taylor's normally deft rhythm section to the background usually occupied by "string arrangements." Fine by me—this one's lotsa fun.

TISQ also puts in an appearance on *The Impressionists* (Windham Hill 01934 11116-2), a brand-new sampler of high-profile WH labelmates recording their own arrangements of snippets of Fauré, Satie, Ravel, etc. TISQ performs Darol Anger's setting of Debussy's *Reverie*, and they do a perfectly acceptable job. The revelation here, however, is how producer Howard Johnston recorded them: the strings are rich, resonant, with lots of ambience, and actually sound as if they're all playing together in the same room. I'm sure this is all state-of-the-art studio trickery, mind you, but it's such an improvement over TISQ's usual dry-as-dust self-production that I sighed hugely in relief.

But that's just how the *sound* sounds; on both of the Turtle Island String Quartet albums, the *music* sounds great. Recommended. If you haven't heard *Skylife* (see Vol.14 No.1, p.277), get it first—there's a lot more there than just "Crossroads." **—Richard Lehnert**

Rock

Move over, MFSL, & let Dunhill Compact Classics take over!!

CREAM: *Wheels of Fire*
Dunhill Compact Classics GZS(2) 1020 (2 CDs). TT: 84:58
CREAM: *Fresh Cream*
Dunhill Compact Classics GZS 1022. TT: 46:37
RAY CHARLES: *Ingredients in a Recipe for Soul*
Dunhill Compact Classics GZS 1027. TT: 49:49
THE DOORS: *The Doors*
Dunhill Compact Classics GZS 1023. TT: 44:31
BOB DYLAN: *Highway 61 Revisited*
Dunhill Compact Classics GZS 1021. TT: 51:39
All above: Gold CDs only. Steve Hoffman, remastering eng. AAD.

A couple of weeks ago the phone rang and *The Absolute Sound*'s Michael Fremer came on the line.

"You know that you are scum, right? Are we clear in this?" he asked me. I assured him that I understood the situation, and that he was scum too.

"Good! Now listen, man: you have GOTTA check out these new DCC gold reissue CDs!! They're the best-sounding CDs I've ever heard!!"

"DCC? Never heard of them."

"Dunhill Compact Classics! Look, these guys are the *real thing*—give 'em a call and get their CDs, you won't *believe* it."

"OK, Michael. How're you doing otherwise? How's the new house?"

"Great—the house is *finally* coming together, listening to a lot of great music—how 'bout you?"

"Can't complain. Dara's cool, weather here's been bitchin'. Hey Michael, *thanks* for the tip on these CDs, they sound serious."

"They are, so check 'em out. I still officially loathe you, you know."

"As I you, of course."

So I called Dunhill Compact Classics, got the goods on their remastering mojo, and received the discs several days later. And let me tell you, Michael was *right*! These Dunhill discs *are* the best reissues I've ever heard, and miles ahead of the hypola CRAP that Mobile Fidelity Sound Labs has been dangling like pseudo-audiophile carrots under our noses all these years with their "24 Karat Gold UltraDiscs" that cost twice as much as regular CDs and don't sound any better.[3]

You see, Dunhill's Steve Hoffman actually remasters from the original master tapes, not third- and fourth-generation "safety" masters. And the coolest part of it all is that Steve Hoffman *isn't* an audionut, he's just a quality-minded music lover with a personal stake in producing the best- and most faithful-sounding reissues of his favorite classic albums, like *The Doors* and *Fresh Cream*.

When I spoke with Dunhill's Mike Ragogna, I got the same vibe: the folks at Dunhill Compact Classics are clearly rabid fans of classic music from the '60s and '70s, and are getting off in a major way by bringing this music back to the CD Generation with as high a quality as they can possibly muster. All it takes is one listen to any of these reissues, and you can hear the pride and care that went into every one of them.

Sonically speaking, the Dunhill discs are mind-blowingly superior to their standard counterparts; the RSO Cream CDs, in particular, are so heinous that I took 'em back the same day I bought 'em, so disgusted was I with the shoddy sound. Sony/Columbia's *Highway 61 Revisited* is no prize pig at the county fair either, sounding *much* rougher and chalkier than the original LP. Of these, only the original Elektra CD of *The Doors* comes close to giving up decent sound, but it's still a far cry from the great-sounding Dunhill reissue. I'm listening to "The End" as I two-finger this review out, and I've been slinking 'round the room with a machete 'twixt my teeth looking for a fat guy to off for the past 11:35.[4]

3 Excepting their gold Eric Clapton *Slowhand* disc, which is the only good-sounding "Original Master Recording" I've heard from MFSL.

4 I don't have an LP of the Ray Charles CD, so I can't tell you how it sounds in comparison. I *can* tell you that it sounds real good, and that if you dig Brother Ray's post-Atlantic period of ABC/Paramount supper-club swank more than I do, you'll definitely want to get this disc.

Buy the Dunhills. That's all I can say: BUY THEM. They cost $25, but you will want them if you hear them. Every one sounds so much closer to the original records than I ever thought possible, especially the Dylan disc, one of my all-time favorite albums and whose crappy Sony/Columbia CD I grudgingly bought just so I could listen to it on my CD-only bedroom system. There is just no contest between the Dunhill and the Sony: the Dunhill sounds very, very close to the original LP. The Cream and Doors discs, too, are first-class all the way, and if your old Cream records are as beat-up as mine, you'll marvel at how good these records actually sounded before you played them 200 times on that 8-gram tracking-force Garrard record changer your folks gave you when these records first came out!

Folks, this is the real deal. Forget Mobile Fidelity's unremarkable sound and puzzling taste in what records to reissue; Dunhill is everything MFSL ever promised but never delivered. I've got to tell you, after getting stung for so many years by expensive "audiophile" reissues that sounded like crap, the very knowledge of Dunhill Compact Classics and Steve Hoffman's existence makes me incalculably happy. I can't *wait* to see what they've got coming up next, and where they go from here.

Thanks, Michael! **—Corey Greenberg**

RECORDING *of the* MONTH

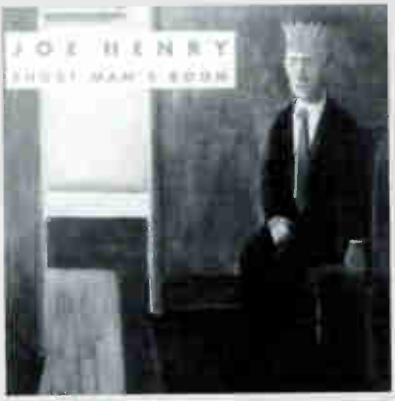
JOE HENRY: ***Short Man's Room***
with The Jayhawks
Mammoth MR0037 (CD only). Joe Henry, prod.; Brian Paulson, eng. AAD? TT: 45:51

After reading my rave review of John Wesley Harding's *Why We Fight* in the October issue, John Atkinson (The Editor, The Boss) said to me: "I guess it's the *words* that are important to you, huh?"

Well, yeah—especially when so many rock reviewers and musicians think of song lyrics as just something to hang a melodic hook on. Truly excellent lyrics are rare enough that the, ah, word needs to be spread. And when such lyrics are allied to music and singing as powerful as Joe Henry's, it's time to stop a press or two.

Like terminal raconteur T. R. Pearson (author of *A Short History of a Small Place* and many other books), Joe Henry is a born writer from North Carolina, where the oral tradition never died. I knew that the minute I read his liner note for the Jayhawks' *Hollywood Town Hall* (reviewed last month). What I didn't know until I asked Mammoth Records to send me *Short Man's Room* (which I've since found out, to my chagrin, is his *fourth* album), is that he's a born songwriter as well. And singer. And producer. There is absolutely no fat, no hype, no pretension, no bullshit on either this album or its predecessor, 1990's *Shuffletown* (A&M 75021 5315 2), which I nabbed as soon as I'd listened to *Short Man* once through. What there *is* is honesty, strength, passion, pain, integrity, hope, tough compassion, and a hell of a lot of talent.

Henry's first two albums, *Talk of Heaven* and *Murder of Crows*,[1] are now out of print. If they're anything like *Shuffletown* or *Short Man's Room*, I want 'em bad. *Short Man's Room* can be judged lacking only if directly compared with *Shuffletown*, where Henry's sharply pungent lyrics were set to unclassifiable acoustic rock/folk/jazz featuring such players as Cecil McBee, Don Cherry, and producer T Bone Burnett, all recorded



live to analog two-track—a moving, totally satisfying album any way you listen. Remember—you heard it here last.

Short Man's Room was also recorded live in the studio, to 8-track this time, with the

1 Anybody out there have copies of these they want to sell? Contact me at *Stereophile*.

THE B-52's: ***Good Stuff***
Reprise 26943-2 (CD only). Tom Durack, Ed Cherney, others, engs.; Don Was, Nile Rodgers, prods. AAD. TT: 56:09

If the summer of '77's "Last Resort Live" was the last time local fans say they saw the "real" B-52's, 1989's *Cosmic Thing* gave the world a hit single ("Love Shack") and dumped the now-aging rock lobsters into comeback city as a triumph of experience over hope.

Both that album and now *Good Stuff* were levered sonically and commercially to new levels of professionalism, thanks to an oddball production tag team combining pseudo country-boy Don Was with city sophisticate Nile Rodgers. Here, Was chose to record and mix analog all over the country, while Rodgers recorded digitally and mixed analog at two studios in New York. While Rodgers's tracks are a little different from Was's in terms of style, any differentiation due to original recording format isn't noticeable on a home system. On the other hand, now and then the vocal work sounds left of center, in either a mixing or a miking problem, and Fred Schneider, studying, it says here, with C. Crudnutt's Opera Club for Men, loses breath control. His voice breaks too, noticeably on "Vision of a Kiss." If the decision was to keep the glitches to keep the feel, keep showing up for class, Fred.

Jayhawks as house band. *SMR* alternates a tough, gritty, on-the-road feel with a more countrified, acoustic string-band atmosphere—both very different from *Shuffletown*'s dark, introspective, jazz-tinged intimacy. The songs themselves are less freely structured, hewing more closely to the classic rock structures of albums like, well, *Hollywood Town Hall*, with ample breathing space for acoustic country and bluegrass breaks. The recording itself, though straightforward and as honestly direct as only live-in-the-studio can be—yes, there is *air* here—lacks *Shuffletown*'s awesome immediacy by only a hair.

But there's no diminution at all of the artless, emotionally direct power of Henry's singing, reminiscent of Bob Dylan somewhere between *John Wesley Harding*, *New Morning*, and *Planet Waves*, with completely digested bits of Mark Knopfler (on "Sault Sainte Marie"), Richard Fariña, John Hiatt (on "Last One Out"), Neil Young, even Paul Simon (on "Best to Believe"). Nor are *SMR*'s lyrics any less striking; some of them can almost stand alone as—dare I say it?—*actual writing*.

There are enough good lines and verses on *Short Man's Room* to keep me humming and quoting for months; try these few on for size, and don't be worried by the metrical looseness; Henry's learned enough about phrasing from Dylan and others to make his lean and hungry blank verse sound as natural as speech.

From "Good Fortune," an uptempo song about the aching, bracing sadness—half regret, half the relief of escape—that accompanies a clean break with a lover: *I climb up on the side / of the engine where I ride / it's warmer than the cars that lay behind. / I shake my collar free / And I hold myself against my knee / and I pray tonight's the peaceful, dreamless kind. // This is my good fortune now at last / This is all I never knew to ask of you / To leave me with no love I might return.*

From "Reckless Child": *If I never hear another word from you / I'll remember that too as something you once said.* From "Stations," which starts out apocalyptically, only to fade like a lost radio signal: *Bring me the head of John the Baptist / Show it round and shine / his cloudy, marble, crossed and final eyes / once more into mine.*

From the nearly acoustic "Best to Believe," backed by Mike Russell's lonesome fiddle: *I find a letter I'd once written / half buried in her drawer / and I wonder how I've come to know / so much less than I knew before.* Or from "Diving Bell," a pair of lines that mean something different to me each time I hear them: *I guess I thought that all I gave to you / was somehow mine to keep.*

Most powerful are the title song and "One Shoe On," which closes the album with the tale of a grateful death: *I was just thinking about old Lost John / how those who dream aloud so often disappear.* "Short Man's Room" is a chiaroscuro waltz and a character sketch of astonishing concision: *I once thought that I'd live forever / I pitched for the Indian Leagues / But now I guess I've learned some better / You're only as good as your needs // The better you watch your head / a guy like you / You're not near as tall as you're thinkin' / But then this is a short man's room.* A simple story of a complex man . . . or vice versa. Can't get it out of my head.

Joe Henry is a very old young man you should spend some time getting to know. His songs of love and parting, short in time but long in haunt, will expand your idea of what's possible in a four-minute country-rock tune. They also might expand your idea of what's possible in a human being.

