

SPECIAL REPORT: 96-kHz/24-Bit Digital

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JULY 1998

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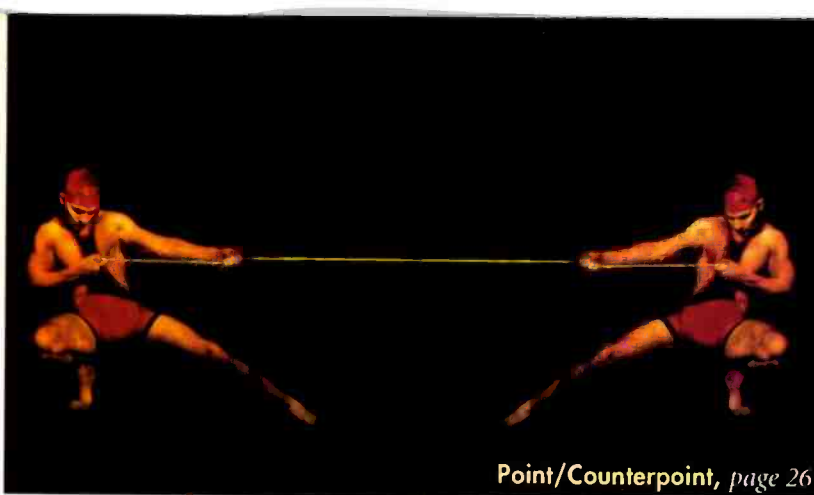
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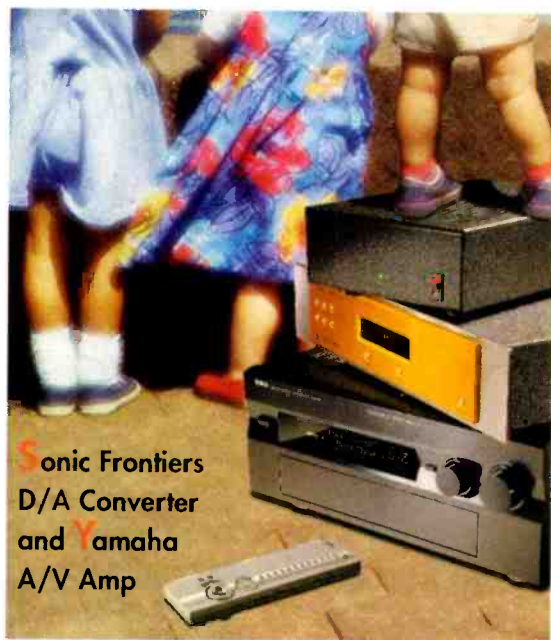


# AUDIO

THE EQUIPMENT AUTHORITY



Point/Counterpoint, page 26



Sonic Frontiers  
D/A Converter  
and Yamaha  
A/V Amp

## FEATURES

- 96/24: DIGITAL HEAVEN  
OR DIGITAL HELL? Bob Katz and Ken Kantor ..... 26
- 96/24 ON DVD: FIRST IMPRESSIONS OF  
THE 96-kHz/24-BIT STEREO MUSIC DVDs FROM CHESKY  
AND CLASSIC RECORDS Anthony H. Cordesman ..... 32

## EQUIPMENT PROFILES

- YAMAHA DSP-A1 A/V AMPLIFIER Edward J. Foster ..... 36
- SONIC FRONTIERS PROCESSOR 3  
D/A CONVERTER Bascom H. King ..... 46
- DUNLAVY AUDIO LABS SC-III SPEAKER Bascom H. King ..... 50

## AURICLES

- dCS ELGAR 96-kHz/24-BIT  
D/A CONVERTER Anthony H. Cordesman ..... 54
- KRELL KAV-500  
MULTICHANNEL AMP Anthony H. Cordesman ..... 58
- UNISON RESEARCH POWER 35 AMP  
AND FEATHER ONE PREAMP Ken Kessler ..... 62
- ROCKTRON HTD1 CIRCLE SURROUND  
5.2.5 DECODER John Sunier ..... 64

## PLAYBACK

- PANASONIC DVD-L10 PORTABLE DVD PLAYER,  
NAIM AUDIO HEADLINE HEADPHONE AMPLIFIER,  
AND NHT NEW WAVE HOME THEATER SYSTEM ..... 88

## DEPARTMENTS

- FAST FORE-WORD Michael Riggs ..... 4
- LETTERS ..... 6
- AUDIOCLINIC Joseph Giovanelli ..... 9
- WHAT'S NEW ..... 12
- SPECTRUM Ivan Berger ..... 16
- MONDO AUDIO Ken Kessler ..... 20
- FRONT ROW Corey Greenberg ..... 22

## RECORDINGS

- CLASSICAL ..... 68
- ROCK/POP ..... 72
- JAZZ & BLUES ..... 75
- DVD ..... 78

Cover Photographer: Bill Kouirinis Studio  
Cover Equipment: Sonic Frontiers Processor 3  
D/A converter and Yamaha DSP-A1 A/V amplifier

Audio Publishing, Editorial, and Advertising Offices,  
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Subscription Inquiries:  
Phone, 303/604-1464; fax, 303/604-7455;  
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Naim Audio  
Headphone Amp,  
page 88

M & K  
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page 12





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**W**hile putting this issue together, we received, by happy coincidence, an invitation from Chesky Records to come over to their studio and audition some 96-kHz/24-bit recordings. Chesky's offices are only a few blocks from ours, so about a week later, Ivan Berger, Alan Lofft, and I walked over and spent a few pleasant hours listening, making comparisons, and chatting with David Chesky.

Chesky is a refreshing change from typical big-name record labels. I don't, by the way, mean that as a slam on the latter, which almost by their nature have to be concerned with artist recognition and sales ahead of everything else. But at Chesky, the order of the day very obviously is quality, musical as well as sonic.

We sat down in a large, quiet, well-damped room, facing a pair of Verity Parsifal loudspeakers powered by the Futterman OTL mono tube amplifiers David reserves for special occasions. The source was the compilation of 96-kHz/24-bit recordings Tony Cordesman discusses at length later in this issue. The signals from these recordings were routed through a dCS 972 sampling-rate converter to a dCS professional D/A converter similar to the dCS Elgar reviewed in this issue. The 972 could be set to pass the signal, unaltered, to the converter or to reduce the word length or sampling rate as desired. This enabled us to compare 96-kHz/24-bit to CD-type 44.1-kHz/16-bit coding or to other combinations of sampling rate and word length.

Result? Well, everything sounded very, very good. All of us thought at one time or another that we might have heard some difference between 44.1-kHz/16-bit and a bigger word size or a higher sampling rate or both. But we were never quite sure. I have always been from Missouri on the subject of high-data-rate PCM, and this experience left me more convinced than ever that CD is much better than many audiophiles give it credit for. If there is an audible difference between 96-kHz/24-bit and 44.1-kHz/16-bit, it is a very subtle one. I don't feel comfortable saying there isn't one at all, however, even though I can't see any reason why one should exist and am not certain I heard anything that would indicate one does.

On the other hand, David and Bob Katz, who work with 96-kHz/24-bit originals all the time now, are convinced they sound better than 44.1-kHz/16-bit recordings. Have

they fall into the trap of convincing themselves that technically better must be sonically better, or is there really a difference that becomes more apparent as you become more acclimated to the better format?

I don't know, but only a fool spits at the feet of experience. One of our goals for the future will be to gain more experience of our own with these high-data-rate recordings and then to conduct more extensive (and preferably blind) comparisons. Then, I hope, we can give a more definitive answer.

Regardless of the outcome, it is exciting that we have the opportunity to explore the issue at all. The huge storage capacity and bandwidth of DVD have opened the door to a new world beyond CD. The most important aspect of that will be a strong push into high-quality multichannel music recording and playback, the advantages of which are quite obvious to anyone who can hear. But if sound quality within each of those channels can be improved as well, so much the better.

Two final thoughts, however, related specifically to 24-bit. First, there is something silly about the push for 24-bit recording given that no A/D or D/A converter on earth comes close to true 24-bit resolution—and none ever will at room temperature. The thermal noise is much too high. The very best that converters currently available can do is about 20 bits on a good day with a tail wind. And we're never going to do a lot better than that.

Second, what would we do with 144 dB of dynamic range if we had it? That's well beyond what our ears can handle. And as Don Fostle showed back in our March 1996 issue, recordings that come close to stressing the limits of even plain old 16-bit PCM are exceedingly rare. Many have noise floors approximately equivalent to 12-bit resolution. The reason is noise from all the preceding analog stages—microphones, mike preamps, mixing consoles, and so forth—as well as from the recording venues themselves. At this point in technological history, improving the digital end is the easy part. Effort exerted on the analog side might now yield greater sonic dividends. At the very least, it could make the move to 20-bit recording (or beyond, for the bigger-must-be-better crowd) seem more sensible—even to old curmudgeons like me.



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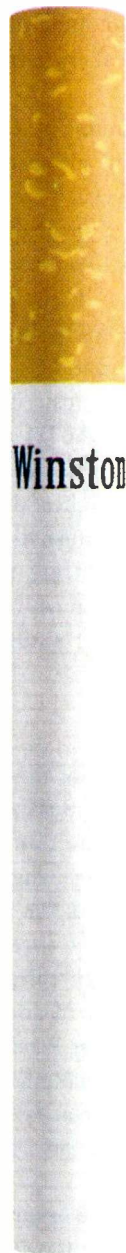
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### Canby Tribute

I was saddened to read, in your May issue, of Edward Tatnall Canby's death. His long reach in the history of electronic reproduction was punctuated by his always-colorful and fascinating writing.

As one who was also searching for high fidelity before it was a common term—when “high fidelity” meant frequency response to 10 kHz and THD under 5%—and whose technological growth experience somewhat paralleled his, I always looked forward to his column. I have missed it, these recent months.

May Edward Tatnall Canby's name and memory live long in honor among dedicated audiophiles.

*Robert H. Coddington  
Richmond, Va.*

### The Doctor Is In

J. Robert Stuart's “Digital Audio for the Future,” in your March issue, is the most pedagogical and punctiliously researched document on the subject of sound reproduction I have ever read. In many respects, it surpasses all the texts on music reproduction in the physics library of the graduate school I attended.

I wish to submit a modest amendment to Stuart's article: A maximum sound intensity of 120 dB SPL is far beyond what is necessary to reproduce what is heard in the concert hall. When 100 dB is measured, the concert hall is considered too loud, and acoustical modifications are ordered. In the most expensive seats of the most famous concert halls, a maximum loudness is usually 90 to 95 dB. Half of this results from echoes of the original source. It takes a full orchestra and chorus to make it this loud.

To duplicate this in a listening chamber, at least four—and perhaps six—speakers are needed: two main speakers at full power for the orchestra and either room echoes or sound-field speakers to duplicate the reverberations of the concert hall. This means that by themselves, both main speakers need output at maximum volume of 84 to 89 dB; in other words, each speaker needs to produce only 78 to 83 dB where the lis-

tener is seated. This can be done with modest amplifier power and small speakers. A McIntosh technician told me that the transparency to which we aspire has been achieved at these more realistic concert hall volumes, rather than 120 dB. This requires refinement instead of the electronic obesity of oversized speakers and overpowered amplifiers.

Louder applications of sound reproduction are found in modern “alternative” forms of music—which are to music as astrology, “scientific” creationism, and claims of the paranormal are to science. Such alternative forms—disco, pop, rap, and rock—are written for the least critical mind and substitute loudness for artistry. It does not matter if this music is distorted, because most people who listen to it at 120 dB are drunk or otherwise drugged to the degree that they do not hear distortion. These excessively loud “alternatives” and those who listen to them are not important enough to consider in defining transparent sound reproduction.

*Dr. Barney Vincelette  
Houston, Del.*

### Great Performances

I have done a lot of thinking about the process of critiquing musical performances, notably classical piano. I am at a loss to explain how Patrick Kavanaugh can give Murray Perahia an A+ for his performance of the Schumann Piano Concerto (May).

A music critic can compare work to a certain standard or to another performance. As wonderful as Perahia is, where do we, then, place the Schumann Concerto by the late and truly great Sviatoslav Richter? Different kinds of great? Different levels of great? What *is* great?

Whether intimidated or not by today's critics, following in the footsteps of the keyboard titans of old—such as Rachmaninoff, Gilels, Horowitz, Bolet, Richter, and others—is hugely difficult. Most of today's concert artists have four-star skills, but the elusive fifth is hard to come by, unless your last name is Pollini.

*Michael L. Janket  
Putnam, Conn.*

### Perfect Perahia

I noticed a small error in your May issue. Accompanying the review of Murray Perahia's new recording of Schumann's Piano Concerto (Sony Classical SK 64577) was a photo of the cover of another recent Perahia CD (Sony Classical SK 62786), a recording of Schumann's Kreisleriana and the Piano Sonata No. 1, Op. 11.

No matter, however, since your reviewer's description of Perahia's rendition of the Schumann Piano Concerto—“a near-perfect performance”—applies equally to his Schumann solo recital, especially the extraordinary reading of the sonata.

*John Holdren  
Greenwood, Va.*

### Divx Dementia

I recently came across an article about Mobile Fidelity overestimating the market for vinyl LPs, which reminded me of the current Divx situation. The scariest thing about Divx is not that it is a foolish and misguided enterprise doomed from the start, nor that it is rooted in greed and paranoia. It is how some of the biggest companies in the movie business cannot see what almost everybody else sees. Like vinyl, there is and will be no market for Divx—no profit for rental stores and no advantage for buyers.

Companies investing in the Divx format are going to lose their shirts, while consumers will wait an extra year or more to get some of their films on regular DVD. It is a no-win situation for everyone involved.

*John J. Puccio  
via e-mail*

### Mini Happy Returns

I read with interest Robert Long's “Living with CD-R” (February). It sounds like the CD-R process is expensive and somewhat clumsy. I'm glad I bought a Sony MZR-30 MiniDisc recorder. It records directly, from digital or analog sources; the sound quality is excellent (I can't tell it from CD); it's totally anti-shock; and with noise-cancelling headphones, you can't beat it on long plane rides. My wife also has an MD player, so we can both listen to the discs I record. I recommend that you do a follow-up article comparing MD to CD-R, point for point.

*Steve Fry  
via e-mail*



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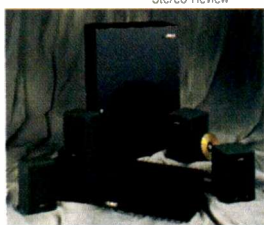
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## Card Game Cancelled

One of *Audio*'s features that I like is the postal card insert with a series of numbers to circle for obtaining product literature. The last few issues had no inserts of any kind. What are we supposed to circle?

Robert F. McDonald  
Lafayette, Cal.

*Editor's Reply:* Because it's now easier for readers to contact manufacturers directly (many have toll-free phone numbers and Web sites), we've discontinued our reader service cards. Where appropriate, company addresses or phone numbers, fax numbers, and Web sites are included throughout the issue in columns and equipment reviews. Also check the “Ad Index” near the back of the issue for companies whose products interest you.—S.V.C.

## State-of-the-Art Address

I have been an avid reader of your magazine for years, and I have a few suggestions.

Please list where I can audition and buy the products you review; I don't know where I can find a Clearaudio turntable in Los Angeles. List the Web sites of manufacturers, too. At the back of your magazine, have a listing of all manufacturers reviewed, referenced, and advertised in that issue.

There should be some kind of standard set of measurements for products—like the daily nutritional requirements for food—so readers can compare products. *Car Audio* magazine has measurement criteria such as RTA, SPL, sound quality, value, etc. *Audio* should have something similar. Readers would probably like to pick up your magazine, read its tables of measurements, and be able to compare those to the manufacturers' tables of measurements.

Please have state-of-the-art standards, minimal requirements for something to be reviewed other than price. A computer magazine today would not bother reviewing a state-of-the-art '80s computer, such as an IBM XT or Apple IIe. They would begin with 400-MHz workstations, with DVD drives as a minimum.

I've read that linear-tracking turntables read records at 90° angles without the distortion of pivoted-arm turntables; therefore, shouldn't the minimum requirement for turntables be that they are linear-tracking? State-of-the-art technology for tuners

requires that they have FM coaxial input, Radio Data System (RDS) with a 64-character display, balanced and unbalanced outputs, a stereo/mono switch, and sorting by format. Compact Disc players should have features for programming, cueing to index points within tracks, balanced and unbalanced outputs, optical outputs, display of CD titles, and even a computer interface. Digital home theater decoders should include Dolby Digital, Dolby Pro Logic, and THX Cinema 5.1 settings. Just as computer readers don't care to even know about computers that can't run Windows 95, I'm sure many of your readers don't even care to know about products that don't meet the minimum state-of-the-art standards.

It doesn't matter who makes it, how much it weighs, and how shiny it is, if it doesn't do what you want, then it's useless.

Name withheld  
via e-mail

*Editor's Reply:* There is no practical way we could list all the dealers for some (most, really) of the products we review. We do provide the manufacturer's or distributor's mail address, phone number, and (when there is one) Web address in the product-information box for each review. Each issue also includes a directory of advertisers with phone numbers and Web addresses. And each October issue contains a complete manufacturers' directory. You should be able to find dealers by contacting manufacturers directly or checking their Web sites. You can also locate dealers for many products via [www.paralink.org](http://www.paralink.org).

Just about all our “Equipment Profiles” for each particular component type do include a core group of measurements, review after review.

As for reviewing only state-of-the-art equipment, this would normally mean testing only the best that can be achieved with current technology. This is not always straightforward to define, and it does not necessarily bear on features. For example, does a preamp have to do surround decoding in order to be considered state of the art? How do we know whether a product is state of the art *before* we test it? And would you really want us to ignore components that provide good performance and value if the best products in the category all have five-figure prices?—Michael Riggs

**Receiver Ventilation**

**Q** *In my audio setup, there's about 4 inches of space between the top vent of my receiver and the shelf above it. Do you think that is enough?—William Alberico, Santa Monica, Cal.*

**A** Yes, in most instances 4 inches of ventilation space above your receiver will be fine. The amount of space required for a low-powered receiver is usually less than that needed by a high-powered amplifier or A/V receiver. (Some old, low-powered receivers may need only an inch of space for adequate cooling.) But if the output stages are of Class-A design, they will run much hotter than those that operate in Class-AB or Class-B mode.

If you find your equipment running hot and cannot raise the shelf above it, you can always add a small fan to move air around. It usually doesn't take much air to accomplish the necessary cooling.

**Speaker Wire Connections**

**Q** *Have there been any tests to show which method of connecting speaker wire is the best to obtain optimum signal transfer from the wire itself to speaker binding posts? I want to have a really secure, musically accurate connection. In addition, what type of cleaning method do you recommend that I use for binding posts and the ends of speaker cables?—Roosevelt Kilpatrick, Jr., Utica, N.Y.*

**A** I'm not aware of any tests of speaker-cable/binding-post conductivity. By way of answering your questions, I really don't think how you attach your speaker cable to binding posts will make an audible difference. What's more important is that the connection be mechanically solid in order to minimize electrical resistance. The fewer splice points used, the better; each splice adds a small amount of resistance.

It is also important for you to use the right cable size for the impedance of your speakers and for the length required from the speakers to the amplifier.

Any good contact cleaner should work fine for cable ends as well as binding posts.

If the ends and posts are gold-plated, cleaning isn't required because gold doesn't tarnish or oxidize.

**Speaker Power Handling**

**Q** *My loudspeakers have a nominal impedance of 6 ohms and a maximum power rating of 200 watts. Is the power rating related to the impedance of the speaker? Would it differ if the voice coil impedance were 4 or 8 ohms?—Jun Moon, St. Louis, Mo.*

**A** If your speakers are rated as having a specific maximum input power, it means exactly what it says: Power peaks (in watts) should not exceed the speakers' maximum input rating. The nominal voice coil impedance of the speaker is not relevant here. If the amp can supply as much power as the speaker will safely accommodate, then the speaker's power handling won't change significantly should the impedance dip to 4 ohms or rise to 8 ohms at some frequency. Of course, on transient peaks lasting a few milliseconds, many speakers can safely absorb more power than their stated maximum power handling.

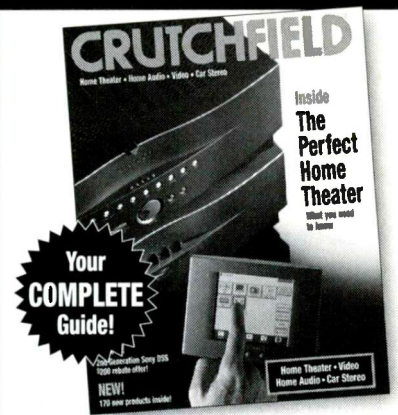
**Amplifier Popping Noise**

**Q** *One of my two monoblock amps produces an annoying popping noise through the speaker to which it's connected. The amplifier's manufacturer and my local repair shop tell me that nothing is amiss. However, I've just spent big bucks on new speakers and would hate to damage them. What's wrong?—Peter B. Betti, Jr., Wrentham, Mass.*

**A** Because the popping noise is confined to one speaker, the problem must be in the monoblock amp connected to it. Popping sounds are the result of

If you have a problem or question, write to Mr. Joseph Giovannelli, *Audioclinic Magazine*, 1633 Broadway, New York, N.Y. 10019, or via e-mail at JOEGIO@earthlink.com. All letters are answered. In the event that your letter is chosen by Mr. Giovannelli 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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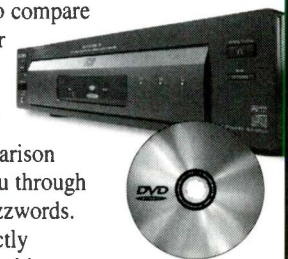


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an IC turning itself off when operating voltage falls below some critical level. The exact manner in which the IC shuts down may change as it ages, yet it may work properly when normal supply voltage is present.

You did not state *when* the popping noise occurs. Is it an intermittent noise, for example, or does it occur as you turn your system on or off? In a setup like yours, you should always turn off the two power amps *first* and then turn off the other components. (When you turn your equipment on, the power amps should be the *last* to be activated.) Many devices produce transient pulses when they are turned on or off. If the amps are running when ancillary components are powered up or down, the transient pulses will be passed to the amp and then to the speaker, where they'll be heard as pops or thumps.

Popping sounds also may occur as a result of offset voltage being removed when the amplifier shuts down, which produces cone excursion. When an amp is running but there's no audio input present, little or no DC voltage should develop across the amp's output terminals. As components age, however, DC voltage may arise. If it becomes too great, the voice coil will heat up because of power flowing through it. Use a voltmeter to see if such a voltage exists in your system. If it does, make the necessary adjustments to remove it; this can often be accomplished by just slightly rotating a trim pot. The annoying sound is likely to go away. While you're at it, you may as well check your other power amp.

### Turntable Motor Problem

**Q** *While changing the drive belt on my old AR turntable, I noticed the motor shaft vibrating even though the power switch was off. Checking further, I found a 0.022-microfarad, 600-volt DC capacitor installed across the contacts of the switch. Assuming it may have caused the problem, I disconnected it; the vibration ceased. What is the purpose of the capacitor? Should I replace it? If I do replace it, does it matter what type I get? Do you think the motor has been damaged?*—Al Pizzuto, Pittsford, N.Y.

**A** The capacitor's purpose is to prevent transient thumps from being heard through your speakers when the turntable power is switched off. If you're not hearing

these thumps now, you can safely operate the turntable without the capacitor. Should you want to replace it (and I would), it really doesn't matter what kind you use except that it should not be an electrolytic type. As with the original cap, the working voltage should be 600 volts, and its value should be 0.02 microfarad.

Whether you install a new capacitor or not, no degradation of audio quality will result. You also will be glad to learn that no damage to the motor has resulted from the current leakage that flowed through the defective capacitor.

I congratulate you on your troubleshooting. You correctly understood that the motor vibrations were indeed caused by power getting into the motor, though not enough power to cause the motor shaft to spin. The only thing that blocks power from reaching the motor is the switch and, in your case, its associated capacitor. Even with a good cap installed, there will be a small amount of current flowing in the motor. However, the amount of current will be so slight that no motor vibrations will be detectable.

### Background Voices

**Q** *When I use my A/V receiver in Dolby Pro Logic mode, I can still hear voices coming from the front speakers, although they're not as loud as when Pro Logic is off. Why does this happen?*—Santos Gonzalez, New York, N.Y.

**A** Because you don't describe the nature of the voices you're hearing, I can only suggest possibilities. Are the voices the dialog of the program you're playing through your Dolby Pro Logic receiver, or is it leakage from the receiver's tuner section, i.e., radio stations? (If the latter, dirty contacts in the program selector switch could be the cause.) A third possibility is radio-frequency interference (RFI) from a nearby radio transmitter (commercial, ham radio, CB radio, etc.). However, RFI is such a complex subject that it requires far more space to explain than is available here.

I think the most likely possibility is the first one: In Pro Logic mode you are hearing leakage (crosstalk) of center-channel signals into the left and right front speakers. In a properly operating surround system, when your A/V receiver is in Pro Logic mode, the steering logic circuitry will route all mono (L + R) dialog signals to the cen-

ter-channel speaker, simultaneously suppressing those signals in the other channels. Although steering logic is effective, it isn't perfect. Suppression of center-channel information in other channels by first-rate Pro Logic processors approaches 50 dB; routine values typically fall in the 30-dB range. At this level, crosstalk of dialog may sometimes be audible in the front left and right speakers from your listening chair. With the best Pro Logic processors—those with 50 dB of separation—leakage of dialog from the center to the left or right front channels or to the surround channels is normally inaudible unless you put your ear next to the speakers.

### Choosing an Amp for Biamping

**Q** *To biamp my speakers and achieve flat response, I need a second amp whose gain is identical to my current amp's. Unfortunately, that amp isn't made anymore; to complicate matters, mine has been modified and I don't even know what its gain is. Can I easily measure it? And, if so, would it be okay to buy an amp of a different brand but that has the same gain? Should I look for an amp that has a gain control, or should I buy an amp without one and add a high-quality gain-control stage later?*—Bob Mihora, Dearborn, Mich.

**A** The chances of your finding a suitable amplifier having *exactly* the same gain as your current one are very slim. But you shouldn't have to worry about that anyway, because you should be able to compensate by means of the level controls on the electronic crossover network used to feed both power amplifiers.

If you're handy with a soldering iron and have a little technical know-how, an alternative solution is to wire a 50-kilohm potentiometer in each channel, inserting it between the output of the crossover network and the input to the amp. To avoid potential losses of high and low frequencies from excessive capacitance, place the pot near the amp so that the cable between the pot and the amp's input can be kept short. If you're inexperienced, have a technician do the job.

You also could look for another power amp that has input level controls. This amp's input sensitivity (the input signal needed by the amp to produce a given output in watts) and power output should be

similar to your existing amp's. This will ensure that your new amp will have more or less the same gain as your present unit.

### Subwoofer Hookup

**Q** I like my front speakers, but I want to add a powered subwoofer to reinforce the bass frequencies of some movie soundtracks. My A/V receiver has two tape loops but lacks a subwoofer output. Will I be able to connect the subwoofer's line inputs to the receiver's extra tape loop? If not, what options do I have?—Anthony Virone, Middle Village, N.Y.

**A** You cannot add the powered subwoofer via the extra tape-monitor loop because the loop is ahead of the volume control. Consequently, there would be no way for you to adjust subwoofer volume simultaneously with the rest of the speakers in your system.

Does your A/V receiver have a pre-out/main-in loop serving the front channels? If so, use that to connect the powered subwoofer. Powered subs almost always have internal low- and high-pass filters. Connect the pre-out jacks on your receiver

to the main input jacks on the sub and the high-pass-filtered outputs from the subwoofer to the main-in jacks on the receiver. If the powered sub lacks line-level inputs, it will certainly have speaker-level inputs (and an internal crossover), which will pad down the speaker output from your receiver, filter the lows for the sub, and redirect the high-pass-filtered output to your main speakers. In this arrangement, the volume control on the receiver will adjust the subwoofer and main speaker levels together.

If you want to continue to run your front speakers full-range and add the subwoofer, use two Y connectors between each pair of pre-out/main-in jacks on the receiver. The main lead of the Y connector should go to the pre-out jack. Attach one of the secondary leads to the receiver's main-in jack and the other lead to one of the subwoofer's line input terminals.

### Give It a Whack

In the December 1997 issue ("CD Changer Black-Out"), Brad Weintraub complained about his CD changer, which had to have the

power cycled off and on to restore it to proper operation. I also have a five-disc carousel changer whose behavior is erratic. For example, sometimes the drawer won't close, so I hit it. Anyway, in your response to Mr. Weintraub, I'm not sure I buy your explanation of a drop in line voltage as the source of the problem. A more probable cause is buggy software. (I should know, as I've been writing microprocessor software professionally for almost 20 years.)—Marty Leisner, via e-mail

### Tape Generations

**Q** If I dub a VHS Hi-Fi tape or a DAT to an analog cassette, is the resulting tape considered second generation? Or is it first generation because of the absence of tape hiss associated with my original DAT recordings?—Name withheld, Houston, Tex.

**A** The original recording (what you wish to copy) is always first generation. If you then dub it, the result—the copy—is second generation. Regardless of noise, it is still one step removed from the original and, thus, the second generation. A dub of that would yield a third-generation copy. A

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# WHAT'S NEW

## SONY PORTABLE CD PLAYER



With its rounded action grip, rubber gaskets (for water resistance), and electronic shock protection (ESP), the D-ES51 Sports Discman is said to be ideal for rugged outdoor use. Battery life with two AA alkaline batteries has been extended to 13 hours (ESP on) or 14 hours with ESP off. The D/A converter is a 1-bit design; frequency response is rated at 20 Hz to 20 kHz,  $\pm 3$  dB. Available in yellow or blue, the D-ES51 comes with matching sports headphones. Price: \$179.95. (Sony, 800/222-7669)

Component video outputs, 10-bit video processing, and individual loading trays for DVDs and laserdiscs are among the features of the DVL-909. A proprietary "ViterBi" decoding circuit is said to compensate for DVD manufacturing flaws in such characteristics as hole centering and disc flatness. For laserdisc Dolby Digital compatibility, an AC-3 RF output is provided, as are standard coaxial and optical

## PIONEER DVD/LASERDISC PLAYER



digital outputs for DVD and CD. Analog output is provided via 20-bit/96-kHz DACs. Price: \$1,099. (Pioneer, 800/746-6337)



## Kenwood A/V Receiver

The VR-2080 uses separate DSP chips to decode Dolby Digital and DTS program material, and bass-management chores are handled digitally by a 24-bit Motorola DSP chip, which is said to enable more precise filtering than analog circuitry. The A/D and D/A converters are by Crystal

Semiconductor. Power output to every channel is rated at 100 watts in all modes. A menu-driven PowerPad remote control with an LCD panel, joystick, and two-way infrared communication shows system status as adjustments are made. Price: \$799. (Kenwood, 800/536-9663)



## M&K POWERED SUBWOOFER

Dual 12-inch drivers operating in a push-pull arrangement are said to virtually eliminate even-order harmonic distortion and to double the sound power per watt of the MX-125 Mark II's built-in 150-watt amplifier, delivering a 6-dB increase in maximum output. M&K says articulation is also improved. Bass extension is rated to below 20 Hz. Price: \$1,095. (M&K, 310/204-2854)

## ARCAM CD CHANGER

With eight separately regulated power supplies, a low-jitter master clock, and a 20-bit D/A converter built by Crystal Semiconductor, the Alpha MCD changer is said to make no sonic compromises for the sake of convenience. According to Arcam, the internal Sony mechanism, which holds up to six

CDs in a stack, enables loading a single disc far more quickly than carousel-type CD changers. The MCD accepts commands from its remote control or via a rear-panel jack and an electrical bus. Price: \$999. (Arcam, c/o Audiophile Systems, 317/849-5880)





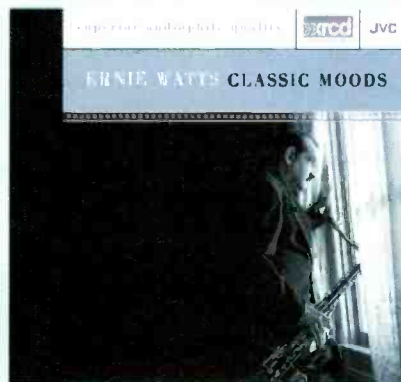
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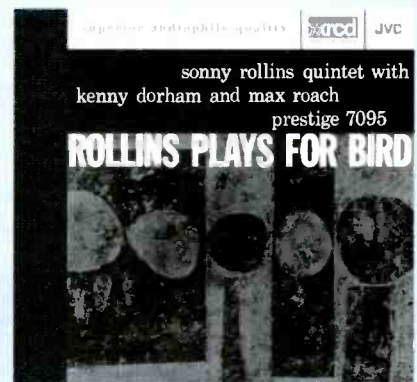
Contemporary jazz pianist Hiroko Kokubu's extraordinary talent and passion for her art have brought together a collection of the finest musicians for this recording, including Alex Acuna, Abraham Laboriel, Gary Herbig and Tom Coster.



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**classic moods**

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**sonny rollins quintet**  
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Joining Rollins on this tribute to Charlie Parker are musicians who knew him intimately: Kenny Dorham, Max Roach, Wade Legge and George Morrow.

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# WHAT'S NEW



Equipped with four digital inputs (two optical, two coaxial), the SH-AC500D automatically detects and decodes bit streams from any Dolby Digital or DTS source and feeds its analog output to six discrete-channel RCA jacks. Intended for use with an A/V receiver or amplifier

having matching analog input connections, the Technics has controls for bass management, dynamic-range compression (for late-night listening), center- and surround-channel delay times, and master volume. A remote is included. Price: \$299.95. (Technics, 800/222-4213)

## CD Playright Repair Kit

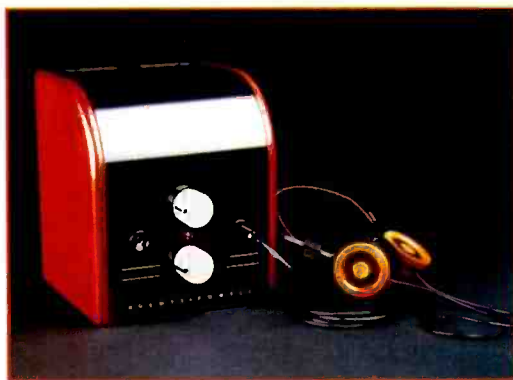
The Max CD Kit includes enough repair polish to treat a dozen scratched CDs, a 4-ounce bottle of Quick Clean spray (used to apply a protective anti-static shield that is claimed to repel dust and oils), CD



Quick Wipes (for routine cleaning and maintenance), two spare jewel boxes, and a CD holder. The CD repair polish is also said to be effective in restoring scratched laserdiscs, CD-ROMs, and DVDs. Price: \$35. (CD Playright, 800/800-8879)

## ◆ Holmes • Powell Headphone Amp ◆

Styled to resemble a classic deco table radio yet retain a contemporary look, the DCT has ¾-inch solid cherry side panels and inlaid solid aluminum knobs. The Class-A vacuum-tube circuit uses one 6072 input tube and two 6055 output tubes and is claimed to



provide the highest possible fidelity with headphones. The DCT accepts signals from a preamp's main or tape outputs or any line-level source; there are two ¼-inch phone output jacks. A money-back 30-day in-home trial is available. Price: \$3,500. (Holmes • Powell, 209/449-9090)



## JL AUDIO CAR SUBWOOFER

Molded of fiberglass to match a specific vehicle's trunk contours, the Stealthbox subwoofer is said to extract greater usable enclosure volume without compromising trunk space than typical wooden-box enclosures. Stealthboxes are available in a choice of carpet coverings and for more than 40 different makes and models of cars, trucks, and sport utility vehicles. The Honda Accord unit

(shown in cutaway and installed) has a 10-inch driver with a power-handling rating of 300 watts. Price: \$499.95. (JL Audio, 954/981-9497)

## ALTRA GALAXY STAND



Sculpted from recycled wood, the Galaxy GXA stand has a rear-column support with a counterbalanced shelving system to achieve a floating effect. The GXA has four shelves that accommodate components up to 20 inches wide. To avoid messy-looking exposed cables, a hidden wire system routes interconnects down the back of the support column. Finished in a deep, scratch-resistant lacquer, the GXA is available in mahogany, black, or spice. Price: \$149.99. (Altra, 973/778-8844)



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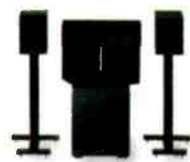
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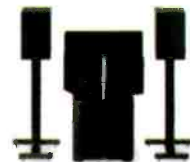
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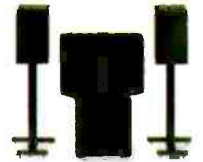
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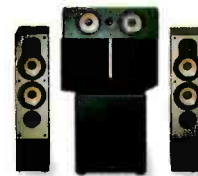
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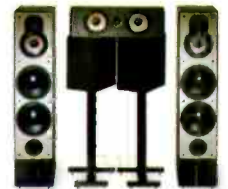
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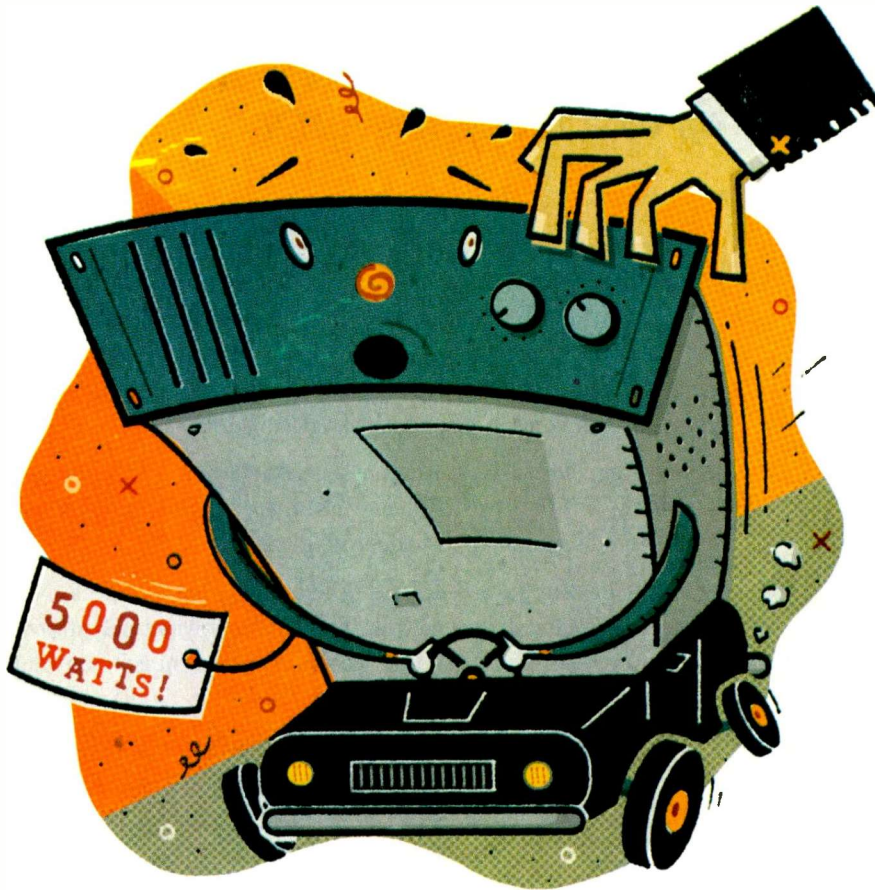
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## WATTS LEGAL



**R**ight up into the 1970s, amplifier power ratings were as wild and woolly as a saloon in an old Western. Off in a corner, nursing sarsaparillas, would be the manufacturers in the white hats, telling you precisely how much power their amps and receivers could deliver. Over by the bar, you'd find the black-hatted cowboys whooping it up while bragging of still higher power, never mentioning how long their equipment could maintain that output, how much distortion it entailed, or any of them niceties. (Back then, I calculated that my Dynaco Stereo 35, capable of an honest 17.5 watts per channel, could be rated at 200 watts or more by "cowboy standards.")

Then the Federal Trade Commission rode in on its white horse, intent

on cleaning up the town. In 1974, the FTC issued the regulation it called Power Output Claims for Amplifiers Utilized in Home Entertainment Products (which you can read at [www.cemacity.org/govt/files/power.htm](http://www.cemacity.org/govt/files/power.htm)). Under this rule, a component's main advertised power rating must be for continuous power, with all channels operating, into the highest load impedance it is claimed as handling. Further, the rating must state the distortion level at which that power is developed and the frequency range over which it is available.

