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# HIGH FIDELITY

AUDIO • VIDEO • TEST REPORTS • MUSIC

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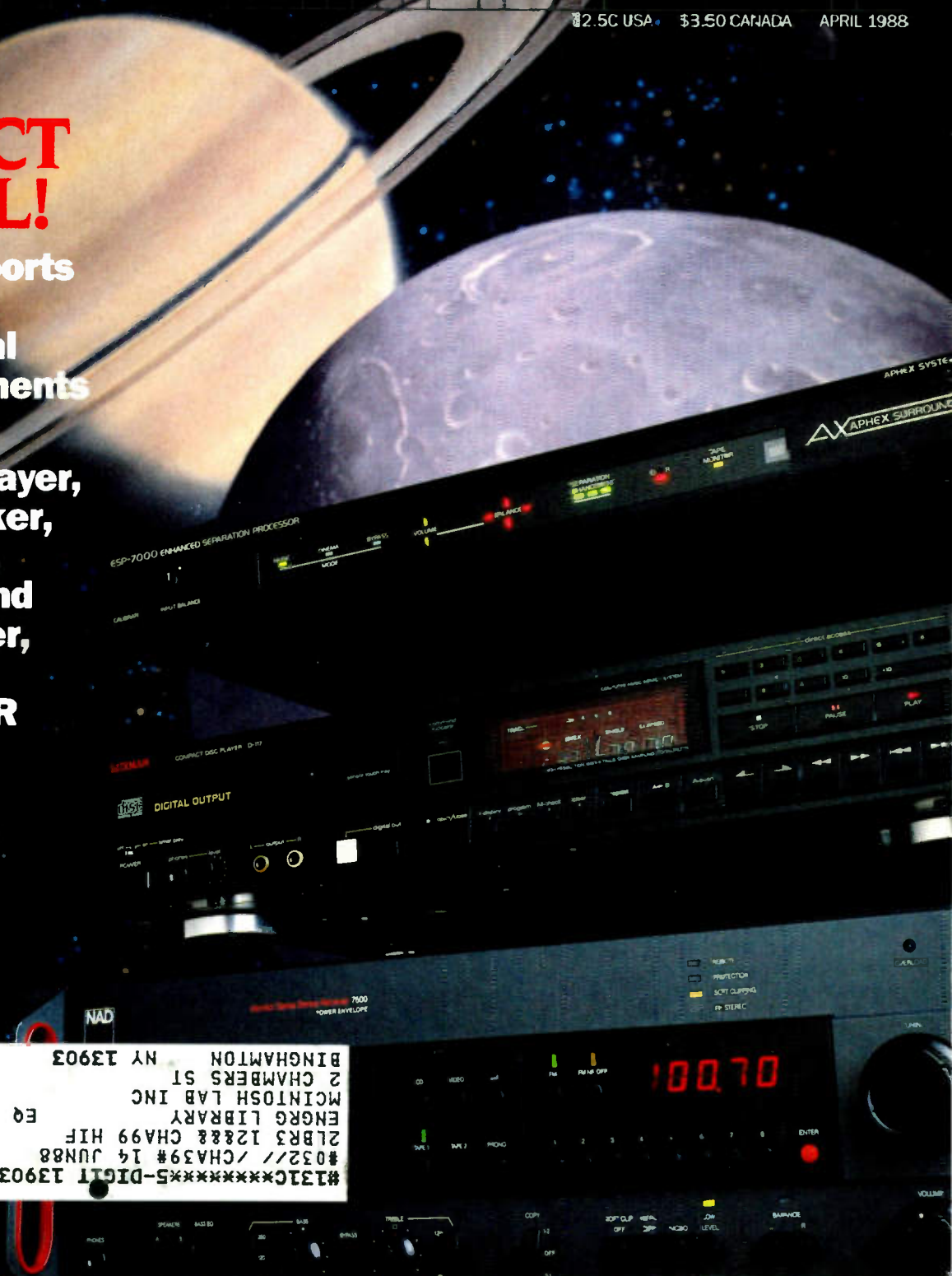
Complete Reports on the Latest Video & Digital Audio Components

### LAB TESTS

Luxman CD Player, AR Loudspeaker, NAD Receiver, Aphex Surround Sound Decoder, Mitsubishi Super VHS VCR



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# After four years at Hewlett-Packard, we w

In 1983, Dr. Godehard Guenther, President of *a/d/s/*, issued an injunction to our engineers and designers. "Guys," he said, "somebody's got to come up with a new loudspeaker standard. Let's make sure it's us."

Understand: he wasn't suggesting our existing loudspeakers weren't good. Rather, he was challenging us to address the shortcomings present even in the very best speakers, ours included. Shortcomings made all the more apparent by the sonic demands of the compact disc.

What we sought to build were speakers that didn't sound like a set of drivers stuffed in a box. Our goal was to create speakers characterized by a stable sound stage, pinpoint imaging and sound that seemed to emanate from free space.

It was a tall order. But the technology that has resulted—Unison™ . . . of one voice—is the kind other speaker makers will be emulating for years to come.



At *a/d/s/*, we make our own drivers. Our high definition woofers feature new cones, magnets, baskets and voice coil assemblies—painstakingly crafted to eliminate coloration.

## We finally had the tools to be as critical as we were inclined to be.

Our first task was to take a long, hard look at the limitations inherent in loudspeaker drivers. That required a powerful "microscope." And, fortunately, we had one—a high-resolution, super-fast computer from Hewlett-Packard, supported by a sophisticated mathematical program of our own devise.

Housed in a specially designed *a/d/s/* acoustics laboratory, the computer gave us the ability to generate and analyze driver performance data with an accuracy, thoroughness and detail never attainable before.

High technology enclosure materials enable us to make the new CM7 (left) and CM5 extremely compact without sacrificing interior volume. How compact? Consider that the CM5 measures a mere 9<sup>5/8</sup>" x 5<sup>3/4</sup>" x 6<sup>7/8</sup>".

Unison is a trademark of Analog and Digital Systems, Inc

In this veritable mountain of information, acoustic truths resided.



The CM7's 4th-order, 24dB/octave crossover network. Complex, sophisticated and expensive to manufacture, it's a major reason why the speaker produces such a stable image.

## If the drivers aren't flawless, no amount of camouflaging will hide the flaws.

One fact was obvious: the traditional materials used to construct woofers, tweeters and midranges—polypropylene, metal, cellulose compounds—were simply inadequate. So we set about to discover new ones ideally suited at the molecular level to the jobs they're required to do.

For the domes of our tweeters, we selected a proprietary copolymer that's exceedingly rigid, yet has superb internal damping and freedom from ringing. For the voice coil formers in our midranges, we adopted stainless

# the keyboard of a ere ready for a Steinway.

steel. Strong and non-magnetic, it enabled us to produce a motor quick enough to resolve the finest detail, even at the highest volume level. And so our research went, until our drivers were as perfect as the laws of physics allow.

## **The crossover network. You don't see it. You shouldn't hear it, either.**

When most speaker makers design crossover networks, their primary concern is the interaction of the drivers. We were more ambitious. We sought crossovers that optimize the relationship between the drivers and their

enclosure, even with the room in which the system is played.

And we had an advantage: the excellence of our drivers allowed us to use *ideal* crossover points. Using these points, all the fundamental tones of the human voice can be reproduced by a single driver. With the computer, we evaluated countless prototypes of crossovers. A 4th-order network of the Linkwitz-Riley type proved the most appropriate. This type alone yields the response that satisfied our requirements for neutrality and realistic imaging. On a frequency response plot, the crossover points aren't even detectable.

## **How good it ultimately sounds depends on the box you put it in.**

That's why we employed a polymer material filled with an



With its stainless steel coil former and copolymer cone, the Unisōn midrange does something a cone midrange has never done before: span the fundamental range of the human voice—from 200 to 2,000 Hz.



Our tweeters' domes are made of yet another proprietary copolymer, giving them the unique ability to provide smooth, detailed, high frequency response at even the highest levels.

extremely high mass compound to produce the rigid, aurally "invisible" enclosures of our Compact Monitor Series. You'll be amazed by the weight of these little beauties—they're heavy. You'll be floored by the sound.

To our ears, our new speakers—the M Series and compact CM Series—offer convincing proof that Unisōn technology does indeed define a new era in speaker performance. For more information about a/d/s/ products, phone a/d/s/ toll-free, at 1-800-345-8112. (In PA, call 1-800-662-2444.)



The M12 is the instrument on the right.

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# HIGH FIDELITY

AUDIO • VIDEO • TEST REPORTS • MUSIC

APRIL 1988

VOL. 38 NO. 4



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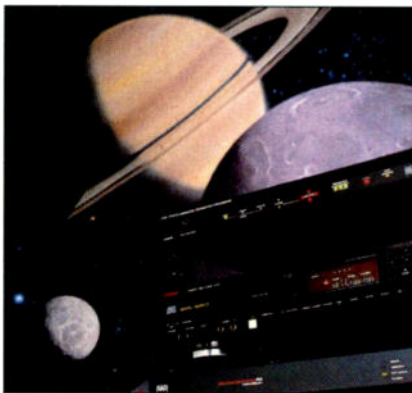
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On the cover: From the top, Aphex's ESP-7000 surround-sound decoder; Luxman's D-117 Compact Disc player; and NAD's 7600 AM/FM receiver.



Cover design: Joanne Goodfellow  
Cover photo: Tony Pettinato

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**"They truly represent a breakthrough."**

*Rolling Stone Magazine*

Polk's critically acclaimed, 5 time AudioVideo Grand Prix Award winning SDA technology is the most important fundamental advance in loudspeaker technology since stereo itself. Listeners are amazed when they hear the huge, lifelike, three-dimensional sonic image produced by Polk's SDA speakers. The nation's top audio experts agree that Polk SDA loudspeakers always sound better than conventional loudspeakers. Stereo Review said, "Spectacular... the result is always better than would be achieved by conventional speakers." High Fidelity said, "Astounding... We have yet to hear any stereo program that doesn't benefit." The new SDA 1C and SDA 2B utilize new circuitry which allows the drivers to more effectively utilize amplifier power at very low frequencies. This results in deeper, more powerful bass response, greater dynamic range and higher efficiency. In addition, the new circuitry makes these new speakers an extremely easy load for amplifiers and receivers to drive. Lastly, the imaging, soundstage and depth are more precise and dramatically realistic than ever.

### Why SDAs Always Sound Better

Stereo Review confirmed the unqualified sonic superiority of Matthew Polk's revolutionary SDA Technology when they wrote, "These speakers *always* sounded different from conventional speakers — and in our view better — as a result of their SDA design.

Without exaggeration, the design principals embodied in the SDAs make them the world's first true stereo speakers. The basic concept of speaker design was never modified to take into account the fundamental difference between a mono and stereo signal. The fundamental and

basic concept of mono is that you have one signal (and speaker) meant to be heard by both ears at once. However, the fundamental and basic concept of stereo is that a much more lifelike three-dimensional sound is achieved by having 2 different signals, each played back through a separate speaker and each meant to be heard by only one ear apiece (L or R). So quite simply, a mono loudspeaker is designed to be heard by two ears at once while true stereo loudspeakers should each be heard by only one ear apiece (like headphones). The revolutionary Polk SDAs are the first TRUE STEREO speakers engineered to accomplish this and fully realize the astonishingly lifelike three-dimensional imaging capabilities of the stereophonic sound medium.

**"A stunning achievement"**

*Australian HIFI*

Polk SDA Technology solves one of the greatest problems in stereo reproduction. When each ear hears both speakers and signals, as occurs when you use conventional (Mono) speakers to listen in stereo, full stereo separation is lost. The undesirable signal reaching each ear from the "wrong" speaker is a form of acoustic distortion called interaural crosstalk, which confuses your hearing.

**"Literally a New Dimension in the Sound"**

*Stereo Review Magazine*

The Polk SDA systems eliminate interaural crosstalk distortion and maintain full, True Stereo separation, by incorporating two completely separate sets of drivers (stereo and dimensional) into each speaker cabinet. The stereo drivers radiate the normal stereo signal, while the dimensional drivers radiate a difference signal that acoustically and effectively cancels the interaural crosstalk distortion and thereby restores the stereo separation, imaging and detail lost when you listen to normal "mono" speakers. The dramatic sonic benefits are immediately audible and remarkable.

