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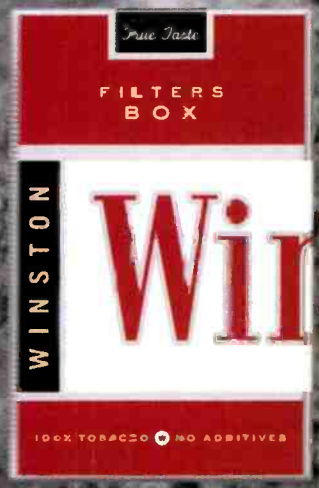


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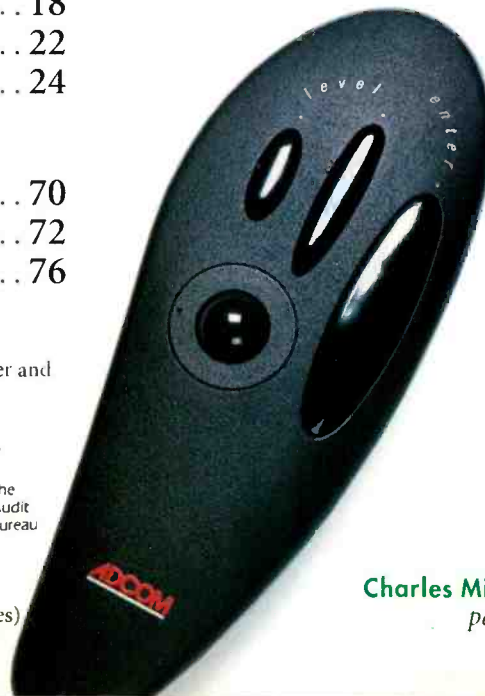
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Audio Publishing, Editorial, and Advertising Offices,
1633 Broadway, New York, N.Y. 10019
Editorial E-Mail: audiomag@aol.com



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This month, Rad Bennett surveys the state of DVD software at the tender age of one year, and he finds it surprisingly mature. Of course, DVD builds on the foundation of CD, so in many respects (disc manufacturing and player transport design, especially) it represents refinement of existing technology rather than anything totally new. In others, however, it is a marked departure from the past. CD is basically a very simple system; just getting high-quality stereo digital audio onto and off of an optical disc was a big enough job 15 years ago. DVD is a lot more complex, reflecting the enormous advances that have occurred in laser optics and digital electronics since then.

DVD has also had a much faster break into the market than CD did. Manufacturers sold approximately 350,000 DVD players to dealers last year—about 10 times the number of CD players sold in that format's first year. (In fact, both CD and the VCR took more than two years to achieve comparable total sales.) This makes DVD the second most successful format launch in consumer electronics history, surpassed only by DSS. Estimates of sales to consumers last year range from 160,000 to 250,000 units, depending on whom you ask. Sony thinks the number is closer to the high end of that range, based partly on the chronic back-order situation it has faced for its players. Sales of stand-alone DVD players are expected to about double this year.

Conditions on the software side have been, if anything, even brighter. More than 500 titles were released last year; by the time you get this magazine, the total should be approaching 1,000, and by the end of the year, it should rise to between 1,500 and 2,000. Last year, studios shipped more than 1.5 million DVDs to dealers. As I write this, in the middle of March, the total is up to around 2.5 million.

So far, I've been speaking strictly of DVD-Video, but much more is on the horizon. DVD-ROM drives (compatible with DVD-Video) should become a standard feature of personal computers this year. (I saw a DVD-ROM title for the first time just a few days ago, in a local Computer City store.) And by this time next year, we will probably see the introduction of two competing primarily-audio formats based on DVD's high-density disc technology—DVD-Audio and the Sony/Philips Super Audio CD. (The "0.9" specification for the former is out now, but little has changed from my description in the March issue, so I won't rehash the whole

thing here. For a rundown on the Super Audio CD, see John Eargle's "Currents" column in the January issue.) The most important aspect of both systems is their ability to convey very high-quality multichannel sound. The specific implementations, however, embody not just different technology choices but also very distinct design and marketing philosophies.

There is so much to like about the underlying goal that it is painful to see what a mess the whole thing is becoming. Super Audio CD has the virtue of simplicity and completeness. It should be very clear to everyone what the format provides, and every player sold should play every Super Audio CD ever made as well as DVD-Video discs. Plus, if it works as Sony and Philips say (only they seem to believe it will), there will be a standard CD layer on every Super Audio CD that will play in the normal fashion on any ordinary CD or DVD-Video player. The main problem with Super Audio CD is that its adoption will require the entire recording industry to switch over, at great expense, from PCM to Sony's DSD bitstream coding method.

DVD-Audio preserves PCM as its core coding method. It is thus automatically more compatible with existing digital audio equipment in recording studios. But it offers no CD layer and only spotty compatibility with existing DVD-Video players. And the very fact that I use a phrase like "core coding method" is a tip-off that DVD-Audio is not nearly as buttoned up as Super Audio CD. Yes, a DVD-Audio disc must use PCM, but in the current proposal, it may use anything else as well, so long as a maximum data rate of about 9 megabits per second is not exceeded. Anything at all. So some form of the program on any DVD-Audio disc will play in every DVD-Audio player, but not necessarily every form of the program on the disc. There is effectively no limit to the potential expansion of the universe of coding formats that might appear on DVD-Audio.

So it's tight and regimented versus open and loose. Would that we could mix and match the best elements of each. Instead, all we can do is kick back and watch the proverbial tag-team grudge match unfold before us. At least we'll have some good movies to watch between rounds.



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Ken Kessler, Daniel Kumin, Robert Long, Paul Moor
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V.P./GROUP PUBLISHER
Tony Catalano 212/767-6061

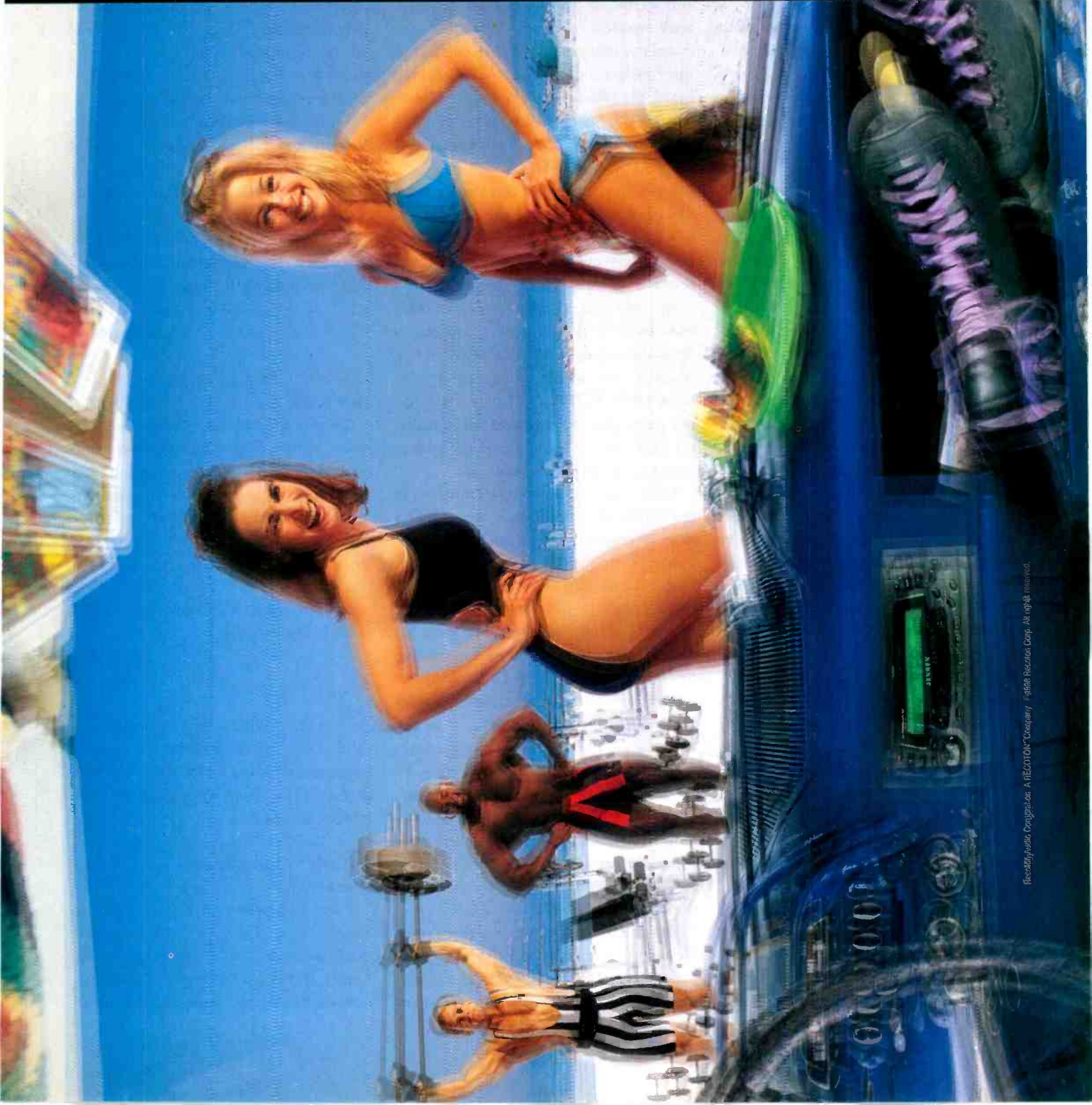
V.P./ASSOCIATE PUBLISHER
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GENERAL MANAGER Greg Roperti
BUSINESS MANAGER Jonathan J. Bigham
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Is That a Threat... or a Promise?

Dear Editor:

In his "Front Row" column in March ("Hell Bent for Leather"), Corey Greenberg's claim that our company's name has sadomasochistic connotations is patently untrue.

If we catch him making such a claim again, he'll get the whipping he so richly deserves.

Jeff Joseph
Joseph Audio
White Plains, N.Y.

Gimme Some Spatializer

Dear Editor:

As a longtime *Audio* subscriber and the inventor of Spatializer, I'm writing to clarify a statement made by Eric G. Norberg in the February "Letters" section. Mr. Norberg states that although he had not tried Spatializer, he understood that "when its output is monoed, there are phase effects. As a broadcaster, I don't like that."

I am not going to comment on the sonic virtues of Spatializer, as I believe its sonic signature is a highly personal experience, the preference for which must be determined by each listener. However, the fact that 10 million self-adjusting Spatializer devices are in use throughout the world does say something about preferences. I strongly encourage Mr. Norberg to familiarize himself with the sound of Spatializer at his earliest convenience.

In contrast to his conjecture, Spatializer is indeed very mono-compatible. As the designer of Spatializer and a 25-year veteran of professional recording, I am well aware of the devastating commercial consequences that mono incompatibility brings. The fact that professional Spatializers are used for numerous recordings, major movies, and awards shows (including the Grammys, MTV Music Awards, Tonys, and Emmys) attests to Spatializer's mono compatibility. Recently the Olympic committee purchased and used an unprecedented 22 professional Spatializers for NBC's official feed to 197 broadcasting affiliates worldwide. If mono compatibility were an issue,

the professional and skilled engineers working on the Olympics would *not* be interested in Spatialized broadcasting. Extensive professional use affirms Spatializer's complete mono adaptability. Since many televised events are heard in both mono and stereo, all production devices must meet broadcast standards for mono compatibility. It is estimated that one out of three people on the planet watched (and heard) the 1996 Olympic Games and therefore heard either Spatialized stereo or mono from Spatialized stereo. No compatibility problems were reported.

Spatializer was designed in the vinyl days, and its professional use predates the CD. Spatializer is mechanically mono compatible, mathematically mono compatible, forward and backward compatible, and compatible with not only FM broadcasting but also satellite up/down compression links, AC-2 and AC-3 perceptual coding schemes, microwave compression relay links, DVD, HDTV, and Dolby Pro Logic and other cinematic matrixes. All Spatializers meet these criteria—digital and analog, professional and commercial.

Mechanical mono compatibility is the most difficult to achieve. It means that a stereo V-groove LP record can be tracked by a mono cartridge without loss of information or mistracking of the stylus. Spatializer is the only 3-D process with this ability. Michael Jackson's *HIStory* is the most recent modern Spatialized recording of note to be released in the stereo LP format.

Mathematical mono compatibility applies to broadcasting of every type. It means that when a stereo signal is heard in mono (L + R), there is no loss of information, no modification of the inner instrumental balance between stereo and mono listening conditions, and no spectral anomalies (phasing) between the two conditions. It also means that the final signal conforms to the standards of the FCC and BBC.

Forward compatibility means that a regular stereo production can be spatially enhanced using Spatializer. Backward compatibility means that a previously Spatialized

stereo production (i.e., any recording made using Spatializer or other devices) can be reproduced through any Spatializer device without overprocessing. This is regulated by a spatial perception network in Spatializer called Double Detection Protection. It continually monitors the spatial perspective of any given stereo source and adjusts Spatializer's output to conform to a proprietary internal perception model.

Other compatibility issues involving Spatializer's use with various encoding and compression systems are all demonstrated to be nonexistent. They verify in theory and practice Spatializer's musical and electronic ability to conform to the many format standards used worldwide, including mono.

I hope this will abate any concern Mr. Norberg may have regarding the broadcast compatibility of Spatializer. I invite him to visit our Web page, at www.spatializer.com, for a demo.

And many thanks to *Audio* for years and years of excellent articles and for the enjoyment and insight it has given me.

Stephen W. Desper
Tujunga, Cal.

Doubling Your Pleasure

Dear Editor:

Regarding Corey Greenberg's "Auricle" review of the Philips DVX8000 multimedia controller (February), I was salivating at the thought of using this unit's line-doubling capabilities until it was pointed out that it works only with a front projector. Isn't there anything out there for people with rear-projection TVs? If not, there's a fortune to be made. Manufacture it, and I'll stand in line to buy it.

Steven Shaw
via e-mail

Editor's Reply: What actually is required is a set that can operate at twice the standard horizontal scanning frequency. It just happens that essentially all of these are front projectors.—M.R.

A Rush to Judgment?

Dear Editor:

I feel compelled to respond to Ken Kessler's December 1997 "Mondo Audio." While praising Mobile Fidelity's products, Kessler said he could forgive "sad aberrations such as the occasional Rush or Moody

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Tom Miiler
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Vol. 3 Issue 9

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Blues release.” Does Kessler mean that audiophile releases are wasted on rock as a genre? If so, he did not mention MoFi’s Guns n’ Roses releases or Pink Floyd’s *Dark Side of the Moon*. It would seem that he dislikes Rush and The Moody Blues and deems it necessary to inform his readers, as if to imply that such unworthy bands are crowding out chamber music on audiophile vinyl.

As a Rush fan, I take offense. I don’t like laying down bucks for an audio magazine only to see one of its columnists bad-mouthing one of my favorite bands. Of course, I’ve lost count of the instances in which I’ve been irritated by one or another pompous member of the audio press. Therefore, since I suspect Kessler has never listened to Rush, I offer him the following challenge: Turn the volume knob on your high-end reference system to 11 o’clock, and listen to “The Trees,” “La Villa Strangiato,” and “442.” (These are tracks, not albums.) Perhaps then some amendment or comment, if not an actual retraction, would be in order. If Kessler remains unimpressed, maybe he will at least acknowledge that his personal musical tastes are immaterial.

As for his “Through the Grapevine” piece to which I refer, it is my opinion that it served only as filler and is yet another vehicle by which Kessler tries to convince himself and his readers that he is an insider in the audio industry and is special because he lives in England while writing for American magazines. Big deal. His column was, in the slang of his adopted country, a “wank.” Why is it repeatedly necessary for Kessler to mention that he lives in the U.K.? It would have been infinitely better if there had been a review of a boombox in the same space wasted on this kind of crap. Too bad his writing, which is mediocre, can’t be restricted to his side of the Atlantic.

*Cornelius Montague
St. Simons Island, Ga.*

Case for Computers

Dear Editor:

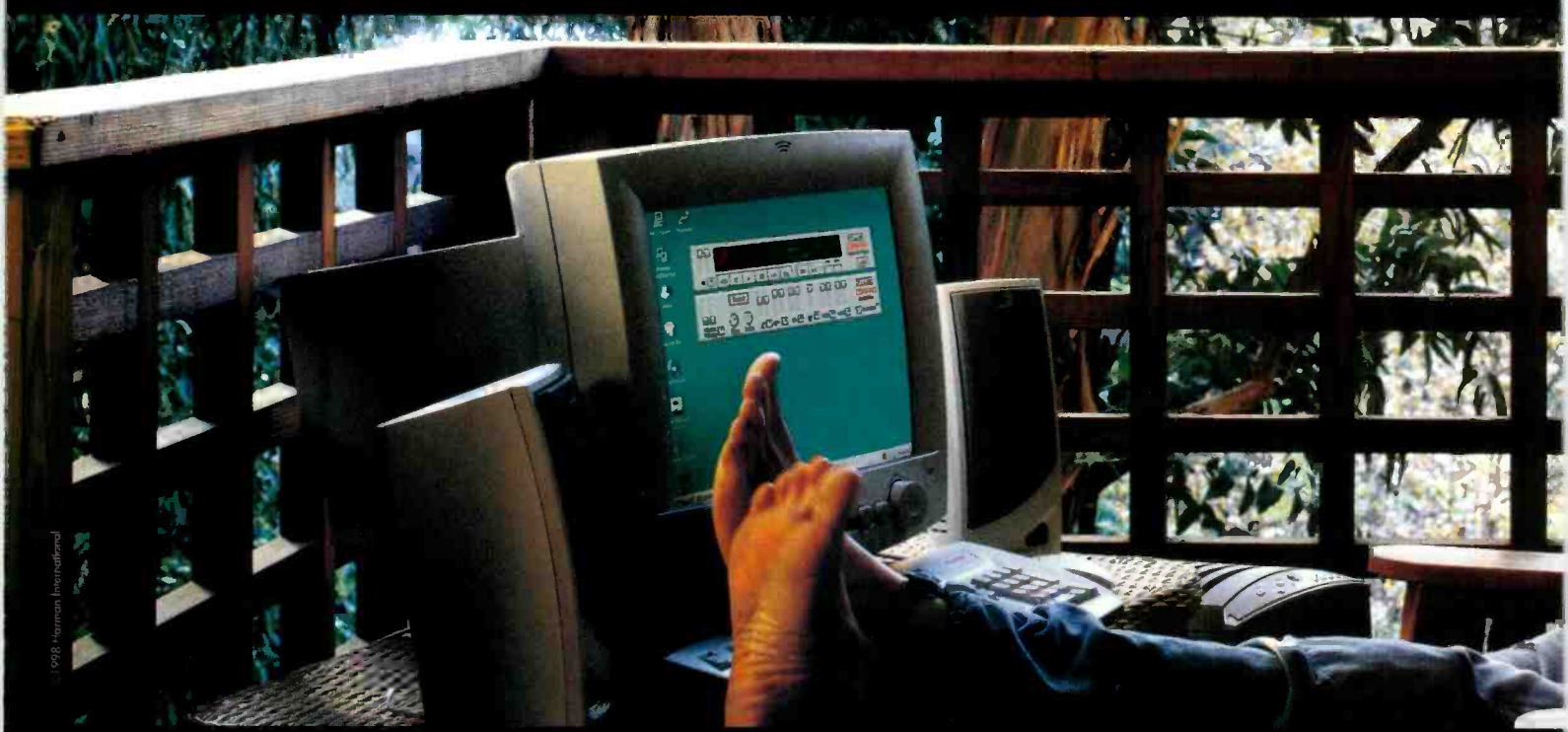
In his February article, “Living with CD-R,” Robert Long concludes that making CD-R recordings on a home computer is more cumbersome and “likely” less accurate than making such recordings on a dedicated audio-only device. But Long’s dismissal of

the computer route ignores some important benefits. I’ll briefly describe the upside.

It’s vastly less expensive if you already have a decent computer and plan to do just CD to CD-R recording. CD-R computer peripheral devices are available for as little as \$300, and the software already bundled with them typically makes sound-file manipulation a breeze. Toast software (made by Astarte) for the Macintosh is a marvel of simplicity and can also be bought separately for about \$99. CD-R blanks are often free after manufacturers’ rebates, and in any event, I never pay more than \$2 per blank after rebate. Finally, forget about external speakers; a good pair of headphones works great, and most of us already have those. The most you might need in addition is a headphone amp. Check out Edcor’s Website: It makes great, rugged, professional-oriented headphone amps for very low prices (mine was about \$100). So assuming we’ve bought extra software and a headphone amp, we’re up to about \$500 and are ready to make party mixes from our regular CDs.

In his article, Long raises the issue of transferring analog recordings—vinyl, for

WAS AT WORK.



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instance—onto CD-R. I suppose this is where a dedicated audio-only device comes in handy, since you can go directly from a phono preamp to the A/D of your CD-R machine and then onto the blank. (Like Long, I don't trust the indigenous analog inputs of most computers, but today's separately purchased sound cards can be excellent in this regard.)

I still think the computer offers some advantages in terms of bit-by-bit manipulation of the recordings you make, and this could tilt the scale for some users. I transfer to DAT in the first instance, since I'm free to make mistakes and record over them. (It's also convenient to have two hours of music in one place—four hours if I'm willing to sacrifice sound above 16 kHz.) Now that the music is just data, I can feed that data into my computer directly via the DAT recorder's digital output and the computer's digital input. Most computers require a digital sound card with digital inputs and outputs for this, and these are still a bit pricey (\$700 or so). But you open up a world of opportunities with a good sound card, such as those made by Digidesign.

Once music becomes data on your computer's hard drive, available software allows bit-by-bit editing of the data; you can make fades, cross-fades, level changes, balance correction—you name it. The editing possibilities are nearly endless these days.

I can't deny that this stuff can get complicated. I will say that today's expensive, audio-only CD-R may be a short-sighted purchase. CD-R is just a format, after all; it's just another medium for storing numbers. Computers represent the junction where formats can—and most likely will—converge. Anyone considering getting his feet wet in digital recording should at least keep an open mind about convergence and explore the cross-platform possibilities inherent in digital media.

Patrick Sutton
Alexandria, Va.

The Price Is Not Right

Dear Editor:

I know there is the argument that *Audio* needs to review, test, and carry ads for high-end products to provide a guide for what is the ultimate in today's audio.

However, a \$3,500 CD player, a \$1,900 mono amplifier, a \$27,500 speaker, and an 8-foot speaker cable costing \$3,350—all in your February issue—speak to me as overkill so gross as to be meaningless to the average audio enthusiast.

Equipment designed to sell at these price levels cannot possibly be compared to components that the average audio fan is buying. I'm afraid you have become an elitist magazine for only the very rich (and the very gullible).

To keep your loyal but less well-heeled subscribers, you should be providing more coverage of truly affordable products. The designers and manufacturers who can provide the most audio fidelity for the least cost deserve to be recognized.

Ken Massey
Indianapolis, Ind.

Editor's Reply: What appears in advertisements is largely out of our control. In editorial coverage of components, we try to strike a balance, at least over time, though individual issues may lean one way or the other.—M.R.

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Optimal Cassette Storage

Q *I would like to keep my audio cassettes in top condition for as long as possible. What is the best way to store them?—Phil Sager, Tempe, Ariz.*

A If possible, maintain your storage space at a temperature between 60° and 75° F, with a relative humidity between 30% and 45%. In very dry climates like yours in Arizona, you may have to use a room humidifier to achieve this level of humidity. If you do, I recommend using only distilled water in the humidifier to avoid the dispersion of residual mineral deposits usually present in tap water. Were these to migrate onto the tapes, they might cause long-term degradation.

Protect your cassettes from dust by keeping them in their plastic boxes in a closed cabinet. *Never* store them in a damp basement in cardboard cartons; after a few years, the dampness and mildew may render them unplayable. And try not to store tapes in your car, where they will be subject to extreme heat or cold. Buy a zippered nylon carrier, and take the tapes inside when you leave your car.

Dipole Surrounds vs. Dolby Digital

Q *Which type of surround speakers should I use for my Dolby Digital system? I know that bipolar and dipolar speakers are intended to create a diffuse surround effect and prevent pinpointing the location of the speakers. But is this appropriate with a discrete 5.1-channel system like Dolby Digital? And because I have an open area behind my couch, I'm not sure where to put them. Should I suspend them from the dropped ceiling?—Bryan G. Walbert, via e-mail*

A Placement rules for surround speakers are not inflexible, but it is usually best to mount them (regardless of type) on the *side* walls, to either side of your couch, somewhat above the ear level of seated listeners. Then, if you want to experiment with a second pair of surrounds on the rear wall, go ahead and see what effects you obtain. I've heard several home theaters set up

this way, and the sense of ambient envelopment was outstanding.

The effects produced by dipole or bipole surround speakers, mounted on the side walls, are very similar. By radiating sound toward the front and rear of the room (and, in the case of dipoles, producing a null toward the listening area), both types of speakers create a large, amorphous, enveloping surround sound field. In my comparisons of dipole and bipole surrounds with Dolby Digital (AC-3) material, neither type of speaker muddled directional information when it was intended for the left or right surround speakers. Some people might argue that conventional surround speakers, used with Dolby Digital, produce a more precise delineation of the discrete surround channels' directional cues, but I have not found that to be the case.

Bloated Bass

Q *Help! My bass is bloated. Using an SPL meter and a test record, I measured a 10-dB hump between 80 and 100 Hz. I'm sure the problem is in my listening room, because my speakers are rated to be very flat over this region (this was confirmed in a review in Audio). I've tried every possible room rearrangement and have the sprained back to prove it. Any steps I've taken to alleviate the situation cause even worse problems at other frequencies. Is there an acoustical room treatment that can rectify this difficulty? I do not use an equalizer, and I would hate to add more circuitry to the signal path if I can avoid it.—Tom Ryan, Boones Mill, Va.*

A Your mention of a sprained back suggests that you own heavy, floor-standing speakers. Even so, a small stand (about 12 inches high) can sometimes work wonders by elevating the woofer (and port,

If you have a problem or question about audio, write to Mr. Joseph Giovanelli at AUDIO Magazine, 1633 Broadway, New York, N.Y. 10019, or via e-mail at JOEGIO@delphi.com. All letters are answered. In the event that your letter is chosen by Mr. Giovanelli to appear in Audioclinic, please indicate if your name or address should be withheld. Please enclose a stamped, self-addressed envelope.



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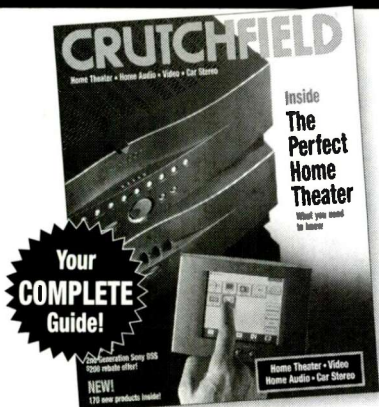
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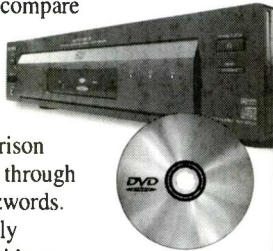
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if it's a vented system) far enough above the floor to eliminate the emphasis of bass frequencies that results from proximity of the woofer to an adjacent surface. And make certain the distance of the woofer to other nearby boundaries—the walls to the side and behind the speaker—is different from its height above the floor. Nor should it be an arithmetic multiple of that distance (i.e., if the woofer is 12 inches above the floor, don't position the speaker 24 inches away from the side or rear walls).

Audiophiles whose listening rooms are plagued by standing-wave problems like yours too often think of repositioning only the speakers; try moving your chair or sofa as well. You may find a position for the seat that puts you in a null for the offending standing waves. By shifting it forward or back a foot or so, you may be able to tame the offending standing waves to a tolerable level without nulling them into inaudibility. Parametric equalization, carefully applied, can offer a real solution to your dilemma, but so can the simple remedies outlined above.

If your listening room is in the basement, with concrete floors and walls—the very worst sort of room, because the walls and floor don't absorb sound—you might consider adding false walls using gypsum board on 2 x 4-inch studs to serve as membrane absorbers for low frequencies. A false floor can also provide good low-frequency energy absorption.

Oddball Meter Readings

Q *When I use my new tape deck to play back cassettes that were recorded at the 0-dB mark on my old deck (a different brand), the new machine's level meters read +6. But if I use my old deck to play back tapes recorded at 0 VU on the new machine, the meters on the old deck read -6. Why? Is my old tape deck oversaturating the tapes?—Eric Wong, via e-mail*

A It's not likely your old deck is oversaturating the tapes. Do you hear distortion on peaks when you play back the recorded cassettes? What counts is the signal level that goes onto the tape; the record level meters are there only as a rough indicator to help you avoid recording distorted signals. But you must get used to the particular characteristics of the meters on your machine and the corresponding sound

quality at different recording levels, because factory calibration of tape decks and meters can vary significantly from one manufacturer to another, as your experience illustrates. There are even different standards worldwide for 0-dB recording level.

With your new deck, you should determine which record level settings yield clean sound. How far above 0 dB can you let levels peak without incurring audible distortion? If your tapes from the old deck peak at +6 dB on the new machine and the sound is distortion-free, it shows that the 0-dB mark is set more conservatively on your new deck than on the old deck. Try recording the same music on the new machine and let the levels peak at +6 dB. If the resulting tape sounds clean, with no dulling of high frequencies or mushiness on cymbal clashes, then you know you can set the meters to peak at +6 dB.

If you want to be really persnickety about this, you could recalibrate one of your decks. You could try to do it with a test tape (hard to obtain); even then, you'll need a service manual so you can make any internal adjustments that may be required when you play the tape.

The test tape will contain signals recorded at standardized levels; the supplied instructions should identify each signal and its recorded level. Some tape decks have Dolby Laboratories' specified level, 200 nanowebers per meter, marked on the meters. Your new machine may or may not have been calibrated to that level; some decks are calibrated to the DIN-specified flux level of 250 nanowebers per meter.

If you play the test tape and discover your meters read -6 dB, then you have to find the calibration control that adjusts playback level so that you obtain 0-dB playback. Once you have properly set up the playback level on both decks, use this reading as the basis by which to calibrate your record levels. Record a signal at a frequency of 1 kHz at 0 dB. When you play back this test tone, you should obtain a similar reading. If it is significantly different, adjust the record level such that the playback reads 0 dB when the record level shows 0 dB. This procedure is greatly simplified if your decks have separate playback heads for off-the-tape monitoring during recording. **A**

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The heart of the MartinLogan product line is our proprietary CLS™—curvilinear line-source—electrostatic technology. This unique assembly consists of an extremely low-mass diaphragm which floats between two perforated metal plates called stators. The application of an electrostatic charge enables the diaphragm to move at a level of accuracy and at distortion levels traditionally associated with only the finest audio electronics. The CLS™ projects a 30 degree phase coherent wave-front producing a wide listening area with minimal room interaction. This ground breaking transducer is unequalled in its ability to reveal previously hidden harmonic detail, the experience of which suspends disbelief.

MartinLogan's electrostatic innovation enables our unique hybrid technology to crossover at a single point, conservatively 2-3 octaves lower than traditional dynamic driver loudspeaker systems—considerably lower than the most fragile audio information. The resulting upper range and low bass spectral components are seamlessly recombined. Each sonic event appears powerfully and brilliantly against a deep and continuous stage extending infinitely in 3 dimensions.

The reQUEST and AERIUSi systems exemplify the exhaustive engineering in electrostatic transducer, dynamic driver, and crossover technology, required to manifest this new standard in reference sound reproduction. Remarkable efficiency, impedance stability, and superior power handling make CLS™ technology appropriate for use with a broad range of amplifiers. Outstanding attention to design and detail along with strict attention to fit and finish have resulted in uncompromised form and function—with surprising affordability.

When you become disenchanted with the ordinary, I invite you to audition MartinLogan CLS™ hybrid electrostatic loudspeaker technology. Experience music as it was performed—experience audio as it was recorded—experience *the* electrostatic technology.