—Richard Lehnert

Let's hope, too, the skips and scratches at the end of the final track are just Don's little joke. On balance, however, if sonic fireworks are what you're after, *Good Stuff* is just great: vocal separation, use of effects, layering in of cast-of-thousands overdubs, and purity of sound, for instances, are all remarkable.

On the other hand, following the loss of founder-member Ricky Wilson, who died in 1985, and the current exit of his sister Cindy—rendering the gang essentially a trio with one good voice—the group's polished new approach throws their insistence on mining a goofy vision of the absurd into painfully stark relief. In the new '90s, any reverence for kitsch, no matter how it's dressed in thrift-shop clothes and highly correct cause-related commitment ('60s, anyone?), is essentially passé. No one's knocking the manatees, but no one's waiting either for a high-gloss approach to subjects like hot pants and UFOs. (Still, "Is That You, Mo-Dean," the group's sweetly stupid take on *Alien Nation*, along with "The World's Green Laughter," an instrumental for voice, Synclavier, and birdsong, is one of the recording's most original and most mo'-fun tracks.) Nevertheless, sensual gliss isn't love, and the laughter's wearing thin.

—Beth Jacques

INDIGO GIRLS: *Rites of Passage*
Epic EK 48865 (CD only). Pat McCarthy, eng.; Peter Collins, prod. AAD. TT: 56:03
THE ROCHES: *A Dove*
MCA MCAD 10601 (CD only). Dominick Maita, eng.; Stewart Lerman, prod. AAD. TT: 44:38

Take the proverbial half-empty glass of water, and put it in front of the Girls Indigo or the Sisters Roche. From either of the Dark Blue Females you might elicit this kind of reaction: "This whole logocentric litmus test thing, it really bums me out. Maybe if I, like, dumped the water out and smashed the glass against the table, I could like slash my wrists, you know? Now wouldn't that be such a *statement*." From Maggie Roche: "Betcha could fit a goldfish in there." Or sister Suzzy: "Fugeddabowdit. Where's the Kool Aid? I'm thirsty."

Sure they both harmonize, and sure they both make Metallica fans cringe, but, surfaces aside, these two all-female squads are as different as day and night. An album like *Rites of Passage* is the result of tossing too many copies of Sylvia Plath in the pile of fifth-grade R.I.F. books. Maybe we can forgive writing a song about Nashville without mentioning the Grand Ol' Opry, but they get no slack for a song about Virginia Woolf with stuff like this: "The place where you hold me is dark in a pocket of truth." Say what? Still, there's nothing wrong with the Indigos that a few down and dirty lessons from Suzanne Vega wouldn't cure. This could almost be funny in a *Plan 9 From Outer Space* kind of way, except for my worry—are you listening, Tipper Gore?—that impressionable young girls might be listening to this dreck. Invest in the youth of America: buy your niece a Sister Souljah record. Please.

Will the Indigo Girls turn into the Roches when they grow up? Not a chance. Maggie, Terre, and Suzzy have been dancing that fine and funky line between subtlety and obscurity ever since their Peter Fripp–produced debut a decade and a half ago. Like their Canadian contemporaries the McGarrigles, they show that you can write about this oh-so-serious human condition without recording an album of *Music to Off Yourself By*. A line like "I wanted to take your face in my hands / And kiss you on the mouth at the funeral" has more TRUTH WITH A CAPITAL T than all 56 minutes of *Rites of Passage*. And over and over, this music just makes me smile.

In the spirit of Holt's First Law of Consumer Protection, I must warn you that *Rites of Passage* sounds a lot better than *A Dove*. It has that nice "big acoustic" sound with slightly punched-up guitars and better-than-real vocals; it's not quite as good as something like *Tracy Chapman*, but it's in that ballpark. The Roches disc is, frankly, a mess: compressed, a little edgy, unfocused soundstage—not enough to drive you screaming from the room, but hardly a joy to listen to. But unless you're planning an audiophile party with a Jonestown theme, do yourself a favor and stick to the seriously funny Sisters Roche.

—Allen St. John

JEFF KATZ

prince and the new power generation

PRINCE: ☥
Paisley Park 45037-2 (CD only). Prince & The New Power Generation, prods.; at least 15 engs. AAD. TT: 74:56

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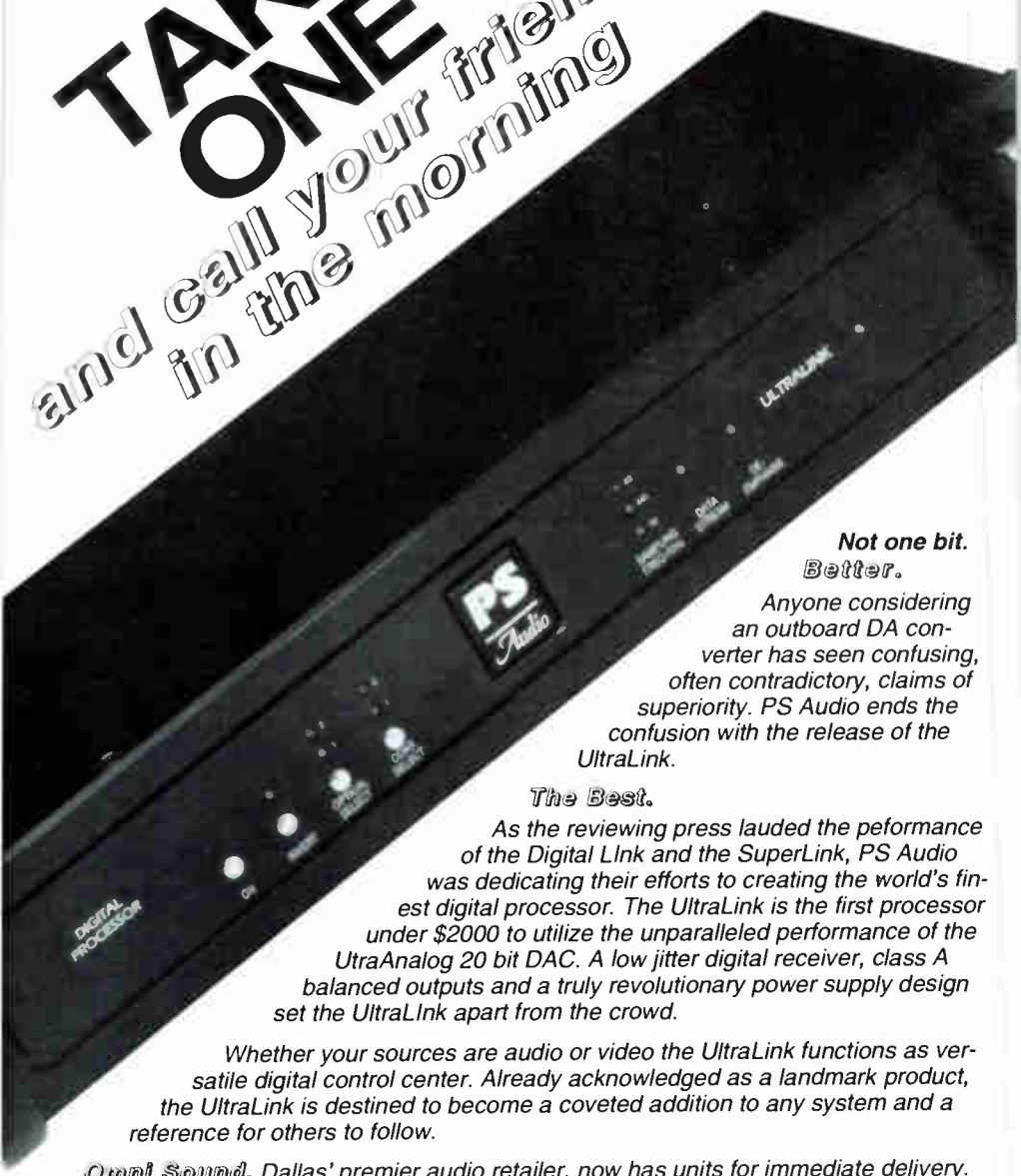

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The Man from Minneapolis comes out swinging this time. The decision to open up with "My Name is Prince' and "Sexy M.F." back to back shows a Prince in sync with his funk roots as a point of reference rather than just another style in his extensive catalog of pop sensibilities. Yes, it's all here: loopy rockers, fluffy pop, sensuous ballads, and indescribable hybrids of everything all thrown in together. Never has Prince bested the post-JB, funk-groove *swing* of "Sexy M.F." He's also achieved a convincing blend of rap and funk that has rarely, if ever, been done this well. But most impressive about this album, compositions aside, are the horn arrangements and vocals. If you doubt Prince's skills as a crooning soul singer, check out the wounded intensity of the jazzy, floating "Damn U." The O-Jays couldn't do it any better than this.

Regardless of their overall impact, Prince's albums have always had variety. This one is no different. Joyous slices of pop optimism like "Love 2 the 9's" and "Blue Light" are offset by the moody, introspective beauty of "Sweet Baby." Then, of course, there's the spiritual, albeit slightly skewed, stance of "And God Created Woman," "7," and "3 Chains of Gold." Prince *is* the dancemeister, however. The heart of this disc consists of the two opening cuts plus "The Max," "The Continental," and "The Flow." The whole thing is tied together by segues that present an oblique story line, occasionally involving Kirstie Alley as a reporter and Prince's latest femme protégé, Mayte. No matter—as on any Prince record, it's the grooves that beckon.

This disc advances beyond last year's *Diamonds and Pearls* in its more intuitive, more polished blend of hip-hop, funk, and rock. Realizing that any Prince release provides only a small glimpse of the total amount of his available recorded material, one can only speculate what languishes in his vaults. What he chooses to release is usually a dead-on depiction of the enigmatic artist in transition; Prince always seems to be caught evolving from one phase to the next. As long as he keeps reinventing himself, he's unlikely to lose his edge. While revealing no startling new directions, the new album does demonstrate the continuing refinement of one of pop music's most creative and original visions. Oh, and one other thing: it's funkier 'n a sack o'granddaddies.—**Carl Baugher**

FRANK ZAPPA: ***Beat The Boots! #2***

Includes: *At The Circus, Conceptual Continuity, Disconnected Synapses, Electric Aunt Jemima, Our Man in Nirvana, Swiss Cheese/Fire!, Tengo Na Minchia Tanta*

Foo-Eee/Rhino RI 70372 (11 LPs), R2 70372 (8 CDs). Frank Zappa, prod.; John Polito, eng. AAA/AAD. TT: 6:56:23

Beat The Boots, Box 2 is even more interesting than *Box 1* (see Vol.14 No.11, p.240); in addition to their musical value, some of these things actually sound *good*. (As does a very limited pressing of 11-LP boxed sets.) The 7-title, 8-CD set (*Swiss Cheese/Fire!* is a double) comes packaged with a beret, a pin, and a scrapbook commemorating FZ's unique career and life. . . But you FZ maniacs already know all of this.

Disconnected Synapses, from Paris 1970, features an early configuration of the Flo & Eddie band, this one with Jeff Simmons on bass and vocals and violinist Jean-Luc Ponty sitting in. I've always liked the alternate arrangement of "Who Are the Brain Police?" from this period (the Mothers performed it on the "Dick Cavett Show" in the early '70s); it's great to have this energetic recording, especially since Zappa has yet to release an authorized one. The sound quality is quite listenable, with vocal detail and reasonable bass response, although it's still bootlike. The 30-minute "King Kong" has a fine violin solo from Ponty and overall ensemble sharpness despite its length. *Synapses* adds significant meat to the recorded canon of this particular Zappa ensemble.

The same lineup, *sans* Ponty, is heard on *Tengo Na Minchia Tanta*, from NYC's Fillmore East, *ca* early 1971, with sound almost up to the quality of authorized recordings from this period. This was no audience recording, but a good stereo dub; sounds like someone had access to the board. A marvelous FZ guitar solo, full of twists, turns, and melodic fire, illuminates "A Pound for a Brown," and Volman/Kaylan (Flo & Eddie) are on the money throughout. A jaunty, instrumental "Sleeping in a Jar" and a vocal version of "Holiday in Berlin" are among the highlights. This CD would have been cause for real celebration had it been released at the time; 20 years later, it's a revelation.

Fueled by Art Tripp's relentless timpani, *Electric Aunt Jemima* is a slice of vintage early Mothers captured live in 1968 at Denver's Family Dog. Here again, Zappa's untiring resourcefulness at overcoming instrumental inadequacies often amazes—witness the masterfully seamless segue that turns "Little House I Used to Live In," "Dog Breath," and "Hungry Freaks, Daddy" into one logically coherent musical performance. FZ's wah-wah pedal was the order of the day in 1968; his guitar provides most of the direction and solos (listen to the way he cues the band at the end of "Little House"). Bunk and Motorhead were raucous and earthy, and the rhythm section of Estrada/Black was, if nothing else, steady. Yes, this group sounds sloppy compared to the technical precision of the later ensembles, and eons behind the crack '88 band, but, first and foremost, the original M.O.I. had personality. Sound quality is muddy and distant.