**THE FTC REGULATION'S  
BIG LOOPHOLE  
IS ITS OMISSION  
OF CAR AUDIO.**

The regulation is still in force, though not all manufacturers (especially small ones) seem aware of it. It also has a few flaws and one major loophole.

One flaw is the somewhat draconian requirement that the device under test be preconditioned by running all its channels for an hour at one-third of rated power—a Class-AB amplifier's least efficient, hottest-running, operating point. As a result, you often pay for amplifier heat sinks that are needed only to pass this test, not for playing music.

Another flaw is that the specified distortion has to be the maximum total harmonic distortion (THD) at any power level from full rated output down to 250 milliwatts. But at 250 milliwatts, anything that's not part of the signal is more likely to be noise than THD. Many test instruments can't tell the two apart, so "THD + N"—THD plus noise—is often cited, rather than straight THD. It sounds academic, but it penalizes makers of some very good amps by forcing them to cite "distortion" (THD + N) that's higher than the actual THD.

The regulation's big loophole is its omission of car audio. This made sense back in '74, as the market was small and power claims were modest. Companies such as Pioneer and Sanyo were specifying power the same way as they did for home audio components, essentially following most of the FTC mandate even before it was issued. But many companies listed power the cowboy way, at

10% distortion with a 1-kHz signal—not that they ever bothered to mention those overly charitable test conditions, of course. (According to

one of our reviewers, Bascom King, some makers of single-ended tube amps also list 1-kHz power at 10% distortion without specifying these

conditions.) Today, when some car amps boast a kilowatt of power or more, and even head units claim 35 or 40 watts per channel (but may deliver half of that), this loophole is overdue for closing.

And it probably will be closed. The FTC, which periodically reviews its rules, last year called for comments on the power regulation's "overall costs and benefits. . . and its overall regulatory and economic impact." That led the Consumer Electronics Manufacturers Association (CEMA) to ask that the rule be broadened to cover car audio, that the preconditioning requirement be modified to reflect typical operating conditions, and that disclosure of THD be made optional for levels below 1%.

Another CEMA suggestion was that the FTC expand its regulation to cover powered speakers. For these products, amplifier power is fairly meaningless, no matter how rigorously it's tested and disclosed. What's needed is a measurement standard for the acoustical output capability of the amp and speaker together—but there is no such yardstick yet. Standards for specifying acoustic output are now being considered by CEMA's engineering committee. Considering the many variables involved in speaker measurement, however, there's likely to be a lot of controversy over any standards that are proposed.

### DOES RECORDING'S FUTURE LOOK BLANK?

People record a lot less than they used to: Sales of cassette decks and blank tapes are declining faster than sales of digital recorders and media are growing.

Much of this decline is probably due to the differences between LP and CD, even though LP never was a home recording medium and CD is only just becoming one. Some audiophiles copied their LPs to tape and played the tapes on everyday occasions, to save wear and tear on fragile grooves. And many people taped LPs so they could play them in their cars and personal portables. Because CDs don't wear out, are hard to damage, and can be played in cars and portables, there's less need to copy them to tape. And since the camcorder replaced the silent 8mm home movie camera, Junior's first words are most likely to be preserved as the soundtrack to a video. School concerts and the

like are also more likely to be preserved on a fuzzy videotape with fuzzy sound than on a good home audio recorder—which is ironic, as home audio recorders can now deliver near-CD quality on MiniDisc and actual CD quality on DAT or CD-R. And whether it's our increasingly suspicious society or the ease of digital copying, I find musicians more and more reluctant to let amateurs tape them.

There's some chance that home recording will acquire a whole new role, as a substitute for the record store. You'll hear a recording you fancy on the radio or elsewhere, download it from the Internet, and record it on a chip. Concept albums will like-

ly disappear, as you cherry-pick favorite songs and ignore the rest. You may buy the recording outright, rent it for a limited time period (no loss, with a lot of evanescent pop), or pay for a specific number of plays. To hear the music when you're on the go, you'll download it from the Internet onto your pocket music player, your pocket computer, or a memory card.

But it will all be like buying food from an Automat's little windows, without the thrill of random discovery we get from a record store's banquet of offerings. Home recording will become, in other words, the ultimate audio convenience. And not much fun.

## MUSICAL BRAINWORK

Some creatures, such as birds and whales, use music for communication. We use it for communication, too, but mainly to convey emotions; our main communication medium is speech.

Scientists have known for about a century that speech is usually processed in a small area on the left side of the brain. However, Robert Zatorre, of McGill University in Montreal, recently discovered that the corresponding area of the brain's right hemisphere is involved in processing music. And research by Diana Deutsch, of the University of California, San Diego, implies that some of the brain's language centers are involved in processing music as well.

But is it emotion or mere pitch change that causes this right-brain activity? It's long been known that English speakers' right prefrontal cortices react to changes in spoken pitch. Yet English uses pitch changes to signal emotion; what about tonal languages—such as Thai, Swedish, and Mandarin—in which pitch can affect a word's meaning? Donald Wong, of the Indiana School of Med-

icine, has discovered that pitch changes in emotionally neutral Thai words will activate the language-processing areas in the left hemisphere of a Thai speaker's brain but not in the brain of a non-Thai speaker.

This correlates well with Zatorre's finding that word syllables can be processed by either side of the brain, with the left side taking charge when their meaning is most important and the right side doing the processing when the emphasis is on pitch.

Deutsch, a renowned authority on musical illusions, has found a

further complication. Certain illusions involve the right ear, the one more directly wired to the language area. Hence her conclusion that the brain's speech-processing centers may also operate when we hear music.

Meanwhile, another finding of Zatorre's is that music also causes activity at the back of the brain, where visual information is processed. This may account for some people's tendency to see images when listening to music with their eyes closed.



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## MINOR ROYALTIES

Music royalties are widely blamed for the comparatively high prices we pay for digital audio recording media. Analog cassettes and computer CD-Rs carry no royalties, and you can buy them for about \$2; MiniDiscs, DATs, and recordable audio CDs (CD-Rs) do carry royalties and cost noticeably more. The difference is greatest for audio CD-Rs, which cost several times as much as the computer versions.

But don't blame the mandatory music royalties, which amount to only 3% of the "transfer price" that wholesalers pay to manufacturers. (There's also a 2% royalty on home digital recording gear, but that's capped at \$8 for recorders or \$12 for music systems that incorporate recorders.) The real villains are technology and economics—which is good, because the royalties are fixed by law, whereas improved technology, enlarging markets, and increased competition can lead to lower prices. In fact, they're already doing so.

According to Tim Sullivan of TDK, MiniDiscs are expensive because they're not simple to make, because demand has been low, and—paradoxically—because that demand is now rising in this country faster than supply is. And home audio CD-Rs are expensive, says Sullivan, "because we make so few of them. There's not enough demand to keep a production line going yet. So every time we want to make a batch, we have to shut the computer CD-R line down, change to a different stamper, do a small run, then change the stamper back. Anyone in manufacturing knows that when you shut a machine down, your costs go way up." But prices of both MDs and consumer audio CD-Rs should drop as demand rises, in turn leading to greater plant capacity and more competition. Philips' introduction of a \$649 CD recorder has already boosted demand somewhat (one store reports CD-R blanks out-selling MiniDiscs the week the Philips arrived), and more low-priced recorders are likely to come soon from Pioneer and others.

The purpose of the royalties is to recompense the music industry for sales presum-

ably lost to home recording; in some other countries, a royalty is also charged on analog tapes.

Where do the royalties go, once they're collected? According to the Recording Industry Association of America (RIAA), one-third of the money goes to the Musical Works Fund, the other two-thirds to the Sound Recordings Fund. Disbursements from the latter fund, which compensates recording artists and their labels, are based on recording sales for the year covered by the royalties. (The RIAA has been using point-of-sale data collected by SoundScan

**MUSIC ROYALTIES  
MAKE UP JUST 3% OF  
THE "TRANSFER PRICE"  
OF BLANK DIGITAL  
RECORDING MEDIA.**

for this.) Of that money, 4% goes to "non-featured" musicians, and the rest is split 60-40 between the labels and the featured recording artists. Disbursements from the Musical Works Fund—of

which half goes to composers and lyricists, half to music publishers—are based on a combination of record sales and airplay by broadcasters. The RIAA handles disbursements to the Sound Recordings Fund; allotments to the Musical Works Fund are handled by performing-rights groups (ASCAP, BMI, and SESAC) and by "mechanical-rights" groups (such as the Harry Fox Office), which pay copyright owners for recordings of their music. Basing disbursements on recording sales and airplay is reasonably fair but not entirely equitable. Naturally, what we record off the air is what's currently being broadcast, and most of the recordings we dub are probably pretty current, too. But a lot of what we dub at home is old stuff, recordings that haven't been in print or on the air in decades. For example, the New American Quartet won't see a dime from the old 78s I'm taping, nor will Bob Cooper and his sidemen benefit from my transferring *Shifting Winds* from LP to CD-R. (No sense transferring Cooper's currently available recordings to CD-R; they're on CD already.)

In any case, nobody's getting rich on these royalties. In its first 14 months of operation, October '92 through December '93, the Sound Recordings Fund collected and disbursed less than \$350,000. And receipts since then haven't risen much. A



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KEN KESSLER

## VOLARE, OR SOMETHING LIKE IT



Most Americans, bless 'em, have never heard of the Eurovision Song Contest. Be grateful: This absurd and annoying annual songfest is a pan-continental display of bad taste. It's enough to turn any American Europhile into a confirmed isolationist. And as if it were necessary, the contest proves not all is pâté de foie gras and classy designer duds on the eastern side of the Atlantic.

This lowering of standards almost denies a collective musical history that can boast a rich legacy: from Bach and The Beatles to Django Reinhardt, Edith Piaf, and Le Petomain to the creation of the opera, the invention of the pianoforte, and Frank Sinatra's grandparents.

Competition, at the time this column is being written—early April—is hitting near-fever pitch. And with national pride at stake, it becomes apparent that everyone in Europe detests everyone else, especially the British vis-à-vis the French and the Germans, not to mention a slew of “minor” hatreds whose origins have been lost in the mists of time. If you thought the Olympics were the only occasions when various countries engaged in some nonviolent warfare, think again.

The nature of this exercise is: What country, among all of those in Europe, bits of the Middle East, and the westernmost part of what was once “Commie Central,” can produce the worst pop song of the year? Well, maybe that's unfair; perhaps it

should be: What country can produce the most *populist* song of the year, one that transcends language barriers, genres, style, intelligence, art, wit, originality, craft, and anything else that might cost it votes?

In early May, a major network in every one of the countries represented in the competition devotes an evening's airtime monitoring the event. After months of local heats, we'll next hear the nominations—one from each country—in glorious NICAM stereo. And there are approximately 20 countries that participate, though it's never precisely clear which ones will be involved, as boundaries change according to the prevailing politics. Oddities abound; for example, Turkey's involved. Why? Because half of it is in Europe. So, why is Israel in it? Because it is a member of the European Broadcasting Union—as are the Vatican, Libya, and Algeria. All are entitled to compete but have managed to resist the temptation.

The results bring to mind images of the Tower of Babel or a bad night on *Ted Mack's Original Amateur Hour*. Now, I know this sounds terribly xenophobic, but let's be perfectly honest: Modern pop music *not* sung in English tends to, well, suck. You need proof? Okay, name a major French pop star who has topped the American charts besides that arch fluke, the late Singing Nun. Now name a hot German act. (No, Kraftwerk doesn't count; they're robots.) Next, name a mega-level Greek/Finnish/Portuguese/Andorran/Lebanese/Kamchatkan rock star. Or a Belgian who can fill a stadium.

Of all of the countries involved in this competition, only the U.K. and Ireland have track records that bode well. So well, in fact, that they win quite regularly. Success can be costly, however, because the winner hosts the following year's competition—a multimillion-dollar shebang funded by the TV networks, local government, and anyone else likely to benefit. I suppose you could find record company involvement in there, too.

Illustration: Marina Sagona

Ireland recently had an expensive run because it won in 1992, 1993, 1994, and 1996. So what happened in 1997? An expatriate Yank living in England won it for the U.K.; it was almost like Ireland exacting revenge on Great Britain. But more about that victor anon.

The language thing is crucial because most countries do their best to have performers stick to their native tongues rather than succumb to the lure of an easy/possible win if they were to sing in English. They also learn that French and Italian, for example, sound nicer to non-colinguists than do Icelandic, Finnish, or Portuguese. As a result, since the contest began in 1956, Ireland and the U.K. have won 12 times between them—over a quarter of the competitions—while French-language victors (Belgium, France, Luxembourg, Monaco, and Switzerland) number a heady 14. But if singing in English or French is just too much for the more jingoistic to bear, you can always resort to nonsense and gibberish—hence, winners like “La, La, La” (Spain, 1968), “Ding Dinge Dong” (Netherlands, 1975), and “Diggi-loo, Diggi-ley” (Sweden, 1984). Since I speak neither Spanish, Dutch, nor Swedish, I could be way off the mark, and those titles might actually mean something. But I doubt it.

Still, the recipe for most years is simple. You start with a team of professional songwriters who have mastered the art of the hook, the instantly memorable melody, and the monosyllabic refrain. Then you mix in a handpicked professional or semipro group, preferably two cuddly boys and two sexy-but-wholesome girls. What you end up with on rare occasions might turn into a world-class pop outfit—like the phenomenal ABBA, which entered the world stage with the magnificent “Waterloo,” providing victory to this Swedish quartet (two babes, two blokes) in 1974.

More likely than not, though, you end up with lesser ABBA clones, such as The Brotherhood of Man, who won for the U.K. with “Save Your Kisses for Me” in 1976. In case you’ve never heard this ditty, imagine “Tie a Yellow Ribbon” without the wit. Five years later, the U.K. did it again with a group virtually interchangeable with The Brotherhood of Man, Buck’s Fizz. That group grabbed first prize with “Making Your Mind Up.” And in case you’ve never heard

this ditty, imagine “Yummy, Yummy, Yummy” without the wit.

And that’s just the palatable stuff. Friends and colleagues in other countries, who actually speak languages like Danish and Norwegian, tell me that the songs are as awful as one would fear and that it’s not just a case of English or even French chauvinism. Even the locals find the stuff risible.

But, after 40+ years, the Eurovision Song Contest is as unassailable an institution as any other tedious event we suffer out of habit. And, in 40+ years, a mythology has attached itself to the contest: apocryphal tales and rumors and lies and wishful thinking. One tale buried amidst the footnotes of rock lore alleges that the legendary Ray Davies—author of “Waterloo Sunset,” “Lola,” and every other Kinks masterpiece—once proffered a song for consideration, as did Roy Wood, founder of The Move and Electric Light Orchestra. And can you believe that “Volare,” an all-time great if ever there was one, actually lost?

On the other hand, not all of the winning songs have been unmitigated dreck, nor have all the competing artists been immediately forgettable failures who returned posthaste to unknown status. Check ’em out if you don’t believe me: Sandie Shaw, Mod songstress par excellence, won for the U.K. in 1967 with “Puppet on a String,” while Lulu, of “To Sir with Love” fame, tied in 1969 with a song that she outlasted. Cliff Richard, once described as England’s Elvis but actually more its Perry Como, competed twice. Others include Mary Hopkin, who entered in 1970, and Olivia Newton-John, who tried in 1974. Though she might want to forget it, Celine Dion (a Canadian) won in 1988 for Switzerland. But there’s probably no truth whatsoever to the rumor that The Beatles offered to write a song, only to be told, “Thanks, but no thanks.” Even Eurovisioners aren’t that stupid.

However, much as I loathe the whole affair, which I love to cite whenever some Eurosnoob calls Las Vegas “tacky,” I must admit that 1997’s competition vindicated me for worshiping a second-string band for more than a decade. The band, Katrina & The Waves, who gave us the pop classic “Walking on Sunshine,” had gone the way of numerous other one-hit wonders. But though they spent the 1990s forgotten everywhere but Germany (and *chez* Kessler), lo and behold,

they produced a stupendous anthem, “Love Shine a Light,” which made them the clear winners last year. Indeed, their score was the fifth highest in the competition’s history, following Celine Dion’s and ABBA’s.

So what happens? The sharp-witted and immensely telegenic Katrina looks set for a career as a presenter on British television, while rumor has it that the Eurovision success caught the band unawares, with the strain (petty arguments, the too-much-too-soon syndrome, etc.) breaking up a group that had managed to stay together after a decade in the wilderness. Ah, well. . .

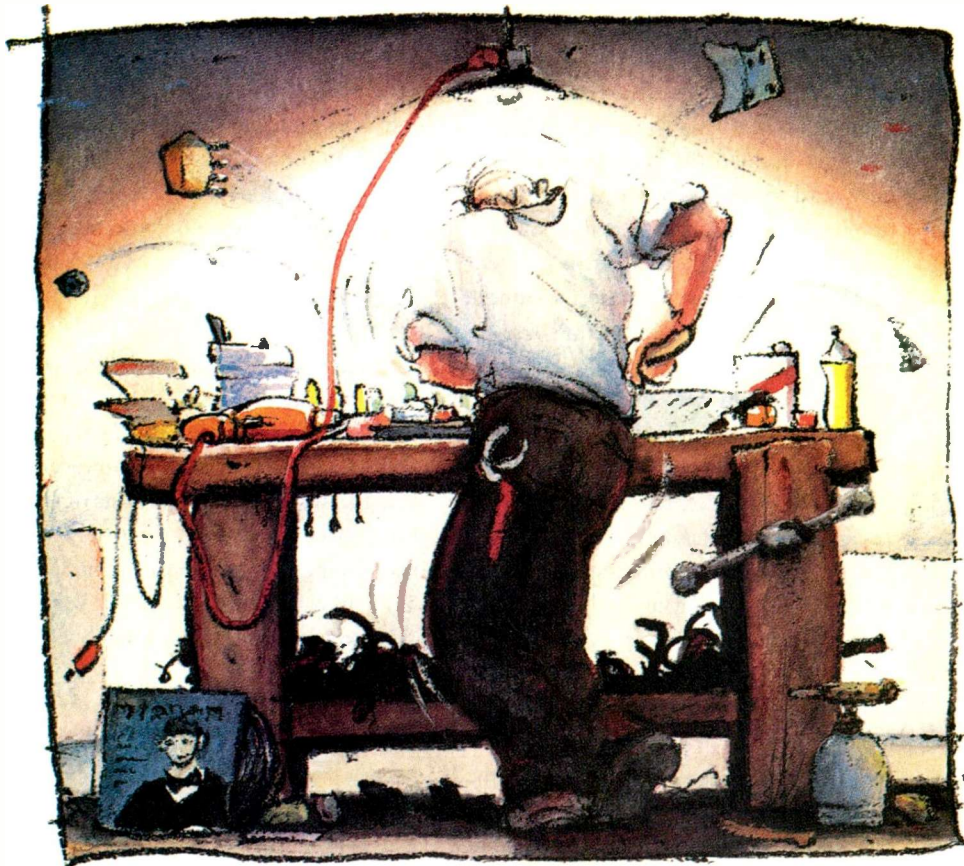
Given that this year’s crop is a throwback to previous ditties rather than a treasure emulating the standards set by Katrina & Co., I won’t suffer through the three hours’ worth of torture I endured while rooting for a fellow ex-pat. Instead, I’ll spin the semi-tongue-in-cheek CD of cover versions, *A Song for Eurotrash*, which was issued by EMI just in time for the event. Yup, you guessed it: The disc consists of a host of hip artists performing their “fave” Eurovision songs, with one or two vintage numbers, like Dean Martin’s hit version of “Volare” and Brigitte Bardot’s “St. Tropez,” thrown in for good measure.

Named after and issued in conjunction with a mondo bizarro TV show called, appropriately, *Eurotrash*, the CD led the original members of Bananarama to re-form just to record “Waterloo.” We also find Sinead O’Connor joining former Fun Boy Three misery Terry Hall for “All Kinds of Everything,” Kenickie performing “Save Your Kisses for Me,” The Pogues’ Shane McGowan bellowing through “What’s Another Year,” and Dubstar—with arch, ageless smoothie Sacha Distel—singing the 1965 winner, “Poupée de Cire,” ad nauseam.

But here’s a tip for the Europopsters among you, the ones who can name Little Bob Story’s bass player or the B-side to “Ça Plane pour Moi”: Aside from the contributions of Dino and Bardot, all of the tracks are unique to this set, therefore rendering it a future collectible. Which sad cases (like yours truly) simply must own.

Alas, The Foo Fighters didn’t sign up to cover “Ding Dinge Dong.” And I suppose that now we’ll never know what Snoopy Doggy Dogg might have done with “Diggi-loo Diggi-ley”. . . . But there’s always hope they’ll be on the next compilation. A

## HUM JOB



**Y**ou want to talk about masters of diplomacy? Forget Kissinger. James Baker? Pinhead. Madeleine Albright? I laugh at thee, madame. For I have single-handedly brokered the hardest-won peace accord in hi-fi history: I got a Grado phono cartridge to work on a Rega Research turntable without humming like a mof! And if you're willing to spend \$80 and engage in a bit of manly tin-snippery, you can, too.

You may ask yourself why I even bother with turntables and cartridges anymore now that CD and DVD are the formats of choice. But that's precisely the point. Vinyl is dead! The trickles here and there of new major-label vinyl have all but dried up, and even the used LP huts

have been scavenged so many times now that all that's left are REO Speedwagon and Falco records. But while it no longer makes sense for even the nuttiest audiophile to drop a couple grand or more on a high-dollar turntable, I'm seeing lots of guys like me who have good-sized record collections putting together one last reasonably priced but still high-quality analog rig to ride into the sunset. A hum-jobbed Grado/Rega rig is the perfect solution—top-drawer analog sound for well under a thousand bucks.

Grado phono cartridges and Rega turntables have always been high-end audio's version of the Hatfields and McCoy's. The Grados sound great in other turntables, and the Rega works well with most any other

cartridge, but mount a Grado on a Rega, and it's hum city.

The problem is the Rega's unshielded motor: It throws a pretty mean field when it's running, and the unrepentantly unshielded Grado cartridges lap it up like sweet cream. It's such a drag, because the Grados have a magical midrange and staggering bass as well as incredible musicality all the way down the food chain. Even the cheapest \$30 Grado is a truly excellent-sounding cartridge. Rabid audio nuts can bitch all day long about how the Sumiko Blue Point sucks or rules, or how the Benz Glider rules or sucks, but I've never heard anyone dis a Grado. Everybody loves them, and for good reason.

The Rega Planar 3 turntable is the same deal. Barrels of ink have been spilled about what an extraordinary overachiever this \$500 British-built turntable and arm combo is, but as a former Linn LP12 and Well Tempered Turntable user, I'll give you the short form: The Rega Planar 3 is by far my favorite out of all the high-end turntables I've used. It packs all the muscle and finesse of the high-dollar 'tables but doesn't have a tweaky bone in its beaverboard plinth. You set this thing up once and it just plays records, perfectly, forever, and without any futzing or other embarrassing audio-druid rituals.

And because the Rega comes complete with a world-class arm, the legendary Rega RB-300, it blissfully discourages the never-ending cycle of upgrade abuse you suffer through with all the high-dollar tweaktables. You know the drill—better arm, better platter, better bearing, better motor, better power supply, better arm, better platter, better bearing, better batter butter bitter bibble bippy boo-boo. *Mommy, why's daddy crying?*

I bought a used Rega about three years ago for \$300 and got the tweaktable monkey off my back for good. Let me tell you something: It's the best 300 hi-fi bucks I ever spent. If I want to play a record, I just do it. No worries, no procedure, no flinching. But the one thing the Rega won't do

Illustration: Philippe Lechien



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Grado's cartridge glides into action.

is go with a Grado. It's the most frustrating thing, because here you have the world's greatest budget turntable and the world's greatest budget cartridge, and they don't work together without humming like crazy! By all rights, this should be the king of the affordable analog rigs, but the hum problem was so bad I had to use different cartridges, even as I wished for that magic Grado midrange.

Now, I don't know about you, but I've always got three or four to-do projects that bob up from time to time out of the background noise in my brain. "Build a microphone preamp with the Burr-Brown chips that you got two years ago," the little voice cracks through the static, only to fade out again. *Fzzzzkzzzz.* "Get new ribbons for those old RCA mikes you bought five years ago." *Fzzzzkzzzz zzzzzkzzzzfzzzz.* "Figure out a way to shield the Rega so you can use Grado cartridges with it." *Fzzzzkzzzz. . .*

Of course, I never get moving on any of them. But one day I was talking to Rega's U.S. distributor (Lauerman Audio Imports, 423/521-6464) about my Grado jones, and he said he'd always wanted to try shielding his own Rega with mu-metal. However, the idea always bobbed back down in *his* brain static, and he never got around to actually trying it.

Not me, though—I was desperate. The Sumiko SHO cartridge I'd been using for the past few years was on its last legs, and I'd just gotten one of the new wood-bodied Grados to try, so it was time to finally make this mess fly. I did a quick "Infoseek" on

"mu-metal," got a couple hundred hits, and a few minutes later I was talking on the phone with Brad Friestedt of Magnetic Shield Corporation, my knight in shining mu-metal.

Mu-metal (pronounced moo-metal) is a special shielding material used in hospitals and laboratories to keep magnetic field interference out of sensitive circuitry. It's expensive stuff, but unlike copper and aluminum foil, mu-metal's shielding remains effective all the way down to below the 60-Hz AC power-line

frequency, which is exactly where the Grado/Rega hum lives.

Magnetic Shield Corporation normally sells blank sheets of mu-metal for a couple hundred bucks a pop, but it also sells a "lab kit" sample pack with several good-sized sheets of the stuff for just \$80. You get three shiny 10 x 15-inch sheets of a type of mu-metal called CO-NETIC AA in different thicknesses, another three sheets of a different type called NETIC S3-6, various little samples of mu-metal braided cable sleeving and the like, and a roll of thin, double-sided foam tape to stick this stuff to your application. I spoke to Brad on Monday and had my mu-metal on Friday.

Magnetic Shield Corporation's catalog says that the CO-NETIC type of mu-metal works best with low-intensity

magnetic fields like from the little Philips motor in the Rega, while the NETIC type is for high-intensity fields. But since, of course, I jumped in and started cutting and bending without reading anything, I happened to use the NETIC stuff first, to build a shielding cage for the Rega's motor, and got no hum improvement whatsoever. And let me tell you, it's no walk in the park to measure and snip and tuck and bend and fold and fiddle a little motor cage to fit in the cavity underneath the Rega's base.

So right off the bat, I'll save you some time and sweat: Don't bother with the NETIC sheets, and don't bother making a motor shield. I found a much easier and more effective hum job.

As it happens, the sheets of mu-metal are just about the perfect size to lay on top of the Rega's base, under the platter. This way, you get a good piece of hum-killing real estate between the motor and the cartridge.

With the Grado mounted on my Rega and the system turned up all the way, till the hum throbbed through my living room, I tried sliding the 0.01-inch-thick CO-NETIC sheet under the platter, and *bam*—the hum died down to almost nothing! Then I tried the same thing with the 0.025-inch sheet of CO-NETIC, and *bam*—the hum was *gone*. I mean, there was nothing left in the silence but the faint hiss of the preamp.

So I gather it's not as important to surround the motor in a little cage of mu-metal as it is to just put a good-sized slab of the stuff between the motor and the cartridge. I know this because I also tried making a CO-NETIC motor cage (hey, it was a rainy afternoon and I had nothing to do, and *Jerry Springer* was a rerun—"My Ho Thinks Your Ho's Ho Is a Ho, You Ho"), and it didn't do much at all.

Before you undertake this project, you should remove the cartridge from the RB-300 tonearm and also remove the glass outer platter and plastic inner spindle from the Rega. The mu-metal sheet then fits nicely on top of the Rega's base, with just a few minor snips along the back edge to clear the motor and the tonearm base. You'll need to cut a hole big enough for the brass bearing cup to clear, of course, and here's where you want to be very careful, because if you bend the mu-metal too much while you're cutting it, it won't lie flat enough against the Rega's base. You might find it then scrapes the underside of the plastic inner spindle as it turns.

**THE MU-METAL SHEET  
FITS NICELY ON TOP  
OF THE REGA'S BASE,  
WITH JUST A FEW  
MINOR BACK-EDGE SNIPS.**





A Rega Planar 3 awaits a Grado cartridge.

Once I cut the spindle hole, I cut a bunch of 2-inch-long strips of the double-sided tape and stuck them all around the sheet's underside, as well as all around the hole in the middle to keep it flat against the base. Then I laid it down, pressed firmly all over to make sure it stuck securely, and that was that. Of course, now I had a shiny metal plate covering the front half of my Rega's base, but I kind of like the simultaneously high- and low-tech look this gives it. And Magnetic Shield Corporation says the CO-NETIC material can be painted black to blend with the Rega's base without affecting the shielding at all.

Man, I must've played half my record collection once I put the platter back on and installed and aligned the cartridge. This hum-jobbed Grado/Rega is the best sounding analog rig I've ever had! And Planar 3 owners don't have to spring for the expensive Grados, either: Even the \$60 Grado Green I tried sounded terrific. Maybe the Rega's own green-colored logo makes for good mojo with the Grado Green; who knows? What I do know is that the budget Grado and the hum-jobbed Rega Planar 3 sound better overall than any combination of Linn or Well Tempered 'table and cartridge I've used in the past, and for less than \$500, including the mu-metal kit. I wish I'd had this rig years ago, but I'm glad I've finally struck gold (green?) with it now.

Rega Planar 3 owners wishing to try the mu-metal shielding mod can buy the \$80 set of mu-metal sheets directly from Magnetic Shielding Corporation (630/766-7800). Ask for product LK-110.

Again, I recommend caution anytime you're messing around with expensive cartridges and metal cutting, but this isn't brain surgery. It's just hi-fi. A

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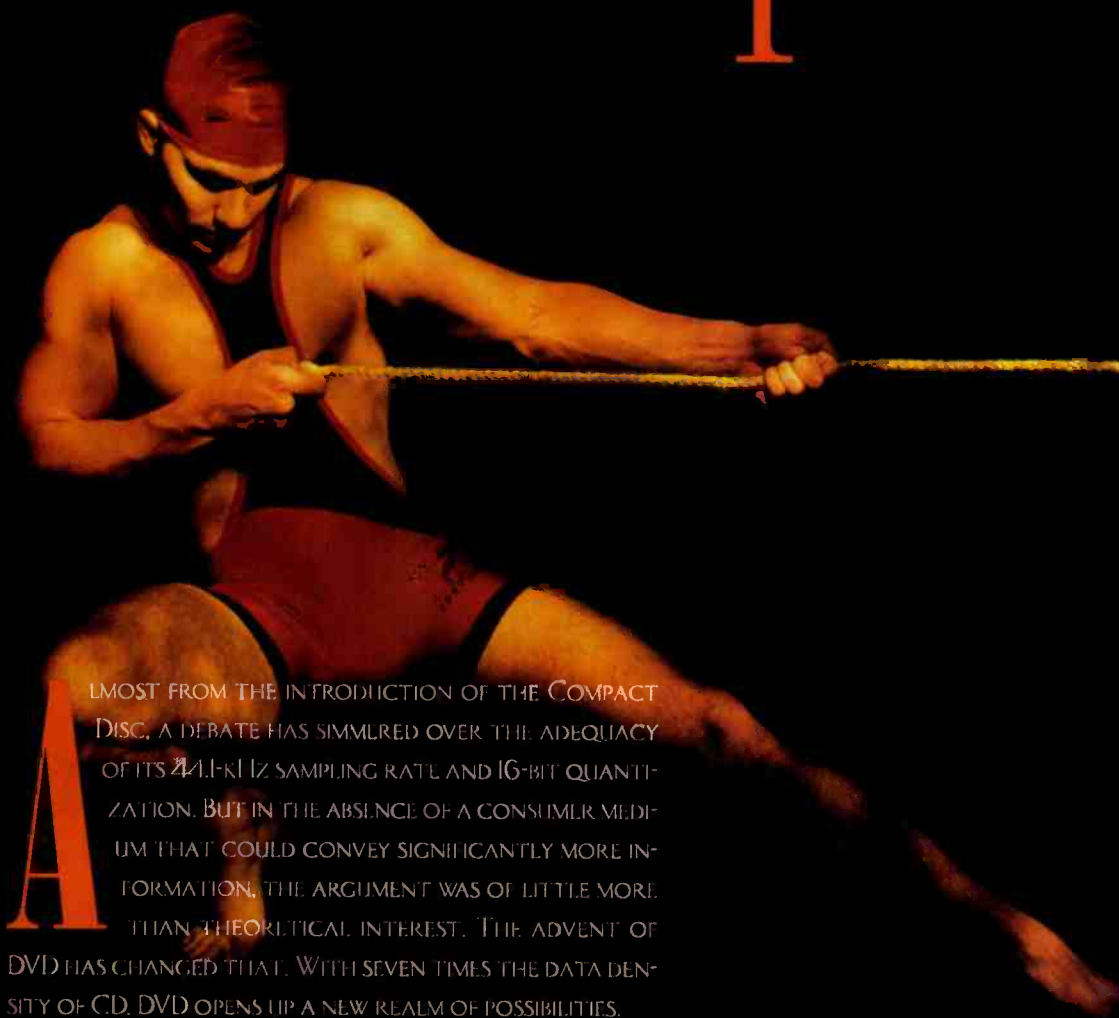
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by Bob Katz

# point cou



ALMOST FROM THE INTRODUCTION OF THE COMPACT DISC, A DEBATE HAS SIMMLRED OVER THE ADEQUACY OF ITS 44.1-KHz SAMPLING RATE AND 16-BIT QUANTIZATION. BUT IN THE ABSENCE OF A CONSUMER MEDIUM THAT COULD CONVEY SIGNIFICANTLY MORE INFORMATION, THE ARGUMENT WAS OF LITTLE MORE THAN THEORETICAL INTEREST. THE ADVENT OF DVD HAS CHANGED THAT. WITH SEVEN TIMES THE DATA DENSITY OF CD, DVD OPENS UP A NEW REALM OF POSSIBILITIES.

FULL EXPLOITATION OF THE OPPORTUNITIES FOR ADVANCED PURE-AUDIO APPLICATIONS WILL NOT COME UNTIL DVD-AUDIO AND SUPER AUDIO CD REACH THE MARKET NEXT YEAR. MEANWHILE, HOWEVER, A FEW AUDIOPHILE RECORD LABELS AND HIGH-END EQUIPMENT MANUFACTURERS HAVE SLIZED UPON THE PCM AUDIO CAPABILITY DEFINED WITHIN THE EXISTING DVD-VIDEO SPECIFICATION, WHICH ALLOWS

digital heaven

# Inter point

or digital hell?

FOR TWO-CHANNEL AUDIO AT SAMPLING RATES UP TO 96 KHZ AND WORD LENGTHS UP TO 24 BITS. CLASSIC AND CHESKY RECORDS HAVE RELEASED 96-KHZ/24-BIT TITLES IN THIS FORMAT, AND MOBILE FIDELITY HAS SHOWN INTEREST BY DEMONSTRATING A COUPLE OF 96/24 TRANSFERS AT THE LAST CONSUMER ELECTRONICS SHOW.

THIS DEVELOPMENT HAS REINVIGORATED ARGUMENTS OVER WHETHER SUCH HIGH-DATA-RATE CODING IS NECESSARY FOR THE HIGHEST QUALITY SOUND REPRODUCTION OR MERELY A WASTEFUL MISAPPLICATION OF RESOURCES THAT OFFERS NO ADVANTAGE OVER THE FAMILIAR, TRIED AND TRUE COMPACT DISC. WITH THAT IN MIND, WE'VE BROUGHT TOGETHER ADVOCATES OF BOTH POSITIONS TO PRESENT THEIR CASES, PRO AND CON. BOB KATZ, OF DIGITAL DOMAIN MASTERING, WILL TAKE THE AFFIRMATIVE, KEN KANTOR, OF VERGENCE TECHNOLOGY AND ANXIOUS HIPPIE MUSIC, THE NEGATIVE. GENTLEMEN, THE FLOOR IS YOURS.—MICHAEL RIGGS

by Ken Kantor

CON

Photograph: © Joseph Pluchino/Graphistock

All else being equal, 20-bit converters sound dramatically better than 16-bit,

and 24-bit converters slightly better still.



BOB KATZ IS AN AUDIOPHILE RECORDING ENGINEER AND PRESIDENT AND CHIEF MASTERING ENGINEER OF DIGITAL DOMAIN, ORLANDO, FLA. HIS RECORDING OF PAQUITO D'RIVERA'S BIG BAND WON THE 1996 LATIN-JAZZ GRAMMY AWARD.

If you want to learn about the sound of high-end digital audio technology, ask a professional mastering engineer. Day after day we slave over hot consoles, making careful A/B decisions about dithering (what flavor dither should we use today?), equalization (should it be IIR, FIR, or analog?), word length (is this new 32-bit processor really better than yesterday's 20-bit?), and sample rate (which sample-rate converter really sounds best?). Every decision is important to us, and our clients (the record companies and the artists) are concerned about the quality of sound we deliver to them.

When I began digital mastering in 1988, the digital audio art was just coming out of the dark ages. I built the first workable model of Bob Adams' (then of dbx) 128-times oversampling analog-to-digital converter and used it to engineer the world's first high-oversampled Compact Discs for Chesky Records. The latest version of this ADC, made by UltraAnalog, has a 5-bit front end that is capable of 20-bit (120-dB) dynamic range when its output is decimated down to the CD sample rate. All high-quality audio A/D converters made today are oversampling designs, and this has made a big contribution to the exponential improvement in CDs since 1988.

### The Second Digital Audio Revolution

I mark 1993 as the beginning of the second digital audio revolution. Before then, I was recording direct to 16-bit with pink-noise dither added in the analog domain. (Dither is used to linearize quantization and enable signals at levels below -96 dBFS to remain audible.) Around 1993, engineers began recording at 20 bits, which sounds



wonderful in the studio, and trying to find ways to get that sound quality to the consumer. Pretty tough job. Engineer Keith Johnson compares the task of fitting 20-bit sound into 16 bits to rolling a bowling ball down a garden hose.

So we began using high-resolution noise-shaped dither, which allows us to get more of that 120-dB dynamic range to you. That doesn't mean we've increased the ratio of forte to piano on typical CDs (though I'd like to). But this small change in noise at the lowest levels has improved the sense of ambience, space, warmth, depth, and separation on our CDs. This is audible even at normal listening levels, with almost any kind of music. In that respect, CDs made today sound much better than those made in 1983, or even 1990.

Some skeptics may find it hard to believe that so little a change in noise makes so much difference. Listen for yourself: Compare two CDs whose only technical difference is in how they were dithered. Both were made in a transition period before we began to record 20-bit. The original session tapes are 16-bit (DAT), all from the same recording session. The first CD, *Clark Terry Live at the Village Gate* (Chesky JD49), was produced using simple pink-noise dither, which was applied twice, first during recording and then during post-production. The second CD, *Clark Terry, The Second Set* (Chesky JD127), was made with pink-noise dither during recording and high-resolution noise-shaped dither in post-production. The second CD sounds dramatically warmer, with a wider, deeper soundstage and ambience, all because we used differently shaped noise at a nominal -96 dBFS! I promise that no equalization was used on either recording, though you'd think they were made with different microphones or in a different hall. If only we could completely remove the veil of 16-bit dither and present an original 20- or 24-bit recording to you. That is the promise of DVD.

Every day in my control room, I have the pleasure of auditioning high-resolution, 20- to 24-bit

*Continued on page 30*

# counterpoint



KEN KANTOR IS CO-FOUNDER AND CHIEF TECHNOLOGY OFFICER OF VERGENCE TECHNOLOGY, INC., A MAKER OF HIGH-PERFORMANCE STUDIO RECORDING EQUIPMENT, INCLUDING THE NHT PRO LINE OF MONITOR LOUDSPEAKERS. A FREQUENT CONTRIBUTOR TO AUDIO, KEN HAS AN EXTENSIVE BACKGROUND IN ELECTRONIC AND ACOUSTIC ENGINEERING AND CAN BE READ ONLINE AT [WWW.E-TOWN.COM](http://WWW.E-TOWN.COM).