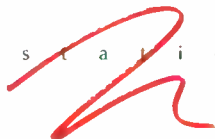


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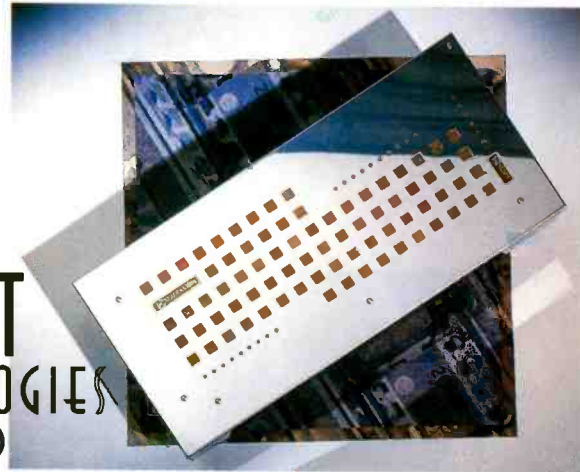
WHAT'S NEW

THIEL SPEAKER



A coaxial midrange/tweeter and metal-cone woofer built by Thiel distinguish the CS2.3, a three-way system that also uses a 9-inch passive radiator. The last, combined with the 8-inch woofer, is said to deliver dynamic bass output down to 35 Hz (-3 dB). Thiel says metal diaphragms provide superior stiffness and eliminate diaphragm resonances, thus yielding very clear sound. Frequency response is specified at 37 Hz to 20 kHz, ±2 dB. The CS2.3 weighs 70 pounds and stands 41½ inches tall. Price: \$3,300 per pair. (Thiel, 606/254-9427)

XTANT TECHNOLOGIES CAR AMP



Housed in a stainless-steel enclosure and cooled by a variable-speed fan, the 3300x three-channel amp has rated power output of 60 watts x 2 plus 180 watts x 1, all into 4 ohms. THD is specified at 0.04%, and input sensitivity is adjustable in 10-dB steps from

100 millivolts to 8.5 volts. Frequency response is rated at 5 Hz to 50 kHz, ±1 dB, with an S/N of 100 dB. The built-in crossovers have a specified slope of 12 dB/octave and a knee frequency of 90 Hz. Price: \$999. (Xtant Technologies, 602/431-8686)

Designed to provide the necessary gain and RIAA equalization for moving-magnet or moving-coil phono cartridges, the PH-1 is for LP enthusiasts

integrated amplifier. The PH-1 supplies 61.5 dB of gain to MC cartridges and 42 dB of gain to MM cartridges; its output



who wish to upgrade an existing phono system or add a phono input to a line-level preamp or

is appropriate to feed a preamp's auxiliary input or another line-level input. Price: \$1,200. (AcousTech Electronics, 800/716-3553)

Technics A/V Receiver



Besides Dolby Pro Logic surround processing, the SA-AX920 has six discrete-channel inputs to accommodate the output from an external Dolby Digital or DTS decoder or from a DVD player with built-in 5.1-channel AC-3 decoding. The integral Class-H+ amp is rated to produce

100 watts for each of six channels into 8 ohms (1 kHz, 0.9% THD). Moreover, there are four A/V and four audio inputs, a 30-preset AM/FM tuner, a line-level subwoofer output, a test-tone generator, and a 58-key universal remote. Price: \$399.95. (Technics, 800/222-4213)

X PARASOUND SPEAKER SELECTOR X

The S/PS-140 speaker switcher permits a power amplifier to safely drive as many as four pairs of speakers without incurring damage to the amp's output stage. A bypassable protection circuit connects



a precision, 4-ohm, 60-watt, noninductive resistor bank in series with the input. Parasound says the selector remains sonically invisible in the circuit because of its bifurcated switches and redundant contacts. Price: \$120. (Parasound, 415/397-7100)

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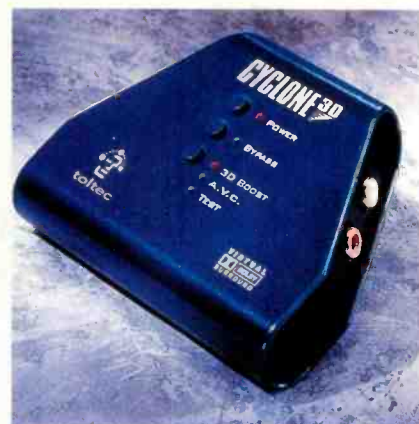
WHAT'S NEW

ATLANTIC TECHNOLOGY HOME THX SPEAKERS

Said to have been engineered to provide exceptional performance with discrete digital 5.1-channel audio systems, System 450 THX comprises five speakers: a pair of 451 LR main speakers, a 453 C center speaker, two 454 SR three-sided surround speakers, and a 452 PBM powered subwoofer. The sub has a long-throw 15-inch driver, a 300-watt



built-in amp, high- and low-level inputs, a phase inversion switch, and a front-panel level control. The drivers for the main and center-channel speakers are identical, to maintain timbral consistency: Each has two 3½-inch midranges and a 1-inch tweeter, in a D'Appolito array, and two 6½-inch woofers. Price: \$5,046; stands (shown) optional. (Atlantic Technology, 617/762-6300)



◆ VLS TOLTEC ◆ SIGNAL PROCESSOR

Connected between a hi-fi VCR or laserdisc/DVD player and a stereo receiver, the Cyclone 3D enhancer is said to create five "virtual" speakers from two stereo speakers, enabling owners of a conventional stereo system to experience Dolby Surround sound. Toltec Virtual 3D Processing is built in, as is an automatic volume control for late-night listening. The Cyclone 3D uses psychoacoustic techniques and a Motorola DSP chip to achieve its effects. Price: \$99.95. (Virtual Listening Systems, 352/379-0807)

JVC CD CHANGER

The XL-MC334BK can hold 200 CDs and play them randomly on its rotary changer mechanism. With CD Text, you can set up eight custom files, with as many as 32 discs per file, and call up any disc by name, performer, or genre. Text Compu Link will transfer CD titling information to certain JVC



receivers, which can then display the information on a TV. The XL-MC334BK uses a proprietary 1-bit D/A converter. Price: \$450. (JVC, 800/252-5722)

DENON DVD PLAYER

A 10-bit DAC handles the video chores in the DVD-3000, and a 96-kHz, 24-bit DAC is used for the audio. The player also has built-in 5.1-channel Dolby Digital (AC-3) decoding with a six-channel array of analog output jacks. Besides S-video and composite-video outputs, there are

component-video outputs for use with high-resolution monitors. Coaxial and optical digital outputs are included, and, unlike first-generation DVD players, the 3000 will recognize and feed a DTS bitstream to a digital output. Price: \$899. (Denon, 973/575-7810)



CAR SPEAKERS

The pressure-cast aluminum basket of the QM 218.61Q, a 6½-inch woofer, encapsulates a neodymium magnet and is radially finned to enable it to function as an integral heat sink. MB Quart says this typifies the design detail of its Q-series systems. The QM 25.61Q

tweeter has a 1-inch titanium dome with a composite surround and a neodymium motor. A flush/angle mount is provided, as is an external crossover that enables biamping or bi-wiring. Price: \$799 for two woofers, two tweeters, and two crossovers. (MB Quart, 508/668-8973)

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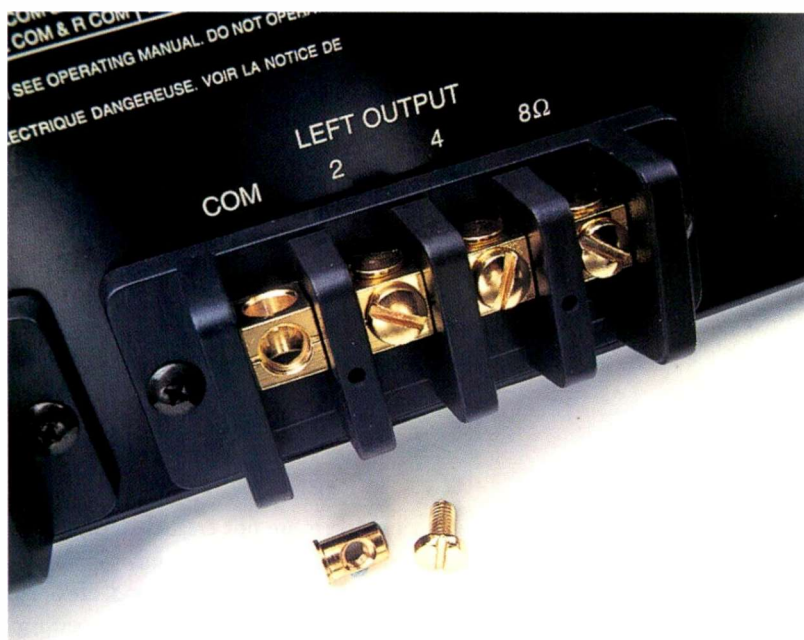


Photo: Len LaGruta

The speaker terminals that made the author sweat

Somewhere, there are two McIntosh MC300 amps with my name on them. Well, my initials, anyway. And they're not on the outside of the amps but inside them.

My initials are there because everyone at McIntosh signs off on everything they build, and I recently

built one MC300 rear panel and did mechanical assembly on another. I wasn't moonlighting, just being a guest and guinea pig at a press preview of the company's McMasters program. About 160 McIntosh dealers and their employees are scheduled to go through this innovative program by November.

"Manufacturers forget that the guys out on the sales floor may not know what the company is doing, why it's doing it, and how it got to where it is," says Tom Cumberland, the company's product planning director. "But because our factory is in the U.S., we can bring dealers and reps

The author work

here and show them. There's also a hidden agenda: If I bring installers and sales guys to visit us... what do you think that might do for product development?"

Our McMasters preview began with a plant tour. McIntosh's high-tech products are produced in a largely low-tech environment, using plenty of hand craftsmanship. The plant's transformers, for example, are wound on a machine that founder Frank H. McIntosh built in 1949—but that machine does a better job of putting precisely the right number of wire turns on every winding than any outside transformer maker McIntosh has found. And although circuit boards go through a solder bath, some parts of certain boards are still hand-soldered.

The square, tapered holes in McIntosh's glass front panels are made by a water-jet machine, originally developed for metal cutting, which spews water and abrasive garnet dust onto the glass. The cutting pattern is controlled by a computer, but the computer is controlled by a craftsman, Dave Stanton. Why make the panels of glass instead of easily

McINTOSH'S HIGH-TECH PRODUCTS ARE MADE IN A LOW-TECH PLANT WITH PLENTY OF HAND CRAFTSMANSHIP.

cut metal? "With glass, all you need to make a 20-year-old amp look new again is a soft cloth and some Windex," explained Cumberland.

The best way to understand hand craftsmanship is to practice it. So, after seeing how McIntosh products were made, we returned to the production line to help build some. One writer in our group stuffed circuit boards, another put power transistors into heat sinks, another silk-screened glass front panels, and so on. Under the tutelage and supervision of Rose Silvanic (who's been at

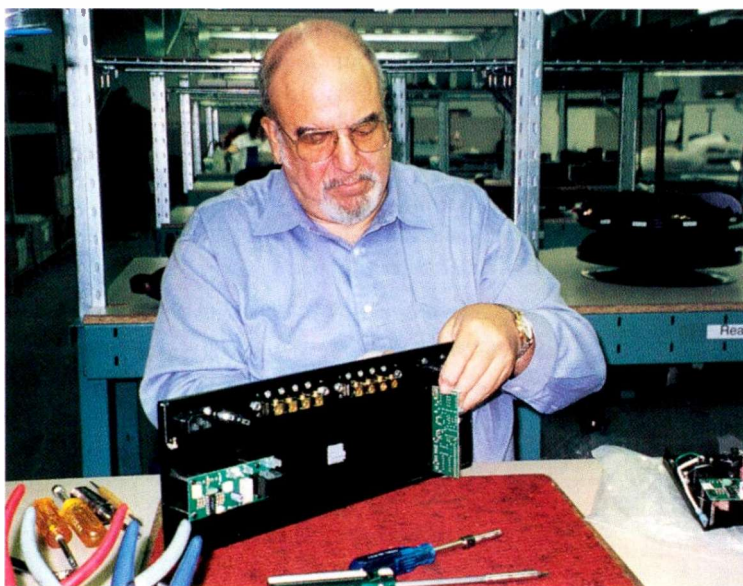


Photo: Tom Cumberland

7B ST



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McIntosh for 13 years) and Kathy Tabor, I slowly put one panel together and was making faster headway on my second when our two-hour “shift” ended.

I’d perhaps have been faster had I not paused to analyze the panel’s design. At first, I wondered why just one of the screws that held parts inside the panel was a welded-on stud, while all the others were screws I had to insert. But as I attached the parts that each screw held, the difference became obvious: The screws merely fastened other sub-assemblies in place. The stud was a ground-connection point, which had to make perfect contact with the metal of the panel.

But the speaker terminals—massive, elaborate, and hard to assemble—did not make any sense to me until

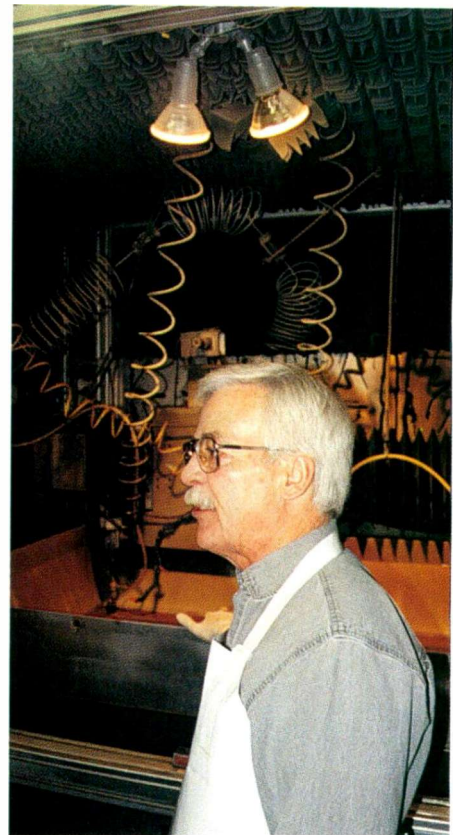
Tom Cumberland explained their design, a paradigm of McIntosh’s take-no-prisoners approach. Each of the MC300’s terminals is a gold-plated brass block with a $\frac{1}{16}$ -inch hole, big enough to hold a banana plug or the end of an AWG #4 wire. Plastic moldings form barriers to keep stray wires from shorting together—but unlike the simple barrier strips I’m used to, the MC300’s barriers have

quarter-inch-thick walls, and the terminal spaces between the barriers are almost half an inch wide.

Once I’d installed the barriers, my next task was to plug the holes in the terminals with gold-plated brass barrel nuts and secure the nuts with gold-plated machine screws. This wasn’t easy, because the barrels rolled out of alignment with the screws I was trying to thread into them (not that my instructors on the bench had any problems with them).

I was perplexed: With the holes plugged by barrel nuts, how do you get your speaker wires

Dave Stanton, the craftsman behind the glass cutter’s computer



The McIntosh assembly line



rels in the block and connect to the screws that hold the barrels in place—“But,” says Cumberland, “nobody uses spade lugs anymore.” Why gold-

plate the barrel nuts, which you won’t be using? “To avoid pitting and corrosion from galvanic action between dissimilar metals. Though these are dummy parts, you’ll only remove one pair of them per channel, so the others will be in there for a long, long time.”

After our “shift” on the assembly line, we got to see the high-tech side of McIntosh, as engineers demonstrated two of the company’s patented technologies, Power Guard and LD/HP. Power Guard is basically a distortion analyzer circuit linked to an attenuator that reduces input level at the onset of clipping; test instruments and our ears proved that the reduction in harmonic and intermodulation distortion was impressive. According to Cumberland, this lengthens amp life—and speaker life—since “amplifier distortion can also heat and warp mid-range cones.”

The goal of LD/HP (“low distortion/high performance”) speaker design is to

into them? “By removing the barrel nuts,” Cumberland told me. “They’re only there to protect the terminal block against damage in transit.” (Fat chance of that, considering the blocks’ ruggedness and the sturdy packaging necessitated by McIntosh’s glass front panels!) Once you remove the barrel nuts from the two terminals you’re using (e.g., 2 ohms and common), you put your cables’ ends or banana plugs into the terminal blocks’ holes, then secure your connections with entirely different screws (separately bagged and added later, which is why I didn’t know about them), that thread into the terminal blocks. “The key,” says Cum-

Carl Van Gelder explains his LD/HP speaker innovation

berland, “is to maintain a gas-tight connection, for maximum current transfer with the lowest possible voltage drop.” If you used spade lugs, you might leave the bar-

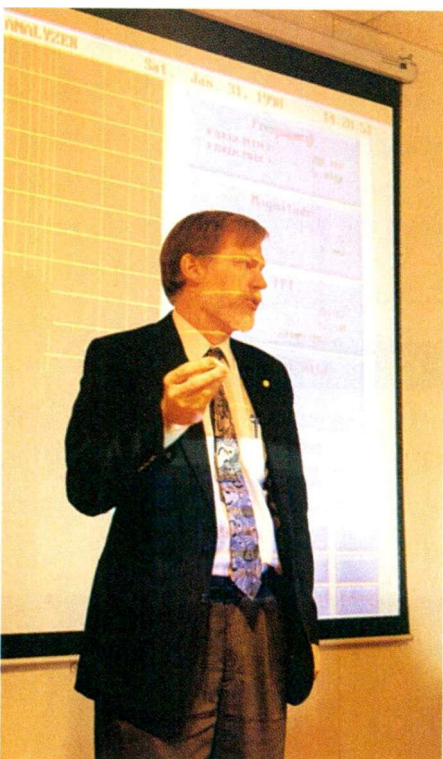


Photo: McIntosh Laboratories

Photos: Ivan Berger

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reduce distortion and improve power handling. The technology itself is simple: Shorting rings are placed above and below the gap between the pole piece of the speaker driver's magnet and that driver's front plate. According to its inventor, Carl Van Gelder, this makes the magnetic field more symmetrical, reducing the speaker's second-harmonic distortion. It also reduces the tendency for speaker inductance to rise as frequency increases; cutting back on the inductance rise enables more current to flow through the coil, increasing power handling and output.

After these demos, McIntosh put us to work one last time, wiring up a multiroom installation and a home theater. I wound up

**FIENDISH TRAPS
AWAIT UNWARY DEALERS
IN THE FINAL STAGE
OF McINTOSH'S
McMASTERS PROGRAM.**

working on the multiroom system, which was based on McIntosh's CR12 multizone preamp. The CR12's rear panel (glad I did not have to wire that!) has about three dozen RCA jacks, four D connectors of various sizes, half a dozen DIN jacks, and four terminal strips. Nevertheless, hooking up this preamp with the other components was pretty easy, because so many different and distinctive jacks were used and because they were all labeled logically.

Not that the system worked once we'd wired it; McIntosh had seen to that. Everything lit up, and input and output switching worked properly—but the CD player wouldn't operate. The engineer who'd set up the demo had deliberately left the player's transit screw locked, and none of us thought to check that because the player was already sitting on the shelf. But the traps awaiting dealers who go through the McMasters program will be far more subtly fiendish.

At our graduation dinner, each of us got a commemorative plaque. We did *not* get to keep the products we'd helped assemble. And someone, I'm sure, did a thorough inspection of each fumble-fingered journalist's work the moment we left the line. A

EDWARD TATNALL CANBY

Ed Canby, a longtime columnist and reviewer of classical music recordings for *Audio*, died at his Connecticut home on February 21, a week short of his 87th birthday. Readers of his column, "Audio ETC," which ran from 1947 to 1996, know that his interest in the interface between music and technology began long before the word "interface" (or the term "high fidelity") became common. Throughout his life, he had the enthusiasm for new ideas that most people lose by the time they reach high school.

In addition to his column, which combined reminiscences about his life in audio (going back to the wind-up phonographs of his school days) with coverage of intriguing and sometimes far-out technical developments that might affect hi-fi, Canby contributed thousands of record reviews. He was a Charter Member and a Fellow of the Audio Engineering Society.

Canby was actively involved in music throughout his life. At one time, he taught under Roger Sessions in the music department of Princeton University and later taught music at Finch College (where one of his students was Grace Slick, of Jefferson Airplane). He sang with the Dessoff Choirs, sat on its board, and had his own group, the Canby Singers, which made several recordings. Canby long maintained that amateurs, such as his group, brought a special quality to singing that professionals could not match.

Canby began his writing career with an article in *Harper's*, not long after graduating



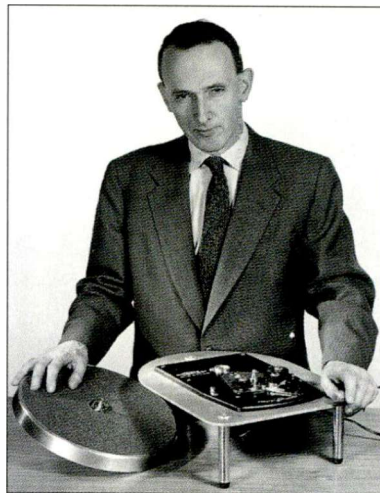
from Harvard in 1934. He later wrote about the burgeoning new field of high fidelity in *Saturday Review* (a magazine founded by his father, Henry Seidel Canby) and contributed to *The New York Times* and other publications. He went on at least one field recording trip to the Appalachians with folk song archivist Alan Lomax and for 18 years had a radio program, "Music ETC," on WNYC in New York.

Ed was always one of our most controversial writers, driving some readers to distraction and others to delight—

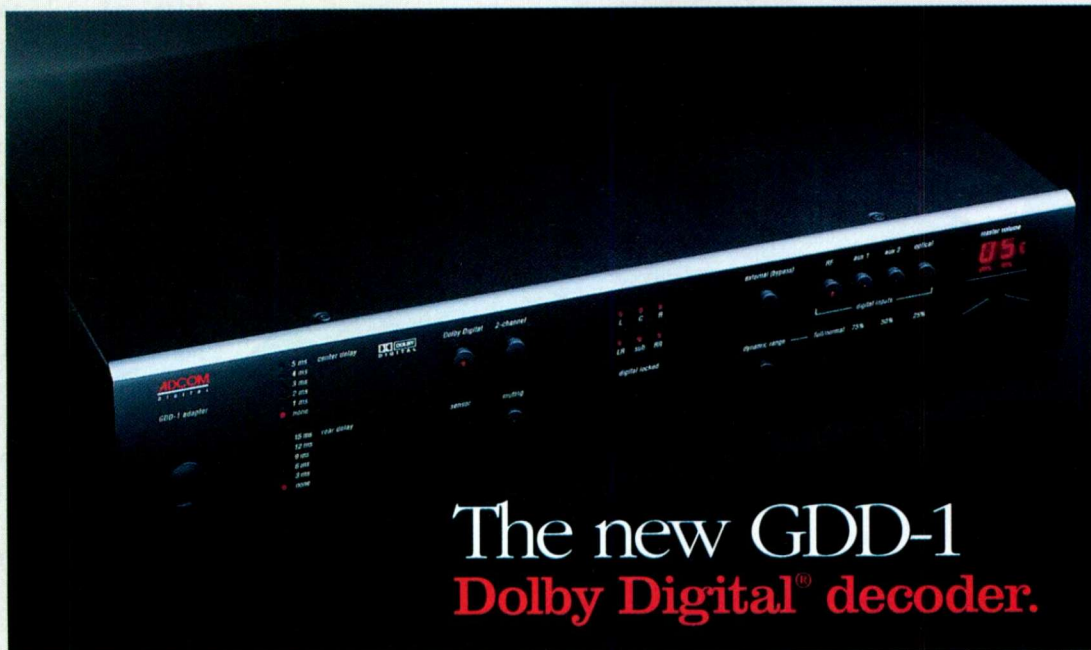
but none to boredom. The New England quiriness of his writing style always reminded me of Charles Ives' music. But Bob Long, another *Audio* contributor, remembers him for his long-

time radio theme music, Schubert's Symphony No. 5 in B flat. Says Long, "Its sunny insouciance represents the way I like to remember him: without the exuberance of an outright scherzo, perhaps, but poised and positive."

Ivan Berger



**CANBY'S WRITING
DROVE SOME READERS
TO DISTRACTION
AND OTHERS
TO DELIGHT.**



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GLOBAL SWARMING



Some peerless wit, probably Oscar Wilde, once said that England and the United States are two countries separated by a common language. Too bloody true. And you can use hi-fi pursuits and prejudices as prime examples, even though the world is shrinking and tastes seem to be growing more tediously uniform. But however recognizable a New Yorker or Los Angeleno would find the wares in hi-fi stores in London, there are differences in local preferences.

ATC's sub:
It's big,
it's bodacious,
and (surprise!)
it's British.



As fellow *Audio* contributor Tony Cordesman has mentioned, the British aren't exactly the world's most bass-aware, bass-hungry music lovers. By way of illustration, British speaker manufacturers have specialized in, and ex-

celled at, producing small speakers, setting the standard for compact two-way monitors. Yes, America has produced its fair share of excellent compact loudspeakers (Spica's first speaker, the Wilson WATT, and—going wa-a-y back—the Acoustic Research AR4x speaker spring to mind), and the Italians currently produce some of the finest examples that the world has seen. But mention small two-way speakers to a crowd of clued-in audiophiles, and most will see a Union Jack.

Conversely, Americans are seen outside of the U.S.A. mainly as purveyors of *big* speakers, as a nation of listeners whose obsession with the lower octaves is reflected in the typically large seat of a pair of Yankee trousers. And illustrative of this,

**THE PAIRING OF REL
AND BOSTON ACOUSTICS
IS THE BEST EXAMPLE
OF TRANSATLANTIC
CROSS-POLLINATION.**

American brands have established the stand-alone subwoofer as a specialty, a John Wayne-ism regarded as laughable and irrelevant in countries—no, make that whole continents—where homes with rooms larger than 12 x 15 feet are the sole province of the extremely wealthy.

But home cinema is challenging the status quo. To the delight of British manufacturers that have a few decades' worth of experience in downsizing, and to American manufacturers who've been looking for homes for subwoofers, the advent of 5.1-channel surround sound has been an absolute blessing.

With the exception of those homes so large that speakers of Wilson/Martin-Logan/Avalon dimensions are swallowed up with ease or where the resident audiophile has the nerve to dictate to his spouse that he will use whatever speakers he pleases, most of those spouses have looked on the trend with utter dread. And just as the change from mono to stereo meant much cajoling so that hubby could get a second speaker into the den, so has the need to add three more speakers and one or more subwoofers meant another wave of begging and pleading.

But salvation finally arrived in the form of self-powered, compact subwoofers and magnetically shielded mini-speakers so discreet and room-friendly that even the most ardent Martha Stewart devotee has had a hard time objecting to their presence. Whether it's a dinky, swivelly plastic construct from Bose or the latest in hang-on-the-wall miracles from Mission, a war has been waged on wives who would deny hubbies their A/V pursuits. And what's so ironic are recent role reversals in national identities, as hinted at during



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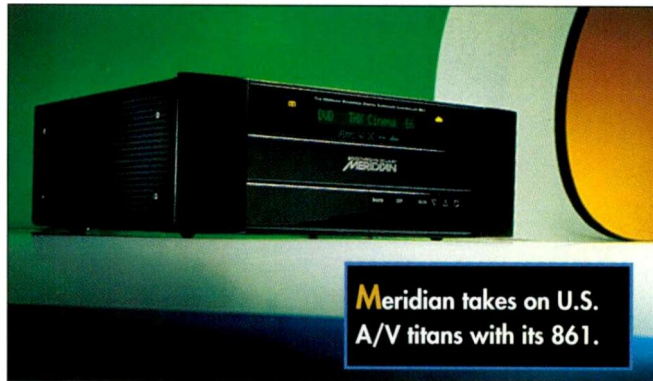
You've got questions.
We've got answers.

the January Consumer Electronics Show in Las Vegas.

Take Evett & Shaw, for example. This Salt Lake City-based speaker manufacturer made its high-end debut with the elegant Milano floor-stander, which, however novel its styling, was conventionally audiophilic in that it was larger than a loaf of bread. For 1998, E & S has chosen the other tack with the new Elan. (Note that it's named after a famous—and tiny—British sports-car of the 1960s.) The company demonstrated a pair of Elans sitting on a table flanking an amp, the obvious message being that those of us who spend hours a day in front of computers needn't suffer the disgustingly low-fi rubbish that passes for acceptable in the PC community. The other message, though, was almost as (loud and) clear: that this no-compromise, fully shielded mini-speaker conceived for near-field usage would also work perfectly well in a 5.1-channel setup if the prevailing conditions in a given household dictated speakers of minuscule

proportions. Even though an Elan's dimensions are only ¾ inches high, 4 inches wide, and 9¾ inches deep, each cabinet houses a forward-firing full-range driver, with a 4-inch woofer and 4-inch passive radiator underneath.

To further convey the new-found impression of widespread role reversals, let's pop



back across the pond and look at the latest from ATC, a firm so British in its outlook it's easy to forget that its founder and main designer, Billy Woodman, is Australian and that the company's compact two-way designs are outnumbered, 2 to 1, by gigantic floor-standers. What will appease those who are prepared to write off England as a

nation unaware of the bottom octave is ATC's first-ever subwoofer. And it's a big'un: ATC wasn't concerned with the sort of pressures that have led other manufacturers to stuff 10-inch drivers into 12-inch cubes. The SCM0.1/15 powered sub houses a 1-kilowatt amp and a 15-inch driver, and although I didn't measure the enclosure, it looks like it could serve as the stand for a 32-inch TV. Controls on the rear let you choose a crossover point of 50, 60, 75, or 90 Hz and select gain over a 12-dB range. The most important point is that this U.K.-made boombox delivers maximum SPL of 115 dB, which should be enough for both Beavis and Butt-head. But if this seems like overkill to you, note that a smaller version, containing a 12-inch driver, has been announced.

Perhaps the best example of transatlantic cross-pollination is a hands-across-the-water collaboration between Boston Acoustics and REL Acoustics, at least here in Great Britain. You need to understand that Boston has a very special place in the hearts of



Tree sap. Road grime.

The intestinal fluids of assorted flying insects.

Not exactly what mommy's window cleaner was made for.



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British audiophiles, especially those of limited means, because the Massachusetts firm produces speakers that could wear bowlers and carry umbrellas. Its assorted small two-ways, selling for less than the equivalent of \$200 per pair, are ideal mates for dinky, gutless integrated amps and are available just about everywhere. Hell, there are probably British hi-fi buffs who think the company is based in Boston, Lincolnshire, not Beantown.

Boston Acoustics, not one of those companies that was slow on the multichannel uptake, is now packaging its Micro 80 and 90 satellites, its CR1 and Micro 90c center-channel models, and its VRS Micro dipole surround speakers in systems using REL Q-50 or Q-100e subwoofers. Or maybe it was REL who packaged its subs with Boston speakers. Well, whoever played Yenta, this is precisely the kind of Bizarro (see *Superman* comics, *passim*), topsy-turvy marriage that keeps us on our toes. Instead of matchmaking with Brit minis and Yank subs, what we have here is precisely the opposite.

While this partnership is aimed specifically at British consumers, there's nothing to stop you from creating the same systems in America—after all, Boston is a home team, REL is imported by Sumiko, and all of



the speakers that make up these entry-level A/V systems in Britain are available on your side of the Atlantic.

REL/Boston 1 uses an REL Q-50 (the company's 50-watt powered sub with a 12-inch woofer), a pair of Boston Micro 80 satellites, the CR1 center channel, and a pair of VRS Micro dipoles. The package's price is £799—about \$1,280, including England's evil 17.5% "value-added" tax.

REL/Boston 2 substitutes the Q-100e for the Q-50, doubling the power of the internal amplification. The Micro 80s are replaced by Micro 90s, the CR1 departs to make way for the Micro 90c, but the VRS Micros remain. Package price is £1,199, or about \$1,900 in U.S. greenbacks.

Will we see other instances of cross-pollination, including, perhaps, more suggesting a loss of national identity? What should we make of Meridian—as British a firm as has ever reared its golden-eared head—climbing up the A/V slope to challenge the King of the Hill with its 861 surround processor? Or of the new turntable from Basis, the 1400, which shows that Americans aren't content to let the British monopolize the budget turntable market? Or how about Jadis releasing the entry-level Orchestra series, as if to disprove that the French only make stuff that no one else can afford?

Yup, the world is shrinking and national boundaries are becoming increasingly meaningless. But I don't think we'll have to disband the U.N. for some time. At least, not until the Italians make something ugly. **A**

the Softer Side of DVD

by Rad Bennett



As we come to the first birthday of DVD in North America, it seems fitting to evaluate the progress of the nascent medium. Is DVD delivering the goods?

Let's recall, for a moment, what the developers of DVD promised: a high-resolution picture, a selection of audio tracks (such as multiple languages), numerous video effects (slow motion, still frame, forward and reverse scan, etc.), an assortment of special features (such as different camera angles, subtitles in multiple languages, and closed captioning), and a playing time long enough

to hold a complete movie on one side of a disc. All this was to be delivered on an affordable, CD-sized disc that could be stored easily in a standard jewel box or in a package similar to those used for videocassettes.