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At the Circus is a combination of 1970 and 1978 performances from the Circus Krone in Munich, Germany. The 1978 tracks consist mostly of brisk, late-'70s repertoire ("Baby Snakes," "Dancing Fool," "Bobby Brown," etc.). With the exception of a lusty 1970 Jeff Simmons vocal on "Wino Man," complete with a "Bringing In the Sheaves" intro, *Circus* offers the least of the eight discs. Still, it's hard to ignore that wonderful Zappa guitar solo on "Why Does It Hurt When I Pee?," even if it is cut off prematurely. The pinched, distorted sound is the least listenable of the set. (*Circus*, *Nirvana*, and *Conceptual Continuity* are the only titles in Box 2 to have been mastered from bootleg LPs. The rest come from bootleg CDs. Ah, progress.)

The fire that ended the famous Montreux concert of December 4, 1971 and destroyed all of the Mothers' equipment was later commemorated in Deep Purple's "Smoke on the Water." *Swiss Cheese/Fire!*, a double CD of that concert, ends with Howard Kaylan yelling, "Fire! Arthur Brown in person!" It was a funny ad-lib, but the circumstances were anything but as Zappa stiltedly, almost mechanically enjoins the audience to calmly head for the exits. This is the later version of the Flo & Eddie revue band, with Jim Pons and Don Preston replacing Jeff Simmons and George Duke. The material is a mix of *200 Motels* and *Just Another Band*, with excellent renditions of "Peaches en Regalia," "Cruisin' for Burgers," and the ubiquitous "King Kong." The band is in seemingly good humor, despite an occasionally caustic Kaylan. The long intro that precedes "Peaches" is deliberate and evolutionary, with FZ's wah-wah once again in the lead. The band turns in a polished set, very similar to *Just Another Band* in both style and pace. The original version of "Stick It Out" can be heard on disc 2 during the "Sofa" suite, some eight years before it was to appear on *Joe's Garage*. Sound is not on a par with *Tengo*, but it's quite acceptable for an audience boot. The cover photo is one of the more amusing Zappa poses, right up there with the legendary Phi Zappa Krappa poster.

"The String Quartet" was the original title of a suite from the *Uncle Meat* era which included "A Pound for a Brown on the Bus" and "Sleeping in a Jar." *Our Man from Nirvana* includes a live version that is precise and lively, despite Ian Underwood's absence from the November '68 concert in Fullerton, CA. Bunk, Buzz, and Motorhead earn their money here negotiating FZ's tricky horn lines. Sharp-eared fans will recognize the music more commonly known as "Get a Little" from *Weasels Ripped My Flesh*, which occurs in the second half of "String Quartet." Interestingly, "Get a Little" features a rare Lowell George guitar solo, as does "King Kong." Non-FZ guitar solos are rare as hen's teeth in Zappa's earlier music, so these are noteworthy, besides being musically well-organized and quite different from Zappa's own brand of guitarism. There's the usual assortment of Zappa wah-wah, surprising transitions, smart stage banter, and the added appeal of two acappella performances by special guest Wild Man Fischer. It all ends with "King Kong," this version very similar to the well-known *Uncle Meat* recording.

Conceptual Continuity, an audience recording from a November '77 Detroit concert, features a stripped-down band comprising Terry Bozzio, Eddie Jobson, Patrick O'Hearn, and Ray White. The opening medley of "Stinkfoot/Dirty Love/Wind Up Workin' in a Gas Station" gets underway with a pissed-off Zappa chastising an enterprising T-shirt vendor for peddling his wares in front of the stage during the concert. The poodle story that segues into "Dirty Love" is a classic, and the band is, to absolutely no one's surprise, tight and confident. Zappa's guitar playing from this period is often thrilling. A quiet, almost reflective "Torture Never Stops" slowly builds in intensity before launching into a "City of Tiny Lights" notable for its relaxed tempo and guitar work that occasionally suggests Wes Montgomery, a seldom mentioned but important influence on FZ's guitar style. *Continuity* contains the finest guitar playing of the set.

Though rich in startling and original Zappa tidbits spanning two and a half decades, the *Beat the Boots* series comprises specialty material aimed at fanatics who already possess full racks of the official catalog. Though often fascinating, and certainly filling in discographical holes otherwise undocumented in Zappa's extensive recording/performing career, these unedited sets often ramble, are at best haphazardly engineered, and only occasionally approach the thematic tautness of Zappa's official releases. Listeners approaching FZ's work for the first time would be making a real mistake by starting here. For the rest of us, however, *Beat the Boots! #2* is a joy.

—Carl Baugher

OUTTAKES

TERRY REID: *The Driver*

Warner Bros. 26912-2 (CD only). Various engs.; Trevor Horn, Gerard McMahon, Terry Reid, prods. AAD. TT: 45:20

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perfect pitch, and perfect control—Terry Reid's returned to studios in London and LA, only to find his material (a mix of originals and covers) has let him down.

So has popster producer Trevor "Video Killed the Radio Star" Horn, who, along with composing and performing guests like Stewart Copeland, Hans Zimmer, Howard Jones, and Reid himself, all seem to have divined that their personal futures lie in writing soundtracks (the title track was originally written for Tom Cruise's *Days of Thunder*). Want an unfair comparison? The Irish kid belting soul in Alan Parker's *The Commitments*. *He*'s hungry. Reid's amusing himself. Best tracks: "If You Let Her," Steve Winwood's "Gimme Some Loving." Reid used to be great. *Seed of Memory*, *Rogue Waves*, and, especially, *River*, all from the '70s, all out of print, show why. **—Beth Jacques**

THE RESIDENTS: ***Freak Show***
ESD 80602 (CD only). Cryptic Corporation, prod. DDD.
TT: 44:55

After hearing this concept release from the big-eyeball collective, a collaboration between The Residents and David Lynch during his *Eraserhead* period seems like a match made in—well, not Heaven. Maybe Limbo.

The cynical tone and perverse, unvarying, voyeuristic lyrical content would make any good Catholic shuffle off to confession in search of interminable penance for merely belonging to a culture which sanctions the exhibition of such peculiarities for profit. I could imagine a similar result if Devo's Mark Mothersbaugh, on a bad hallucinogen, were to loosely interpret Kurt Weill. The slightly twisted synthesized calliope melodies and monotonous cadences effectively create a somberly disturbing atmosphere for these character sketches as each "freak" is introduced.

It has a certain aural presence, and there's message here, but *Freak Show* is not a disc to put on for dinner guests. The closing track says it all: "Nobody Laughs When They Leave."

—Mark Duran

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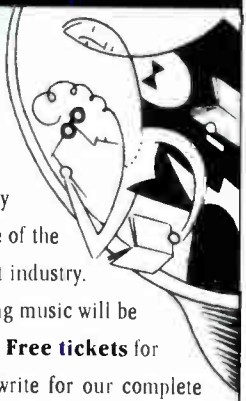

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VOLUME XV

Volume XV of *Stereophile* was published in 1992, with Volume XIV covering 1991; XIII, 1990; XII, 1989; XI, 1988; X, 1987; IX, 1986; VIII, 1985; VII, 1984; VI, 1983; V, 1982; IV, 1977-81; III, 1971-1977; II, 1967-71; and I, 1962-67. All issues listed other than Vols.I & II are available from our back-issue department; if out of print, they can be supplied in Xerox form except for Vol.9 No.7 (which is available as a black-and-white reprint), Vol.10 No.3, and Vol.12 No.10. See the advertisement in this issue for details.

ARTICLES & OTHERWISE

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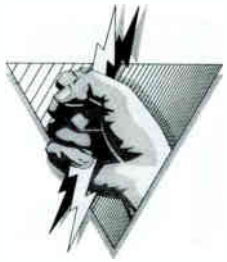

MANUFACTURERS' COMMENTS

MUSEATEX ON JITTER

Editor:

We concur with you that LIM™ would become an important design tool for the next generation of digital recording and playback equipment. As we are not in the test-instrumentation business, we are discussing the licensing of the LIM analyzer principle to an established third-party test instrument manufacturer. This would enable all designers and manufacturers to use this measurement technique without any political concerns.

Until we conclude our licensing arrangement, we will sell LIM™ detectors directly to anyone interested. The price is $2000 US; orders can be placed directly with us. This is not a consumer product, and as such will not be available through dealers.

We believe that once the jitter problem is identified, isolated, and measured, there will be many innovative solutions for the correction of digital jitter. I am sure that as a manufacturer we will benefit from many of the upcoming innovations in this area.

ED MEITNER
Museatex Audio

AUDIO ALCHEMY ON JITTER

Editor:

We wish to express our thanks to Robert Harley and *Stereophile* for "breaking the news" on our Digital Transmission Interface (better known as DTI).

Audio Alchemy, Inc. began its work on the sources (and cures) of data-stream jitter and their audible effects better than 14 months ago. It became clear to us that, to get the very best results with today's digital playback technology, we had to find a way to minimize time-domain errors.

To that end we have introduced DTI. . . our answer to minimizing the above-mentioned errors. Our design and production engineers were given the task of bringing about a product that not only addressed these issues, but, as well, could fit the (Alchemy) mold of an *affordable* digital solution.

By the time this is read, we will have better than 3500 of these DTIs already in service. Never in my history (22 years as of October '92) have I seen such a universally accepted product. It seems to have transcended all of the traditional lines of product selection based on price or name. We see this product in use with extraordinarily expensive ancillary components as well as more mid-priced offerings. Truly a unique situation. *All* digital playback systems seem to improve with the addition of the DTI.

It should be mentioned that we appreciate the obvious time and effort put into this dissertation by Robert Harley, and we must also be mindful of the significant contribution made by the folks at Meitner. The LIM Detector opens the door for tremendous advancement in the art of digital playback technology. Hats off to you both.

All of us at Audio Alchemy, Inc. wish to thank you once again. We look forward to the full review of our DTI, as well as some of our other more current product offerings.

MARK L. SCHIFTER
President, Audio Alchemy

BITWISE ON JITTER

Editor:

Thank you for including the Bitwise Musik System Zero in "The Jitter Game."

We applaud Robert Harley's efforts to educate the public on digital and to dispel the misconceptions about digital reproduction. The effect of clock jitter and other forms of digital noise on the sound quality of DACs has long been an area of interest and study to Bitwise. In our research, we have found that although jitter is a significant source of degradation in D/A performance, its effect on the final performance of a D/A processor is a complex interaction of the overall system. We would like to share some of our findings.

The LIMD technique is an innovative approach to assessing the digital artifacts contributed by clock jitter. The results of these digital artifacts of clock jitter are unwanted spectral components. These spectral components in the clock timing will contribute similar spectral components in the DAC output signal, which may result in degraded sound. In other words,

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the effect of the timing jitter can also be observed in the total DAC output signal, which in addition may contain unwanted spectral components and noise caused by additive digital noise, and parametric effects induced by interference contained in the supply voltages, the ground connections, and the digital signals feeding the DAC.

Clock jitter has the effect of varying the timing of the DAC output signal. If the output signal is a sinewave, as in the article, the timing jitter is equivalent to phase jitter in the output signal. The magnitude of the equivalent phase jitter is Thi (RMS) = Tau (RMS) x f_0 x 360°, where f_0 is the DAC output frequency and Tau (RMS) is the RMS timing jitter. For a 2ns RMS timing jitter and a 1kHz output signal, the equivalent phase jitter in the output signal is 0.00072° RMS.

The effect of jitter, which is time delay variations of the clock signal, is to phase-modulate the DAC output signal. The LIMD spectrum represents this phase modulation [which] will add components to the DAC output spectrum, having signal levels and frequencies that can be computed using established methods from communications theory. The following general rules apply when the output signal is a sinewave of fixed amplitude and frequency:

- If the spectrum of the timing jitter is white noise, then the addition to the DAC spectrum is also white noise. This will result in an increase of the noise floor of the DAC output similar to the addition of tape hiss.
- If the spectrum of the timing jitter contains harmonics of the output signal frequency, then the effect is to add harmonics to the DAC output signal. If, for instance, the output signal is 1kHz and the timing jitter contains frequency components of 1kHz, 2kHz, 3kHz, and so on, then frequency components at 2kHz, 3kHz, and so on will also appear in the DAC output spectrum.
- The magnitude of the resulting spectral components in the DAC output will be proportional to the magnitude of the output signal. For instance, a 2ns timing jitter with a -50dB, 1kHz output signal will generate spectral components in the DAC output which are below -160dB. This is far below the resolution of the DACs considered. If the signal level is raised to 0dB, the spectral components added by timing jitter may be as high as -110dB.