Nobody who knows what he is talking about would ever claim that 44.1-kHz, 16-bit audio is a major limiting factor in home playback fidelity. A lot of work went into choosing a standard that is, for all intents and purposes, flawless in this situation. In the home, the playback level is adjusted by the user's volume control, and so 90+ dB of signal-to-noise ratio reaches far beyond any musical needs—especially considering the domestic ambient-noise floor. Bandwidth is not a limitation, either. The audio signal will most likely undergo only one D/A conversion, and even three or four would not be an issue. All the junk you hear about quantization and low-level detail is spewed by people who haven't a clue what Nyquist math really says about signal reproduction (or they do but are trying to sell something anyway).

Even so, no one who is well-informed would claim that 44.1-kHz, 16-bit audio is totally transparent under all conditions. It is easy to come up with artificial signals and conditions that will

highlight various limitations and artifacts. This doesn't mean they are any kind of problem in the home, but they sure can be in the studio. When recording, an engineer doesn't have the luxury of adjusting volume on the fly. Headroom is a necessity. And with the mixing and processing of many channels, 16 bits just doesn't cut it. It is usable, but it isn't easy or fun. Going to 18 bits is a big improvement, and 20 bits is an outright luxury, allowing total freedom in recording levels as well as complete processing and mixing flexibility.

As to 44.1-kHz sampling, that's more controversial. It should be okay, really, and is typically the sample rate of choice over 48 kHz, available in most studios, to make things easier to send to CD. But it does demand careful filter design, and everyone secretly wishes it were up at least around 60 kHz, just to be sure.

Well, then, it's settled, right? Technology has advanced, memory is cheap, and we can have a wonderful audio medium by moving from the current standard up to a 60-kHz, 20-bit system. Hell, we can even go to 88.2 kHz (double the CD rate) to make the changeover simpler. Recording engineers will be thrilled, audio purists will be placated (at least the sane ones), and we'll need only a little more than twice the amount of storage space we use now. Plenty of room left for multichannel. I'm there, dude!

Oh yeah? Well, then, what's up with 96/24? It certainly is unjustified sonically, and it seems a little extreme even for marketing hype. Not only does it pointlessly burn up more storage space, it makes studio processing equipment and computer hard-disk-based recording systems a total nightmare. Affordable high-end consumer digital recording or performance-oriented computer sound cards? Guess. "Big Audio" doesn't like just how good inexpensive digital recording and playback equipment is getting. Pushing for 96/24 seems downright greedy to me, if the motive is really planned obsolescence.

Recently I was discussing this issue with a well-known recording engineer/producer friend of mine. I was also adding the angle that a big incentive behind 96/24 is the fear that the mechanical/

*Continued on page 31*

Pushing for 96/24 seems downright greedy to me,



if the motive is really planned obsolescence.

**E**ven  
16-bit/44.1-kHz  
recordings can  
exhibit more  
life and purity



if properly  
reprocessed  
and reissued  
in 20-bit/  
88.2-kHz format.



*Continued from page 28*

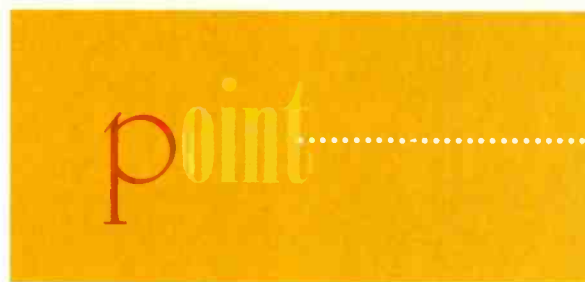
recordings. True 24-bit dynamic range (144 dB) is not achievable with current A/D or D/A converters; jitter and thermal noise limit even the best to around 20 to 21 bits (on a good day). But there is some resolution below 20 bits. Thus, all else being equal, 20-bit converters sound dramatically better than 16-bit and 24-bit converters slightly better still. I cut about a CD a day, and each day is a clear demonstration: It takes at least 20 bits to capture the full ambient and spatial qualities from our mixes.

But what about 24-bit? Robert Stuart of Meridian Audio reminds us that it is possible to hear a 24-bit truncation in an 18-bit reproduction system. Working with a 16-bit reproduction system, I have clearly heard 20-bit truncations. So everything has to be done right. Intermediate DSP operations must be performed at 24-bit or better accuracy to maintain purity of tone when the final product is to be 16 to 20 bits. This illustrates the concept of professional headroom.

However, there is some justification to reducing a 24-bit signal to 20 at the end of the chain, because consumer D/A converters seldom exceed 20-bit precision. You probably will get better sound from such converters if they are fed signals that have been dithered down to 20 bits than if they are presented with raw 24-bit signals that they then truncate during conversion. I don't think I can hear the difference between a 24-bit source and 20-bit, noise-shaped reduction of it, but I can clearly hear a dithered reduction to 18 or 16 bits. So I don't see any reason to get into a war over 24 versus 20 bits. I have no doubt, however, that we need at least 20 bits; 16 is not enough.

### **The Third Digital Audio Revolution**

Recently a digital equalizer was introduced that employs double-sampling technology. It accepts up to 24-bit words at 44.1 or 48 kHz, upsamples the signal to 88.2 or 96 kHz, performs 32-bit EQ calculations, and then resamples the output back



to 24 bits at 44.1 or 48 kHz. I was very skeptical, thinking that these heavy calculations would degrade the sound, but the equalizer won me over. Its low distortion gives the midrange an open sound. The improvement is measurable and quite audible—more, well, *analog* than I've heard from any other digital equalizer.

Which brings us to the third digital audio revolution: calculation and recording at higher sample rates. No, we haven't magically developed ultrasonic hearing capabilities, but there is good scientific foundation for improvement. In a white paper on the subject, Dr. James A. (Andy) Moorer, Sonic Solutions' senior vice president for advanced development, explains that, in general, "keeping the sound at a high sampling rate, from recording to the final stage will... produce a better product, since the effect of the quantization will be less at each stage." In other words, because errors are spread over a much wider bandwidth, we notice less distortion in the band from 20 Hz to 20 kHz. Sources of such distortion include cumulative coefficient inaccuracies in filter (EQ) and level calculations.

Moorer also points out that the improvement afforded by high sampling rates "is a binaural (two-ear) phenomenon. If we plug one ear, it is unlikely that anyone would be able to distinguish a 96-kHz recording from a 48-kHz recording;... some kind of time-domain resolution between the left and right ear signals is more accurately preserved at 96 kHz." And he notes that because of the errors in the decimation stages of typical consumer D/A converters, "on the average, it is likely that a consumer-quality 96-kHz converter will sound better than a consumer-quality 44.1- or 48-kHz converter, simply because it might be built with one less decimation/quantization stage." (For a copy of Moorer's paper, contact Chris Kryzan via e-mail at kryzan@sonic.com.)

The sonic improvements from recording at 96 kHz are not as dramatic as from an increase in word length, but they are important enough, in my opinion, to justify using more storage space on the consumer DVD. Mike Story, chief engineer



of dCS, has given other reasons why 96-kHz sampling can sound better than the current standard. In a paper presented at the 96-kHz mastering workshop at the 103rd Convention of the Audio Engineering Society, Story also focused on binaural and localization improvements. He demonstrated that relaxed anti-alias filtering constraints (e.g., Nyquist filtering at 48 kHz instead of 22.05 kHz) result in better spatial resolution. He said that the energy spread of digital filters designed for 48 kHz produces an equivalent distance smear of  $\pm 15$  centimeters (at the speed of sound), whereas digital filters designed for 96 kHz keep almost all the filter dispersion within a very tight 1.5 centimeters. (Copies of this paper are available via e-mail from [mstory@dcsLtd.co.uk](mailto:mstory@dcsLtd.co.uk).)

### Good News on Disc Capacity

And there's good news with regard to storage capacity, provided the DVD Forum heeds Bob Stuart's advice. Stuart and the late Michael Gerzon showed that a combination of lossless compression, noise shaping, and pre-emphasis can significantly reduce the storage requirements for 96-kHz audio at no sacrifice to sound quality. Since this subject was covered extensively by Stuart himself in the April issue of this magazine, I'll summarize simply by noting that appropriate application of these techniques would enable more than 74 minutes of five-channel, 24-bit, 96-kHz audio to be packed onto just one side of a DVD-Audio disc.

And the good news doesn't stop there. Remember the lesson of the improved Clark Terry CD? Record companies are sitting on a new gold mine. Even old, 16-bit/44.1-kHz session tapes can exhibit more life and purity of tone if properly reprocessed and reissued on a 20-bit, 88.2-kHz DVD-Audio disc.

I will continue to advocate higher-resolution digital recording and processing and to practice what I preach. The benefits are apparent on many currently available CDs, and you may not have to hold your breath much longer to hear even better sound in the home. A



CON

*Continued from page 29*

optical media and gear manufacturers have of solid-state memory. After all, we are getting ever closer to the point where you can fit a CD's worth of 44/16 on a chip. Easy to manufacture, no transport needed. Where would this leave the billions (trillions?) of dollars the Sonys and Philipses of the world have invested in optical media development? If you were in the disc business, wouldn't you want to up the ante? The more memory you can hog, the safer your technology is. Mere 44/16 or 88/20 would look downright low-fi to the consumer. Optical would stay atop the alleged quality heap.

But my friend offered an interesting alternative view. As a person who makes his living producing audio "content," he was telling me how annoyed producers were at the introduction of the CD. Used to be, you got paid for a finishing an LP with maybe 20 minutes of music a side. All of a sudden, people expected an hour of sound. But since production budgets didn't go up proportionately, producers got paid the same to do 50% more work. Now there's DVD, and people expect even more playing time. A movie lasts 90 minutes or more—why should I pay for only 60 minutes of music? Producers are dreading this. Bands are dreading it. Solution: Waste bandwidth. Fill up that disc with extra bits, and tell people they are getting better quality.

I say: BS! Whatever the reason, or reasons, behind 96/24, it is a dumb idea, and you might have to pay for it. But you shouldn't want to. Instead of moaning about Divx, which is bound to go down in flames on its own, watch out for the digital excess of 96-kHz/24-bit audio, an equally anti-consumer concept you may well be forced to live with forever. A

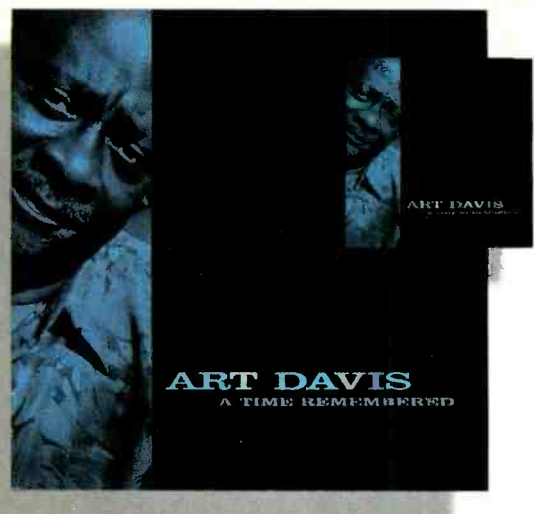
If you were in the disc business, wouldn't you want to up the ante?

The more memory you can hog, the safer your technology is.

When I look back over the years, the audio industry has not had a particularly distinguished track record with respect to format launches. I can remember speaking with engineers when the Compact Disc was introduced at a Consumer Electronics Show in the early '80s and learning that none of them owned a decent stereo system or had spent much time doing critical listening using high-end components. Digital Audio Tape (DAT) was introduced without any attempt to demonstrate its superior sound quality. To this day, the few demonstration tapes and commercial recordings available in this format tend to be musically bland and sonically mediocre. And recent years have seen the introduction of THX, Dolby Digital (AC-3), and DTS without any rigorous comparative listening tests beyond the sort that are carefully controlled by equipment manufacturers or the owners of the process. Even now, there is only a minimal amount of high-quality musical program material that an audiophile can use to make comparisons between Dol-

cautioned that these discs are playable *only on DVD players*; they are *not* compatible with conventional CD players.—A.L.)

Let's begin with the Classic Records releases. I received a set of four 96-kHz/24-bit DADs (available at \$32 each from Classic Music Direct, 800/457-2577) plus a sampler CD, and the same samples on 45-rpm vinyl records. This



## First Impressions of the 96-kHz/24-Bit Stereo Music DVDs from Chesky and Classic Records

by Pro Logic, Dolby Digital, and DTS. Most of the music encoded in these processes has been subjected to so much complex mixing, and uses so many electronic instruments or surround effects with arbitrary implementation of the low-frequency effects (LFE) channel, that any appraisals of sound quality must be largely intuitive.

This is not the case, however, with the first 96-kHz/24-bit music recordings recently released on DVD by Chesky and Classic Records. (Chesky calls its sampler recording a "96/24SuperAudioDisc," whereas Classic Records refers to its disc as a "24/96 DAD.") Both companies also have existing CD versions of the same recordings, thus enabling direct comparisons with the new 96-kHz/24-bit discs. Each provides samples of clean, well-produced music with natural instrumental sound. And both labels include different kinds of music for critical listening. In fact, Classic Records has gone one step further, supplying 33 $\frac{1}{3}$ - and 45-rpm analog vinyl LPs in addition to the CD and 24/96 DAD versions. (*Editor's Note:* Passionate audiophiles eager to obtain their first 96-kHz/24-bit audio recordings should be

made comparative listening easy, particularly since I already owned commercial CD and LP releases of some of the material.

The first Classic 24/96 DAD release, Art Davis's *A Time Remembered* (DAD 1001), is an excellent jazz recording with Herbie Hancock on piano, Ravi Coltrane on saxophone, Marvin "Smitty" Smith on drums, and group leader Art Davis playing bass. This modern jazz was recorded on two-track analog tape in 1995. While the matching selections on the 45-rpm record and the CD provide excellent sound quality, the sound of the 96-kHz/24-bit DAD is noticeably cleaner than the CD, with better percussion detail, a more realistic brass sound, better low-level and harmonic detail on the piano, and a slightly tighter bass viol. The sound of the DAD is very close to that of the record, but the DAD has the virtue of no surface noise, which is not true of the record. The 45-rpm platter has slightly more low-level detail if you are willing to listen through the added surface noise, but the 96-kHz/24-bit DAD has more accurate instrumental timbre, more consistent highs, and is noise-free.



96/24 on DVD

The percussion tracks on the 45-rpm record and the CD version deliver very good sound quality, but can't compete with the 96-kHz/24-bit DAD.

The second Classic Records DAD, *Pulse* (DAD 1002), includes portions of two avant-garde percussion albums performed by the New Music Consort. Represented are works for percussion and strings by composers John Cage, Lou Harrison, Henry Cowell, Harvey Sollberger, and Lukas Foss. The recordings were originally made in 1990 on two-track analog tape at 15 ips by Tony Salvatore and Paul Goodman. Once again, the matching cuts on the 45-rpm record and the CD version deliver very good sound but cannot compete with the 96-kHz/24-bit DAD. Percussion detail is much cleaner on the DAD than on the CD, and there is more harmonic and ambient information. The bass is faster and cleaner on the DAD, and the cymbal sounds musically natural—something that CD seems unable to capture. The analog LP has surprisingly good bass and low-level detail, but the upper-octave delineation is not quite as clean or as natural as the DAD's. And the DAD's absence of surface noise often contributes a great deal to the listening experience. I like the record more than the CD, but I'll take the DAD over the record.

**A**nother 96-kHz/24-bit disc, Red Rodney's *1957* (DAD 1003), was (as you might guess) recorded in 1957. This is classic jazz, with good trumpet, piano, tenor sax, and percussion. I like the music, but I do not find the sound quality to be all that special. The DAD



**RED RODNEY**  
**IRA SULLIVAN**  
**RED RODNEY**  
**TOMMY FLANAGAN**  
**RED RODNEY**  
**OSCAR PETTIFORD**  
**RED RODNEY**  
**PHILLY JOE JONES**

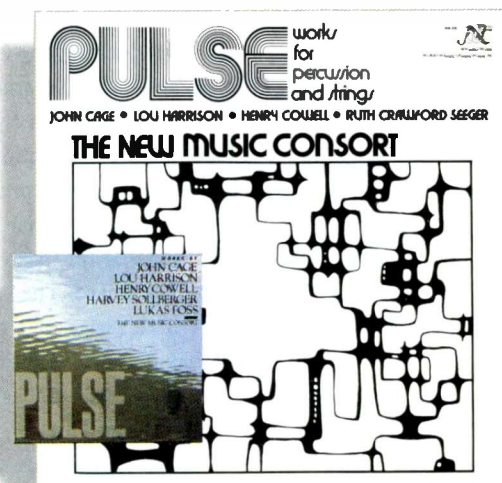
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**IRA SULLIVAN**  
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**TOMMY FLANAGAN**  
**OSCAR PETTIFORD**  
**RED RODNEY**  
**PHILLY JOE JONES**

version is a bit cleaner than the CD (and, of course, has no surface noise), and its soundstage and imaging are a little better defined than the CD and LP. Nevertheless, I suspect that analog fans who have learned to listen through surface noise might stick with their turntables if they could get the entire performance on a 45-rpm record. The vinyl seems slightly more dynamic, perhaps because my cartridge adds a touch of euphonic dynamic energy to the original recording.

The fourth DAD from Classic Records is a great audiophile recording: Rachmaninoff's *Symphonic Dances and Vocalise* (DAD 1004), with the Dallas Symphony Orchestra conducted by David Johanos. Originally made on two-track analog tape at 30 ips by David Hancock, it was issued on vinyl in 1967 by Vox/Turnabout. I still have the original as well as two remasterings. The irony is that I have often used the 1967 Turnabout LP to show that analog can still sound better than CD. Now I have a DAD version that is much better than the CD, which shows that digital can be directly competitive to the LP and superior in a number of ways.

**T**here isn't much reason to discuss the CD. The DAD is cleaner and has tighter and more dynamic bass, more low-level detail, better soundstaging and depth, and a more natural upper midrange. The DAD also has more natural and less compressed dynamics than the original 33 $\frac{1}{3}$ -rpm record, although the excerpt on the Classic Records 45-rpm remastering is very competitive. The DAD provided cleaner, tighter, and more realistic deep bass than the LP in the opening bass-drum passages, equally natural soundstage ambience, and more detail in massed instrumental passages. There were other sections where I still preferred the sweetness and midrange dynamics of the 33 $\frac{1}{3}$ -rpm LP. I suspect, however, that in such instances the timbre, low-level detail, and musical dynamics of the DAD were more accurate and that I chose euphony over accuracy. The DAD's treble was also cleaner than the 33 $\frac{1}{3}$ -rpm LP's when I compared it with matching passages on inner grooves of the record. The 45-rpm excerpt again was much more competitive, but the surface noise . . .

The first Chesky Records 96-kHz/24-bit DVD, *The Super Audio Collection & Professional Test Disc* (CHD-

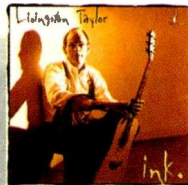


## On DVD, Rebecca Pidgeon's voice has the sweetness and harmonic integrity found on the best analog recordings.

VD171), is available from regular record stores at \$29.98 or directly from Chesky (800/426-8576). This sampler represents the state of the art in DVD audio recording technology, whereas the Classic Records releases demonstrate DVD's archiving capability. The sampler was made directly from Chesky's 96-kHz/24-bit master tapes, and most of the music on it can be immediately compared to various Chesky CDs, which, of course, are conversions from the 96-kHz/24-bit master tapes to the 44.1-kHz/16-bit CD standard. The Chesky sampler also has an extensive range of test tracks, though they involve tests that are of little interest to most consumers.



Several tracks demonstrate the strengths of the Chesky 96-kHz/24-bit DVD relative to the conventional CD. Track 1, "Brick House" by Sara K., has some excellent percussion. The 96/24 DVD is full of ambience and life and is cleaner and tighter than the CD version (Chesky JD165). On track 2, Livingston Taylor sings "Isn't She Lovely," an excellent recording of male voice made with classic simplicity. The DVD



is cleaner and better defined than the CD (Chesky JD162), from the opening passage of whistling to the end of the song. Listen to this passage once, and you are never going to be fully satisfied with CD again.



There are two jazz selections, one by Jon Faddis (track 3) and one by the John Basile Quartet (track 7). Both demonstrate the superior detail and life of the 96/24 DVD relative to the CD, but the music by Basile's group provides some of the nicest soundstage detail around.

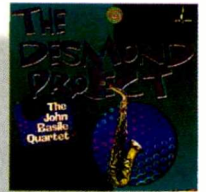
Drum music by Babatunde Olatunji (track 5) may initially seem more live on the CD version (Chesky WO160) until you listen carefully to the 96/24 DVD and hear the superior range of dynamic contrasts and added realism. A warning, however: If you have the kind of speaker that sounds best at one volume level, the 96/24 DVD may not sound better relative to a CD with more compressed dynamic range. The DVD is remarkably free of any compression, and you really need a speaker that

performs equally well at low to very loud listening levels. Similarly, you want silent electronics, the quietest room possible, and no mechanical noise. The 96/24 stereo DVD exhibits more true dynamic range than any CD or conventional DVD that I have heard.

There are two selections by Rebecca Pidgeon (tracks 4 and 8) that I find difficult to be objective about. I was stationed in Scotland some years back, and Pidgeon has a great voice and sings the kind of Scottish ballads that make you reach for a single malt. I did, however, find the DVD to be kinder to the female voice than the CD (Chesky JD165). On DVD, Pidgeon's voice has the kind of sweetness and harmonic integrity that female voice has on the best analog recordings but that always seems slightly flat and hard on CD.



Finally, on track 9, there are excerpts from David Chesky's *Three Psalms for String Orchestra*. I would have liked material with more string bite and dynamics, but Psalm II is a lovely piece of music and the DVD does a notably better job with massed passages of strings than the matching CD (Chesky CD163). The differences are not as immediately apparent as on some of the other DVD/CD comparisons I have discussed, but I suggest you listen to the DVD version and then switch back to the CD. Once again, the DVD is definitely superior.



Both Chesky and Classic Records have a wide range of 96-kHz/24-bit recordings coming this summer and fall (for example, Chesky is planning to release all of the aforementioned Chesky titles on 96/24 DVDs), and Mobile Fidelity has announced a forthcoming demo disc. I can only hope that the other contenders in the format wars provide music and comparative software this good. The last thing we need in music is the kind of mess that has developed in home theater, with competing formats (e.g., Dolby Digital versus DTS) landing in the market with software incapable of providing a solid basis for judging their respective merits. Past history has shown that virtually any company can write a convincing white paper before a new format is introduced. It has also demonstrated that few have made a real, audible advance in the quality of musical recording. **A**

# SONIC NIRVANA



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EDWARD J. FOSTER

# YAMAHA DSP-A1 A/V AMPLIFIER



**T**welve years ago, Yamaha introduced a revolutionary product called the DSP-1, a six-channel digital sound-field generator. Although there were many ambience-extraction and reverb devices on the market at the time, the DSP-1 was the first that attempted to replicate, in the home listening room, sound fields that had been measured in real concert halls, churches, jazz clubs, and the like. To do this, it fed delayed and recirculated signals to six speakers, strategically placed around the listening room, duplicating the early and late wall reflections that occurred in the original environments. Coming up with the appropriate signals took a good bit of computational horsepower, which was provided by Yamaha-designed DSPs—an acronym that this manufacturer defines as Digital Soundfield Processor rather than the more common

digital signal processor, even though its DSP chips do both.

The original DSP-1 was incredibly flexible. If you had six speakers and power amps, you could simulate just about any sound field you could imagine, from the sublime to the ridiculous. I'm not sure many people ever fully mastered the DSP-1, but they didn't have to. It came preprogrammed with quite a few simulations that you could use instantly or tweak if you wanted to. With the current popularity of home theater, lots of people are using at least four speakers, lots more want to add more speakers and more amps, lots of competitors have aped the DSP-1 (most cutting corners here and there), and now Yamaha has come out with the DSP-A1.

Whereas the DSP-1 was simply an add-on sound-field processor, the DSP-A1 is a full-fledged A/V integrated amplifier that

replaces Yamaha's highly respected DSP-A3090 (*Audio*, July 1996). In this one rather hefty box are five 110-watt/channel power amps for three front and two surround channels and dual 35-watt amps for a pair of "front effects" speakers. Yamaha recommends using front-effects speakers to augment the sound field's height and, more importantly, its depth. In certain operational modes, these extra speakers (which should be placed high and to the outside of the main pair) are fed a DSP-concocted blend of the original signals. If you choose not to use all seven of the speakers the DSP-A1 provides for, it can be set up to fold the DSP-processed front-effects signals into the left and right front channels.

According to Yamaha, though the DSP-A1's amplifiers are more powerful than those in the DSP-A3090, their topology is

**THE DSP SYSTEM  
DELIVERS  
EXCEPTIONAL REALISM  
AND EXCEPTIONAL  
FLEXIBILITY.**

similar, to ensure high dynamic power into low-impedance loads (rated as 340 watts per channel into 2 ohms, 240 watts per channel into 4 ohms) and a uniform damping factor. (Regular readers of my reviews know that I consider the latter point particularly important.) Other improvements

**Rated Output:** Main, center, and surround channels, 110 watts/channel into 8 ohms at 0.015% THD, 20 Hz to 20 kHz; front effects channels, 35 watts/channel into 8 ohms at 0.05% THD, 1 kHz.

**Dimensions:** 17½ in. W x 7½ in. H x 18½ in. D (43.5 cm x 19.1 cm x 47.3 cm); with side panels, 18½ in. W (47.3 cm).

**Weight:** 50.6 lbs. (23 kg); with side panels, 55 lbs. (25 kg).

**Price:** \$2,599 in black or \$2,799 in gold with wood end panels.

**Company Address:** 6660 Orangethorpe Ave., Buena Park, Cal. 90620; 714/522-9105; [www.yamaha.com](http://www.yamaha.com).

vis-à-vis the DSP-A3090 include the use of 24-bit rather than 20-bit D/A and A/D converters, a higher oversampling rate (128X) for the A/D converter, and a number of new sound fields.

Indeed, the DSP-A1 has more sound fields based on real environments than any other product I can think of. It has 18 "Hi-Fi DSP" programs intended for pure listening: disco, party, and game/amusement modes as well as simulations of four European concert halls, a U.S. concert hall, a large round concert hall, three churches, three jazz clubs, and three rock-concert

**YAMAHA'S DSP-A1 AMP  
HAS MORE SOUND FIELDS  
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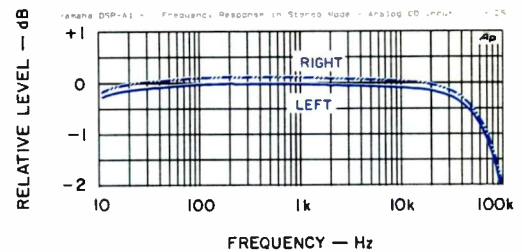
venues. There are a dozen "Cinema DSP" modes, which are meant for A/V programming: Four are optimized for concert videos, two ("Movie" and "Variety Sports") are aimed at TV viewing, four are "Movie Theater" modes, and two are devoted to "Normal" and "Enhanced" Dolby Pro Logic and 5.1-channel (Dolby Digital or DTS) decoding. The 5.1-channel mode uses what Yamaha calls "Tri-Field Cinema DSP," which generates separate sound fields, each with different characteristics, for the front left, center, and right speakers and for each of the surround speakers.

If you feel adventurous, you can tinker with the sound-field parameters for a program and store your own setup. Depending on the program you've selected, the variables could include effects level, initial delay (with separate settings for the front and surround fields), surround delay, room size (again with separate front and surround adjustments), room liveness (with separate adjustment for the surround field), reverb time, reverb delay, and reverb level. Going too far with these adjustments can produce some pretty bizarre results, but you can return any or all parameters to their factory settings quite simply. (If you want to check how far you've deviated from Yamaha's settings, you'll find the factory-set parameters in the DSP-A1's excellent owner's manual.

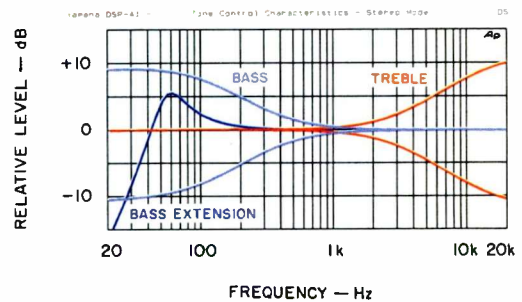
Technology enthusiasts will be particularly impressed with its signal-flow diagrams.)

Surround sound works better if you're unconscious of the surround speakers' locations—as you are when you're in a movie theater, with multiple speakers arrayed along its walls. To accomplish this in home theaters, dipole speakers are commonly used and positioned so that they flank the viewers, who are then in the dipoles' nulls and hear only diffuse, rather than direct, sound from the surround channels. But the processing algorithm used in the DSP-A1's "enhanced" movie modes simulates the effect of an array of speakers lining the sides of the room, to re-create the movie house's surround sound field. To do this, the A1 generates "synthetic speakers," by feeding delayed and processed information to the surround speakers and to all five front speakers. Therefore, Yamaha says, all of these speakers should be conventional, direct-radiating types rather than dipoles or other "diffuse" radiators, because the digital processing the A1 uses to control in-room sound fields depends on good speaker imaging. Yamaha also recommends that the surround speakers be behind the viewers rather than on the room's side walls, which is usually more convenient than side-wall placement and should help increase the optimum viewing area's depth.

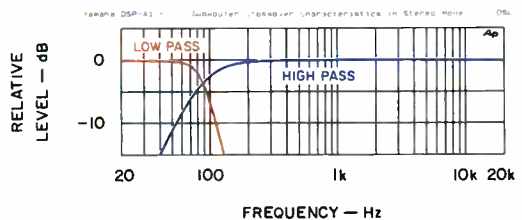
As I mentioned earlier, the Yamaha DSP-A1 decodes DTS 5.1-channel bitstreams as well as the more common Dolby Digital (AC-3) variety. In fact, the A1 is the first DTS product to cross my test bench. It's too soon to tell whether DTS encoding will prove successful in the DVD-Video market. Its proponents claim it can deliver better sound than Dolby Digital because it uses less compression, but the resulting higher bit rate requires more bandwidth and storage capacity than Dolby Digital soundtracks. There is a small but increasing number of DTS music CDs



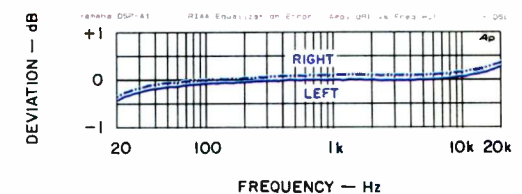
**Fig. 1—Frequency response, stereo mode.**



**Fig. 2—Tone-control characteristics and effects of "Bass Extension" circuit.**

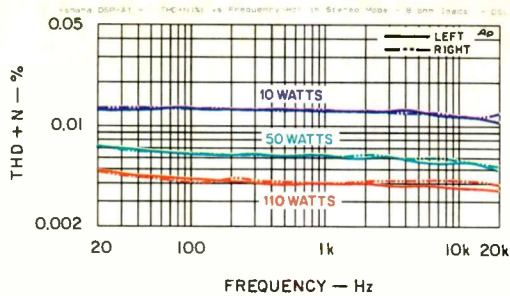


**Fig. 3—Subwoofer crossover characteristics.**

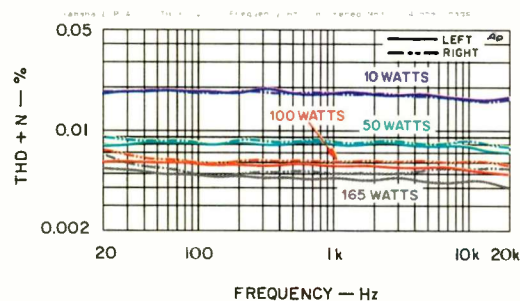


**Fig. 4—RIAA equalization error.**

around, however, and a reasonable number of DTS-encoded laserdiscs for movie buffs. (The DTS sound is carried on the PCM tracks of a laserdisc, which means Dolby Pro Logic can be used only on the inferior analog tracks of those laserdiscs). Should DTS prove as successful as its backers hope, the A1 will be ready for it. It will also be



A



B

Fig. 5—THD + N vs. frequency in stereo mode for 8-ohm loads (A) and 4-ohm loads (B).

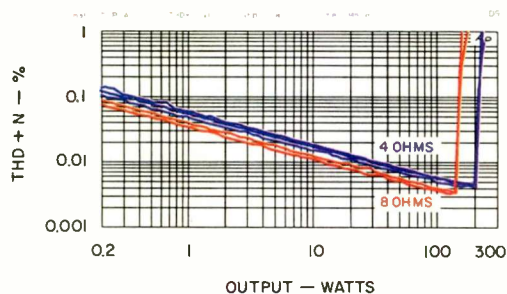


Fig. 6—THD + N vs. output in stereo mode.

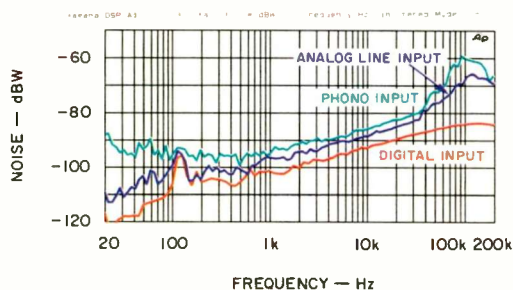


Fig. 7—Noise analysis, stereo mode.

ready for any new 5.1-channel formats that may arise, as it has 5.1-channel analog input jacks that can accept an external decoder. (Incidentally, although the A1 uses a Motorola 56009 chip for DTS decoding, Dolby Digital and Pro Logic matrixed sur-

round are decoded by Yamaha's own, newly developed YSS-249 LSI chip.)

Outputs are provided for two surround speakers and six front speakers: left, right, a pair of front effects, and *two* for the center. There are outputs for two center speakers so that you can flank your TV with them instead of placing one above or below it. When two are used, however, they're connected in series, so the center-speaker mode switch on the rear panel must be set properly. All speaker connections are made to color-coded multiway binding posts that are on standard, 3/4-inch, centers and will accommodate single or dual banana plugs. (Hear! Hear!)

Every channel also has line-level outputs, so you can hook up external power amplifiers if you wish. Power amp inputs are provided for three front channels and are normally coupled to the corresponding line outputs by removable links. The center channel has two line output jacks, enabling you to avoid the series connection established by the center-speaker mode switch (by using external power amps for two center speakers or by powering one of them with an external amp and using the internal center-channel power amp to drive the other).

Three line output jacks are provided for powered subwoofers. One is a conventional "Mono" jack; the other two, marked "Split," feed left front and left surround signals to the left subwoofer, right front and surround signals to the right sub, and signals from the center and LFE (low-frequency effects) channels to both subs.

The DSP-A1 has connections for a wide variety of program sources. For straight audio, there are RCA inputs for moving-magnet "Phono," "CD," and "Tuner" and record/play loops for two tape decks. The "CD" input has optical (Toslink) and coaxial digital connections, too, and one tape loop ("MD/Tape 1") has Toslink inputs and outputs as well as ana-

log—handy for dubbing digital audio to DAT and CD-R as well as to MiniDisc. Very nice!

The Yamaha amp also handles six A/V sources, one ("Video AUX") via front-panel jacks and the other five via rear-panel connections. Three of the six have recording as well as playback jacks. The DSP-A1 also has Toslink optical audio inputs for the source labeled "DVD/VCR 3" and two A/V sources; the first and one of the other two also have coaxial digital connections. An additional RCA jack can be used for the RF AC-3 signals from laserdisc players that are equipped to play Dolby Digital soundtracks.

Although all of the RCA jacks on the back are base metal (those up front are



**DOLBY DIGITAL AND DTS  
ARE ON BOARD,  
AND JACKS PROVIDE  
FOR ANY FUTURE  
5.1-CHANNEL FORMATS.**

gold-plated), each and every video connection is provided in both composite- and S-video. Only one pair of video "Monitor" outputs is marked on the rear panel, but you can set the "DVD/VCR 3" output to act as a second monitor terminal with one of the DSP-A1's many, many setup adjustments. Three convenience outlets, two switched and one unswitched, complete the back panel.

Normally, all you can see on the DSP-A1's clean-looking front panel are the generously sized volume knob (with LED indicator), an almost equally large input selector, a button that toggles the "Tape 2 MON/EXT. Decoder," and a "Standby/On" button. Between the toggle switch and the power button is the display, which is remarkable for the clarity of its nomenclature as well as for its brightness. You can actually



read this display from across the room; that's fortunate because, as with most A/V components, you'll usually control the A1 from your armchair via the remote.

The Yamaha is also easier to control from its front panel than most A/V components.

**SURROUND SOUND  
WORKS BETTER  
IF YOU CAN'T TELL  
WHERE THE SURROUND  
SPEAKERS ARE.**

Its front looks simple, but lowering a hinged panel below the display exposes myriad buttons that set up and control most of the DSP-A1's extensive features. These buttons are accompanied by tone controls, a "Bass Extension" button, and a "REC Out" selector.

The sleek, silver learning remote also has a deceptively simple look. Only the controls you're likely to use on a regular basis are on its surface; the rest are behind a left-hinged door. Those that are normally accessible include a four-segment "Operation Control" group that navigates through the DSP-A1's on-screen menus, a split-ring "Master Volume" control with central "Mute" button, power switches (for your TV, VCR, and the A1), and a dozen buttons that are aligned along the remote's right edge. The top nine of these select the most popular program sources; the bottom three toggle the Tape 2 monitor and external decoder inputs on and off, select the phono input, and toggle sound-field processing (including DSP simulations, Dolby Pro Logic, Dolby Digital, and DTS) on and off.

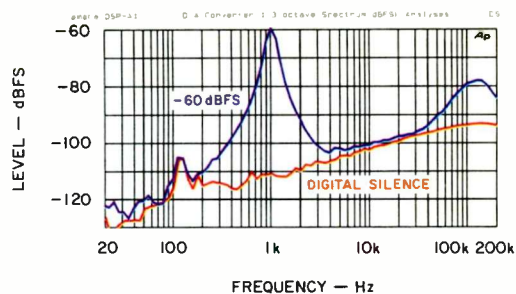
For use in the dark, the remote has Braille-like dot patterns that enable you to identify the top nine buttons along the right edge by touch. The lower three are distinguished by their lack of dot patterns and the other controls by their shapes. The selectors and "Operation Control" group glow briefly when you tap the "Light" bar on the side of the remote, and each selector glows momentarily when you press it, revealing the legend marked on its surface. At the same time, any of the "Operation Control" buttons that apply to the selected source also glow. Very neat!

There are too many controls behind the remote's door (which is double-hinged, to fold out of the way) to describe individually. Suffice it to say that a dozen select DSP programs, separate four-segment clusters control disc- and tape-based program sources, while others teach the remote the command sets of non-Yamaha gear. Still others program it with "macros," strings of commands that are issued in succession when you press a single button. A well-conceived macro can fire up an entire home theater and have it turn on in whatever mode you specify. (A switch at the remote's side determines the speed at which macro-based instructions are issued.)

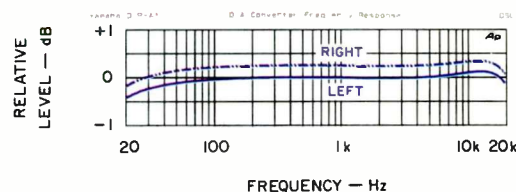
A slider on the right edge of the remote determines which disc- and tape-based sources are affected by the control clusters behind the door. One of the slider's positions is for Yamaha cassette decks and CD players; the other two positions are programmable (though one will control Yamaha laserdisc players if you don't reprogram it).

In addition to the analog tone controls behind its front-panel flap, the DSP-A1 offers digital timbre control, separately adjustable for each group of channels (main and center front, front effects, and surround). This so-called "Cinema EQ" function combines parametric equalization ("PEQ") with a shelving treble equalization ("High"), usable independently or together. Each offers a response change of +6 to -9 dB at your choice of 16 frequencies, from 1 to 12.7 kHz. The "PEQ" is actually semi-parametric, as its Q is fixed (at 1.85) although its gain and center frequency are changeable. The factory "Cinema EQ" settings ("PEQ" center frequency and shelving-EQ inflection point at 12.7 kHz, with "PEQ" gain at -4 dB and the shelving EQ at -3 dB) are apparently intended to emulate Home THX re-equalization.