Remarkably, in barely a year (compared to the decade or so it took laserdisc to mature), most DVD promises have come true. DVD's picture, even at a casual glance, is notably sharper than laserdisc's. Given an average video transfer, a DVD image resembles a laserdisc picture given a thorough cleaning with Windex. And when a movie has been newly mastered just for DVD, it yields a picture that is astonishingly sharp and clean. Movies shot with the widest aspect ratio, 2.35:1, benefit the most, more often than not displaying a level of video definition found only on laserdisc in



Photograph: © 1997, Benelux Press/The Stock Market

full screen or on occasional films that were shot with a 1.85:1 aspect ratio.

With DVD, there's no color noise. Hot reds and deep blues don't generate the dirty, granular texture so often visible on laserdisc. Moreover, "blooming" of white lettering on color backgrounds doesn't seem to exist on DVD, which makes subtitles and credit rolls a lot easier to read.

Sound quality ranges from good to excellent. The discrete center-channel isolation of dialog in multichannel films makes every word easy to hear. Still-frame and slow-motion capabilities are good, though they vary somewhat from one brand of DVD player to another. Scanning can be jerky. However, this problem is already being addressed on many second-generation DVD players,

which yield smooth scanning at several different speeds. Chapter search is rapid, much faster than that provided in the laserdisc format. The price of DVDs varies from about \$24.95 to \$29.95, with slightly higher prices for some titles boasting special features.

Though darned close, DVD is not perfect yet; there are some features that are either confusing or need to be worked out. As promised, most movies are contained on one side of a DVD. This enables films of average running times, such as *My Best Friend's Wedding* (105 minutes) or *Presumed Innocent* (127 minutes), to be presented in widescreen format on one side of the disc and in pan-and-scan (to fill a standard 4:3 TV screen) on the other—a technique used on most titles of average length from Warner Home Video, MGM/UA, New Line, Columbia TriStar, and Polygram.

Other studios have opted for just one version. And in making that decision, some ignore running time entirely: Universal, for instance, has risked offending movie purists by issuing some of its widescreen films in pan-and-scan only, whereas Live has done the opposite, releasing its titles in widescreen only.

An additional feature of some widescreen transfers is that they are processed anamorphically rather than simply letterboxed. This is not significant for conventional 4:3 displays, but on a 16:9 display, vertical resolution can be better than it would be with a straight letterbox. For 4:3 sets, the DVD player creates the letterboxed image from the anamorphically processed data.

Dual-layer DVDs enable longer films to be presented on one side of a disc, so you don't have to turn it over; however, these

think of Dolby Digital as implying 5.1 channels. In commercial movie theaters, it does. But on DVD, it ain't necessarily so. Dolby Digital can support as many as 5.1 discrete channels or as few as one (mono) or two (stereo)—the last carrying matrix Dolby Surround, if appropriate, for Pro Logic playback.

Not surprisingly, this has created confusion. MGM/UA, for example, has correctly labeled *The Wizard of Oz*, *National Velvet*, and *Jezebel* as mono because they use one-channel Dolby Digital. But MGM also labels early James Bond movies (*Dr. No*, *From Russia with Love*, and *Goldfinger*) as

opinion, what's really needed are standardization and clarification. I've raised the matter with a representative of the DVD Group (a consortium of representatives from studios and hardware manufacturers) in hopes that it will introduce standardized nomenclature or an icon system that consumers can readily comprehend.

Of course, how various movie studios apply Dolby Digital to their titles is left up to them. Not all movies made in the past 10 years have discrete multichannel soundtracks. These movies can most easily be transferred to DVD in two-channel Dolby Digital, retaining the original matrix Dolby Surround encoding. However, a studio might choose to remix a soundtrack to 5.1 channels or some other configuration. This is an expensive proposition, however, and so far, Warner seems to be the studio most inclined to remix. Although some of its older titles (*The Road Warrior*, *Gremlins*, and even *Jeremiah Johnson*) have emerged in spiffy new 5.1-channel mixes, they are really exceptions, if not icing on the cake.

Extra soundtracks and foreign languages are other options left up to the producer. Most Warner titles include soundtracks dubbed in French and Spanish, sometimes in the same audio configuration as the English soundtrack but often not. *Ladyhawke*, for example, has an English soundtrack remixed to Dolby Digital Surround 5.1, a French soundtrack in Dolby Digital two-channel matrix surround,

and a Dolby Digital mono Spanish soundtrack (clearly labeled as such on the box). When a language has been omitted on a Warner soundtrack, it will usually be covered by subtitles. Closed captioning is generally available in English and occasionally in other languages. Yet some DVD releases, such as *Silence of the Lambs* and *Robocop* (both Orion titles, released by Image Entertainment), carry no foreign languages or subtitles at all. This would seem to suggest a lack of interest in the

D*V*D enables films of average running times to be presented in letterbox format on one side and in pan-and-scan on the other.

have become commonplace only recently. Some long titles, such as *Michael Collins* (Warner) and *JFK* (Warner), were released on two-sided discs (widescreen) in order to get hot titles out to early adopters. But now, long films (*Terminator 2*, *Waterworld*, *Contact*, et al.) are being issued almost exclusively on dual-layer discs.

THE DISCRETE CHARMS OF DOLBY DIGITAL

Sound on DVD has been a bit confusing. Several years ago, laserdiscs were introduced with Dolby Digital (AC-3) soundtracks, with discrete presentation of front left, center, front right, left surround, right surround, and LFE (low-frequency effects) channels. Because the only reason for laserdiscs to have Dolby Digital was to reproduce the discrete 5.1-channel configuration of recent movies, the public began to



The Wizard of Oz, 1939
Photograph: MGM/Courtesy of Kobal

mono, although in these cases, two-channel mono. Thus, nothing should have come through my surround speakers when I played the Bond DVDs, but occasionally I heard plenty there; perhaps phase anomalies during transfer were the culprit. The bottom line is, you've got to read the fine print to know exactly what you're getting. But in my

DVD DVD DVD DVD DVD DVD

French Canadian and Spanish markets that share DVD Zone 1 with the United States.

Foreign films on DVD can benefit greatly from an array of soundtracks and subtitles. Vidmark's *La Femme Nikita* and Columbia TriStar's *Das Boot* are good examples: You can play the movie in the original French or German with no subtitles or, if you prefer, turn on the English subtitles. Or you can engage the dialog track dubbed into English instead of, or in addition to, the English subtitles. Foreign films could take on new life in the DVD format, where one size could literally fit all!

Defeatable subtitles could also be a boon for opera lovers. You might watch a favorite Verdi or Puccini opera with the titles on, until the meaning becomes reasonably clear, and then turn them off to concentrate on the staging, costumes, and music.

Many DVDs have other optional audio tracks. *Rock 'n' Roll High School* (Lumivision), *Who's Afraid of Virginia Woolf?* (Warner Home Video), *Demolition Man*

(Warner Home Video), *Roseland* (Warner Home Video), *Attack on Precinct 13* (CKK/Image), *The Cabinet of Dr. Caligari* (Blackhawk/Image), and *Dead Man Walking* (Polygram) are among those that have special tracks with commentary by the director, stars, or film historians. Still others have optional music tracks. *Mars Attacks*



Michael Collins, 1996
Photograph: Warner Bros./Courtesy of Kobal

(Warner Home Video) and *Amadeus* (Warner Home Video) have music-only tracks, and these are digital, unlike the optional laserdisc tracks, which had to be analog. *The Best Years of Our Lives* (HBO) offers an interesting mix: a choice of the original mono soundtrack, a Chace stereo remix (ex-

plained on a menu card), or the Oscar-winning film score. The only limits on DVD sound would seem to be lack of imagination, source materials, or budget.

VIDEO DISC HISTORY

Before DVD, laserdisc reigned as *the* benchmark format for video aficionados and home theater buffs. First introduced to the public almost 20 years ago, the optically read disc was developed by Philips/Magnavox and MCA. In its early DiscoVision catalogs, MCA promised family entertainment at an affordable price of \$4.95 to \$14.95 per disc. Unfortunately, MCA was never able to deliver on that promise. Plus, the discs were hard to find and contained an alarming number of defects: Images often had unacceptable levels of video noise, and the discs sometimes jammed (so-called laserlock), accompanied by an unpleasant sound. Another problem was vertical crosstalk, shaded areas of interference that moved slowly across the screen, caused by imperfect laser tracking of a warped disc's up-and-down movement.

A few years later, Pioneer stepped in and revitalized the laserdisc. Slowly the Japanese giant increased disc production and solved the problem of vertical crosstalk. Pioneer also applied CX noise

reduction to laserdisc movie soundtracks as well as music programs. And eventually Image Entertainment joined Pioneer in the production of quality software.

Both Pioneer and Image Entertainment survived a difficult period when thousands of laserdiscs became afflicted with laser rot (gradual delamination and oxidation of the disc, resulting in noise and snow levels that ruined the image). The companies replaced the faulty discs at no charge and tightened up their manufacturing techniques.

In the mid-'80s, laserdisc sound was notably improved by the addition of CD-quality digital audio tracks. At the insistence of consumers, more and more letterboxed editions of widescreen movies were issued, thus preserving the aspect ratios of the original releases. And stringently remastered discs began receiving THX certification.

In recent years, laserdisc has matured into a thoroughly reliable medium that delivers high-quality video and audio to its enthusiastic fans. R.B.

TRAILERS FOR SALE OR RENT

Some DVDs include supplemental material in the form of one or more trailers (Warner's *Under Siege 2* has eight, one for each movie Steven Seagal has made for the studio), featurettes about how a film was made, interviews, or galleries of stills. The companies that seem most interested in offering supplementary material are Warner Home Video, New Line, Live, Criterion, and, in its Collectors' Editions, Universal.

New Line, which has embraced the DVD format with an obvious passion, has announced a Platinum Series, priced at an affordable \$24.95 per disc. Each Platinum title will offer three of the following: audio commentary tracks, a behind-the-scenes featurette, scenes that were cut from the theatrical release, storyboard comparisons, original animation, original music composition, or music videos from bands featured on the film's soundtrack. Goodies that New Line considers *standard* are a widescreen version of the film, menus with animated graphics and icons for jumping to specific scenes, trailers, biographies and filmographies of the cast, photo galleries, closed captioning, subtitles, and multiple languages.

Warner has issued several DVDs with "making of" documentaries and some mu-

A C R I T I C ' S P I C K S

DVD has made more of an impact and shown greater improvement in its first year than laserdisc did in its first ten. Given DVD's success so far and its potential, I can't wait to see what the second year brings. In the meantime, here's a sampling of recent releases that make good use of DVD features and are also first-rate buys.



The reds and intense blues look a lot better on the DVD, too.

Jeremiah Johnson. 1972, 116 minutes, PG rating. Two-sided (one side 2.35:1 letterboxed, other side pan-and-scan), Dolby Digital 5.1, French Dolby Digital one-channel mono, English/French/Spanish subtitles, closed captioned. Includes featurette and trailer. Warner Home Video 11061, \$24.95.

An American Werewolf in London. 1981, 90 minutes, R rating. One-sided (1.85:1 letterboxed), Dolby Digital 5.1, closed captioned. Includes trailer. Live 60453, \$24.95.

This is the fourth release of this title in an optically read format, and it's the best. The first three laserdisc versions all had mono sound. In fact, the original movie may well have been in mono, as there's no Dolby logo in the credits. Whatever the source, the sound has been remixed here into very effective and natural Dolby Digital 5.1. Couple that with a very good video transfer, and you have a horror/black comedy cult movie that is much improved in its DVD incarnation, even though it doesn't have a lot of extra features.



The Arrival. 1996, 109 minutes, PG-13 rating. Two-sided (one side 1.85:1 letterboxed, other side pan-and-scan), English/French Dolby Digital 5.1, English/French/Spanish subtitles, closed captioned. Includes trailers. Live 60446, \$24.95.

Bram Stoker's Dracula, 1992
Photograph: Ralph Nelson/
Columbia/Courtesy of Kobal

Charlie Sheen stars as an astronomer who discovers a cosmic noise that might signal extraterrestrial contact in this above-average sci-fi thriller. The DVD video transfer is among the best and the 5.1-channel sound of demonstration caliber. Try the opening scene, when the two astronomers first hear the noise, and you'll be hooked. The music sounds better than usual, too.

Bram Stoker's Dracula. 1992, 130 minutes, R rating. Two-sided (one side 1.85:1 letterboxed, other side pan-and-scan), Dolby Digital 5.1, English/French/Spanish Dolby Digital two-channel matrix surround, Spanish/Korean subtitles, closed captioned. Columbia TriStar 51419, \$29.95.

Another DVD that presents the movie in widescreen on one side of the disc and in pan-and-scan on the other. TriStar is unique in providing an additional two-channel Dolby Surround mix on all its 5.1-channel releases. I preferred the 5.1-channel mix, which put creepy little sounds in unexpected places. Those effects, coupled with clean, clear video, make this one of the scariest movies I've played in my home theater. Where the laserdisc release shows that "something" is lurking in the shadow areas, the DVD intimates much better exactly what, which is deliciously unsettling.

Here's an old favorite given new life on DVD. Robert Redford stars as a loner living in the past century who sets out to carve a place for himself in the American West and ends up becoming a legend. I was unaware that this relatively short film (107 minutes) existed in a multichannel magnetically striped print, but apparently it does, for this handsome DVD has both an overture and an intermission (each presented with a video still frame) in which you can listen to more of John Rubenstein and Tim McIntire's grand Americana score. Those sections and the rest of the film have been meticulously remixed into Dolby Digital 5.1, and a breathtaking new video transfer makes the movie look like it was made yesterday. The interesting "making of" documentary is "windowboxed" with black borders all around so you can see the entire film frame without losses from overscan

Waterworld, 1995

Photograph: Ben Glass/Universal/
Courtesy of Kobal

Night of the Living Dead. 1968, 96 minutes, no rating, black-and-white. Two-sided (each side 1.33:1 and identical), THX-certified transfer, Dolby Digital one-channel mono. Includes extra Dolby Digital one-channel mono commentary tracks, trailers, TV promotions, and "Night of the Living Bread" parody. Elite Entertainment EE116, \$29.95.



This is a fine example of a cult film benefiting from DVD release. The price is much lower than it is on laserdisc, and you get two commentary tracks running the full length of the movie plus other extras. For example, there's a menu with which you search for scenes as they go by on an obsolete TV. The THX-certified transfer is the best I've ever seen for this title.

The Player. 1992, 124 minutes, R rating. Two-sided (one side 1.85:1 letterboxed), Dolby Digital 5.1, French Dolby Digital two-channel matrix surround, English/French/Spanish subtitles, closed captioned. Includes audio commentary track, Robert Altman featurette, cut scenes, menu of stars playing cameo roles, and trailer. New Line N4032, \$24.95.

New Line includes this innovative title in its Platinum Series. All the extras are fun, informative, or both, but the neatest feature of all is the menu that lets you identify the many stars who play cameo roles in this film about Hollywood filmmaking. Click on one of the stars, and the DVD player immediately proceeds to that

actor's scene in the movie, a feat that laserdisc could never accomplish. Return to the menu, click on a second line, and you'll be rewarded with a list of the star's other films. I hope Paramount adopts DVD soon, because I never figured out all the cameos in *Reds*, and if New Line's example is followed, many of my questions will finally be answered.

Show Boat. 1951, 108 minutes, no rating. One-sided, Dolby Digital one-channel mono, English/French/Spanish subtitles, closed captioned. Includes trailer. MGM/UA 906614, \$24.95.

There are no unusual extras here, but the excellent video transfer "speaks" for itself. The movie was shot in intense Technicolor, and the near-garish, eye-dazzling costumes challenge the conventional rules of color coordination. Watching this movie on laserdisc, I often need to back off the color control (which still leaves the rich color palette but softens its bite). I don't have to do any backing off with this DVD, because the bright reds, oranges, hot pinks, and purples of the opening sequence (aboard the Cotton Blossom) are rich, pure, and unwavering; there is no trace of bloom or chroma noise. Scenes in more natural color, such as "Old Man River," are rich in detail and texture, and the mono soundtrack is quite adequate. A classic movie has been rejuvenated in the new format.

Show Boat, 1951
Photograph: M-G-M/
Courtesy of Kobal



the movie is going to be a very good viewing experience. The refocusing of the laser to the second layer is discernible as an inconspicuously placed two-second freeze frame, which isn't perfect, but it sure beats the 10 seconds or so that laserdisc players need to change sides! More cool stuff: This DVD has a picture-disc label, much like some pop CDs and vinyl records.

Thelma and Louise. 1991, 129 minutes, R rating. Two-sided (one side 2.35:1 letterboxed, other side pan-and-scan), Dolby Digital 5.1, French Dolby Digital two-channel matrix surround, Spanish Dolby Digital one-channel mono, English/French/Spanish subtitles, closed captioned. Includes director's commentary track, alternative ending, and trailer. MGM/UA 906727, \$24.95.



Thelma and Louise, 1991
Photograph: MGM/Courtesy of Kobal

I enjoyed this movie far more on DVD than in its theatrical release. The stunning, razor-sharp transfer no doubt helped, as did the ability to freeze-frame key scenes. Ridley Scott's commentary proved informative and entertaining, and the alternative ending sheds some light on the unsatisfactory conclusion of this buddy movie's theatrical version.

Waterworld. 1995, 136 minutes, PG-13 rating. One-sided (1.85:1 letterboxed), dual-layer, Dolby Digital 5.0, French/Spanish Dolby Digital 5.0, Spanish subtitles, closed captioned. Includes trailer. Universal 20039, \$29.95.

This movie seems much better than critics told us it was on its original release. It strikes me as an aquatic *Mad Max*, just as believable and often quite as exciting. There are all sorts of neat gimmicks and special effects, including the Mariner's boat, a fanciful trimaran with a huge, commanding mainsail. The DVD transfer makes the pictures look like film—not like video, which is too often the case on laserdisc. The production design abounds with patterns (grids, grills, and mesh knits) that heretofore have severely taxed MPEG-2 video, producing irritating shimmer on some DVDs during slow pan shots. But this release exhibits lots of clean, latticework detail, pan or no pan. The Dolby Digital mix is exemplary, with just enough water and ship noise in the surrounds to add atmosphere without being distracting. I liked *Waterworld*, but seeing those clear azure skies and ocean did whet my appetite for a DVD of another Universal title, *Jaws*—a better film and one I'd like to see the studio release soon.

Universal includes a chart indicating the technical features of its DVDs on their jackets. From the *Waterworld* chart, we learn that there is no LFE channel (which is not a drawback). This DVD is packaged in a jewel box with a cardboard sleeve, but Universal has indicated that future releases will be available in a choice of jewel box or oversize snap case.

R.B.

Terminator 2: Judgment Day. 1991, 139 minutes, R rating. One-sided (2.35:1 letterboxed), dual-layer, Dolby Digital 5.1, English/French/Spanish Dolby Digital two-channel matrix surround, English/French/Spanish subtitles, closed captioned. Includes trailers and production notes. Live 60441, \$34.95.

Terminator 2 pleases its fans by being a "cool" movie, and the DVD edition is that from beginning to end. The menu contains live action; every time you click on a choice—say, a second language—there's a fiery visual explosion and the desired selection emerges from the visual cacophony. The scene-access menus contain live-action video instead of the usual still-frame boxes. The Dolby Digital 5.1 sound is crystal clear, with a very active LFE channel. Notes on the production and biographical information about the cast are included, as are several trailers. The opening credits are all orange and red fire, shifting rapidly to a scene in shades of blue, both ranges that severely challenge laserdisc. Here they're handled with no streaking or chroma noise, harbingers that



Terminator 2: Judgment Day, 1991
Photograph: Zade Rosenthal/TriStarr
Courtesy of Kobal

sic-only tracks, and it almost always offers at least one trailer. Universal, Columbia TriStar, Polygram, MGM/UA, and others will occasionally release special editions of certain titles but seem less inclined to include a lot of extras.

Except for X-rated discs, the only alternate video track I'm aware of that requires using a DVD player's mysterious "Angle" button is in *The Big Story*, on the first volume of *Short Cinema* (Polygram; also available by subscription). This animated short includes pre-

DVD DVD DVD DVD DVD

ers, especially second-generation models, are designed to deal with these problems, so you can set up language, subtitle, and audio defaults as you wish and be rewarded with them every time a disc is loaded. A second-generation player corrected most of my problems.) Perhaps even more frustrating is the common inability to scan through the opening FBI warning, studio logos, and credits.

and about to draw the chalk door that will let them enter the spirit world. There's a slow pan across a brick wall, and those bricks undulate slightly. And in a scene in *Twister*, Bill Pullman crosses a barnyard strewn with hay that seems to have living creatures in it! Fortunately, such artifacts are rare, and some players seem to handle them better than others, which suggests that second- or third-generation players may reduce the incidence even further. Any pixelization or tiling I spotted (i.e., the picture breaking up into digital squares) resulted from dirt on the disc.

I have encountered only one DVD title, *Viva Las Vegas*, that froze or "locked up"—for three seconds before moving ahead. A second copy acted the same way, but when I returned to the beginning of the scene, it played straight through without a hitch. Out of more than 200 DVDs I've viewed, *Viva*

Las Vegas is the only title that has behaved erratically. Compare that to an estimated 60% defect rate of the early MCA DiscoVision laserdisc releases. After locking up, they never advanced!

But such complaints are niggling. As someone who, in the early days of laserdisc, endured lines of vertical crosstalk that moved like barber poles across skies and backgrounds intended to be clear, I find DVD's

glitches to be trivial. And most of the time, there aren't any at all. Each DVD I watch seems better than the last, and the first was way ahead of laserdisc. Not all of my favorite titles are on the shelves yet, but heck, it's fun to collect them as they become available, savoring each rediscovery.

The DVD Group reports that more than 600 titles are already in stores and estimates that close to 2,000 will be in release by Christmas. Many companies—including New Line, Polygram, Warner, and Columbia TriStar—are planning simultaneous release of DVDs and VHS cassettes. Most companies have been able to deliver almost 95% of the titles they've promised. Fox Video and Paramount still haven't committed to the DVD format as of this writing, but they're the only ones. And considering what a big party DVD is getting to be, you can bet these two giants will want their share of the pie soon. A

Given an average video transfer, a DVD image resembles a laserdisc picture cleaned thoroughly with Windex.

liminary pencil sketches that run simultaneously with the finished frames; by pressing the "Angle" button, you can switch back and forth between them. Think of the possibilities: different camera angles of a Jackie Chan fight sequence or perhaps *all* the camera angles for the big sequences in *Apocalypse Now*, including those not used. Given the opportunity to see the shots that hit the cutting-room floor, you could learn how a complex scene is edited together and sometimes understand the filmmakers' choices.

KINKS AND MYTHS

DVD is so software-driven that a disc can sometimes trigger peculiar default modes on your player. For instance, when I play MGM/UA's *The Wizard of Oz*, I usually get what I want: the English language soundtrack with no subtitles. But when I put on the same studio's *Show Boat*, I get the English soundtrack—with Spanish subtitles! On many Warner DVD titles, my player first defaulted to the English soundtrack but with English subtitles, which was absurd.

Of course, I could have corrected that idiosyncrasy by turning off the offending subtitles through the on-screen menu or by using a button on the player's remote, but it was irritating to have to do so. (Some play-



The Cabinet of Dr. Caligari, 1919
Photograph: Decla-Bioskop/Courtesy of Kobal

I find some DVD menus difficult to use. Some are so overly "designed" that it isn't always clear which icon is highlighted. You can catch on quickly by fiddling with your remote, but it would be better to be able to zero in on the right choice the first time.

DREADED ARTIFACTS

A note on the much-touted digital artifact: It seems more legendary than real, although there are occasional sightings. Rather than having problems handling scenes with rapid motion, as detractors initially feared, MPEG-2 compression seems to have greater difficulty handling *slow* motion, particularly in backgrounds. A typical example occurs in *Beetlejuice* (Warner), when the husband and wife are in the attic

TIME TESTED

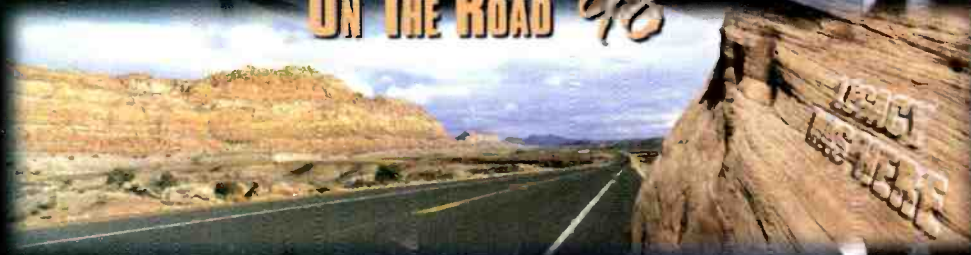
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EDWARD J. FOSTER

PANASONIC DVD-A310 DVD PLAYER



Panasonic's DVD-A310 is a notable member of the new generation of DVD players now hitting the street. Its predecessor, the DVD-A300, was the first DVD player I tested (*Audio*, April 1997), and Panasonic's parent company, Matsushita, has built many of the players currently available under other company's brands.

The DVD-A310 sells for less than its predecessor yet offers quite a bit that the earlier machine lacked. It boasts component-video outputs as well as S- and composite-video jacks. Its digital audio outputs are compatible with DTS soundtracks. And because it has coaxial as well as optical digital outputs (the A300 had Toslink only), you can use any external surround decoder. On the oth-

er hand, you do not have to use one, as the A310 incorporates first-rate Dolby Digital (AC-3) decoding circuitry with analog outputs for five main speakers and a subwoofer. It also incorporates 10-bit D/A converters for video and 96-kHz, 24-bit audio DACs. Like the earlier model, the A310 has a headphone output and "Phones Level" control for private listening, and all its jacks are gold-plated.

In gaining the A310's advantages and improvements, you lose the A300's karaoke sing-along features (though a new model with karaoke, the DVD-A510, is in the works). You also give up the A300's simplified interface for an optional Panasonic RF adaptor that enables you to play DVDs through the tuner of a TV lacking

direct A/V inputs (which, to my mind, would give you just a travesty of DVD's video and audio). But you can still feed a second TV if it has direct audio and video inputs, since the A310 provides a second composite-video output and a pair of "Mixed Audio Out" jacks that supply a Dolby Surround-encoded stereo mix from 5.1-channel programs.

The A310 also features Virtual Surround Sound (VSS), to simulate a 5.1-channel Dolby Digital sound field through a stereo pair of speakers. The realism of the simulation depends on the software and your speaker setup, of course. Panasonic offers two levels of VSS enhancement, for a "natural" or an "emphasized" effect. You can select the VSS mode or defeat it by pressing

**PANASONIC'S DVD-A310
SELLS FOR A LOT LESS
THAN ITS PREDECESSOR
AND OFFERS
A GREAT DEAL MORE.**

small buttons on the front panel or the remote. The front panel also carries an "FL Scroll" button (which controls the information shown on the display), a shuttle dial for variable-speed advance through the disc (at 2, 10, 30, 80, or 100 times normal speed for scanning or for slow motion at 1/2, 1/3, 1/4, 1/8, or 1/16 normal speed), plus the usual transport and drawer controls.

Most users will operate the DVD-A310 via the remote. It's relatively comfortable to grasp, offers full control of the A310, and controls power, channel selection, and volume for a reasonable number of TVs. (The control codes for 15 manufacturers are listed in the owner's manual.) Seldom-used controls—for example, the numeric keypad and the buttons for repeat play, programming, VSS, and initial setup—are behind a

Dimensions: 16 $\frac{1}{8}$ in. W x 11 $\frac{3}{8}$ in. D x 3 $\frac{1}{2}$ in. H (43 cm x 29 cm x 8.8 cm).

Weight: 7.9 lbs. (3.6 kg).

Price: \$599.95.

Company Address: One Panasonic Way, Secaucus, N.J. 07094; 800/222-4213; www.panasonic.com.

Photos: Michael Groen

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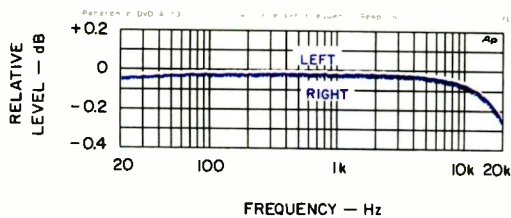


Fig. 1—Frequency response, D/A converter section.

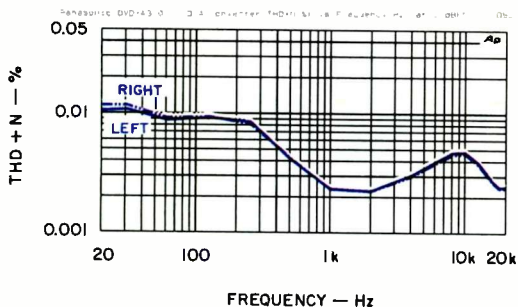


Fig. 2—THD + N vs. frequency, D/A converter section.

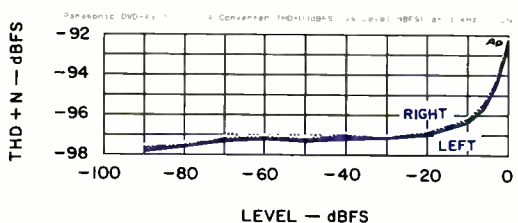


Fig. 3—THD + N vs. level, D/A converter section.

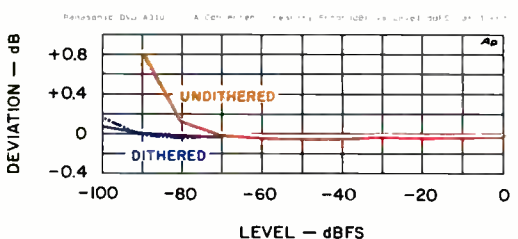


Fig. 4—Deviation from linearity.

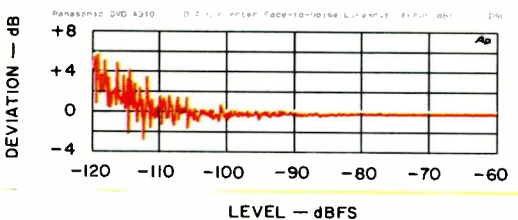


Fig. 5—Fade-to-noise test.

slide-down panel that covers the remote's handle section.

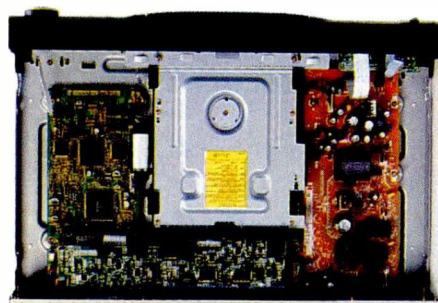
The remote's main transport controls, including a "Slow/Search" key that duplicates the function of the A310's shuttle dial, are always at your fingertips. Individual pads call up disc titles and menus, and a stubby joystick negotiates through the on-screen displays. (Press the joystick to select your choice.) "Display" brings onto your TV screen most of the information you'd normally see on the panel display—a nice feature, especially if it's hard to see the player from your seat. Other pads place, recall, and clear up to five bookmarks per disc, while others choose the subtitle and soundtrack languages and select camera angles, when the disc supports these features. A "Return" pad closes the current on-screen menu. Finally, there are power buttons for the DVD player and for your TV, as well as a button to open and close the disc tray.

Measurements

I have only one question: Why can't manufacturers put DACs like these into their A/V receivers? Wow! On the test bench, Panasonic's new 96-kHz, 24-bit DACs (and the analog electronics that follow them) leave the vast majority of CD-player DACs in the dust, to say nothing of competitive DVD players. As usual, I tested DAC performance separately by playing a standard test CD (the CBS CD-1) and measuring the signals at the main-channel outputs.

Figure 1 shows DAC frequency response and channel balance. There are two curves here; take my word for it, as the channels are so perfectly balanced in level and response that you can't distinguish one from the other. Don't get excited about what appears to be a high-end rolloff. I used a scale of 0.1 dB per division to uncover any filter ripple that might exist. There isn't any, and the level is down less than 0.25 dB at 20 kHz.