The above examples show that clock jitter will primarily degrade the DAC output when strong signals are present. Many of the processors tested had harmonics of the 1kHz output signal in the LIMD spectrum. These will not generate non-harmonic components in the output. To generate strong non-harmonic spectral components in a D/A, a more complex waveform, such as two sinewaves at -6dB, could be used.

In conclusion, we believe that the LIMD test is a valuable tool in the design and test of clock timing circuits. With observable clock jitter, the effect of spectral components in the timing delay translates into similar components in the DAC output spectrum. Because of the additive nature [of] types and levels of added distortion of jitter, correlation of the LIMD output spectrum with sound quality requires complex test signals where a single sinewave is just the start.

BJORN BJEREDE, PH.D.
Director of R&D, Bitwise Audio Technologies

EAD ON JITTER

Editor:

We appreciate Bob Harley's comments regarding the "extremely low" jitter performance of the DSP-7000. Bob is correct in concluding that the circuitry of the DSP-7000 is designed to resist jitter-inducing phenomena after the input receiver.

Bob is also correct in his statement regarding his review unit from last September being fitted with the older "B" chip. At this time, the "C" chip was not available in production quantities. It became available shortly thereafter, and Bob's machine should have been upgraded.

Finally, we suggest that the DSP-7000 jitter measurements (in Table 1) be shown in the 4x-oversampling mode—which, as Bob correctly states, reduces the DSP-7000's already "extremely low" jitter by another 50%. Showing the measurements in this mode is appropriate because the 4x-oversampling mode is the manufacturer's recommended setting. All machines leaving the factory are set in the 4x mode; we estimate that more than 99% of the machines remain in this mode.

Clearly, the 4x-oversampling mode is representative of how the DSP-7000 is heard; a jitter measurement based on this setting is most useful to *Stereophile* readers for comparison purposes.

The consensus at EAD is that this article is useful and well-written. It helps to demystify the subject of jitter and provides a helpful guide to consumers.

JOHN S. HAGELIN, PH.D.
Director of Research
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MADRIGAL ON JITTER

Editor:

We would like to congratulate Robert Harley and *Stereophile* magazine on "The Jitter Game." His presentation of the technical reasons for the sonic effects of time-domain errors in the current system of digital audio reproduction

is the most complete and cogent one we have seen in the audio press. We also applaud efforts to find objective measurements that correlate with listening tests, and Mr. Meitner's use of FM demodulation to analyze jitter in digital systems seems quite promising. Of course, we have many technical questions and reservations about specific applications of this particular instrument and the technique in general, but we believe it will probably be another useful tool in the advancement of musical reproduction.

As to the particular measurements of the No.30, which we gather from the cover of the December 1992 issue you still rather like, there may be some reasons why they do not exactly correlate with your sonic evaluations. The No.30 has no 75 ohm terminated data inputs, and your use of a 75 ohm cable through an adaptor may be the source of some impedance reflection jitter. The No.30's DACs trigger off of the deglitch signal rather than the word clock, and we would expect our deglitch signal to measure more jitter-free than our word clock because we handle this signal with particular care due to its particular importance in our overall design. Further, RH was only measuring the output of one pin to ground, and with the unique balanced communications from our DSP board to the Audio Board and DACs, you would have to make a balanced measurement between two pins to judge the timing accuracy of our signal at that point.

There are many other technical issues raised by RH's article that we will enjoy discussing with him at greater length than is possible in these "Manufacturers' Comments," which you request to be under 750 words. Without our own use of the actual LIMD, or at least a lot more information, we cannot say for certain that the No.30 would test better than your results with any other setup we could now recommend, although the considerations above suggest it might.

This leads, however, to a concern that we would like to raise. Consumers, for obvious reasons, would very much like to have objective numbers to guide their purchases of technical products. We receive very many consumer calls requesting our "number" on a certain spec so that they can compare it to the "number" they have been told applies to a competitor's product in order to decide which to buy. We believe very strongly in objective testing in conjunction with other methods of evaluation, but we have often found that "numbers" are used to mislead many consumers who do not have the engineering background to interpret what the "numbers" really mean.

RH's article is carefully written, with appropriate caveats and disclaimers, but in your December issue JA refers to RH's upcoming article with the comment, "(At last, a measurement that correlates with digital sound quality!)" We agree that this is very interesting information, but the danger exists that it will be taken for more than it is. If the numbers in RH's table become the "numbers" that consumers are looking for, just as with other specs, it would be easily possible to design products with a great jitter "number" despite poor overall performance.

Careful reading of *Stereophile* would reveal your sensitivity to readers possibly misinterpreting or misusing the information you supply. You are also aware that some of your readers skip over "the boring tech stuff" and only look at the summary conclusions. Please don't let your enthusiasm create an unexpected monster.

J. Michael Wesley
VP, Product Development
Madrigal Audio Laboratories

Sumo on Jitter

Editor:

We would like to thank Robert Harley and *Stereophile* for the highly valuable information they have provided all of us with their measurements using the LIMD. We have been making jitter measurements using frequency counting with 10+ decimal-point resolution. We will certainly now also review the use of Meitner's LIMD as an adjunct to our current measurement techniques.

Sumo has been very interested in the audible improvement gain by lower jitter, so we are disappointed that *Stereophile* was unable to measure the jitter performance of our Revision "C" Theorem converter board assembly. As John Atkinson mentioned last December, ". . .we are still witnessing a furious and passionate improvement in the standards of digital replay." That passion led us to almost immediately implement an additional jitter-reduction circuit into the production of our Theorem D/A converter cards. With the improvements (which focus on the action of the PLL in the YM3623B receiver chip), a performance of approximately 200 picoseconds jitter, rather than the 1248ps RH reported on the Revision "A" board (there was no "B"), was achieved.

At *Stereophile*'s request, we sent an Athena II preamp in October 1992, with the improved Revision "C" converter board installed. Unfortunately, Robert Harley has informed us that the jitter measurements performed in Table 1 [of "The Jitter Game"] were done before the arrival of our Athena II. The Theorem and D/A-optioned Athena II use exactly the same D/A converter card. So we look forward to your measurement of our current technology.

It is the design philosophy of Sumo to provide performance requirements that are most

key to sound quality and avoid those which simply inflate the cost to the audiophile. We believe this has been achieved in the Theorem, as it now has jitter performance rivaling the most expensive converters available. Furthermore, the Theorem is virtually the only converter available, at any price, which uses a fully discrete I/V converter following the DAC. We believe future studies of *Stereophile* shall show proper design at this stage is at least as important as low jitter. MICHAEL CUSTER
Sumo

THETA DS PRO BASIC II

Editor:

Thank you, Corey. Do you want the blond, the brunette, and the redhead delivered to your room at CES on successive nights, or all at once?

We are really gratified to find corroboration of our findings on the UltraAnalog DACs. We've tried working with them, of course. We certainly understand their use by companies that don't have real DSP capabilities, as they offer a "pretty" solution to some sonic problems, and a really seductive midrange. But no matter what we did with the computer part of our D/A, we couldn't get it to have acceptable highs or lows.

We couldn't tap our feet to it. It just wouldn't *swing*.

You, too, noticed the UltraAnalog's insidious *niceness*: the characteristic smoothing in the top. It is frightening to think how many people have gotten seduced into buying something that is smoothing away information that's supposed to be there!

Thanks, Corey, for saying the stuff we couldn't come out and say ourselves. NEIL SINCLAIR
Theta Digital

PAS STUDIO MONITOR I

Editor:

Neither Larry Doran nor PAS claims any responsibility for the development of UREI Time Aligned™ Studio Monitors. To the best of my knowledge, they were developed by Bill Putnam, Ed Long, and members of the UREI staff.

Many loudspeaker designers have experienced the depth and transparency of the soundstage provided by the Quad ESLs. Very few would argue that they did not enjoy the experience. Based on the space constraints of the control room and the bipolar radiation of electrostatic loudspeakers, they are quickly discarded as a candidate when getting down to the business of developing studio monitors.

A 15″ coaxial loudspeaker/1″ compression device, with all its limitations, has stood as a standard of reference for at least three decades. The Altec 604, the Big Reds, the ORB1 813s have made their marks as reference studio monitors. They all are 15″ coaxial designs.

The TOC™ Studio Monitor 1s are a variation on this theme. Using an active filter set, all adjustments are fixed except for the adjustment of the tonal balance between the 15″ and the high-frequency compression device. This function is intended for the purpose of balancing amplifiers with different amounts of gain, and, to a lesser degree, the tonal balance in the room acoustics.

Mr. Olsher had a good start when he set the balance of the TOCs with ATI's LMS prior to listening. From the documentation we received, the setting was 2–3dB too hot on the high frequency. This excessive high-frequency energy would disrupt the tonal balance of the TOCs and make them sound metallic.

As with other aspects of the design, the tonal balance is crucial for the soundstage of the TOCs to come alive. Following the ballpark setting with the LMS, correct balance is achieved by minor adjustments through listening. Unfortunately, Mr. Olsher settled on the tonal balance as set with the LMS for the duration of the listening tests, as stated in the review.

From our experience, the listening evaluations were quite predictable with the settled-on tonal balance. When vocals come to you through a "megaphone," there exists a strong indication that the high-frequency energy should be turned down. Had the tonal balance of the TOCs been achieved by ear, Mr. Olsher may have had a better glimpse of the "studio experience" he alluded to. Certainly, the reader would have benefited from a review of the TOCs in proper tonal balance.

On a more general note, I am unfamiliar with the recording industry as described in this review. Possibly the description is of an industry prior to my ten-year involvement. Personally, I find the criteria of the recording engineer are weighted toward the accuracy of the acoustical information as it relates to the reference tool, not high spls. Sure, if you give them high output, they'll take it, but not as a steady diet, or at the expense of accuracy. After all, their hearing pays the bills.

Getting back to the theme, "can a studio monitor work in an audiophile setting?" If you accept Mr. Olsher's generalization of the "hearing-impaired" recording engineer, one can easily assume that the criteria of the sound engineer can't be equal to [those of] the audiophile. If you view the sound engineer as an individual who has developed their hearing as a standard of reference to become successful within the segment of the music industry they address, then you can easily assume that the criteria may not be far apart.

A studio monitor can be defined with one word: "reference." A studio monitor that has

achieved industry-wide acceptance can be described in two words: "reference standard." Of all the loudspeakers that fall within the audiophile criteria, does one exist that can be the agreed-upon reference standard for the audiophile industry?

If so, we designers of studio monitors could use our talents to present it in a studio-monitor format. This would speed up the process of bridging the criteria, and would be a more scientific approach than reviewing studio monitors one at a time and knocking them down.

PAS appreciated the input of *Stereophile*, and we welcome their contributions in bringing audiophile criteria to studio monitors.

LARRY DORAN
Professional Audio Systems

DANA AUDIO 2F

Editor:

I would like to thank *Stereophile* for reviewing the Dana Audio 2f speakers. However..." severe ringing resonance," "exaggerated scrape flutter"?! Did it not occur to anyone at *Stereophile* that these speakers were damaged? Especially considering that, when we took this pair to Santa Fe for a brief listen, track 1 of the *Stereophile* Test CD 2 was inadvertently started with the level turned 'way up? The sound that came out was horrible. (There isn't a warning about this track for nothing.)

I expressed serious concern about damage to the speakers. While maybe not apparent at that time, it could create a problem later. Because of this, later, when told this pair was going to be reviewed, I asked that this particular pair *not be reviewed*.

Considering our Model 1 is listed in "Recommended Components," and another respected publication (which takes no advertisements) made comments about the 2f such as "having a very natural presentation" and "it emphasizes a balanced approach to music," maybe something is not functioning correctly. We also have many customers (some of them musicians) who have written us expressing their pleasure with the 2fs, particularly their natural sound, and what a great service Dana Audio is doing for the price-conscious audiophile. Maybe someone *should* have contacted Dana Audio and requested another pair.

Our customers have a pretty good idea what's good and what's not. For readers interested in how the Dana Audio Model 2f sounds, ask a friend who owns a pair, read the *Bound for Sound* review, or judge for yourself by trying a pair for 30 days at the original price of $395.