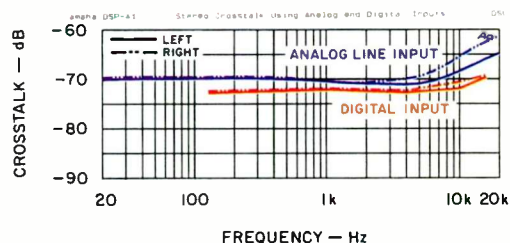
The DSP-A1 also has a constant-Q (0.7), five-band digital graphic



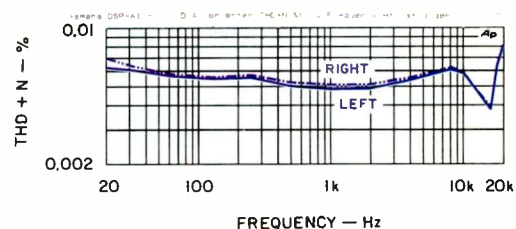
**Fig. 8—Noise analysis, D/A converter section.**



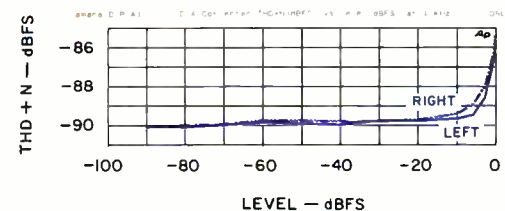
**Fig. 9—Frequency response, D/A converter section.**



**Fig. 10—Stereo crosstalk.**



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



**Fig. 12—THD + N vs. level, D/A converter section.**

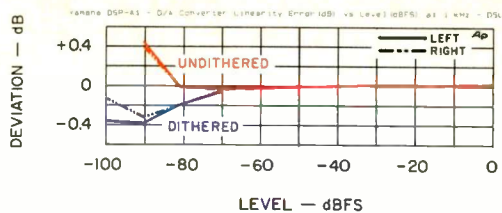


Fig. 13—Linearity error.

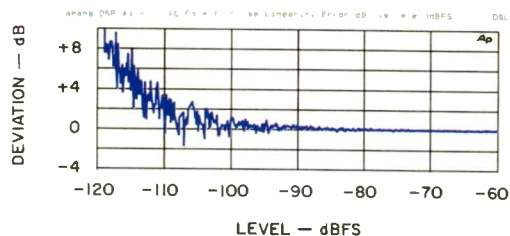


Fig. 14—Fade-to-noise test.

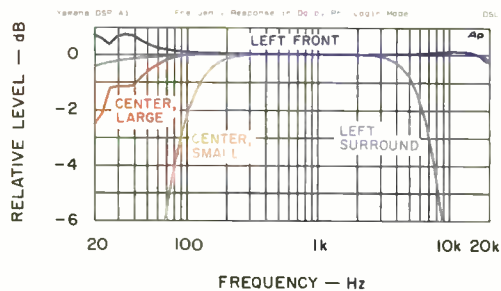


Fig. 15—Frequency response, Dolby Pro Logic mode.

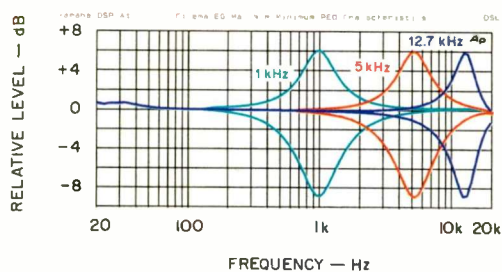


Fig. 16—Response of parametric equalizer for maximum cut and boost at lowest, middle, and highest frequency settings.

equalizer (“GEQ”) for the center channel. Equalization in each band (100 Hz, 300 Hz, 1 kHz, 3 kHz, and 10 kHz) is independently adjustable over a range of  $\pm 6$  dB. Both “Cinema EQ” and “GEQ” are set via on-screen displays that, considering the complexity of the adjustments being made, are quite simple to use. They can also be set, though less efficiently, from the front-panel

display, and the effects of these equalizers are elaborately charted in the owner’s manual.

### Measurements

In normal stereo, when none of the Yamaha’s many DSP effects are being used, analog input signals remain in the analog domain as they wend their way through the circuitry, and their bandwidth is not limited by the anti-aliasing and reconstruction filters used in conversion to and from the digital domain. I therefore used this mode to evaluate the basic performance of the analog circuitry (preamp and power amp).

When the Yamaha DSP-A1 is operated in unprocessed stereo, only the “Bass Extension” switch and rotary bass and treble controls can be used to alter frequency response (the various equalizers operate in the digital domain). You cannot switch out these controls to further flatten response, as I recall you could with most past Yamaha high-end amplifiers and receivers, but you wouldn’t know it from the A1’s response curves.

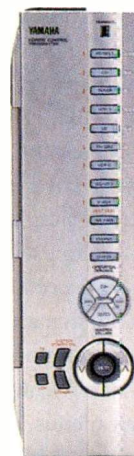
With the bass and treble controls set to their center detents and “Bass Extension” off, the DSP-A1’s frequency response (Fig. 1) is broad and uniform. From 20 Hz to 20 kHz, it’s within  $+0, -0.13$  dB, and the  $-3$  dB points lie below 10 Hz and above 110 kHz. The smoothness of the curves is particularly impressive, as nondefeatable tone controls often cause response humps or depressions. So although the A1 lacks a tone-control defeat switch, it’s one of the few products I’ve tested that doesn’t really need one.

The range of the analog tone controls is remarkably well balanced; each produces a maximum boost or cut of approximately 8 dB at my standard test frequencies of 100 Hz and 10 kHz. As you can see in Fig. 2, the bass control’s response shelves below about 100 Hz, while the treble shows little sign of shelving, even at 20 kHz. Yamaha’s “Bass Extension” circuit is really an under-

damped high-pass filter that boosts main-channel response at 60 Hz by 5.5 dB and removes energy below that frequency at a rate of approximately 15 dB/octave so the boost won’t cause speaker overload. This would seem most useful with medium-sized speakers that have rated bass cutoff frequencies of 50 to 60 Hz; with large speakers or with small speakers plus subs, you probably won’t need the 60-Hz boost or want the cut below it.

Figure 3 shows subwoofer crossover characteristics with the DSP-A1 set up for “Small” left and right front speakers. These curves are for stereo mode, but they’d be the same in the surround modes for the crossover between the subwoofer and any channel that’s set up to use a “Small”

The DSP-A1’s remote has buttons that glow when touched.



**YOU CAN PROGRAM THE REMOTE TO PERFORM A STRING OF ACTIONS WHEN YOU PRESS A SINGLE BUTTON.**

speaker. The crossover characteristics fulfill Dolby Labs’ requirements; the filter characteristics (Butterworth) and slopes (12-dB/octave high-pass, 24-dB/octave low-pass) also adhere to Lucasfilm’s dicta for Home THX certification.

The DSP-A1’s RIAA equalization (Fig. 4) is not the flattest I’ve measured, but it’s not bad. The input circuit provided a classic termination for a cartridge, although the shunt capacitance was on the high side. The phono section’s sensitivity was fairly typical, its overload point more than adequate, and its noise level also pretty decent. (See

“Measured Data” for details.) All in all, the A1 contains a fine phono preamp for this type of product.

The main power amps are pretty impressive, too. From the evidence, I surmise that Yamaha uses traditional Class-AB topology in this amp. The trick circuits some amplifier makers use to increase efficiency often

yield strange distortion characteristics, but there are no signs of those here. And even without tricks, the DSP-A1 ran reasonably cool on my test bench and in my listening room.

The Yamaha’s total harmonic distortion plus noise (THD + N) versus frequency is remarkably uniform over the full spectrum, at all power levels, using 8-ohm loads (Fig. 5A) or 4-ohm loads (Fig. 5B). I ran the 8-ohm tests at output levels of 10, 50, and the rated 110 watts per channel. As output level increases, distortion drops, which suggests that the DSP-A1’s THD + N is more noise than distortion. For the 4-ohm curves, I took measurements for 10, 50, 100, and 165 watts per channel. (The last is the 4-ohm “rating” I assigned, based on my tests of this amp’s clipping power). Although the distortion is slightly higher with 4-ohm loads, it’s remarkable how small the difference is. (And note that the maximum distortion I measured at rated power into 8 ohms is less than 0.005%, only a third as much as Yamaha specifies.) The curves in Figs. 5A and 5B suggest that the A1’s amplifiers are equally adept at all frequencies and into any reasonable load. Hats off!

Figure 6 shows THD + N versus output level. I used test frequencies of 20 Hz, 1 kHz, and 20 kHz, but the curves are so close together that labels for them wouldn’t have been readable. This further confirms that the THD + N is essentially independent of frequency at all power levels. And note how smoothly it drops with increasing output, reinforcing the conclusion that there’s more noise than distortion here.

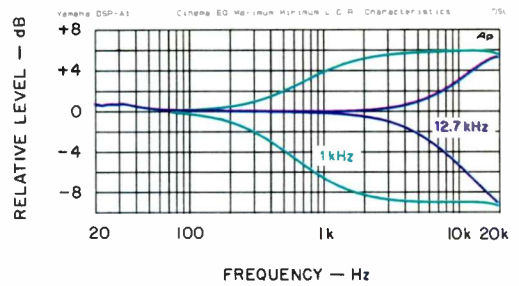
The 4-ohm “rating” of 165 watts/channel that I derived for the DSP-A1 was based on the curves in Fig. 6. The output clipping point with 8-ohm loads is 155 watts per channel, 1.5 dB greater than Yamaha’s 110-watt/channel rating. With 4-ohm loads, the Yamaha’s power amplifiers clipped at 235 watts (23.7 dBW); lowering this by the same 1.5-dB factor yielded an output “rating” of 22.2 dBW, or 165 watts per channel, with 4-ohm loads.

On a “dynamic” basis, far more output power was available: 180 watts per channel with 8-ohm loads, 280 watts per channel into 4 ohms, and a substantial 390 watts per channel into 2-ohm loads. Because Yamaha rates output only with 8-ohm loads, dynamic headroom can be calculated only for that impedance. It turned out to be +2.1 dB, which I’d say supports Yamaha’s claim that the DSP-A1 can deliver high levels of dynamic power.

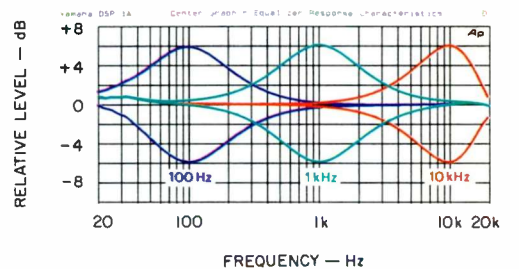
The DSP-A1’s damping factor was in excess of 400 at 50 Hz but fell to 111 at 20 kHz. Even so, damping factor and dynamic range were exceptionally constant with frequency.

On a more mundane front, the DSP-A1’s input overload (important when using digital effects) was an unusually generous 9 volts. Pressing the “Mute” button dropped the level 19.8 dB rather than cutting it off altogether; many people prefer that, because partial muting is less likely to make you wonder why the sound went dead. Channel balance taken at an analog input was within  $\pm 0.06$  dB, which is great. Considering the analog “CD” input’s high impedance and overload point, the Yamaha’s A-weighted output noise level (-80.2 dBW) strikes me as being quite respectable.

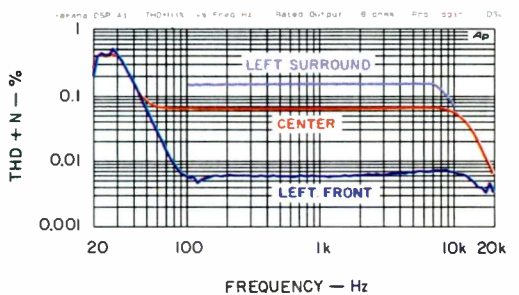
In Fig. 7 are noise spectra for several of the DSP-A1’s inputs. There’s a bump in most of the spectra at 120 Hz, caused by pow-



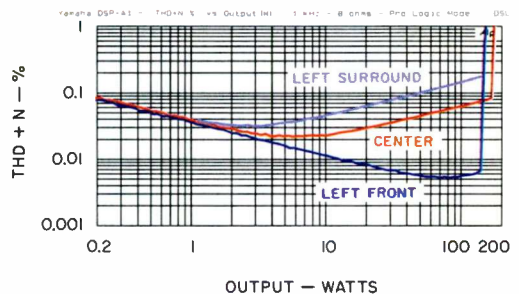
**Fig. 17—** Response of shelving equalizer for maximum cut and boost at lowest and highest frequency settings.



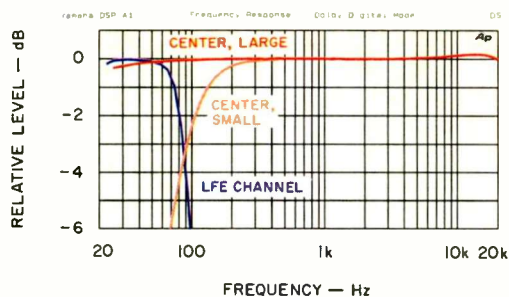
**Fig. 18—** Response of center channel’s graphic equalizer for maximum cut and boost at lowest, middle, and highest frequency bands.



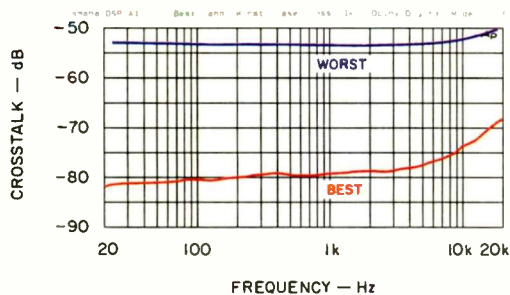
**Fig. 19—**THD + N vs. frequency, Dolby Pro Logic mode.



**Fig. 20—**THD + N vs. output, Dolby Pro Logic mode.



**Fig. 21—Frequency response, Dolby Digital mode.**



**Fig. 22—Crosstalk, Dolby Digital mode.**

er-supply hum, but it's not bad. The spike is less noticeable in the curve taken using the phono input (the reverse is usually true), so I'd guess that the hum is in the power amp rather than the preamp.

In Fig. 8 are spectrum analyses for the digital CD input alone. The curve taken using the "silent" track of the CBS CD-1 test disc is the same as the lowest curve in Fig. 7 but is plotted on a different scale; here, noise is shown with respect to 0 dBFS, or "maximum digital level," rather than the dBW of Fig. 7. In the top curve (taken using the -60 dBFS, 1-kHz track of the CD-1), the rising level of ultrasonic energy indicates that the DSP-A1 uses a "noise-shaped" D/A converter, which is pretty much standard fare these days. The two curves basically overlaid each other below a few hundred hertz and between about 10 and 30 kHz, suggesting that Yamaha doesn't mute the D/A converter on "digital silence" or that the noise is being introduced downstream from the DAC, perhaps in the power amplifier. I can't be sure about this, but I suspect the latter.

This residual noise keeps the Yamaha DSP-A1 from achieving the A-weighted S/N figures of 100 dB boasted by some D/A converters, but I wouldn't get very worked up about that. As I've said in the past, S/N

data taken when a DAC is muted doesn't mean very much; what counts is the noise under real-world conditions and is indicated more accurately by testing dynamic range. At 90.2 dB, unweighted, and 92.9 dBA, the DSP-A1 is certainly competitive. Quantization noise is down nearly 90 dBFS, which isn't bad either!

In Fig. 9 are the D/A converter section's frequency response and channel balance, which are quite acceptable. Though I again used the Yamaha's digital CD input and the CBS CD-1 test disc, results are actually better from the analog connections, as seen in Fig. 1. Channel separation (Fig. 10) is almost the same for the analog and the digital inputs, which suggests that the crosstalk is occurring in the power amplifier section.

Although the Yamaha DSP-A1's D/A converters do not match the best of the breed in S/N, response flatness, and channel separation, they hold their own quite nicely in linearity and distortion. In Fig. 11, a plot of THD + N versus frequency on a fairly expanded distortion scale, maximum contamination stays below

**THE DSP-A1'S AMPS  
ARE EQUALLY ADEPT  
AT ALL FREQUENCIES  
AND INTO  
ANY REASONABLE LOAD.**

0.0081% everywhere except at 16 kHz and higher and, for the most part, is below 0.006%. That's very good. Figure 12 shows the D/A section's THD + N at 1 kHz as a function of level. Considering that noise from the power amplifier is also included, the results are really quite decent. The test of linearity error (Fig. 13), which essentially ignores power amp noise, may portray converter performance more accurately. The Yamaha's DACs acquit themselves very well in this regard, with maximum linearity error considerably less than 0.5 dB. Figure 14 shows linearity error for a fade-to-noise signal.

So far, we've looked at the DSP-A1's stereo performance from an analog input (which exercises neither the A/D converter nor the D/A converter) and from a digital input (which exercises the DAC but not the ADC). Now we come to the Dolby Pro Logic measurements, for which I use analog input signals, thereby exercising both the A/D and the D/A converters. This test setup also provided a convenient way to assess the A1's various equalizers and to probe its bass management, i.e., how it routes bass signals when set up to use "Small" speakers.

The Yamaha DSP-A1 has several bass-management options, labeled "Main," "SW," and "Both" in the setup menu. "Main," which you select when you have no subwoofer, directs all bass to the left, center, and right front speakers. If you have a subwoofer, choosing "SW" sends bass from the LFE channel and any bass redirected from "Small" speakers to the subwoofer jacks. "Both" is the same as "SW" except that setting the front left and right main speakers to "Large" sends bass for those channels to the subwoofer outputs as well as to the outputs for those speakers.

Figure 15 shows the response of various channels in Pro Logic mode without any equalization. If you compare the center channel's high-pass filter response with that of the subwoofer crossover's (Fig. 3), you'll see that the two filters act the same (though the curves look different because their relative level scales are different). This high-pass filter characteristic is used to reroute bass from any channel that is set up for a "Small" speaker to whatever destination you've selected in the bass-management setup menu. (I verified this for all conceivable combinations but, in the interests of clarity, omitted all high-pass curves except the center channel's. By the way, you can ignore the wiggles in low bass response that appear in the "Left Front" and "Center, Large" curves; they're probably artifacts of the measurement method and are not likely to show up in real-world operation.)

Figure 16 shows response of the parametric equalizer when set for maximum and minimum effect (+6 and -9 dB), at its minimum, maximum, and middle frequencies. The measured levels and frequencies agree precisely with the Yamaha's settings. (Ain't digital grand!) The filter Q varies

## MEASURED DATA

### AMP SECTION, STEREO MODE

**Output Power at Clipping (1% THD at 1 kHz):** 8-ohm loads, 155 watts/channel (21.9 dBW); 4-ohm loads, 235 watts/channel (23.7 dBW).

**Dynamic Output Power:** 8-ohm loads, 180 watts/channel (22.5 dBW); 4-ohm loads, 280 watts/channel (24.5 dBW); 2-ohm loads, 390 watts/channel (25.9 dBW).

**Dynamic Headroom re Rated Output:** +2.1 dB for 8-ohm loads.

**THD + N, 20 Hz to 20 kHz:** 8-ohm loads, less than 0.0049% at 110 watts/channel and less than 0.0134% at 10 watts; 4-ohm loads, less than 0.0066% at 165 watts/channel and less than 0.0196% at 10 watts/channel.

**Damping Factor re 8-Ohm Loads:** 410.

**Output Impedance:** 21 milliohms at 1 kHz, 31 milliohms at 5 kHz, 49 milliohms at 10 kHz, and 72 milliohms at 20 kHz.

**Frequency Response:** With tone controls at detent, 20 Hz to 20 kHz, +0, -0.13 dB (-3 dB below 10 Hz and at 118 kHz).

**Tone-Control Range:** Bass, +7.8, -8 dB at 100 Hz; treble, +7.8, -8 dB at 10 kHz.

**Bass Extension:** +5.5 dB at 60 Hz, decreasing at 15 dB/octave below 60 Hz.

**Subwoofer Crossover:** High-pass, -3 dB at 92 Hz and -6 dB at 70 Hz, with 12-dB/octave slope; low-pass, -3 dB at 85 Hz and -6 dB at 96 Hz, with 24-dB/octave slope.

**RIAA Equalization Error, 20 Hz to 20 kHz:** +0.27, -0.4 dB.

**Sensitivity for 0-dBW (1-Watt) Output:** CD input, 14.9 mV; MM phono input, 0.255 mV.

**A-Weighted Noise:** CD input, -80.2 dBW; MM phono input, -77.5 dBW.

**Input Impedance:** CD input, 43 kilohms; MM phono input, 48 kilohms plus 300 pF.

**Input Overload (1% THD at 1 kHz):** CD input, 9 V; MM phono input, 150 mV.

**Channel Separation, 100 Hz to 10 kHz:** Greater than 66.7 dB.

**Channel Balance:** ±0.06 dB.

**Recording Output Level:** CD input, 495 mV for 500-mV signal; MM phono input, 295 mV for 5-mV, 1-kHz signal.

**Recording Output Impedance:** 1.015 kilohms.

### AMP SECTION, DOLBY PRO LOGIC MODE

**Output Power at Clipping, 8-Ohm Loads:** Main channels, 160 watts/channel (22 dBW); center channel, 180 watts (22.6 dBW); surround channels, 155 watts/channel (21.9 dBW).

**THD + N at Rated Output, 8-Ohm Loads:** Main, less than 0.009%, 80 Hz to 20 kHz; center, less than 0.087%, 50 Hz to 20 kHz; surround, less than 0.15%, 100 Hz to 10 kHz.

**Frequency Response:** Main, 20 Hz to 20 kHz, +0.84, -0.36 dB (-3 dB below 10 Hz and at 22.9 kHz); center, "Large" speaker mode, 20 Hz to 20 kHz, +0.11, -2.62 dB (-3 dB at 19 Hz and 23 kHz); center, "Small" speaker mode, 91 Hz to 23 kHz, +0.1, -3 dB; surround, below 10 Hz to 7.05 kHz, +0, -3 dB.

**A-Weighted Noise:** Main, -79.4 dBW; center, "Large" speaker mode, -80.7 dBW; surround, -81.4 dBW.

**Channel Separation at 1 kHz:** 49.3 dB or greater.

### DOLBY DIGITAL (AC-3) MODE

**Channel Balance:** 1.14 dB or better.

**Frequency Response:** Main channels, 25 Hz to 20 kHz, +0.13, -0.34 dB; center channel, 25 Hz to 20 kHz, +0.16, -0.33 dB; surround channels, 26 Hz to 20 kHz, +0.17, -0.2 dB; LFE channel, 22 to 73 Hz, +0, -1 dB.

**THD + N at 1 kHz for 0-dBFS Signal:** Main, 0.0068%; center, 0.0212%; surround, 0.0411%; LFE (at 30 Hz), 0.0028%.

**Channel Separation, 100 Hz to 10 kHz:** 52.1 dB or greater.

### D/A CONVERTER SECTION

**Frequency Response:** 20 Hz to 20 kHz, +0.13, -0.42 dB.

**THD + N at 0 dBFS:** Less than 0.0081%, 20 Hz to 20 kHz.

**THD + N at 1 kHz:** Below -85.5 dBFS from 0 to -90 dBFS and below -89.8 dBFS from -30 to -90 dBFS.

**Maximum Linearity Error:** Undithered signal, 0.46 dB to -90 dBFS; dithered signal, 0.39 dB to -100 dBFS.

**S/N:** A-weighted, 93.5 dB; CCIR-weighted, 84.4 dB.

**Quantization Noise:** -89.8 dBFS.

**Dynamic Range:** Unweighted, 90.2 dB; A-weighted, 92.9 dB; CCIR-weighted, 83.4 dB.

**Channel Separation, 125 Hz to 16 kHz:** Greater than 69.2 dB.

with frequency setting, which is okay with me, even if the manual suggests otherwise. Figure 17 is a similar family of curves using the "High" shelving equalizer. Here I used the maximum and minimum effects settings (+6 and -9 dB, respectively) and the highest and lowest frequency settings. The filter's shelving action is clearly apparent in the latter.

The graphic equalizer, which affects only the center channel, has five fixed-frequency sections with ±6 dB of adjustment. In Fig. 18 are response curves taken on three of

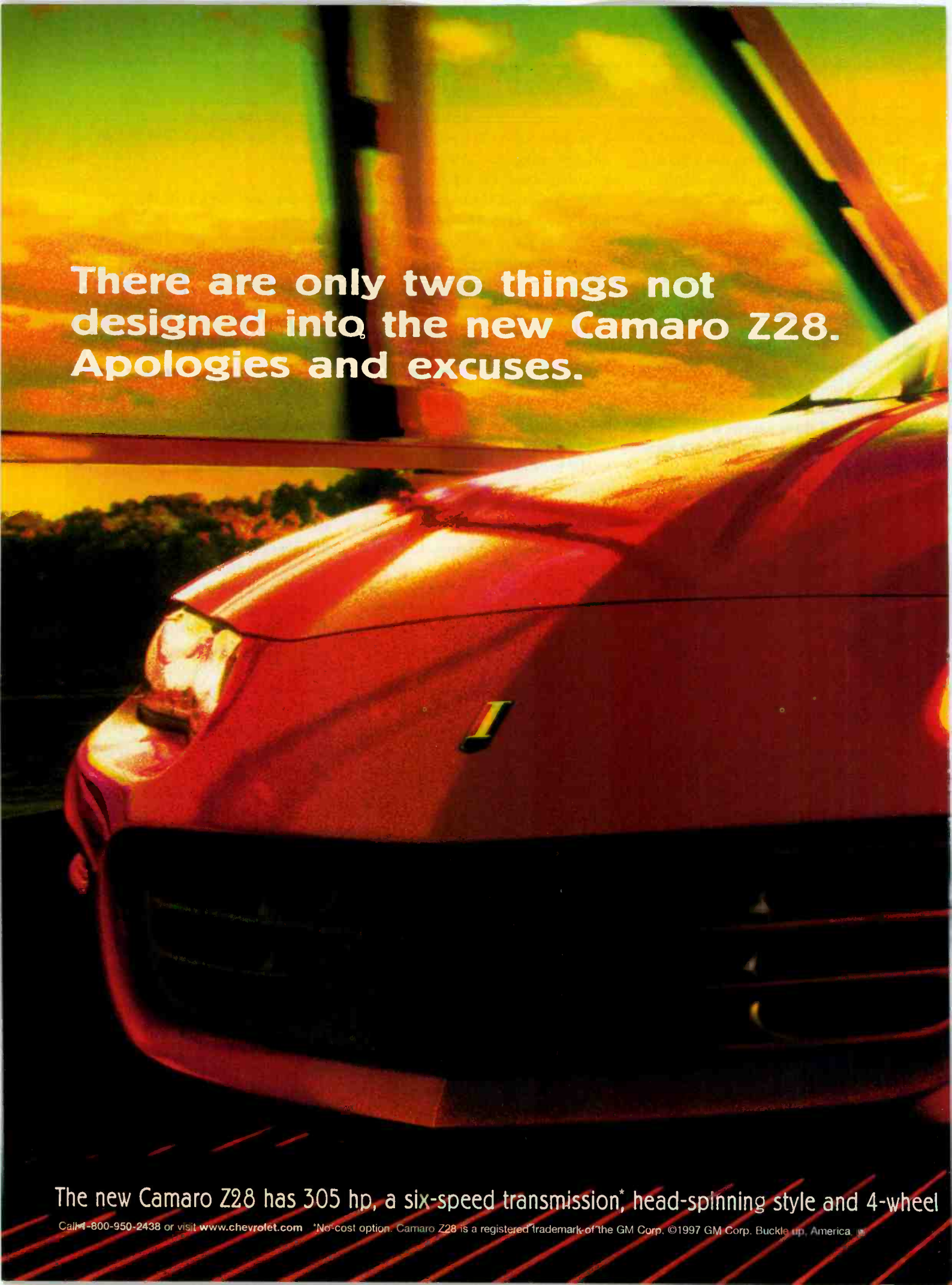
those sections. Note how precisely these controls produce exactly the center frequency and adjustment range I set them for.

Using surround is convenient for realistically evaluating the power amplifiers in multichannel operation. I used Dolby Pro Logic mode, which also brings the A/D and D/A converters into play. Therefore, the THD + N graphs in Figs. 19 and 20 include the noise and distortion introduced by the A/D converter, the Pro Logic decoder, and the D/A converter as well as the power amps themselves. Compared with competi-

tive products, the DSP-A1's distortion is admirably low—remarkably so on the main channels.

The results listed in "Measured Data" for output power at clipping in Dolby Pro Logic mode were taken from the tests for Fig. 20. The DSP-A1's A-weighted noise was essentially the same in all channels, ranging from a low of -81.4 dBW in the surrounds to a high of -79.4 dBW in the front left and right channels—pretty good, I'd say. Channel separation (at 1 kHz under

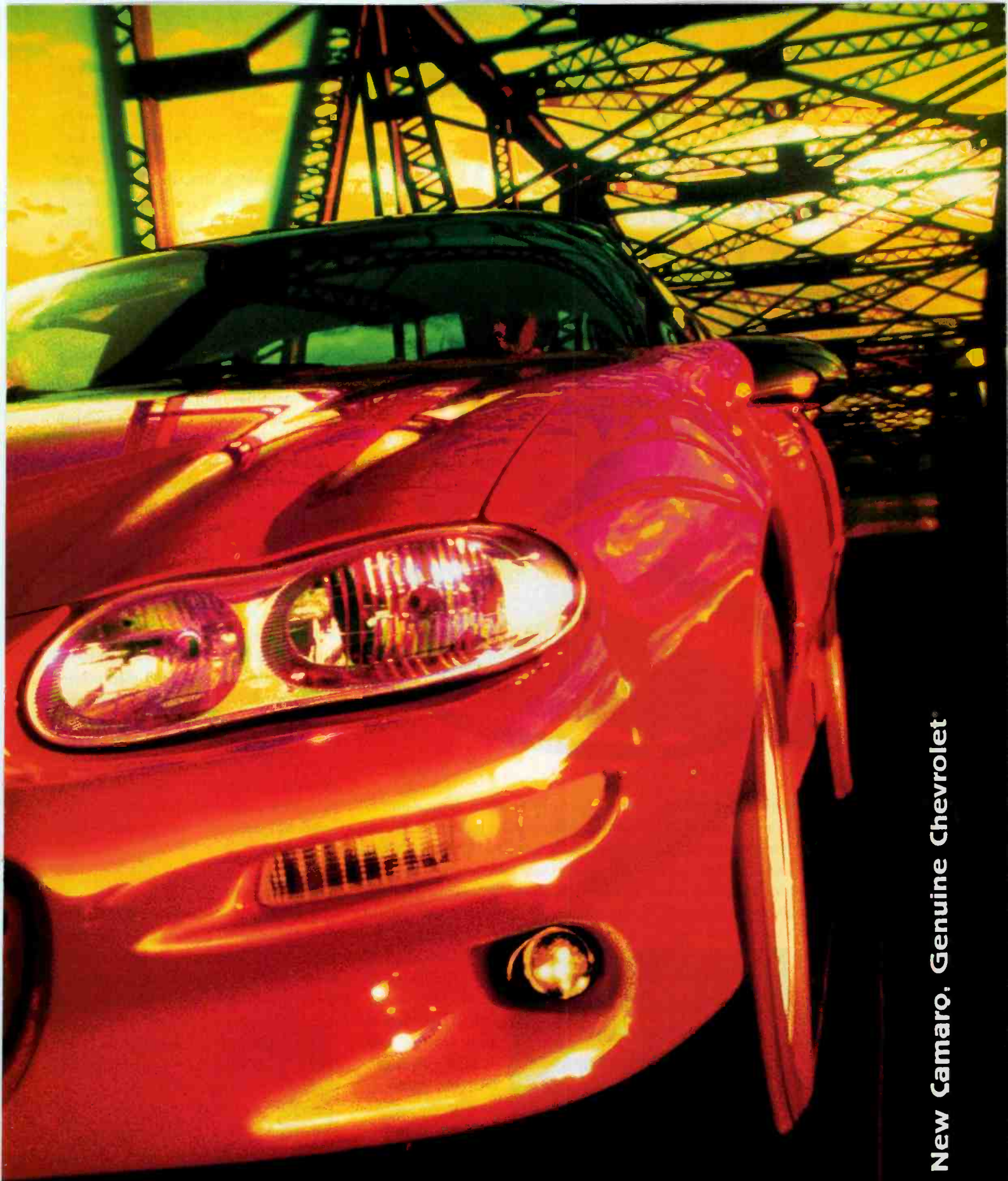
*Continued on page 11*



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# SONIC FRONTIERS PROCESSOR 3 D/A CONVERTER



**L**ike the two other Sonic Frontiers D/A converters I've had the pleasure of using, the Processor 3 is a hybrid design, with tubes in its analog output stage and solid-state components everywhere else. But unlike its predecessors, the Processor 3 has an external power supply and was designed with upgrading in mind; its modules can be quickly unplugged and replaced as new developments in digital audio occur.

The Processor 3 is also the first home audio component to have an input for the new I<sup>2</sup>S-enhanced (I<sup>2</sup>S-e) digital bus. Instead of a current-to-voltage (I-V) converter on the DAC chip, the Processor 3 has a discrete I-V module in order to re-create the analog signal more

faithfully. As in previous Sonic Frontiers models, a proprietary inductor-capacitor low-pass filter is inserted after the I-V converter to help keep oversampling-frequency components out of the audio signal. The output buffer uses two tubes per channel. Its outputs are directly coupled and have

servo circuitry to minimize DC offset. Sanyo Oscon electrolytic capacitors are used in the DAC power-supply regulators for their extremely low equivalent series inductance and resistance. Arlon, a hybrid Teflon material, is used for the DAC section's circuit board.

The front panel is simple. There is a pushbutton for each of the six inputs: two coaxial (one with an RCA jack and the oth-

er with a BNC connector), one AES/EBU (an XLR jack), two optical (Toslink and ST glass-fiber), and one I<sup>2</sup>S-e. The selected input is indicated in the display, as is the sampling frequency of the incoming signal (even 88.2 and 96 kHz, which future standards may require). The display also has indicators for signal lock, muting, HDCD, and polarity reversal. Two pushbuttons beneath it select output polarity ("Phase") and the brightness of the display itself. The only other button switches power between standby and operating modes. The rear panel carries the six digital input connectors, RCA jacks for coaxial digital and unbalanced analog output, a pair of XLR balanced analog output jacks, and a multipin connector for the power-supply cable.

Removing the top cover (which is very heavy and dead-sounding, thanks to a lining of vibration-damping material) reveals four circuit boards that occupy virtually all of the Processor 3's interior. One, behind the front panel, holds the panel controls and display. Two boards are at the rear of the chassis, one for the digital inputs and input receiver and the other for the tube output stage. The fourth and largest board holds the DAC modules and their power-supply regulators, the new I-V converter modules, and the passive LC low-pass output filters. The power supply's interior is occupied by one circuit board that carries all of the rectifiers, filter capacitors, primary voltage regulators, and ancillary parts. Parts and build quality are of a high order in both chassis.

## Measurements

The frequency response curves in Fig. 1 were taken at the Processor 3's balanced outputs. Switching from instrument to IHF loading with unbalanced output dropped the level only about half as much, because

**THE PROCESSOR 3  
SOUNDED LIFELIKE,  
WITH SUPERIOR  
DEFINITION, CLARITY,  
AND SPACIOUSNESS.**

**Dimensions:** Main chassis, 19 in. W x 14 1/4 in. D x 4 1/2 in. H (48 cm x 36 cm x 11.5 cm); power supply, 9 in. W x 13 in. D x 4 in. H (23 cm x 33 cm x 10 cm).

**Weight:** 30 lbs. (14 kg).

**Price:** \$6,995.

**Company Address:** 2790 Brighton Rd., Oakville, Ont. L6H 5T4, Canada; 905/829-3838; [www.sonicfrontiers.com](http://www.sonicfrontiers.com).

Photos: Michael Groen



the unbalanced outputs' impedance is half that of the balanced outputs.

De-emphasis error was essentially zero. On 1-kHz square waves, ringing was symmetrical and the peaks were unclipped. The symmetry is characteristic of finite-impulse-response (FIR) digital filters; the absence of peak clipping is characteristic of the Pacific Microsonics PMD-100 digital filter/HDCD decoding chip used in the Processor 3.

As can be seen in Fig. 2, total harmonic distortion plus noise (THD + N) at 1 kHz, distortion is higher for unbalanced output than it is for balanced output and with IHF rather than instrument loading. Even at its worst, however, THD + N won't be very noticeable: Its maximum level, -70 dBFS, amounts to a mere 0.03%. And that maximum is attained only near digital full scale (0 dBFS), well above typical music levels. (The distortion rise occurred in the tube output stage, as I determined by tracing it

**THE I<sup>2</sup>S-e INPUT  
CONSIDERABLY REDUCES  
RANDOM JITTER  
OVER MOST  
OF THE AUDIO RANGE.**

back through the circuit.) Furthermore, as Fig. 3 reveals, distortion does not rise much with frequency and doesn't even begin to climb until about 2 kHz.

Deviation from linearity for a 500-Hz input signal (Fig. 4) is very good; linearity is nearly perfect down to -105 dBFS. This was borne out by a noise-modulation test, devised by Richard Cabot of Audio Precision, in which noise spectra are analyzed for a 41-Hz signal at five levels from -60 to -100 dBFS. The Processor 3's noise spectra (not shown) were almost identical at every level.

Interchannel crosstalk was outstandingly low: -120 dB or better from 20 Hz to 15 kHz, increasing to about -105 dB at 20 kHz.

S/N ratios are listed in Table I. The excellent wideband results testify to the effectiveness of the LC filters that follow the Processor 3's DACs. Because noise common to both phases of the balanced outputs cancels out, the noise at those outputs is noticeably lower. This can be seen in Fig. 5, an analysis

The Sonic Frontiers Processor 3 D/A converter has six digital inputs. Five of them are common types (two coaxial, two optical, and one AES/EBU) and are selected via four double-pole, double-throw relays. Each of the coaxial inputs passes through a two-pole LC low-pass filter whose cutoff frequency is about 30 MHz. Signals from either coaxial jack or the AES/EBU input pass through a 1:2 step-up isolation transformer, whose output is passed on as a balanced signal. Toslink and ST input signals are sent through optical receivers, which are referenced to the digital section's power-supply ground; output of the ST input's digital receiver also passes through a differential comparator. Because the selector section has a two-phase output, each optical input's physical ground point is used as the source for the negative signal phase. This helps reduce the effect of any induced noise and jitter in the circuit board traces leading up to the digital input receiver, an UltraAnalog AES21.

The sixth of the Processor 3's digital inputs is a new type, an I<sup>2</sup>S-e connection. Its clock and data signals are all isolated via 1:1 transformers. Each transformer is resistively terminated and coupled to high-speed Motorola PECL (positive emitter-coupled logic) chips, which square up the signals to 1-nanosecond switching speeds. Fast multiplexer chips at the input to the Processor 3's digital filter and HDCD decoding chip, a Pacific Microsonics PMD-100, select data and clock signals from the squared-up I<sup>2</sup>S-e signals or from the digital receiver for the other inputs.

The Processor 3 has two UltraAnalog DAC modules, one per channel. The PMD-100's left and right data outputs reach them via four XOR (exclusive-or) gates, which drive each DAC module's two channels in push-pull and reverse the output signal's absolute polarity when commanded by the front-panel "Phase" switch. The serial bit-clock and word-clock signals from the PMD-100 pass directly from the digital filter and HDCD decoder to the DACs. And the PMD-100's deglitch output, the critical timing signal for the DAC modules, is reclocked by the master clock en route to the DAC section.

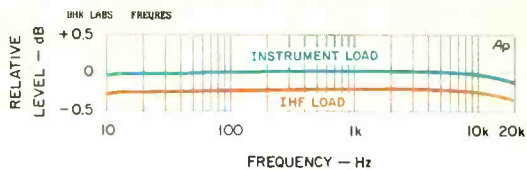
Push-pull, or differential, output from each DAC module is fed into two custom current-to-voltage (I-V) converter modules, one for each signal phase. A two-position, relay-controlled balanced attenuator can be activated to compensate for the 6-dB level difference between normal and HDCD-encoded discs. However, the Processor 3 leaves Sonic Frontiers' factory with this attenuator bypassed by an internal jumper, to provide maximum S/N for non-HDCD discs. Attenuated or not, the audio signals then go to a proprietary balanced LC low-pass filter that rolls off the signal below 176.4 kHz to just about eliminate out-of-band ultrasonic oversampling components in the output.