**"Mindboggling, astounding, flabbergasting"**

*High Fidelity Magazine*

Words alone cannot fully describe how much more lifelike SDA TRUE STEREO reproduction is. Reviewers, critical listeners and novices alike are overwhelmed by the magnitude of the sonic improvement achieved by Polk's TRUE STEREO technology. You will hear a huge sound stage which extends not only beyond the speakers, but beyond the walls of your listening room itself. The lifelike ambience revealed by the SDAs makes it sound as though you have been transported to the acoustic environment of the original sonic event. Every instrument, vocalist and sound becomes tangible, distinct, alive and firmly placed in its own natural spatial position. You will hear instruments, ambience and subtle musical nuances (normally masked by conventional speakers), revealed for your enjoyment by the SDAs. This benefit is accurately described by Julian Hirsch in Stereo Review, "...the sense of discovery experienced when playing an old favorite stereo record and hearing, quite literally, a new dimension in the sound is a most attractive bonus..." Records, CDs, tapes, video and FM all benefit equally as dramatically.

**"You owe it to yourself to audition them."**

*High Fidelity Magazine*

SDAs allow you to experience the spine tingling excitement, majesty and pleasure of live music in your home. You must hear the remarkable sonic benefits of SDA technology for yourself. You too will agree with Stereo Review's dramatic conclusion: "the result is always better than would be achieved by conventional speakers...it does indeed add a new dimension to reproduced sound."

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## Brave New (Digital) World

By Michael Riggs

In this issue, we report on some of the highlights of the most recent Consumer Electronics Show. Despite its name, the show isn't open to consumers. Rather, it is a trade exhibition for manufacturers, distributors, and dealers of consumer electronics—everything from digital watches to microwave ovens to the most exotic audio equipment available. (A hot item at this winter's CES was Panasonic's automatic bread-baking machine.) Most of the 100,000 or so people who clot the aisles are there to buy and sell. We go to talk to the people behind the products and to see and hear what's new.

As usual, we found a lot of interesting stuff, but this show was more of a teaser than anything else for those who thrive on technological breakthroughs. You could see high-definition television and hear digital audio tape (DAT), but not from real products headed for American homes. HDTV is hung up on issues of standardization and commercial viability, which probably will keep it out of the consumer market for a good many years to come. DAT is stalled by fear. Record companies are afraid that the ability of DAT decks to make essentially perfect dubs of commercial recordings will cut into their revenue. Audio manufacturers are afraid of the crippling "solution" to this anticipated (and, I think, largely imaginary) problem that the record industry is trying to get written into law: they are even more scared at the prospect of restrictive trade legislation if they start bringing machines in before the question is settled in Congress.

Yet I came away from this relatively sedate CES with a clearer vision than ever before of where home audio and video are headed. Three products in particular stand out as signposts to the future. The first is perhaps the most unlikely: Casio's "digital horn." It looks like a cheap alto saxophone, you finger it somewhat like you would a clarinet, and it sounds sort of like a horn. Not like a saxophone, not like a clarinet, not exactly like any "real" horn I've ever heard, but still somehow familiar.

This remarkable instrument has a loudspeaker in its bell, but it can make itself heard by other means as well. Connect its MIDI port to the MIDI port on one of Casio's keyboards, and presto! Reedman turns pianist. And the digital synthesizer at the heart of that keyboard can sound remarkably like a "real" piano. Again, the match is not exact, but it is better than I would have thought possible. It can sound remarkably like a few other things, too. Sooner or later, it's going to take an expert to distinguish "real" from "fake," if indeed such a distinction makes any sense.

That such categorization might be beside the point disturbs me a little, even though I can't come up with a good argument to support my gut reaction. It probably is nothing more than sentimentality that makes me feel that an instrument that sounds like a piano should look and work like one as well. Historically, in fact, instruments

have changed in sound as much as in appearance, for example. To a composer or musician, an instrument is primarily a tool, judged foremost by how well it gets the job done. Viewed in that light, a top-notch synthesizer can look pretty good. At the very least, it will score well in flexibility.

The second item is not so much a product as an idea. A new company called International Cablecasting Technologies, started by a group of people who cut their technical and marketing teeth at HBO, has developed a system for sending eight channels of 16-bit digital audio and several times that many channels of data down a single cable-television channel. Their secret is a sophisticated digital data compression and encryption scheme, undone in a subscriber's home by a special tuner. Programming is beamed by satellite to cable operators who distribute it over their systems for a fee, the same way they now sell movie or sports channels. In return, subscribers get virtually nonstop music (no commercials and very little talk) that has not been subjected to the kind of ham-fisted signal processing typically applied by radio stations in an effort to sound louder than everyone else on the dial. ICT claims its system does not alter sound quality in any way. During the demonstration, we occasionally thought we heard very small differences between processed and unprocessed signals. But if they were indeed present, they were minute and certainly inconsequential relative to the gross changes introduced by most radio stations.

Number three on my list is the Lexicon CP-1 digital surround-sound processor. Lexicon has picked up the gauntlet thrown down by Yamaha's DSP-1 (our 1986 Product of the Year), which brought a new level of realism to the simulation of acoustic spaces in the home. We are eagerly looking forward to putting the CP-1 to a thorough test, but our initial impression is that Lexicon has done a stunning job. In addition to performing some of the best Dolby Surround decoding we've ever heard, it has a very sophisticated bag of tricks for making music sound as though it's being played someplace more interesting and appealing than the space between a pair of loudspeakers, up to and including simulation of real concert halls.

Three products for three purposes: creation, transmission, and reproduction of music. What makes all of these otherwise quite different products possible is digital signal processing. Once an audio (or video) signal is in digital form, it is almost infinitely manipulable. Designers are quick to see the advantages. (Denon's prototype all-digital preamplifier is an example of how even the most traditional components can be transformed.) From the recording studio to our homes, we're going to be seeing a lot more digital processing in audio, and with it will come a fundamental change in the way we think about making and reproducing music. □



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152854

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134536

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 1330 Avenue of the Americas, New York, N.Y. 10019

**HIGH FIDELITY** is published monthly by ABC Consumer Magazines, Inc., a division of ABC Publishing, Inc., a Capital Cities/ABC, Inc. company. © 1988 ABC Consumer Magazines, Inc. Member, Audit Bureau of Circulations. Indexed in Reader's Guide to Periodical Literature. Current and back copies of **HIGH FIDELITY** are available on microfilm from University Microfilms, Ann Arbor, Mich. 48106. Microfiche copies (1973 forward) are available from Bell & Howell Micro Photo Div., Old Mansfield Rd., Wooster, Ohio 44691.

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**New York:** ABC Consumer Magazines, Inc., 825 Seventh Ave., 8th fl., New York, N.Y. 10019. Tel: (212) 265-8360. Peter T. Johnsmeyer, Group Advertising Director; Andrew Eisenberg, Associate Advertising Director; James R. McCallum, Advertising Director; Music/Books, Maria Manasse, Classified Advertising Director; Marina Paruolo, Production Manager.  
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**Los Angeles:** ABC Consumer Magazines, Inc., 1888 Century Park East, Suite 1900, Los Angeles, Calif. 90067. Tel: (213) 284-3132. Howard Berman, National Sales Manager.

**Editorial correspondence** should be addressed to the Editor, **HIGH FIDELITY**, 825 Seventh Ave., New York, N.Y. 10019. Editorial contributions will be welcomed, and payment for articles accepted will be arranged prior to publication. Submissions must be accompanied by return postage and will be handled with reasonable care; however, the publisher assumes no responsibility for return of unsolicited photographs or manuscripts.



Magazine Publishers Association

## PRIMITIVE STEREO

I am writing in response to your December 1987 "Front Lines." I have been collecting early stereo recordings for years, and although the first couple of Beatles albums were poorly mixed two-track recordings, they certainly qualify as true stereo. I understand that many audiophiles call this limited track stereo "binaural," but stereo is not just the illusion of wide spacing between two speakers. Limited track stereo is superior to plain mono because it enables you to hear more of the instrumentation than you can in a mono mix. Anyone who considers this form of stereo offensive or not up to today's standards can simply push the mono button on his preamp, amplifier, or receiver.

In my opinion—and in the opinion of an ever growing group of collectors and music fanciers—the majority of the record-company engineers, producers, and executives involved in this CD reissue business have yet to understand what should be done to bring this kind of historically important music into the modern age. First and foremost, they should try their best to find the original master tapes (which is not often done). Then they should do a little bit of plain, old-fashioned filtering to eliminate some of the tape hiss without ruining the original treble and bass response. Finally, they should consider these old recordings sacred, using the two-track stereo mix (when the master tapes are not available) and, if necessary, slightly blending the two tracks together to decrease the isolation of the voices and instruments from each other.

**Barry Margolis**  
 Hoboken, N.J.

*Editor in Chief Michael Riggs replies: One point I tried to make was that the earliest two-channel Beatles records are not true stereo because they do not do anything other than provide an "illusion of wide spacing between two speakers." Moreover, neither the Beatles nor their producer, George Martin, ever intended the recordings of that era to be released in anything other than mono. Martin has said that they used two tracks solely for convenience. He mixed them to mono and added compression to achieve the desired sound. Because additional processing (compression, in this case) was applied, you cannot get equivalent results simply by engaging your system's mono switch.*

*On the technical side: The binaural process is a variant of stereo recording in which the microphones are placed in the "ears" of a dummy head. The result is a recording that will yield striking spatial realism when*

*heard over headphones. Unfortunately, filtering out tape hiss is nearly impossible by conventional means without dulling the sound somewhat. This is because the most obvious tape hiss will be in the lower treble, at a few kilohertz or so.*

## OL' BLUE EYES IS BACK AGAIN

Regarding Terry Teachout's August 1987 review of Capitol's first four Frank Sinatra CDs, I have this to add:

*Songs for Swingin' Lovers:* The songs enter and exit abruptly. I miss the ambience of the natural studio sound. Also, it would have been nice of Capitol to include "Memories of You," the 16th title recorded for (but never released on) the album. The song can be found only on a British LP called *The Rare Sinatra*.

*In the Wee Small Hours:* The "special abridged Compact Disc version" is missing only one song, "Last Night When We Were Young"—perhaps because it was recorded in March 1954, whereas the others were done in February and March of 1955. It was only as an afterthought that "Last Night" made it to the LP.

*Close to You:* This is an excellent CD of an LP that has been out of print in the U.S. for many years. The bonus tracks were previously available here on 45s only, save "There's a Flaw in My Flue," which was just a novelty number.

*Sinatra's Swingin' Session:* Great sound. The album was supposed to be done at a much slower tempo, but Sinatra had Nelson Riddle speed it up; therefore, it's Sinatra's shortest recording. The bonus tracks are available on other LPs.