When it comes to THD + N versus frequency at 0 dBFS (Fig. 2), the two curves again are so close to being identical that it's difficult to distinguish them on the printed page. They are, however, rather unusual. The prevalent state of affairs is to see relatively low and constant distortion out to a few kilohertz, then a relatively gradual rise out to perhaps 10 kHz, and finally all hell breaking loose as the signal beats with the carrier. Not with the DVD-A310! Distortion actually falls when you go above 10 kHz, demonstrating that intermodulation with the carrier, if



**THE A310'S
96-kHz, 24-BIT DACs
LEAVE MOST
CD-PLAYER DACs
IN THE DUST.**

any, produces no cross-products within the audio range. I expect that's the result of using DAC chips that have 96-kHz capability to convert 44.1-kHz PCM data. (I've always contended that the "improved sound" that people claim to hear from 96-kHz PCM has at least as much to do with the ADCs and DACs needed to do 96-kHz conversion as with the use of a higher sampling rate.) And don't worry about the rise in distortion at low frequencies; again, I've used an extremely sensitive scale. Worst-case distortion is only 0.0123%, and that's not bad.

I also had to change the scale to plot THD + N versus level at 1 kHz (Fig. 3), setting my measurement range 5 or 10 dBFS lower than usual so that the DVD-A310's distortion wouldn't fall off the bottom of the graph: It's below -92 dBFS even at maximum level (0 dBFS), and by -30 dBFS, residual distortion and noise fall to -97

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Wes Phillips, *Stereophile Guide to Home Theater, Spring 1997*



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MX-150THX powered subwoofer
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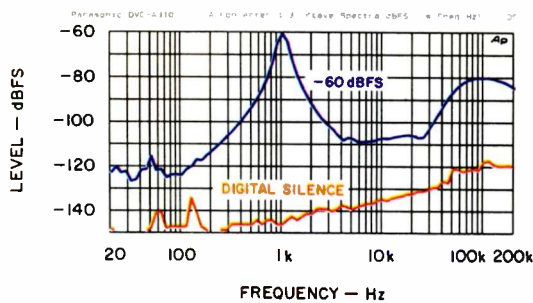


Fig. 6—Noise spectra.

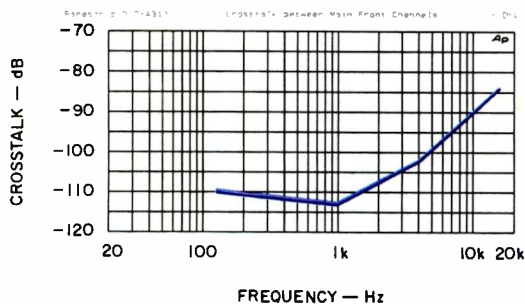


Fig. 7—Stereo crosstalk.

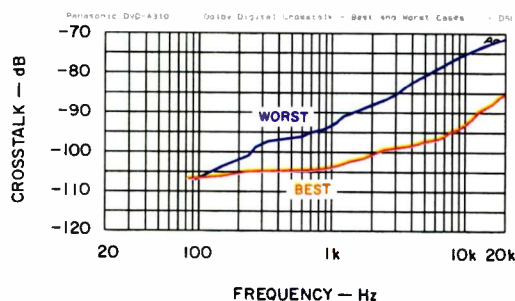


Fig. 8—Crosstalk at Dolby Digital 5.1 outputs.

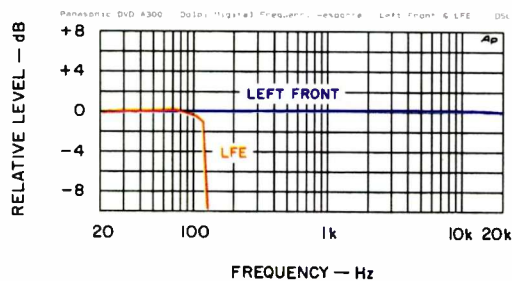


Fig. 9—Frequency response at Dolby Digital 5.1 outputs.

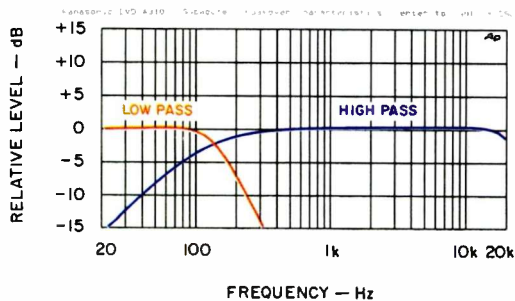


Fig. 10—Subwoofer crossover characteristics.

dBFS and stay down from there on. Superb!

Linearity error (Fig. 4) is extraordinarily low, too, especially when measured with dithered signals. This is the more meaningful of the two curves, and from -70 to -100 dBFS, its worst-case error is only 0.2 dB. In the other test of linearity deviation I usually make, fade-to-noise error, the plot often goes off-scale by the time the level drops to -120 dBFS—because of noise, if for no other reason. For the Panasonic DVD-A310, however, the average error at -120 dBFS is less than 4 dB or so (Fig. 5), about the best performance I can recall seeing.

Another remarkable curve is the third-octave noise spectrum, the lower of the two curves in Fig. 6. This is a first! I'd never encountered third-octave noise levels that dropped below -150 dBFS before. But in this case, they do; the curve drops right off the bottom of the scale! That doesn't tell you anything about the DACs, since they undoubtedly mute when recognizing the code for digital silence. But it does speak volumes about the quality of the analog electronics that follow the DACs: They're not just quiet as a mouse, they're quiet as a dead mouse! They're free of hum, too; a 60 -Hz component that is below about -140 dBFS and a power-supply component (at 120 Hz) barely above that do not qualify as "hum" in my book. I didn't know my test bench was that hum-free.

In the top curve of Fig. 6, a spectrum analysis of a 1 -kHz, -60 dBFS signal, the test signal keeps the DACs "alive" so you see their distortion and noise compounded with that of the analog circuitry. No harmonic-distortion components are apparent in this curve at all (which is not surprising, given the THD + N levels seen in Fig. 3). The rise in noise above 24 kHz reflects the noise shaping that is used with the low-bit converter to attain

24 -bit resolution. (Interestingly, this noise shaper seems less aggressive than some others I've tested.)

As you can see in "Measured Data," signal-to-noise ratio and dynamic range were excellent, too, 10 to 20 dB better than I typically measure. And the dynamic range, while less impressive than the S/N, is nothing to sneeze about. The A310's quantization noise was a low -95 dBFS. Output levels and impedance were just fine, at the line outputs and at the headphone output. Channel separation in stereo (Fig. 7) is better than 100 dB out to 4 kHz, better than 83 dB from there to 16 kHz, and virtually



**THE ANALOG SECTION
ISN'T JUST
QUIET AS A MOUSE,
IT'S QUIET AS
A DEAD MOUSE.**

identical (just try to distinguish the two curves!) from left to right or right to left.

The internal Dolby Digital decoder's channel separation is also impressive, as seen in the crosstalk curves in Fig. 8. The crosstalk is lowest from the right surround to the left front channel and highest from left front to right surround. The crosstalk curves for all other channel combinations were between the curves shown and, in every instance, testified to excellent performance.

With the Dolby Digital decoder set for "Large" speakers, the frequency response measured for each of the five main channels was essentially the same as that seen for stereo in Fig. 1. In Fig. 9, therefore, I've plotted only the left front and LFE (low-frequency effects) channels' responses, on a more compressed scale.

The last graph, Fig. 10, shows the crossover between the center channel and the subwoofer when the player's decoder is set up for a "Small" center speaker. These are reasonable curves, but the filter slopes, 6 -dB/octave high-pass and 12 -dB/octave

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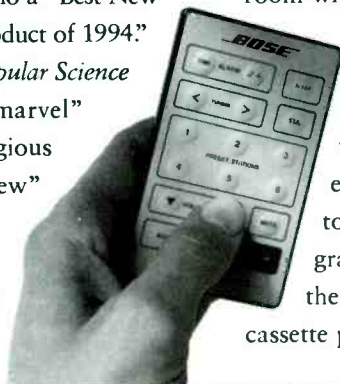
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MEASURED DATA

PCM AUDIO

Line Output Level: 2.13 V.

Channel Balance: ± 0 dB.

Line Output Impedance: 1.035 kilohms.

Headphone Output Level: Maximum voltage, 4.89 V; maximum power, 32.5 mW into 600 ohms or 36.9 mW into 50 ohms at clipping.

Headphone Output Impedance: 58 ohms.

Frequency Response: 20 Hz to 20 kHz, +0, -0.23 dB.

THD + N at 0 dBFS, 20 Hz to 20 kHz: Less than 0.0123%.

THD + N at 1 kHz: Below -92.1 dBFS from 0 to -90 dBFS and below -96.9 dBFS from -30 to -90 dBFS.

Maximum Linearity Error: Undithered recording, 0.86 dB to -90 dBFS; dithered recording, 0.2 dB to -100 dBFS.

S/N Ratio: A-weighted, 128.8 dB; CCIR-weighted, 119.6 dB.

Quantization Noise: -95 dBFS.

Dynamic Range: Unweighted, 97 dB; A-weighted, 99.6 dB; CCIR-weighted, 89.9 dB.

Channel Separation, 125 Hz to 16 kHz: Greater than 83.8 dB.

DOLBY DIGITAL (AC-3) AUDIO

Channel Balance, Relative to Left Front Output: Right front, center, and surround channels, within +0, -0.19 dB.

Frequency Response: Main channels, 20 Hz to 20 kHz, +0, -0.23 dB; center channel, 20 Hz to 20 kHz, +0, -0.18 dB; surround channels, +0, -0.2 dB.

THD + N for 0-dBFS Signal: Main channels, 0.0044% at 1 kHz; center channel, 0.006% at 1 kHz; surround channels, 0.0062% at 1 kHz; LFE channel, 0.0207% at 30 Hz.

Channel Separation, 100 Hz to 10 kHz: 74.3 dB or greater.

DVD VIDEO

Luminance Frequency Response (to 4.2 MHz): Composite-video output, +0, -2.4 dB; component-video output, +0, -1.2 dB.

Luminance Level: -0.26 dB.

Chroma Level: +2.2 dB.

Gray-Scale Linearity: No measurable error.

Chroma Phase Accuracy: Within 1°.

Chroma Differential Gain: No measurable error.

Chroma Differential Phase: No measurable error.

low-pass, are only about half as steep as usual. The crossover frequency is also unusually high, with -3 dB points at 120 Hz for the high-pass section and 145 Hz for the low-pass. The gradual slopes and high crossover point increase the possibility that the listener will become aware of the subwoofer's presence and location, which is undesirable. There's also some treble loss—1.76 dB at 20 kHz—in the center channel when the A310 is set up to use a small speaker; I assume that has to do with the way the A310's digital filters were programmed.

That said, the output levels of the various channels on my sample matched within less than ± 0.1 dB, which is very good. Distortion at 1 kHz in the main channels was negligible. Although higher, distortion in the LFE channel likewise was negligible, considering the distortion that is generated by the typical subwoofer.

Video performance was quite good. I did measure some high-frequency loss via the composite output (-2.4 dB at 4.2 MHz) but only half that amount through the component output. I doubt very much whether anyone would be able to see any degradation in picture sharpness caused by those losses without a direct A/B comparison. Luminance level was just shy of the target but not to a perceptible degree. Chroma level was somewhat high, which seems to be as common among DVD players as low chroma level is among VCRs. I found no measurable gray-scale error nor any change in chroma level or phase (saturation or tint) with changes in scene brightness (chroma differential gain and phase). Chroma phase

accuracy (tint) was within 1°, which is as accurate as it can be measured.

Use and Listening Tests

The Panasonic DVD-A310's DACs were so impressive on the test bench that I felt compelled to audition them thoroughly with music, not just video soundtracks. I first set the player up in my listening room and ran through a number of CDs. For sheer sound quality, the Panasonic DVD-A310 ranks in the top echelon of DVD players. The sound was a trifle more veiled and a bit tubbier than that of either of my reference CD players (the Sony CDP-XA7ES and Meridian 508.24), but the A310 blew away most ordinary players. It was not as easy to use, nor did it access tracks as swiftly as the average CD player, but the designers' main focus was not on playing CDs. Its performance in the listening room is an extra goodie and a most worthwhile one.

In my home theater, the cleanliness of the DVD-A310's pictures mightily impressed me. Colors were sharp, vivid, and totally free of chroma amplitude-modulation and phase-modulation noise. Despite the slight measured droop in video high-frequency response, the pictures were sharp to the eye; I could easily discern the tightest portion of the response wedges in the test patterns I used. This indicates that the A310's video response extended to at least 5.5 MHz, yielding a visible picture resolution in excess of 440 lines.

Still-frame and slow-motion were excellent. In my necessarily limited evaluation of these features, the DVD-A310 invariably chose an "I-frame" to lock onto, which meant the picture was clean unless there

was blur in the frame itself. The same can be said of the high-speed scan modes. But, make no mistake, DVD does not deliver smooth scanning; it's more like high-speed frame advance—you jump

from scene to scene instead of moving through them. However, the DVD-A310 at least delivered more pleasing scans than some older players I've used.

On the human-engineering side of the ledger, I would have liked the disc tray to

**ON MEASUREMENT
AFTER MEASUREMENT,
THE A310 PROVED
UNPRECEDENTEDLY GOOD.**



The Panasonic's remote has a stubby joystick to navigate through on-screen displays.

**FOR SHEER
SOUND QUALITY,
THE A310 RANKS
IN THE TOP ECHELON
OF DVD PLAYERS.**

open more fully. You have to slip the back edge of the disc slightly under the lip of the panel, and that makes Old Fumble-Fingers nervous. On-screen menus seemed reasonably intuitive to me, but I sometimes felt insecure using the joystick on the remote; perhaps the player's relatively slow response made me feel it wasn't getting my commands. But that's not a very serious shortcoming, and I could adapt to it.

I can easily recommend the Panasonic DVD-A310 to serious audio/video fans, especially those who have A/V receivers that can accept a six-channel analog-audio feed. The DACs in this player are likely to be far better than those in any such receiver. The A310's relatively weak-kneed subwoofer crossover will be problematic only if the player is set up for "Small" speakers. If your theater has full-range speakers all around (which I prefer), it will be no problem at all. And, of course, it won't be a concern if you use a separate surround decoder, fed from one of the A310's digital outputs.

Fans of DTS encoding will appreciate the player's ability to hand off DTS digital to an external decoder. Anyone who uses an external decoder will appreciate being able to use either a wired or an optical interface. And upscale videophiles will appreciate the Panasonic DVD-A310's component-video outputs. What more is there to say? This player is a serious contender!

"WOW, I can't believe you have that CD!"

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PIONEER ELITE VSX-09TX A/V RECEIVER



main speakers, so you can send stereo to another room or use different speakers for stereo than for your home theater.

The VSX-09TX has an interesting set of PCM/AC-3 (Dolby Digital) inputs. There are dedicated coax inputs for the DVD and "LD/SAT" video inputs and one Toslink optical socket that can be assigned to either (or disabled) by a button behind a front-panel flap that conceals subsidiary controls. The VSX-09TX also has an internal RF demodulator that accepts raw laserdisc AC-3 signals, which is very nice if you own AC-3 laserdiscs and have neither the room nor the desire for an external demodulator. The RF jack is, naturally, assigned to the laserdisc input. If you have a combination DVD/laserdisc player, such as Pioneer's DVL-909 (\$1,099), and connect its RF and S/P DIF (Toslink or coax) outputs to the receiver's corresponding inputs, the VSX-09TX will automatically choose the RF input for AC-3 laserdiscs and the S/P DIF input for everything else. If you insist, you can override the choice with the main-panel "Signal Select" button, which cycles through "Auto" (the mode you'd normally use), "Analog," "Digital," and "AC-3 RF."

Four buttons let you select the appropriate listening mode—stereo, surround (Dolby Digital if available, Dolby Pro Logic otherwise), "Home THX Cinema" (which is the same as the regular surround mode except with THX post-processing), and "DSP Mode." Repeatedly pressing that last button cycles the receiver through "Hall," "Jazz," "Dance," "Theater 1," and "Theater 2" modes. (On the remote, these buttons appear in slightly less user-friendly form, as secondary functions of the first four numerical keys.)

The Pioneer Elite VSX-09TX is one of the most complete A/V receivers you're likely to find. It's Home THX certified, multiroom ready, fully equipped for Dolby Digital, and doesn't stiff you when it comes to inputs, outputs, S-video connections, or the like. Furthermore, it has such audio niceties as switches for loudness contour and tone-control bypass, features we used to expect on decent receivers but now can hardly find.

The VSX-09TX also looks great: black with gold accents and high-gloss simulated-wood end panels.

More important than its looks are its flexibility and the ease with which it can be operated from its front panel or its remote.

There are equal numbers of audio-only and audio/video inputs, five each, including two VCR and two audio tape loops and an MM phono input. An S-video jack parallels each composite-video input and output (except for "Multiroom Video Out"), so you're never forced to use composite video for lack of available S-video connectors. Aside from an A/V input behind a flap on the front panel,

the connectors are on the back, and even the rear-mounted RCA jacks are gold-plated. The multiway speaker binding posts are not spaced for double banana plugs (one of my bugaboos), but they are

gold-plated, handle single banana plugs nicely, and are reasonably sturdy. Two switchable output pairs are provided for the

**THE PIONEER ELITE
VSX-09TX IS ONE OF
THE BEST-CONCEIVED,
BEST-SOUNDING
A/V RECEIVERS I'VE USED.**

Rated Power Output: Stereo mode, 110 watts/channel into 6 ohms, 20 Hz to 20 kHz, at 0.09% THD or less; surround mode, 100 watts/channel into 6 ohms at 1 kHz, at 0.8% THD.

Dimensions: 18 in. W x 7 in. H x 17 $\frac{1}{2}$ in. D (45.7 cm x 17.7 cm x 44.9 cm).

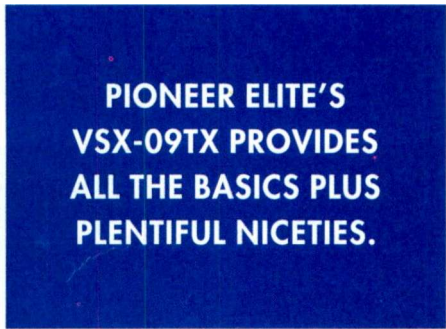
Weight: 35.6 lbs. (16.2 kg).

Price: \$1,750.

Company Address: P.O. Box 1540, Long Beach, Cal. 90801; 800/746-6337; www.pioneerelectronics.com.

There's plenty more behind the flap: rockers to adjust bass and treble (and a "Direct" button to bypass them), buttons to activate and defeat the loudness contour and Dolby Digital "Dynamic Range Control" (a compressor for maintaining a more even volume level for quiet listening), and a headphone jack. There's even a button to reset the receiver's microprocessor should it lock up and stop following its software instructions.

The flap conceals buttons for entering AM and FM stations into memory, selecting the tuning band, and choosing auto-stereo or mono reception mode. Another button is for setting up lists of radio stations entered in the tuner section's memory, which you can display on the monitor—cute, but I wonder how many people will bother. It can also be used for setting up a displayable list



of up to 100 CDs, which might be handy if you have a mega-changer.

Also behind the flap are setup controls, too often available only on remotes. These controls (and those on the remote) take the form of a "System Setup" button and four controls surrounding an "Enter" pad. Very nice! As is frequently the case, setup is performed with the aid of an on-screen graphical user interface, or GUI. Pioneer's GUI is neither as clear nor as user-friendly as others I've seen, but it does get you through things, one way or another, and you don't have to use it very often.

The remote does so much that I won't attempt to describe its operation in detail. Needless to say, control versatility comes at the expense of complexity. But Pioneer's device is reasonably friendly despite its green-on-black and dull-gold-on-black lettering (which sure didn't help these tired eyes). Only nine buttons are illuminated, but I muddled through. Having preprogrammed control codes for many manufacturers' A/V components and the ability to learn codes for unusual functions and com-

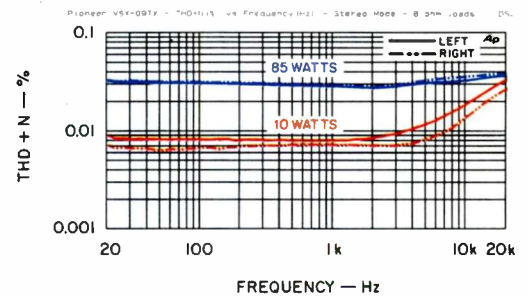
ponents sets this remote apart from the crowd.

The VSX-09TX can grow with your needs (or, let's face it, desires). Should you someday want more power than its built-in amplifiers provide, you can feed external amps from the preamp outputs provided for each of the three front and two surround channels. (The subwoofer output is line-level only). "Control" input and output jacks let you daisy-chain this receiver with other Pioneer components, for unified control. For multiroom systems, the VSX-09TX has separate stereo and composite-video outputs and an input for an optional sensor that lets you use the remote to operate the receiver from another room, adjusting the second room's volume and selecting its program source independently. (However, as with many multiroom systems, turning off power from the secondary room turns the main unit off. And changing stations from the second room changes them in the primary room—a problem if you're taping from the tuner at the time.)

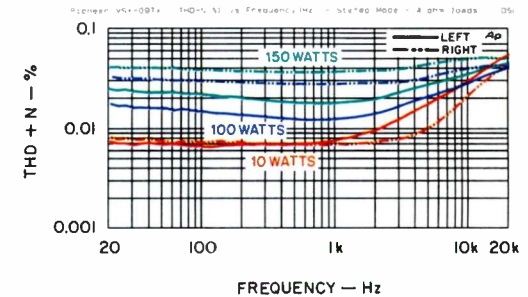
The receiver has one unswitched and two switched convenience outlets. (The unswitched outlet is rated at 100 watts, while the other two can handle a total of 100 watts between them.) Its FM and AM antennas connect via wire clamps; I would prefer an F connector for the FM antenna.

Measurements

In order to put amplifiers and receivers' amp sections on an equal footing, it is my practice to ignore the load that the manufacturer uses for rating power and to make all stereo power tests using 8- and 4-ohm loads (unless the manufacturer specifically says not to use the latter). When I did this with the Pioneer Elite VSX-09TX, it quickly became apparent that this receiver has a very "stiff," or well-regulated, power supply. For example, as you can see from "Measured Data," there's practically no difference between

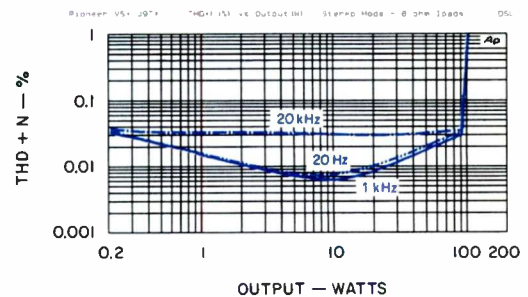


A

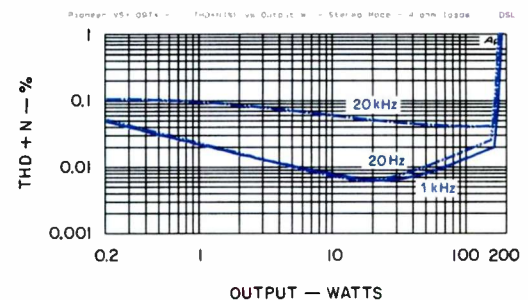


B

Fig. 1—THD + N vs. frequency in stereo mode for 8 ohms (A) and 4 ohms (B).



A



B

Fig. 2—THD + N vs. output in stereo mode for 8 ohms (A) and 4 ohms (B).

continuous and dynamic output power. Furthermore, both power measurements practically double with 4-ohm loads. This indicates that the supply voltages remain essentially constant over a wide range of

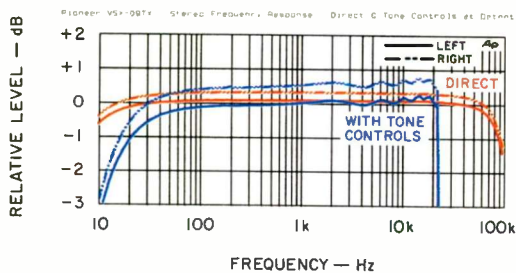


Fig. 3—Frequency response, stereo mode.

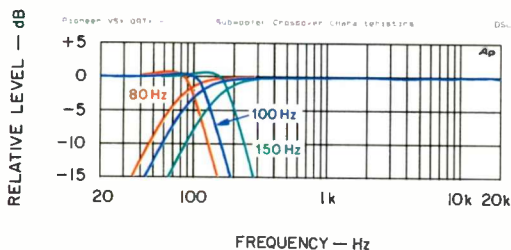


Fig. 4—Subwoofer crossover characteristics.

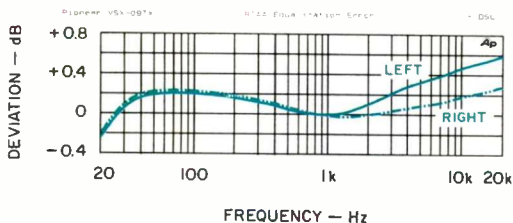


Fig. 5—RIAA equalization error.

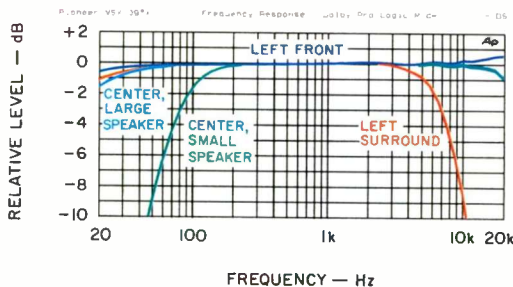


Fig. 6—Frequency response, Dolby Pro Logic mode.

output current, another way of saying that the power supply is very tightly regulated.

But because of that regulation, the VSX-09TX can't deliver as much power into 8 ohms as it can into 6 ohms, the load for which Pioneer choose to rate power. Many Japanese companies rate their A/V receivers' power into 6 ohms but use "soft"

enough supplies to let the output stage deliver its 6-ohm specified power into 8-ohm loads. Delivering a given wattage into 8 ohms instead of 6 requires about 15% more voltage but 15% less current. With less current to deliver, a soft supply's output voltage may bounce up enough to keep power output the same; a stiff supply's voltage won't. That doesn't mean soft supplies are better, per se, than stiff supplies (although I happen to favor the soft type, if they're well designed). In fact, the makers of many highly regarded amplifiers pride themselves on their products' superior power-supply regulation.

Because this receiver's stiff supply would not allow it to deliver its rated power into my standard loads, I had to derive 8- and 4-ohm power "ratings" for it. The output voltage that generates Pioneer's specified 110 watts per channel into 6 ohms in stereo will produce 82.5 watts per channel into 8 ohms. I rounded this up and rated the VSX-09TX as an 85-watt amplifier for 8-ohm loads, a level that also meets Lucasfilm's minimum requirement for THX certification of integrated amps or receivers. Further testing showed that power at clipping into 8 ohms was 0.71 dB higher than the 85-watt continuous power rating I assigned; I therefore chose a 4-ohm rating 0.71 dB below the 4-ohm clipping point (which came out to 157 watts per channel) and rounded that down to 150 watts.

Figure 1 shows THD + N versus frequency at my assigned power ratings and at 10 watts for 8-ohm loads (Fig. 1A) and 4-ohm loads (Fig. 1B). The 4-ohm graph also shows power at 100 watts per channel.

Figure 2 shows THD + N versus output. Note that the maximum output power is independent of frequency with 8-ohm loads (Fig. 2A) and is virtually so with 4-ohm loads (Fig. 2B). That's one advantage of well-regulated power supplies, although the quality of the output stage is at least equally important in this regard. Overall, Pioneer's Direct Energy MOS-FET output acquits itself superbly into both

loads. Not only are the clipping points pretty much independent of frequency, but distortion at my assigned power levels is quite low—less than 0.037% with 8-ohm loads and less than 0.049% into 4 ohms, about half what Pioneer specifies.

Damping factor was fairly high (over 200), but output impedance rose with frequency by a factor of nearly 5 between 50 Hz and 20 kHz. More constant output impedance would be nice, but I've seen far worse.

Figure 3 shows frequency response in "Direct" mode, which bypasses the tone controls, and with the tone controls active but set to their neutral positions. Clearly,



THE VSX-09TX CAN GROW WITH YOUR NEEDS OR, LET'S FACE IT, YOUR DESIRES.

there's an advantage to using the "Direct" mode. Because the tone controls operate in the digital domain, analog signals must be converted to digital and back again for the controls to work on them; the VSX-09TX's anti-aliasing and reconstruction filters for A/D and D/A conversions sharply restrict the treble bandwidth. As a result, frequency response in "Direct" mode is within +0, -0.23 dB from 20 Hz to 20 kHz, and the response is beyond 115 kHz when it reaches its 3-dB-down point. Going from analog to digital and back broadens the tolerance within the audio band to +0.28, -1.05 dB and lowers the -3 dB point in the treble to 23.15 kHz. This action is typical of A/V processors and receivers that use digitally based signal processing, but in the VSX-09TX, the conversions introduce some bass rolloff and treble ripple, too. Although the Pioneer's response curves aren't bad, I have seen flatter bass and smoother treble.



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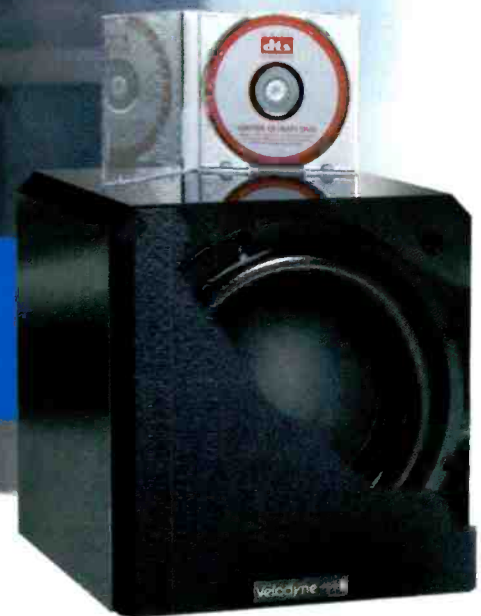
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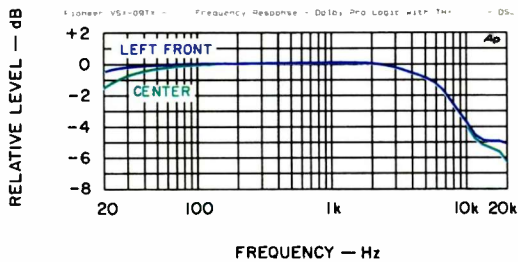


Fig. 7—Frequency response, Dolby Pro Logic mode with THX.

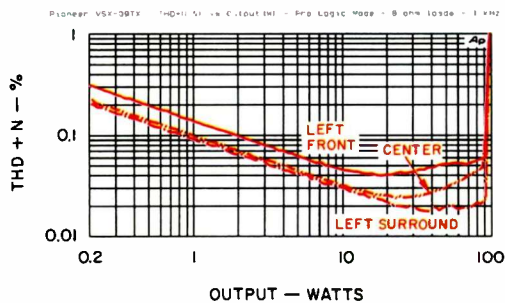


Fig. 8—THD + N vs. output level, Dolby Pro Logic mode.

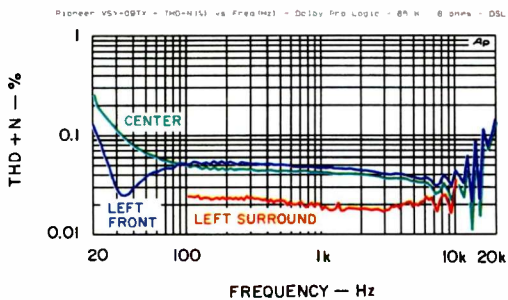


Fig. 9—THD + N vs. frequency, Dolby Pro Logic mode.

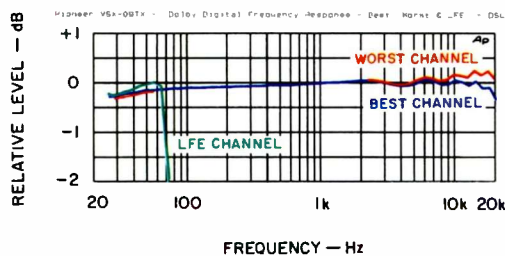


Fig. 10—Frequency response, Dolby Digital mode.

The VSX-09TX's bass and treble controls and loudness contour switch had commendably modest effects (see "Measured Data")—especially the bass control, which had greater ability to cut low frequencies than to boost them. Still, it might have been preferable had the bass and treble affected the midrange a bit less. If you like to really muck around with tone controls, you may find this receiver's tone controls and loudness contour too subtle for your liking, but I prefer Pioneer's tasteful moderation.