From the LC low-pass filter, the signal is capacitively coupled to the control grids of the output buffer stage's tubes. Two 6922 dual triodes are used for each channel, one per signal phase. To minimize output impedance, both halves of each tube are paralleled, and the tubes are connected as cathode followers. Each signal phase's cathode follower is loaded with a one-transistor, constant-current source and is DC-coupled (via a series muting relay and another LC output-RF filter) to the analog output jacks. An op-amp servo compares DC at the tubes' cathode outputs to 0 volts and changes the grid-leak resistance to eliminate any output DC offset it detects.

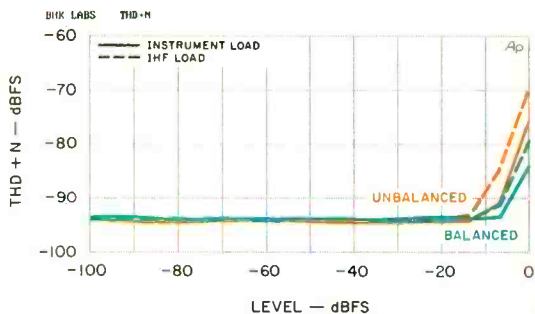
The power transformer in the supply chassis feeds seven full-wave rectifier bridges and capacitor-input filters, each from a separate secondary winding. The high-voltage bridge uses discrete, fast-recovery rectifiers instead of the common four-diode packages used for the other rectifiers. The high-voltage supply is RC-filtered to develop about +165 volts and then passed through the interconnect cable to the main chassis, where it powers +110-volt Zener-follower discrete voltage regulators for the tube stage. The low-voltage supplies (including a -9-volt supply, which also feeds the tube stage) contain three-terminal IC regulators, some in the power supply and others in the main chassis.

All in all, the design of the Sonic Frontiers Processor 3 is quite complicated yet elegant and sophisticated. *B.H.K.*

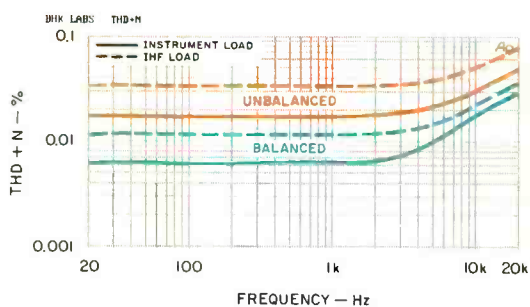
## THE I<sup>2</sup>S-e BUS



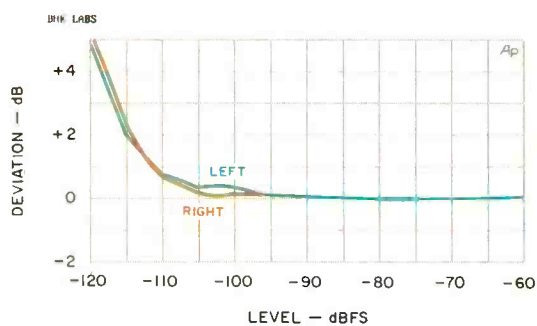
**Fig. 1—Frequency response at balanced outputs.**



**Fig. 2—THD + N vs. level.**



**Fig. 3—THD + N vs. frequency.**



**Fig. 4—Deviation from linearity.**

The Processor 3 has six digital inputs and an external power supply.



Prized as they are by audiophiles, separate CD transports and D/A converters have an Achilles heel: jitter, or variations in clock-signal timing. Its three main causes are standing waves in the cables and connectors linking the transport and the converter, contamination of the clock signal by crosstalk from the signal data, and timing errors that arise in the converter's input section.

In one-piece CD players, connections between the transport mechanism and the DAC are short and direct, and the clock and data signals are kept separate. Many of these players have an internal Inter-IC Sound (I<sup>2</sup>S) digital audio data bus (defined by Philips when the Compact Disc was first developed). This bus uses four separate signal lines—one each for the master clock, serial bit clock, word clock, and serial data.

Connections between separate CD transports and D/A converters, however, are usually in the form of S/P DIF or AES/EBU digital audio interfaces, both of which use digital transmitter chips to combine the four clock and data signals into one composite signal that can be sent through simple cables. In a conventional stand-alone D/A converter, where a digital input receiver separates the four original components from the composite signal, the input receiver's imperfections can be yet another source of jitter.

At one time, Audio Alchemy attempted to circumvent this process by using the original I<sup>2</sup>S bus to transmit clock and data separately between transports and D/A converters. (A few other companies introduced products using the I<sup>2</sup>S interface.) This bus was the basis of the I<sup>2</sup>S-enhanced (I<sup>2</sup>S-e) interface developed by UltraAnalog, which will license it to other makers.

of the noise for a 1-kHz signal at -80 dBFS. Whether I used balanced or unbalanced output, quantization noise was no more than -93.4 dBFS, and dynamic range was 96 dB or better.

Its enhancements include extra timing-signal lines and the addition of flags for sampling-clock frequency, clock status (master or slave), and pre-emphasis. For now, only the Sonic Frontiers Processor 3 has this interface, although the company also has a transport with I<sup>2</sup>S-e output in the works.

Proprietary cabling is not required for I<sup>2</sup>S-e connections; the interface was designed for use with a standard professional video cable, the 13W3, which comprises three 75-ohm coaxial cables and five twisted pairs in an overall shield, with 10-pin D-Sub miniature hybrid cable connectors on each end. The I<sup>2</sup>S clock and data signals are all transmitted differentially, with the master clock using two of the coaxial cables and the remaining clock and data signals using three of the twisted pairs. (The clock and pre-emphasis flags and two transport digital grounds use the remaining twisted pairs.) In a D/A converter, these received signals can be used directly to operate the DAC chips but are usually isolated and relocked at the DACs by the received master clock for lowest overall jitter.

As a Level 2 I<sup>2</sup>S-e device, the Sonic Frontiers Processor 3 uses a master clock signal that is generated in the transport to control its DAC chips. In Level 1 products, master clock signals generated in the D/A converter will control the CD transport, which UltraAnalog says will result in the lowest jitter if the transport's clock is at least as good as the D/A converter's. (Incidentally, the third coaxial cable in the 13W3, currently unused, is reserved for the Level 1 clock-signal connection.) Level 1 and Level 2 devices can be used together but will operate in Level 2. *B.H.K.*

For all the tests that I've described so far, I fed signals to the Sonic Frontiers Processor 3 via an AES/EBU balanced interconnect. I found that there were no significant differences when I repeated several tests via the I<sup>2</sup>S-e bus connection, although some

## ASSOCIATED EQUIPMENT USED

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

**CD Equipment:** PS Audio Lambda Two Special and modified Sonic Frontiers SFT-1 CD transports, Genesis Technologies Digital Lens anti-jitter device, and Classé Audio DAC-1 D/A converter

**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, Ayre Acoustics K-1, and author's custom passive

volume control and signal selector with phono preamp

**Amplifiers:** Lamm Audio Laboratory M2.1 mono hybrid amps, Quicksilver Audio M135 and Sonic Frontiers Power-3 mono tube amps, and Audio Note Conqueror and Bel Canto SET 40 single-ended stereo tube amps

**Loudspeakers:** B&W 801 Matrix Series 3s and Lowther PM5A drivers in Lowther Club Medallion II cabinets

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

noteworthy differences emerged when I compared jitter performance.

To determine the I<sup>2</sup>S-e link's effect on jitter, I first obtained a Sonic Frontiers SFT-1 CD transport that had been modified to include an I<sup>2</sup>S-e output. I put the SFT-1 in pause mode and connected it to the Processor 3's AES/EBU and I<sup>2</sup>S-e inputs. Next, I measured jitter at each DAC module for each type of connection. My test points were the modules' deglitch inputs, which work with the digital filters' deglitch outputs to prevent switching noise during transitions from one bit to the next.

As Fig. 6 reveals, switching from the Processor 3's AES/EBU to its I<sup>2</sup>S-e connection considerably reduces random jitter over most of the audio range, even though the I<sup>2</sup>S-e curve has slightly more prominent peaks at 120 and 240 Hz (related to the AC line frequency) and slightly higher jitter above 10 kHz. (With AES/EBU connections, the digital input receiver's phase-locked loop, whose cutoff frequency occurs at about 1 kHz, causes a high-frequency rolloff in the jitter spectrum.) Note that the jitter levels in Fig. 6 are peak to peak; the equivalent sine-wave jitter would be 3.54 nanoseconds rms for 10 nanoseconds peak to peak, 1.12 nanoseconds rms for 3 (actually, 3.16) nanoseconds peak to peak, and so

on. When I played a jitter-prone -90 dBFS signal on the CBS CD-1 test disc, the Sonic Frontiers' jitter was again lower in I<sup>2</sup>S-e mode. The reduction I recorded was about 26 dB for the 1-kHz test signal and 14 dB for its second harmonic; that's impressive.

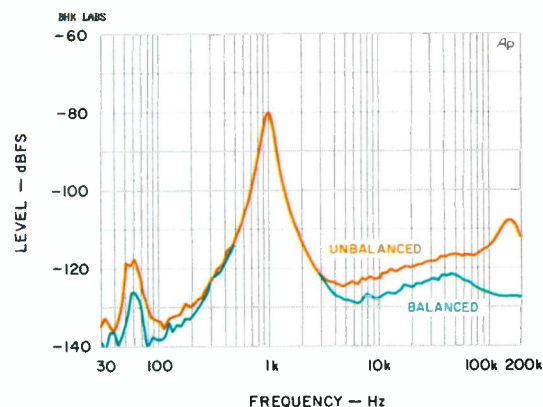
### Use and Listening Tests

When I first received the Sonic Frontiers Processor 3, I hooked it up in my normal CD setup. Right from the beginning, I was very impressed with the sound and thought it was more lifelike than that of the Classé Audio DAC-1, one of my longtime favorite D/A converters. The Processor 3's definition, clarity, and spaciousness all struck me as superior.

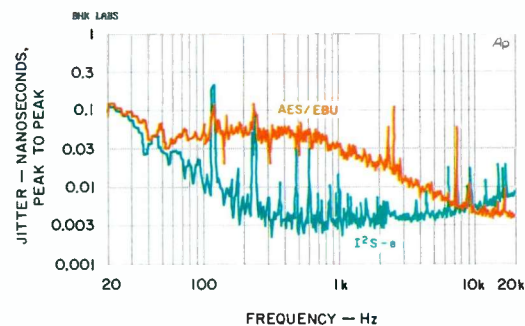
Next, I replaced my PS Audio CD transport with the modified Sonic Frontiers SFT-1 so that I could hear how the Processor 3's AES/EBU and I<sup>2</sup>S-e connections compared. The I<sup>2</sup>S-e connection did improve transparency, detail, and spaciousness, but the differences weren't large. However, this precluded my using the DGX Audio digital preamp (which provides EQ for my B&W speakers) or any other ancil-

**Table 1—Worst-case S/N ratios.**

	-138 dBFS Signal	
	BALANCED	UNBALANCED
Wideband	93.2 dB	88.6 dB
22 Hz to 22 kHz	93.6 dB	93.6 dB
400 Hz to 22 kHz	93.8 dB	93.6 dB
A-Weighted	95.6 dB	95.5 dB
	Digital-Zero Signal	
	BALANCED	UNBALANCED
Wideband	110.4 dB	89.6 dB
22 Hz to 22 kHz	115.6 dB	110.3 dB
400 Hz to 22 kHz	116.1 dB	111.7 dB
A-Weighted	118.0 dB	113.8 dB



**Fig. 5—Noise analysis for a 1-kHz signal at -80 dBFS.**

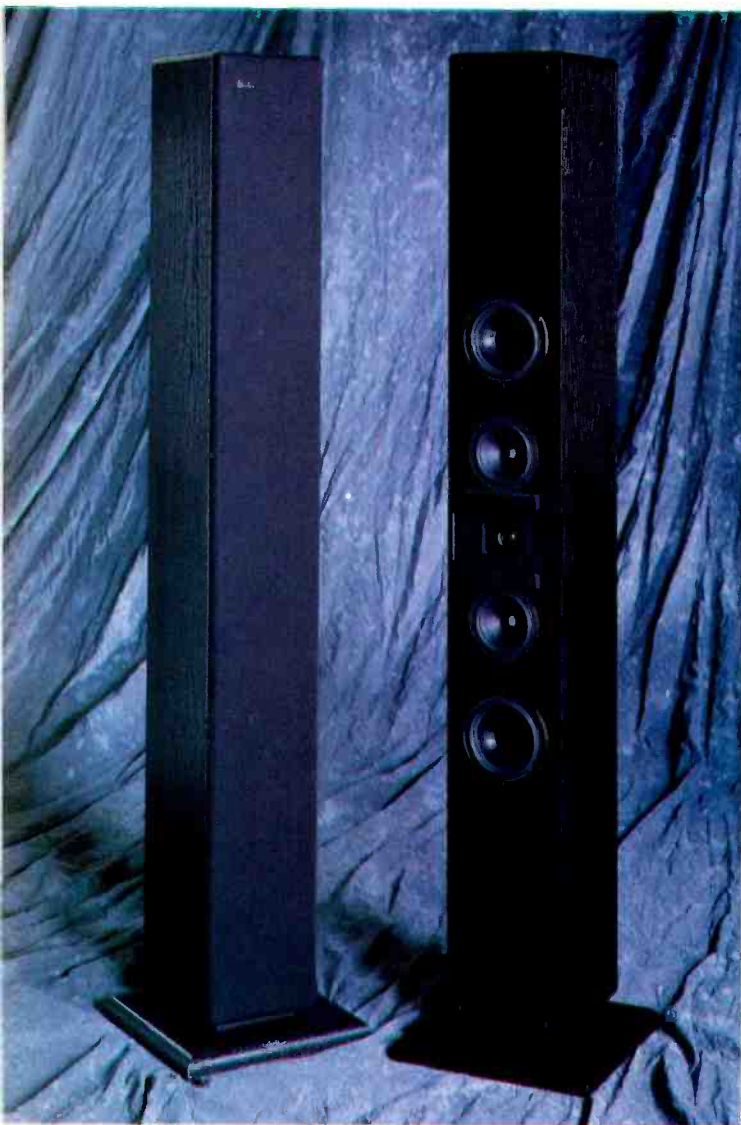


**Fig. 6—Jitter spectra for I<sup>2</sup>S-e and AES/EBU inputs.**

lary digital components that have only the common types of digital connections.

The Sonic Frontiers Processor 3 performed flawlessly in my lab and in my listening room. Not only was its measured performance superb, it also gave me the best digital sound I've heard in my home system. Needless to say, I very much enjoyed its stay in that system, and I enthusiastically recommend it. **A**

## DUNLAVY AUDIO LABS SC-III SPEAKER



**T**he SC-III falls about in the middle of Dunlavy Audio Labs' speaker line, which ranges from the small SC-1 to the mammoth SC-VI. Like all but the SC-1, the SC-III is a tall speaker, some 6 feet high, but narrow and not very deep. For increased stability, it is supplied with a base 15 inches square.

John Dunlavy, the company's chief designer and CEO, engineers all of his speakers with accuracy as the main criterion.

(Opinions on what this entails obviously differ; speaker manufacturers using wildly different approaches all claim it, even in the face of independent findings to the contrary.)

Dunlavy, however, passionately believes that, to be accurate, a speaker should reproduce the waveform of the electrical input at some designated listening distance in a room. His speakers are designed to deliver a time-coherent waveform, on axis, at a distance of about 10 feet. Dunlavy refers to this as "path and phase alignment," because it equalizes path lengths from each driver to the listener's ear. Almost no speakers deliver such waveform accuracy. Achieving it requires not only flat frequency response but also flat or linear phase response and simultaneous arrival of the signals from all drivers.

One way Dunlavy speakers reach this goal is through symmetrical array geometry. In the SC-III, for example, the five drivers are in a vertical array: 5-inch midrange drivers are above and below the 1-inch dome tweeter, while 6½-inch woofers are above and below the midranges. Other techniques employed by Dunlavy include recessing the tweeter and midranges behind the plane of the woofers, use of carefully worked out first-order (6-dB/octave) crossover networks, and use of absorbent materials on the front panel and around the recessed drivers. This

last strategy, on which Dunlavy held the original patent (now expired), virtually eliminates edge diffraction.

Together, these techniques make the company's speakers radiate sound very much like directional antennas (Dunlavy has patents in the antenna field, too); they direct most of their energy toward the listener and control sound radiation to the room's walls, ceiling, and floor. This, in turn, helps make the frequency response you hear more even. For example, a speaker with a single woofer will often have a dip in its lower midrange, caused by cancellation between the direct sound from the woofer and the slightly delayed sound of its output bouncing off the floor. The Dunlavy speakers' two-woofer vertical array reduces this effect because the array becomes directional in the lower midrange, reducing the amount of energy radiated toward the floor.

### Measurements

Most of my measurements of the SC-IIIs were made in Dunlavy Audio Labs' large test chamber, which is much better suited to this sort of work than any room normally available to me. The chamber is essentially anechoic down to about 125 Hz, but it is possible to make accurate measurements below that frequency, using correction factors for the chamber's acoustic modes. The measurements made in this chamber, and some made in my lab, were analyzed with a DRA Laboratories MLSSA.

For Fig. 1A, I plotted the SC-III's frequency response only from 200 Hz to

**Rated Frequency Response:** 45 Hz to 20 kHz,  $\pm 2$  dB;  $-3$  dB at 40 Hz.

**Rated Sensitivity:** 90 dB SPL at 1 meter, 2.83 volts applied.

**Rated Impedance:** 3 to 5.5 ohms; 4 ohms, nominal.

**Dimensions:** 72 in. H x 12 in. D x 9 in. W (182.9 cm x 30.5 cm x 22.9 cm).

**Weight:** 85 lbs. (38.6 kg), including base.

**Price:** In light or black oak, \$3,995 per pair; in rosewood or cherry veneer, \$4,495 per pair.

**Company Address:** P.O. Box 49399, Colorado Springs, Colo. 80949; phone, 719/592-1159; fax, 719/592-0859.

## TEST EQUIPMENT USED

**Test Signal Sources:** DRA Laboratories MLSSA (Maximum Length Sequence System Analyzer) in a PC, Hewlett-Packard 239A oscillator, and IEC F37 function generator

**Acoustical Data Acquisition:** Brüel & Kjaer Model 4133 calibrated instrument microphone with Type 2804 power supply and custom-made microphone preamplifier

**Data Analysis:** MLSSA measurement system, oscilloscope, and Hewlett-Packard 3580A spectrum analyzer

20 kHz. Over this range, response is very flat, within about  $\pm 1$  dB! What's more, the other speaker of the pair was within about 0.5 dB of this response, which is exceptionally close. With the measurement range extended down to 20 Hz (Fig. 1B), the effects of the chamber's room modes can be seen; the dashed curve represents bass response after these effects are factored out. The -3 dB point is about 40 Hz, right on spec.

One measure of a speaker's path and phase alignment is its reproduction of step waveforms. Like a stair step, the signal rises abruptly from one steady DC level to another and remains at the new level. But because speakers act as bandpass filters, they can't pass DC; a speaker's passband normally ends at around 20 to 100 Hz in the bass and at perhaps 15 to 50 kHz in the treble. The step response of an ideal speaker would rise straight up, with no overshoot or ringing, then roll off exponentially to zero (its original level) over a time period that relates to the speaker's low-frequency cut-off. (In practice, there will always be some finite rise time, which means the rise will not be straight up.)

If a speaker is not path and phase aligned, its tweeter signal almost always arrives first, as a narrow spike, followed by the usually broader pulse of the midrange signal and, finally, by the signal from the woofer. The tweeter, midrange, and woofer signals may or may not have the same polarity. Such a speaker's step response is shown in Fig. 2A. The tweeter and midrange outputs have the same acoustic polarity, but the woofer's contribution appears

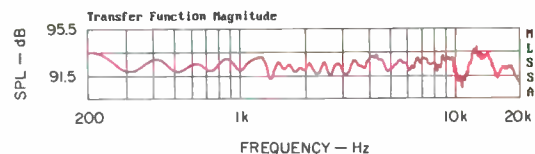
to have the opposite polarity. However, the SC-III's step response (Fig. 2B) comes very close to meeting the previously discussed criteria.

Another sign of the SC-III's path and phase alignment is its phase response (Fig. 3). If this alignment were perfect, the phase response would be a straight line—horizontal if there were no delay and sloping down when there is delay, as seen here. The slope is a function of the delay in the speaker—but more important, the properly aligned speaker's delay is constant with frequency, producing the linear phase curve in Fig. 3. This is very good phase linearity, among the best I've seen from a loudspeaker.

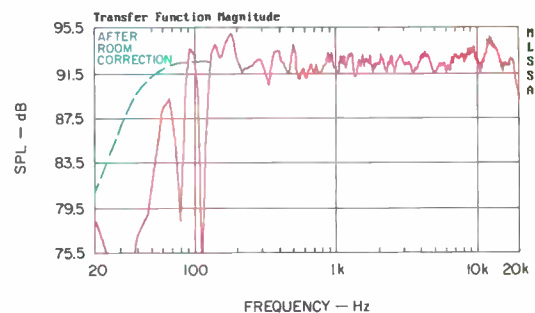
A speaker's output should not only rise quickly, as seen in its step response, but also decay quickly when a tone is suddenly cut off. Energy storage caused by resonances or excessive phase shift in a speaker will slow the decay, especially at frequencies where the speaker resonates. This is illustrated by a plot of cumulative spectral decay (Fig. 4). In this "waterfall" plot, the SC-III's normal frequency response was derived from a Fast Fourier Transform of its time-windowed impulse response. As you move toward the front of the plot, the time window changes for each curve, so that each shows the speaker's output a fraction of a millisecond later than the previous curve.

The peaks and dips in a speaker's decay spectrum are a good indication of its resonances. If a speaker has good path and phase alignment, the amplitude of the second curve from the rear will drop sharply, as the SC-III's does in Fig. 4. If a speaker has excessive phase shift, its energy storage will keep the successive curves from dropping in amplitude as quickly.

Figure 5 shows how the SC-III's response changes as you move to one side of its forward axis. There

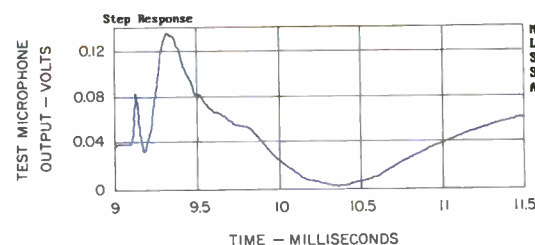


A

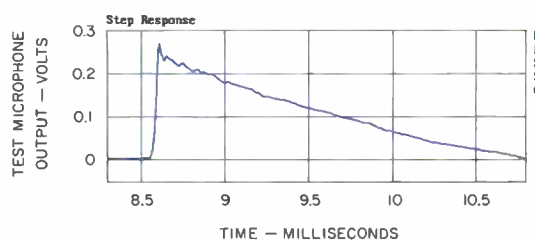


B

**Fig. 1—Frequency response, from 200 Hz to 20 kHz (A) and from 20 Hz to 20 kHz (B), measured 10 feet from the Dunlavy SC-III in an anechoic chamber.**

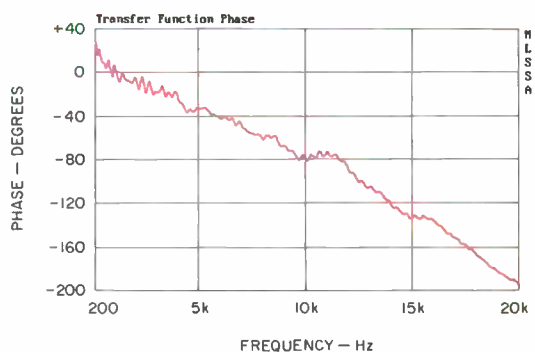


A

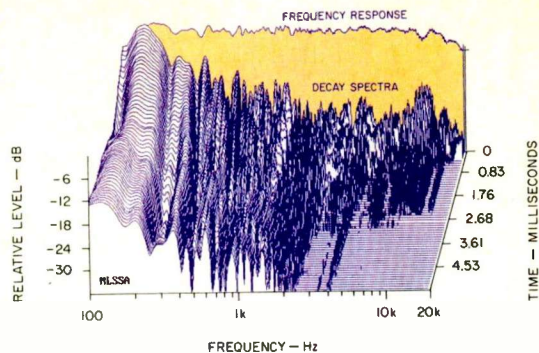


B

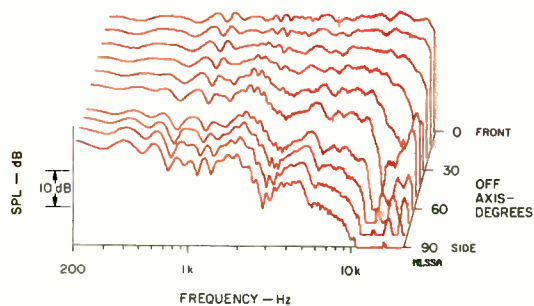
**Fig. 2—Step response of a speaker without path and phase alignment (A) and of the SC-III measured 10 feet away in an anechoic chamber (B).**



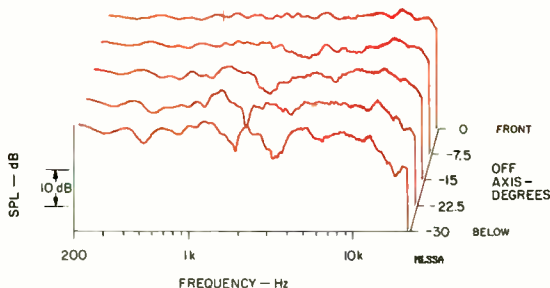
**Fig. 3—Phase response.**



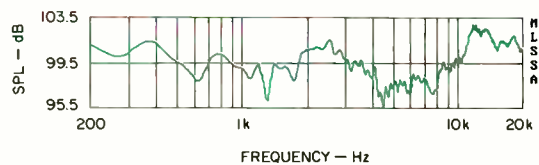
**Fig. 4—Cumulative spectral decay.**



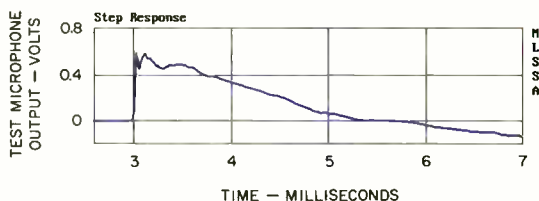
**Fig. 5—Horizontal off-axis frequency response.**



**Fig. 6—Vertical off-axis frequency response.**



**A**



**B**

**Fig. 7—Frequency response (A) and step response (B), measured 3 feet from the SC-III in the listening room.**

is little change for listening positions as much as 30° to one side. Because of the speaker's symmetry, results are the same to either side. That symmetry also explains why I plotted response below, but not above, the forward axis (Fig. 6), especially as I was measuring only within 30° of the axis; any listeners farther off this axis would probably be on the floor or ceiling.

All the preceding measurements were made at 10 feet, the Dunlavy speakers' designed working distance. To see how some of these results would fare at the standard microphone distance of 1 meter, I tested on-axis frequency response and step response at a distance of about 3 feet, which is within a few inches of a meter. The frequency response (Fig. 7A) is not as flat as in Fig. 1, and the step response (Fig. 7B) isn't quite as good as that in Fig. 2B. Though the SC-IIIs still sounded good from 3 feet away, they're likely to sound best when they're closer to the 10-foot distance recommended by Dunlavy, which is about where you're likely to sit anyway when using speakers of this size.

I also measured total harmonic distortion plus noise (THD + N) at a microphone distance of 10 feet in the anechoic chamber (Fig. 8). The input was 2.83 volts, equivalent to 1 watt into 8 ohms or 2 watts into a 4-ohm speaker such as this. (As in Fig. 1A, this produced a fairly loud 92 dB SPL or so from the SC-III.) The dip at 100 Hz in Fig. 8 is most likely caused by a room mode in the chamber near that frequency; the apparent lessening of distortion above about 7 kHz is caused by the measurement system's anti-aliasing filter. Because the SC-III's distortion is highest in the bass, I retested low-frequency distortion at the original level of 2 watts and at one-fourth and four times that power (Fig. 9); these are close-miked measurements made in my listening room using the DRA Laboratories MLSSA. The SC-III produced

reasonable distortion levels, typical of speakers in its general size and price range.

John Dunlavy believes it's important that a speaker's impedance stay within reasonable limits. The SC-III exemplifies this with an impedance magnitude ranging from a bit less than 3 to about 7.5 ohms and an impedance phase angle that varies only from about +19° to -31° (Fig. 10).

#### Use and Listening Tests

I first heard the Dunlavy SC-IIIs in Bel Canto's room at the 1998 Winter Consumer Electronics Show, where I and a highly critical friend agreed that their sound was very good. The next time I heard these speakers was in Dunlavy Audio Labs' large, acoustically treated sound room; my review pair of SC-IIIs and a pair of SC-IVAs were set up side by side on one of that room's long walls. The angle of separation between the speakers of each pair, at 130° or so, was very wide. With a setup like this, you have to sit right in the center to get the full effect. If you move to either side, the image quickly shifts in that direction, but oh, in the middle, what a sound!

The music I listened to included my own CDs, some from the company's library, and some DAT recordings of the Colorado Symphony made personally by Dunlavy with Brüel & Kjaer instrumentation mikes. In some cases, the sound was among the best and most realistic I've heard in terms of tonal honesty, imaging, and dynamics. Some recordings, however, didn't have enough center fill for such a wide angle between the speakers.

As I switched back and forth between the two sets of speakers, I was most impressed with how much alike they sounded, even though the SC-IVAs are about \$2,000 more per pair. I did hear more extended bass from the SC-IVAs' 10-inch woofers than from the 6½-inchers in the SC-IIIs. However, when Dunlavy swapped the positions of the speaker pairs, I was surprised to find that the SC-IIIs' bass response was much better than I had thought—a gentle reminder that speaker placement is vital to sound quality. In my own listening room, which is neither symmetrical like Dunlavy Audio's sound room nor large enough for such wide-angled placement, I'd thought the imaging would not be as precise and stable as it had been at the factory, but my

## ASSOCIATED EQUIPMENT USED

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

**CD Equipment:** PS Audio Lambda Two Special and modified Sonic Frontiers SFT-1 CD transports, various CD players, 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 tone-arm, Win Research SMC-10 moving-coil phono cartridge, and Vendetta Research SCP2-C phono preamp

**Additional Signal Sources:** Nakamichi ST-7 FM tuner, Nakamichi 1000 cassette deck, and Technics 1500 open-reel recorder

**Equalizers:** DGX Audio DDP-1 and Z-Systems RDP-1 digital preamps

**Preamplifiers:** Sonic Frontiers Line-3, Dynaco PAS 2, and Kora Electronic Concept Eclipse

**Amplifiers:** Arnoux 7B stereo switching amp, Reference Line Audio Preeminence Model 1 Class-A stereo amp, prototype amp by James Bongiorno, Quicksilver Audio M135 and Kora Electronic Concept Triode 100SB mono tube amps, and Audio Note Conqueror and Bel Canto SET 40 single-ended stereo tube amps

**Loudspeakers:** B&W 801 Matrix Series 3s and Lowther PM5A drivers in modified Lowther Club Medallion II cabinets

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

concerns were unfounded. Moreover, I think my room is more typical of the rooms potential buyers will have.

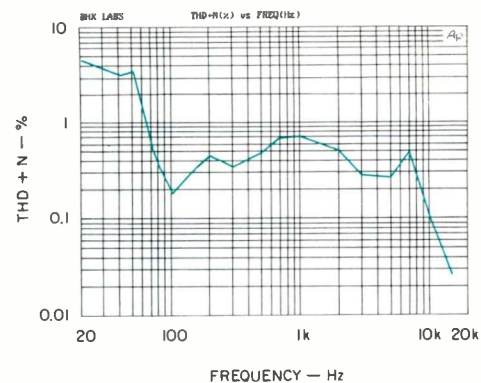
At first, I placed the Dunlavy Audio Labs SC-IIIs near the usual locations of my B&W 801s, well out in the room. With this place-

ment, a recording whose sound I had not liked previously immediately sounded more lifelike—a very good sign. Experimentation showed me that bass was a bit better with the SC-IIIs set back from these positions. When I set them further forward, the soundstage became quite a bit more spacious, but the timbre was too bright for my taste. Overall balance was quite good, but the bass was not as deep and robust as with my 801s. That wasn't unexpected, given the SC-IIIs' higher bass cutoff frequency, but I believe the low-frequency response would be better in a more typical, regularly shaped, reasonably closed room—which mine is decidedly not. Even so, I did get very good bass that was tight and musical.

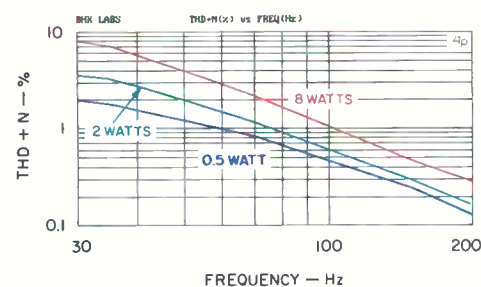
After further experimentation, I wound up placing the SC-IIIs quite forward in the room, as far apart as I could get them. I angled them inward (which Dunlavy recommends), so that they directly faced my listening position. With this setup, the SC-IIIs' imaging, spaciousness, tonal honesty, and overall musical believability were exceedingly good. With many of the recordings I used, the soundstaging was most impressive, though on some the image was more likely to collapse into the left and right speakers than with the 801s. Generally, however, I was amazed at the large and realistic soundstage I heard from most of my recordings.

I also got an astonishing sense of clarity and detail on much of the music I played, though several recordings sounded noticeably edgier and brighter through the SC-IIIs than through the 801s. Since the SC-IIIs were rather unforgiving of less than stellar source material in my room, I used the digital equalizer in the Z-Systems RDP-1 preamp to attenuate the highs and lift the bass a bit for such recordings; I also used the loudness-compensation and tone controls of an old Dyna PAS 2 tube preamp to very good effect.

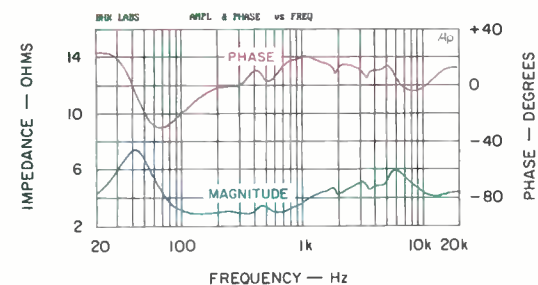
I did not notice any of these anomalies when I heard the SC-IIIs in the manufac-



**Fig. 8—THD + N vs. frequency, measured 10 feet from the SC-III in an anechoic chamber.**



**Fig. 9—Near-field measurements in the listening room of woofer THD + N vs. frequency.**



**Fig. 10—Impedance.**

turer's sound room, so I expect that they would not show up in some other installations, or even bother all listeners, for that matter. However, the SC-IIIs make it easy to hear differences between good and bad recordings as well as between various amps and source components.

Overall, I am most impressed with the SC-IIIs and give them very high marks. I enjoyed reviewing them and would definitely recommend them—or any of Dunlavy Audio Labs' other speakers—for consideration by serious listeners. **A**

AURICLE

ANTHONY H. CORDESMAN

## dCS ELGAR 96-kHz/24-BIT D/A CONVERTER

**CD** is dead, long live CD! While this may sound like a paradox, it isn't with this equipment. The Data Conversion Systems (dCS) Elgar digital-to-analog converter offers you the opportunity to go on to the next generation of digital sound while still enjoying the current generation to its fullest potential.

used for the Sony/Philips Super Audio CD format.

For this review, dCS also sent me its 972 digital-to-digital converter, which enables you to extract further detail out of existing CDs by increasing the sampling rate fed into the D/A converter from 44.1 kHz to either 96 or 192 kHz. It cannot recover information that isn't there, but it does produce a cleaner and

Data Conversion Systems is a top supplier of digital equipment to recording studios and mastering houses and until recently has not had much of a presence outside of that market. The Elgar is actually a consumer version of the company's professional D/A converter. Unlike some consumer products derived from professional gear, however, the Elgar is very user-friendly. It is nicely styled and relatively svelte (16½ x 2¾ x 14½ inches), weighs a little under 7 pounds, and does not require a separate power supply. As a result, it can fit easily into almost any rack or shelf space.

The Elgar has a large array of inputs and can be used with any digital interface except the I<sup>2</sup>S bus connection. There are two AES/EBU inputs and four S/P DIF inputs (one BNC, one RCA, one ST optical, and one



The Elgar is the most flexible D/A converter I know of, capable of playing not only CDs and DATs but also 88.2-kHz recordings and the new 96-kHz/24-bit "DADs" introduced by Chesky and Classic Records (see page 32). It is also ready for 192-kHz recordings, should they eventually become available, and can be upgraded to handle the Direct Stream Digital (DSD) coding that will be

more transparent sound, ensuring that your existing disc collection will provide as much musical enjoyment as possible.

At \$12,000, the Elgar does not come cheap. (The 972, which is designed primarily for the pro market, is priced at \$5,750.) But it offers as good a guarantee as any D/A converter around against obsolescence and the problems created by today's format wars. It also has excellent volume and balance controls that enable it to drive a power amplifier directly, without a preamp. These features make the Elgar a considerably safer investment than most of today's best D/A converters.

Toslink optical). Both balanced and unbalanced stereo analog outputs are provided. The front-panel LCD display is excellent, conveying an unusually wide range of information (including the precise sampling frequency of the signal at the selected input).

The Elgar's front-panel controls are "Standby," "Display," "Phase," "De-Emphasis," "Input," "Mute," and "Volume/Balance." Changes to the volume or balance setting are displayed precisely in the front-panel LCD, making them easy to repeat.

I found the Elgar's size and ease of use to be a refreshing contrast to some of the clunkier high-end

**Company Address:** dCS, c/o Canorus, Inc., 240 Great Circle Rd., Suite 326, Nashville, Tenn. 37228; phone, 615/252-8778; fax, 615/252-8755; [www.canorus.com](http://www.canorus.com).



products. In contrast, the remote control is large, metal, and clunky but nonetheless perfectly adequate for the job.

This is one component that saves its best for where it really counts—the inside, which is truly impressive. One of the pleasures of really good high-end gear is the elegance of internal construction and circuit layout. Although I can't recommend using a glass top to show off the Elgar's interior, it is beautifully built, and its digital-to-analog circuit board is one of the most complex I have ever seen.

DCS was among the first companies to develop professional 96-kHz/24-bit equipment (the 902D A/D and 952 D/A converters), and the Elgar shares much of that technology. In particular, it uses what dCS calls a "ring DAC," which is said to avoid the pitfalls of both 1-bit (bitstream) and conventional multibit converters. DCS contends that a 1-bit converter has good linearity but that, because it must run at very high speed internally, it is prone to noise and distortion caused by small clock errors. And dCS says that it's difficult to apply noise-shaping aggressive enough to overcome a two-level quantizer's inherently poor S/N and achieve an extremely low noise floor.

Multibit converters, on the other hand, rely on current sources set by a resistor chain. This chain requires resistors that adhere to unusual values with extreme precision, which are difficult to manufacture and then subject to drift over time and with changes in temperature. As a result, dCS feels multibit converters are prone to poor low-level linearity and cannot accurately resolve low-level signals.

DCS claims that the ring DAC in the Elgar operates at a relatively low oversampling frequency compared to 1-bit converters and that the consequently lower clock speed reduces its susceptibility to jitter. The ring DAC is not a traditional multibit converter, either. It is built around a 5-bit modulator, which is said to eliminate the problems associated with using resistor chains to define extremely small current values while yielding good stability over time and changes in temperature.