**Raymond Horton**  
 Baldwin, N.Y.

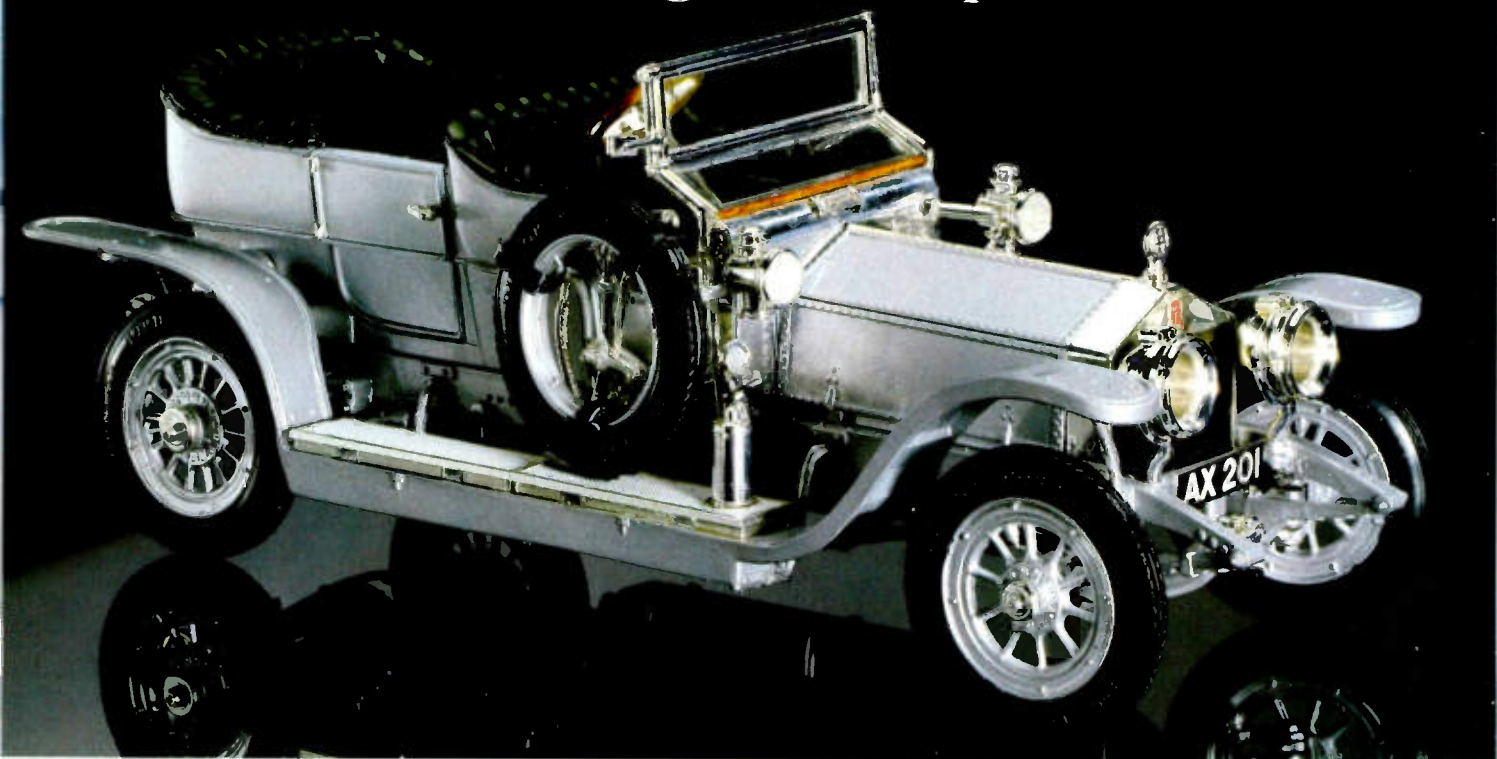
*Terry Teachout replies: Many thanks to Mr. Horton for the interesting details he provides in his letter. Some I knew and omitted for lack of space, others I didn't know and am glad to find out. As for the original number of tracks on In the Wee Small Hours, my memory slipped: I remembered 18 instead of 16. Either way, it was inexcusably cheap of Capitol to shorten the album for CD.*

## NEXT TIME, HOLD THE REVERB

Already quite ill from statements by film colorizers—who claim they need pristine prints before they can stain them sloppily and cut them for syndication—I suffocated upon hearing the news that RCA's producers "are going back to try to find the best originals [Toscanini masters] we can" ["Medley," June 1987]. I purchased the CD version of the 1949 *Eroica* and found

(Continued on page 12)

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(Continued from page 8)

that a long, vapid, phony echo has been piled on. Someone who bought the Berlioz CD tells me the same has been done to the great 1953 *Roman Carnival*—as if “Phase Four” reverb would be an improvement.

RCA’s statement, when conveyed to your readers, should have been accompanied by a dry, pained, humorless laugh—

and by some of the scholarship you gave the Beatles “reverbs.”

Richard Sebolt  
Springfield, Mass.

Classical Music Editor Ted Libbey replies: *Thomas Hathaway was careful to point out in his review that “a small amount” of artificial reverberation had been added to a*

*couple of the recordings on RCA’s first Toscanini CDs, but that the effects of this and the apparent rechanneling of the originals in some places “are not sufficient to spoil what has been achieved.” De gustibus non est disputandum. As for the quote from Red Seal president Michael Emmerson to which you refer, I made it clear in the context of my report that I did not approve of lost masters. Beyond that, I did not feel it was appropriate to editorialize on the way RCA’s reissues might sound.*

#### TWO MORE FOR TOSCANINI

Thomas Hathaway’s review of the new Toscanini Compact Discs from RCA [August 1987] hits the mark! RCA has done a wonderful job of remastering and, in doing so, has recaptured truly magnificent and powerful performances.

I also must echo Hathaway’s amazement over the level of criticism directed at Toscanini’s character and intelligence. What is the motivation for this sort of criticism? Even though the barbs are still flying, Hathaway is right: We’re not paying attention. That’s because we *do* hear the music!

As for the projected 56 Toscanini CDs, I hope one of them will contain his November 15, 1952, broadcast of the Saint-Saëns *Organ Symphony*. What an astounding performance! I think it may be the greatest performance of anything I’ve ever heard. A reissue of this hair-raising and brilliant account by the NBC players and their maestro would be cause for celebration.

Daniel Pastore, Jr.  
Cranford, N.J.

*I’ll bring the confetti—this Organ Symphony performance will be available on a midprice RCA CD this summer.—Ed.*

I must take issue with Thomas Hathaway’s criticism of Harry Glantz in his review of three Toscanini CD reissues. Glantz was one of the great classical trumpet players. His intonation was unique, combining the gold of the Vienna Philharmonic horn with a lift, thrust, and centering brilliance that seem purely American. Toscanini once dismissed a second horn with the comment: “Not bad, but not good enough to sit next to such a fine artist as Harry Glantz.”

“Tinny” in loud passages? Mount Vesuvius would have erupted! The trumpet is difficult to record well—I’ve heard some tin and fuzz even in the most recent recordings. Toscanini liked to outline his ensemble brass in the low-middle range with a burr that was heavier than normal. This

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gave them an increased weight, definition, and expressiveness. Striking examples can be found in Toscanini's recording of the Prologue to *Mefistofele* and Robert Russell Bennett's original soundtrack recording of *Victory at Sea*. When the technique is continued by a solo trumpet within the ensemble, it is very difficult to record well. It is not "phonogenic"—refer to the first movement of the *Eroica* as an example.

Glantz's solo lead (in the upper range) in the "Cloudburst" section of the remastered Toscanini *Grand Canyon Suite* is wonderful, incomparable. The intonation is open and clear, rich and sweet, and it carries very far. Indeed, Glantz's ability to play far or through the note was his greatest achievement.

John Turner  
Omaha, Neb.

#### THE DECISION WASN'T CAPRICIOUS

As you may already know, Harmonia Mundi, U.S.A., has been selected to be our general agent in the United States. We would very much appreciate it if you would inform your readers of this.

Jan Kask  
Caprice Records  
Stockholm, Sweden

#### THE PAUSE THAT REFRESHES

Compact Disc players would benefit from a feature that is not currently available—a programmable silent interval that could be inserted between major selections on a disc (an intermission, in effect). The interval could be based on a 15-second unit applied one or more times to obtain the desired pause. Current CDs give us Beethoven's Fifth following hard on the heels of Schubert's Eighth. They give us no time to come down from the heights, no time for aftertaste. Customarily, it seems, the interval between symphonies is the same as that between movements. I have a CD of Mozart violin sonatas that sounds more like one 12-movement supersonata than four three-movement pieces. A programmable pause like the one I've described would enable us to correct such peculiarities.

David Ohde  
Weaverville, Calif.

#### SONIC HOLOGRAPHY

With regard to the Carver invention of Sonic Holography, your magazine is quoted a few years ago as saying that "the holographic generator seems to open the curtain and reveal a deployment of musical forces extending behind, between, and beyond the speakers." If Sonic Holography does make such a drastic, audible difference, why haven't record companies started to record with it? And if this is not possible, then why hasn't the Carver C-9 Sonic Hologram Generator or another ho-

lography-equipped component made it into almost every audiophile's system? I would think that anything that could restore an accurate, three-dimensional image to stereo reproduction would have achieved greater popularity and acceptance than Sonic Holography has.

Dean Stewart  
(no address given)

*It's hard to say. Why doesn't every audiophile have a surround-sound system? One reason is that Sonic Holography does not work well with all recordings, and the speakers used (not to mention their placement) can have a drastic effect on the results obtained. Moving a speaker a few inches one way or another can make a big difference. Consequently, we doubt that many people have ever heard Sonic Holography properly demonstrated.*

*On the other hand, you may be underestimating its commercial success. Carver is the largest American manufacturer of audio electronics, and many of its products include Sonic Holography circuits. In addition, the idea behind Sonic Holography has inspired other products from other manufacturers. Polk's SDA loudspeakers, for example, work to achieve similar ends by somewhat different means.—Ed.*

#### THE CASE OF THE ROUNDED-OFF CD

Leslie Berman's review of Rounder artists on Compact Disc [October 1987] left out something important regarding the Persuasions' *No Frills*: Whoever transferred this music to CD cares little about details, such as making sure all the tracks begin cleanly. Two of the album's best cuts, "Still Ain't Got No Band" and the medley including "Under the Boardwalk," start with the vocal slightly clipped off. (I compared them with the vinyl versions.)

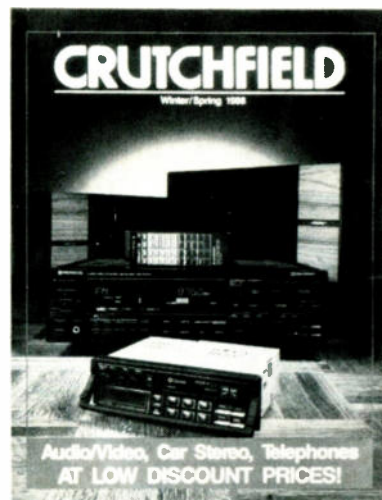
This is a major annoyance—and an insult to a fan who has shelled out nearly \$20 for 35 minutes of music. These aren't ancient master tapes full of hiss, but strong stuff recorded in 1984. The transfer person at Rounder didn't care to get it right. A botched job is the result.

J. J. Syrja  
Mount Clemens, Mich.

#### KING CRIMSON UPDATE

*King Crimson's Discipline is indeed available on Compact Disc, contrary to what we reported in our October 1987 review of the band's CD catalog. But it's available only as an import, which is why it proved hard to verify. Copies sold here as Polydor/EG 800 099-2 are, in fact, from Europe and not from Polygram in America.—Ed.*

All letters should be addressed to The Editor, HIGH FIDELITY, 825 Seventh Ave., New York, N.Y. 10019. Letters are subject to editing for brevity and clarity.



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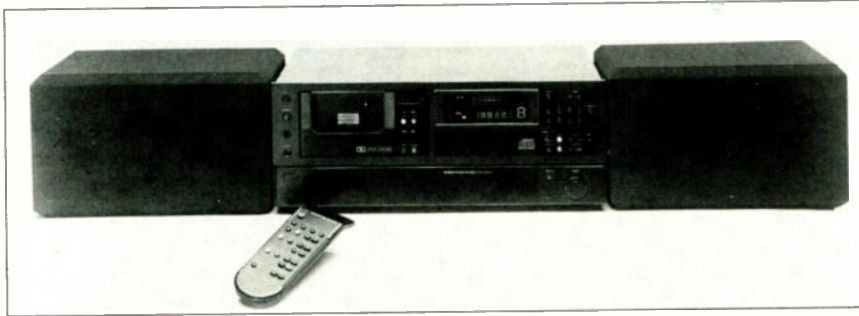
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### Shelf System

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### Covering All Bases

Akai is best known for audio tape decks, audio-video receivers, VCRs, and, increasingly, professional music products (through a separate division) such as digital samplers, synthesizers, and assorted MIDI processors and effects devices. Now, the company is raising its profile in the traditional component-audio business with a new line of integrated amps, tuners, CD players, and, naturally, cassette decks. The CD-93 (\$1,199), Akai's top CD

player, features "sliding" 18-bit digital filters and rugged construction aimed at minimizing internal and external vibrations. All four of Akai's new CD players have digital outputs that can feed the AM-73 integrated amp (\$899), which contains a built-in digital-to-analog converter (DAC). The AM-73, which heads a three-model group, is rated at 100 watts (20 dBW) per channel into 8 ohms.

Perhaps the most intriguing item is the AT-93 AM/FM tuner (\$599), the first such home model to incorporate an FM tuner that continuously chooses the best signal from either of two antenna inputs. (A few high-end car tuners also use such "diversity" tuning to combat multipath reception, one of the biggest irritants in mobile sound.) Based on the quality of the incoming FM signal, the AT-93 can further optimize reception by automatically selecting a wide or narrow IF bandwidth setting, one of two levels of stereo blending (or, at worst, mono), and a high-frequency filter. These parameters can also be set manually and can be stored with the station in one of 20 memory presets.