The VSX-09TX's subwoofer crossover can be set for 80, 100, or 150 Hz (Fig. 4). At all three frequencies, the high-pass section's nominal slope is 12 dB/octave and the low-pass section's is 24 dB/octave. The slopes are typical of today's products, and the 80-Hz setting would seem to meet Lucasfilm's THX requirements—but it doesn't quite. The high-pass section has the correct slope, and its -3 dB point is within 2 Hz of the 80 Hz specified by Lucasfilm. However, the THX standard requires that the low-pass filter have the same characteristics as a cascaded pair of two-pole Butterworth networks, each 3 dB down at 80 Hz. Such a filter would not have the boost prior to rolloff that you can see in Fig. 4, and, more important, it would be 6 dB down at 80 Hz. I doubt that the slight boost in Pioneer's filter is of any concern, but the low-pass section's -6 dB point winds up at 114 Hz instead of 80 Hz and thus doesn't mate exactly with the high-pass section.

The input impedance of the VSX-09TX's moving-magnet phono preamp couldn't be modeled by a classic R-C combination (which suggests a potential for interaction with load-sensitive cartridges), but the RIAA-equalization error itself (Fig. 5) is reasonably low. The phono preamp's input overload point was reasonably high, input sensitivity was adequate, and S/N with standard gain settings was excellent. The Pioneer receiver's A-weighted output noise measured a low -82.7 dBW through the phono

input and -86 dBW through the line-level inputs.

Spectrum analysis also indicated a very low noise floor, with both the analog and digital CD inputs. Aside from a noticeable but minor (-90 dBW) peak at 60 Hz, it was below -100 dBW up to 2 kHz and then rose gradually. It reached a plateau between -85 and -90 dBW from 40 kHz on. For the phono input, the 60-Hz peak rose past -85 dBW; otherwise, noise remained below -90 dBW out to 20 kHz. The 60-Hz hum seemed to be mainly in the power amp, as its level didn't differ radically from input to input.

Output level at the recording terminals was adequate for phono signals and rather more generous for the tuner or a CD

SETUP CONTROLS AREN'T JUST ON THE REMOTE BUT ARE ALSO ON THE FRONT PANEL.

source. Impedance at the recording outputs was low enough for easy interfacing to typical consumer tape decks. Line-input sensitivity and impedance were fine, and channel separation was adequate as well. I guess channel balance could have been better, but it wasn't really bad. (As is typical of today's A/V receivers, the Pioneer doesn't have a "balance" control; you're forced to use the setup adjustments for that purpose. I'd much rather have a balance control for stereo listening, but there's no fighting City Hall.) The VSX-09TX's line-input overload point more than met Lucasfilm's THX requirement, and you're unlikely to get into clipping problems with any consumer program source (which is more than can be said for some receivers I've had on my bench).

In Dolby Pro Logic mode, the frequency response of each channel was excellent—save for a slight bit of ripple in the treble and a sharp cutoff above 23 kHz, both typical of digital surround decoders. Figure 6 shows response taken on the left front and surround channels, and in the center channel with "Large" and "Small" speaker settings (formerly known as "Center Wide" and "Center Normal"). The difference be-

MEASURED DATA

AMP SECTION, STEREO MODE

Continuous Output Power at Clipping (1% THD at 1 kHz): 8-ohm loads, 100 watts/channel (20 dBW); 4-ohm loads, 185 watts/channel (22.7 dBW).

Dynamic Output Power: 8-ohm loads, 100 watts/channel (20 dBW); 4-ohm loads, 190 watts/channel (22.8 dBW); 2-ohm loads, 315 watts/channel (25 dBW).

THD + N, 20 Hz to 20 kHz: 8-ohm loads, less than 0.037% at 85 watts/channel and less than 0.032% at 10 watts/channel; 4-ohm loads, less than 0.049% at 150 watts/channel and less than 0.054% at 10 watts/channel.

Frequency Response: With tone controls bypassed, 20 Hz to 20 kHz, +0, -0.23 dB (-3 dB below 10 Hz and at 117 kHz); with tone controls at detent, 20 Hz to 20 kHz, +0.28, -1.05 dB (-3 dB below 10 Hz and at 23.15 kHz).

Tone Control Range: Bass, +6.5, -5.9 dB at 100 Hz; treble, +5.7, -4 dB at 10 kHz.

Loudness Contour: +5.3 dB at 50 Hz and +2.3 dB at 15 kHz.

Subwoofer Crossover at 80-Hz Setting: High-pass, -3 dB at 82 Hz and -6 dB at 62 Hz; low-pass, -3 dB at 101 Hz and -6 dB at 114 Hz.

RIAA Equalization Error, 20 Hz to 20 kHz: +0.58, -0.26 dB.

Sensitivity for 0-dBW (1-Watt) Output: CD input, 32.5 mV; MM phono input, 0.432 mV.

A-Weighted Noise: CD input, -86 dBW; MM phono input, -82.7 dBW.

Input Impedance: CD input, 50 kilohms; MM phono input, 50 kilohms (see text).

Input Overload (1% THD at 1 kHz): CD input, 4.9 V; MM phono input, 115 mV.

Channel Separation, 100 Hz to 10 kHz: Greater than 56.8 dB.

Channel Balance: ± 0.12 dB.

Recording Output Level: 485 mV for 500-mV signal at CD input; 365 mV for 5-mV, 1-kHz signal at MM phono input; 625 mV for 100% modulated FM signal at 1 kHz.

Recording Output Impedance: 1.15 kilohms.

Damping Factor re 8-Ohm Loads: 205 at 50 Hz.

Output Impedance: 40 milliohms at 1 kHz, 70 milliohms at 5 kHz, 120 milliohms at 10 kHz, and 185 milliohms at 20 kHz.

AMP SECTION, DOLBY PRO LOGIC MODE

Output Power at Clipping, 8-Ohm Loads: 97 watts/channel (19.9 dBW).

THD + N at Rated Output, 8-Ohm Loads: Main channels, less than 0.13%, 20 Hz to 16 kHz; center channel, less than 0.11%, 30 Hz to 16 kHz; surround channels, less than 0.04%, 100 Hz to 10 kHz.

Frequency Response: Main channels, 20 Hz to 20 kHz, +0.55, -0.65 dB (-3 dB below 10 Hz and at 23.13 kHz); center channel, "Large" speaker mode, 20 Hz to 20 kHz, +0.07, -1.62 dB (-3 dB at 13 Hz and 22.5 kHz); center, "Small" speaker mode (80-Hz crossover), 82 Hz to 22.5 kHz, +0.07, -3 dB; surround channels, 11 Hz to 7.04 kHz, +0.03, -3 dB.

THX Re-Equalization Response: Main channels, -3 dB at 8.35 kHz and -5.23 dB at 20 kHz; center channel, -3 dB at 8.2 kHz and -6.52 dB at 20 kHz.

A-Weighted Noise: Main channels, -77.7 dBW; center channel, "Large" speaker mode, -78.4 dBW; surround channels, -80 dBW.

Channel Separation at 1 kHz: 49.7 dB or greater.

DOLBY DIGITAL (AC-3) MODE

Channel Balance: 1.42 dB or better.

Frequency Response: Main channels, 30 Hz to 20 kHz, +0.25, -0.31 dB; center channel, 30 Hz to 20 kHz, +0.07, -0.27 dB; surround channels, 30 Hz to 20 kHz, +0.06, -0.35 dB; LFE channel, 30 Hz to 80 Hz, +0.24, -3 dB.

THD + N at 1 kHz for 0-dBFS Signal: Main channels, 0.0445%; center channel, 0.0189%; surround channels, 0.0178%; LFE channel (at 30 Hz), 0.764%.

Channel Separation, 100 Hz to 10 kHz: 57.7 dB or greater.

D/A CONVERTER SECTION

Frequency Response: 20 Hz to 20 kHz, +0.26, -0.44 dB.

THD + N at 0 dBFS: Less than 0.195%, 20 Hz to 20 kHz.

THD + N at 1 kHz: Below -76.5 dBFS from 0 to -90 dBFS and below -87.9 dBFS from -30 to -90 dBFS.

Maximum Linearity Error: Undithered signal, 1.6 dB to -90 dBFS; dithered signal, 1.33 dB to -100 dBFS.

S/N: A-weighted, 96.6 dB; CCIR-weighted, 87.5 dB.

Quantization Noise: -79.5 dBFS.

Dynamic Range: Unweighted, 88.4 dB; A-weighted, 91.5 dB; CCIR-weighted, 82 dB.

Channel Separation: Greater than 57 dB, 125 Hz to 16 kHz.

FM TUNER SECTION

Sensitivity for 50-dB Quieting: Mono, 27.2 dBf; stereo, 48.5 dBf.

Channel Separation at 50-dB Stereo Quieting: 33.9 dB.

S/N Ratio at 65-dBf Signal Input: Mono, 73.6 dB; stereo, 65.6 dB.

Frequency Response, Stereo: 20 Hz to 15 kHz, +1, -1.4 dB.

Channel Balance: ± 0.014 dB

Channel Separation, 100 Hz to 10 kHz: Greater than 35.2 dB.

THD + N at 65 dBf, 100% Modulation: Mono, 0.44% at 100 Hz, 0.4% at 1 kHz, and 0.51% at 6 kHz; stereo, 0.48% at 100 Hz, 0.41% at 1 kHz, and 1.57% at 6 kHz.

THD + N at 65 dBf, 50% Modulation: Mono, 0.2% at 100 Hz, 0.24% at 1 kHz, and 0.58% at 6 kHz; stereo, 0.28% at 100 Hz, 0.29% at 1 kHz, and 1.07% at 6 kHz.

Capture Ratio at 45 dBf: 2 dB.

Selectivity: Adjacent-channel, 14.6 dB; alternate-channel, 69.4 dB.

Image Rejection: 26.1 dB.

AM Rejection: 56.8 dB.

Stereo Pilot Rejection: At 100% modulation, 75.5 dB; at 0% modulation, 83.8 dB.

Stereo Subcarrier Rejection: At 100% modulation, 79.8 dB; at 0% modulation, 80.5 dB.

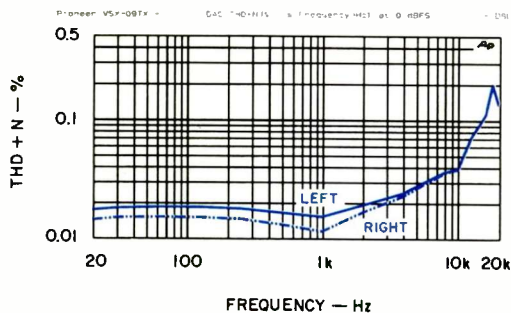


Fig. 11—D/A converter THD + N vs. frequency at 0 dBFS.

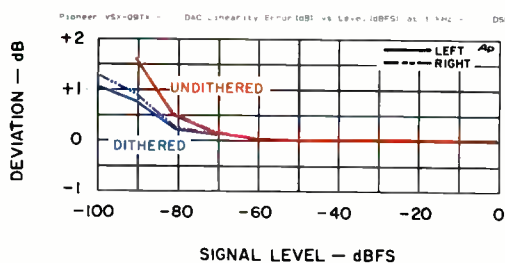


Fig. 12—D/A converter linearity error.

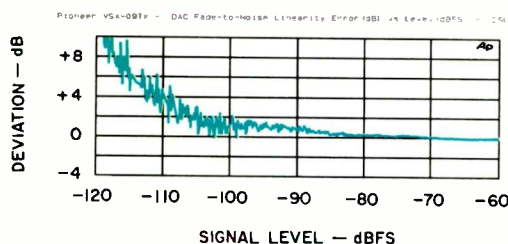


Fig. 13—Fade-to-noise test.

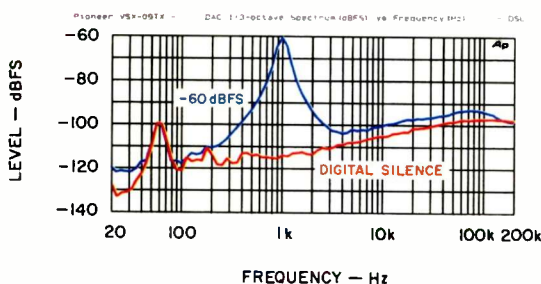


Fig. 14—Noise analysis.

tween the settings should be a response rolloff below 100 Hz for “Small” speakers. The actual rolloff point in the VSX-09TX depends on the subwoofer crossover choice; I used the 80-Hz setting.

Surround channel response dropped above 7 kHz, as it should, and the main chan-

nels were reasonably flat over their operating bandwidth. Since Pioneer claims THX certification, I plotted response for the left front and center channels in that mode. The results (Fig. 7) are in extremely close agreement with the THX re-equalization curve out to at least 10 kHz and within acceptable tolerance over the entire range.

Output power at clipping in Dolby Pro Logic mode (97 watts, or 19.9 dBW, into 8 ohms) was identical in all channels and within 0.1 dB of the values measured in stereo. (The clipping points can be read from Fig. 8, which has a different horizontal scale from the graph of THD + N versus power in stereo mode.) These levels are about 0.6 dB better than Lucasfilm’s minimums. Chalk up another one for Pioneer’s stiff power supply.

Figure 9 shows THD + N versus frequency, in Dolby Pro Logic mode, at 85 watts into 8 ohms. Interestingly, it is lowest in the surround channels and highest in the main channels. Although unusual, it’s of no real concern, since distortion is better than usual in every channel. Maximum distortion is less than 0.15% over the meaningful frequency range, which includes noise and distortion from both the Dolby Pro Logic decoder and the power amp section. Decoding Pro Logic digitally can have its drawbacks, but it usually yields lower distortion, better channel separation, and lower noise than analog decoding does.

As with distortion, A-weighted output noise was lowest in the surround channels and highest in the main channels—so good that I can’t quibble with it. Steady-state channel separation ranged from a low of 49.7 dB at 1 kHz (between the surround and left front channels) to a high of 72.7 dB (between the center and surround channels—where low crosstalk is most critical, as you don’t want dialog popping up in the surrounds). For most channel combinations, separation was around 55 dB, which is more than adequate.

In Dolby Digital (AC-3) mode, I would have liked somewhat better channel balance; at the default gain settings, the spread amounted to nearly 0.75 dB. As seen in Fig. 10, frequency response is quite good but sets no records. Pioneer’s decoder takes a moment to lock to the carrier when a DVD player starts. This is almost never a problem in normal use, but the frequency sweep on the Dolby Labs test DVD starts so abruptly that my Audio Precision System One test equipment couldn’t catch up with it until the sweep had already progressed to about 30 Hz. That’s why the curves start where they do and why I’ve limited the response range in “Measured Data.” For the most part, response is within ± 0.28 dB or better over the test range.

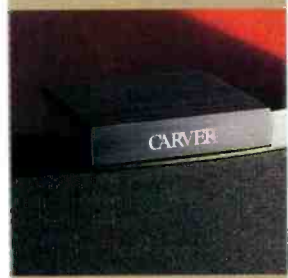
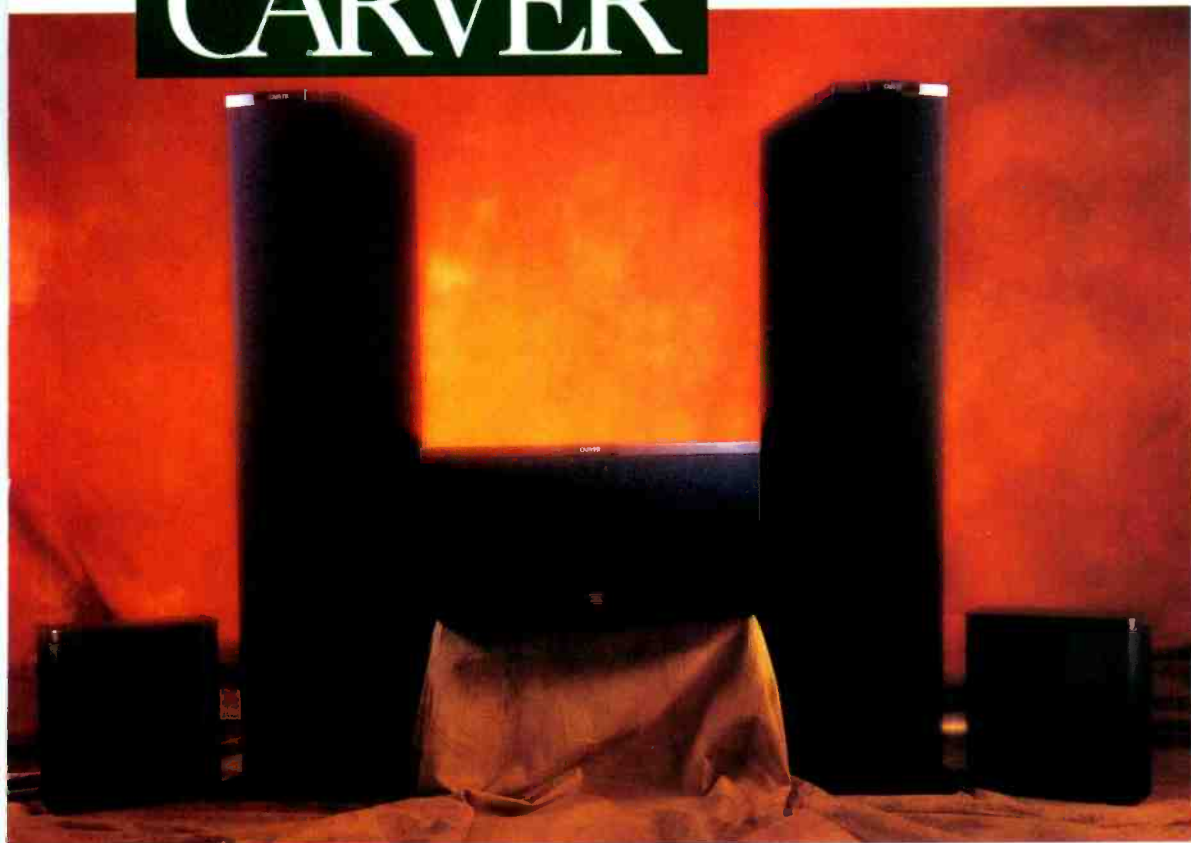
Through the Dolby Digital decoder, D/A converter, and power amplifiers, THD + N at 1 kHz and 0 dBFS was well below 0.02% in the center and surround channels and measurably higher in the main channels (0.0445% in the left front and 0.0258% in the right). That’s rather odd, but as the distortion was very low in all channels, it’s no cause for concern. In the LFE channel, distortion was 0.764% at 30 Hz—substantially higher but still so much lower than a typical subwoofer’s distortion that it’s simply not going to be heard.

OUTPUT NOISE WAS QUITE LOW, EVEN THROUGH THE PHONO PREAMP.

In Dolby Digital mode, channel separation was greatest from the left front to the left surround channel; crosstalk was about -80 dB from 30 Hz to 5 kHz, rising to nearly -60 dB at 20 kHz. Overall, separation was worst from the right surround to the left front, where it was relatively uniform at just over 60 dB from 100 Hz to 10 kHz and about -56 dB at 20 kHz. (The worst-case result in “Measured Data” is for crosstalk from center to right surround and occurred only at 10 kHz; it is, however, the single worst measurement between 100 Hz and 10 kHz.)

As usual, I measured the D/A converter section separately, using the CBS CD-1 test

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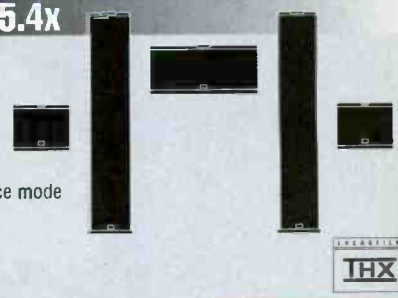
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- Progressive Directivity array
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- Constant Directivity tweeters
- Nominal impedance 4 Ohms
- Freq. response 27Hz-22kHz



**If you can't tell whether
it's a Fender or a Gibson,
it isn't a...**

Wharfedale

- 
- 
- **Diamond**
 - **Valdus**
 - **Music**
 - **Modus**
 - **Emerald**
 - **Opal**
 - **Monitor**

disc. The bass rolloff and treble ripple seen in Fig. 3 showed up in the D/A converter's response, suggesting that these characteristics are caused by the digital filters in the DAC rather than the anti-aliasing filters in the ADC. The DAC's THD + N versus frequency (Fig. 11) supports that conclusion: It is quite low in the bass and midrange but picks up in the treble, especially above 10 kHz. The worst point occurs at 18 kHz, where THD + N (actually, carrier intermodulation) peaks at just under 0.2%.

CROSSTALK WAS LOWEST BETWEEN CENTER AND SURROUND, EXACTLY WHERE LOW CROSSTALK IS MOST CRITICAL.

When I measured the DAC's THD + N versus level at 1 kHz, I found that it hovered around -88 dBFS from -10 dBFS on down, reasonably good for a D/A converter in a receiver. At 0 dBFS, however, THD + N shot up by almost 12 dB, which could bear improvement.

The DAC's linearity error (Fig. 12) is good down to -60 dBFS but rises to 1.6 dB at -90 dBFS with an undithered signal and to 1.33 dB at -100 dBFS with dither—not bad, but no great shakes. The fade-to-noise test (Fig. 13) confirms the situation, as the curve goes off scale before the level falls to -120 dBFS.

On the other hand, S/N ratio and dynamic range (96.6 and 91.5 dB, A-weighted) were reasonably impressive for a receiver DAC. (CCIR weighting degraded the results by almost 10 dB, but that's not unusual.) From the shape of the spectra (Fig. 14) for a "digital silence" track and for a 1-kHz signal at -60 dBFS, it seems that Pioneer has used ladder DACs rather than the 1-bit noise-shaped variety. That would explain the low-level linearity problems, too, since low-level nonlinearity is a ladder DAC's Achilles' heel. Quantization noise (-79.5 dBFS) seemed adequately low but was certainly no record setter. Overall, I'd say that Pioneer's DACs are different from those used in many A/V receivers but not necessarily better or worse overall. (Still, many of us would gladly pay a few bucks

more for a receiver that had really good, CD-quality, DACs.)

Pioneer marches to the beat of its own drummer in the FM section, too. In "auto" mode, most receivers mute signals that aren't strong enough for stereo of reasonable quality, but the VSX-09TX delivers mono sound on such signals. I prefer Pioneer's approach, because I'd rather hear something than nothing. You can see what I mean in Fig. 15, which displays tuner quieting as a function of signal strength for stereo and mono signals. As is true of most present-day receivers, the tuner in the VSX-09TX is reasonably sensitive but no match for a top-notch separate tuner or for the tuners we used to get in good receivers. So-called "usable" sensitivity (not really usable at all!) is 21.5 dBf; 50-dB quieting is attained at a signal level of 27.2 dBf in mono and 48.5 dBf in stereo. Really sensitive tuners would meet these targets with far weaker signals. But with a strong (65-dBf) signal, the Pioneer's tuner displays excellent quieting, 73.6 dB in mono and 65.6 dB in stereo. Frequency response (Fig. 16) is so-so (+1, -1.4 dB from 20 Hz to 15 kHz), yet channel balance (± 0.014 dB) was excellent and channel separation quite good.

The tuner section's mono and stereo THD + N, though not atypical of today's receivers, could sure be better. Figure 17 shows it at 100% carrier modulation, but reducing the modulation to 50% lowered the distortion noticeably (to about 0.3%) below 2 kHz. The relatively high distortion is consistent with the tuner's very high adjacent-channel selectivity. That selectivity should enable the Pioneer to discriminate between adjacent stations far better than average, implying that it would work well in urban areas. But its relatively poor capture ratio and average AM rejection would work against it if there's multipath, which is common in cities. Image rejection was very poor, but that's usually not a problem unless you live near an airport. On the other hand, pilot and subcarrier rejections were excellent, so there should be

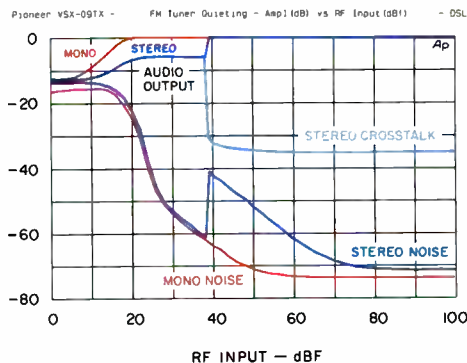


Fig. 15—FM tuner quieting.

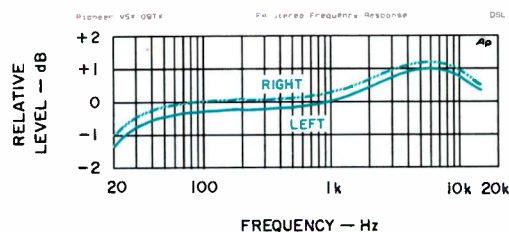


Fig. 16—Frequency response, FM tuner section.

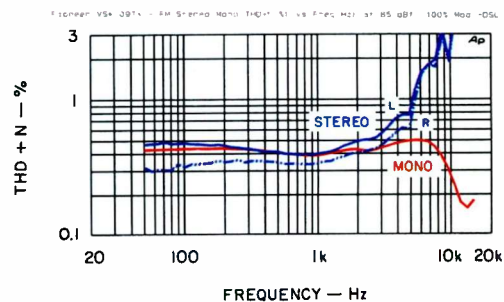


Fig. 17—THD + N vs. frequency, FM tuner section.

The VSX-09TX's very complete universal learning remote fits comfortably in the hand.



no interactions with Dolby noise reduction when you're recording from the VSX-09TX.

Use and Listening Tests

Quite simply, the Pioneer VSX-09TX is one of the best-conceived, best-sounding

Continued on page 59

BASCOM H. KING

LAMM AUDIO LABORATORY M2.1 MONO AMP



Vladimir Shushurin, president and chief designer of Lamm Audio Laboratory, says that the M2.1 hybrid mono amplifier is one of his best creations. It's a Class-A/AB design rated at 200 watts in Class AB into an 8- or 4-ohm load, and it is said to handle impedances as low as 1 ohm.

Lamm also makes the Model M1.1, which is the same size as the M2.1 but is \$400 more expensive. Although the M1.1

delivers only 100 watts into an 8- or 4-ohm load, it does so in pure Class A. (And, like the M2.1, it can drive loads down to 1 ohm.) The DM1, a dual-mono version of the M2.1 rated at 125 watts/channel into 8 ohms, will soon be available for about \$8,700. Another Lamm Audio Laboratory component is the L1 line preamp (\$6,990). Under the Lamm Industries banner are two mono tube amps, the push-pull ML1 (\$9,990 each) and the single-ended ML2 (\$13,645 each).

The M2.1 switches to Class AB at a relatively high power level. This ensures that it will be in Class A during most of your music listening, even if you use low-impedance speakers. But it also gives the amp very high power dissipation—more than 200 watts—at idle. The resulting heat is handled by six large, finned sinks, three on each side.

The M2.1 is big and beautiful, with nothing on its front panel except lettering for the company name and model number, a red power-on LED, and a pair of rack handles. The on/off switch is on the rear (presumably, Shushurin wants you to leave the amp warmed up, despite its heat dissipation). Another rear-panel switch sets the M2.1 for a high-impedance load (8 to 16 ohms) or a low-impedance load (1 to 6 ohms). Also on

**TO CUT RIGHT TO
THE CHASE,
THE LAMM M2.1 AMPS
SOUNDED
ABSOLUTELY TERRIFIC.**

the rear panel are a balanced input, accessible via a Neutrik XLR connector or a pair of Esoteric Audio phono jacks (also usable for inverting or noninverting input from an unbalanced source); two pairs of Esoteric Audio five-way binding posts for speaker connections; two remote-control jacks, which enable daisy-chaining two or more units together for common control; an IEC AC cord connector; an AC line fuse; and a

Rated Continuous Output, 20 Hz to 20 kHz: Into 8 or 4 ohms, 200 watts in Class AB or 36 watts in Class A; into 2 ohms, 400 watts in Class AB or 18 watts in Class A; into 1 ohm, 600 watts in Class AB or 9 watts in Class A.

Rated THD, 20 Hz to 20 kHz, 8- or 4-Ohm Load: 0.3% at 200 watts or 0.05% at 1 watt.

Dimensions: 17 in. W x 8¼ in. H x 19½ in. D (43.2 cm x 21 cm x 49.5 cm).

Weight: 65 lbs. (29.5 kg).

Price: \$7,545 each.

Company Address: 2621 East 24th St., Brooklyn, N.Y. 11235; phone, 718/368-0181; fax, 718/368-0140.

Photos: Michael Groen

binding post for ground connection. A pair of handles on the rear panel, a nice touch, greatly assists you in handling and moving the amplifier.

Most of the circuitry, including the tube (a 6922 dual triode) that marks this amp as a hybrid, is on a large board attached to a horizontal subchassis. I noted many high-quality parts, including Dale metal-film and PRC wire-wound resistors, Electrocube and Roederstein film capacitors, and Cornell Dubilier switching-grade electrolytic capacitors. On the underside of the subchassis are a pair of 39,000-microfarad/75-volt main filter capacitors, a power-supply and system-control board, and the power transformer. That transformer, a 1,700-volt/ampere toroidal unit made by Plitron,



DISTORTION WAS ESSENTIALLY THE SAME FOR BALANCED AND UNBALANCED INPUT, WHICH IS EXCELLENT.

is isolated in a metal subenclosure that measures 3¼ x 7 x 7 inches. Construction and wiring quality is first-rate. An especially elegant touch is the use of Lemo CAMAC connectors for the cables that connect the input jacks to the main circuit board.

Measurements

Lamm Audio Laboratories sent me two M2.1s, which I'll refer to as amps A and B. Because their performance was very similar in most tests, reported results are mostly for amp A. Unless stated otherwise, the loading switch on the rear panel was set for high impedance (8 to 16 ohms) with an 8-ohm load and for low impedance (1 to 6 ohms) with loads of 4 ohms or less.

Frequency response is plotted in Fig. 1. The effect of changing load is minimal and is uniform over the entire spectrum. Response with an NHT dummy load (not shown) fell between the open-circuit and 4-ohm curves, which means that the frequency response deviation caused by a typical speaker load would be essentially inconsequential.

Rise and fall times at an output level of ± 5 volts into 8 ohms were 2 microseconds. Notable in the square-wave response (Fig. 2) is the way the Lamm amp handles an additional 2-microfarad capacitance (middle trace); there's very little ringing here. The slight tilt in the 40-Hz (bottom) trace is caused by the time constant of the coupling capacitor between the driver and output stages.

Distortion was essentially the same for the M2.1's balanced and unbalanced inputs, which is excellent. I used unbalanced signals via the noninverting input for Figs. 3 through 6.

Total harmonic distortion plus noise (THD + N) as a function of power into 8-, 4-, and 2-ohm loads is plotted in Fig. 3. Figure 4 shows SMPTE IM distortion for the same load conditions and for a 4-ohm load with the amp's rear-panel loading switch set for high impedance, instead of the recommended setting. In Fig. 5, THD + N is plotted versus frequency for different power levels; note how little it rises at high frequencies, a desirable but very rare characteristic. A spectrum analysis of the harmonic distortion residue of a 1-kHz signal, at a power level of 10 watts into 8 ohms, is presented in Fig. 6. Commendable is the absence of any higher harmonics above the third. All in all, the M2.1's distortion performance is very good, especially in view of the low amount of feedback employed.

Common-mode rejection ratio (CMRR) for balanced input is shown in Fig. 7 for both of the amps I tested. The curve shapes may differ, but each amplifier did well on this test. That's particularly true at high fre-

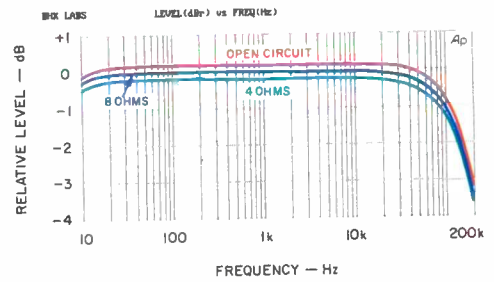


Fig. 1—Frequency response.

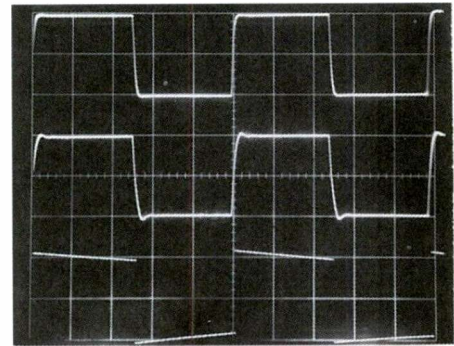


Fig. 2—Square-wave response to a 10-kHz signal into 8 ohms (top), a 10-kHz signal into 8 ohms paralleled by a 2-microfarad capacitance (middle), and a 40-Hz signal into 8 ohms (bottom).