JOHN FISH
Dana Audio

Sadly, not one of us at Stereophile *remembers the conversations mentioned by Mr. Fish quite the same as he does. This is what actually happened during the genesis of this review: Back around the time of the 1992 Summer CES, John Fish and his wife Dana visited Santa Fe, and we allowed Mr. Fish to set up in the* Stereophile *listening room the review samples of the Dana 2f he had sent earlier so that he could be certain that they were working properly. Our policy is that while we assume that all samples that we receive are intended for review, if the manufacturer visits and finds something broken, we allow him to submit a further sample. RH, TJN, and I listened to the 2fs with Mr. Fish but, as is also the magazine's policy, we did not communicate to him what we felt about their sound quality. None of us remembers playing track 1 of Test CD 2 (the Fender bass tracks), but then, none of us remembers Mr. Fish expressing "serious concern about damage to the speakers." Instead, Mr. Fish seemed happy that the speakers were sounding pretty much as he intended. He made no request whatsoever, neither then nor later, to submit a replacement pair.*

Although he subsequently spoke with Tom Norton on a number of occasions, primarily to ask "how the review was coming along," my next communication with Mr. Fish was, I remember, in late August '92 when I received a telephone call from him in which he asked me to abort our forthcoming review of the 2f. I replied that this wasn't an option. He then asked me if I would abort the review were he to tell me that he was going to replace the tweeter due to criticism elsewhere of the 2f's treble performance. I said no, but that if he were going to replace the tweeter, he should send revised samples of the speaker so that we could include in the review mention of the changes in the sound that resulted from the new tweeter. Mr. Fish then asked me if I would abort the review were he to tell me that he was going to discontinue the speaker altogether. I replied that it was not our policy to abort reviews, and, as the mail-order 2f had been widely advertised and a not inconsiderable number had been sold, Stereophile *readers still needed to be informed of our opinion. All during this quite lengthy conversation, Mr. Fish made no mention of his concern that the review samples of his speaker had been "damaged." He subsequently spoke to Tom Norton and told him that he would now not be substituting different-model tweeters. Tom told Mr. Fish that the review would be part of our next survey of inexpensive speakers, to appear in our January '93 issue. There was still no mention made of our samples of the 2f being "damaged."*

I can only conjecture that Mr. Fish is confusing the communications he had with members of Stereophile*'s staff with those he had with another publication*—The Magazine of Fantasy & Science Fiction, *perhaps.* —JA

SPENDOR S20

Editor:

After reading the draft of the review of the Spendor S20s (along with the other eight loudspeakers), and the method under which they

were all "auditioned," it's not at all surprising that the S20 did not fare very well under those conditions. The speaker was never designed to be played in a 3000-cubic-foot listening room full of people! The speaker has specific limitations, which are clearly stated on the spec sheet: it has a sensitivity of only 84dB/1W/1m and has a maximum spl of 100dBa at 1m, and the bass response is good down to 70Hz. With these types of performance specifications, it is quite obvious that this speaker is meant to be used in a smaller listening environment at moderate to low listening levels (*ie*, "typical British" minimonitors). To ask to reproduce so-called "normal" listening levels in a large, dead room full of people is absolutely absurd. As was noted, they are 3dB *less* efficient than the next most efficient speaker of the group, and more than that for the others. This means they required at least twice the amount of power as the others to produce an equivalent volume level.

As is noted later in the review by JA, the speaker showed excellent "textbook" measurements. And when listening to them in a "normal" home situation, CG also found the speakers quite outstanding ("musical, refined, and clearly several notches above the ragtag group of speakers they were grouped with that fateful weekend"). Thus, both found them to actually be quite remarkable speakers, when used properly.

These speakers were not designed to appeal to the "general public," nor to be everyone's cup of tea. They were designed as high-quality "compact monitors" to be used for reproducing music within their design limitations. When used this way (as was noted by both JA and CG), they are quite marvelous speakers.

PETER EWENKO
Sales Manager, RCS Audio

ROGERS LS2A/2

Editor:

Wo mama, what a gaggle of speakers, specifications, and factoids! In some ways I envy your opportunity to listen to so many affordable speakers. In other ways it could be grueling.

Having read your assessment of our Rogers LS2A/2, a few observations are warranted. Your listeners correctly identify the Rogers's strong points: natural reproduction of voice and unamplified instruments. We also concur with the observation that the LS2A/2 is not made to play at ear-busting levels. The identification of a warmth or softness is accurate, as is the note of a laid-back or slightly distant soundstage.

Some of your descriptions are probably the result of setup and placement not in line with Rogers's recommendations. A few of your panel complained of some "tizziness" or "strain" in the high frequencies. This was likely due to auditioning the speakers without their grilles. All Rogerses are meant to be played with the grilles on. On the LS2A/2 the grille acts as a loading device and minimizes diffractions from the drivers. Removal of the grille causes a 1–1½dB increase in the 10–15kHz area. Just enough to sound "tizzy." Slap those babies back on and you'll find the LS2A/2 more pleasant.

We also recommend positioning Rogers speakers much closer to room boundaries than you did. Most Rogers speakers are designed to take close placement to wall surfaces into account. The system is tuned to a low enough frequency that approaching a room boundary boosts the lower bass harmonics, below the woofer's actual frequency response. This gives a marvelous illusion of extended bass, perfect for most real-life bookshelf situations, while avoiding upper-bass boominess. So, up against the wall with those Rogerses!

You mentioned that your electronics were more high-end than what most would normally use with such speakers. This is a pertinent observation. Rogers tries to walk a fine line between transparency and aural palatability for each speaker. Since lower-priced models usually get budget-oriented electronics, they must be forgiving of the graininess found at those price points. They do this through a slight sacrifice in transparency.

Finally, where the Rogers LS2A/2 fell short in power handling for louder amplified instruments, the LS4A/2, with its larger woofer, might do very well. At $750/pair, the LS4A/2s fall within the affordable range you are examining.

Happy listening! MICHAEL ZEUGIN
Audio Influx

PARADIGM COMPACT MONITOR

Editor:

Thank you for including the Paradigm Compact Monitor in your latest listening panel sessions. The comments on the Compact Monitor turned out to be somewhat of a mixed bag. Many were very favorable and some were less so. The tweeter, in particular, seemed to come under some criticism. This was unexpected, given all of the very favorable comments we have received about this tweeter's performance. The same tweeter is used in our Studio Monitor, which was reviewed by TJN in June '92 (Vol.15 No.6). In this review he gives it very high praise, stating "it just might be the best metal-dome tweeter I'd ever heard—maybe the best dome tweeter *period*."

The measurements of the Compact Monitor indicate that there is, in fact, a problem with the tweeter. Figs.41, 42, and 44 all clearly show a large resonance peak/dip at 10kHz. The tweeter, unfortunately, is defective. Mechanical failure

has occurred—the dome is separating from the voice-coil former. When functioning properly, this tweeter does not exhibit the 10kHz resonance that JA measured. Look back to the June '92 review of the Studio Monitor, on p.185, and you will see that the same tweeter shows no similar 10kHz resonance in any of the measurements.

We are sorely disappointed that this tweeter failure occurred. Although these speakers were thoroughly tested before leaving our factory, something must have occurred in transit to cause the failure. And although this breakdown is very rare, it has happened with the Compact Monitors used in this listening panel session. We would, therefore, appreciate the opportunity to send a new sample for a "Follow-Up."

The failed tweeter with this resonance at 10kHz would indeed sound like a "buzzy-whistle"—similar to what we used to hear with something like a badly mistracking phono cartridge. This will most definitely reduce "air" and "transparency," and can also be the root cause of other nasty sounds. This situation is lamentable; it certainly would have been much preferred, for all of us, if the tweeter would have just stopped working. At least then it could have been replaced.

Even with the incorrectly functioning tweeter, the Compact Monitors did garner a number of positive comments. JA: "an all-around good performer"; CG: "This speaker . . . rewards closer scrutiny," "extremely well balanced for the group. I like it. Swings really well"; DO: "detailed presentation . . . nice depth perspective." And TJN reports in his summary that the Compact Monitors "earned praise for their deep bass, which appeared to be liked as well as, or better than, that of any other contender."

We would also like to point out that the Compact Monitor represents superb value. In addition to its sonic virtues, the speaker is finished in architectural-grade wood veneer and has facilities for bi-wiring/bi-amping. The faceplate of our metal-dome tweeter is made of diecast aluminum. This ensures rigid mounting and also provides a heatsink for the tweeter. In addition, heat-transfer compound is used to provide better heat dissipation from the voice-coil to the faceplate chassis. The woofer is also a high-performance design and has a diecast chassis and mineral-filled polypropylene cone.

Finally, we invite all music lovers to take the time to audition the Compact Monitor and discover their very compelling musical attributes for themselves. W. A. VANDERMAREL
Director, Sales & Marketing, AudioStream

ROOMTUNES

Editor:

We'd like to thank Corey Greenberg for his "Follow-Up" to GL's review of RoomTune acoustic treatment. Corey has discovered for himself the very core of the RoomTune product philosophy: *less is more.*

Our products were developed as an answer to the traditional, over-absorptive approaches to room control that were robbing audiophiles of high-frequency extension, air, and overall music "liveness." It is true our products can be overused, and we have tried to make this clear from the beginning. (You may recall that "Mr. Tunes" removed half of the floor-standing 'Tunes from GL's room before submitting it for approval.) We did not mean to suggest to Corey that all of the 'Tunes we sent him would be necessary to control his room; we merely intended to provide him a sufficient amount of the product with which to make a thorough evaluation.

All rooms, even those of like dimensions, have their own unique sonic signatures. There are many variables to consider, from the reflective *vs* absorptive quality of the room right down to the textures of the walls, ceiling, and floor covering. This is why each individual room will require its own unique RoomTune configuration, and why free consultation is an integral part of our product support.

In regard to Mr. Green having moved GL's listening position into the nearfield, it is important to note that nearfield listening has long been a part of Michael Green's method of listening. We do not, however, claim to own the patent. In fact, we strongly encourage audiophiles to try the nearfield experience for themselves. We must, however, stress that, even under nearfield listening conditions, the room's effect on the reverberant field is still very much apparent; and, like a liquid taking the shape of its container, the loudspeakers will ultimately take the shape of the listening room. This is why proper RoomTune placement is critical to controlling the reverberant field and providing the best possible speaker/room/listener interface.

While RoomTune products are most certainly not a replacement for proper speaker and listener placement, they are a significant part of the final question. Albert Einstein once said, "Simplify as much as possible, and then no more." In short—*less is more, but too little ain't nearly enough!* MICHAEL ROTHACHER
RoomTune

NELSON-REED 804/CM

Editor:

Nelson-Reed wishes to thank all concerned for about as favorable a re-review, "Follow-Up," or original as we have ever been pleased to read in *Stereophile* or elsewhere.

When the Vol.15 No.3 804/CM review emerged, we were truly discouraged. Yes, we had already discovered the problem. Yes, we

were already in the process of replacing such woofers as need be. No, we didn't figure it out in time to correct before the review had gone to print. Damn!! As we said in the last "Manufacturer's Comment," "It sure raised hell with the coffee fund."

The "100 out-of-spec woofers from hell" really did a number on us. The latest 804 iteration really did embody worthwhile refinements. It really wasn't our intent to willfully degrade an already successful work. As it turned out, *Stereophile*, based on past experience with the 804 series, we guess, graciously placed the 804 in Class B pending re-review. (Who says magazines have no heart?)

For the readers' interest, we say go back and re-read the original review and attendant NR comments. Both are a study, we feel, in a magazine and a manufacturer trying very hard to be accurate, forthright, candid, and understanding. As a matter of fact, if you add this month's 804/CM "Follow-Up," we feel no one could want for much more, whether you be audiophile, manufacturer, or magazine. Isn't this, to paraphrase Gordon, how it's supposed to work? Guess what, it did!

A few comments on the 804/CM. From inception, the 804 series was designed with the following parameters:

1) No "compression" at any vaguely reasonable spl level.

2) The least "personality" possible.

3) To be to a loudspeaker what the so-called "straight wire with gain" is to an amplifier.

4) To reveal in an unbiased and unadorned fashion the real differences between preceding components.

5) To give one the best in music out, if music there be, going in.

Thanks again to all.

RON NELSON & BILL REED
Nelson-Reed Loudspeakers

BRYSTON 4B NRB

Editor:

We appreciate the thoroughness of Tom Norton's work in measuring the 4B NRB power amplifier, and the favorable comments he made about its performance. There is one small area where I believe the test equipment "hiccupped": in the noise figure. Our records for the noise figure on this particular amp show between -84 and -86dB below 1W/8 ohms unweighted, on the balanced input, and about 5dB better than that unbalanced. The graphs and figures in Tom's tests, including the THD+N at 1W and the spectral analyses involved in the IM and THD measurements, correlate with our own noise figures, so we assume the noise measurement you printed results from a quirk of the test setup. Thanks again for the positive review of our amplifier.

CHRISTOPHER W. RUSSELL
VP Engineering, Bryston Ltd.