Finally, topping the list of three new cassette decks is the GX-52 (\$499), which features Dolby HX Pro headroom extension, Dolby B and C, a bias fine-tuning knob, and controls to assist editing. *Akai Div., Mitsubishi Electric Sales America, Inc., 225 Old New Brunswick Rd., Piscataway, N.J. 08854.*



Akai's AT-93 is the first home tuner to employ diversity tuning.

### Attention, Frequent Flyers

Can't bear those painful airline headsets? Then try the Jetset, which uses a shirt-pocket-size adapter to convert an airplane's piped-in sounds to regular electronic signals for reproduction through a conventional lightweight headphone (supplied). Inside the battery-powered adapter are two tiny mikes and a small stereo amplifier, plus "correction baffles" said to filter out some of the hiss and sibilants. Made by Lotus Developments, Ltd., the Jetset can be ordered for \$19.95 plus \$3 shipping and handling from Executive Travelware, P.O. Box 59387, Chicago, Ill. 60659. (Illinois residents, add 8 percent sales tax.) We'd like to know whether you still have to pay for the in-flight movie.



But do these filter out crying babies?

### TDK Lineup

Among the new accessories from TDK are the HCL-11 "dry" and the HCW-01 "wet" audio cassette head cleaners. Also new is the HD-30 head demagnetizer cassette, said to be appropriate for car and portable decks as well as for home recorders. Currently being test-marketed is the Limited Edition SA high-bias 90-minute audio cassette, packaged in a black, rounded-edge, soft-plastic case. The new case is more conducive to carrying in your back pocket; it's also quite attractive.

On the video side, the company has introduced S-VHS and S-VHS-C videocassettes in the standard 120- and 20-minute lengths, respectively. The formulation carries the XP ("excellent professional") designation, a phrase that cries out for an alternative translation. *TDK Electronics Corp., 12 Harbor Park Dr., Port Washington, N.Y. 11050.*

(Continued on page 96)





## Answers to Readers' Questions

By Larry Klein

### Head Demagnetization

*I've been using my cassette deck for years and have never demagnetized the heads. As far as I can tell, the recording and playback performance is as good as it ever was, which is very good. A friend who does some professional recording and who demagnetizes his recorder's heads before every job expressed surprise when I told him this. Do machines differ in their need for demagnetization?*

*Charles Smythe  
Woburn, Mass.*

The development of better bias-oscillator circuits has greatly reduced the problem of residual head magnetism that "degaussers" were originally designed to eliminate. In fact, a two-head cassette deck automatically degausses its heads every time it records (a three-head unit may eventually require demagnetization of the playback head).

A tape engineer once told me that the most likely causes of a tape's high-frequency loss are "magnetostrictive" effects caused by, for example, the squeezing of the tape between the capstan and pinch roller or the bending of the tape sharply around small-diameter tape guides. But this does not totally obviate periodic demagnetization. A slightly magnetized playback head or capstan may not have a strong enough residual field to erase the highs on a tape, but it could increase the playback noise level—permanently. So, like chicken soup, a little bit of head degaussing now and then certainly couldn't hurt.

### Unequal Speaker Volumes

*I own a pair of Pioneer loudspeakers rated at 8 ohms and a pair of Technics rated at 6 ohms. When I play them using the A+B switch position on my speaker selector, the Pioneers are louder than the Technics. Is there any way I can adjust their impedances so that they will play at the same volume?*

*John Montgomery  
San Jose, Calif.*

The impedance of a speaker system bears no necessary relationship to its sensitivity or efficiency, just as its efficiency has no necessary relationship to its quality. But, as a first step, check the midrange-level controls (if any) on the Pioneers. If they are set high, you may be able to achieve an apparent level reduction of the Pioneers by turning down their midrange controls—assuming you are not distressed by the resulting change in tonal character. If the Pioneers don't have midrange controls to adjust—or if you don't like the resulting sound when you make the adjustment—you can reduce their relative volume by wiring an L pad in each of the speaker lines. You'll find both stereo and mono L pads listed in the Radio Shack catalog, but it would prob-

ably work out best if you use a separate mono L pad with a high power rating on each speaker.

Since L pads work by putting both a series and parallel variable resistance in the speaker line, the series resistance may cause slight frequency-response irregularities as it interacts with the speaker's impedance curve. The variations will mostly be in the low frequencies, and you may even like the audible effect. Also, remember that the best way to use an L pad is with as little attenuation as possible. This will prevent overheating of the pad and gross frequency-response variations.

### Fluttering Speakers

*My car stereo system sounds fine with the exception of the cassette deck. When I'm playing my dubbed tapes loudly, I can't turn up the bass very much without flutter and rattling in the speakers. But when I play the radio as loud as I like with full bass, the sound is clear. Any ideas?*

*John Del Vecchio  
St. Paul, Minn.*

I've encountered problems identical to yours many times before, but always with a home tape deck rather than a car installation. The records you've taped are probably sufficiently warped to cause severe vertical deflection (which may be visible) of your phono stylus during play. This produces a strong low-frequency signal on the recording that, during playback with full bass boost, overloads your car speakers. The records themselves sound okay through your home system because the infrasonic warp "signal" is handled without overload or filtered out by the components in your setup after the tape-output jacks. However, your car player's electronics or speakers are unable to handle the recorded low frequencies without overloading.

The solution is to rerecord your tapes through an infrasonic filter or to settle for less bass boost in playback. If the problem you described had occurred in a home system when playing records—or even CDs—I would say that its source was acoustic feedback. But I've never heard (or heard of) acoustic feedback in a car tape system.

### Receiver as Tuner

*I'm about to upgrade my system by replacing my low-power receiver with a more powerful integrated amplifier and a separate tuner. I've bought the amplifier, but for financial reasons I'll have to hold off on the tuner. Is there any way I can use the tuner section of my old receiver in the interim?*

*Eric Johnson  
Salem, Ill.*

Easily. With the receiver's selector switch set to FM, the

*(Continued on page 95)*



## Bouncing Bits: Graphics on CD

By David Ranada

**A**t January's Consumer Electronics Show, representatives of Warner New Media (WNM)—a joint venture of Warner Communications and the Record Group—demonstrated a capability of the Compact Disc that has been, until now, just about ignored: subcode graphics. With help from engineers and CD-player prototypes from JVC, the WNM people showed how a Compact Disc can play back images and text stored in a hitherto-underused portion of its digital bit stream.

Don't confuse this system with the still-unintroduced "5-inch" CD-V, which stores 5 minutes of Laservision-style video and 20 minutes of digital audio. Rather, subcode graphics are based on ordinary CD technology. Along with two channels of 16-bit audio data, a CD stores eight channels of auxiliary data called subcodes (from *subsidiary*, I suppose). The subcodes are useless for storing audio information, since their combined data rate is very low (about 4 kilobytes per second, each byte equaling 8 bits). So far, subcodes have been used only for essential, but mundane, low-data-rate applications such as time codes, track numbers, and index marks.

Since July 1984, however, a standard for encoding computer-graphics information in the subcodes has existed. An image (which may also include text) measuring 300 pixels across by 216 pixels high can be stored in the subcodes, and each pixel can take on one of 16 colors (see last month's "Scan Lines" for more on pixels). A CD player with appropriate decoding circuitry can show these images on a TV set or monitor. It takes about 8 seconds to redraw the entire screen, and the picture quality is no better than what can be obtained on a typical video-arcade game. WNM demonstrated some psychedelic pop art that accompanied a display of lyrics and other text information on a disc containing music from the Doors, Buffalo Springfield, Jimi Hendrix, and the like.

Why would anybody want this? Don't ask me. The folks at WNM think that a principal appeal of subcode graphics is economic. The added information and its perceived value will enable record companies to maintain CD prices at their present levels (WNM foresees no dual inventory of discs with and without graphics data). The reasoning goes that consumers will be willing to spend what they do now—or even more—to obtain the added attractions of sing-along-with-CD lyrics or librettos with multiple simultaneous translations, or 16-color "art."

Perhaps it's because I've never taken the necessary mind-expanding drugs or because I grew out of sing-alongs after my summer-camp days, but I have difficulties with this logic. Consumers already think CD prices are too high, and the only thing that will encourage the purchase of more CDs is *lower* prices, subcode graphics or not.

For a record company to maintain profit margins on a

CD-graphics pressing, the cost of producing the extra information must be lower than the added income derived from the high disc price. Subcode information will not come cheap, especially if artists or photographers are involved (and who wants to look at unartistic computer graphics?). Text information isn't free, either: at the very least, someone has to be paid to translate lyrics, enter them into a computer, and to cue them up to the music. If, as I suspect, sales might actually go down if the subcode-graphics disc prices are high, I see in the system little financial advantage to record companies, which may be why subcodes have languished for so long.

WNM, on the other hand, feels that since the standard has been around for so long, it is therefore a "mature" technology and a logical extension of CD capability. In the technical sense, they're right: All it takes to add subcode graphics to any CD player circuit is about \$30 in parts and a few more front-panel controls.

But in today's economic climate, I do not sense that it is possible to generate the consumer excitement necessary to overcome the natural resistance to buying the new graphics hardware. In order to obtain graphics capability, you will either have to buy a new CD player with the decoding circuits built-in (JVC said it will announce a model at about \$400) or purchase a graphics adapter for an older player. The latter course assumes that the player has a compatible subcode output (typically, only certain high-end models do) and that some company will actually manufacture a suitable adapter (an unlikely prospect given the historical failure of adapters as a product category—consider the fate of outboard stereo TV and stereo-FM decoders). The system will also inevitably run up against the chicken/egg problem: Who will want to invest in hardware when there is nothing to play on it?

Perhaps I should say, "Nothing *worthwhile* to play on it." Despite the appeal of some of the images in the WNM demonstration, the technical limitations of the format—in particular, the low number of pixels and the restriction to only 16 colors—will severely limit its scope of visual artistic expression. When it comes to text information, I prefer what in computer circles is called "hard copy," a piece of paper to hold and to read at leisure without having to turn on a TV, something that record companies are already providing (some better than others). The fact that subcode text is not directly accessible to a user as computer data—it is encoded merely as patterns on a screen—means that such useful functions as being able to transfer texts onto a computer system for further processing are difficult to perform.

I'd love to be proven wrong about all of this. If nothing else, subcode graphics will give audio and video magazines something new to write about. But I can think of far more interesting things to do than following the bouncing bits. □

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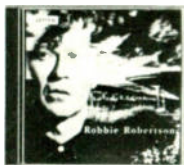


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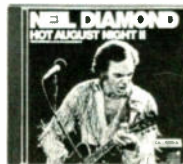
362657. Madonna—You Can Dance



357640. Wynton Marsalis—Standard Time



362343. Stevie Wonder—Characters



362277. Neil Diamond—Hot August Night II



361139. R.E.M.—Document



362525. Steve Winwood—Chronicles

364257. Arthur Fiedler & The Boston Pops—Capriccio Italien-Capriccio Espagnol "Last Command Recording" (Ultragroove)

363465. Dolly Parton—Rainbow. (Columbia)

362210. Earth, Wind & Fire—Touch The World. (Columbia)

362129. Belinda Carlisle—Heaven On Earth. (MCA)

360974. Squeeze—Babylon And On. (A&M)

360040. Jethro Tull—Crest Of A Knave. (Chrysalis)

360016. Spyro Gyra—Stories Without Words. (MCA)

359018. Pat Metheny Group—Still Life (Talking). (Geffen)

357087. Grateful Dead—In The Dark. (Arista)

356667. Heart—Bad Animals. (Capitol)

355156. Vladimir Horowitz. Piano—Favorite Chopin. (CBS Masterworks)

355115-395111. Prince—Sign 'O' The Times. (Paisley Park)

352948. Wynton Marsalis—Carnaval Eastman Wind Ensemble Donald Hunsberger, Dir. (CBS Masterworks)

348318. The Police—Every Breath You Take—The Singles. (A&M)

348110. Buddy Holly—From The Original Master Tapes. (MCA)

347955. Huey Lewis And The News—Fore. (Chrysalis)

346544. Kenny G—Duotones. (Arista)

346445. The Beach Boys—Made In U.S.A. (Capitol)

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SB2/RX

SB3/RV



## Sony's New CD Changer

By Christopher J. Esse

**S**ony invented the car Compact Disc changer, and for a short time its CDX-A10 was the only one on the market. In fact, the CDX-A10 *created* that market. As with other Sony product firsts—most notably the VCR, the Walkman, and the portable CD player—the CDX-A10 blazed a path for other companies to follow. And that's just what others have done, offering car CD changers with innovative features fired point-blank at Sony's initial offering. In response to the closing ranks, Sony has introduced the CDX-A20, a second-generation system featuring an extraordinarily compact changer unit and a variety of configuration options.