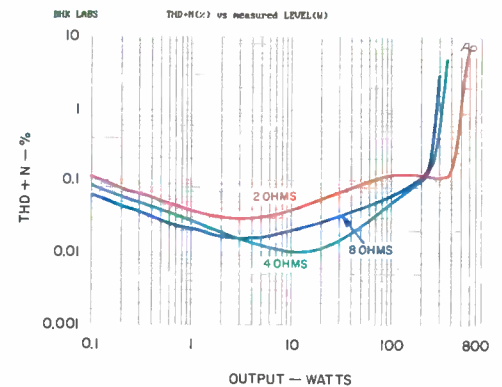


Fig. 3—THD + N vs. output.

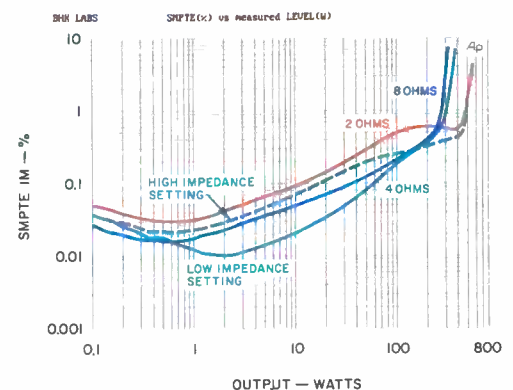


Fig. 4—SMPTE IM distortion vs. output.

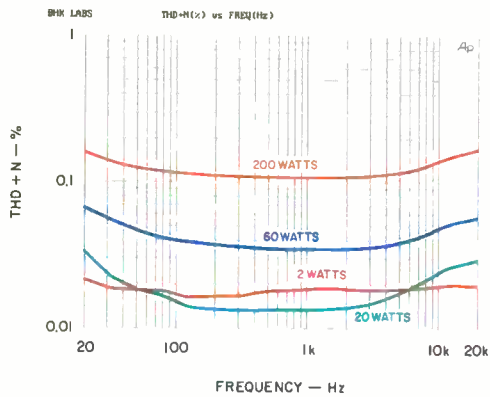


Fig. 5—THD + N vs. frequency.

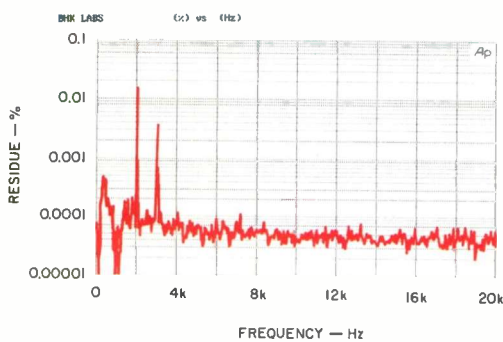


Fig. 6—Harmonic-distortion residue for a 1-kHz signal at an output of 10 watts into 8 ohms.

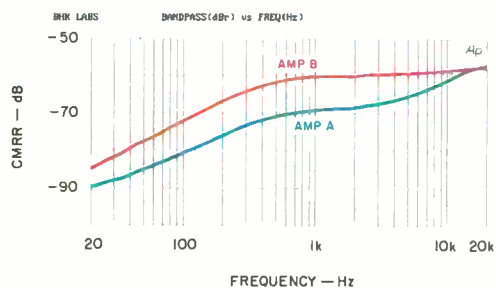


Fig. 7—Common-mode rejection ratio, taken at balanced input.

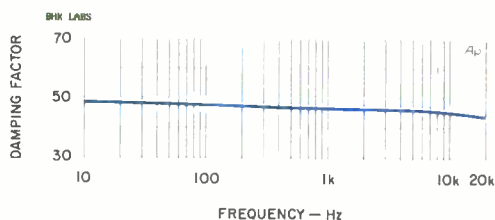


Fig. 8—Damping factor.

quencies, where many amplifiers' CMRRs decrease.

The M2.1's damping factor is reasonably constant with frequency. You can see this clearly in Fig. 8, but it can also be inferred

from Fig. 1, which demonstrates that output level at all frequencies drops uniformly as the load impedance decreases.

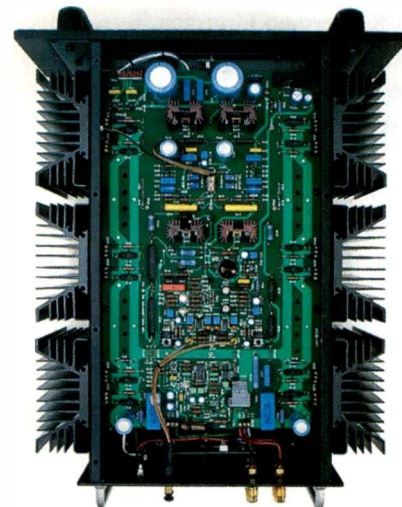
Dynamic power with an 8-ohm load was 233 watts (corresponding to clipping headroom of 0.66 dB) and did not sag at all during the 10-millisecond test period. With lower load impedances, there was some sag over the burst interval, however: Output went from 264 to 253 watts into a 4-ohm load, from 484 to 462 watts into a 2-ohm load, and from 800 to 684 watts into a 1-ohm load. Dynamic headroom at the beginning of the tone-burst test interval was 1.2, 0.83, and 1.2 dB, respectively, for the three loads. Clipping power at about 1% distortion was 280 watts for an 8-ohm load, 310 watts for a 4-ohm load, and 500 watts for a 2-ohm load, corresponding to clipping headroom of 1.5, 1.9, and 1 dB.

Voltage gain was 31.8 dB, with negligible difference between unbalanced and balanced input. Input sensitivity for 1 watt into 8 ohms was 72.7 millivolts. Output noise for unbalanced input was 655.9 microvolts, wideband, and 223.7 microvolts, A-weighted; for balanced input, the results were 655.3 and 253.4 microvolts, respectively. Input impedance was 40 kilohms at 1 kHz. With the M2.1 warmed up enough to stabilize, DC offset at the output was within 10 millivolts of zero. When it was cold, AC line draw was a little more than 5 amperes and dropped to 4 amperes once the amp stabilized, which is consistent with Lamm's claimed levels for power output in Class A.

But let's look at that question another way. In Class-A operation, every output device in an amplifier is always conducting current, even when there's no signal—hence the high idling current. As a signal is applied, current through one output device will rise while current through its push-pull or complementary mate will decrease until the signal reverses polarity. When the current through either device reaches twice the idling current, natural cir-

cuit action reduces the current through its mate to zero, beyond which point the amplifier's operating mode changes from Class A to Class AB.

In the Lamm M2.1, setting the load switch for high impedance also sets the output stage's idling current to 1.5 amperes. (To simplify things, let's consider the six paralleled MOS-FETs in each half of the



**WHEN THE M2.1s
PLAYED LOUD, THINGS
GOT LOUD NATURALLY
AND DIDN'T
SOUND STRAINED.**

output stage as two single devices.) If you drive one output device to the point where it's conducting 3 amperes of current and the other device's current falls to zero, the entire 3 amperes of current will pass through the 8-ohm load. At that point, peak output voltage reaches 24 volts (3 amperes x 8 ohms). And 24 volts into 8 ohms equals 36 watts—exactly what Lamm says the M2.1 can deliver in Class A with an 8-ohm load.

Up to this point, the M2.1's output stage is drawing constant power from the power supply. Past this point, because the power-supply rail voltages are considerably higher than +24 and -24 volts (+69 and -69 volts, in fact), the mode of operation shifts to Class AB but output power continues to increase up to the point where the output waveform starts to clip. In my lab, with an 8-ohm load and the Lamm amplifier's load

Signals flow into the M2.1 through high-speed, unity-gain buffers designed for video instead of the usual op-amp input buffers that use feedback to achieve unity gain. Separate buffers for the input signal's positive and negative phases provide a high input impedance and a low output impedance to drive the circuitry in the input stage proper. This is a differential cascode amplifier, consisting of a pair of P-channel J-FETs whose drain outputs drive the emitters of a pair of PNP transistors. A multi-transistor current-mirror circuit is used here as a current source for the Lamm amplifier's J-FET input devices.

Next in the signal chain is the 6922 dual triode. It serves as the last voltage amplifier (LVA) stage, which provides the voltage swing for the output stage. The grid of the first triode section is driven from one collector output of the cascode input amplifier. This section's plate is coupled to the second triode section's cathode and grid circuit, in an arrangement similar to that called a mu follower. Even though the output impedance of this stage is fairly low, on the order of several kilohms, Lamm did not deem it low enough to drive the input capacitance of the output stage. Therefore, the output of the LVA tube stage feeds a driver stage, which consists of an NPN bipolar transistor loaded by an NPN-transistor current source. Negative feedback (6 to 7 dB of it, according to Lamm) runs from the output of the driver stage to the inverting input of the input differential cascode. (There is no negative feedback around the output stage or overall feedback around the amplifier.)

The feedback loop is a bit out of the ordinary. The input buffer is coupled to the input differential cascode via four resistors. Two of the resistors form a voltage divider from the positive-phase buffer into the noninverting input of the differential amplifier. The other two resistors form a feedback voltage divider. One of these (which would be grounded in a conventional design) connects the negative-phase buffer to the inverting input and serves as the shunt feedback resistor; the other resistor, for series feedback, connects the input with the output of the NPN driver stage.

The M2.1's output stage comprises six pairs of complementary MOS-FET power transistors. The input to this stage is capacitor-coupled from the emitter of the driver transistor via separate capacitors to the gate circuits of the N- and P-channel MOS-FETs. A voltage divider and bias-spreading regulator at this stage's input keep its quiescent idling current stable and virtually eliminate DC offset in the output signal. The resistors closest to the MOS-FET gate drive lines in this voltage divider are bootstrapped from the amplifier's output so that the coupling capacitors will see a high input impedance. This enabled Lamm to use relatively small, high-quality film capacitors.

A hybrid design like the M2.1, whose solid-state stages are in full operation while its tube stage warms up, needs some way to prevent large output swings during start-up. In the M2.1, an output speaker relay remains open long enough for the amplifier to reach stability. This relay also opens if the AC line voltage drops below a set threshold level or if

there is excessive DC at the amplifier output. Furthermore, if the output relay opens for these reasons, the output stage's idling current is cut back to zero. In addition, a resistor in series with the power transformer's primary reduces in-rush current when you power up the M2.1; after a suitable delay, the resistor is bypassed by a relay.

The M2.1's front end (everything except its output stage) is powered by a regulated supply that delivers +125 volts and -125 volts, via dropping resistors. This supply also feeds three-terminal regulators to provide +13 volts and -13 volts to power the input buffers. The output stage's supply voltages and quiescent idling current depend on the setting of the loading switch on the rear panel. When this switch is set for low impedance (1 to 6 ohms), the voltages are about +53 volts and -53 volts and idling current is about 2.1 amperes. When it's set for high impedance (8 to 16 ohms), voltage increases to +69 volts and -69 volts and quiescent idling current drops to 1.5 amperes.

An unusual circuit, between the power cord and the power transformer's primary, is intended to eliminate small DC components that may arise from waveform asymmetry in the incoming AC. Eliminating this DC keeps the toroidal power transformer in the middle of its linear magnetic operating region, helping to reduce mechanical hum. This circuit is, effectively, a full-wave rectifier bridge whose two DC outputs are shorted together; it eliminates the DC while AC proceeds to the transformer via two large capacitors that bypass the bridge. *B.H.K.*

switch set for high impedance, AC line draw stayed at a steady 4 amperes until output power reached 30 to 40 watts. At higher output levels, the line draw started to increase, indicating that the amp was no longer operating in Class A. Although I did not repeat this test for 4-, 2-, and 1-ohm loads (or for the low setting of the impedance switch), I am confident the results would bear out Lamm's claims of

Class-A power output of 36, 18, and 9 watts, respectively.

Use and Listening Tests

I'll cut right to the chase: The Lamm M2.1s sounded absolutely terrific! Their ability to resolve sonic detail was amazing. They provided an excellent sense of air and space and a very specific soundstage—miraculously, without the edginess that too

often accompanies such fine resolution. Their portrayal of dynamic shadings was outstanding. When things got loud, they got loud naturally and didn't sound strained. I found myself wanting to play things louder than I usually do with most other amps. Bass extension, sense of pace and rhythm, and slam were as good as I've heard in my system. Overall, the M2.1s were among the very best amplifiers I have heard



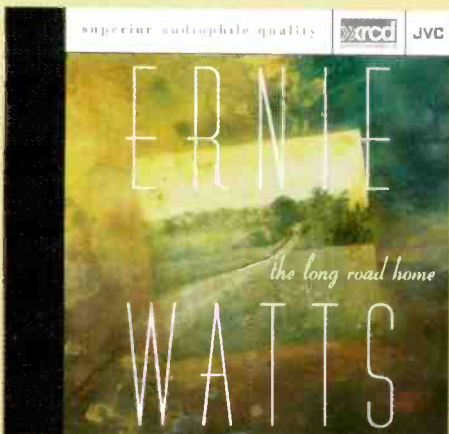
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JVCXR-0045-2

Ernie Watts *The Long Road Home*

Ernie Watts has been quietly playing the part of an influential saxman for over 20 years. His expressive solos have graced the recordings of countless greats in nearly every genre of music. "Music is a language," says Watts, "and with language there are all these dialects – Rock, Classical, Jazz, Be-Bop and R&B among others. As for me, I'm interested in speaking all those dialects." On *THE LONG ROAD HOME*, Watts returns to his favorite dialect...jazz. The results are simply glorious. Joining Watts on this blues tinged release are Kenny Barron on piano, Reggie Workman on acoustic bass, Mark Whitfield on electric guitar and Carmen Lundy, who performs two vocal numbers. This outstanding release was recorded direct to two-track by XRCD co-creator Akira Taguchi and excellently showcases the superiority of the XRCD technology.



JVCXR-0047-2

Miles Davis All Stars *Walkin'*

1954 was a miraculous year for Miles, in which his vision became sharper and his playing even pithier. The quintessential blues jams, "Walkin'" and "Blue n Boogie" are the two masterpieces from this set...considered by many to be two of the greatest instrumental blues performances of all time. The solos by Davis, J.J. Johnson, Lucky Thompson and Horace Silver are electric and the ensemble punches powerful on this classic hard bop date.

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ASSOCIATED EQUIPMENT USED

Equipment used in the listening tests for this review consisted of:

CD Equipment: PS Audio Lambda Two Special CD transport, Genesis Technologies Digital Lens anti-jitter device, and Classé Audio DAC-1 and Sonic Frontiers Processor 3 D/A converters

Phono Equipment: Kenwood KD-500 turntable, Infinity Black Widow arm, Win Research SMC-10 moving-coil cartridge, and Vendetta Research SCP2-C phono preamp

Additional Signal Sources: Nakamichi ST-7 FM tuner, Nakamichi DR-3 cassette deck, Technics 1500 open-reel recorder, and Denon DMD1300 MiniDisc recorder

Preamplifiers: DGX Audio DDP-1, Sonic Frontiers Line-3, and Ayre Acoustics K-1

Amplifiers: Crown Macro Reference, Ayre Acoustics V-3, Audio Note P3 single-ended tube amp, and a pair of Sonic Frontiers Power-3 mono tube amps

Loudspeakers: B&W 801 Matrix Series 3s

Cables: Digital interconnects, Illuminati DX-50 (AES/EBU balanced); analog interconnects, Transparent Cable Music-Link Reference (balanced) and Tara Labs Master and Music and Sound (unbalanced); speaker cables, Transparent Cable MusicWave Reference and Audio Note Custom

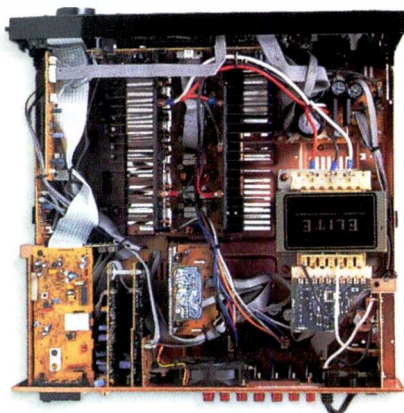
in my listening room. I believe these sound qualities correlate with the M2.1's high output-stage idling current, its low order of distortion products, and the way its distortion and damping factor stayed relatively constant with frequency.

The only negatives to the M2.1 are its high power consumption and high cost. An AC line draw of 8 amperes is definitely not trivial, and \$15,000 per pair isn't cheap! Ah, but really good things are seldom cheap. The Lamm amps performed flawlessly in my lab and in my listening room. If you get the idea that I am enthusiastic about them, you've got it right!

PIONEER, continued from page 53

A/V receivers I've had the pleasure to use recently. This is not to say that it delivers the sound quality of an ensemble of top-quality separate components. The DACs could be better, the tuner could bear improvement in certain regards, the on-screen icons and messages could be more attractive and intuitive, and the remote could be marked more legibly. But in many respects—and where it counts—the VSX-09TX is quite impressive.

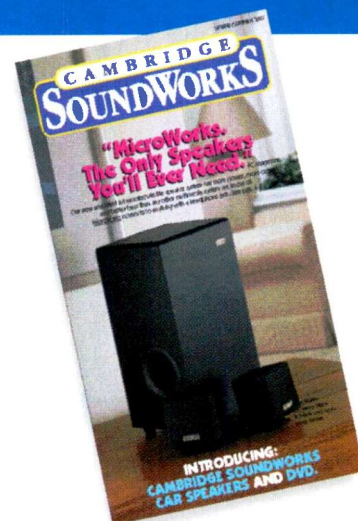
Compared to the average receiver, it sounds pretty bloody good—both on music and with video. And this is a receiver



**OVERALL, PIONEER'S
DIRECT ENERGY
MOS-FET OUTPUT STAGE
ACQUITTED ITSELF
SUPERBLY.**

around which you can assemble a good-quality home theater and still have room for expansion. That's partly because the VSX-09TX doesn't impose the restrictions that so many A/V receivers do: not enough digital audio connections, lack of S-video connections (and paucity of inputs in general), or poor frequency response (which often stems from something as simple as tone controls that can't be bypassed).

A/V receivers are popular in the United States because they are usually more convenient to use than separate components and often less expensive. Asking them to match the performance of top-quality separates is expecting too much, but the Pioneer VSX-09TX comes close. And that's high praise!



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ADCOM THE BALL REMOTE- CONTROLLED HOME THEATER SYSTEM

I'm going to come clean here. Making cheap jokes about The Ball, Adcom's new \$6,000 remote-controlled home theater system, would be tantamount to giving *Audio* readers the shaft. So I'll make no bones about it—The Ball is the latest in a long line of Adcom family jewels.

What is The Ball? In the simplest terms, it's a mouse for your home theater. The Ball also happens to have the best goopy I've ever seen on an A/V product. You know, GUI—graphical user interface—the clunky, confusing display stuff that a lot of today's A/V gear throws up on the TV screen in an attempt to make operation easier and more "intuitive." I hate these things. Whether they're spewing from a cheap A/V receiver or a \$30,000 video projector, most gooeys frustrate me more than they help. If only one of these A/V manufacturers would forget about half-assing its own low-rez gooeys and instead hire a real computer whiz kid/musician/audiophile named—oh, say—Marty Wachter to do it for them. . .But I'm getting ahead of myself.

The Adcom Ball system is one of those products where to demo it is to love and covet it. I've been playing with this thing for the past month, and the couch potato within has



The Ball's DSS menu features current (and updatable) channel icons.

never had it so good. Are you a guy who has to leave detailed Post-It notes for the wife/girlfriend/family on how to operate your system if you leave town? Are you sick of a coffee table festooned not with Wegman photo books of dogs dressed up as people but with a dozen frickin' remotes? Do you, too, own the Marantz RC-2000 mega-remote but wish there were an even easier way to control your entire system with one hand while your other hand's buried in a jumbo bag of Bugles? The Ball addresses these issues better than anything else I've come across.

The Ball is also an all-in-one Adcom home theater separates system consisting of the company's GTP-600 tuner/preamp/Dolby Pro Logic processor, its GFA-7500 five-channel 150-watt amp, and the new BOS-510

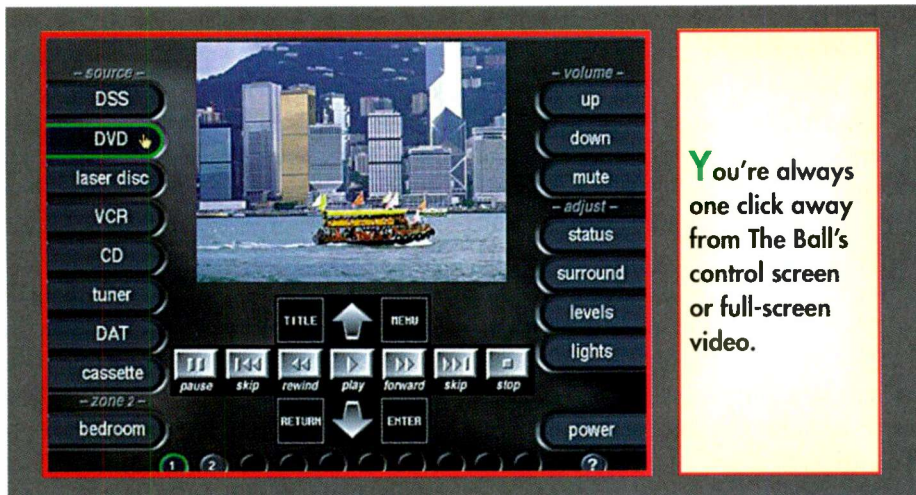
Dolby Digital decoder and BOS-500 system controller. The GTP-600 has been around for several years—it's a good-sounding analog surround pre-amp featuring the high-end Analog Devices SSM-2125 Dolby Pro Logic decoder chip—but the rest of The Ball system is brand-new.

The Ball system's BOS-500 controller has no buttons or controls on its blank front panel. It's really a Mac-in-a-box, an amp-sized black box with the guts of a Macintosh computer. In normal use, the BOS-500 is left on all the time so it can wake up the rest of your system when you fall back on your couch and hit the clicker. There's a small internal fan that can be just barely heard in a very quiet listening room,

but your Adcom dealer can install the BOS-500 in a nearby closet or inside an enclosed rack.

The Mac-in-a-box is loaded with Adcom-designed Ball software, which links all of this hardware and all of your sources together and turns them into an incredibly adroit yet ridiculously easy-to-use home theater that places total system control in the palm of your hand. In terms of user-friendliness, The Ball is light-years ahead of anything else out there right now, including those fancy-shmancy LCD touch-screen remotes that cost nearly as much as the entire Ball system put together.

Company Address: Adcom, 11 Elkins Rd., East Brunswick, N.J. 08816; 908/390-1130.



The belle of The Ball is a lightweight, wireless "air mouse" that sits comfortably in the palm of your hand, with three large, thumb-able buttons and a trackball for one-handed operation. You don't even have to aim the thing in any particular direction because it's a radio-frequency (RF) remote instead of an infrared like most others. You can point this thing any which way and it'll work fine: You just roll the trackball with your thumb and click the big button. A pair of smaller buttons, off to the side, are for volume up and down. And that's pretty much all you really need to know about The Ball.

This is me using The Ball for the first time: I lean back on my couch with my feet up on the newly barren coffee table, and with my right thumb I click on the air mouse. That one simple click turns on the GTP-600 A/V preamp, a Theta Digital CD/LD transport, a Toshiba DVD player, an RCA VCR, the GFA-7500 amp, and a Pioneer rear-projection TV. Up on the Pioneer's screen is a high-rez graphic of a movie theater, with the bright red Adcom logo shining on the fake movie screen and fireworks going off all around it. I can just see The Ball's designer, Marty Wachter, demonstrating the prototype for the Adcom suits:

Suit #1: Saaaay, what if that movie screen had a great big ADCOM, up in lights!

Suit #2: And. . . uh. . . fireworks in the background. Huh, boss? Huh, boss?

Marty (up all night on Domino's pizza and Jolt Cola): Whatever. [Sigh.]

There are four retro-looking movie seats on the screen, to which your dealer can assign different user names and system configurations. (When you buy the system, somebody from your Adcom dealer makes a visit

to your house and sets it up to work with your TV and all of your source components. Sorry, all you slugs who call 18 different mail-order places to play 'em off each other until you get the price down five bucks: If you want to be like Woody Allen in *Sleeper* and enjoy the pleasures of The Ball, you have to—gasp—support your local specialty audio dealer, who not only took the time to learn how to install it but also possesses the Adcom-supplied kit with the separate Mac keyboard and Zip drive needed to unlock the mysteries of The Ball.)

I click on the chair with my name on it and get The Ball's control screen, which displays a little screen image of my video source in the middle, a vertical line of on-screen buttons for all my sources to the left, similar buttons for preamp controls to the right, and a row of source control buttons at the bottom. If I want to watch what's on the screen, I just click on the little screen and The Ball gives me full-screen video. If I want to choose another source, I just click on its on-screen button and then on the little screen image. If I'm watching something and want to go back to the control screen, I just click again and I'm back.

One trackball, one button, one thumb. That's all you need to control your entire home theater system, a second system in another room if you want to go the multiroom route, and even the lighting in your living room if you really want to attain supreme couch potatoitude. You can even have your dealer set up The Ball so that when you're

watching TV, you can change channels with just an upward or downward roll of the trackball. The beauty of it is that any command in your entire system can be assigned to any on-screen button or air-mouse control motion you desire. Want to pause the VCR with a trackball roll to the left and resume play with a roll to the right? Or vice versa? Or do the same things but with up and down rolls? Your dealer can set The Ball up to do just about anything you want.

Adcom says The Ball is fully upgradable to HDTV, whatever its future may hold. In the here and now, DSS owners will love The Ball's on-screen DSS channel menu, as it's loaded with all of the icons for all current DSS channels (any new channel icons can be easily installed later by your dealer). So when you select DSS, the control screen shows the channel icons in full color, ready to be chosen with a single mouse click. And every video input on the GTP-600 has S-video as well, for best picture quality from DSS, DVD, and S-VHS decks.

Adcom's Rob Ain flew in with Marty Wachter to set up the Ball system in my living room, so I gutted my usual reference system to make room. I kept my front and

surround pairs of NHT 3.3 speakers and the AC-1 center-channel speaker, the Pioneer Elite 1009W rear-projection TV, RCA S-VHS VCR, Toshiba SD-3107 DVD player, and Theta Digital Data III LD/CD

transport. Out went my Theta Casablanca surround preamp and Krell KAV-500 multichannel amp. In went the Adcom GTP-600 tuner/preamp, GFA-7500 multichannel amp, BOS-510 Dolby Digital decoder, and BOS-500 system controller plus a gaggle of those little Xantech stick-on remote-repeater nubbies that let the BOS-500 control everything from the Pioneer RPTV to the Toshiba DVD player. Setup consisted mostly of Wachter sitting at the keyboard plugged into the BOS-500 and asking me if I wanted the system to do this or that or a hundred other things that sounded fine by me. You can expect the same attentive treatment from your Adcom dealer.

In terms of sound quality, The Ball system follows in the Adcom tradition of solid, en-

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try-level high-end performance. As I said, the GTP-600 surround preamp's been around awhile. But in listening to it as a part of The Ball system and in comparison with the more modern (and much more expensive) Theta Casablanca, I was pleased to find that time hasn't changed my opinion: The 600 still offers excellent analog surround processing along with very clean (but slightly bright) sound from two-channel music sources.

The new THX-certified GFA-7500 multi-channel amp is no slouch, either, sounding much smoother and more musical than the Adcom amps I've auditioned in the past. Adcom's amps have always been wildly popular with audiophiles, but I felt its older amps, like the GFA-555II, sounded coarse and edgy. The GFA-7500, however, is neither; its powerful, neutral sound compares very favorably with that of much more expensive multichannel amps. It's no \$4,500 Krell KAV-500, but it's clearly one of the better-sounding affordable multichannel muscle amps I've heard.

As part of The Ball system, the BOS-510 decoder adds Dolby Digital (AC-3) capability to the GTP-600, automatically switching between the two components according to the type of surround processing required by a given source. With the latest Motorola DSP engines on board, the BOS-510's audiophile-grade Dolby Digital performance wasn't a surprise, but I did uncover a few bugs. The BOS-510 and the Toshiba SD-3107 DVD player loved each other as long as a disc was playing, but the system let out a continuous loud whine if the AC-3 bitstream was suspended, which in the case of the Toshiba meant any time I hit pause, stop, or chapter advance. Adcom tells me that the DVD player it's using, a Sony, doesn't exhibit this problem and that a fix for Toshiba owners is in the works.

The second glitch involved the BOS-510's bass management. When Wachter originally set up The Ball for me, he configured the system for use with a separate sub I had on hand at the time. But later, when I changed the setup to full-range main speakers and no subwoofer, the background hiss during AC-3 playback rose roughly 10 to 12 dB from the same system volume level. This was also the case for the BOS-510's digital Dolby Pro Logic and two-channel stereo modes and was apparently due to the decoder's LFE bass management being handled entirely in the digital domain. Although it's a rare home theater these days that doesn't have a separate sub-

woofer, they do exist, and Adcom says the system now does the bass summation in analog to avoid this problem.

There was also one bothersome operational hitch: The GTP-600 doesn't allow for automatic surround mode switching when you change sources. The Theta Casablanca, for example, remembers which surround mode goes with each source and automatically switches from two-channel stereo to Dolby Pro Logic to Dolby Digital when you go from CD to TV to DVD. But the GTP-600's analog surround modes "toggle"—there's a single button to switch them, and you have to go through the whole list to get to the one you want. So if you're watching TV and listening in Dolby Pro Logic, the system stays in Pro Logic if you switch to CD, and if you switch it to stereo for music listening, it stays in stereo when you switch back to TV, etc. But this is to be expected from a system based around a three-year-old preamp like the GTP-600 and an add-on Dolby Digital box. The good news is that Adcom is currently developing a new flagship surround preamp for The Ball that will have internal Dolby Digital decoding and direct surround mode switching.

The verdict, as always, comes down to this: After living with a piece of gear for a while, will it kill me to pack it up again and ship it back to the manufacturer? For The Ball, the answer is yes, it will definitely kill me! I thought I had it sweet with the Marantz RC-2000 mega-remote controlling my whole system, but the Adcom Ball is a whole new level of Easy Street. Its on-screen display is just so smartly laid out, and the air-mouse is so light and curvy and fits so nicely in the palm of my hand. After all these years of A/V confusion, it's such a relief to finally have a high-end home theater that has been dead simple to operate from the first moment I tried it.

The Adcom Ball system is by far the simplest, easiest, most user-friendly home theater system I've had in my home. It spoiled me rotten. The bundled Adcom audio electronics offered very good sound quality, but I'd still give my left Ball if Adcom would come out with a controller-only version that could integrate with an existing home theater system to dramatically simplify its operation. As it stands, The Ball offers outstanding value for its \$6,000 price, and I strongly recommend it as one of the smartest products to come out of the high end this year. **A**

POLK RT-2000p SPEAKER

Not all innovations come from small, esoteric firms. Large companies are able to fund more research and harvest the fruits of that research more economically than small ones—at least, those large companies that care to. And Polk Audio, with its RT-2000p speaker, clearly demonstrates this. The Polk RT-2000p incorporates a powered subwoofer and plenty of the company's proprietary technology, all for a highly affordable price of \$1,900 per pair finished in black wood-grain vinyl or \$2,200 per pair in rose-wood veneer. Like many floor-standing speakers, the 2000p is deep but narrow (16 x 9½ inches), which minimizes the impact of its 46½-inch height. Moreover, its styling adds character to what might otherwise have been a rather plain box: A pedestal bottom (actually part of the subwoofer venting system) has a slightly sculptured effect and enlarges the footprint to 18½ x 11 inches. The grille's division into sections adds to the visual character. And even the black vinyl finish has enough texture and natural wood character to avoid the shiny look that many competing speakers have.

The RT-2000p's 1-inch tweeter, 6½-inch bass/midrange driver, and dual 8-inch subwoofers are mounted on a baffle of medium-density fiberboard that's covered with an acoustically inert material. (The cabinet's front panel is 1 inch thick; the others are ¾-inch MDF.) The tweeter and bass/midrange drivers have separate sub-enclosures, isolated from the subwoofers; extensive asymmetrical bracing is used to reduce resonance and standing waves in the vented subwoofer section. The RT-2000p weighs a solid 75 pounds and has adjustable spikes so that you can anchor it firmly to the floor.