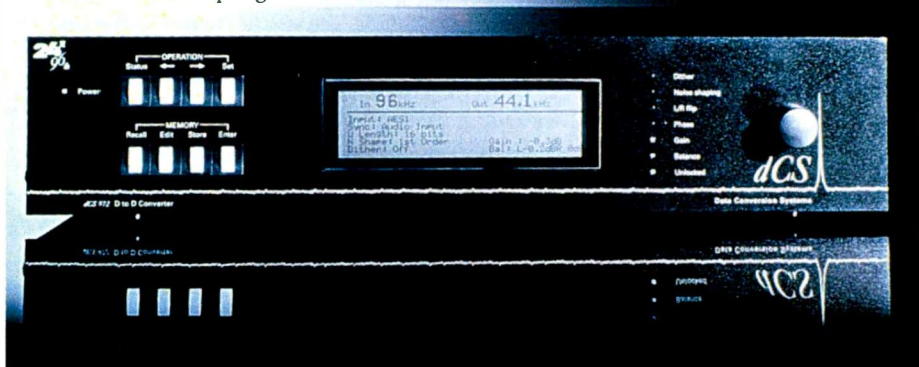
The Elgar is designed to facilitate future upgrading. It has custom-designed, software-based digital filters, and programmable gate arrays, which read from its EPROM, are used for a wide range of signal

processing and routing tasks. In the current design, only 20% of the EPROM's capacity is occupied, leaving plenty of room for new software.

The Elgar already is capable of 24-bit, 96-kHz conversion, and its sampling-frequency limit is being raised to 192 kHz. This compares to the 18- to 20-bit, 48-kHz ceilings of most competing D/A converters (although a few competitors use partial 24-bit processing, and several manufacturers have said they will soon introduce full 96-kHz/24-bit converters). Equally important, the Elgar can be upgraded to handle the DSD process (but only for two channels)

without audible ringing from anti-aliasing and reconstruction filters. It says that the filters used for 44.1- and 48-kHz sampling spread their audible impact over a relatively long time period and that even a 96-kHz filter presents some problems, though it keeps the energy associated with transients to within  $\pm 100$  microseconds (versus 400 to 500 microseconds for 44.1- and 48-kHz conversion). Raising the sampling rate to 192 kHz is said to reduce the smear to  $\pm 50$  microseconds. DCS argues that these energy-decay characteristics are clearly audible at  $-40$  dB for 44.1- and 48-kHz conversion and that this helps to explain why higher

The dCS 972 sampling-rate converter



that Sony and Phillips plan to introduce next spring in the Super Audio CD format. This makes it a universal converter with respect to both existing signal sources and the new stereo formats that are currently under discussion.

DCS has issued several white papers supporting the desirability of moving to higher data rates for digital audio. One particularly interesting argument the company makes is that the reason for going to 24-bit A/D and D/A conversion is not to achieve 140+ dB of dynamic range but, rather, to improve overall performance. DCS says that the high-precision clocks required for 24-bit conversion, the recording headroom and effective dynamic range, the low differential nonlinearity, and the avoidance of gain-ranging are all critical factors affecting sound quality.

The company also argues that sampling frequencies of 96 kHz and higher are the lowest that yield neutral reproduction

sampling rates produce a cleaner and more realistic soundstage.

Anyone who has followed the literature, including Bob Stuart's recent articles in *Audio*, knows that there are different views regarding what word length and sampling rate are really necessary. However, both Chesky and Classic Records—companies that are now introducing 24-bit/96-kHz discs—have experimented with a range of word lengths and sampling frequencies and say that each increase has produced a clear improvement in sound quality.

I have not had the opportunity to do this kind of comparison for myself, but my listening sessions with the Elgar did make a powerful case for the excellence of its performance in reproducing both CDs and the new 96-kHz/24-bit releases. I compared the sound of the Elgar principally to that of a Theta Digital DS Pro Generation V-a Balanced D/A converter, which also is capable of handling the 96-kHz sampling rate, has

**THE ELGAR CAN BE  
UPGRADED TO HANDLE  
192-kHz SAMPLING  
AND SONY'S  
DSD PROCESS.**

24-bit resolution going into the DAC, and can produce the equivalent of a 20-bit output. I also compared it to a Mark Levinson No. 30.5 and several other high-quality D/A converters and CD players.

It is difficult to generalize about the differences in the way very-high-quality D/A converters reproduce CDs without extensive listening to a wide variety of CDs and transports. In some cases, I find that the sound quality of the disc itself makes it impossible to explore the limits of the D/A converter's capabilities. In others, high-quality converters sometimes produce clearly audible improvements in old or low-quality CDs, although in ways that differ in sonic nuance and detail, depending on the particular CD and DAC.

The best converters provide more consistent improvements in sound quality with the latest high-quality DDD CDs, particularly those made from

20- to 24-bit master tapes by way of noise-shaped downconversion, such as Sony's Super Bit Mapping (SBM) process. These improvements are particularly apparent when you're playing well-produced CDs of acoustic instruments recorded with minimal miking and mixing. The differences inevitably vary in detail, but it is hard to say that the qualities of one top converter are decisively better than those of another without access to the original master tape.

What you hear also depends on the transport and interface used with a D/A converter. (I used the Theta Jade and David transports, although I also tried the Elgar with Mark Levinson and Wadia Digital front ends in friends' systems.) It is clear that the choice of transport, interconnect, and interface does have an impact and that the different levels of synergy between different mixes of transport, interconnect, and D/A converter mean that you have to listen to a given combination to know exactly what sonic characteristics you will get.

After all of my listening, I can state that I have never heard a D/A converter that sounded better than the Elgar. It has superb low-level resolution, transparency, and detail. Its soundstage is as clean as any that I have ever heard. It provides excellent depth

whenever there is depth in the recording, and its localization of voices and instruments is equally excellent, without any broadening of the image or artificial spot-lighting. Upper-midrange and treble performance are as good as the CD permits, and midrange reproduction is state of the art. You may hear slightly different nuances with other D/A converters, but you will not hear superior sound. (I found the Elgar was better still when I bypassed my preamp and avoided the need for an extra set of interconnects. The sound got even cleaner and more transparent.)

If there are any areas where other D/A converters have a slight advantage, they lie in the bass and in dynamic contrasts. The Elgar's bass was excellent in terms of extension and detail, but it did not always have the power and drive of the Theta's. Some will argue that the Theta slightly exaggerates the deep bass (the Levinson converter sounded closer to the dCS), others that the Elgar is just slightly soft. (This is yet another reason you have to listen to various combinations yourself.)

The same kind of differences emerged in terms of dynamics. Both the Elgar and Theta deliver excellent dynamic contrasts, with a great deal of natural energy and life. They are often strikingly superior in bringing back the life that's missing from CDs heard through many less advanced converters. The Theta, however, often produced sharp dynamic contrasts from CDs containing a great deal of high-energy music, such as orchestral music, opera, and jazz bands. The Elgar often produced more musically natural contrasts with chamber music and smaller jazz groups. Once again, the Levinson sounded closer to the dCS, but this time, so did the Wadia.

But now, let's introduce the dCS 972 into the equation. This professional sampling-rate and format converter was designed for studio use, and it very definitely is only for the ultimate audiophile. Most people are never going to need to convert from one sampling frequency to another, and the only reason for adding the 972 to a home system is that increasing the sampling fre-

quency from 44.1 to 96 kHz (or the 192 kHz that will soon be incorporated) makes most CDs sound better.

Why? Well, dCS really doesn't have a scientific explanation. In fact, the company sent me the 972 to play around with only because they had found by listening that it improved sound quality. And they are right, although the effect is not dramatic. What you get are cleaner and better transients, more low-level information, slightly cleaner and faster bass, sweeter upper midrange, more low-level soundstage information, and greater depth. (The 972 also worked well, incidentally, with the Theta DS Pro D/A converter and would probably work just as well with any other DAC capable of handling high sampling rates.)

The level of improvement did, however, depend on the quality of the recording. The improvement with old CDs was least predictable. Sometimes the dCS 972 could clean up an old CD in ways that were immediately apparent. Other times, there was little, if any, difference. The improvement with newer CDs was more consistent but less striking. I could almost always hear an improvement in detail and transparency, but it was usually slight. It was usually more apparent when I removed the 972 from the system than when I inserted it. This subjective phenomenon seems to occur with many subtle sonic enhancements: You do not notice improvement as quickly or easily as you notice degradation.

The 972's effect also depended to some extent on the front end and interface: The better the CD transport, the better the sound. Really good AES/EBU cables and connections sounded better than any type of S/P DIF connection. Placing a Genesis Digital Lens between the transport and the 972 helped in some cases but not all.

In short, you have to experiment with the dCS 972 to find the best synergy between it and the rest of your digital gear, and its importance will vary by system and listener. The only way you can evaluate the relative value of the 972 is to listen to it with *your* components and a variety of CDs. I can assure you that you will hear *some* benefit, but whether you find this benefit worth \$5,750 in your system is something only you can judge.

The most exciting part of my sessions with the Elgar came when I started listening

**THE ELGAR'S RING DAC  
IS SAID TO AVOID  
THE PITFALLS OF BOTH  
1-BIT AND MULTIBIT  
CONVERTERS.**

to the new 96-kHz/24-bit DVDs from Chesky and Classic Records. Please understand that these are early days. I did not have a dedicated transport, although I did have access to Theta Digital's new David DVD player, which is said to have the exceptionally low jitter needed to reproduce 96-kHz/24-bit. The David also passed a full 96-kHz/24-bit data stream to the Elgar. (All DVD players must be able to handle 96-kHz/24-bit PCM audio internally, but most of them downsample it—to 48-kHz/20-bit, for example—before passing it to their own D/A converters or to their digital outputs.)

The Elgar's performance with the 96-kHz/24-bit discs was stunning; I can hardly wait until more become available and the industry moves permanently beyond CD. The differences in sound quality between CDs and 96-kHz/24-bit releases are far more important than those you hear in going from a mid-grade to a top-of-the-line CD transport or D/A converter.

With a D/A converter like the Elgar, 96-kHz/24-bit digital audio is a real rival to analog. Classic Records gave me the same mate-

rial on 33 $\frac{1}{3}$ - and 45-rpm phono discs, CD, and 96-kHz/24-bit DVD. A lot of this material came from old analog masters. I found the 96-kHz/24-bit versions to be far better than the CD renderings and as good as the 45-rpm record. Much as I love my turntable, the lower noise of the 96-kHz/24-bit digital was generally more important to me than the superior midrange detail I still

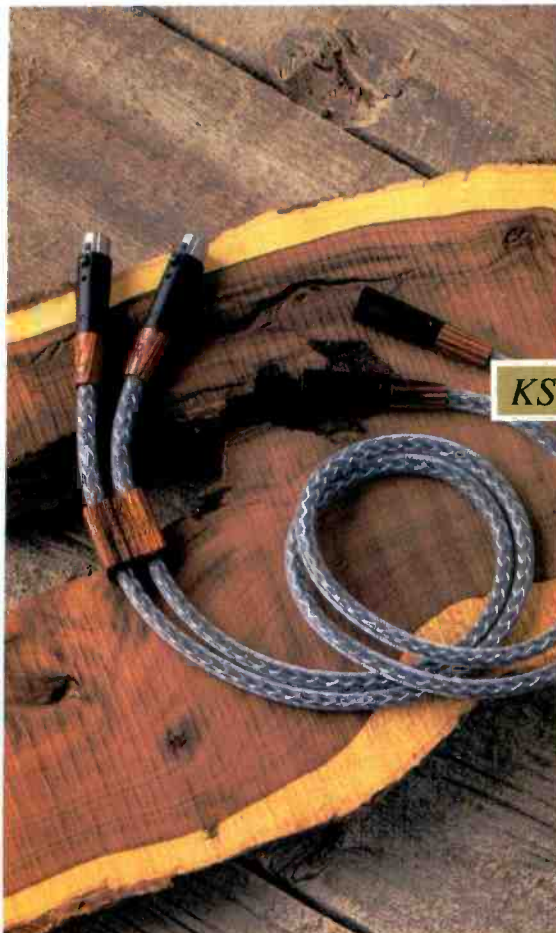
**I HAVE NEVER HEARD  
A D/A CONVERTER  
THAT SOUNDED BETTER  
THAN THE ELGAR.**

sometimes heard on records. I came away feeling that, relative to LPs, 96-kHz/24-bit recordings offer a more enjoyable and accurate way of reproducing performances recorded on analog tape and that they combine most of the best features of analog and CD.

Chesky provided a disc made directly from 96-kHz/24-bit digital master tapes,

and it gave me an indication of what can be done with the latest equipment, simple mixing, minimal processing, and high-quality digital transfers. Voice was notably cleaner than on the comparable CD. There was an immediate increase in low-level detail and presence. Strings and guitar were more realistic. Drum percussion transients were cleaner and more precise. Imaging improved, recordings became more live and dynamic, and upper-midrange overtones became sweeter and more harmonic. I won't say that the 96-kHz/24-bit recording sounded "live"—only real life ever does—but it sure sounded much more like a master tape than CD.

Although CD can hardly be considered dead, I have heard the future, and it is clear that it is possible to establish a whole new plateau of sound quality. If the audio industry shows any intelligence at all in resolving the looming format war between DVD-Audio and the Sony/Phillips Super Audio CD, every aspect of high-end sound will be redefined. As I suggested in the beginning, CD is alive, but long live the new alternatives! A



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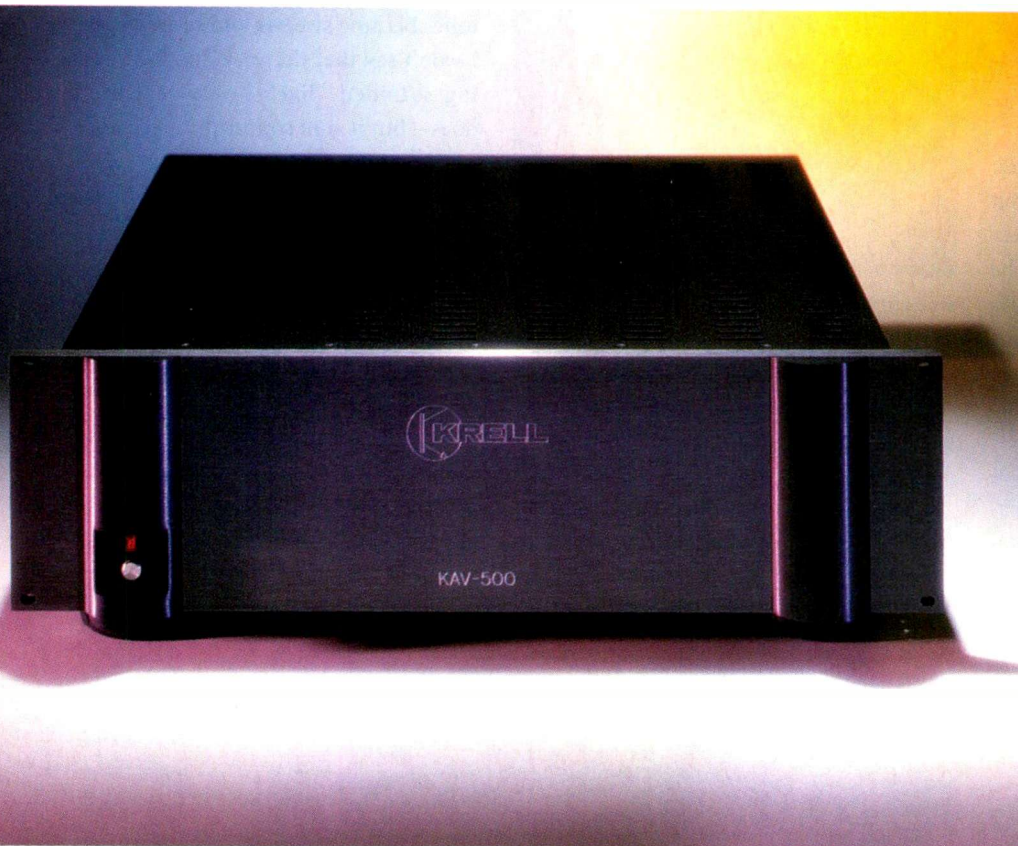
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# KRELL KAV-500 MULTICHANNEL AMP



It would be a real shame if audiophiles were to use the KAV-500 only as a home theater amplifier. Although its Class-AB design breaks with Krell's traditional Class-A topology, the KAV-500 has much of the refinement and subtlety you expect from Krell's considerably more expensive reference amplifiers. And its multichannel flexibility seems tailor-made for the growing number of speakers that benefit from biamping. Also, its 12-volt turn-on trigger can make it use-

ful for multiroom as well as home theater systems.

At \$3,000 for a two-channel unit and \$4,500 for the five-channel configuration, the KAV-500 is, by Krell standards, something of a bargain, especially as you can buy it with only the number of channels that you need to amplify and add more as your system grows.

The KAV-500 is compact (6¼ inches high, 19 inches wide, and 17 inches deep) and weighs just 47 pounds. By contrast, a pair of Krell's FPB-series

Class-A stereo amps would cost at least \$11,800 and take up at least three times the space, and you'd have to be a sumo wrestler to lift them. These savings in cost, bulk, and weight are partially due to the 500's Class-AB design and partially to its having the lowest power per channel of any Krell amp: It's rated to put out up to 120 watts into 8 ohms and 200 watts into 4 ohms, but you can bridge any two adjacent channels to provide 400 watts of output. I was very pleased to see that each channel has balanced and unbalanced inputs—as well as switchable gain so you can get the same output level from either input. (Balanced connections normally give you 6 dB greater gain and 6 dB lower noise.)

The reason I described the KAV-500's output as "up to" 120 watts per channel is that this rating applies only to configurations of two, three, or four channels; with all five channels installed, they are rated at 100 watts apiece. The reason for that is that the amplifier uses a single, massive power supply (with a 1,000-volt-ampere toroidal transformer and 104,000 microfarads of filter capacitance) instead of five separate ones. With a single supply instead of one per channel, each channel can draw as much of the total current as it needs, enabling the KAV-500 to deliver far more power to the channels that need it, moment to moment, than the amplifier's power rating would suggest. In short, while the

**THE KAV-500  
IS A TRUE KRELL,  
EVEN THOUGH  
YOU CAN LIFT AND,  
POSSIBLY, AFFORD IT.**

KAV-500 does not give you the state-of-the-art circuitry and performance you get with the higher-priced spread, it does give you Krell's superb con-

struction and elegant styling and one hell of a lot of technology.

Even though this is a five-channel amp, I spent much of my time auditioning its performance in a reference-quality stereo system rather

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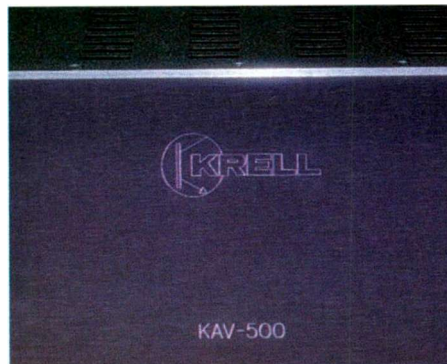
than a home theater. I did this because very little material on today's soundtracks can really challenge the KAV-500. And besides, using this amp in a stereo setup gave me an irresistible chance to make a very unfair comparison between its sound and that of two Krell 300-watt Model KSA-300S stereo amplifiers I use. The more powerful Krell separates were more dynamic, provided greater deep-bass power and definition, had superior soundstage detail, and offered more sonic information and better harmonic definition at low levels. With good recordings, the KSA-300S pair always provided a bit more sense of space and more air and also had a bit more detail and sweetness in the top octaves. Nevertheless, the 500 still did very well, and in blind comparisons I could hear surprisingly little difference between it and its big brothers on voice or most instruments.

The differences in the bass were a bit more obvious, but the KAV-500 still proved to be damn good. I used it to drive the new VMPS Super Tower III, an immense speaker that's about 6½ feet high, has a massive synthetic-granite enclosure weighing 450 pounds, and uses four 12-inch carbon-fiber woofers and one 12-inch passive radiator. The VMPS can produce incredible bass energy and definition down to frequencies well below 20 Hz and imposes far more demands on an amplifier's bass performance than most speakers do. Nevertheless, the KAV-500 admirably handled test tones from 25 to 40 Hz and extremely strenuous deep-bass music, including the organ and percussion on *Pomp & Pipes* (Reference Recordings RR-58CD) and the deep organ notes on Jean Guillou's recording of Musorgsky's *Pictures at an Exhibition* (Dorian DOR-90117). It provided far better bass than most stereo amplifiers and delivered deep-bass power without losing definition or control.

So, while the KAV-500's soundstage may not have been the ultimate, it was damn good—more open and detailed than that of any other five- or six-channel amplifier I have tested. This amp may not deliver all the subtlety and detail of Krell's top-of-the-line models, but it does have exceptionally clean sound.

The Krell KAV-500 really made complex and highly dynamic music come alive. It had no problem at all getting the best from

the phonograph and Compact Disc versions of Frederick Fennel's *Hi-Fi Española*, whose superb imaging and soundstaging, even in very loud and complex passages, causes problems for many other amps. (I find the music on this Mercury Living Presence sonic spectacular incredibly



**THE KRELL KAV-500  
DELIVERED DEEP BASS  
WITHOUT LOSING  
DEFINITION OR  
CONTROL.**

jejune, but its sonic virtues justify its cult following; the CD, if you're interested, is Mercury 434-349.)

The Krell did equally well with complex and difficult passages found in José Serebrier's recording of Janáček's *Sinfonietta* (Reference Recordings RR-65CD). This CD opens with some of the most demanding massed brass passages in music, and Keith Johnson's engineering has superbly captured the feeling of a live performance. On this recording, too, the KAV-500's performance came surprisingly close to that of the KSA-300S.

Similarly, the KAV-500 coped very well with David Chesky's new *Three Psalms for String Orchestra* (Chesky CD163), a natural recording with lots of subtle string detail. A mediocre amplifier employing bipolar output devices can make this recording sound a bit hard and can sacrifice some of its air and presence; a MOS-FET or tube amp that is too sweet can blur string detail and lose the recording's sense of space and naturalness and the subtle transitions that give it meaning. The KAV-500, however, has high definition and exceptional dynamic life, without the touch of hardness and edge

that I associate with most power amplifiers that have bipolar transistors.

This balance between detail and sweetness may be due to the bipolar devices used in the KAV-500, proprietary metal-cased Motorola transistors of the same type used in Krell's most expensive amps. (The 500 has eight of these 15-ampere, 250-watt output transistors per channel.) These devices are said to be exceptionally linear and to provide the outstanding dynamics of bipolar devices and the sweetness normally associated with FETs or MOS-FETs; that certainly sounds like what I heard.

As for speaker compatibility, the Krell KAV-500 easily handled the loads from the VMPS speaker's ribbon midrange and tweeter, Apogee full-range ribbon speakers, Quad and Martin-Logan full-range electrostatics, and such top-quality dynamic speakers as the B&W 801 Matrix Series 3 and Thiel CS6. With the Thiel, bass and dynamics were excellent; the Krell emphasized the transparency of its upper octaves without adding hardness. This amp is not particularly sensitive to speaker cables and will sound its best with any top-quality cables (or at least with the AudioQuest, Discovery, Goertz, Kimber, and WireWorld cables I tried).

Switching from a stereo setup to home theater, I used the KAV-500 to drive my Polk Audio Signature Reference Theater setup, which has powered subwoofers on the four main channels, and a mix of unpowered Vienna Acoustics speaker systems with a REL Stentor III active subwoofer. I also used the KAV-500 with a number of different surround preamps, including a Krell Audio + Video Standard (*Audio*, December 1997) that has both Dolby Digital and DTS surround decoding capability. As might be expected, the two Krell units made a superb combination, although the KAV-500 worked equally well in partnership with Lexicon, Meridian, and Theta Digital surround processors.

It became clear during this part of my listening that the KAV-500 could provide the same dynamics, detail, bass, and soundstaging in a home theater that it could in a reference-quality stereo system. It may not be as powerful as the Cinepro 3k6SE six-channel amp that I reviewed a few months ago (*Audio*, January 1998), but its upper octaves are subtler, sweeter, and more natural, and

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it provided a slightly superior feeling of ambience and space from well-recorded soundtracks and CDs.

Alas, the few passages on current soundtracks that can really challenge the KAV-500 call for listening levels better suited for World War III—it's like hearing the end of civilization take place in your listening room. (Hollywood clearly favors bangs over whimpers.) The KAV-500 did not reproduce car crashes, plane crashes, super-loud spaceship explosions, or gunfire quite as loudly as the Cinepro, but it handled everything else superbly. I came away wishing that more producers and recording engineers would take full advantage of DTS and Dolby Digital and bring out soundtracks that could stretch the 500 closer to its limits. Of course, there are some interesting discrete digital soundtracks. These include *The Long Kiss Goodnight* (DTS version), *Casper* (which, in DTS, offers one of the few realistic presentations of interior room sounds and space available), *The English Patient* (which presents a good sense of space and distance), and *Seven* (although, in the great Hollywood tradition, its helicopter sounds make little acoustic sense to anyone who has actually flown in one). At the same time, I have yet to hear a DTS or Dolby Digital soundtrack that gives as dramatic a sense of being outdoors as the forest

**I WISH HOLLYWOOD  
WOULD GIVE US  
MORE SOUNDTRACKS  
TO MATCH THE KRELL'S  
AUDIO QUALITY.**

scenes in the Dolby Surround version of *The Last of the Mohicans*.

Fortunately, those few golden moments on soundtracks promise that producers and sound engineers may eventually exploit the potential of Dolby Digital and DTS more adventurously—and for the whole movie, not just occasional scenes. The Krell KAV-500 did a superb job in reproducing these magical moments on my best laserdiscs and DVDs. I can only hope that movie soundtracks begin consistently living up to this Krell amp's level of sound quality as soon as possible. **A**

**YAMAHA, continued from page 43**  
steady-state conditions) likewise was pretty good.

I used Dolby Labs' Dolby Digital test disc and the DSP-A1's AC-3 decoder for the final two graphs. (No test disc was available for evaluating DTS 5.1-channel decoding.) Figure 21 shows response for "Large" and "Small" center-channel speaker settings, together with LFE-channel response. (I tested the response of every channel, but give or take a few hundredths of a decibel, the curves were identical, so I've included only the center and LFE.) The "Center, Large" curve is pretty much the same as the response for the DAC alone, seen in Fig. 9. (When comparing, again be aware that the vertical scales are different.) The curves in Fig. 21 don't begin at 20 Hz because it takes the decoder a moment to lock onto a signal, by which time the signal on the test disc has swept beyond 20 Hz. This is a problem only with Dolby Labs' test disc and has no bearing in real life.

Level matching among the channels (using the default gain settings) was not as good in Dolby Digital mode as it could be, but I doubt if the outputs from many speakers are matched any better, given the differences in the acoustic environment within which they must function. You can compensate for these differences, however, by using the DSP-A1's internal test-signal generator and speaker-balance menus.

Distortion in the LFE, front left, and front right channels was extremely low with AC-3 decoding; in the center and surround channels it was noticeably higher but nothing to get excited about. Channel separation from 100 Hz to 10 kHz ranged from 74.4 to 52.1 dB, which is by no means a record but adequate nonetheless; best- and worst-case curves appear in Fig. 22.

#### Use and Listening Tests

Though I used the Yamaha DSP-A1 mainly in my home theater, I listened to a good bit of music there—DTS-encoded as well as straight stereo, with and without Yamaha's Digital Soundfield Processing. I was impressed. I'm still impressed.

On movie soundtracks, Yamaha's Tri-Field Processing and seven-speaker array seemed to produce a wider, deeper, more enveloping soundstage than conventional approaches, although I occasionally felt this was achieved at some sacrifice in image stability. But the sound really grabs you! And isn't that what the home theater experience is all about?

Reactions to DSP enhancement of music are definitely matters of personal taste. I prefer to use it on pop, big band, and orchestral programs; after a time, I find it can sound somewhat unreal on classical solo performances. And it's all a matter of degree. On the whole, I prefer milder enhancements than the factory presets provide, probably because they're set to impress the customer in the store.

That said, the Yamaha DSP-A1 has about the most real-sounding DSP algo-

rithms I've heard in an integrated component, and the flexibility that it offers is exceptional. You should be able to attain the sound characteristics you want for just about any program material, though it can take some effort.

The DSP-A1's complexity results from Yamaha's multitiered approach to soundfield modification: factory settings that are based on "real-world" sound fields plus user-controlled alterations of response and timing. Once you abandon the factory presets, the number of combinations and permutations is virtually limitless. Fortunately, the A1's manual is far more revealing of technical detail and setup procedure than most, and I find its on-screen menus more straightforward and intuitive than many. Between the manual and the excellent menuing, you can corral this bronco.

I can say without hesitation that the Yamaha DSP-A1 is the best-conceived, most versatile, and most complete controller/amplifier that I have discovered to date. It has a marvelous ability to enfold you in sound, and its feature list is endless. You needn't use each and every function—you may never use them all—but they're there for you to explore when you've a mind to. If there is a roadmap to sonic satisfaction, this is it. **A**

**YAMAHA'S DSP-A1 HAS  
A MARVELOUS ABILITY  
TO ENFOLD YOU  
IN SOUND.**

# UNISON RESEARCH POWER 35 AMP AND FEATHER ONE PREAMP

**P**roving that civility still exists, Unison Research has grown to be one of the largest manufacturers of single-ended triode amplifiers without ever behaving in the obnoxious, elitist, or merely antagonistic manner of its coreligionists. For

are even rumors of a design using the 6C33C, that fat Russki tube with the er, nipples on top. So making the conceptual leap back into vintage territory with a push-pull design is not as out of character as it might seem. Clearly, the Power 35's quartet of EL34s presents no shock to Sachetti's system because he's used that tube successfully in the company's entry-level single-ended designs, running this classic pentode in triode mode.

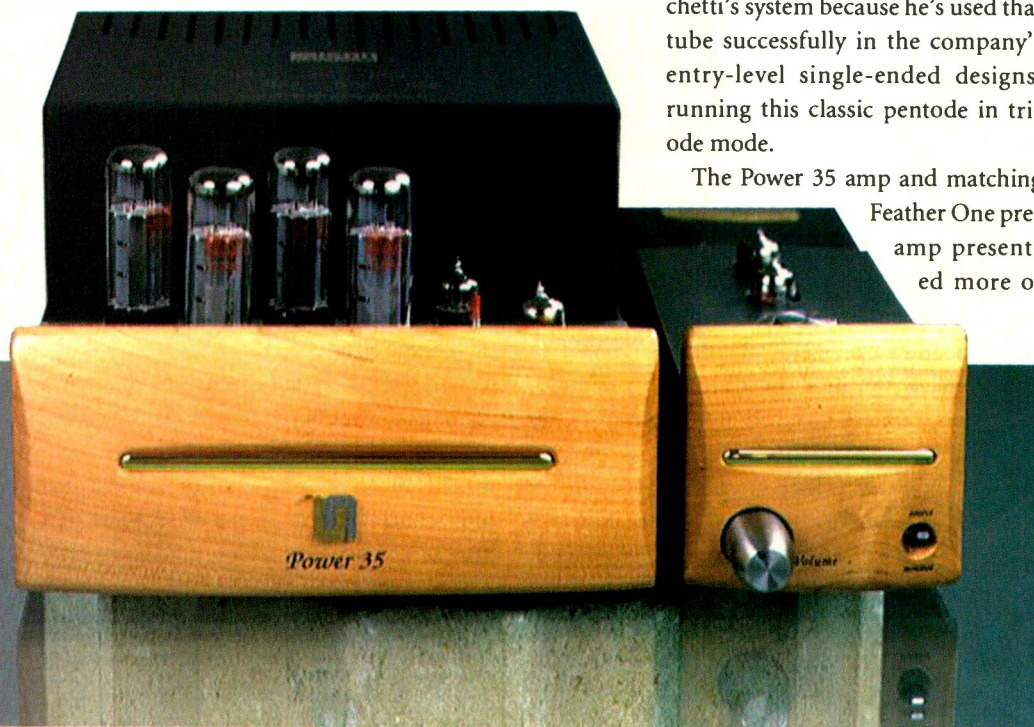
The Power 35 amp and matching Feather One preamp presented more of

of conspicuously placed round meters with vintage styling are not enough to distract the eye from a homely chassis. Even in its first appearances at hi-fi shows, Unison Research froze observers in their tracks by clothing its amplifiers in sculpted wood. And I do mean "sculpted": all compound curves, slopes, and angles; rich cherry or walnut accented by metals, ceramics, stainless steel; and textured paint—ensuring that a Unison Research amp could be mistaken for no other.

But it wasn't simply a heritage of mixing shapes and materials that led to the unusual topology of Unison's Feather One line-level preamp and the 35-watt/channel Power 35 stereo power amp. The preamp, which has no power supply, can derive its power from a socket at the back of the amp. But since the Feather One is a highly covetable thing on its own, it can also be powered from a stand-alone supply for use with other amps. Then again, the Power 35 is equally yummy.

Where Chiarello rewrote the rules (yet again) is in overall shaping and layout. There have been deep, narrow preamps before (Max Townshend made one 20 years ago whose front panel was just under 2 inches across), but the Feather One isn't just a case of downsizing. It's also an ergonomic exercise that follows an early Unison Research practice of placing controls on both the top and front panels and its inputs on the side rather than the back. Not that the back panel is empty: It contains the captive cable for connecting the preamp to either the stand-alone power supply or the Power 35, plus the main signal outputs.

And then there's the styling. Chiarello gave the Feather One a



more than a decade, it has offered the most physically attractive, dependable, and sensibly priced examples of the genre, as musical as they are pretty. So why, all of a sudden, has this Italian firm released a push-pull tube amp?

Unison Research is nothing if not flexible. While its chief designer, Prof. Giovanni Sachetti, clearly favors the 845 tube for most of the company's products, he still cooked up a 300B model when asked; there

a challenge, though, to Carlo Chiarello, the man responsible for the Unison Research "look" and the one who has made Unison designs stand out from a generally ugly crowd. (Before I forget, another part of the Unison Research heritage is ridiculous model nomenclature, including the notorious "Glowy.") Not all modern tube amps are weird attempts at blending retro and techno; the majority are metal boxes with tubes planted on top, and a couple

**Company Address:** c/o Audio Europa, 914 South Santa Fe Ave., Suite 204, Vista Cal. 92084; phone, 760/726-1321; fax, 760/941-4915; lhendersho@aol.com.



small, gently rounded 5 x 5-inch front panel and a depth of 18 inches to create a sleek and tactile unit, with a charcoal case and a floating stainless steel top plate through which protrude the tops of the two 12AX7 tubes. At the front of the top plate is a rotary source selector, while sprouting from the front panel is the volume knob, in the shape of a truncated bullet. To its right is a toggle switch selecting "Source" or "Tape." And grouped together at the front of the right side panel are the phono sockets for four line inputs and tape in/out.

But the neatest touch is a dose of new technology that further enhances the unmistakable Unison Research look. Across the width of the preamp's faceplate is a strip LED that glows to indicate power-on, and the lighting is gentle and even. The color itself? That wonderfully sickly lime hue previously seen on Porsches in the 1970s, when taste wasn't an issue. I've been assured that this is a new type of illumination and that it emphatically is *not* a row of LEDs but a single part. It's also reason enough to want to place the Feather One next to the Power 35, which sports the same strip LED.

Feather One's sister derives its 35 watts per channel from a pair of EL34s per side, 17.5 watts each being well within their capability. They're driven by a 12AX7 and a 12AU7, and the amp's 50-pound weight attests to a seriously over-specified power supply—another Unison hallmark. Further proof of the amp's parts density is that this weight is contained in a chassis only 10½ inches wide. The front panel is the same height as the Feather One, but the back section, just behind the tubes, is 4 inches taller. Interestingly, the shape allows for the fitting of a cage to protect the tubes, though none appears to be offered.

The Power 35's design details, in addition to the matching wooden front panel with the strip LED, include a stainless-steel plate surrounding the tubes, a rear-panel power switch, a detachable AC cable, a grounding post, and multiway speaker connectors—three per channel—to enable the user to match the amp to 4- or 8-ohm speaker loads. The Power 35 operates in Class AB, and feedback is said to be limited to 8.7 dB.

Because the Feather One is line-level only, the Power 35 provides a socket to drive either of Unison's stand-alone phono preamps. The Feather One's only option is remote operation, via a teensy hand-held

controller bearing only up-and-down buttons and a red LED to indicate that it's operating. (The preamp's volume control is motorized.) So tiny is this remote—not much bigger than the "plipper" controlling a car's alarm system—that it features a loop for a key ring so you don't lose it. Cute, but I'd opt for a learning remote and train it to operate the Feather One.

Confession time: The EL34, by virtue of near-ubiquity a generation ago, is one of my all-time favorite tubes; my first serious amplifier, a Radford STA25, used four. This venerable valve seems to me to represent all that was fine, good, and nice about the

**THE POWER 35  
IS PERFECT FOR THOSE  
WHO WANT GOLDEN-AGE  
AMPLIFIER SOUND  
WITHOUT THE HASSLES.**

all-tube amplifiers of the 1950s and 1960s. The EL34s in the Power 35 are of Russian origin, made by Sovtek for Unison Research. As is Unison's practice, biasing is automatic, and the Sovteks have a reputation for ruggedness, so ownership of the Power 35 should be a painless affair.

While I was (sort of) counting on the Power 35 to remind me of my favorite oldies—especially the Dynaco Stereo 70 and the aforementioned Radford—I did not expect it to be such an animal. This is one deceptive little powerhouse; its size and specs do not prepare you for such ballsy behavior. You can immediately cross off your shopping list all of the speakers you were considering only because of absurdly high sensitivity: nasty horns, weird cabinets, and other sorry-ass attempts at making up for the usual dearth of wattage associated with single-ended designs. The Power 35 drove whatever I connected to it, including Quad 77-10Ls (small, hungry, two-way speakers), Rogers LS3/5As (15-ohm loads), New Audio Frontiers Reference Ones (massive towers with sensitivity of 90 dB SPL for 1 watt), and Quad electrostatics (new and old versions).

Used with a Krell KAV-300cd Compact Disc player, the Feather One and Power 35 combo proved as complementary as one would expect matched siblings to be. The

Feather One is exceptionally quiet and neutral, with plenty of headroom and enough transparency to ensure that it's not mistaken for a vintage control unit. I also used it with a Dynaco Stereo 70 and a pair of Quad II amps to see how it fared with elder amplifiers; it gave them a dose of modernization that showed why power amplifiers of yore appeal more to today's users than do equally aged preamps, which tend to be too noisy regardless of condition. The Feather One, as its name suggests, is light of touch, and its delicacy balances the meatier performance of the Power 35 amp and of my collection of antiques.

Especially pleasing is the Feather One's almost squeaky-clean sound—probably fine-tuned so as not to jar younger listeners who simply can't understand how previous generations lived with tube haze, whoosh, or low-level rumblings. Even when driving modern solid-state amps, it managed to demonstrate tube warmth without compromising the clinical precision of circa-1998 transistor amps.

But the Power 35—wow! This is an absolute gem, guaranteed to please those who, deep down, want to run Golden Age amplifiers but don't want the aggravation of nursing transformers nearing their dotage, replacing leaky caps, sourcing new switches, fitting corrosion-free terminals, and so forth. It has the bloom, the rosiness, and the ear-friendly treble that make old tube amps the sonic equivalent of comfort food, yet its sheer newness guarantees the speed and detail that so characterize the digital era. Better still, the Feather One tightens up the sound and adds a modicum of control to produce bass that is free of slop or overhang. What was so pleasing to these ears was the equanimity with which the Unison Research pairing treated recordings made 40 years apart: John Lee Hooker on Chess or John Lee Hooker on Virgin, Frank Sinatra on Columbia or Frank Sinatra on Reprise—it made no difference. The Feather/Power combo rose (or, rather, floated) to the occasion.

At \$1,345 for the Feather One (\$1,595 with remote control) and \$2,595 for the Power 35, you're looking at a true rarity: transatlantic bargains. Because, believe it or not, the company managed to keep the prices the same on both sides of the water. Which kinda makes them offers you can't refuse. **A**

# ROCKTRON HTD1 CIRCLE SURROUND 5.2.5 DECODER

**W**ith so much recent talk about Dolby Digital and DTS, it may seem an odd time to report on an analog matrix surround decoder—especially one that's not designed specifically for Dolby Pro Logic decoding. But most of the signals coursing through our home theater systems are still two-

limitations of most artificial ambience circuits and of all but a few Dolby Pro Logic processors. But because processors that manage to achieve very high levels of fidelity, such as those from Lexicon and Meridian, have correspondingly high price tags, there's still a need for a high-quality, moderately priced analog processor that is capable of creating

other surround matrixes and even better results from plain stereo CDs.