Like its predecessor, the CDX-A20 has a magazine that holds as many as ten CDs and works in Sony's magazine-based home CD changers as well. But unlike the CDX-A10, the new changer (priced separately at \$750) presently gives you a choice of three different controllers. First is the RM-X2 Remote Commander (\$230), a wired control unit (similar to the CDX-A10's) that operates both the changer and an optional hideaway AM/FM tuner module (the new XT-20, \$180). The DIN-size RM-X2 is less than an inch deep and can be mounted in the dash or on an optional \$75 flexible metal stalk (it could even be left free to roam on its tether). A separate subchassis actually contains the RM-X2's microprocessor, an arrangement that will enable Sony to develop future controllers that connect to the same subchassis. In fact, as you read this, two of those future controllers may already be available: a wireless commander with a complete range of functions and an ultramini wired commander that handles the basics. Part of the reason for the reduced size of the new changer is that the original CDX-A10 mechanism actually housed the aforementioned microprocessor.

The second controller option is Sony's "high power" XR-7300 receiver/cassette-deck (\$700), which includes CD controls and has been available since last summer. A cable on its back panel (originally described as for "future applications") connects directly to the CDX-A20. The third choice is the new XR-7200 tuner/deck (\$600), which offers a few more disc-operating features but forgoes the 7300's built-in four-way amplifier. Both the 7200 and the 7300 are removable, anti-theft designs.

The 6½-pound CDX-A20 changer is 25 percent smaller than its forebear, measuring less than 12 inches wide by 8 inches deep by 4 inches high. That's if you mount it horizontally: Unlike the CDX-A10, the CDX-A20 can also be mounted vertically, giving you a wider choice of trunk locations and making it more feasible to secure the changer in the passenger area of a car. Furthermore, the disc compartment's sliding door minimizes the clearance needed to load or remove the disc magazine.

For the "Autophile" road test, Sony had the changer installed vertically between the front seats on the floor of

a 1985 full-size van—a particularly convenient location, as it gives the driver instant access to the discs (when the vehicle is stationary, of course). Unless your car has fold-down backseats that permit access to the trunk, you'll want to seriously consider mounting the small Sony changer in the passenger area; nobody wants to go outside during a hailstorm to reload an upside-down Slim Whitman disc.

For comparison, Sony supplied two of the control options—the stalk-mounted commander and the XR-7300 removable receiver/deck. The amplifiers and speakers were all from Sony, but those are not the subject of this review. Neither is the van itself, although I can't let it pass without comment: This aspiring Winnebago made Stephen King's *Christine* seem like an ill-tempered scooter. Engine? Sometimes. Brakes? Sort of. Steering? Caution: Editor on Board.

After I had gotten used to *le van extraordinaire*, I tested the changer's resilience to bumps and vibrations. Maybe Sony's choice of vehicle was a clever way of urging me to seek out perilous potholes and sinister speed bumps. I did so with a vengeance, and not once was I able to cause the player to mistrack. Not a single skip. In desperation, I launched the van over a railroad crossing and put a little daylight under all four tires. No problem—Sony, one; Deathmobile, zip. The CDX-A20's ability to withstand physical shock—at least as it was mounted in the van—is nothing short of remarkable. Only a sharp rap of the hand against the side of the changer could induce mistracking, and even then the laser quickly returned to where it had left off.

On a number of occasions, one or more of the ten CDs would not load when selected for play, and the changer would dutifully move on to load the next disc. I suspected that this anomaly was prompted by the near-freezing weather, since the problem seemed to go away after the van warmed up (the spec sheet claims a 14-degree Fahrenheit operating minimum). However, a Sony engineer later determined that the well-worn disc magazine was faulty. Indeed, I encountered no problems once a new one was loaded, although apparently a magazine's disc-loading tabs, which must provide a given amount of resistance to work properly, can fall out of adjustment with wear.

Operating features differ slightly, depending on which control option you select. With the RM-X2 Remote Commander, you can select any disc directly, skip tracks within a disc, cue forward or backward (audibly), and preset as many as ten disc/track selections. The last feature operates differently from programming a home CD player. To program, say, Track 5 from Disc 1 into one of the ten memory presets, you have to cue up that selection as if you were about to play it. But you don't have to wait for the disc to finish loading: You can immediately preset other selections, even as the changer jumps from disc to

disc in an attempt to follow your commands. Once finished, you can start programmed playback from any of the ten presets, and it will proceed upward. Obviously, programming is not something you should do while driving, and Sony's arrangement—partly intentional, I imagine—makes this unequivocally apparent. I measured the time to go from one CD to another at between 11 and 18 seconds, depending on the number of discs traversed.

Perhaps the best programming option is the one that's done for you: Shuffle Play, a Sony-originated feature now found on many home CD players. When you do the shuffle, the CDX-A20 will play at random through all the selections on a chosen disc and then move on to do the same for each of the remaining discs. This feature was not available with the CDX-A10.

I found it very easy to familiarize myself with the controls of the RM-X2 commander, not so much because they are labeled plainly, but because of their limited number and generous size. A plus/minus toggle switch controls the volume, balance, fader, bass, and treble, which are selected in round-robin fashion by a single button (the volume function returns automatically after about three seconds). The display panel indicates the status of each as it's being set. Electronic control schemes are becoming the rule, although I suspect most people would prefer a conventional knob for at least the volume. To its credit, Sony has designed the volume control's action with small increments. Lastly, the RM-X2's tuner functions are typical of what you would expect in a digital frequency-synthesis car radio.

If you already have a good cassette player in your vehicle, a stalk-mounted RM-X2 may be your controller of choice for the CDX-A20. I was taken, however, with the complete-system approach available by using the XR-

7300 head unit. Although its disc-operating features are not as extensive—with only six memory presets, no Shuffle Play, and no intradisc cueing—the prospect of having an all-in-one package in a slide-out chassis is alluring (to anyone but thieves, that is). The 7300's full-logic autoreverse deck features Dolby B and C and automatic azimuth adjustment, and its tuner, the same as that in the separate XT-20 module, pulls in many distant stations. Its built-in four-way amp is rated at 17 watts (12.3 dBW) per channel into 4 ohms from 30 Hz to 20 kHz. Preamp outputs for the front and back channels (the same arrangement as on the RM-X2) make it easy to upgrade with more powerful amplifiers. If you know in advance that you'll be wanting more power, the XR-7200—which has no built-in amplifiers—might be the more appropriate choice. With it, you'll also get more disc-operating features, including a second Shuffle Play mode that plays selections at random from among *all* of the discs—a decided advantage over the similar function on the RM-X2. (However, the RM-X2's simpler intradisc random-play mode is less intrusive, since it plays through an entire disc before making you wait for a disc change.)

Without lab measurements, it's difficult to make an objective evaluation of the CDX-A20's performance, but it certainly sounded very good, just as you might expect a CD player to sound in a car or van. That is, the real culprits for any audible imbalance in the frequency response are the speakers and the vehicle's troublesome acoustics. According to Sony, the player uses a single 16-bit digital-to-analog converter (multiplexed between the channels) with a two-times-oversampling digital filter, good for a dynamic range of at least 85 dB. A typical home CD player will have a potential dynamic range of more than 90 dB. However, the high level of ambient noise in a moving vehicle makes it undesirable to have such an extremely wide variation between the loudest and softest passages in music (if the music itself contains such variations). For this reason, the original CDX-A10 had a two-position switch that provided 9 or 20 dB of compression, bringing its 85-dB dynamic range down to 76 or 65 dB, respectively. Sony eliminated the compressor to minimize the cost of the CDX-A20 and because the company found that the feature was rarely used. Although both those reasons are sound, I found that, at a comfortable listening level, wind noise at highway speeds intruded on soft passages in some classical music, leaving me missing the compression option. (Incidentally, classical music is most likely to benefit from a purposeful reduction in dynamic range.)

The Sony CDX-A20 CD changer system deserves applause both for its unusual flexibility of installation and for its practical variety of options. These qualities will not be lost on professional installers, either. At a distance, one might question Sony's restrained approach to programming features; on the other hand, the value of the easy-to-use control layouts that result should not be minimized. But perhaps Sony's greatest achievement is the CD changer mechanism—not only for its size, but for its unshakable disposition.

For more information on Sony's autosound products, contact Sony Corporation of America, Dept. HF, Sony Dr., Park Ridge, N.J. 07656. □



Sony's new CD changer system consists of the small changer mechanism, the wired remote commander, and an optional hideaway chassis containing the tuner circuitry. Another option (not pictured) is the XK-8D half-DIN cassette deck (\$300). A second hideaway box houses control circuitry for the changer and is the connecting point for the remote, the tuner box, and the deck.



An attractive alternative to the commander-based arrangement is the XR-7300 high-power radio/deck. It supplies controls for the CDX-A20 changer and has a built-in AM/FM tuner, an autoreverse cassette deck, and a four-channel amplifier.

# Magnificent Reception.

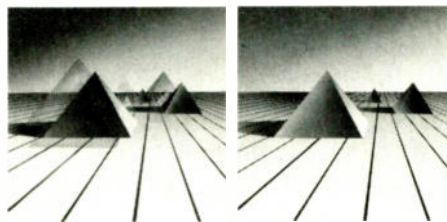
**THE TX-11a COMBINES CARVER'S REVOLUTIONARY ASYMMETRICAL CHARGE COUPLED FM DETECTION CIRCUITS WITH AN AM STEREO SECTION CAPABLE OF FM-QUALITY RECEPTION.**

The Carver TX-11a Stereo AM-FM Tuner is the most complete high fidelity broadcast reception component ever offered. It is a technical tour-de-force which further distances Bob Carver's unique products from traditional electronic components. First, by eliminating forms of FM distortion and interference that even the most expensive tuners available can't correct. And second, with a unique additional tuning section capable of making AM stereo sound as good as FM!

**THE SILENT TREATMENT.** While AM stereo may not yet be available in your area, you can receive FM stereo. Including stations so fraught with interference and distortion that you may be tempted to return to mono AM. That's why the TX-11a includes the first circuitry to remove hiss, "picket fencing" and the myriad other unpredictable noises which often disturb FM listening. Without reducing stereo imaging, frequency response or dynamic range.

Part of the FM signal, the left minus right portion, is extremely prone to "ghosting," or multipath interference caused by hills, buildings and other obstructions. Bob Carver's Asymmetrical Charge Coupled circuitry cancels distortion-causing "dirty mirror" images before they can reach your ears. It filters out noise and restores the part of the signal

needed by our ears and brain to construct stereo imaging. Reintroduced into the mono (L+R) signal matrix, a net reduction of 93% – or better than 20dB of noise reduction – is achieved. All ambient and localizing information is recovered. Only hiss and



distortion are left behind. Or, as *High Fidelity* magazine put it, "... clean, noise-free sound out of weak or multipath-ridden signals that would have you lunging for the mono switch on any other tuner."

*Ovation* magazine observed that the circuit, "... may well mean the difference between marginal reception of the station signals you've been yearning to hear and truly noise-free reception of those same signals."

*Audio* magazine called it, "An FM tuner breakthrough."