Company Address: 5601 Metro Dr., Baltimore, Md. 21215; 800/377-7655; www.polkaudio.com.

The tweeter and bass/midrange driver are mounted in a bezel molded from a dense mineral and glass compound. That bezel, which weighs almost 3 pounds, moves the drivers out to the plane of the grille frame, to reduce diffraction, and the grille itself is designed to reduce diffraction still further. All this is intended to reduce coloration, but it may also help explain why the RT-2000p is able to sustain unusually good imaging and a soundstage that is not localized around the speakers.

The tweeter's dome is of stainless steel and aluminum, vapor-deposited on a soft polymer. Polk Audio says this Tri-Laminate construction combines the stiffness of metal with the damping characteristics of soft materials. The voice coil's former is bent, thereby providing more contact area with the dome.

The bass/midrange driver's cone is a polymer/mineral composite. Its molded rubber surround is intended to minimize ringing, and the external ridges of its steel basket are said to improve mechanical coupling to the baffle, for further reduction of unwanted resonances.

The RT-2000p's dual subwoofers,

which are driven by an internal 100-watt amplifier, have very high moving mass and unusually powerful magnet structures. Their enclosure is vented by what Polk calls a Power Port, located on the bottom of the cabinet, a design intended to maximize airflow while minimizing turbulence, noise, and energy loss. [See "More Bass in Less Space," *Audio*, May 1996.]

All four drivers take advantage of what Polk calls Dynamic Balance technology, a system for selecting combinations of driver materials



Photos: Michael Groen

and geometries so as to minimize resonances. Polk has used this technique, which it developed in cooperation with Johns Hopkins University, to steadily refine the construction of its drivers, in order to reduce their coloration and improve their transparency, clarity, and ability to reproduce dynamic contrasts. My ears tell me it's a great success.

The crossover from mid/woofer to tweeter nominally occurs at 2 kHz, via first-order low-pass and second-order high-pass filters. The lower crossover is specified at 80 Hz; its high-pass section is a first-order design. The 80-Hz crossover point marks the low-frequency section as a true subwoofer. And years of listening have shown me that if a subwoofer crosses over at a higher point, it's extremely difficult to keep it from being audible and distracting.

The power amp for the subwoofer can be set to turn itself on when it receives a signal and turn itself off after several minutes of silence; a front-panel pilot light glows whenever it's plugged in. The amplifier has adjustable gain and accepts preamp- or line-level signals. Because much of the work of driving the RT-2000p is handled by the internal amplifier, the speaker can easily be driven by most high-quality receivers or most small tube and solid-state amplifiers.

I found the RT-2000p to have a relatively "flat" overall timbre that was very smooth. Its treble was accurate rather than forgiving and seemed unusually free of minor irregularities. The tweeter exhibited none of the ringing or slight edge I've heard from some metal-dome tweeters. Upper-octave dispersion was excellent, and transparency and detail were very good. In the high end of the spectrum, performance was consistent from low to super-loud volume levels.

This dynamic consistency was also a strength of the RT-2000p's midrange, which was very neutral and uncolored for a speaker in this price range. Far too many speakers, even those at higher prices, change sound character with signal level, altering their timbre and apparent speed; they begin to sound colored at signal levels

of 90 dB SPL and higher. The 2000p's midrange didn't. What it did do was handle transients and rapid musical changes very well. Its speed was well matched to the tweeter's, allowing each driver to reinforce the other's strengths. I was surprised to discover how well this 6½-inch driver performed at the low end of its range, where it was a lot smoother than many speakers that have 8- and 10-inch drivers. This lower-midrange performance gave the 2000p an unusually good ability to reproduce piano, lower strings and woodwinds, and male voice.

The dispersion of the treble and midrange drivers was wide, without beaming, yet the sound was unusually free of room-interaction effects. As with all speakers having really good transparency and dispersion, I had to experiment a bit with angling to get the best possible focus. I also had to play around with the distance between speakers to find the best compromise between a wide soundstage and deep, rock-solid imaging with ample center fill. Keeping them away from the side walls helped me get the best soundstage.

The RT-2000p's imaging and soundstage did not blur at high levels; I could really crank up sonic warhorses like the Saint-Saëns "Organ" Symphony without losing soundstage size or detail. For its price, the 2000p was excellent at reproducing large choral and full orchestral passages at high volume; this is one affordable speaker that really lets you enjoy Beethoven's Ninth and Mahler's Eighth.

Only in the bass could I hear the sonic trade-offs inevitable in a \$2,000 pair of speakers—and they weren't the compromises in bass extension and power that you might expect. Polk specifies a -3 dB point of 32 Hz. I normally shrug off such a spec as meaningless, since it doesn't tell me anything about maximum level for that bass performance. But the RT-2000p really does provide lots of power down to very low frequencies. It couldn't accurately reproduce the lowest fundamentals of a large organ; only a handful of speakers can. It did, however, do extremely well at reproducing deep



On the RT-2000p's rear panel are hookups for its upper-range drivers and subwoofers.

organ passages on such demanding recordings as *Pomp and Pipes* (Reference Recordings RR-58CD) and the Jean Guillou CD of Mussorgsky's *Pictures at an Exhibition* (Dorian DOR-90117). Low-end response also extended deep enough for excellent sound from bass drum, bass guitar, bass fiddle, and cello.

Where the trade-offs did emerge was in bass speed, control, and definition. Polk claims that all of the RT-2000p's drivers have correctly matched time responses and mechanical Q, so that every part of the system will stop and start in the same way. The 2000p did perform well in this regard, but its subwoofers did not match the other drivers' speed and clarity. Deep bass needs to be extremely fast and tight, or it can overpower the rest of the music. The 2000p's bass speed was good, not great. There were times when I could hear a slight discontinuity in the speed, definition, and pace of the upper octaves or a reduction in the rhythm, pace, and crispness of the bass. Fortunately, I could minimize these problems by turning the bass level control down slightly. I could also improve performance by moving the speakers around. Changing the distance between the speakers and the wall behind them affected their ability to sound natural and have tightest and fastest bass rather than loudest. (Loud is scarcely the goal in music, but natural is. And a speaker like the 2000p, which can handle the most demanding passages in orchestral music, jazz, and rock, is simply more fun and more exciting than one that can't.) The

**WITH THIS SPEAKER,
I COULD REALLY HEAR
DOLBY DIGITAL
SOUNDTRACKS' MOST
DRAMATIC EFFECTS.**

result of my tinkering, though still short of perfect, was very good indeed.

I did a fair amount of listening to other speakers in this price range that had powered subwoofers. My conclusion was that the RT-2000p outdid most of its competition and at least equaled the rest. (You can't, by the way, wiggle out of the bass-versus-price bind by using a separate subwoofer. Really high-quality subs begin at around \$1,200 to \$2,200, and many over-\$2,000 subwoofers do no better than the RT-2000p.)

In home theater use, these bass trade-offs had much less impact. Using the RT-2000p's treble and midrange sections for the main channels and its bass sections for the subs worked very well. This setup gave me, in effect, stereo subwoofers, avoiding the localization problems inherent in using one subwoofer to reproduce stereo music and reducing the room interactions and resonances that arise when a single sub plays the louder portions of soundtracks. The 2000p's bass performance made home theater a hell of a lot of fun. The Polk was one of few affordable speakers that enabled me to really hear the most dramatic and

shocking effects in Dolby Digital and DTS soundtracks, particularly the most extreme passages in *Jurassic Park*. (Some credit for this bass performance should probably go to the Krell KAV-500 five-channel amp that I used in conjunction with, at various times, the Krell Audio + Video Standard, Lexicon DC-1, and Theta Digital Casablanca surround preamps.)

**THE POLK'S
GREATEST STRENGTHS
ARE ITS SOUNDSTAGE,
DEEP BASS, AND
EXCEPTIONAL DYNAMICS.**

The Polk RT-2000p may not be a near-perfect speaker for \$1,900 a pair, but it does offer darn good value for money. Its greatest strengths are its soundstage and deep bass and the exceptional dynamics and transparency of its treble and midrange. (I suspect that many audiophiles will be surprised by just how good this speaker's

midrange and treble really are.) These strengths are easy to exploit in a home theater by properly setting a good A/V preamp's crossover and delay adjustments. And the Polk's weaknesses in stereo listening, its deep-bass definition and pacing, can be minimized through careful setup.

While I was using the RT-2000p, the system that came most to mind was Polk's own Signature Reference Theater (SRT), the best home theater speakers I have yet auditioned. The SRT (which I reviewed for the September 1996 issue) has much of the same technology as the 2000p. That doesn't make the 2000p a mini-SRT, but, on the other hand, it costs less than one-fourth as much. It is a speaker whose treble and midrange are exceptional for the money, and it provides far deeper bass than most of its competitors. It can play the most demanding, loud recordings with a remarkable lack of strain for its price and size.

If you want to approach perfection, you're going to have to buy a system like the Polk SRT. If you want good music, exceptional home theater performance, and an excellent value, buy the Polk RT-2000p. A

"8TC - The most accurate performer"

Hi-Fi News & Record Review - Ben Duncan - February 1997 issue



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 **KIMBER KABLE**

Revealing the Nature of Music

VPI ARIES TURNTABLE AND AUDIOQUEST PT-6 TONEARM



The Aries is VPI's best-looking turntable but not its most expensive.

It seems appropriate to be writing this review just as the LP's 50th anniversary comes to its end, because, despite its age, the LP is not dead. The analog LP, still sonically competitive with the digital CD and DVD in many ways, remains one hell of a lot of fun for the dedicated music collector and sound buff.

The VPI Aries, at \$2,400, is not VPI's top-of-the-line turntable by any means; the various versions of the TNT sell for \$3,000 to \$6,400. But the Aries is the best-looking turntable VPI has ever sold. Although looks certainly don't affect sound quality, if you're going retro, you may as well do it in style!

The Aries offers the kind of value for money that sometimes seems to be missing from analog components. Its sound quality comes surprisingly

close to that of my TNT Series 3, and you can pay far more without getting much closer to the state of the art. Furthermore, the AudioQuest PT-6 arm that came with the Aries I reviewed provides very good sound quality for \$495 (or for just \$400 if you buy it with the Aries). Its sound quality can't compete with that of VPI's JMW arms, but then the PT-6 doesn't cost \$2,300 to \$2,800, either.

One reason for the Aries' exceptional sound quality is that it contains many of the same parts as the TNT Series 3. You get the same platter and bearing, which are among the best at any price, and the same kind of record clamp and belt. The main difference between the Aries and VPI's TNT models is that the Aries does not have a full spring suspension. Its chassis is a 22 x 16-inch board of 2-inch-thick medium-den-

sity fiberboard, with a 10-gauge steel plate bonded to its bottom for grounding and to control resonances. The arm board, the platter, and Tip Toe feet are mounted directly to this chassis. (The Tip Toes terminate in hardened steel balls, to provide good coupling to furniture while preventing the damage sharpened points would inflict.) The motor is in a separate, 17-pound housing to minimize vibration and isolate it from the turntable. The suspension consists of neoprene dampers in the sockets that hold the Tip Toes, a simplicity made possible by the heavy chassis and separate motor.

Setup was remarkably easy. I took the turntable, motor assembly, platter, and arm out of their boxes, followed the instructions, and had them ready in 10 minutes. It took much longer to mount and align the cartridge than to set up the turntable. (Although the arm's vertical tracking angle was fairly easy to adjust.) I did not have to adjust springs, weights, or damping. (If you are new to analog, this should be very reassuring. Anything a reviewer can do, a novice audiophile can do—and usually better.)

I began my auditioning with the Aries in my main equipment room, which is on a heavy cement slab and isolated from my listening room by a load-bearing wall. Consequently, there is no significant transmission of vibration or acoustic energy from one room to the other, so it was possible to check the Aries for wow, flutter, rumble, and mechanical vibration without interference from outside vibration sources.

The Aries' performance came within an ace of the TNT Series 3's.

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I heard few colorations that I had not previously experienced with earlier versions of the AudioQuest PT-6. Like the TNT Series 3, the Aries seemed to minimize record noise, and it had an exceptional ability to resolve low-level musical detail. It extracted an amazing amount of detail from the best LPs and did not color the bass or make records sound warm or lean. Audiophiles accustomed to the minor timbre differences between CD players may not appreciate how rare such sonic neutrality is, but many turntables get their reputations more from euphonic colorations than from accuracy.

The Aries provided rock-solid speed and pitch stability, without losing rhythm or pace. I do not have perfect pitch, but I have always been very sensitive to wow and flutter and have always preferred a tight, focused soundstage to the kind of "super" soundstage you sometimes get with light turntable assemblies or euphonic wow and flutter. At first, the Aries actually outperformed my TNT Series 3 in these regards, leading me to spend a few hours cleaning and fiddling with the TNT's belts and pulleys in order to get marginally better pitch and focus from it. The Aries was just slightly fast, according to my stroboscope, but the sonic difference between it and the TNT's more precise speed settings was virtually inaudible. And you can use VPI's Power Line Conditioner (\$485) to give the Aries equal speed precision as well as variable speed.

For comparisons, I used the AudioQuest PT-6 arm on the Aries and a Triplanar 5 arm on the VPI TNT Series 3, with AudioQuest AQ 7000Fe5 moving-coil cartridges (\$2,795 each) in both. That's not exactly a fair match, as the Triplanar is an expensive (\$2,495 to \$2,815), reference-quality tonearm whose bass, detail, and transparency are notably superior to the PT-6's. Even so, the Aries had the same basic ability as the TNT Series 3 to get amazing sound from my records and to provide deep, tight bass. The Aries' performance with lute, guitar, piano, and harpsichord records approached that of the TNT Series 3. Its reproduction of the soundstage was excellent, with lots of detail, excellent stability, and a size dictated by the recording rather than the colorations of the turntable.

The Aries/PT-6/AQ 7000Fe5 combo's musical dynamics were excellent, partly because of exceptionally low noise and out-



**The PT-6
tonearm, from
AudioQuest,
worked well
with the Aries.**

standing resolution of transient information and partly because the Aries damped records so well that vibration problems were dictated largely by the interaction of arm and cartridge—even on the loudest, most cartridge-shaking, passages. The Aries did nearly as well with reissues of old RCA and Living Presence sonic spectaculars as the TNT Series 3 did, and it played them far better than some turntables whose suspension systems are much more complex.

**THE ARIES PROVIDES
NEAR-REFERENCE
QUALITY
AT A SURPRISINGLY
REASONABLE PRICE.**

The Aries' timbre was accurate rather than romantic. This is not a turntable that gains midrange punch by losing bass information and softening the treble or that warms the midbass but doesn't do very well below 50 or 60 Hz. If you want those colorations, look elsewhere. But if you want an accurate turntable rather than a dynamic equalizer, try the Aries.

Unfortunately, when I moved the Aries from my isolated equipment room to my listening room, it became clear that it was more vulnerable to acoustic breakthrough and furniture-transmitted vibration than the TNT Series 3. Even so, the Aries still sounded surprisingly good when I did nothing more than place it on a TNT turntable stand or a RoomTunes adjustable rack. Just don't place it on lightweight or vibration-prone furniture, furniture that's not firmly coupled to the floor, or shelves attached to vibration-prone walls. If you

must put the Aries in an area where it's susceptible to a lot of mechanical or airborne vibration, you may be able to improve the sound by using a really good acoustic isolation platform, such as one of the Bright Star Audio models. Or you might get a similar improvement by placing the Aries on two pieces of plywood with a sheet of bubble wrap between them. If these methods don't cure the problem, you'll need a turntable with a better suspension, such as the TNT Series 3. (Thirty years of listening have convinced me that 90% of the feet, boards, clamps, and other devices that promise anti-vibration miracles are expensive gimmicks and that devices that do work in one listener's system may not work in another's.)

You are certain to get even better sound from the Aries if you use a reference-quality tonearm with it. Nonetheless, the AudioQuest PT-6 is both a very good tonearm and an excellent value. It has evolved from a Japanese design that's been around for at least a decade, but the PT-6 seems to get notably richer and more accurate sound from moving-coil cartridges than earlier versions. The armtube is larger in diameter and seems more resistant to vibration. The excellent bearings, I learned, are the same ABEC-3 grade used in the SME Series IV arm.

The AudioQuest PT-6 was exceptionally well damped by the combination of the Aries' acrylic mounting board and heavy chassis. I suspect this damping helped minimize vulnerability to acoustic breakthrough and vibration and partially accounted for the unusually good bass and focused soundstage.

The LP and analog recording technology have come a long way in 50 years, so records deserve the best components you can afford. And the VPI Aries and AudioQuest PT-6 combo is worth every penny. **A**

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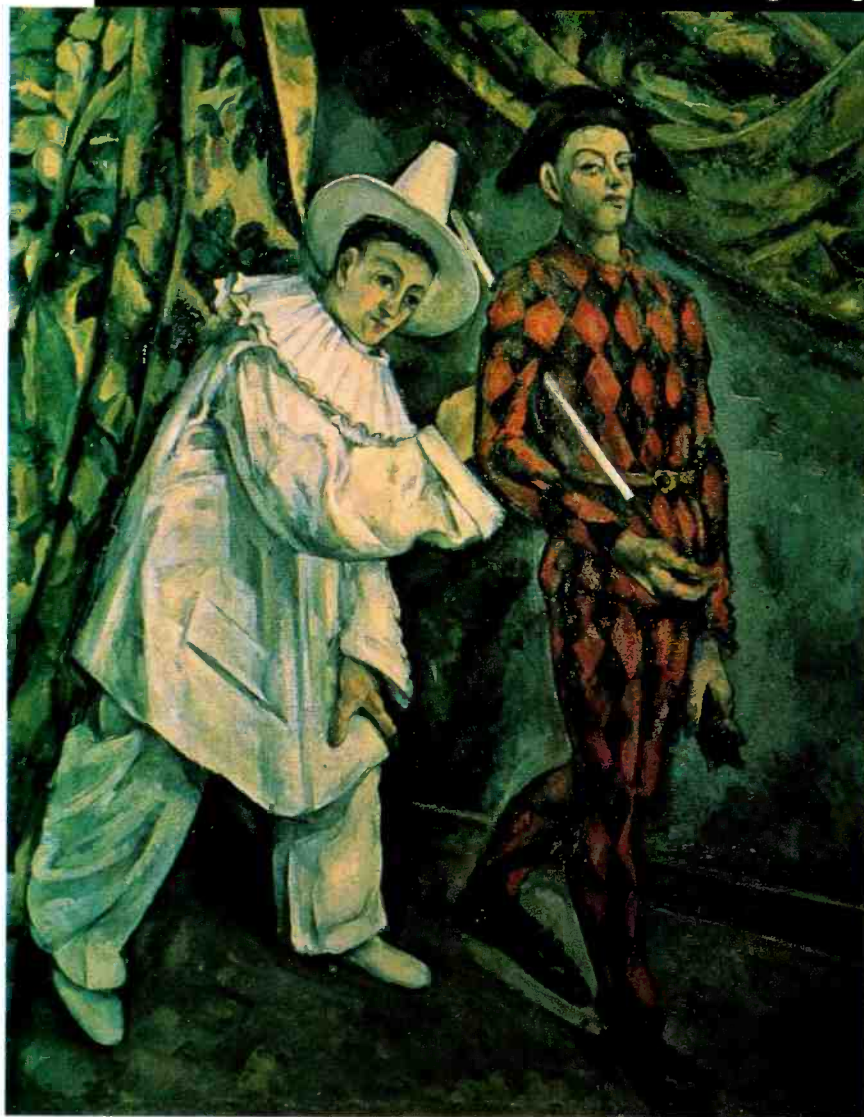
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CLASSICAL RECORDINGS



Stravinsky: *Pétrouchka*
L'Orchestre de la Suisse Romande,
Ernest Ansermet
 CLASSIC COMPACT DISCS
 CSCD 6009; AAD; 34:55
 Sound: A+, Performance: A+

Classic Compact Discs, a division of Classic Records, is currently releasing remastered CDs of the highly regarded London blue-back LPs (so-called because the original back covers had a light blue tint). One of the best is Ernest Ansermet's definitive performance of Igor Stravinsky's early ballet, *Pétrouchka*.

The top-notch recording from the late 1950s has often been lauded by audiophiles as one of the best LPs ever made. And this CD sounds very much like that fabled platter, surely closer to it than the merely good recent CD reissue from London itself. The presence of the percussion is breathtaking, especially the beguiling, tinkly bells and triangles in the First Tableau. As was the case with most London recordings of the era, woodwinds and first stand strings are prominent throughout because of the label's famous mike and frame arrangement known as the Decca Tree. This setup yielded an exciting conductor's perspective that was a favorite of many, including me.

This disc seems to have better, tighter bass than the LP, because, even though the 35-minute work was spread over two record sides, there was apparently more bass on the master tape than could be cut into the vinyl record. Check out the mighty bass drum thwacks in "The Dance of Coachmen and Grooms" from Tableau Four, and see if you don't agree. In that same movement, catch the buzz on the string basses in "The Bear and The Peasant" and the chilling, mocking trumpet solos near the end of the work.

There's musical and sonic delight at every point. Ansermet had this piece in his blood and gave a perfectly balanced reading that captured its essence down to the last lyrical and dramatic detail. His absorbing, exuberant performance is worthy of the greatest audio engineering available, which London provided. Icing on the cake: Classic Compact Discs uses original front and back cover art, original notes, and even the original catalog number, albeit with an extra

Photograph: Pushkin Museum of Fine Arts, Moscow/Giraudon, Paris/SuperStock

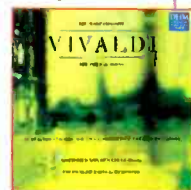
Antonio Vivaldi

**The Four Seasons, *Il Piacere*,
La Tempesta di Mare,
 and Descriptive Sonnets to
 The Four Seasons**

*Gottfried von der Goltz, violin; the
 Harp Consort, Andrew Lawrence-King;
 Freiburger Barockorchester,
 von der Goltz*

DEUTSCHE HARMONIA MUNDI
 77384; DDD; 66:03
 Sound: A, Performance: A+

The performers on this recording treat the violin soloist like an expressive operatic vocalist. Andrew Lawrence-King's virtuoso four-player Harp Consort joins in as a "consort in the continuo," accompanying the soloist and a larger string ensemble (which includes the theorbo, psaltery, lira, and archlute) in a blend of constantly varying, evocative instrumental colors. The players set a new benchmark for this familiar program piece; anything less might now seem a mere violin concerto. Robust sound. *Rad Bennett*



"CD" after the vinyl's "CS" prefix. By this point, you've probably guessed that I consider this one of the great recordings of all time. Now it's one of the best CDs. (Available from Classic Compact Discs, 1444 North Highland Ave., Hollywood, Cal. 90028; fax, 213/466-9825; www.classicrecs.com.) *Rad Bennett*

Schumann: Piano Concerto in A Minor, Op. 54; Konzertstück (Introduction and Allegro Appassionato for Piano and Orchestra), Op. 92; and Konzertstück (Introduction and Allegro Concertante for Piano and Orchestra), Op. 134

Murray Perahia, piano;
Berlin Philharmonic, Claudio Abbado
 SONY CLASSICAL SK 64577; DDD; 57:20
 Sound: A-, Performance: A+

Robert Schumann's Piano Concerto in A Minor has become so popular that it often overshadows his two other principal compositions for piano and orchestra, the Konzertstück, Opus 92, and the Konzertstück, Opus 134. Both of these one-movement works deserve wider recognition, as they showcase Schumann at his dramatic height. Murray Perahia gives a near-perfect performance of all three pieces, and the balance between his piano and the players of the Berlin Philharmonic is outstanding, particularly in the concerto's last movement. Some listeners may object to the practice of recording the piano at a notably higher volume than would be experienced in a concert setting, but Schumann himself would doubtless have given his approval. *Patrick Kavanaugh*



Night of the Four Moons

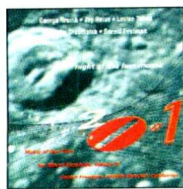
Orchestra 2001
 CRI CD 760; 72:37
 Sound: B+, Performance: B

If ever a composer were deserving of reappraisal, it would be 67-year-old George Crumb. His "Black Angels" for electric string quartet (1970) partly inspired the formation of the Kronos Quartet. But he had the great misfortune to compose his most illustrious works on the eve of minimalism and was lumped in with the composers that the minimalists reacted against.

Orchestra 2001 has resurrected one of Crumb's best-known works, "Night of the Four Moons," which was written during the flight of Apollo 11 in 1969. Crumb seems torn in this piece between the magnificence of the universe and the countless details of Earth. Japanese kabuki, South American poetry, castanets, banjo, and percussive effects are used to outline space. Singing the poetry of Federi-

co García Lorca, mezzo-soprano Barbara Ann Martin expresses Crumb's ambivalence about the Apollo mission. "The Moon is dead, dead," she intones, "but is reborn in the springtime."

In ways both literal and metaphoric, almost all of the other composers represented here are disciples of Crumb. Gerald Levinson's



musical lineage is evident from the opening struck bell and sustained flutes of his brooding 1972 piece "in dark." The wordless voice of soprano Carmen Pelton sounds like a ghostly theremin across Levinson's foreboding landscape; she emerges with the dream poetry of Robert Lax and Nanine Valen before dissolving back into wordless hymn. Jay Reise's "Chesapeake Rhythms," the most recent composition (1995), is a dynamic piece of cross-cut rhythms and melodic canon nestled under the hood of a Lamborghini. More robust than Crumb, Reise nevertheless shares his sense of space, albeit at 150 miles per hour. Timothy Greatbatch's "A Clockwork Legend" (1993) is a tour de force. It's full of stirring cadences and cyclical melodies that rise in gusts of wind and alternately dissipate quietly or fall abruptly.

The one exception to Crumb's influence is the late Louise Talma, who was 23 when Crumb was born. With its tricky but often disconnected melodies sung in stentorian tones by tenor Paul Sperry, her "Diadem" reflects the influence of Arnold Schoenberg.

Orchestra 2001, under the baton of James Freeman, is sensitive to these works, although

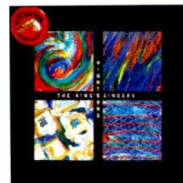
its interpretations are occasionally dry and academic. For the most part, however, this is not exotic foreign terrain for the orchestra. This is where it eats lunch. *John Diliberto*

Nightsong: Music by Schubert, Schumann, Brahms, Reger, and Rheinberger

The King's Singers; Nathalie Stutzmann, contralto; Neill Archer, tenor; Roger Vignoles, piano; Michael Thompson Horn Quartet
 BMG CLASSICS/
 RCA VICTOR 68646; DDD; 62:35
 Sound: A, Performance: A

The inspiration for Franz Schubert to write part songs for male chorus dates back to 1809, when Carl Friedrich Zelter founded the Berlin Liedertafel, a group of amateur singers. Amateur choral groups soon flourished in many other German cities, and Schubert paved the way for other German Romantic composers to write for them.

In faultless performances of incredible beauty, the professional King's Singers have captured the essential and engaging simplicity of works by Schubert, Johannes Brahms, Joseph Rheinberger, Max Reger, and Robert Schumann. The highlight of the collection is Schubert's exquisite, dark-hued "Nachtgesang im Walde," in which the men's voices are joined by the Michael Thompson Horn Quartet (of French horns). The recorded sound seems just right—intimate, yet rich and warm. *Rad Bennett*



Johannes Brahms

Sonatas for Viola and Piano, Op. 120, Nos. 1 and 2

Kim Kashkashian, viola;
Robert Levin, piano
 ECM NEW SERIES 1630; 44:22
 Sound: A, Performance: A

The viola sonatas on this disc are among the last pieces Johannes Brahms composed. Originally written in 1894 for clarinet and piano, they were inspired by the great clarinetist Richard Mühlfeld, who played in the Meiningen Orchestra. Brahms then prepared the viola version for another friend, Joseph Joachim. These late works are very innovative and forward-looking, sounding more a part of the 20th century than the 19th. The chromaticism



is severe, and the mood—especially of the Sonata in F Minor—is dark, intense, and enigmatic.

Both sonatas are exceedingly difficult to interpret authentically and present many technical challenges. Yet violist Kim Kashkashian's performance is remarkably convincing, and she carefully resists the urge to add Romantic gimmicks. Her intonation is excellent, her bowing is extremely clean, and her sound is large without being overtly soloistic in this intimate music. Likewise, Robert Levin's keyboard technique is notably articulate and clear, even in complex passages of the second movement of the Sonata in E-Flat Major. The miking is close enough to underscore this clarity. *Patrick Kavanaugh*

ROCK ~ POP RECORDINGS

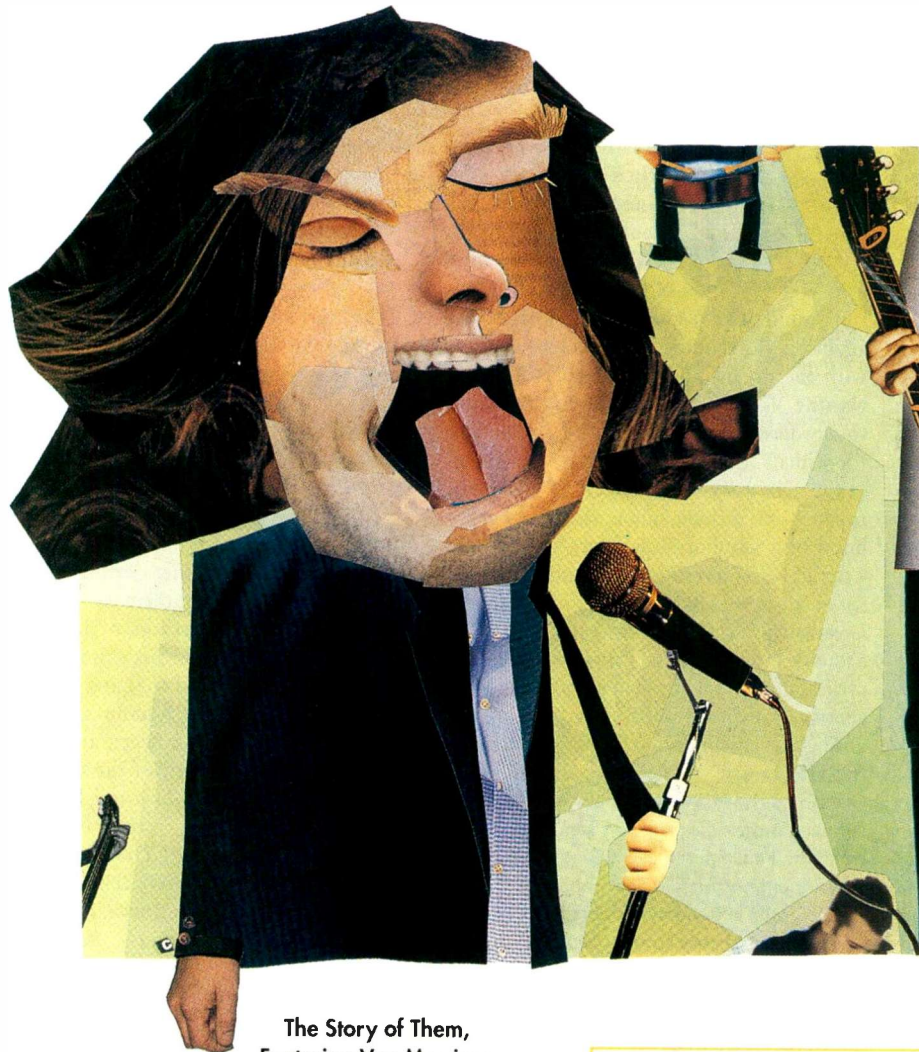
majority are in true stereo and sound great, despite some phasing problems with the cymbals.

This is not the Morrison of "Have I Told You Lately," "Tupelo Honey," or even "Brown Eyed Girl." Morrison was trying to forge a sound similar to what he heard from London's Downliners Sect, Pretty Things, Animals, and Rolling Stones. The raw R&B influence common to Them and these other bands is there, but Morrison's own musical character is so powerful that he transcends the genre. "My Lonely Sad Eyes" and "Could You, Would You" sound as potent today as they did 30 years ago. (Incidentally, the American Morrison, Jim, heard Them and ripped off its sound wholesale, making "Gloria" a staple of The Doors' repertoire and turning "One Two Brown Eyes" into "Break on Through.")