Circle Surround was designed primarily with music in mind. It's the first surround process I've heard that seems to have gotten music steering right. And it avoids a major problem found in many other matrix surround processors (especially Dolby Pro Logic units), the tendency of the image to collapse to mono when there is a very strong center-channel signal or when the music becomes very dense or loud. (The steering algorithms in Pro Logic, fine for film soundtracks, tend to steer instruments helter-skelter around the room when reproducing stereo music.) Another benefit of Circle Surround's steering is improved separation in all directions—including full stereo out of the surround channels.



channel analog, whether stereo or matrix-encoded surround. And although Dolby Surround dominates home video soundtracks, it's just one of several surround matrixes you'll find on CD; my own collection also includes discs with UHJ Ambisonics and Circle Surround encoding, as well as the Shure StereoSurround variant of Dolby Surround. What's more, it will be some time, if ever, before these recordings are reissued with discrete digital surround, and few of us will want to replace more than a handful of our recordings.

For music playback, digital surround has pointed up the serious

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a convincing, non-gimmicky surround sound field from two-channel sources, including LPs. After more than a year of living with Rocktron's Circle Surround decoding, I'd say that it fills the bill nicely.

Unlike some other matrix systems, Circle Surround is a "5.2.5" matrix, encoding five (not four) channels into stereo's two and able to decode all five channels in playback. Although Circle Surround recordings are available from Telarc, dmp, and one or two other labels, they're hardly ubiquitous. But as I found, this is no problem; both Circle Surround decoders I've tried gave me good results from recordings made with

The image positioning is very accurate, and the original left and right stereo signals suffer none of the mixing and confusion they do with other active matrix processors. (In this regard Circle Surround is similar to the

**CIRCLE SURROUND  
DECODERS  
SUPPLY GIMMICK-FREE,  
CONVINCING SURROUND  
FROM STEREO SOURCES.**

passive matrix processors from Fine Line Audio and Dynaco.) Further, the surround channels can be used full-bandwidth, without the

frequency restrictions imposed by Dolby Surround and Pro Logic, thereby improving the depth and heightening the realism of music recordings and video soundtracks.

When I first started looking into Circle Surround, the only available decoders were professional models

with balanced inputs and outputs and rack-mountable chassis. But there's now a model for home theater, the \$995 Rocktron HTD1. It has unbalanced RCA inputs and outputs for direct connection to most home theater equipment, and its individual-channel and subwoofer trim pots are on the front panel, not tucked away at the rear.

To help you set these trim pots, the HTD1 has a pink-noise sequence generator, operated by a button at the far left. The next three buttons select surround mode ("Surround Music," "Surround Video," or unprocessed "Stereo"); other buttons let you select the surround channels' bandwidth (full-range or with the 7-kHz cutoff used by most Dolby Pro Logic decoders) and standard or extra-wide separation between these channels. (The "Wide" setting not only increases the separation between surround channels but also attenuates the center channel by about 6 dB.)

With another control, you can create a phantom center if you don't have a center-channel speaker. At the far right are large knobs for volume and "Cinema Contour." The latter, which rolls off

the treble rise on many film soundtracks, is Rocktron's equivalent of Home THX re-equalization. All controls and setup adjustments are directly accessible without going through on-screen displays (in fact, there are none); that's even more of a blessing if you use the HTD1 in a music system rather than a home theater.

On the rear panel are a pair of stereo inputs, outputs for the three front channels and the two surrounds, and a subwoofer output providing a mix of all channels' bass below 80 Hz. A four-pin DIN socket accepts 9-volt power from a large wall-wart supply.

The HTD1's unprocessed mode ("Stereo") simply feeds the original signal to the front left and right channels, producing no output from the center or surround channels. With the surround modes, things get interesting. According to Rocktron's literature, "Surround Video" and "Surround Music" are designed to maintain stereo in the front left and right channels, even when there's center-channel information, while centered sounds are steered exclusively to

the center channel. When the signal is predominantly left or right, the surround channels are attenuated so that hard left or right signal pans won't be altered. Subtler interchannel differences help the HTD1 steer information to the left or right side of the room; when it is fed a Dolby Surround signal mixed down from a 5.1-channel original, says Rocktron, enough directional clues will remain for Circle Surround decoding to produce results "strikingly close to the original 5.1 mix."

The chief differences between the "Surround Video" and "Surround Music" modes are in delays and steering. In "Surround Video," a fixed 30-millisecond delay on the surround channels keeps front-channel sounds properly localized. In "Surround Music," there is no delay and little steering, thereby ensuring that signals won't be smeared between the front and

surround channels and preventing response anomalies caused by comb-filtering. In addition, the steering logic of "Surround Video" uses 18-dB/octave cancellation filters, not the more com-

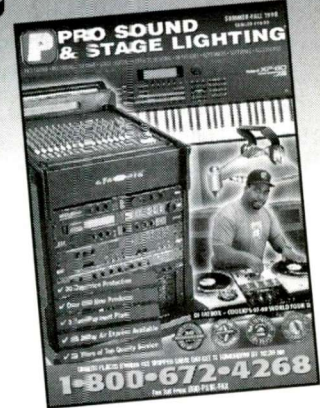
mon 6-dB/octave type, to better attenuate dialog in the main channels and keep the steering stable. (Since music has no dialog to attenuate, "Surround Music" doesn't use any cancellation filters.)

I auditioned the HTD1 in two sound systems. My music system has five matched Celestion SL600Si speakers and a pair of Celestion System 6000 subwoofers. The three front speakers are powered by 200-watt amps and bi-wired; the surround speakers are powered by a 100-watt integrated amp, whose tone controls I use to match the surround channels' timbre to sounds coming from the front. My home theater system is more modest, having Cambridge SoundWorks speakers powered by AudioSource amps. I don't currently use a center speaker there, since the room is rather small and my TV is just a 31-inch.

The Circle Surround decoding proved no slouch in either system. I did most of my listening with the music system, but when the Rocktron was in my home theater, I made thorough comparisons between it

**NOT HAVING TO GO THROUGH AN ON-SCREEN MENU IS A BLESSING IN MUSIC SYSTEMS, WHICH LACK SCREENS.**

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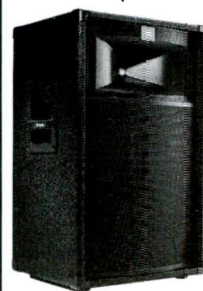
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## ROCKTRON CSA12 CAR AUDIO CIRCLE SURROUND DECODER

Anything that makes a car sound more like a concert hall is okay by me, and the Rocktron CSA12 comes closer to achieving this than any other component I've heard. I like it for what it does and, perhaps equally important, for what it doesn't do: change the front-channel signals.

The DSP ambience-simulation processing I've heard in cars muddies up the front channels with reverb so much that I think I'm hearing jazz in a bathroom and the Philharmonic in a coal mine. The CSA12 adds nothing to the front channels except a phantom center signal that you can switch in if you have no center speaker in your dash. For that matter, it adds nothing to the rear channels that wasn't part of the original recording. All the CSA12 does is analyze the phase and amplitude relationships in a two-channel stereo or matrix-surround recording and steer the signals to create a credible sound field.

So far, that sounds a lot like the Rocktron HTD1 Circle Surround decoder for the home. But since the car is a different listening environment, the CSA12 is a very different component. It's designed to go in your car's trunk (or wherever else your amps are stashed), and it has a bunch of setup controls on its top and a small wired remote for daily operation. The CSA12 has front and rear stereo inputs, left and right outputs for front and "Rear Surround," mono outputs for a center channel and a subwoofer (all gold-plated), power and trigger-voltage terminals, and a telephone-type jack for the remote. It also has a noise-reduction circuit (which shouldn't be necessary in a home but proved worthwhile in my car) and some equalization controls. And, at \$399, it costs only about one-third as much as the HTD1 does.

The CSA12's controls are very different from the home unit's. The front and rear output pairs each have a gain control, two LED indicators for input clipping, and an 80-Hz high-pass filter switch. You set the gain controls so that the clipping LEDs flash only occasionally when your head unit's volume control is full up, and you switch in the high-pass filter if you have a subwoofer. With midband and treble equalizer controls, you can

fine-tune rear-channel response to match your car's acoustics; the midband EQ provides  $\pm 10$  dB of adjustment at its center frequency, 1 kHz, and the treble EQ has a similar range at 10 kHz and about  $\pm 12$  dB at 20 kHz. A center mode switch sets the CSA12 to feed a dedicated center-channel speaker or create a phantom center signal. The final switch activates an 80-Hz low-pass filter in the unlikely event that your car's system has no subwoofer crossover. The wired remote has a surround level control, switches for surround in/out, muting, Rocktron's Hush noise reduction, and LEDs that indicate when surround and Hush are on.

From an ergonomic standpoint, splitting the controls between setup adjustments on the main chassis and operating controls on the remote makes sense. But because the main chassis is rarely within reach of the front seat, it also makes setup adjustments difficult unless you have an assistant. I didn't, so until I got all the adjustments exactly right, I had to repeatedly get out of the car, go around to the trunk, tweak a control, and then go back into the car and shut the door to hear the tweak's effect.

In my Merkur Scorpio, which has a subwoofer crossover but no center speaker, I left the EQ con-



trols pretty flat, used the phantom center setting, and switched off the 80-Hz low-pass. I used Velcro fastener strips (which Rocktron should have supplied) to keep the remote in place on the car's console, but since it's 2¼ inches wide and 3¼ inches long, I would have had trouble finding space for it on the more crowded console of my Saab 900. I was unable to follow Rocktron's recommendation that all speakers be aimed directly at the listeners, not reflected from the windshield or rear window: My

front speakers, in the doors, meet that requirement, but my rear speakers fire upward at the glass. With direct-firing speakers in the rear and a center speaker in front, the CSA12's effect in my car might have been still better. Even so, I liked what I heard.

Most of my listening, naturally, was with stereo CDs and FM. Since the CSA12 mainly leaves the front channels unaffected, switching it in seemed to do nothing, at first, but open up the hall—a lovely effect. After a while, however, I noticed another benefit, a more forward focus to the image, which was most apparent on chamber music. Still later, I realized that the instruments had not moved forward but that there was now depth behind them for comparison.

The rear channels did get too noisy to be enjoyable on weak FM signals or in areas of high multipath, but the owner's manual has the solution for that: turn the surround off. Noisy signals—including a few CDs made from old 78s and alternator whine when my car's battery was low—all proved perfect for testing the Hush single-ended noise-reduction system. It worked as advertised, cutting a lot of noise without cutting into the music much. I was conscious of its side effects only when I really listened for them, but the music did seem to lose a bit of life if I kept the circuit on when it wasn't needed.

When I played Circle Surround CDs, turning up the surround level gave me the feeling I was enveloped by the orchestra—something that doesn't happen in real life yet sounds good in the car. Telarc's *Symphonic Star Trek* (CD-80383) seemed to have more rear depth than most stereo CDs, even with the decoder off. However, while I perceived an array of instruments encircling me, I had no feeling that I was within a performance space. Not so with the dmp Big Band's *Carved in Stone* (512), which gave me a wonderful sense of instrument placement and space—and sounded great in stereo, too. Steve Reid's *Mysteries*, a Telarc recording (CD-83415) made with the Roland Sound Space System, not Circle Surround, seemed to have a surprising amount of rear instrumental presence even without surround decoding, but I had no sense of space from it until I switched in the decoder.

With Dolby Surround recordings, I had to turn the decoder's "Surround Level" control a bit lower and use my head unit's fader to lower the rear levels a bit, too. On the Eerlioz *Te Deum* (Delos DE 3200), the Circle Surround decoder gave me a real sense of space, though it also moved the soloist right up into my face; even so, it was a nice, honest sound.

On Bach's *Brandenburg Concertos* (Delos DE 3185), the decoder mostly opened up the space; the brasses moved behind me a bit, yet some hall space still stretched behind them. But when I listened to Reinhold Glière's *The Red Poppy Suite*, a Delos recording with Zdenek Macal conducting the New Jersey Symphony (DE 3178), I found it too easy to throw the balance all the way to the rear by accident.

Playing the *Nimbus Ambisonic Sampler* (NI 117) gave me mostly good results. With the decoder switched out, the channel-identification track produced some weird effects: The right front signal came from my left front speaker, the right rear signal from the right front, and so on. When I switched the decoder in, channel placements didn't change much, but the voice on that track seemed farther back. On music, the decoder's main effect was to make the sound livelier, warmer, and more spacious—enough so, in fact, that on tracks made in very reverberant halls, I preferred switching the decoder off or setting its level very low. On small groups, voices deepened, stood out of the mix better, and were easier to understand. On a Tchaikovsky track, some sounds that seemed far to the rear with the decoder out moved up a bit when I switched it in. And two tracks sounded more natural with the decoder out.

Once I found the surround level and fader settings I liked, I almost never had to change them while listening to stereo or Circle Surround material but did have to change them whenever I played recordings made with some other surround matrix. (I have few such recordings, so that didn't bother me much.) What I liked best, when listening to stereo, was to turn the surround level almost all the way down, set my head unit's fader almost full front, and leave the surround on. It added a touch of fullness and ambience that was usually just right. Turning the surround level up all the way, however, shifted the sound noticeably rearward, especially on pop.

Alas, writing this review means I have no further excuse to hold onto the CSA12. The Pioneer DEH-P835R head unit in my car ("Spectrum," September 1997) does have some ambience-enhancing features, SRS and an EQ setting that keeps the image up front, but they're no match for what Circle Surround decoding does. So I'm cheered to hear that Circle Surround chips are coming; with luck, my next head unit may have this excellent processing built in. *Ivan Berger*

and the Fosgate Model Four surround processor I normally use there. The Rocktron lacks some of the Fosgate's bells and whistles (though the only one I sorely missed was a remote), but it sounded very much like the Fosgate did on the latter's best-sounding setting ("70mm").

Before I put the HTD1 into my music system, I had just about given up on using a center channel there. Whether I used advanced digital surround decoders or simple passive models, the center channel compromised stereo spread and depth. But the Rocktron Circle Surround decoder handled centered signals properly, clearly placing soloists in front of the orchestra without diminishing the orchestral soundstage. Jazz soloists, in particular, stood out with a holographic realism that you can rarely get from just a pair of speakers, even with the best phantom-center processing.

Because most music recordings have no surround encoding, I was eager to see how the HTD1 would handle plain stereo. Even passive matrix processors can create an astonishing surround field with certain stereo recordings, though not with just any stereo signal. An active processor with proper steering, such as Circle Surround decoding, can produce good surround from virtually any stereo source; the sound seems scarcely different from what's produced on surround-encoded recordings. Stereo material of all sorts sounded fabulous via the HTD1's Circle Surround. As with passive processors, the best results often came from minimally miked recordings and live performances with audiences present. Through the HTD1, for example, John Rutter's contemporary yet very tonal Requiem, with Polyphony and the Bournemouth Sinfonietta conducted by Stephen Layton (Hyperion CDA66947), approached the natural surround feeling of a good Ambisonic recording.

I don't think Dolby Surround, a matrix system made for movies, should ever have been used for music CDs. But the Circle Surround 5.2.5 decoding did the best job I've yet heard of getting passable music surround out of them. Results were better with

recordings that used other surround matrices. For example, Telarc's new two-CD set of Albeniz's complete *Iberia* (Cincinnati Symphony conducted by López-Cobos, CD-80470), which was made with a proprietary surround process, has an enveloping but very natural surround field that doesn't draw undue attention to itself yet is seriously missed when turned off—a mark of the finest sort of audio effect.

The best surround results I got were with CDs encoded with Circle Surround (hardly a surprise) and binaural recordings. One Circle Surround disc of demo quality,

*Big Band Trane* (dmp CD-515), put me right in the center of the Bob Mintzer Band. Producer/engineer Tom Jung kept the surround-channel signals subtle—no trombones suddenly blating at me from be-

**THE SURROUND FIELD  
DOESN'T INTRUDE  
ON YOUR ATTENTION,  
BUT ITS ABSENCE DOES.**

hind—while providing a strong and natural sense of instruments spread out around the studio. And I was really drawn into several Circle Surround CDs from NorthSound Audio (715/356-9800) that combine music with environmental sounds.

Why did binaural recordings work so well with the Rocktron HTD1? In binaural, the two signals from the microphones on a dummy head are kept entirely separate, with no mixing. As a result, all of the left/right difference (L - R) information is very clean and distinct, preserving phase relationships exceptionally well. Circle Surround decoding can process such recordings superbly. (Circle Surround playback through loudspeakers may not actually put you into the environment where the recording was made, as proper binaural playback through headphones can, but it comes very close.)

I think you'll be hearing more about Circle Surround. In addition to the HTD1, Rocktron makes a decoder for the car [see accompanying review], Sherwood has announced a car unit, and Theta Digital offers Circle Surround for its Casablanca processor/preamp. And Analog Devices is bringing out a chip that will enable other manufacturers to incorporate Circle Surround decoding into their products at moderate cost. **A**

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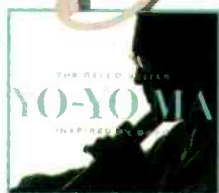
## Inspired by Bach

Yo-Yo Ma, cello

SONY CLASSICAL S2K 63203

Two CDs; DDD; 2:23:21

Sound: A+, Performance: A+



Yo-Yo Ma's latest endeavor—the six-part film series entitled *Inspired by Bach*—is a true masterpiece in modern expression. Ma plays Johann Sebastian Bach's six suites for unaccompanied cello, while collaborating with a number of talented artists of other disciplines (from figure skaters to a garden designer) to create six fascinating film portraits of interpretive creativity. It is not within the scope of this review to critique the extra-musical presentations of Ma's collaborators, but the cello performance is worthy of attention on its own. Indeed, I hope that the extraordinary popularity of the six films will not overshadow the truly great musical accomplishment

of the "soundtrack," released on this two-CD set by Sony Classical.

Bach's six suites for cello have become a test of musicianship for cellists, ever since Pablo Casals brought them out of obscurity. There is nothing else quite like them in the cello repertoire. They are both straightforward and idiomatically, sometimes playful and sometimes profoundly serious. Parts of them can be played by young students, while some sections are so difficult that they defy many master cellists.

"[I] began learning them, two measures at a time, when I was four years old," Ma states. "I have drawn

inspiration throughout my life from their intellectual, emotional, and spiritual power." He first recorded the suites 12 years ago, and, although he was young, Ma gave a very smooth and mature performance.

Now that Ma is in his 40s, one might imagine that his interpretation would have lost its youthful animation. Nothing could be further from the truth. Ma brings them forth with unbounded energy. He performs everything with almost reckless abandon, from the exhilarating Courante of Suite No. 1 to the puissant opening of Suite No. 5. It is amazing how these pieces, essentially a single melodic line, can keep listeners at the edge of their seats. Yet in even the most difficult passages—such as many double-stops played at the tip of the bow, in the fourth suite, or the high-thumb-position passages of the sixth suite—Ma makes it sound easy.

The nature of this vast multimedia project made it impossible to record all in one place. Rather, over a three-year period, Ma recorded the suites in six different locations around the world, from the First Congregational Church in Lee, Mass., to Ishihara Hall in Osaka, Japan. Because the engineers were careful to mike the cello very close each time, the ambience in the various locations is not markedly different. In this way, minuscule string noise is easily audible, giving the recordings an intense, impassioned quality, which accords well with Ma's spirited performance.

The *Inspired by Bach* CDs certainly constitute a landmark recording, even without the further artistic success of the six films by Ma and his friends. *Patrick Kavanaugh*



Photographs: ©Cylla Von Tiedemann

## Chesky: Three Psalms for String Orchestra

Deutsches Filmorchester Babelsberg,  
Stephen Somary

CHESKY RECORDS CD163; DDD; 51:50  
Sound: A+, Performance: A+

In the traditional orchestra, the double bass often seems neglected. It provides the orchestra a solid foundation for its layers of harmony and musical themes, but this instrument remains in the background more often than not.

Not so on this new work from American composer David Chesky. Here the double basses limn the dark and somber themes in each of three psalms. As the other sections of the string orchestra join the basses, you are always conscious of where the bass theme is leading and are carried along. It's an inventive compositional tactic, and because the bassists of the Deutsches Filmorchester Babelsberg play their instruments with such authority, you're drawn into the potent, contemplative works.

This is not upbeat, easy music. In Psalm III, a major key flickers like a thin shaft of sunlight through the shadowy minor modes that pervade much of the music. I hear the influence of composers Arvo Pärt and Henryk-Mikolaj Górecki. But unlike the torpor-inducing, repetitive, and simplistic cadences of a minimalist such as Philip Glass, *Three Psalms* has real power and depth.

The sound, originally recorded using Chesky Records' 24-bit, 96-kHz High Resolution Technology, is superb. It's expansive, both wide and deep. And it supports the music and the sonorous timbre of the orchestra. The recording's virtues are, I suspect, as much a result of Chesky's fastidious microphone positioning and choice of hall as of the 24-bit, 96-kHz technology. Still, the latter can't hurt.

One quibble: Although the notes go to some length to thank even the German hotel-keepers for accommodating the production crew during the recording sessions in Germany, they say nothing of the very fine orchestra. I presume, from its name, that the ensemble primarily records music for German films. Its playing and intonation cannot be faulted. Recommended.

Alan Lofft

## Historic Organs of Connecticut

Various Organists

ORGAN HISTORICAL SOCIETY OHS-94  
Four CDs; DDD; 5:08:10  
Sound: A-, Performance: B+

This set was recorded during the Organ Historical Society's National Convention in June 1994. It boggles the mind to think of the

work involved in setting up mikes and recording equipment in 35 different locations in only seven days. The result is well worth the effort, a thoroughly fascinating musical sojourn. Thirty-eight top organists perform on 35 completely restored instruments, ranging from the charming, four-stop, single manual organ in Hampton's Congregational Church to the mammoth 1928 Skinner instrument housed in Yale University's Woolsey Hall.

The composers span five centuries, from the 16th (Jan Pieterszoon Sweelinck, 1562-1621) to the 20th (Lee Mitchell, born in 1951).



The music includes favorites by Charles-Marie Widor, Charles Ives, Felix Mendelssohn, and Franz Liszt, balanced with little-known literature by Whitney Eugene

Thayer, Emma Lou Diemer, and Percy Fletcher, among others. Appropriately, American composers are well represented. The 10 hymns are sung by a congregation that's largely organists and choir masters, so it seems almost like a rehearsed choir.

The sound is generally excellent, though the inclusion of applause can be distracting. Also, sometimes it's there and sometimes it's not, suggesting that some recordings were made at live performances while others might have been set down studio-style; the otherwise detailed and informative notes are not specific about this. There is some extraneous noise here and there, but most listeners will find it minimal and will instead concentrate on the full-range, lifelike sound accorded the many

organs and locales. Photos of each organ are included in the program booklet, so you can relate sight and sound.

As a listening adventure, a slice of Americana, or a collection of excellent, well-played music, this set really succeeds. And the label has made the price for this journey very attractive: four generously filled CDs for the price of two. (It's available from the Organ Historical Society, Box 26811, Richmond, Va. 23261.)

Rad Bennett

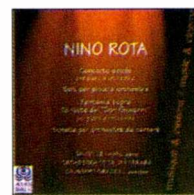
## Rota: Concerto Soiree, Balli per Piccola Orchestra, Fantasia Sopra 12-Note del "Don Giovanni," and Sonata per Orchestra da Camera

Danielle Laval, piano; Orchestra  
Citta di Ferrara, Giuseppe Grazioli

AUDVIS/TRAVELLING K 1034; DDD; 55:20  
Sound: A-, Performance: A

In addition to his familiar scores for movie masterpieces such as *La Strada* and Franco Zeffirelli's *Romeo and Juliet*, Nino Rota wrote music for a variety of settings—concertos, operas, Masses, and cantatas. The Audvis/Traveling label is helping to expose a wider public to Rota's serious music by following up a CD of his solo piano music (Audvis Valois V 4698) with this thoroughly charming collection.

Much of the music here, which comprises compositions spanning 30 years, is neoclassic, seasoned with some piquant "Rota-esque"



## BRAHMS

### The Four Symphonies, Academic Festival Overture, and Variations on a Theme by Haydn

Scottish Chamber Orchestra,

Charles Mackerras

TELARC CD-80450

Three CDs; DDD; 3:18:58

Sound: A, Performance: B

Having thoroughly researched baroque and classic period performing styles and given us a legacy of recordings for each, Charles Mackerras now turns his attention to the Romantic period, Johannes Brahms in particular. The conductor's lively interpretations of Brahms' complete symphonies, the boisterous Academic Festival Overture, and the



Haydn Variations are based on markings and indications found in letters and new editions. These works are played by a smaller orchestra than usual, using a seating plan that places first and second violins to the left and right of the conductor.

The exceptionally clean, lucid, and agreeable sound will be marred for some by the maestro's constant use of rubato. The notes imply this is the way Brahms would have liked it. Maybe so, but the fiddling around sometimes seems fussy and eccentric compared to the metronomic performance style that rules today. The recording, made with only two microphones, is a model of clarity; often-buried wind and brass parts are easy to hear.

Rad Bennett

## The Voices of Angels

### Music of Hildegard von Bingen

*Women of the Voices of Ascension,*  
Dennis Keene  
DELOS DE 3219; DDD; 76:31  
Sound: A+, Performance: A

The last decade has witnessed a well-served revival of the music of the Abbess Hildegard von Bingen (1098-1179), with performers interpreting her simple chant melodies in many ways. Frequently, the original parts receive elaborate orna-



mentation or instrumental accompaniment. For *The Voices of Angels*, Dennis Keene and the Voices of Ascension present Hildegard's work without embellishment. The sound—ethereal, reflective, and otherworldly—perfectly suits the music of the Abbess. The recording was made in New York's Church of the Ascension, and its live ambience is wonderfully reproduced without blurring the melodic expressions of this great 12th-century mystical composer. *Patrick Kavanaugh*

Klezmatic's track, the difficult acoustics of the enormous cathedral are handled well, especially the diverse pipes of its gigantic organ. If you believe that variety is the spice of life, you're sure to enjoy this CD. *Rad Bennett*

### Haydn: Symphonies, Nos. 40-54

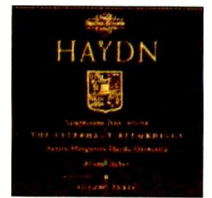
*Austro-Hungarian Haydn Orchestra,*  
Adam Fischer  
NIMBUS NI 5530/4  
Five CDs; DDD; 5:27:11  
Sound: B+, Performance: A-

Franz Joseph Haydn's employment by the Esterházy family ranks as one of the most congenial musician/patron relationships in history. Provided with a good income and first-rank players, and presented a rigorous schedule of required commissions, Haydn wrote some of his most original and daring music. This set contains

the innovative, nervous, and dramatic works often referred to as the *Sturm und Drang* symphonies, which David Andrew Thresher, the author of the excellent Nimbus program notes, suggests might have been influenced more by Haydn's first forays into opera than by any sort of general European movement.

The six works include the famous "Farewell" (No. 45) Symphony, a clever if not subtle hint to the Prince that the musicians needed a break to be with their families; the soulful, somber "Mourning" (No. 44); and the blazing, sunlit "Maria Theresia" (No. 48). Surprisingly, the amazing symphonies that Haydn composed shortly after his No. 48 have largely been neglected. Hearing them here is a revelation. The remarkable No. 51, with its virtuoso horn parts, is a special discovery. Within its slow movement, Haydn successfully merges high drama, melodic invention, brilliant orchestration, and humor. A solo that would normally be assigned to a flute or violin is instead given to the first horn, which soars—daredevil-like—into the stratosphere, only to be answered by the second horn, descending into the opposite end of the first instrument's range. What players Haydn must have had to be able to pull off this effect! Fortunately, conductor Adam Fischer's instrumentalists are up to the task. And as modern instrument readings go, these, which are part of an ongoing series, are among the best of the decade.

The set is warmly recorded, and its generous reverb sounds best to me when the discs are played through a surround decoder. (Most preferable is the Ambisonic UHJ system, the process Nimbus uses in its recording sessions, but I've found that other systems work reasonably well, too.) But however you listen, treat yourself to this dramatic music. *Rad Bennett*



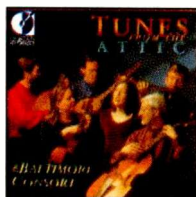
twists. Although all of the pieces are appealing, the 1962 Concerto Soiree is special. This five-part work, which recalls music in a 19th-century salon, contains movements with such descriptive titles as "Ballo Figurato," "Quadriglia," and "Can-Can." Rota's chromatic "wrong" notes give the piece a distinct feeling of time remembered rather than recreated, resulting in an overall feeling of ghostly nostalgia. "Valzer-Fantasia," the opening movement, is as poignant and haunting as any initial statement in more famous works. Its theme is so immediately attractive that it makes this disc a "must hear" experience.

The overall sound is good but perhaps a trifle overreverberant for some tastes. Pianist Danielle Laval's technique is sure, and she possesses abundant sensitivity. This is an artist who should be heard more often. *Rad Bennett*

### Tunes from the Attic

*The Baltimore Consort*  
DORIAN DOR-90235; DDD; 60:00  
Sound: A, Performance: A-

The Baltimore Consort has established itself as America's premier ensemble devoted to music of the Renaissance, with frequent excursions into acoustic folk and occasional trips back to the medieval period. Its albums reward you with concerts that seem to defy time, reaching across all boundaries to entertain in the here and now. *Tunes from the Attic*, which returns the Consort to its English Renaissance roots, is no exception, though it is not the group's usual set of sprightly dance numbers that remain in memory. Rather, it's the wistful, poignant, ruminative tracks—Samuel Akeroyde's pastoral "Jenny, My Blithest Maid," the keening bag-



pipe tune "The Mermaid's Song," and the mystical "Irish Ho-Hoane"—that haunt the mind long after the CD is back on the shelf.

The recorded sound is what we have come to expect from Dorian. Every player and singer is heard in correct balance to one another, and the whole ensemble takes on a three-dimensional quality seldom found in small ensemble recordings, where multimiking can often flatten the soundstage. Here, the sound is so natural, you feel you could walk around the ensemble in a circle. *Rad Bennett*

### I Do! Me Too!: Inter-Faith Wedding Music from the Cathedral of St. John the Divine

*Dorothy Papadakos, organ;*  
*various singers and instrumentalists*  
PRO ORGANO CD 7098; DDD; 76:53  
Sound: A-, Performance: A

Dorothy Papadakos is the first woman to hold the post of organist at New York City's august Cathedral of St. John the Divine, where she has livened up the music-making considerably. Her eclectic taste is showcased in this varied program, which ranges from straight classical compositions by George Frideric Handel and Charles-Marie Widor to a setting of Papadakos' own "My Beloved Is Mine," performed with fervor and sensitivity by pop/folksinger Judy Collins. There are tracks from the Klezmatics, piper Mike MacNinch, and Shoji Mizumoto (who plays a song about the mating of two deer on the *shakukachi*, a soulful-sounding, ancient Japanese wind instrument).

The performers are totally committed and the music-making first-rate, whatever the genre. Except for some fuzzy sound on the



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# ROCK ~ POP RECORDINGS



Photograph: Coni Night Loon Beeson

percussion tracks apart for greater clarity must have been a chore. But Anesini has infused percussion-heavy tracks like "Savor" (on *Santana*) and "Incident at Neshabur" (on *Abraxas*) with added depth and definition. This also helps separate the textured percussion sounds from Carlos's fluttering guitar work on tracks like *Santana's* "Persuasion," *Abraxas's* "Mother's Daughter," and

## HENRI DIKONGUÉ

### C'est la Vie

TINDER 42850862, 49:28  
Sound: B+, Performance: A

Cameroon musicians, including the charming and electric Angèlique Kidjo, use their own rhythms as foundations to build irresistible collages of sound and movement that draw from American hip-hop, R&B, and jazz and from European dance grooves. Unlike many of his colleagues, however, Henri Dikongué draws from the more subtle rhythms of bossa nova, flamenco, and American folk music. Using his own culture's rich history, he weaves compelling music that is as universal as it is of Cameroon.

*C'est la Vie*, Dikongué's third album (though the first to be distributed in the United States) beautifully showcases the musician's artistry. Bossa nova informs "Françoise," which chides an impatient, ambitious young woman; the rhythms of "A Mumi" ("Husband") are based on Caribbean soukous as much as they are on mbaqanga, the soul music of South Africa's townships; and "C'est la Vie" draws from folk to convey the simple message that life is what you make it. Dikongué's music is somehow infectious and intelligent and danceable and soothing all at once. His guitar work, intricate yet simple, conveys as much emotion (as on the classical-influenced "Douala") as his strong, velvety voice.

*C'est la Vie* should bring Dikongué the same accolades in this country that he has received from the rest of the world. If it doesn't, we don't deserve to be spellbound by his quiet magic. *Marie Elsie St. Léger*



### Santana

COLUMBIA/LEGACY CK 65489, 61:44  
Sound: A-, Performance: A

### Abraxas

*Santana*

COLUMBIA/LEGACY CK 65490, 51:14  
Sound: A, Performance: A+

### Santana III

COLUMBIA/LEGACY CK 65491, 56:40  
Sound: A, Performance: A-



Of the myriad faces Carlos Santana and company assumed throughout their career—from jazz and fusion to Latin, blues, and African roots—the Woodstock era, featuring the Bay Area "Cubano rock" band's first three albums, has proved to be Santana's Golden Age. All three discs reached No. 1, all three spawned radio smashes, and all three have endured the test of time. The years have only enhanced what began as brilliant innovation.

Legacy's decision to reissue these three sets (and to compile a new "Best of" collection) is curious, but not entirely unreasonable. These "Expanded Editions"—released with previously unpublished photos and new liner notes to commemorate the band's 30th anniversary and its 1998 induction into the Hall of Fame—join Santana's fine boxed set (Columbia/Legacy), quality gold reissues of *Santana* (Sony Mastersound) and *Abraxas* (Mobile Fidelity), as well as straight rereleases of each one. But Legacy's new releases, remastered from the same original two-track masters by Vic Anesini, opens up the band's arrangements enough to warrant red carpet treatment, especially when compared to the more compressed original CD issues. (This is particularly true for *III*, which had not been remastered until now.) Considering Santana's complex polyrhythms and multi-textured sounds, pulling the knotted

*Santana III*'s "Batuka," a plus for the band's serious fans and audiophiles.

Each of these editions features three live bonus concert tracks, a move spearheaded by producer Bob Irwin and band members. For the band's debut, released a day after its breakthrough appearance at Woodstock, Irwin included three cuts from that storied date in August 1969: Two of them, "Savor" and "Fried Neckbones," were unreleased, and one, the show-stopping "Soul Sacrifice," was included in the *Woodstock* movie soundtrack. On *Abraxas*, the live cuts hail from a date at the Royal Albert Hall in April 1970 and were never previously released: There's the passionate "Se a Cabo," Peter Green's "Black Magic Woman" (coupled with "Gypsy Queen"), and an early working of "Toussaint L'Overture," a track that would turn up on *Santana III*. The final album, recorded by the core Woodstock lineup and introducing guitarist Neal Schon, features three cuts from a July 1971 show at the Fillmore West: the gritty "Batuka," "Jungle Strut," and the rare powerhouse instrumental "Gumbo."

If you haven't listened to these remarkable recordings lately and you don't own the previously released gold versions of *Santana* or *Abraxas*, you'll be pleased, possibly even amazed, at the revelatory sound unveiled on this definitive and reasonably priced new trilogy of reissues. *Bob Gulla*

### The Surveillance

*trans am*

THRILL JOCKEY THRILL 054, 36:07

Sound: B+, Performance: B

### TNT

*Tortoise*

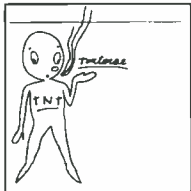
THRILL JOCKEY THRILL 050, 64:56

Sound: A, Performance: A-

If you could literally put your finger on the type of music that Chicago label Thrill Jockey specializes in, it would likely squirm away uncomfortably and mutate into something else. Both *Tortoise* and *trans am* are instrumental groups that jam on decided grooves—only to move away from those grooves, as if to say "not us."

Take *trans am*. On *The Surveillance*, the group finds a riff that smacks of something vaguely surf and immediately twists it into a drone. As that drone starts resembling Sonic Youth, a beeping keyboard is added, suggesting space travel or some dreaded form of "electronic" music. Occasionally *trans am* loses its chops and flails around a bit, cranking its amps up to 10 or relying on the automated sounds of a drum machine. But mostly the band prefers to keep it skrotchy. If this were an LP, you might want to check the needle for dust.

*Tortoise*, on the other hand, verges on New Age music for indie rockers. *TNT* is one dose



Steven Reich minimalism, one dose Steely Dan studio perfectionism (courtesy of the new guitarist, Jeff Parker), and two doses Pink Floyd *Ummagumma*—keeping things just antsy enough to avoid inducing a coma.

As with Brian Eno, though, the band always has at least one part moving independently.

Such song titles as "A Simple Way To Go Faster Than Light That Does Not Work" and "In Sarah, Mencken, Christ, and Beethoven There Were Women and Men" suggest that a sense of humor lurks behind the methodical tinkering.

The ultimate compliment: Both of these CDs make for excellent room-cleaning music. That's room-cleaning, not room-clearing. Therein lies all the difference. *Rob O'Connor*

### This Is Hardcore

*Pulp*

ISLAND 314 524 492, 62:31

Sound: A, Performance: B+

On Pulp's breakthrough record, *Different Class*, frontman Jarvis Cocker approximated a modern-day Charles Dickens, depicting sordid characters against a stage of sexual experimentation and widening class structure. This brilliant album reached its zenith on "Common People," a hilarious indictment of a post-

Margaret Thatcher England where women found amusement sl frustrated lower-class lovers. U glam, and Euro-pop disco, clever songs provided the anti-numbing thickness of Oasis.

Cocker's no longer a bellowing big mouth, however, on *This Is Hardcore*. Lushly cinematic in scope, and melancholic in mood, this album's tales of old age ("Help the Aged"), pornography ("This Is Hardcore"), squandered dreams ("Glory Days"), and even revolution ("The Day After the Revolution") are a glorious surrender to an inevitable, out-of-control future.

Where *Different Class* was living large and late, *Hardcore* is the morning after with a bruising hangover.

But just as the theme song to *M\*A\*S\*H* once promised that "suicide is painless," the miserable pleasures of *Hardcore* are many,



consoling, and catchy. Unlike most rock albums, which are thin in the bass and etched hard in the treble, *Hardcore* glows through an atmospheric, orchestral

production of strings, piano, synthesizer, and booming drums. "This is the sound of someone losing the plot," sings Cocker over a resonating soul chorus and theremin on "The Fear," but the direction is solid.

Cocker—who says, "I am not Jesus, but I have the same initials"—may be more sedate on *Hardcore*, yet he is as bold as any Hollywood director, infusing his songs with the epic tragedies, victories, and dreams of ordinary life. *Ken Micallef*

**B**efore he died, Jimi Hendrix had jammed with Miles Davis and John McLaughlin. If he'd had more time to pursue his jazz inclinations, later renditions of "Electric Ladyland" and "Machine Gun" might have sounded like these interpretations by Jean-Paul Bourelly.

Bourelly, whose own work meets near the junction of jazz, rock, and funk, is a perfect artist to interpret Hendrix's work. His guitar playing has always leaned in that direction, even more so now that he has a wah-wah pedal in his arsenal. When he plays "The Star Spangled Banner," there is no question about where it's coming from.

Though a lot of Bourelly's guitar work and vocals on this album is derivative, a lot of it's also a step beyond what Hendrix did. Bourelly's guitar in "Talkin'



Bout My Baby" and "Power of Soul" travels to tonal and textural places Hendrix hadn't even imagined; the rock-out-of-jazz style calls on much more conscious dissonance and syncopation than the Hendrix originals. Bourelly plays so well, however, that some might mistake this for one of the myriad bootlegs of Hendrix outtakes that litter the stores, were it not for the clean sound. Jean-Paul Bourelly

**Tribute to Jimi**  
*Jean-Paul Bourelly*  
KOCH JAZZ  
KOC-CD-7848, 72:37  
Sound: B+, Performance: A-

is an artist that Hendrix fans should know, and this album should get their attention. *Hank Bordowitz*

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### Struttin' Our Stuff

Bill Wyman and The Rhythm Kings

VELVEL RECORDS 79708, 44:14

Sound: B+, Performance: B-

When Bill Wyman left The Rolling Stones, the group auditioned former Creedence Clearwater Revival bassist Stu Cook to take his place. Cook knew he was wrong for the gig, but he couldn't resist the opportunity to jam with Mick and the gang. Fittingly, Wyman kicks off *Struttin' Our Stuff*, his first post-Stones solo album, with a somewhat stiff cover of CCR's "Green River." That may be the weakest track, mostly because of Wyman's own monochromatic vocals. If only the man could sing!