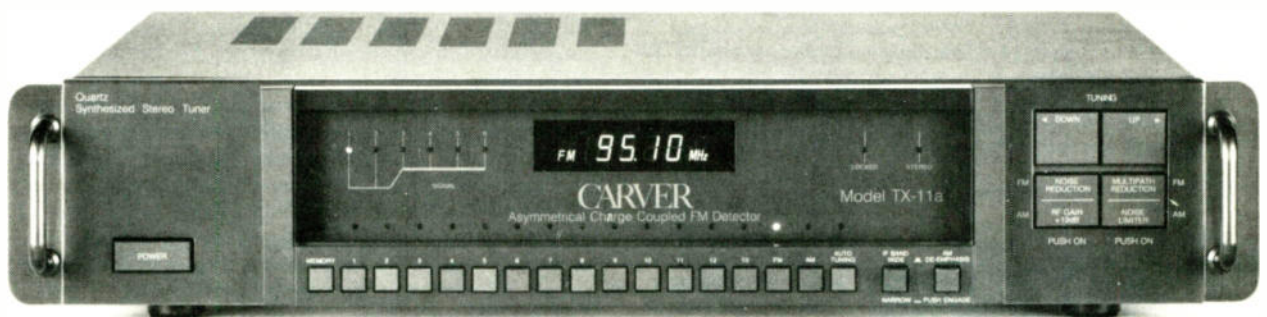
**THE FIRST AUDIOPHILE AM STEREO CIRCUITRY.** Contrary to popular belief, most AM stereo stations have frequency response (20-15kHz), separation (35dB) and signal-to-noise ratios (70dB) audibly indistinguishable from FM stations of equal strength. But only Carver offers the technology to appreciate this hidden performance.

At a press conference in front of America's top stereo writers, Bob Carver unveiled a low powered C-QUAM format AM stereo broadcast transmitter with a Carver Compact Disc Player as a source. The CD source and the TX-11a were also routed directly to a preamplifier and speakers for comparison.

When Bob switched back and forth, most listeners had difficulty distinguishing between the straightwire CD player and the TX-11a's over-the-air AM stereo reception! Many could tell no difference at all!

**HUMAN ENGINEERED FEATURES AND CONVENIENCE.** The TX-11a is designed to make enjoying FM and AM easy, not dazzle you with flashing light and complex programming. Thirteen presets, wide/narrow band selection, automatic/manual scanning as well as Multipath and Noise Reduction buttons are inset into the burnished anthracite metal face. Full instrumentation including digital display, 6-step signal strength LEDs and other monitor functions are tastefully recessed, visible but not garish. The result is performance without theatricality, access without complication.

**CLEAR THE AIR** by visiting your nearest Carver dealer. Ask to hear the most expensive tuner they sell. (It probably won't be the Carver TX-11a). Tune a multipath-ravaged, hiss-filled FM station on it; then the same station on the TX-11a Stereo AM-FM Tuner. Now press the Carver Multipath and Noise Reduction buttons. You'll hear why *High Fidelity Magazine* called it, "By far the best tuner we have tested..."



**CARVER**

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Report preparation supervised by Michael Riggs, David Ranada, Christopher J. Esse, Robert Long, and Edward J. Foster. Laboratory data (unless otherwise indicated) is supplied by Diversified Science Laboratories.

**A**s the only receiver in NAD's Monitor Series, the 7600 may be considered the paterfamilias of the entire line. It is strictly an audio model (though one input is designated for the audio from a video source), and its concentration on performance and value is what we have come to expect from NAD. The results are so exceptional that the 7600 remains an excellent value despite its fairly hefty price.

particularly in NAD products, are the bridging switch (doubling output power for mono use, depending on the load) and the load-impedance optimization switch.

You may be surprised by the front-panel tuning knob. Tuning is digital, but the manual control has the flywheel action of an "old-fashioned" capacitor front end. A delicate turn steps the tuning by quarter-channels (50 kHz) on

## Test Reports

### NAD 7600 AM/FM Receiver



STEVE EISENBERG

Among the unusual back-panel features that caught our eye are the main power switch (the front-panel switch offers standby, rather than off, so the receiver will respond to its remote) and a U.S.-standard threaded F-connector 75-ohm FM antenna input to accept coaxial antenna or cable inputs without an adapter of any sort. Also very unusual are the "lab" and "normal" input options for the power-amp section, which will be described later. Less startling,

FM, full channels (10 kHz) on AM; a swift twirl sends it rolling in either direction along the band. Rotation of the shaft is counted internally, driving the digital dividers that change the operating frequency. Mature users brought up on tuning knobs won't be the only ones delighted by this scheme.

Curiously, the balance control takes the opposite approach. A pair of buttons steps the balance in either direction from electrical parity. Just above them, an

**Dimensions:** 17 by 6½ inches (front), 14 inches deep plus clearance for controls and connections.

**AC Convenience Outlets:** One switched (0.8 amperes max.), two unswitched (1.2 amperes max. total).

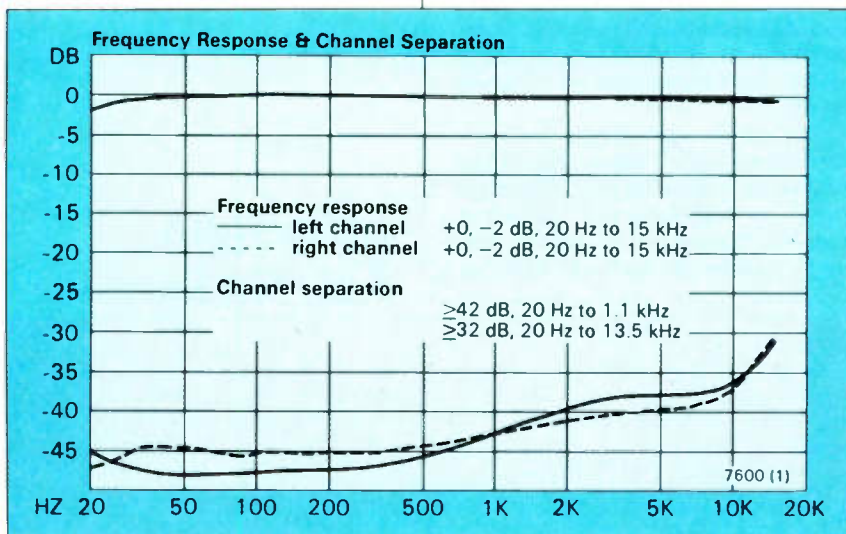
**Price:** \$1,498; optional RH-150 rack-mount hardware, \$50.

**Warranty:** "Limited," two years parts and labor.

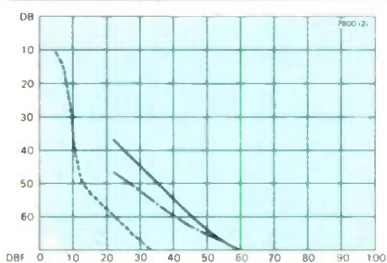
**Manufacturer:** Made in Japan for NAD (U.S.A.), Inc., 575 University Ave., Norwood, Mass. 02062.

# Test Reports

## FM Tuner Section



## Sensitivity & Quieting



— stereo quieting (noise), FM noise reduction off  
- - - mono quieting (noise)  
- - - stereo quieting (noise), FM noise reduction on

**Stereo Sensitivity (for 50-dB noise suppression; see text)**  
35 1/2 dBf at 98 MHz, with 0.34% THD + N  
(35 3/4 dBf at 90 MHz; 35 1/2 dBf at 106 MHz)

**Mono Sensitivity (for 50-dB noise suppression)**  
13 dBf at 98 MHz

Muting Threshold	12 1/2 dBf
Stereo Threshold	21 dBf
Stereo S/N Ratio (at 65 dBf)	71 1/2 dB
Mono S/N Ratio (at 65 dBf)	77 1/4 dB
Capture Ratio	1.5 dB

## Selectivity

alternate-channel	62 1/4 dB
adjacent-channel	7 1/4 dB

## Harmonic Distortion (THD+N)

	stereo	mono
at 100 Hz	0.240%	0.13%
at 1 kHz	0.08%	0.07%
at 6 kHz	0.15%	0.21%

Stereo Pilot Intermodulation 0.06%

Intermodulation Distortion (mono) 0.06%

AM Suppression 63 dB

Pilot (19 kHz) Suppression 71 1/2 dB

Subcarrier (38 kHz) Suppression 99 dB

LED lights to let you know when electrical balance has been reattained. Admittedly, a knob is easier to use, but digital operation of both the balance and tuning controls is necessary for the remote. Besides, balance controls are seldom used.

spot-on for the nearest station; just below it is a signal-strength indicator.

The supplied wireless remote is NAD's unique design, which we find of average comfort when hand-held but well above average when used as a keypad resting on a table or chair arm. Powered by two AA cells, it offers power on/standby, all selectors (including tape), volume up and down (which rotate the front-panel control), balance, "low-level" on/off, the tuner presets, and an up/down tuner search that ferrets out the nearest receivable station.

Subjectively, FM receivability depends a lot on whether or not you're using the FM noise-reduction feature, which is extremely effective on very weak stations. It blends channels to cancel the stereo effect and, with it, the noise derived from the stereo subcarrier. As a result, 50 dB of S/N (signal-to-noise) ratio is maintained down to a signal strength of 27 dBf—astonishingly low for the stereo mode—but with so little channel separation (3 1/4 dB) that we decline to consider it stereo. However, these figures represent steady-state signals rather than the dynamics of actual broadcasting. With real stations, we were able to get very listenable results with a semblance of stereo on some stations that are relatively useless with conventional (if excellent) tuners—a feat that shouldn't surprise anyone familiar with past NAD tuners. With strong FM signals, we also were impressed by the more than 70-dB stereo S/N ratio, a figure that ranks among the top in our experience. NAD feeds the signal from the 75-ohm connector directly to dual-gate MOS FETs (metal-oxide-semiconductor field-effect transistors), whereas typical receivers require an outboard balun transformer or, sometimes, employ an input transformer with primary taps for 75- and 300-ohm lines.

Frequency response of the FM section is exceptionally flat, and separation is unusually generous with the FM noise reduction defeated. Alternate-channel selectivity is about par, but that for the adjacent channel is well above average. The five elements of the signal-strength indicator trigger at thresholds from 12 1/2 to 71 dBf, an exceptionally broad range but one in which the steps are too far apart. Once the second element has triggered at 28 dBf, for instance, there is no further activity until the third lights at 48 dBf—that's 20 dB higher, skipping right over the most critical range for indicating borderline stations. Fringe-area users with rotating antennas thus will wish for closer spacing or (ideally) an analog meter. Otherwise, we are very

The volume knob is at the bottom right, just outside the balance control. To the left is a group of buttons that control, respectively, "low level" (a roughly 20-dB attenuator, normally mislabeled "mute," which in this case is automatically engaged every time you turn on the receiver), mode (mono/stereo), an infrasonic filter, and NAD's soft-clipping feature (designed to prevent the sort of tweeter-threatening distortion products characteristic of hard clipping in an overdriven amplifier). Farther left is a copy switch for dubbing in either direction between two connected tape decks. Similar three-position switches select the turnover frequency for each of the tone controls; they flank the bass and treble knobs, between which is a defeat button. At the far left are a bass EQ button, on/off switches for each of the two speaker pairs (sturdy binding posts are supplied on the back panel), and a headphone jack.

Near the center of the front panel are the selectors: AM or FM, phono, CD, two tape decks, and video (or any other line-level audio) from external sources. Pressing either tape button simply changes the monitoring; the recording source remains the one chosen at the main selectors or by the copy switch. Next to the FM selector is a switch for NAD's FM noise reduction feature; beneath both are the presets, which can store the frequencies for eight stations on each band. The frequency readout also indicates when tuning is high, low, or



# Brain vs. Bulk.

## FOR UNDER \$625 YOU CAN OWN AN AMPLIFIER JUDGED TO HAVE THE EXACT SOUND CHARACTERISTICS OF AN ESOTERIC \$3000 MODEL.

Bob Carver recently shocked the staid audiophile world by winning a challenge that no other amplifier designer could ever consider.

The new M-1.0t was judged, in extensive listening tests by one of America's most respected audiophile publications, to be the sonic equivalent of a PAIR of legendary, esoteric mono amplifiers which retail for \$3000 each!

**CARVER'S GREAT AMPLIFIER CHALLENGE.** Bob Carver made an audacious offer to the editors of *Stereophile Magazine*, one of America's exacting and critical audio publications. He would make his forthcoming amplifier design sound exactly like ANY high-priced, esoteric, perfectionist amplifier (or amplifiers) the editors could choose. In just 48 hours. In a hotel room near *Stereophile's* offices in New Mexico! As the magazine put it, "If it were possible, wouldn't it already have been done? Bob's claim was something we just couldn't pass up unchallenged."