These recordings are primitive, but the digitizing and remastering do them justice, uncovering the beauty of the performances. The previously unreleased tracks—alternate versions of "Richard Cory," "Bring 'Em on In," and "Little Girl"—are revelations. (Now can we please have the live BBC tracks?) We could pick nits—the original mono mixes versus the early '70s stereo remixes—but why bother? This set is the Holy Grail for fans of the wild Irish soul singer.

Jon & Sally Tiven

Illustration: Tomi Nick Cocotos

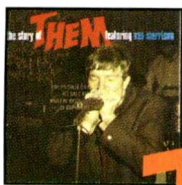


The Story of Them, Featuring Van Morrison

DERAM 42284 4833

Two CDs, 2:25:09

Sound: B+, Performance: A+



This two-disc set is a compelling collection of nearly all of Van Morrison's recordings fronting the group Them. Morrison fans have been clamoring for years for a proper CD retrospective of Them, as one had to buy five vinyl albums to own all of the band's works. With the exception of the great "Mighty Like a Rose" (an obscure Them song that Morrison will not allow to be rereleased, as he considers it a demo), everything's here. Of the 50 tracks, which include several alternate versions/mixes, the

..... LOUDON WAINWRIGHT III

Little Ship

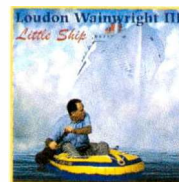
VIRGIN 44879, 48:36

Sound: B, Performance: A-

Throughout his long career, Loudon Wainwright III has had a problem squeezing his considerable talent into the limited dimensions of a recording. His natural habitat is the concert stage, where he's alone and in control. Surprise! This time out, the expansive tunes work on disc more often than not.

The bouncy arrangement of "Primrose Hill"—fleshed out with keyboards, guitars, bass, and percussion—doesn't crowd Wainwright one bit. His rambling

little sojourn, "What Are Families For," threads such fresh insights as, "You're the brother who is big/You were your parents' guinea pig" and "Life was a quiz/Now it's a test" into breezy snippets of a kindred lament. Better yet, the strings (yes, the strings) on "A Song" put Wainwright at ease, and this inside-the-songwriter's-muse



tune has an unexpected grandeur to it. But don't get the wrong idea, as *Little Ship* also brims over with intimate ditties like "The World," where he proclaims, "The world is a sandwich of shite/ Everyday you take another bite." The guy sure knows how to put things in perspective.

Steve Guttenberg

South Mouth

Robbie Fulks

BLOODSHOT BS 023, 40:51

Sound: A-, Performance: A-

If only mainstream Nashville saw music through the eyes of a guy like Robbie Fulks. As a fast-rising star of insurgent country, the bristly Fulks would rather bite the hand that feeds him than pander to it. And let's be honest: A little rebellion is what the hyper-sanitized Music City desperately needs right now. If you listen to Fulks's frank, anti-Nashville crowd-pleaser "Fuck This Town" from *South Mouth*, you'll begin to understand the edge on which the songwriter is teetering.

But there's actually as much reverence to Fulks as rebelliousness. Armed with an arsenal of great-sounding swing and honky-tonk chops, and accompanied by the fabulous bar band The Skeletons, Fulks's hard country lands just left of tradition. Though his tendency is to rabble-rouse on songs like the sleazy "I Told Her Lies" and the pleasantly blasphemous honky-tonker "What the Lord Hath Wrought (Any Fool Can Knock Down)," he also knows how to pay homage: to Roy Orbison on the despondent "Forgotten but Not Gone," to The Everly Brothers on the harmony-laden "South Richmond Girl," and to Buck Owens on the dazzling "Dirty-Mouthed Flo," which features Buck's own steel guitarist, Tom Brumley.

Fulks can also get creepy. "Cold Statesville Ground," propelled by a traditional bass line but strangled by a squealing guitar solo, recalls original creepsters The Carter Family. And "I Was Just Leaving" captures the humiliating awkwardness of being the odd man out in a love triangle. If frank, old-time country swing and plainspoken honky-tonk sounds better than the whitewashed sounds of Nashville to you, Robbie Fulks can and will be your man, and *South Mouth* your disc. *Bob Gulla*

Low Estate

16 Horsepower

A&M RECORDS 31454 0840, 49:37

Sound: B, Performance: B

Tibetan nuns funneling illicit campaign contributions and mad televangelists mauling airline attendants are but two examples of how organized religion has swung low from its once sweet chariot. But lowered status provides iconoclasts fertile ground to explore. The grizzled rockers of 16 Horsepower grapple with themes of spirituality and faith, with results as charged as a Pentecostal church exorcising demons from snakes.

Led by preacher's son and "Jesus geek" David Eugene Edwards, 16 Horsepower's clangorous alt-country conjures visions of moonlight tent meetings and Holy Rollers talking in tongues. His fire and brimstone tales involve tight-skinned saints, repentant sinners, and the unholy rest of us.

Edwards warbles like a maniacal Patti Smith on the title track, singing "diggin' up words of pleasure from evil hollow ground" as if the earth is cursed but still capable of some goodness. And on the forlorn "The Denver Grab," he predicts his own doom: "Blood is to blame, there's...fury on me." When 16 Horse-

power isn't dipping into the baptismal fire, it does raise a hellacious ruckus on its collection of ancient instruments. Old rockabilly demons inform "My Narrow Mind," which describes in torrid detail a "Bible-thumpin' fool" (Edwards himself, perhaps?), while "For Heavens Sake" equates rock 'n' roll's sinful scald with the need "to suffer for the sake of Heaven."

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TED HAWKINS

The Ted Hawkins Story: Suffer No More

RHINO R2 72956, 64:53
Sound: B+, Performance: A

The Final Tour

EVIDENCE ECD 28002, 68:09
Sound: B+, Performance: A

Even in the swankiest of nightclubs, Ted Hawkins would sit on his milk crate and tap his foot on a wooden plank as if he were performing at his usual spot on Venice Beach. Ever the street singer and with a soulful voice reminiscent of Sam Cooke, Hawkins was unaffected by his surroundings. He sang to make his audience smile.

Hawkins died of a stroke on New Year's Day 1995, having just released his DGC debut, *The Next Hundred Years*, to widespread critical acclaim. It was the same sort of sad, ironic fate mirrored in his best songs—many (but not all) of which can be



found on the recent *The Ted Hawkins Story*. This collection unearths an early single, "Baby," recorded by Hawkins for Money Records in the mid-'60s, as well as several later unreleased studio recordings—two, "You're Beautiful to Me" and "Happy Day," made at the behest of a Mattel executive(!). The rest of the material is culled from Hawkins' various releases on Rounder, American Activities, and DGC. You get a taste of his incredible singing skills, enough to give you the Hawkins bug.

Hawkins' powerhouse voice is able to sound gruff and tender at once. His interpretive instincts led him to country and soul standards, where pain and loss could be sweetly rendered. The purest representation of his talent can be heard on *The Final Tour*, a collection of live recordings that includes an entire performance at McCabe's Guitar Shop in Santa Monica. Alone on stage, Hawkins is in his element, strumming furiously, singing his sad songs with an empathy that, one hopes, will eventually find him his place in history. He remains the king of the Venice Beach street singers.

Rob O'Connor



Moorcheeba refuses to be lumped in with all the other trip-hop trendees on the scene today: The Olives, The Lambs, The Sneaker Pimps, The Monos. On *Big Calm*, the British trio seems bent on breaching the genre's stylistic walls by brandishing pedal steel guitar ("Part of the Process"), sitar ("Shoulder Holster"), and a full string section (on several songs); by proffering a less oblique, more easily digestible approach (by way of Syke Edwards' simple melodies and simplistic lyrics); and by genre-skipping—from scratch-and-sample ambient ("Bullet Proof") to sing-along folk ("Over and Over") and from dance-hall reggae ("Friction") to old-school grooveathon (the title track). The results are vibrant, if sometimes schizophrenic, packing the commercial punch of Texas, the smooth nouveau soul of Lisa Stansfield, the bewitching exoticism of Sade, and the edgy futurism of The Dust Brothers.

Sure, *Big Calm* presses its luck now and then. Take the sappy platitudes of "Fear & Love": "Fear can stop you loving/Love can stop your fear." But in fashioning a follow-up album brimming with pastiche and pleasure, one thing's for sure: "Trip-hop" is no longer a useful construct for Moorcheeba. Greg Siegel



Gently Down the Stream

Come

MATADOR OLE 254-2P, 66:53
Sound: A-, Performance: B+

Most of what passes for alternative rock these days is nothing more than glorified pop rock: The eyes may be downcast in dejection, but the catchy little chorus and pretty little harmony are never far behind. Yet what initially fueled the 1980s rock underground was something far afield from mere pop songs. Come leader/guitarist/vocalist/clarinetist Thalia Zedek spent that decade fronting the abrasive noise combo Live Skull. In the '90s, she's kept her glum eyes focused on Come, a Lower East Side ensemble determined to be keepers of the alt-rock guitar wars that began in the '80s.

Taking a cue from Sonic Youth's penchant for intertwining dissonant guitar lines, Zedek and guitarist Chris Brokaw mesh torrents of energized guitar into songs that mirror severe emotional crisis on *Gently Down the Stream*. Songs turn quiet only to explode in cathartic rage (or vice versa); the seven-plus minutes of "Saints Around My Neck" prove that. Perfect for anyone who likes to float away on waves of distortion and ennui.

Rob O'Connor



even if 16 Horsepower's diehard, true-believer status makes its songs more than a little enigmatic. *Low Estate* is music worked in fear and trembling.

Ken Micallef

Chris Knight

DECCA DRND-70007, 48:36
Sound: A-, Performance: A

From the first lines of the album's opener, "It Ain't Easy Being Me," Chris Knight grabs your attention like fishhooks—with barbs that go in and can't be pulled out: "There oughta be a town somewhere named for how I feel/Yeah, I could be the mayor down there/And say welcome to Sorryville." The chorus here uses an instantly brilliant couplet: "I had to work to be the jerk I've come to be/It ain't easy being me." Special kudos to Knight for ignoring the obvious temptation to name the album after this song.



Other songs are about violent losers: a logger who claims he was framed for the murder of his wife's lover ("Framed"); a cop whose wife has just left him, a hooker just out of jail, and the murder that brings them together ("Love and a .45"); and a boyfriend friend who

was a bullied and abused child who "grew up hard and mean," repeating the abuse cycle and finally dying in a botched drug store robbery ("William").

Several songs address the plight of the family farmer: "Bring the Harvest Home," "House and 90 Acres," and "The River's Own" are crisply etched portraits of characters who feel ripped from real life.

The Frank Liddell and Greg Droman production sizzles as it showcases the dramas in Knight's songs. The guitar parts—by Kenny Greenberg, Richard Bennett, and David Grison—are outstanding throughout. Knight's voice and writing evoke a driven, young Steve Earle but with fewer demons. This debut is an unqualified knockout. Chris Knight's future is bright.

Michael Tearson

Big Calm

Moorcheeba

CHINA/SIRE 31020, 50:40
Sound: A, Performance: B+

Part of a critic's job is to spot and name trends. Part of an artist's job is to resist those names, or at least their oppressive application. The question, though, isn't whether a coinage like "trip-hop" is an artificial construct—all such labels are—but whether it's a useful one.

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RECORDINGS

— Charles Mingus —

Passions of a Man
Charles Mingus
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 Sound: A, Performance: A+

His superb boxed set contains the complete Atlantic recordings from 1956 to 1961 of bassist/composer/bandleader Charles Mingus

Night Prayer Meeting”), call-and-response (“Hog Callin’ Blues”), and collective improvisation (“Pithecanthropus Erectus”) to propel his music. Mingus had an uncanny knack for lush horn arrangements, an unparalleled sense of theatrical dimension, and a penchant for gorgeous ballads. And although his composi-

during this phase that he refined an ensemble whose personnel included, at different times, alto saxophonists Jackie McLean and Eric Dolphy, tenor saxophonists Booker Ervin and Rahsaan Roland Kirk, baritone saxophonist Pepper Adams, trombonist Jimmy Knepper, trumpeters Richard Williams and Ted Curson, pianist Jaki Byard, and drummer Dannie Richmond. The innovative music they made, with Mingus at the helm, is full of passion and intensity, romance and adventure, exploration and discovery—“music for the long haul,” as compilation producer Patrick Milligan calls it.

The bulk of this collection draws from five key albums, (*Pithecanthropus Erectus*, *The Clown*, *Blues & Roots*, *Mingus/Oh Yeah*, and *Mingus*

LAURENT DE WILDE

Spoon-a-Rhythm

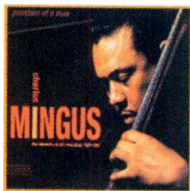
COLUMBIA COL 487235, 53:28
 Sound: A-, Performance: A-

“Rhythmical,” Louis Armstrong’s word, absolutely applies to Laurent de Wilde’s close combination of piano, bass, and percussion: It’s a pulsating, modern sound. On *Spoon-a-Rhythm*, his second recording for Columbia, extra bounce is provided by the expanded rhythm section, in which Dion Parson’s drumming seamlessly commingles with Bobby Thomas’s percussion. De Wilde believes we hear sound “from the bottom up,” so it is not a coincidence that bassist Ira Coleman’s support is somehow both heavyweight and freewheelin’. This is a quartet of equals who really listen to each other.

The players tear through seven de Wilde originals and three covers, throwing out a tidal wave of rhythmically charged explosions. But there’s no doubt that it’s de Wilde’s gripping pianism that directs the action. Things open up on “Tune for T.,” his insightful tribute to Thelonious Monk; here the piano naturally takes the rhythm lead. He caps the proceedings with a lyrical solo piece, “So Long Barney.” Set off against the throbbing energy of *Spoon-a-Rhythm*, Laurent de Wilde’s shimmering piano shines brightly.

Steve Guttenberg

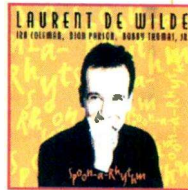
Photo: © David Galir



us, one of the most irascible and creative figures in jazz. A bassist of awesome strength and unrivaled technique, Mingus often stood in the center of his swirling, turbulent compositions as if he were in the eye of a hurricane. He used rhythmic modulation and alternating meters (“Haitian Fight Song,” “Moanin’,” “Passions of a Woman Loved”), spoken-word recitation and onomatopoeic devices (“The Clown”), exhortative shouting (“Ecclesiastics,” “Better Git Hit in Your Soul”), montage (“Passions of a Man”), spirited hand clapping (“Wednesday

tions were often heady, involving separate and complex movements, he never abandoned the essential element of swing.

A brilliant and prolific composer who seamlessly combined elements of gospel, blues, be-bop, avant-garde, third stream, and symphonic music, Mingus produced an astounding body of work, including many timeless gems. Though his earliest compositions were developed by 1939, Mingus’s writing skills flourished during this first Atlantic period. (He returned to the label in 1973 and stayed until his death in 1979.) It was



at *Antibes*), which were made during what was possibly the most fertile and productive period in Mingus's career. Selections from other recordings highlight his work as a sideman (with vibraharpist Teddy Charles on *Word from Bird*) and as a pianist (*Oh Yeah* and *Tonight at Noon*, in which he hands off the bass chores to Doug Watkins). There are also four unissued alternate takes from the brilliant *Blues & Roots* session.

This loving tribute fills in the musical gaps left by Rhino's *Thirteen Pictures: The Anthology* (a two-disc set). With insightful notes by Mingus scholar Andrew Homzy, a comparative essay by Stefano Zenni, revealing anecdotes from Atlantic producer Joel Dorn and engineer Tom Dowd, a gallery of rare photographs, original liner notes from the various Atlantic albums, and an expansive Mingus interview with Atlantic producer Nesuhi Ertegun (which fills disc six), it gives us the most complete picture possible of this most complex visionary. *Passions of a Man* is essential for anyone wanting to enhance his understanding of modern jazz. *Bill Milkowski*

The Complete Blue Note Recordings

Herbie Nichols

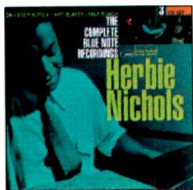
BLUE NOTE 59352, three CDs, 3:32:43

Sound: A, Performance: A

Only a handful of Herbie Nichols' LPs were released during the pianist's lifetime. One was aptly titled *The Prophetic Herbie Nichols*, for he truly was ahead of his time.

The 30 master takes and 18 consummate alternative takes in this boxed set were all recorded during one year, from May 1955 to April 1956. Although generally A-A-B-A in form, Nichols' compositions stretched beyond the standard 32-bar format, combining influences as far-reaching as Paul Hindemith, Igor Stravinsky, and Heitor Villa-Lobos.

Nichols exhibits his own brand of fire, only slightly masked by the complexities at hand. Often compared to Thelonious Monk because of his quirky melodies and the use of an occasional "knuckle" chord, Nichols' pianistic style presses further into the realm of dexterous technique and absolute precision. His melodies can, at first, seem obtuse, yet they are accessible.



Mention should be made of Blue Note founder Alfred Lion. In addition to having the chutzpah and foresight to record a sophisticated, noncommercial artist such as Nichols, Lion deserves kudos for enlisting empathic sidemen. The blending of melodic drum parts into a song's contour is a Nichols hallmark, and this is substantially realized by quintes-

GHAZAL

Lost Songs of the Silk Road

SHANACHIE 64096, 64:05

Sound: A, Performance: A

When the West embraced Indian classical music in the '60s, hordes of hippies adopted it as a kind of exotic jazz. Ravi Shankar's lightning leads are largely improvisatory, sure, but "A-Tisket, A-Tasket" they ain't. Indian ragas are only somewhat free, because they are highly structured, chock-full of modes, and even have designated performance times. The same can be said for the related canon of Persian music, whose intricate melodic system is called *dastgah*.

On *Lost Songs of the Silk Road*, an extraordinary recording, three masters of Persian and Indian music upend centuries of tradition, engaging in cross-cultural, without-a-net improv—only to discover keys to the past. Khayan Kalhor, a talented young Iranian, leads the Ghazal trio (there's no World Music impresario lurking about) with his *kamancheh*, the Persian spike fiddle. Joined by sitar master Shujaat Hussain Khan (son and student of Vilayat Kahn) and Swapan Chaudhuri on tabla, Kahlor weaves in and out of his partners' improvisations in four emotive, exhilarating pieces. From the opening strokes of "The Saga of the Rising Sun," when Kalhor's dry, mournful bowing blows like a desert-borne sirocco into the sun-dappled chiming of sitar and tabla, the instruments' tonal qualities are captivating. And the performances are just as extraordinary. *Mark Schwartz*

sential drummers Art Blakey and Max Roach. Rounding out the personnel are stalwart bassists Al McKibbon and Teddy Kotick.

Herbie Nichols seldom was invited to perform his music for audiences. After years of playing in revivalist Dixieland bands to make ends meet, he died of leukemia in relative obscurity at the age of 44. His music is only now being fully appreciated. *James Rozzi*

The Sound of Summer Running

Marc Johnson

VERVE 314 539 299, 53:25

Sound: B, Performance: B

On *The Sound of Summer Running*, bassist Marc Johnson delves into the heartland-styled jazz popularized by Bill Frisell, Pat Metheny, and Gary Burton. Here Johnson one-ups the jazz fraternity, however, by joining guitarists

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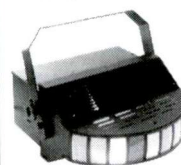
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Frisell and Metheny in his first group album since *Bass Desires* in the late '80s. That disc was a cauldron of fiery improvisation and electric ballyhoo, whereas this one is closer to a demented Mayberry yarn.

For much of the '90s, Johnson has worked in pianist Eliane Elias's Brazilian-tinged band. That folk element seems to have inspired him beyond the blazing fusion of *Bass Desires*. *Summer Running* finds everyone kicking up his heels and sounding as if he's sipping moonshine while chewing on Johnson's homespun country tales. Joined by drummer Joey Baron, Frisell and Metheny play it smooth and sassy, obviously relishing the chance to do some picking and grinning as sidemen. And although things start out slow, they pick up before ending with simple, small moments of memorable musical magic.

In an album of simple pleasures, several tracks really shine. "Faith in You" could be an outtake from Metheny's classic *Bright Size Life*, with the two guitarists doubling an ethereal melody over Baron's skipping beat. "Ghost Town" is a laid-back soundtrack to a lazy afternoon, while the title track is pure acoustic Metheny, with windy gales and shimmering cymbals setting the mood. "Union Pacific" is a sharp Kansas City blues-style shuffle; there's a nice liquid solo from Metheny and goofy gaggle from Frisell. "Porch Swing" is lush and sweet, but "Dingy Dongy Day" is an annoying sequel to "Green Acres." Closing the album is Metheny's pristinely beautiful "For a Thousand Years."

Jazz and country? Marc Johnson takes the union to heart with this unlikely, but winning, offering. *Ken Micallef*

Afterglow

Mark Isham

COLUMBIA ACK 67929, 60:02
Sound: A-, Performance: B+

The Education of Little Tree

Mark Isham

SONY CLASSICAL SK 60330, 38:08
Sound: B+, Performance: B

Film composer Mark Isham's chameleon-like ability to change musical hues to fit the mood and tone of a picture's subject is an extraordinary gift. Though his bailiwick is jazz, the trumpeter/composer/arranger/producer also flirts with pop and contemporary classical without sounding like a dilettante.

Isham's score for Alan Rudolph's recent film *Afterglow* reiterates his compositional skills as naturally suited to jazz. Accompanied by Charles Lloyd on sax, Geri Allen on piano,

LOUIS ARMSTRONG

Master of Jazz:

Live in Chicago, 1962

MOBILE FIDELITY UDCD 710, 66:24

Sound: A-, Performance: B+

Satchmo fans, take note: If you somehow overlooked the original Storyville CD of this stellar 1962 Chicago performance, jump on this Mobile Fidelity reissue. Sure, Armstrong's long past the peak of his powers, but Pops and his All Stars were still more than capable of scoring a direct connection to the very soul of jazz. He makes awfully pretty sounds as he remembers those thrills on "Blueberry Hill," and his exquisite vocal on "Give Me a Kiss To Build a Dream On" shines as brightly as ever. Overall, this is a far more intimate, less vaudevillian performance than most of his live recordings from the early '60s.

Mobile Fidelity's sweet, sweet sound is interrupted with a little distortion and image instability here and there, but this is a vivid rendering of the finest jazz musician who ever stood before a microphone. *Steve Guttenberg*



Gary Burton on vibes, and Billy Higgins on drums, Isham's mainly traditional jazz score is spare and lovely. Centered on his own after-dark trumpet (muted in typical Rudolph fashion on "A Life Suspended"), on Lloyd's unpredictable sax ("For Charles"), and on Burton's vibes on the sexy "Yeses and Noes," the music is passionate, moody, and occasionally cryptic, much like the director's own work. But Isham's score for *Afterglow* summons enough tasteful sensuality to stand sweetly on its own.

The Education of Little Tree falls a hair short of this achievement. Classical in nature and featuring an orchestra conducted by Ken Ku-



gler, this score is too understated and reverent, perhaps too dependent on the film's visual side. Isham's compositions are prayerful and hushed, with only a violin, a flute, or a cello peering from the film's musical shadows. The recording doesn't completely stand on its own, because Isham's score is perhaps in awe of its subject. He does not overwhelm it with too much trumpeted musicality, and although remaining in the shadows is a noble gesture on his part, it's a pity for those yearning for a more engaging listen. *Bob Gulla*



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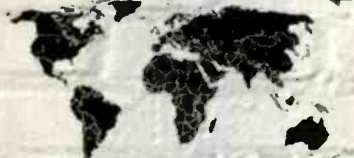


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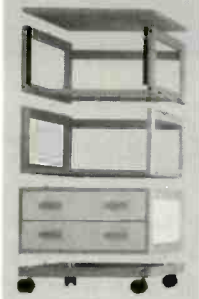
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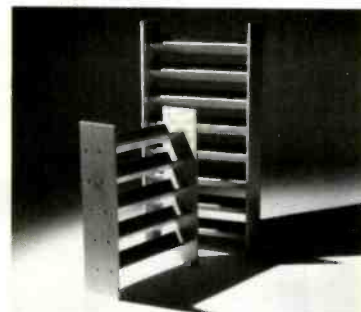


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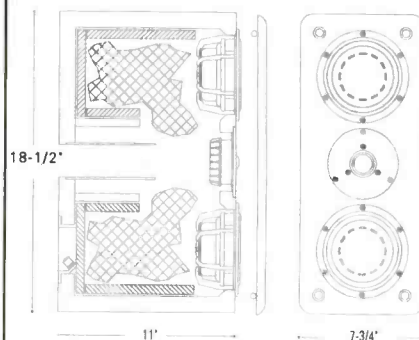


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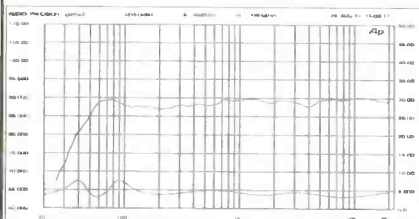
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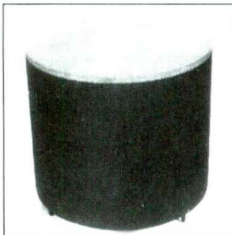
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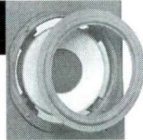
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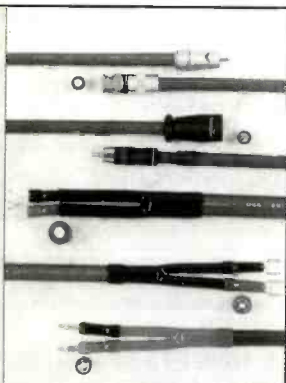
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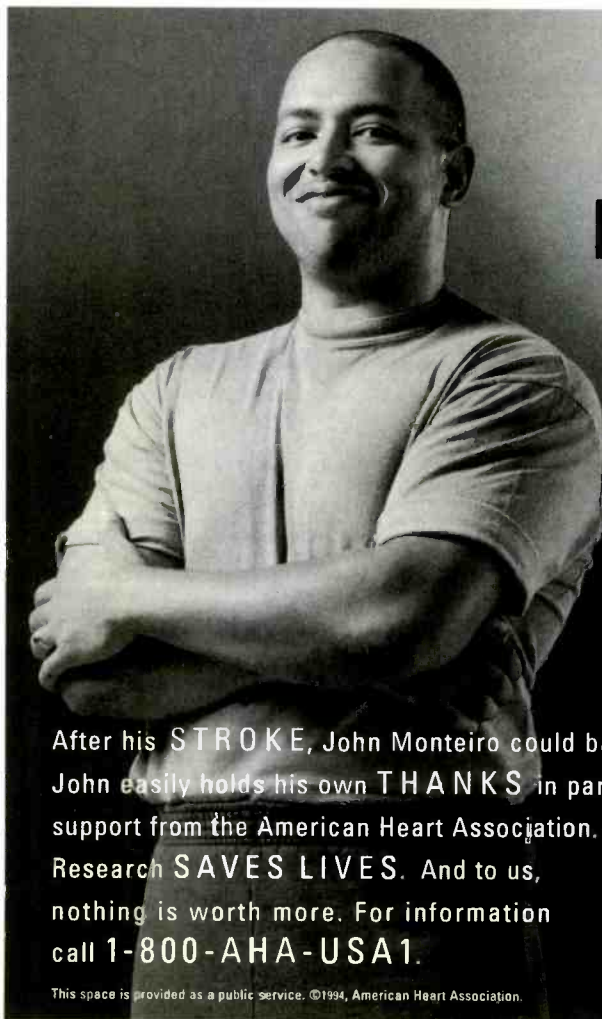
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PlayBack

TEAC V-8030S CASSETTE DECK

The once-dominant analog cassette is under siege by digital media—recordable CD, MiniDisc, and, to a lesser extent, DAT, with recordable DVD likely to follow. Still, as a recording engineer once told me, “Cassettes sound better than they have a right to.” With advanced tape formulations and transparent noise reduction (such as Dolby S), cassettes can achieve excellent fidelity.

Such high performance is exemplified by the Teac V-8030S, priced at \$1,150. Its features include a third head for off-the-tape monitoring as you record, a heavy-duty four-motor transport, Dolby S noise reduction (not to mention B and C), bias and recording-level calibration adjustments, timer recording, and a headphone jack with volume control (a rarity these days).

As with other high-end decks I have used, the Teac's bias and record-level calibration controls enabled me to match the machine to the tape for optimum performance. On the V-8030S, it was easy: All I had to do was adjust the bias and level calibration

knobs until both channels' level-meter bars lined up with a reference mark.

GRADE: A



For my recording tests, I used the “CD Direct” jacks (which bypass the left/right recording balance adjustments), used TDK's MA metal (Type IV) tape, and switched in Dolby S noise reduction. As usual, Dolby S sounded a lot more natural than Dolby C and was extremely quiet, without pumping artifacts. As I recorded, I used the monitor switch to compare the source (a CD) and the signal off the tape. In the signal from my tape, the bass was not quite as tight and the upper midrange and treble did not quite have the CD's presence; I could always tell the difference, though just barely. And on pop, the difference was often very hard to detect. (Teac: 7733 Telegraph Rd., Montebello, Cal. 90640; 213/726-0303.) **John Gatski**

Photo: Len LaGriva

Lovan's Sovereign Hi Fi equipment racks are high-quality, modular, and stackable. Its components are sold in sets of four or individually, so you can buy just as many as your equipment and pocketbook demand.

The Lovan modules are 24¼ inches wide and 20½ inches deep (20 x 18½ inches within the pillars) and come in heights of 7 inches (Sovereign Hi Fi), 10 inches (Sovereign T Hi Fi), and 4½ inches (Sovereign Amp Stands). Each module is made of black-painted welded steel and includes a platform of medium-density fiberboard, finished with black epoxy paint or with cherry or beechwood veneer under a protective laminate. Adjustable leveling spikes are provided.

I tried four of the 7-inch Hi Fi modules and two of the 10-inch T Hi Fi modules. Suggested retail prices for a four-unit rack with black shelves are \$549 for the Hi Fi system and \$649 for the T Hi Fi variety; with wood finishes,

prices are \$80 higher. (Prices for individual modules are about 30% of the four-module

price.) The Amp Stands are \$159 each with black shelves or \$174 with either wood finish.

Even with modules of different heights, the Lovan Sovereign was a breeze to put together: You simply attach the spikes and stack the modules as desired. The modules were machined perfectly, and each one's spikes were precisely aligned with holes in the rack beneath it—something that hasn't been true of some other modular racks I've tried. The platforms needn't be added until after the modules are stacked—a nice touch.

I placed one of the 10-inch modules on the bottom, so I could put a large power amp underneath, and set the other 10-inch unit at chest level so I could stack several components (preamp, D/A converter, and CD transport) on its shelf; the Lovan seemed secure with this load. It was fairly resistant to shock, transmitting only the hardest jolts to the turntable when I purposely bumped the rack.

Just as important, the rack looks good, a fine match for A/V components. (Lovan, c/o Access Marketing: 1306 Kingsdale Ave., Redondo Beach, Cal. 90278; 310/793-7676.) **John Gatski**



GRADE: A

Philips Magnavox DVD420 DVD Player

What is it, a year since the first DVDs came out? And already people are starting to do it right. First thing I noticed about the Philips Magnavox DVD420 (\$649.95) was its double set of audio output jacks, one to feed my A/V receiver and one to feed directly to my TV when I don't feel like turning my whole system on. Nice touch. Second thing I noticed was the absence of subtitles when I first turned the player on. You can set it to display subtitles as a default, but the sensible factory setting leaves them off. The 420 has a few features not found on Philips' \$399.95 DVD400, such as a headphone jack with level control and a repeat button. But the big news is its remote, which has a jog/shuttle dial, plentiful setup controls, and a locator that emits a beep whenever you turn the player on. It's also, theoretically, a “universal” remote, with built-in operating codes for plenty of popular TVs, amplifiers, and receivers. Unfortunately, I couldn't get it to operate my Zenith TV or Pioneer receiver, though it did trigger some unwanted functions on my TV, such as picture-in-picture. My only other complaint was that the dynamic range control was several menus deep. The DVD420 has a 10-bit video DAC and an audio DAC with 20-bit resolution; if there were any defects or artifacts in its performance, I couldn't see them on my 27-inch monitor or hear them through the rest of my system. And the manual required only the barest minimum of head-scratching. (Philips Electronics: 64 Perimeter Center East, Atlanta, Ga. 31146; 800/531-0039; www.philipsmagnavox.com.) **Ivan Berger**



GRADE: A-

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