KOSS ESP/950

Editor:

Koss Corporation would like to thank Tom J. Norton and his associate for the very thorough and detailed review of our ESP/950 Electrostatic Stereophone System [in the December '92 issue].

Regarding Mr. Norton's complaints about the ESP/950, he states "that the earpieces do not swivel at all." We would like to point out that the vertical pivot of the yoke on the earpiece has a ± 4° freedom of rotation, which translates into enough freedom of travel to accommodate most head sizes.

The E/90 Energizer/Amplifier rear-panel openings for the RCA connectors have been increased in diameter since the first production. Anyone removing the back panel of the E/90 and opening up the diameter of the holes may certainly void their warranty. We emphasize our 100% warranty service, so we will correct any of the initial first production units returned to us because of this or any other problem. Due to the very high (but not lethal) voltages present in the energizer unit, even after it is disconnected from a power source, we do not authorize anyone to open the units. We only authorize factory service.

Mr. Norton's problem with the slight electrical shock which he received from his first ESP/950 could not be duplicated once we received the unit back at Koss. It is possible that something happened during shipment which rectified the problem. However, there are no conductive surfaces near the user's ear which have not been carefully insulated via plastic housings or protective outer membranes. So, we don't expect this type of customer complaint.

Finally, the noises and hum which Mr. Norton experienced in his first two units were eventually tracked down to a set of malfunctioning opto-isolator ICs used as a turn-on delay in the energizer. For no reason (the manufacturer of the IC cannot explain this to our satisfaction), the opto-isolator ICs apparently began to slowly degrade due to internal leakage. More curious, these opto-isolators tend to "heal" themselves and operate correctly for a period of time after being allowed to "rest" with the E/90 turned "off." We have instituted a program of extensive burn-in prior to final test in an attempt to weed out any defective components. All current ESP/950s use a new opto-isolator IC which has so far proved to have none of the previous device's problems.

We would like to point out that anyone who owns an ESP/950 is welcome to use our toll-free number and discuss any problems they may

have encountered with our stereophone. It is our utmost desire to provide the best possible electrostatic stereophone to our customers and to provide the best possible service. Our basic design goal was to provide the most advanced and musically accurate stereophone possible, which we feel has been achieved from reading Mr. Norton's excellent review.

DAVID THOMAS
VP-Engineering, Koss Stereophones

LINN KARIK NUMERIK

Editor:

When reading through the "Recommended Components" section of the October edition of *Stereophile*, we noticed comments made by Martin Colloms under the CD listings section on the Linn Karik Numerik and the Naim NA CDS [p.127].

The listing for the Linn Karik Numerik states: "MC demurs, however, feeling that the Linn has a reduced sense of pace and involvement."

Under the Naim NA CDS listing: "However, as MC prefers the CDS to the Linn (as do some others whose ears we trust), we advise you to listen for yourself to see whether the CDS's balance of virtues fits your tastes."

We are not writing to complain about the content of what has been written. We feel, however, that it would be fair to point out in the editor's note that Martin Colloms was highly involved in the design of the Naim CDS, and that readers of *Stereophile* should be made aware of this.

OONAGH HUTTON
Export Communications, Linn Products

Having heard both the Naim and Linn CD players in familiar rooms and systems, I felt that the comment from Martin Colloms that I had included in "Recommended Components" succinctly expressed the quality of the difference I had heard between the two players. I was in error, however, in including comments Martin had made in private to me in the data set I gather before writing "Recommended Components." Mea culpa.

—JA

In my view, Oonagh Hutton of Linn Products is right to object to the appearance of my initials included with the opinions of others in the comments in the "Recommended Components" entry for the Naim CDS. I also take exception to this. In fact, I did not make any comment on the CDS for publication—for example, I did not comment in the request for information sent out to Stereophile *authors to help produce "Recommended Components," nor would I have done so.*

I regard my separate responsibilities as an audio reviewer and an industrial consultant very seriously indeed, and strive to avoid any conflict between the two. It is my policy never to review or allow my name to be used in advertising/supporting material for any product where I have been involved in the design, or where I have given engineering consultancy support. A couple of years ago I was concerned in an early feasibility study for a Naim CD player; the player was subsequently refined in-house by Naim engineers to attain the specific sound and performance the company required. It is a matter of public record that the company assembled a considerable team to design and produce the product which is now on sale.

I fear that, without my knowledge, my editor has inadvertently appended my initials to the "Recommended Components" listings in Stereophile *concerning the CDS. In doing so, he anticipated rather than accurately reported my views. I stress that I would not provide material for publication where a conflict of interests could arise, and* Stereophile *will only get a comment on a Naim player from me if and when I assess one of the company's later digital designs for publication in the normal manner.*

—Martin Colloms

VIMAK ON JITTER & THE DS-2000

Editor:

Much effort has been expended at Vimak in the development of what we feel is the finest jitter-reduction design extant, and it was disconcerting to read RH's parting shot in the review of the DS-2000 in the December '92 issue, which called the jitter performance and overall integrity of our products into question.

In the word-clock jitter tests conducted by *Stereophile* published in the article entitled "The Jitter Game," you stated that the Vimak DS-2000 had "astonishingly low levels of jitter: just 34.8ps compared with [the] specified 50ps," and that jitter remained "very low in all cases" of varied input frequency and level. We request that you issue a formal retraction and print a correction of the December 1992 review, wherein RH erroneously stated that the DS-2000 did not meet its published specification. In fact, in our "Manufacturer's Comment" letter published in the December issue, we informed *Stereophile* of the relevant data needed to properly measure jitter on the DS-2000. The measured word-clock jitter for the DS-2000 is well within published specification.

While the results published by *Stereophile* now closely agree with the data which we at Vimak have obtained in our lab (using a Hewlett-Packard 5412B digitizing oscilloscope mainframe with a 20GHz-bandwidth front-end), several discrepancies are evident in "The Jitter Game."

The 1kHz "spike" in fig.18 looks very suspicious, as the extremely low cutoff frequency of the Main PLL in the DS-2000 (less than 5Hz) has been shown in our tests to result in no increase of RMS jitter when decoding a 1kHz full-scale tone over the jitter present when playing silence.

We at Vimak remain troubled by the dispar-

ity between the reviews from other periodicals around the world, which have been uniform in praising the sonic performance of the DS-2000, and the opinion of *Stereophile*. In the "Coming Attractions" published in the December issue, you acknowledge the well-known fact that there exists a direct correlation between sound quality and word-clock jitter. The sound-quality opinion expressed by *Stereophile* is clearly unsupported by *Stereophile*'s own test results published in "The Jitter Game," and remains unsupported by the worldwide reviews of the DS-2000. RH is clearly wrong when he stated in December that the DS-2000 had the highest level of jitter of any processor encountered. *In fact, the DS-2000 is one of the best in this regard!*

Outstanding jitter performance has been a primary design goal for all Vimak products. It has been our feeling and experience that jitter performance is one of the key elements in superior sonic performance.

It was interesting to note the differences in performance between Crystal CS8412 B and C versions. We have obtained somewhat similar test results between the two, and we have been using the Revision C part in all production units built since April 1992, when Revision C became available.

In summation, it is evident that RH's comments about jitter printed in the December review are not supported by the facts. By *Stereophile*'s own admission, the DS-2000 meets published specifications with margin to spare. Therefore, we respectfully request that *Stereophile* acknowledge the errors contained in the December review of the DS-2000 and print a correction. MICHAEL A. KOULOPOULOS
Vimak

Robert Harley's and my statements in the December issue about the Vimak having high levels of jitter were based on erroneous preliminary measured data; I therefore formally withdraw them. Our apologies to Michael Koulopoulos and Vimak. However, even though "other periodicals around the world. . . have been uniform in praising the sonic performance of the DS-2000," we stand by our opinion of the DS-2000's sound quality, which was arrived at after careful listening tests and comparisons with top-rated competitors at matched levels. The proof, of course, must be in the listening. As always in these disputes, readers must listen to the component in question for themselves in order to decide who is correct. **—JA**

ELFIX POLARITY TESTER

Editor:

In the "Letters" section of your November 1992 issue [p.39], under the heading "Polarity Tested," Kenneth Beers, Jr., MD, writes, "The Elfix Polarity Tester. . . offered by Audio Advisor. . . may be purchased from many builders' supply and electricians' supply outlets. . ."

In his zeal to protect your readers from paying too much, I think Dr. Beers has made an error in judgment. Several customers have called us to tell us they've tried this "polarity tester" and discovered it doesn't work.

It looks like an Elfix. It's the same size and shape—it even has the same two lights—but it features a simple On/Off switch. It's designed to detect the presence of AC current in walls, etc. It can't measure the intensity of the current, so it's useless for determining proper grounding of audio equipment.

To determine proper equipment grounding, the device must be able to measure the difference in field intensity between one plug orientation and another. The Elfix has a variable-intensity adjustment wheel. By holding the Elfix close to the component and adjusting the wheel, it's easy to measure differences in field intensity and identify proper grounding.

If your readers want to check for AC current in cables or walls, or if they're inmates who need to check a fence to see if it's electrified, buy the polarity tester sold in hardware stores. If your readers want to make sure their audio and video components are properly grounded, the Elfix is still the best choice. WAYNE SCHUURMAN
President, Audio Advisor

WHERE TO BUY STEREOPHILE

Dealers interested in selling *Stereophile*, please call John Frye at (800) 835-4836.
Stereophile is also available at selected B. Dalton Booksellers and Tower Records stores.
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4343 N. Scottsdale Rd

Tucson
Wilson Audio
2900 E. Broadway

ARKANSAS

Little Rock
River City Compact Disc
10700 Rod Parham

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Anaheim
Audiophile Selections
8111 E. Oak Ridge Circle

Berkeley
Audio Chamber
1717B University Ave
CD World
1573 Solano Ave
DB Audio
2573 Shattuck Ave
Music Lovers
1510A Walnut St

Beverly Hills
Beverly Hills Audio
8950 W. Olympic Blvd #902
Christopher Hansen
8822 W. Olympic Blvd

Carmichael
Deetes Sound Room
5825 Manzanita Ave #4
Stereo One
6650 Fair Oaks Blvd

Costa Mesa
Upscale Audio
1835 Newport Blvd

Culver City
Armadillo & Company
5795 W. Washington Blvd

Daly City
Audio Vision
55 First Ave

Encino
All American Newsstand
18001 Ventura Blvd
Sound Factor West
17265 Ventura Blvd

Gardena
Reference Audio Systems
18214 Dalton Ave

Hollywood
World Book and News
1652 Cahuenga Blvd

Los Angeles
L.A. Audio Video
101 S. Western Ave
Robertson Magazine & Bookstore
1414 S. Robertson Blvd
Upscale Audio
330 N. La Cienega Blvd

Menlo Park
Kepler's Books & Magazines
1010 El Camino Real

Monrovia
Brooks Berdan
110 W. Olive Ave

Mountain View
Sound Goods
391 San Antonio Rd

Newport Beach
Pacific Coast Audio Video
2816 E. Coast Hwy

North Hollywood
Levity Distributors
6850 Vineland Ave #F

Orcutt
Paradise Records
1232 Bamette Rd

Pacific Grove
Audio Video Design Group
227 Grand Ave #3

Palm Springs
David Rutledge Audio
875 N. Palm Canyon Dr

Palo Alto
Audible Difference
805 El Camino Real
Western Audio Imports
4191 El Camino Real

Pasadena
Canterbury Records
805 E. Colorado Blvd
GNP Audio Video
1254 E. Colorado Blvd

Reseda
Variety Newsstand
18456 Sherman Way

Riverside
Speaker Craft
1650 Seventh St

Roseville
Dimple Records
1701 Santa Clara Dr

Rowland Heights
Audio Best
2411 S. Joel Dr

Sacramento
Audio FX
3019 D St
Paradyme Audio/Video
1720 Fulton Ave

Salinas
House of Sight & Sound, Ltd.
1300 S. Santa Fe

San Carlos
Rod's CDs & Video
876 Laurel St

San Diego
Sound Company
5079 El Cajon Blvd
Stereo Design
9240 Clairemont Mesa Blvd
Stereo Unlimited
3191 Sports Arena Blvd

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Sounds Alive
731 Florida St

San Rafael
The CD Seller
90 A St

San Jose
Books, Inc.
420 Town & Country Village

Santa Barbara
AudioVision #1
612 N. Milpas St
Cymbaline Records
1035 State St
Lenz Arts
142 River St
Mission Audio
215 W. Mission St

Santa Monica
Optimal Enchantment
522 Santa Monica (by appt.)
Shelley's Stereo
1520 Wilshire Blvd

Santa Rosa
Sawyer's News
733 Fourth St

Studio City
Dave's Video,
The Laser Place
12144 Ventura Blvd

Sausalito
Music by Design
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Stereo Plus
2201 Market St
Ultimate Sound
141 Kearny St