Fortunately, Wyman takes vocals on only four tracks; for the other cuts, he leaves the singing to the professionals. Georgie Fame does a remarkable "Hole in My Soul." Paul Carrack tears through "Tobacco Road," with Peter Frampton on guitar. The discovery of the album, Beverley Skeete, pours buckets of blues over "Bad To Be Alone."

The album's mix of roots blues, boogie, early R&B, and originals doesn't really cut clean; it sounds almost offhanded, like a well-recorded impromptu jam with Wyman's pick of playmates. Geraint Watkins pays generous homage to Willie Mabon on "I'm Mad" and then takes it a few notches better, while Albert Lee lends some hot rockabilly licks to "Motorvatin' Mama." Wyman even covers the obscure and wonderful early Stones tune "Melody," with Fame singing and Eric Clapton on guitar.

This is not as impressive as the all-star jam CD with Johnnie Johnson a couple of years ago, but it does give an inkling of the real blues scholar in The Stones. *Hank Bordowitz*



### Poughkeepsie

Dylan Hicks

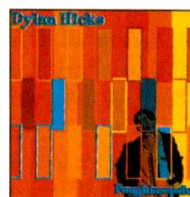
NO ALTERNATIVE TRG 89375, 43:53

Sound: B-, Performance: A

Dylan Hicks has arrived just in time to save the word "alternative" from complete irrelevance; in the process, he might just make you believe in pop music again. There's a bit of Jonathan Richman, Beck, and They Might Be Giants in this performer, but more than anything, this kid from Minneapolis has the true spirit of rock 'n' roll.

*Poughkeepsie's* home-brew aura only adds to its charm—hell, Hicks' simple, catchy tunes don't need any sort of highfalutin production to stick in your brain. When he sings ditties about escaping on a rocket ship or his life as a local legend—"I looked cool in jeans"—you'll believe him.

Hicks digs deepest on his "coming of age" tune, "Crybaby Crusade," where he reveals



that the first love in his life wasn't a girl, but a record he heard on the radio. And when he screams "Yeah, I want to go back/to the very first time," he's taking us all back to a time when the music really mattered. Hail the new Dylan! *Steve Guttenberg*

### Boggy Depot

Jerry Cantrell

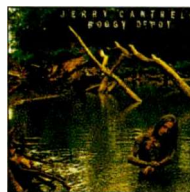
MERCURY 314-536737, 59:38

Sound: B, Performance: B-

Alice in Chains was firmly ensconced in the Seattle grunge rock scene, but it transcended the limitations of the genre with elements of classic rock, country rock, and folk over its writhing grooves. On his first solo album, *Boggy Depot*, Alice's guitarist, Jerry Cantrell, expands his musical boundaries while retaining some of the minor-key murk that earmarked his previous efforts.

"Breaks My Back" is a sprawling seven-minute epic that features weary vocals reminiscent of Neil Young and drifting rhythms that recall Pink Floyd. Another offering, "Between," serves up poppy, string-bending licks that bring to mind the glory days of .38 Special.

But while Cantrell covers more musical ground these days, some of his output isn't quite as spine-tingling. Without the eerie nasal drone of Alice vocalist Layne Staley, the music has a more traditional and, occasionally, lackluster feel. Cantrell's guitar playing is brash and shit-kickin', for sure—tailor-made for stadiums—but it doesn't quite hit with the confidence and authority of old. The same can be said for his vocals, which fit in somewhere between the mighty roar of Bad Company's



Paul Rodgers and the baleful rasp of Lynyrd Skynyrd's Ronnie Van Zandt. And sometimes his voice lacks urgency and desperation. Even so, Cantrell's minor-key harmonies still abound, and his lyrics are as bleak and cynical as ever.

Throughout, the guitarist is aided by his peers. Alice drummer Sean Kinney plays on the entire album, while bassist Mike Inez performs on three songs. Pantera bassist Rex Brown contributes on five cuts. Other guests are Primus bassist Les Claypool and Angelo Moore and Norwood Fisher of Fishbone.

But *Boggy Depot* is neither self-indulgent supergroup rock nor Alice in Chains in absentia. It's an ambitious, compelling effort, and even though it sometimes misses the mark, it never wants for trying. *Jon Wiederhorn*

# JAZZ ~ BLUES

## R E C O R D I N G S

Pianist Chris Anderson is the most unsung hero in jazz, a musician's musician and *cause célèbre* who's flown beneath the radar of major jazz institutions for decades. And there's no easy explanation as to why. In truth, the 70-year-old Anderson's career—which includes teaching a young Herbie Hancock and accompanying Charlie Parker, Sonny Rollins, Sonny Stitt, and numerous others—is a complex tale of awe-inspiring talent and supreme

### Davell Crawford

#### The B-3 and Me

BULLSEYE BLUES & JAZZ  
BB 9603, 64:28  
Sound: A–, Performance: B+

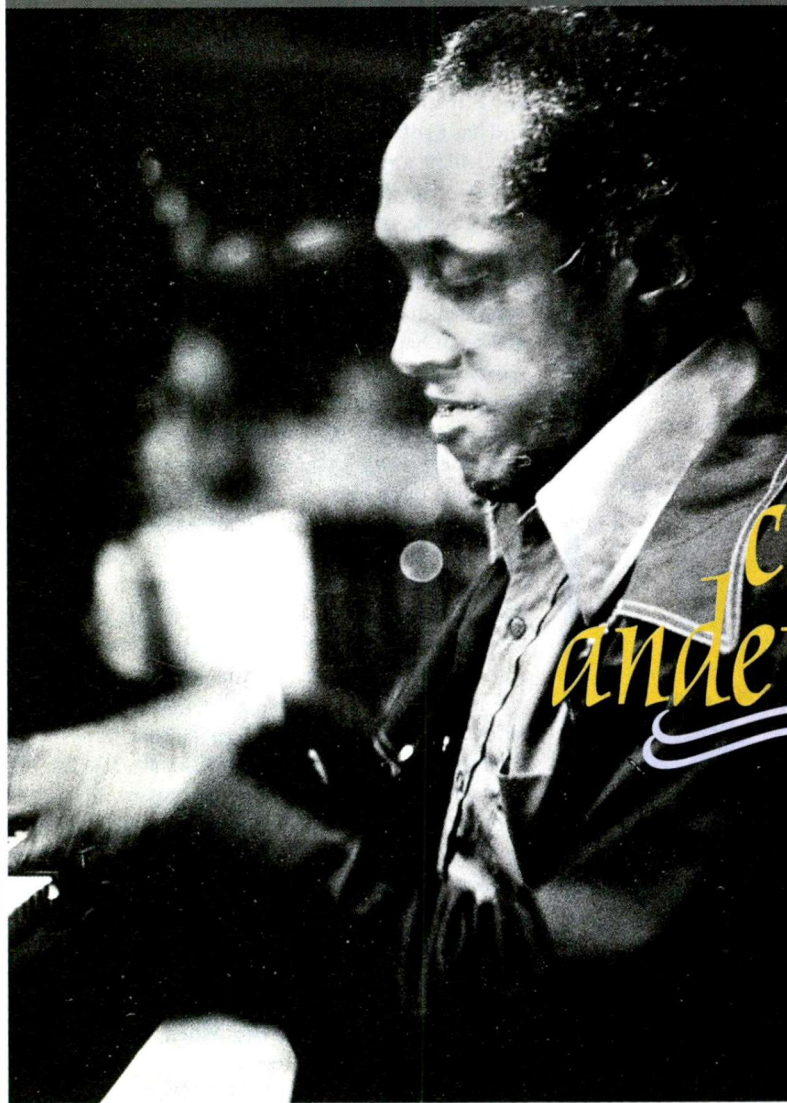
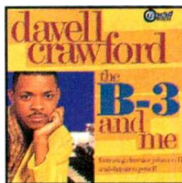
Blues and funk organ combos were once snubbed by jazz purists as being too commercial. Today, this type of ensemble is widely accepted.

When well played, the gutsy sound of the Hammond B-3 is thoroughly engaging. On *The B-3 and Me*, two youngsters, organist Davell Crawford (21) and tenor saxophonist Clarence Johnson, III (23), team up with drummer Shannon Powell in a show of maturity that begins with the opening "Ooh Wee Sugar," a smoker of a shuffle. Crawford sidesteps the influence of Jimmy Smith's blues-scale barrage by tastefully leaving space in the keyboard parts while cranking out flawless bass lines on the pedals. Powell, who lays back with measured restraint most of the time, kicks up front when needed. After several cuts of crafty funk and swing, Crawford displays his real forte, getting down and churchly on some slow gospel blues.

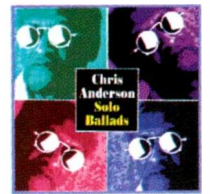
Johnson's unusual approach to the tenor sax is what catches your ear most consistently. His harmonic choices invariably skirt the outer perimeter of ordinary blues changes in pursuit of absolute surprises for his primary melodic notes. Sounding reckless at every turn, he has no qualms about shooting from the hip, and his lines always manage to come to fruition. In a word, he's exciting.

New Orleans has a history as a hotbed of hot jazz. With *The B-3 and Me*, Crawford and his band of Big Easy renegades add their own brand of spice to the mix.

James Rozzi



Chris  
Anderson



musicianship. For a variety of reasons (his physical disabilities? his supposed reclusiveness?), Anderson has gone largely unnoticed. Rarely does he record or even perform, although several recent releases unveil the talent that has fellow musicians nearly breaking down the pianist's door just to make beautiful music with him.

And beauty is the bedrock of Anderson's music, though his brilliance resides in an extraordinary sense of chordal coloration and textures, not flashy technique or gimmickry. His talents are exquisitely presented on *Solo Ballads*, which was recorded by Rudy Van Gelder at his legendary studio in 1996. This predominantly Ellingtonia set reso-

**Solo Ballads**  
Chris Anderson  
ALSUT AS 0193, 71:53  
Sound: A+, Performance: A

**None but the Lonely Heart**  
Charlie Haden and Chris Anderson  
NAIM CD022, 72:42  
Sound: C, Performance: A–

nates with Anderson's distinctive elocution. Completely impervious to the constraints of meter and structure, the pianist pours his heart and soul into every chord, as if he's about to plunge into some harmonic netherworld.

"In a Sentimental Mood" and "Lush Life" begin with Anderson establishing form and harmonic foun-

Photo: © Mitchell Seidel

dation. But he nearly rewrites and reinvents these classics with abstract forays into the colorful recesses of his own harmonic vision while never forsaking the song's tonal center.

## BILL EVANS

### The Complete Bill Evans on Verve

VERVE 31452 79532

18 CDs, 21:44:51

Sound: A, Performance: A-

Bill Evans was one of the finest pianists ever, ranking right up there with reigning jazz contemporaries Miles Davis and John Coltrane. In fact, Evans was one of Miles' favorites. Sure, occasions arise when only the blazing bop of an Oscar Peterson or the heady structures from a Herbie Nichols will suffice, but Evans' absolute



depth of feeling secures his position as the favorite of many a jazz aficionado.

Evans began recording for Verve while still under contract to Riverside in 1962 and continued with the label for the rest of the decade. This set of 18 CDs, all remastered with 22-bit technology and encased (with a bound book) in a heavy metal box, showcases his entire Verve output. Of the 269 tracks, 252 are complete takes and 98 are previously unissued works (37 done in the studio and 61 taped live). The great trios are here (with Chuck Israels, Paul Motian, Ron Carter, Philly Joe Jones, Gary Peacock, and so on), as are the sessions co-led with Jim Hall, Stan Getz, Gary McFarland, and Monica Zetterlund.

Evans' recordings reveal that he was an absolute master of the piano (in a style calling on a variety of classical genres and techniques) as well as a consummate artist. Admittedly, the recordings here are not all magical, but in every disc there is enough of the magician's touch to maintain the Evans standard and, at least for a while, keep a less desirable world at bay.

James Rozzi

In lieu of typical right-hand lines, his improvisation paints nocturne-like moods with chords and drop-dead gorgeous voicings. For some, Anderson's introspective ruminations—pretty much devoid of rhythmic invention and with no discernible sense of swing—might seem like low-gear parlor music. But for anyone who appreciates beauty and has a soft spot for the underdog, *Solo Ballads* will be a revelation.

*None but the Lonely Heart* is a harmonic convergence, of sorts, between Anderson and bassist Charlie Haden (who is similarly recognized for a distinctive, harmonically driven approach that eschews "chops" and flash). On this set of hauntingly beautiful ballads, the pianist tames his wanderlust slightly, keenly aware of Haden's trenchant bass line and its undulating pulse. Nevertheless, he does venture wherever the conduit between soul and fingertips takes him. At times, particularly in the duo's reading of "The Night We Called It a Day," Haden plays catch-up to Anderson's soloistic unpredictability; he's at a loss where the pianist will go—and when. In slightly more up-tempo performances, such as "Body and Soul," Haden emerges from merely supplying a Spartan pulse to engaging Anderson's hidden ability to swing, via a walking bass line. Overall, sonic quality is, unfortunately, less than satisfactory; Anderson's piano sound bounces around the room, and Haden's normally tight and focused bass is muddy. But ultimately, Anderson and Haden succeed in capturing something beautiful, something only harmonically adventurous romantics are capable of.

Mike Bieber

### Memories of Barber Mack

Ernest Ranglin

ISLAND JAMAICA JAZZ

314 524 425-4, 56:23

Sound: B-, Performance: A-

### Big Up!

Dean Fraser

ISLAND JAMAICA JAZZ

314 524 339, 72:35

Sound: B-, Performance: B-

New Orleans broadcasts that wafted along the trade winds to Jamaica were among reggae's roots. As evidenced by the amazing solos of the Skatalites, some of these broadcasts carried jazz, but not many people have perceived Jamaica as a jazz stronghold. Albums by two renowned reggae sidemen may help change that.

Veteran guitarist Ernest Ranglin had a tune on the flip side of Bob Marley's second Island single, "One More Cup of Coffee," in 1963, and he often accompanied Jimmy Cliff and other Jamaican stars. In his modest way on *Memories of Barber Mack*, Ranglin fuses

## WOMEN

Various Artists

PUTUMAYO PUTU137, 59:36

Sound: A, Performance: A

Unlike *Women at Work*, Putumayo's tortured collection of music by women songwriters from around the world, *Women of Spirit* doesn't belabor the "I am woman, hear me roar" dogma. Instead, like *Divas*, the label's winning compilation, *Women of Spirit* reaches high artistic standards. The results are stellar.

This collection travels mostly in Africa and the Americas and includes such international stars as Peru's Susana Baca (the superb "Negra Presentuosa"), Madagascar's Tarika (the joyous yet haunting "Avelo"), and America's folk-punker Ani DiFranco ("Done Wrong"). American pop influences seem to be the common thread, but the personality of each artist emerges nonetheless. It's hard not to sway to the traditional rhythms of Cameroon that drive Coco

the chords and fluid solos of Wes Montgomery with his own strong sense of melody and, in the opening strains of "Lovebird," adds a dash of Al DiMeola. Ranglin merges many elements of reggae, from the dub effects blowing through "Mountain Breeze" to the stiff backbeat of "Undecided." He also plays and composes with a sense of humor, grabbing licks from the *Bonanza* theme amid the lyrical storm of notes in the deceptively funky



"For Juni." Not every tune has a destination, but those that do—the title track in particular—get there via genuinely inspired playing.



Dean Fraser's sax work, frequently featured on sessions for the Taxi label, has graced albums by Bunny Wailer, Dennis Brown, and Sly Dunbar. *Big Up!* leans more on reggae and ska

rhythms than Ranglin's *Memories*, making it a jazz album only if you consider King Curtis a jazz artist. True, Fraser blows some fiery improvisation, overdubbing various solo sax "trios" and starting the title tune with a promising flourish. However, with the exceptions of "African Elation" and the post-bop-ish "Bank of the River," most of his band eschews the harmonic propulsion and rhythmic flexibility of jazz.

# OF SPIRIT

Mbassi's "Muengue Mwa Ndolo" or to respond to the oddly seductive Afro-Peruvian waltz of Baca's "Negra Presentuosa." Cassandra Wilson, who also appeared on *Divas*, contributes "Death Letter" from her second acoustic pop/jazz album, *New Moon Daughter*, and reaffirms her status as the premier jazz vocalist of her generation.



The liner notes, expertly written by music critic Jennifer Einhorn, are informative and provide historical perspective, but the music remains paramount. From Brazil's Fortuna, whose work is based on the medieval folk music of Spain's Sephardic Jews, to Toshi Reagon, who is joined by Berenice Johnson Reagon (her mother and Sweet Honey in the Rock founder) on the beautiful blues-folk duet "A Song," *Women of Spirit* is an expression of soulful yearning, striving, and beauty.

Marie Elsie St. Léger

However, the biggest treat in these two CDs is not their leaders; rather, it's accomplished pianist John Williams' astonishing keyboard work. He establishes the themes in Ranglin's title track and in "Papa's Bag Juice," adding great depth and a Latin tinge to the sprightly sound. Even within the rhythmic strictures of Fraser's album, Williams manages to shine, especially on the romantic "It's Me Again Jah." His ear-opening solos challenge Fraser and Ranglin, giving both sessions a needed edge. The sound on each one of these recordings, while lacking in dynamics, is nonetheless crisp and dry.

Hank Bordowitz

## Miles 2 Go

Mark Ledford

VERVE/FORECAST 314 537 319, 61:02

Sound: A-, Performance: A-

Sure, multi-instrumentalist/vocalist Mark Ledford's tribute to Miles Davis has a slick sheen, but there's something truly heartfelt going on here. If you get past the first couple of jazz-cum-pop-R&B cuts, you'll hear how completely Ledford keys into Davis' sensual side while fully integrating the man with the horn's funk/fusion sounds. Ledford's probing pocket trumpet on Davis' classic "So What" effortlessly jump cuts the tune 40 years.



But with Pat Metheny's subdued guitar on George Gershwin's "Summertime," Ledford is cool enough to dance through space. Imani's sultry rap on another tune Davis interpreted, "Someday My Prince Will Come," glances off skittering beats, and the tasty hip-hop/be-bop sandwich of the title track satisfies. Even with his mix 'n' match cast of 26 exuberantly eclectic guest musicians appearing in different configurations, Ledford never loses his grip on the proceedings; maybe he should have called this Miles Smiles, Again.

Steve Guttenberg

## Two Blocks from the Edge

Michael Brecker

IMPULSE IMP3P90100, 55:45

Sound: B, Performance: A

After recovering from two dismal Brecker Brothers' albums, followed by a return to solo form with 1996's *Tales from the Hudson*, tenor saxophonist Michael Brecker unleashes what may be his purest jazz recording to date. Too often, his enormous talent for melody and improvisation has put a stranglehold on the music, each note captive to his thunderously soaring ideas. This relegated accompanying musicians to the role of cogs in Brecker's musical apparatus.

*Two Blocks from the Edge*, on the other hand, shows Michael Brecker to be as cerebral as he is sonically imposing. With his tone now supple, his phrases more probing and, perhaps, a little shy and playful (as well as powerful), he sounds reborn. After more than 25 years of soloing virtuosity, this musician finally has figured out who he is.



*Two Blocks* relies on a deeply interactive cast: pianist Joey Calderazzo, drummer Jeff "Tain" Watts, bassist James Genus, and percussionist Don Alias. A solid year of touring preceded recording, and it shows.

Brecker weaves in and out of the band's well-greased course, his tunes breathing with each member's imprint.

"Madame Toulouse" swings between gospelized funk and winding, straight-ahead jazz, while the title track takes a thoroughly serpentine route, like a tornado crossing a mountainside. "Bye George" sashays breezily, with Watts' tumbling drums kicking butt. "Delta City Blues" features something new from Brecker, a jumping, jiving solo shout that turns into a humorous New Orleans blues march when the band arrives and then takes yet another turn into shimmering swing territory.

Throughout *Two Blocks from the Edge*, Brecker takes a different approach: He finally seems to be having fun! And what a joyous noise he makes.

Ken Micallef

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By Barry Willis *Stereophile* Nov. 1997  
Chase Technologies, Inc. of St. Petersburg, Florida, is now in receivership. The company manufactured an inexpensive line-level pre-amp, the RLC-1, which last year was heavily advertised in *Stereophile* and other publications. Designed and marketed as a sonically transparent remote-controlled add-on for older systems, the RLC-1 enables users to control volume, balance, bass and treble; to select between four line-level inputs; and to fade between two amplifiers if desired - all via the remote. The unassuming little box, with a monolithic IC (the Philips TEA6320) at the heart of its circuitry, won a sort of underground following among budget conscious audiophiles. Its sonic transparency also lent it a degree of reverse-snobbery appeal. My own extended use of the RLC-1 convinced me of its value, but Chase Technologies' unfortunate circumstances precluded it from a formal review. Initially priced at \$149, the RLC-1 widely sold for \$120 before Chase Technologies abruptly disappeared from the market several months ago. Sound City, a mail order operation based in Towaco, New Jersey, has purchased all remaining Chase Technologies inventory and is selling the RLC-1 at \$59 each, less than half the original retail price. Kamel Yassin, Sound City's president, said in a telephone interview that his company offers a 90 day warranty on the device. Defective units will be exchanged for new ones until stock is depleted, after which the purchase price will be refunded.

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# DVD REVIEWS

## EWITTA

**Evita** 1996; PG rating; one-sided (2.35:1 letterboxed); Dolby Digital 5.1; Spanish subtitles; closed captioned. HOLLYWOOD 13849, 2:15:00, \$29.95  
Picture: A, Sound: A-, Content: A

# W

inner of the Golden Globe Award as best picture, *Evita* has made the most successful transition from Broadway to screen of any musical in this decade.

The film's producer/director, Alan Parker, has opened it up considerably and with great skill, making it cinematic and spectacular, yet intimate and, at times, very intimate. Almost entirely sung, as was the original stage show, *Evita* the movie resembles grand opera more than a typical musical.



The casting proved a coup: After years of rumors that tossed about the names of some of the most famous singing actresses, Madonna landed the plum role of Eva Perón, and she is, in a word, magnificent. The Material Girl seems actually to become Evita.

Antonio Banderas is perhaps less successful in the role of the narrator, Che. Though he cuts a dashing screen figure, I miss the stage show's original Che, Mandy Patinkin, who sang the role with more surety and tone. But that's the only disappointment, and that's saying a lot in favor of this lavish production.

The DVD presentation is a marvel in itself, presenting a picture even sharper and



clearer than the excellent laserdisc versions. *Evita's* opulent period costumes and sets are rendered with remarkable texture and detail, and the many crowd scenes have breathtaking video resolution. The sound is full-bodied and exceptionally clean, with prominent channel separation, though slightly deficient in bass.

This well-produced edition of *Evita* is a perfect title to add to a DVD collection. It is a movie to which one can return time and time again.

Rad Bennett

Photo: ©David Appleby/Hollywood Pictures/Kobal

## MICHAEL JACKSON HISTORY ON FILM

**Michael Jackson: HIStory On Film Volume II** 1983-96; no rating; two-sided; black-and-white and color; mixed aspect ratios (from 1.33:1 full screen to 1.85:1 letterboxed); Dolby Digital 5.1 and two-channel PCM; English subtitles; lyrics. EPIC MUSIC VIDEO EVD 50138, 1:46:00 minutes, \$24.98  
Picture: A, Sound: A, Content: A

Ranging from the hard-driving "Beat It" to the introspective, socially conscious ballad "Stranger in Moscow," this decade-plus retrospective reminds us just how diverse Michael Jackson's output has been. It's astounding that so many

### VOLUME II

different styles and topics have been handled with the same skill. There's not a video in this set that isn't very good, and many are better than that, having justly achieved classic status. "Thriller" is surely one of those, and here it looks and sounds better than ever, as does "Billie Jean" with its incredible moonwalking sequences.

The video quality all the way through this collection is state of the art. The

Spielberg-like "Childhood," the nervous, jump-cut black-and-white "Scream" (which won numerous video awards), and the rhapsodic, letterboxed black-and-white "Stranger in Moscow" exhibit video that's as good as it gets.

The Dolby 5.1 mix is really imaginative, with true stereo surround effects and consistent spatial clarity, yet not ignoring, when called for, some real subterranean bass crunch. Thoroughly enjoyable for its music and artistry, *HIStory Volume II* is also a great demo disc. R.B.





**Fahrenheit 451** 1966; no rating; one-sided (1.85:1 letterboxed); Dolby Digital one-channel mono. UNIVERSAL/IMAGE ID4231USDVD, 1:52:00, \$29.95  
Picture: A, Sound: B+, Content: B+

**Beneath the 12-Mile Reef** 1953; no rating; one-sided (2.35:1 letterboxed); Dolby Digital two-channel matrix surround; includes trailer. LUMIVISION DVD 2297, 1:42:00, \$19.95  
Picture: B+, Sound: B+, Content: B

These two movies demonstrate how vital a solid soundtrack is to raising a production's artistic level. The scores for both titles were written by Bernard Herrmann, the dean of film music composers. Herrmann was so intent on creating singular moods to suit each particular film that he would go to great lengths to orchestrate every score differently. *Fahrenheit 451*, for example, featured a large string orchestra, which was augmented by harps and some percussion. The resultant lush and warm sound helps focus the viewer's attention on the human elements of Ray Bradbury's story rather than the futuristic, unhappy world in which a fireman's job is to burn books.

*Fahrenheit 451* was recorded in mono. The sound is clean and accurate, however, if somewhat lacking in dynamic range.

*Beneath the 12-Mile Reef* was one of the first CinemaScope movies as well the first widescreen effort to use extensive underwater photography. To create a colorful, aquatic soundscape, Herrmann's score employs a full symphony orchestra with nine separate harp parts. Their arpeggios enhance diving sequences, while glissandos and plucked passages make waves, the surf's spray, and lurking danger seem more immediate. The music contributes greatly to creating interest in an otherwise tepid Romeo-and-Juliet tale of rival sponge fishermen down in the Florida Keys.

*Beneath the 12-Mile Reef's* Dolby two-channel matrix surround remix of the original four-track magnetic stereo soundtrack, though not a revelation, sounds very good. The orchestra spreads across the front soundstage, sometimes wrapping around the sides to the back of the room.

The picture quality on both titles is above average. *Fahrenheit 451*, in particular, seems

exceptionally crisp and clean; the reds of the fire engines are vibrant, with no video distortion or breakup. Image Entertainment's presentation of this Universal release is strictly no-frills—there is not even English closed-captioning, though the jacket's notes promise it.

Both of Herrmann's scores have been re-recorded in state-of-the-art audiophile sound. Herrmann himself took charge of *Fahrenheit 451* in 1974 (now available on London 443 899 and Mobile Fidelity UDCD 656 CD), while the recording of *Beneath the 12-Mile Reef* was conducted by Charles Gerhardt, also in 1974. (It is remixed to Dolby Surround on RCA 0707-2-RG CD). Neither the original films nor these DVDs sound as good as those rerecordings, but they do offer an opportunity to study how this well-known film music actually works. Both also let us see and hear what the initial excitement was all about. R.B.

**Lord of the Dance** 1996; no rating; one-sided; Dolby Digital two-channel matrix surround; includes behind-the-scenes featurette. POLYGRAM 440 043 189, 1:30:00, \$29.95  
Picture: B+, Sound: B+, Content: A

Lead dancer and choreographer Michael Flatley's charismatic program of Irish dancing (a blend of flamenco, ballet, and tap) with Ronan Hardiman's music (which combines folk and rock elements) is tremendously exhilarating entertainment. This DVD of a live Dublin concert captures it all with great accuracy.

Busby Berkeley-style aerial shots, as well as some taken from beneath the stage—which focus on the bottoms of the dancers' feet through a transparent surface—enable a viewer to see more than he could have in the large theater in which *Lord of the Dance* was filmed. R.B.

**Help!** 1965; G rating; English Dolby Digital two-channel stereo; French/Spanish Dolby Digital one-channel monaural; English/French/Spanish subtitles; includes trailer, biographies, newsreels, still photos, posters, and promotional radio spots. MPI DVD7081, 1:30:00, \$24.98  
Picture: A-, Sound: B+, Content: A-

*Help!*, The Beatles' second feature film, follows the Fab Four on an adventure in which Ringo is pursued by a cult trying to regain a sacred ring that has become stuck on his finger. There are some truly hilarious sight gags involving the young rock stars, allowing director Richard Lester to pursue

moments of inspired lunacy. But the plot is really just an excuse to showcase seven great Beatles tunes, including the title track,



"Ticket To Ride," and "You've Got To Hide Your Love Away."

This movie, along with *A Hard Day's Night*, was completely restored by Paul Rutan, Jr., for a 1996 presentation on cable's American Movie Classics. Details on the restoration of both films can be found via the "Additional Features" menu, which also includes some nostalgic newsreels, still frames, and other surprises.

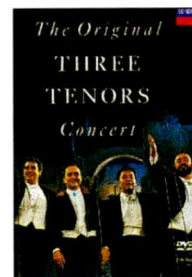
Video restoration efforts were quite successful. The color is rich and vibrant, with no sense of fading or color shift. The magnetic audio tracks were lost, so the soundtrack was skillfully reconstructed from optical elements.

*Help!* seems as fresh, appealing, innocent, and thoroughly entertaining as it did when initially released in 1965. The movie has become a timeless classic. Kudos to MPI for preserving and presenting it so well. R.B.

**The Original Three Tenors Concert** 1990; no rating; one-sided; Dolby Digital 5.1. LONDON 440 071 223, 1:26:19, \$29.95  
Picture: A-, Sound: B+, Content: B

This title with José Carreras, Plácido Domingo, and Luciano Pavarotti is as much of a cultural crossover phenomenon as it is an actual artistic endeavor. It has sold thousands of copies on VHS cassette and laserdisc, not to mention audio-only versions. The video on the DVD blows all the predecessors away, but the remix of the outdoor location recording in Rome still favors the magnificent voices at the expense of the enormous combined efforts of the Orchestra del Maggio Musicale Fiorentino and the Orchestra del Teatro dell'Opera di Roma, both led by Zubin Mehta.

The DVD could have included multiple soundtracks and text translations that could be turned on or off with the push of a button on the remote control. But London doesn't take advantage of these possibilities; the DVD contains only one soundtrack and absolutely no subtitles. Nor are there any biographies or production notes. The absence of such commonplace DVD features contradicts the back cover's statement promoting them. R.B.



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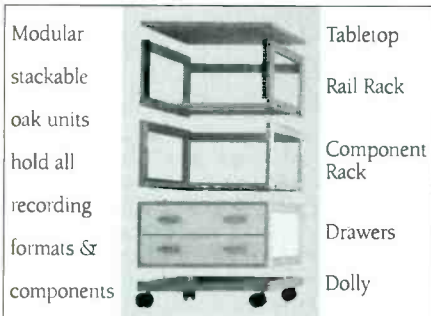
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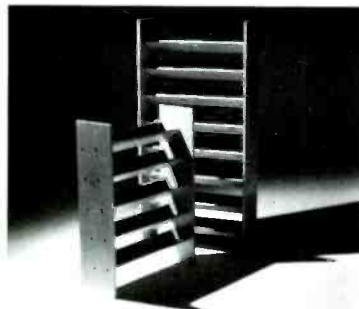
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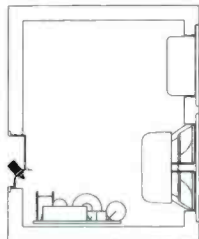
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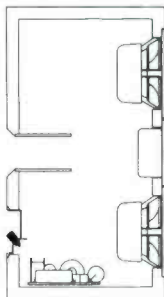


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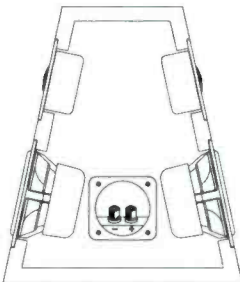


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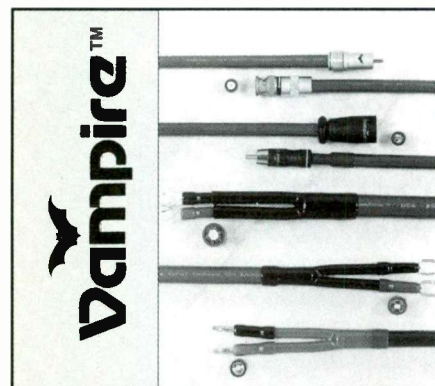
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**AUDIO**, July 1998, Volume 82, Number 7. **AUDIO** (ISSN 0004-752X, Dewey Decimal Number 621.381 or 778.5) is published monthly by Hachette Filipacchi Magazines, Inc., a wholly owned subsidiary of Hachette Filipacchi USA, Inc., at 1633 Broadway, New York, N.Y. 10019. Printed in U.S.A. at **Dyersburg, Tenn.** Distributed by Warner Publisher **Services Inc.** Periodicals postage paid at New York, N.Y. **10019** and additional mailing offices. One-year subscription rates (12 issues) for U.S. and possessions, \$24.00; Canada, \$33.68 (Canadian Business Number 126018209 RT, IPN Sales Agreement Number 929344); and foreign, \$32.00.

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# PlayBack

## PANASONIC DVD-L10 PORTABLE DVD PLAYER

Some products seem to exist just because they can. Take Panasonic's L10 portable DVD player: There's probably no crying need to be able to watch your own copy of *L.A. Confidential* on the red-eye to the coast, and you'd have to spend a lot of time in the air to justify the \$1,300 cost of this unit, but that's not the point. Reason aside, this is just a nifty gizmo.

The L10 is only a little larger than some portable CD players; Panasonic has dubbed this "PalmTheater," a name we should perhaps allow to die gracefully. The top half is a flip-up LCD screen of amazing quality: fine detail, excellent color balance, and widescreen, to boot.

The stereo speakers below the screen, only about an inch in diameter, are more a gesture than a serious audio system. Listen on 'phones, however, and the sound's fine. In fact, for those who may want to feed the L10 to a two-channel audio system or stereo TV, Panasonic provides two virtual surround modes that work quite well at spreading the sound. They sound pretty good on headphones, too.

But for all its portable promise, the L10 is mostly intended to be a source in a conventional home theater. The full-size infrared remote and the unbelievably awkward battery pack point in this direc-

GRADE: A

tion. So do the S-video and optical digital audio outputs, which can be used to feed a Dolby Digital surround signal or conventional PCM audio to an appropriately equipped receiver or decoder. To save space, the optical out is combined with the analog out in a hybrid mini-jack that requires a special cable. Fortunately, that's supplied.

The L10 performed superbly, both in audio and video. Dolby Digital sound was pristine, of course, but even the derived two-channel signal decoded excellently in Pro Logic.

To some, Panasonic's miniature player might be worth the price in gadget value alone. If you're in that group, rest assured that it lives up to its technical promise as well. (Panasonic: One Panasonic Way, Secaucus, N.J. 07094; 201/348-7000.)

Ian G. Masters

## NAIM AUDIO HEADLINE HEADPHONE AMPLIFIER

Naim Audio, a British maker of quality components, is one of the most recent companies to offer a high-end headphone amplifier. The Headline is a neat little box sporting a stereo headphone jack and a large volume knob. The amp itself is priced at \$450 but, like most of Naim's electronic components, requires a separate power supply; the supply can be as basic as the company's PSC (\$350) or can be one of its bigger and beefier supplies, whose prices run into the thousands.

I used the Headline with Naim's \$750 Flatcap supply and several Grado headphones, from the \$69 SR60 to the \$695 Reference RS-1. I played a variety of binaural and stereo recordings, and after a good warm-up, the Headline sounded somewhat more spacious than my reference headphone amp (which retails at \$1,350). On the other hand, it was a shade short in its extension at both ends of the spectrum and sounded less muscular. I was using different interconnects for the two headphone amps because the Headline's Chord Cobra cable is attached permanently; this



may have affected what I heard. And because performance nearly always improves with stronger power supplies, if you use the Headline with the supply next up in Naim's line, the \$1,500 Hi-Cap, I suspect you'll find it equal to the best headphone amps available. (Naim Audio: 2702 West Touhy Ave., Chicago, Ill. 60645; 773/338-6262.)

John Sunier

GRADE: A-

## NHT NewWave Home Theater System

NewWave is NHT's "lifestyle" line of compact, affordable speakers: The Home Theater System (\$800) comprises a sub and five satellites; the Music System gives you the sub (\$350) and just two satellites (\$180 for the pair), but you can add a three-pack of satellites (\$270) later. The magnetically shielded SAT-24 satellites have 3/4-inch soft-dome tweeters and 3 1/2-inch midrange drivers; bass for all channels comes from the PS-8 powered subwoofer, which has an 8-inch long-throw driver, a 50-watt amplifier, and a crossover (variable, from 80 to 220 Hz).

The owner's manuals show how to connect the front speakers via the subwoofer's speaker-level inputs and outputs, which feed the satellites through 160-Hz high-pass filters, and how to connect the surround satellites directly to your receiver. However, nothing is said about using the subwoofer's line inputs, other than suggesting you call NHT tech support—which told me to use the other inputs to get the correct (160-Hz) crossover. Because my A/V receiver has a 150-Hz crossover (not just a low-pass), I drove the sub's line input from the receiver's subwoofer output and connected the satellites to the appropriate receiver outputs. As with most home theater systems, it took some fiddling with the receiver and subwoofer adjustments to get the sound balance right, but the NewWave manuals explain with unusual clarity how you can tell what needs adjusting.

Once I had everything dialed in, voices sounded natural, orchestras sounded reasonably full (I could have used a hair more midrange warmth), and even piano sounded realistic—though high piano chords sounded a touch metallic at high volume. The system's overall response range is rated as 45 Hz to 20 kHz, but I got usable bass from about 35 Hz up. For the price, NHT has done its usual nice job. (Now Hear This: 535 Getty Court, Benicia, Cal. 94510; 800/648-9993; www.nhthifi.com.)

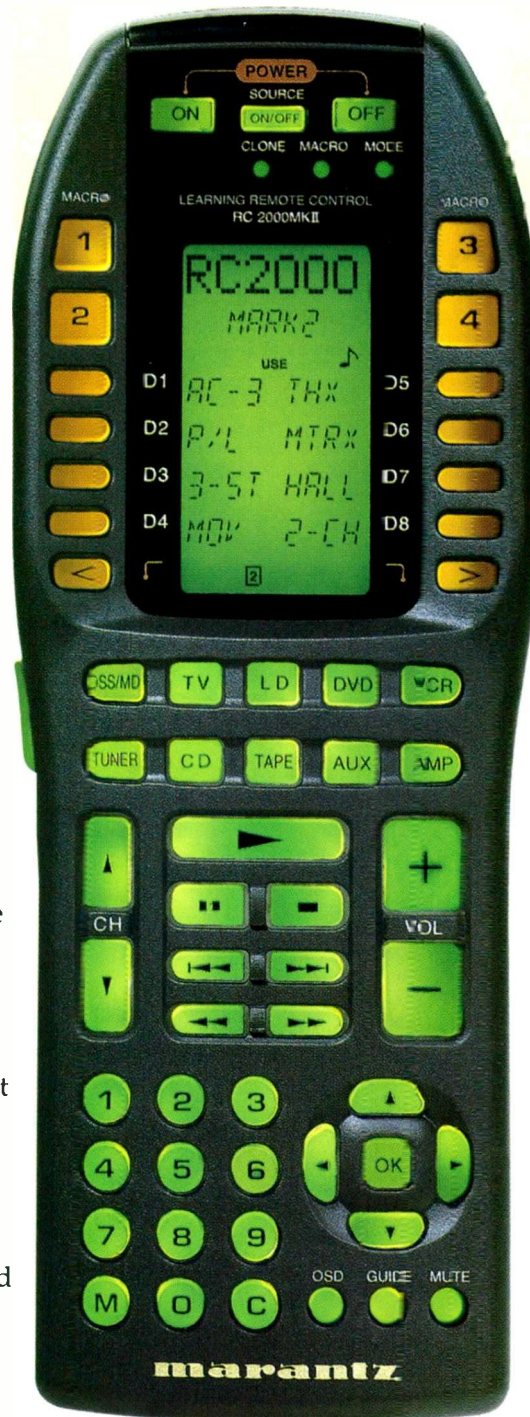
Ivan Berger

GRADE: B+



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