What transpired is now high fidelity history. From the start, the *Stereophile* evaluation team was skeptical ("We wanted Bob to fail. We wanted to hear a difference.") They drove the product of Bob's round-the-clock modifications and their nominees for "best power amplifier" with some of the finest components in the world. Ultimately, after exhaustive listening tests with carefully selected music ranging from chamber to symphonic to high-impact pop that led them to write, "... each time we'd put the other amplifier in and listen to the same musical passage again, and hear exactly the same thing. On the second day of listening to his final design, we threw in the towel and conceded Bob the bout. According to the rules... Bob had won."

**BRAIN vs. BULK.** Pictured is a photo of the 20-pound, cool-running M-1.0t. Above it are the outlines of the pair of legendary mono amplifiers used in the *Stereophile* challenge. Even individually, they can hardly be lifted and demand stringent ventilation requirements. And yet, according to some of the most

discriminating audiophiles in the world, Bob's new design is their sonic equal.

The M-1.0t's secret is its patented Magnetic Field Coil. Instead of increasing cost, size and heat output with huge storage circuits, Magnetic Field Amplification delivers its awesome output from this small but powerful component. The result is a design with the dynamic power to reproduce the leading edge attacks of musical notes which form the keen edge of musical reality.

**A DESIGN FOR THE CHALLENGES OF MODERN MUSICAL REPRODUCTION.** The M-1.0t's astonishingly high voltage/high current output and exclusive operation features make it perfect for the demands of compact digital discs, video hi-fi and other wide dynamic range playback media. The M-1.0t:

*Has a continuous FTC sine-wave output conservatively rated at 200 watts per channel into 8 ohms 20 Hz to 20 kHz with no more than 0.15% THD.*

*Produces 350-500 watts per channel of RMS power and 800-1100 watts momentary peak power (depending on impedance).*

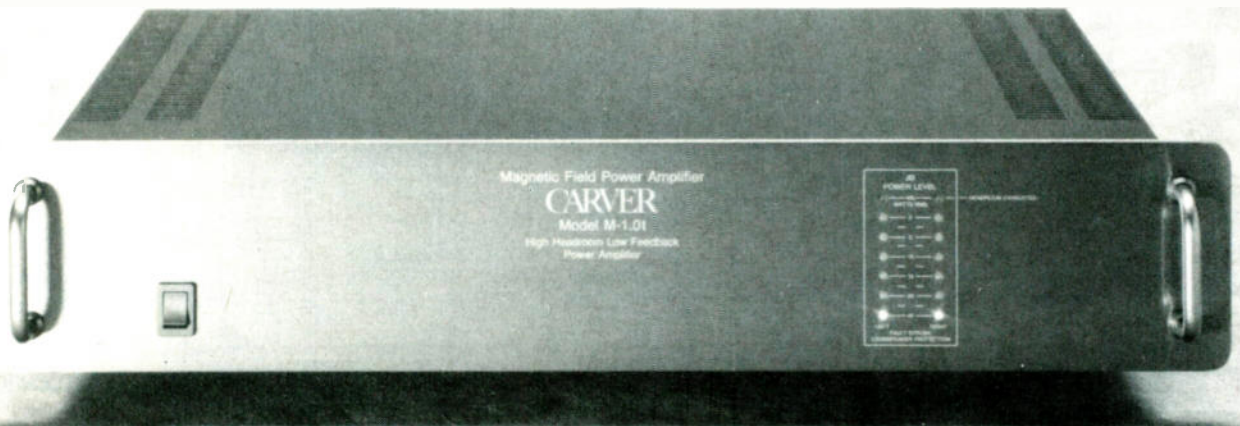
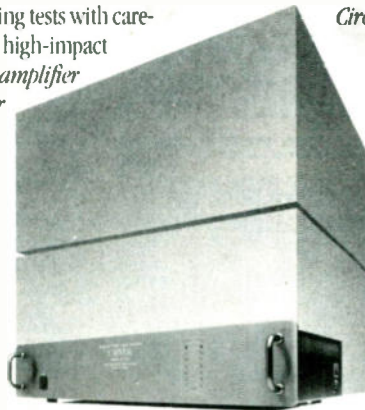
*Delivers 1000 watts continuous sine wave output at 8 ohms in bridging mode without modification.*

*Is capable of handling unintended 1-ohm speaker loads.*

*Includes elaborate safeguards including DC Offset and Short Circuit Power Interrupt protection.*

**SHARE THE RESULTS OF VICTORY.** We invite you to compare the new M-1.0t against any and all competition. Including the very expensive amplifiers that have been deemed the M-1.0t's sonic equivalent. You'll discover that the real winner of Bob's remarkable challenge is you. Because world class, superlative electronics are now available at reasonable prices simply by visiting your nearest Carver dealer.

**Specifications:** Power, 200 watts/channel into 8 ohms 20Hz to 20kHz, both channels driven with no more than 0.15% THD. Long Term Sustained RMS power, 500 watts into 4 ohms, 350 watts into 8 ohms. Bridged Mono power, 1000 watts into 8 ohms. Noise, -110dB IHF A-weighted. Weight, 20 lbs.



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for co-developing stereo TV, our list of firsts and onlies puts us in a class all our own.

The results are ready for you to take home now. Professional equipment with all the clarity, impact, nuance and range you couldn't get before. Even in the most expensive amateur systems.

The differences you'll see and hear are audible, visible and phenomenal.

For example, our Soundfield psychoacoustic-imaging speaker systems sound spectacular in any room. Anywhere you sit in that room.

Our audio/video preamplifier incorporates Dolby® Pro Logic surround sound using dbx proprietary technology. For the most thrilling home-theater performance you can get.

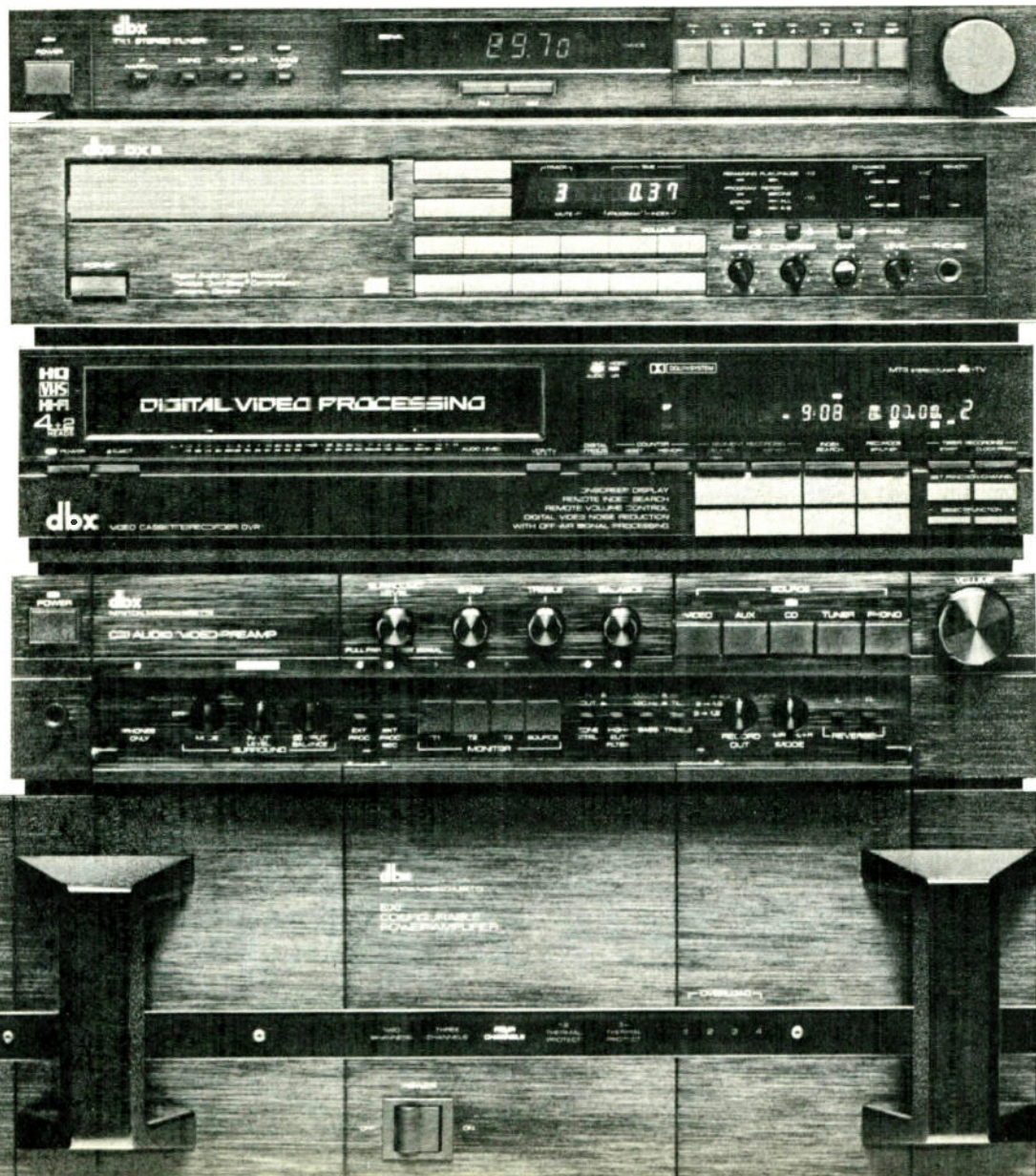
Our incomparable configurable 2/3/4-channel amplifier provides over 800 watts per channel in actual use. With a flatter response than amateur amps costing twice as much.

Add to these one-of-a-kind components our FM/AM tuner with Schotz® noise reduction, uncanny clarity and a noise floor way below what you're probably listening to now.

And a CD player that's so good, *Stereo Review's* Julian Hirsch wrote: "Even without its special circuits [proprietary sonic enhancements], the dbx DX5 would rank as one of the best available."

Complete your home studio/theater with our superlative digital-processing VCR with VHS Hi-Fi and our own MTS stereo TV sound. And bring your video enjoyment up to where it should be.

A visit to your dbx dealer will convince you that your amateur days, and nights, are over.



**dbx**  
Audio and Video  
at its professional best.

pleased with the tuner section, particularly for fringe reception.

The phono circuitry is said to be identical to that in the company's top model, the NAD 1300 preamp. For fixed-coil pickups (moving-magnet or moving-iron designs), there are three input capacitance options, all switchable on the back panel (as is the MM/MC option). Nominal capacitances are 100, 200, and 300 picofarads; on Diversified Science Laboratories' test bench, they measured only nominally higher. Response with the moving-magnet option is extremely flat through most of the range, with only a very slight droop at the top end (down less than 1/2 dB at 20 kHz and a similar amount at 40 Hz, with a steeper rolloff below that). The moving-coil response is nearly as flat, with a very slight tilt toward the low end throughout the mid-range. Even without the infrasonic filter, warp attenuation is better than 20 dB at 5 Hz with both options. All in all, we found the phono section distinctly above average on all counts for a receiver—and, as NAD implies, in the same league as separate preamps.

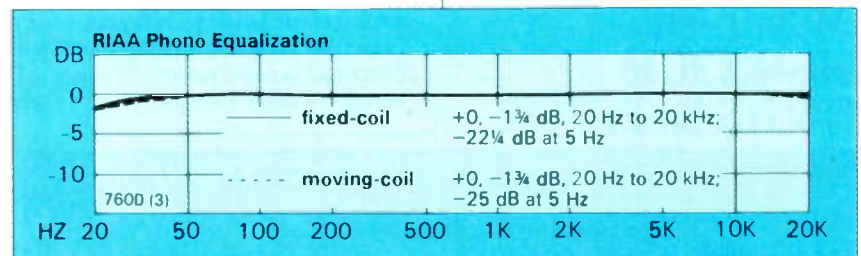
The infrasonic filter, with an attenuation of about 21 dB per octave below 15 Hz, can add radically to the warp suppression. Curiously, it also *boosts* response very slightly at the bottom of the audio band, flattening the negligible inherent droop in the 30-Hz region. The Bass EQ feature, intended to give extra punch below the resonance frequencies of typical speakers, provides a rolloff slope of about 20 dB per octave (below 30 Hz or so) but adds almost 7 dB of boost at its own resonance, just below 40 Hz. It thus should complement many speakers without overdriving them or contributing to any problem-causing infrasonics.