Torrance
Stereo Hi Fi Center
22926 Hawthorne Blvd

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The Digital Ear
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Upland
Audio Haven
1937 W. 11th St #G

Van Nuys
Audio Den
15600 Roscoe Blvd
The Audiophile Network
14155 Kittridge St

Vernon
Kinergetics
4260 Charter St

Walnut Creek
Sound Distinction
1919 Mt. Diablo Blvd

Westminster
Upscale Audio
15251 Beach Blvd

West Sacramento
Mts Inc./Tower Magazines
2500 Del Monte Bldg C

Westminster
Audio Today
14306 Beach Blvd

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Laser's Edge
20929 Ventura Blvd #24

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Gross Television
12126 California St

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SoundTrack
6490 Wadsworth Blvd

Aurora
SoundTrack
15022 E. Mississippi Ave

Boulder
A D Systems Ltd.
2525 Arapahoe Ave #E4-284
Eads News & Smoke Shop
1715 28th St
Listen Up
2034 E. Arapahoe
SoundTrack
1685 28th St
Stereo-Image
1939 Pearl St

Colorado Springs
Listen Up #3
230 N. Tejon
Sound Shop
528 S. Tejon
SoundTrack
1230 N. Academy Blvd

Denver
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999 S. Logan St
Second Sound
1875 S. Broadway
Sound Hounds
1575 S. Pearl
SoundTrack
1298 W. Alameda Ave
SoundTrack
2553 S. Colorado Blvd

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Gold Sound
4285 S. Broadway

Fort Collins
Ovation
236 S. College
SoundTrack
4606 S. Mason St

Highlands Ranch
SoundTrack
2680 E. County Line Rd

Littleton
SoundTrack
9350 W. Cross Dr

Thornton
SoundTrack
930 E. 104th Ave

Westminster
Westminster Newsstand
5068 W. 92nd Ave

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SoundTrack,
Pearce Electronics
9901 W. 50th Ave

CONNECTICUT

Bristol
Sound Unlimited
169 Church St

Danbury
Carston Stereo
146 Old Brookfield Rd

Hartford
Al Franklin's Music
1 Civic Center Plaza

Middleton
Madrigal Audio Lab
2081 S. Main St

New Haven
Take Five
105 Whitney Ave

New London
Roberts
90 Bank St

FLORIDA

Boca Raton
Stereo Shoppe
279 N. Federal Hwy

Bonita Springs
Kirk's Music World
26880 Old 41 #5

Clearwater
Rising Sounds
28901 US 19 N.

Fort Pierce
Sound Insights
2302 S. US #1

Fort Lauderdale
Audio Center
4134 N. Federal Hwy

Hollywood
Hollywood Sound
523 S. 21st Ave

Jacksonville
House of Stereo
3505 Southside Blvd #10

Key West
Audio Video International
1436 Kennedy Dr

Madeira Beach
Book Nook of Madeira
15029 Madeira Way

Melbourne
Jazz Waves CDs & Tapes
822 E. Newhaven Ave

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Audio by Caruso
13831 S. Dixie Hwy
Disctronics Corp.
2315 NW 107th Ave
Joe's News
1549 Sunset Dr
Sound Components
11927 S. Dixie Hwy

Tampa
Audio Visions South
3953 W. Kennedy Blvd

GEORGIA

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Audio Forest
6806 Peachtree Ind. Blvd
Music Masters
931 Monroe Dr NE #109

Marietta
Audio Atlanta
19 Atlanta St
Music Audio
2100 Roswell Rd NE #400-L
Stereo & Video Systems
1253 Powers Ferry Rd

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Stereo Shoppe
104 Chamilla Ave

Tucker
Audio Solutions
4880 Lawrenceville Hwy

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Honolulu
Audio Direction
3184A Waialae Ave

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Stereo Shoppe #3
8778 Fairview Ave

ILLINOIS

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Record Service
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Chicago
Jazz Record Mart
11 W. Grand Ave
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175 W. Washington
Sound Choice
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Superior Audio Systems
833 N. Milwaukee
Evanston
Audio Consultants
1014 Davis
Chicago Main Newsstand
880 Chicago Ave
Homewood
Record Swap
18061 Dixie Hwy
Schaumburg
Hi Fi Hutch
879 S. Roselle Rd
Skokie
Rosine Audio
4525 Dakton St
Mt. Morris
Walden Books
4279 W. Rt 64
Naperville
Select Sounds
1220 W. Ogden
Norridge
Rolling Stones Records
7300 W. Irving Park
Peoria
Sound of Peoria
105 E. Arcadia
Saint Charles
Audiophile of St. Charles
411 S. Second St
Skokie
Digital Sound
7435 Tripp Ave
Springfield
King's Stereo
225 Highland Ave

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Fort Wayne
Three Rivers Audio
4003 S. Wayne
Indianapolis
Ye Olde Hi Fi Shoppe
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Mishawaka
Orbit Music
2564 Miracle Ln
Richmond
Side 1 Music
3753 E. Main St

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Bettendorf
Sound Environments
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1718 E. Kimberly Rd
Des Moines
Audio Logic
5733 Urbandale Ave
Iowa City
Hawkeye Audio
401 S. Gilbert St

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7825 E. Harry
Custom Sound
830 S. Hillside

KENTUCKY

Louisville
Four Seasons Records
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Chenoweth Plaza

LOUISIANA

Baton Rouge
Art Colley's
Audio Specialties
711 Jefferson Hwy
New Orleans
Wilson Audio
8001 Maple St

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Laserland of Baltimore
7914 Honeygo Blvd
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711 W. 40th St
Soundscape
406 W. Cold Spring Ln
Burtonsville
JS Audio
15454 Old Columbia Pike
Ellicott City
Gramaphone
9005 Chevrolet
Kensington
Soundworks
10534 Connecticut Ave
Laurel
High Tech Service
& Exchange
14209 Baltimore Ave
Lutherville
Gramaphone
10801 Tony Dr
Rockville
Needle in a Haystack
785 Rockville Pike
Silverspring
Capitol Classics Newsstand
14446 Layhill Rd
Towson
An Die Musik
One Investment Pl,
Annex Bldg

MASSACHUSETTS

Boston
Looney Tunes Records
1106 Boylston St
Brookline
Audio Studio
414 Harvard St
Cambridge
Looney Tunes II
1001 Massachusetts Ave
Q Audio
95 Vassar St
Everett
Everett Music Shop
30 Norwood St
Framingham
Natural Sound
401 Worcester Rd
Northampton
Sound and Music
351 Pleasant St
North Dartmouth
Sound II
576 State Rd
Saugus
Rockit Records
120 Broadway
Worcester
D'Coin's
239 Mill St

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539 E. Liberty
Dearborn
Almas Hi-Fi Stereo
15031 Michigan Ave
Dearborn Music
22000 Michigan Ave
East Lansing
Jemstone Audio
2800 E. Grand River Ave
Ferndale
Imagery
2907 Horton
Rochester
Audio Video Systems
3250 Rochester Rd
Royal Oak
Audio Dimensions
4128 N. Woodward Ave
Saginaw
Listening Room #2
1305 Court St
Traverse City
The Sound Room
1319 S. Airport

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Hopkins
Audio Video Dimensions
1011 E. Excelsior Blvd
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740 11th Ave S.
Minneapolis
HiFi Sound Electronics
1226 Harmon Pl

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Seventh Heaven
800 S. Seven Hwy
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10 W. Nifong Blvd
St. Louis
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227 N. Lindbergh Blvd
Flip's Stereo Place
9556 Watson Rd
Great St. Louis Sound Co.
1341 S. Lindbergh #1
The Sound Room
747 N. New Ballas Rd

MONTANA

Kalispell
Audio Visions
136 Main St

NEBRASKA

Omaha
Stereo West
7425 Dodge St

NEVADA

Reno
High End Stereo
959 W. Moana Ln

NEW HAMPSHIRE

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Camera Shop of Hanover
47-51 S. Main St
Dartmouth Bookstore
33 S. Main St
Nashua
Audio Ensemble
419 Amherst St
Peterborough
Old Colony Sound Lab
305 Union St
Ridge Center
DB Systems
Main St

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Hi Fi Connection
136 Rt 41
Little Falls
Film & Music by
Audio Video Interiors
Rt 64 E.
Marlton
Hi Fi Connection
RD 1, Rt 73
Middletown
Stereo Dynamics
1670 Hwy 35
Millburn
Professional Audio
Consultants
182 Essex St
Montclair
Cohen's
635 Bloomfield
Morristown
South Street Stereo
20 South St
Northfield
Sound Inc.
900 Tilton Rd
Nutley
Bernhard DeBoer
113 E. Centre St
Ridgewood
Sounding Board
75 Franklin Ave
Trenton
Hal's Stereo & Video
US Rt 1 at Texas Ave
Verona
Audio Connection
615 Bloomfield Ave
Wayne
Second Saturday
40 Galesi Dr
West Caldwell
Woodbridge Stereo
1103 Bloomfield Ave
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Stuart's Audio
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Woodbridge Stereo Center
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851 St. Michaels Dr
Downtown Subscription
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Galisteo News
201 Galisteo St
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376 Garcia St
Rare Bear
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Santa Fe Sight & Sound
500 Montezuma #109

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3604 Main St
Great Neck
Discriminating Ear
937 Northern Blvd
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RAF HiFi/Stereo
JFK Airport, Bldg 80
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Smith Haven Plaza
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8409-B Shallow Creek Rd
Lynbrook
American Audiophile
Trading Corp.
373 Sunrise Hwy
Merrick
Performance Audio
2064 Sunrise Hwy
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Accent on Music
175 Main St
Fox & Sutherland
15 S. Moger Ave
New York
Dina Magazines
270 Park Ave S.
Electronic Workshop
10 E. 8th St
J&R Music World
23 Park Row
Lyric Hi-Fi
1221 Lexington Ave
The Magazine Store
30 Lincoln Plaza
Park Avenue Audio
425 Park Ave S.
Sound by Singer
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Pleasantville
Audio Excellence
343 Manville Rd
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T.D. Electronics
115-36 229th St
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3400 Monroe Ave
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Sound Concepts
2314 Monroe Ave
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Hi Fi Classics
115-09 Rockaway Beach Blvd
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Listening Room
590 Central Park Ave
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Coventry Commons
Rt 347
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Superior Sight & Sound
2780 Erie Blvd E.
West Babylon
Audio Visions
1067 Montauk Hwy

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Advanced Audio
1263 Kildaire Farm Rd
Charlotte
Ernie's Music
8042 Providence Rd #1400
Mr. Audio
601 S. Kings Dr #F
Durham
Audio Visions
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Raleigh
Audio Advice
3532 Wade Ave

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Stereo Lab #1
11419 Princeton Rd
Columbus
For The Record
1386 Grandview Ave
Needle in a Haystack
2384 Wellesley Ln
Progressive Audio
1764 N. High St
Stereo Lab
2244 Neil Ave
Dublin
Audio Encounters
4271 W. Dublin Granville Rd
Fairborn
Audio Etcetera
2616 Col. Glenn Hwy
Findlay
House of Hindenach
830 N. Main St
Lakewood
Play It Again Sam
12611 Madison Ave
Lyndhurst
Hi-Tech Hi Fi & Video
5280 Mayfield Rd
Toledo
Boogie Records
3301 W. Central
Jamiesons'
5431 Monroe
Westlake
New Image Electronics
31017 Center Ridge Rd

OKLAHOMA

Oklahoma City
Audio Dimensions
10407 N. May Ave
Tulsa
K-Labs Audio
4715 E. 41st St
The Phonograph Ltd.
8221-B E. 61st St

OREGON

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Chelsea Audio
3700 SW Hall
Corvallis
Northwest Audio Labs
1557 NW Monroe
Portland
Chelsea Audio
935 SW Washington St
High Fidelity Unlimited
1428 SE 36th Ave
Sixth & Washington News
617 SW Washington St

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Soundex
747 Berwyn Ave
Carlisle
Sound Solutions
150 M.J. Mall
Doylestown
Trac Records
Doylestown Shopping Center
Edinboro
Boro Tunes
106 Meadville St
Erie
Custom Audio
1550 W. 26th St
Harrisburg
I.P.D. Distribution Services
2323 Woodlawn St
Jenkintown
The Stereo Trading Outlet
320 Old York Rd
Philadelphia
Chestnut Hill Audio
149 N. Third St
David Lewis Audio
8010 Bustleton Ave
Pittsburgh
Audio Options
5824 Forbes Ave
Mook's Audio
3047 W. Liberty Ave
Selinsgrove
Stereo Shoppe
19 N. Market St
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1933 W. Third St
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Nova Electronics
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Nashville
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4119 Hillsboro Rd
Nicholson's Stereo
115 19th Ave S.

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Arlington
Texas Audio
4211 S. Cooper #111
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Austin News Agency
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Krystal Clear Audio
4433 McKinney Ave
Omni Sound
19120 Preston Rd
Preston Trail Audio/Video
3953 Beltline Rd
Shakespeare Beethoven Galleria #3200
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6800 Gateway E. #1D
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2624 Westheimer
Lubbock
The Sound Wave
Salem Village
4601 S. Loop 289 #13
San Antonio
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8474 Fredericksburg Rd
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Pro Audio
4020 Rhea Rd #5-B

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Ballston Metro Center
901 N. Stuart St
Centreville
Gifted Listener Audio
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238 Zan Rd
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Audio Buys
5177 Lisberg Pike
High Technology Electronic Services
228 W. Broad St
Richmond
Audio Art
2215 E. Broad St
Stereo Trading Post
8705 W. Broad St

WASHINGTON

Bellevue
Eastside Daily Planet News
156600 NE Eighth #33
Hawthorne Stereo
13107 Northup Way
Seattle
Bulldog News
4208 University Way NE
Definitive Audio
6017 Roosevelt Way NE
Platters
8064 Lake City Way NE
University Bookstore
4326 University Way NE
Silverdale
Nuts About Hi Fi
10100 Silverdale Way

WASHINGTON, DC

Tower Video #630
2000 Pennsylvania Ave

WEST VIRGINIA

Morgantown
Sound Investments
59 S. University Ave
South Charleston
Absolute Sound
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Cudahy
Cudahy News & Hobby
4758 S. Packard Ave
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Elite Audio
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Sound Investments
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344 17th Ave SW
Loyalty Sound
1107 Eighth St SW
Sounds of Music
220 Seventh Ave SW
Edmonton
Audio Ark
10746A 124th St
Audio Plus
9934 82nd Ave
Medicine Hat
Sounds Fantastic
222 S. Railway St SE

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1105 Austin Ave
Kelowna
K&A Audio
453 Bernard Ave
Richmond
Book Warehouse
6340-9 No.3 Rd
Vancouver
Book Warehouse
632 W. Broadway
1150 Robson St
The Magic Flute
2100 W. Fourth Ave
Sikora's Classical Records
432 W. Hastings St
The Soundroom
2803 W. Broadway
Victoria
Sweet Thunder Records
575 Johnson St

MANITOBA

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214 Osborne St S.

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6650 Morris St

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725 St. Clair St
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Audio One
3200 Steeles Ave W.
Essex
Disc 'n Dat Audio/Video
5 Frances Ct
Hamilton
McMaster University Bookstore
1280 Main St W.
Thompson's Select Audio
610 Upper James St
Village Audio—Westdale
1059 King St W. #2
Kingston
House of Sounds
277 Princess St
Vern Napier's Cameras
333 Princess St
London
Multimag
150 Dundas St #3
Mississauga
Laserland
2200 Dundas St E.
North Bay
Popular Audio
144 Main St W.
Oakville
Oakville Audio
2347 Lakeshore Rd W. #3
Ottawa
Distinctive Audio
903 Carling Ave
Euphonics Audio & Video
685 Bank St
Stereo Trading Post
242½ Bank St
Peterborough
The Audio Room
300 George St N.
Rexdale
Audio Empire
1003 Albion Rd
Richmond Hill
American Sound
9108 Yonge St
Sudbury
Total Sight & Sound
818 Barrydown Rd
Thornhill
Stereo Factory
7616 Yonge St
Timmins
Professional Sound
175 Third Ave
Toronto
Brack Electronics
69 Front St E.
Disticor
155 Gordon Baker Rd #213
Great National Sound
615 Queen St W.
L'Atelier Grigorian
70 Yorkville Ave

Toronto Home of Audiophile
71 McCaul St #E8/E9
Waterloo
Soundstage
59 Regina St N.
Whitby
Whitby Audio Video
233 Brock St S.

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Québec
C.O.R.A.
131-18 Rue E
Ste-Foy
ROTAC électronique
2873 Chemin Ste-Foy

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National Distributor
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Audio Q Imports
544 Burwood Rd, 1st Floor
Pirimai Hi-Fi & Video
Westfield Shopping Town #54
Burwood Rd, Burwood
Melbourne, Victoria
McGill's Authorised News
187 Elizabeth St

BELGIUM
Hasselt
Ghijsens Hi Fi
Sint-Truidersteenweg 14

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M&M International
61 Church St

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Media Audio
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Noerregade 19-21
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KT Radio
M.P. Bruunsgade 36
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Hi-Fi Entusiasten
Tagensvej 162
KT Radio
Vesterbrogade 179-181

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National Distributor
Frankfurt
Audio International
Gonzenheimer Str 2b

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The Sound Chamber
Dina House #1001
11 Duddell St
YK Audio Ltd.
Room 203, Man Yee Bldg.
60 Des Voeux Rd
YK Audio Ltd.
248 Ocean Terminal
Kowloon

ICELAND
National Distributor
125 Reykjavik
Steini HF, S. Danielsson
Skulagata 61

IRAN
National Distributor
Teheran CP 11316
Gramophone Company
Ave Djomhouri Eslami
Rue Massoud Saad No.21

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Cloney Audio
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National Distributor
Lucca 55100
Sound & Music
Via della Formica 496

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Tokyo
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3-4-1 Marunouchi,
Chiyoda-Ku

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National Distributor
60000 Kuala Lumpur
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10 Jln Tun Mohd Fuad
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Mexico 19, DF
Diseño Activo, SA
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78 Greenmeadows Ave
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UL Bacha 101303

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Coming Attractions *(continued from p.3)*

well in their future endeavors.

Third, an erratum: in Richard Schneider's "Industry Update" on Sony's Super Bit Mapping process in the November '92 issue (Vol.15 No.11, p.49), an unfortunate typo reversed the meaning of a key sentence, which should have read: "It was possible to appreciate the subtlety and skill with which these parts were played" —not "*im*possible," as it was printed. Our apologies to Sony and to RS. **—John Atkinson**

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THE FINAL WORD

There is an irony in the current use of the term "political correctness"—it has become a politically correct weapon with which to attack anyone who mildly smacks of PC. If you therefore champion women's rights, affirmative action, greater awareness of black history, or the eurocentricity of most historical research and reporting, you're automatically politically incorrect by association with alleged political correctness.

I even detected some of this tendency in *Stereophile*'s December pages when RL rebuked reader Atheil Lashley, inferring racist thinking in Lashley's suggestion that a black editor on *Stereophile*'s staff could "possibly" be enlightening for *Stereophile*'s readers.

First, I find it upsetting to hear the word "racist" hurled so readily. There's no question that Lashley was making at least a racial suggestion—after all, he was identifying both his own race and the race of the putative *Stereophile* editor he wished to read. But "racist"? There's no question that the United States is a racist society. There is hardly an institution or bit of our history not permeated by racism, and it's not likely to go away in our generation or the next (though its constant interference with our health and productivity will sometime have to be recognized as the debilitating national neurosis that it is). But, although I agree with RL's self-evidently true statement that you don't have to be black to like black music, I don't find the notion that a black editor could make a positive contribution to *Stereophile*'s pages—one that couldn't be offered by a similarly inclined white editor—racist in any way.

One of the interesting comments to come out now that people are thinking and talking about Malcolm X was made by Studs Terkel: "The white people haven't a clue, not a clue, as to how black people feel." That's a pretty strong statement, but I suspect that it's almost 100% true. Without any question, white Americans and black Americans live in different worlds. This was brought home to me in a remarkably forceful manner almost 30 years ago as I rode from Chicago to New York in the middle of the night with three young militant black men who were making the journey in order to attend the funeral of Malcolm X, which took place the day we arrived. I had spent the previous six months working in a Mississippi Delta voter-registration project, and had heard of these men's trip through my civil-rights connections. My only requirement was a ride to the east coast, so I could return home.

You might think that six months of living exclusively with black people would have prepared me for the trip I was taking, but that wasn't so. The tension and anger in that car were completely unforced—even almost unexpressed—but just as completely out of my experience as if those three men had been raised on a different planet. While there was no question that I understood why this tension and anger existed, and that I could in some way feel a common sorrow and anger, the very specific destruction which Malcolm X's death meant to young, militant black men in 1964 was not something I could share. Their lives had prepared them for the almost-inevitability of Malcolm's death in much the same way his life prepared him; my life, and the life of every Caucasian I've known, had been worlds away.

Also interesting was the fact that, even though these three black men and I rode in the same car, they and I were traveling to completely different New Yorks. Although black people will often frequent the parts of New York where white people live, white people will very infrequently travel in the black parts of New York. The two groups of people have characteristically very different experiences of and in this city. They are two different cities.

I also don't know what black people think—but I do know that I don't know. *Stereophile*'s equipment-reviewing staff consists solely (though not exclusively, in any intended sense) of white males; in the ranks of record reviewing, two (white) females have intruded. It's very possible that we could all learn more from writers who more accurately reflect the diversity of our readership. JA's policy is to publish the best writers we can get, which carries no inherent prohibition on any race or color. Any applications?

—Larry Archibald

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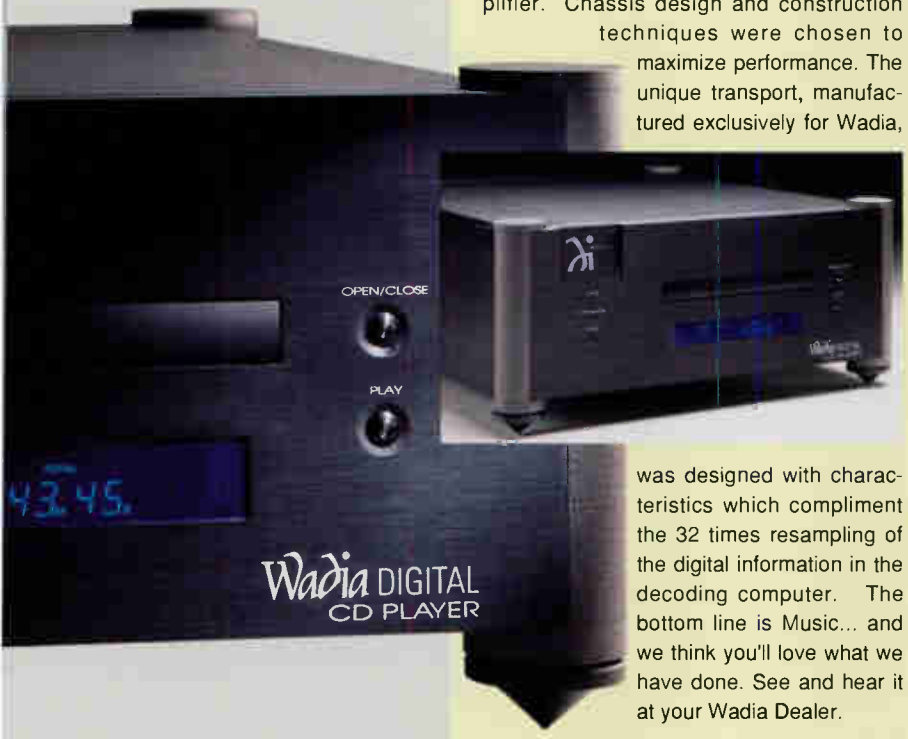

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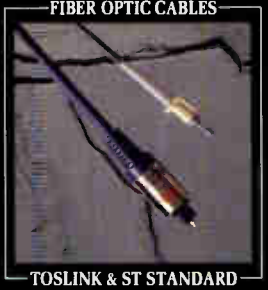

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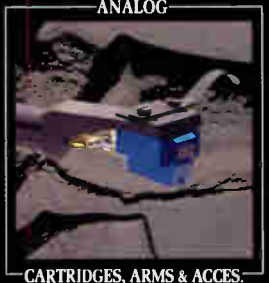

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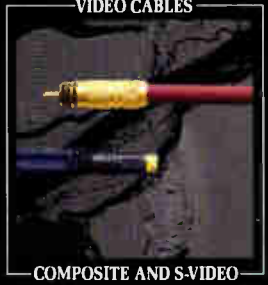

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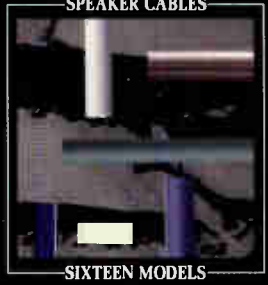

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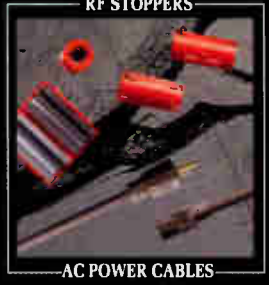

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