NAD describes the tone controls as amounting to a two-band semiparametric equalizer (offering no control over the bandwidth, or Q, of their action). Be that as it may, the controls are very well-behaved and quite useful. BASS offers about 12 dB of boost or cut at the extreme settings, with greatest effect very near the nominal center frequencies of 50, 120, and 250 Hz. The lowest of these has almost no effect above 1 kHz; the  $\pm 3$ -dB points of the highest are near 2 kHz. Behavior of the treble control is closely comparable over center frequencies of 3, 6, and 12 kHz.

So far, we have considered the 7600 in its normal amplifier mode, which includes deliberate bandwidth-limiting to prevent loading the amp (or the speakers) with infrasonics and ultrasonics that, although beyond hearing, can pro-

duce unwanted audible by-products through such mechanisms as intermodulation. This is the way NAD expects the receiver to be used. But, for those who believe in the wideband concept, the company offers an alternative: Shut off the receiver, remove the pre/main jumpers (which come plugged into the "normal" amp inputs), and place them between pre-out and the "lab" amp inputs, which bypass the bandpass filtration. The pros and cons of the two approaches have been argued since the dawn of high fidelity, and we see no end to the debate. Take your pick. We were too pleased with the receiver in the normal mode to work up much enthusiasm for the lab option, but we wonder whether our reaction would have been any different had NAD indicated that the lab mode were normal and band-limiting the option.

By receiver standards in particular, there's power to spare in the 7600. NAD is adamant that amplification should be approached in terms of the "power enve-



lope"—in effect, graphing the output power against the time over which it can be sustained. Using the more succinct method of the IHF standard, we measure only the steady-state (FTC-rating, or RMS) power and transient headroom based on a 20-millisecond tone burst. Essentially, however, the DSL data confirm the design's excellent headroom.

However, interpreting the power figures is complicated by NAD's traditional approach to load optimization. A back-panel switch can be set for true 8-ohm-or-higher loads or (in the normal position) for lower impedances. The latter position is required if you have speaker pairs connected to both outputs. DSL made its 8-ohm measurements at the higher setting, which makes the most of such loads; lower-impedance loads were measured in the lower position. Thus, there isn't quite as much increase in measured power when impedance is lowered as there presumably would be if the load setting were left unchanged. Nevertheless, the increase is material. And it continues when (in the dynamic-power test) the load is further reduced to 2 ohms,

## Amplifier Section

Measurements were made with soft clipping off and, except as indicated, through the "normal" power-amp inputs with the 8 ohm load setting.

**Rated Power (8 ohms)** 21.8 dBW (150 watts)/channel

**Output at Clipping (at 1 kHz; both channels driven)**  
 8-ohm load 22.6 dBW (180 watts)/channel  
 4-ohm load 23.1 dBW (205 watts)/channel\*

**Dynamic Power (at 1 kHz)**  
 8-ohm load 25.5 dBW  
 4-ohm load 27.7 dBW\*  
 2-ohm load 28.1 dBW\*

**Dynamic Headroom (re rated power; 8-ohm load)**  
 +3.7 dB

**Harmonic Distortion (THD; 20 Hz to 20 kHz)**  
 at 21.8 dBW (150 watts)  $\leq 0.021\%$   
 at 0 dBW (1 watt)  $\leq 0.011\%$

**Frequency Response, "normal" input**  
 +0, -1/4 dB, 31 Hz to 18.7 kHz  
 +0, -3 dB, 16 Hz to 44.3 kHz

**Frequency Response, "lab" input**  
 +0, -1/4 dB, 14 Hz to 25.2 kHz  
 +0, -3 dB, < 10 Hz to 92.6 kHz

Sensitivity & Noise (re 0 dBW; A-weighting)		
	sensitivity	S/N ratio
aux input	13 mV	93 dB
fixed-coil phono	0.21 mV	80 dB
moving-coil phono	12 $\mu$ V	80 1/4 dB
Phono Overload (1-kHz clipping)		
fixed-coil phono		195 mV
moving-coil phono		11 mV
Input Impedance		
aux input	50k ohms	
fixed-coil phono	51k ohms, 130/230/340 pF	
moving-coil phono	100 ohms	
Output Impedance (to tape)		1,000 ohms
Damping Factor (at 50 Hz; re 8 ohms)		
		190
Channel Separation (at 1 kHz)		
		74 dB
Infrasonic Filter	-3 dB at 15 Hz	$\approx 21$ dB/octave

\* Measurement taken with the speaker impedance switch set to 4 ohms

Mitsubishi  
HS-423UR  
S-VHS Hi-Fi VCR

which proves that the amp isn't running out of steam because of the high current drain. And with over half a kilowatt available for transients in each channel—even with a 4-ohm load—there's plenty of steam.

Invoking the soft-clipping feature reduces available power somewhat and increases distortion at high signal levels. This is deliberate. In effect, the feature alters the waveform to throw away the portion that threatens hard clipping. As a result, you get neither the full capability of the amplifier nor the danger (should you overdrive it). Overdriving the powerful 7600 is extremely unlikely but also exceptionally risky for the speakers.

In sum, we have no hesitation in calling the 7600 an outstanding receiver and, ultimately, a logical candidate for the status of a classic model. Consider one detail, for example: the automatic 20-dB attenuation when you turn the unit on. On first glance, it seems superfluous. But if you play music as loud as the 7600's excellence encourages you to do and then leave the volume at that level when you shut it down, the attenuator gives you a moment to lower the volume after turn-on to escape the full brunt of the sound. This detail could be conceived only through an exceptional ability to see with fresh eyes. Once again, NAD has demonstrated that it has few peers in that department. □

**M**itsubishi's HS-423UR is a member of the first generation of Super VHS recorders and, like its brethren, is jam-packed with every feature we would consider appropriate for normal VCR usage (except for some form of digital picture processing). In fact, the very well-organized and well-illustrated manual runs to 62 pages. Although we don't have the space to cover

portance of S-VHS, though, it is, as usual, accorded only an on/off switch (on the control panel hidden by a flip-down front-panel door running along the bottom of the VCR). Other capabilities of the VCR are more complex to operate and are nearly as significant.

Take, for example, the 423's index-search features. A generally underappreciated and underutilized function increasingly available on high-end VHS machines, the index system makes it easy to find the "good parts" by providing rapid access to any point on a videocassette that has been marked with a special invisible and inaudible signal. The 423 automatically records one of these index signals whenever the unit is placed into record from stop, and index marks can be added manually during recording or playback by pressing ADDRESS ENTER on the remote control. Also with the remote control, index marks can be numbered for direct location by the 423's numerical cueing system.

Three remote-control features use the index marks. Forward/reverse search will find a portion of the tape as many as 19 index marks forward or back from the present location. A repeat function continually plays a segment between two index signals. The deck's skip-search system fast-forwards through the tape until an index signal is encountered, whereupon the fast-search mode is entered; the picture plays for about five seconds before the deck moves on to the next index point. The viewer can switch to normal playback at any time by pressing PLAY.

A feature we haven't seen before—a three-position picture-mode switch—is also located behind the front-panel door. The manual is very vague as to what the control is used for, but we gather that

all of the features here, we'll fast-forward through some of the most important ones.

The main event is the VCR's incorporation of Super VHS, a system that enables the unit to record typical video signals (from cable and broadcast TV or regular VHS tapes) with no loss of luminance resolution (detail). Despite the im-



STEVE EISENBERG

**Dimensions:** 16¾ by 4 inches (front), 14½ inches deep plus clearance for connections  
**AC Convenience Outlet:** One, timer-switched (see text). 300 watts max  
**Price:** \$1,200  
**Warranty:** "Limited," one year parts, six months labor  
**Manufacturer:** Made in Japan for Mitsubishi Electric Sales America, Inc., P.O. Box 6007, Cypress, Calif 90630

## VCR Section

Except where otherwise indicated, the recording data shown here apply to both speeds—SP and EP. All measurements were made at the direct audio and video outputs, with test signals injected through the direct audio and video inputs. For VHS Hi-Fi, the 0-dB reference input level is the voltage required to produce a 0-dB reading on the VCR's audio level meter, for the standard audio recording mode, it is the voltage at which the automatic level control (ALC) produces 3 dB of compression at 315 Hz. The 0-dB reference output level is the output voltage from a 0-dB input.

switching it from its center (normal) position results in specific minor improvements in picture quality. When moved to the left (detail) position, it seems to add a bit of contour enhancement to standard-VHS playback and to have no effect with S-VHS tapes. The right (notch) position seems to throw in a notch filter at the color-subcarrier frequency and can reduce certain types of noise in S-VHS playback only.

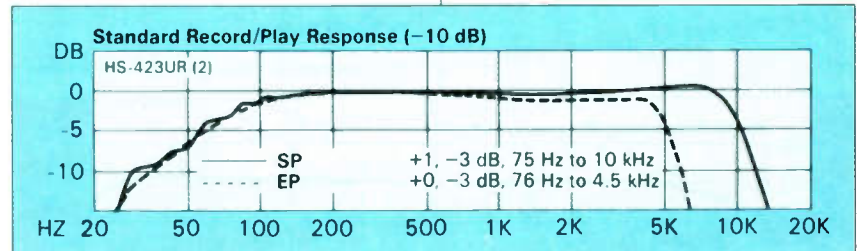
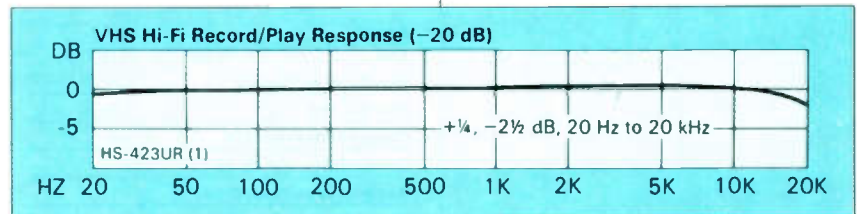
The 423's TV tuner receives MTS (stereo-TV) broadcasts (including the separate audio program, or SAP), and the recorder provides the VHS Hi-Fi frequency-modulation stereo recording system as well as monophonic edge-track recording. Recording level is adjustable only on the Hi-Fi tracks by means of two center-detented sliders. Levels are displayed on two 12-segment peak-reading LED displays, with calibrations running from -30 to +10 dB. A front-panel control switches audio playback between the monaural edge track and the Hi-Fi tracks in stereo or mono (left or right channel to both outputs). Instructions are given for recording simulcasts, recording the SAP, using the 423 as an audio-only deck, and dubbing between VCRs of different types.

The remaining video and tuner facilities are extensive. The deck itself offers still frame, variable-speed slow motion, fast playback (twice the normal speed, with sound if the tape has been recorded at the SP speed), and two speeds of visible-picture bidirectional searching, as well as the standard transport operations. While the TV tuner receives VHF, UHF, and midband and highband (or "superband") cable stations, "only" 100 channel presets are available, which can be set to any channel in any sequence. To avoid any initial confusion, the unit comes factory-set with a sequence favoring the VHF and cable stations. Channel-presetting is normally the most confusing aspect of setting up a VCR nowadays (worse even than timer recording), and Mitsubishi, like other companies, hasn't found a simple way of doing it, either. The manual, though better than most on presetting, is still not as clear as it could be. Mitsubishi has apparently realized this, having added to our copy of the manual a terse one-page insert describing a nine-step method of channel setting.

Timer recording is possible for as many as eight programs during a two-week period. However, the three same-program-every-day settings (Sunday to Saturday, Monday to Saturday, or Monday to Friday) count as one program each, as do the seven same-program-on-

a-given-day settings. Audio-only programmed recording is available, and using the 423 in this way can take advantage of the back-panel convenience outlet. Normally, this outlet is always on. But when the VCR is switched to programmed recording, the outlet is switched off until a recording is activated. For off-the-air radio recording, this would be the obvious place to plug in the tuner.

Of considerable assistance during the channel-presetting and programmed-



recording operations are the two main readout systems: the front-panel vacuum fluorescent display and the on-screen display. The former, in addition to having a clock and a tape counter reading out in minutes and seconds (a format we prefer), includes a somewhat useful graphic indicator showing what mode the transport is in. However, it's difficult to see this indicator from across the room. Much easier to see is the on-screen display which shows, when appropriate, the channel tuned, the present time, the status of the tape transport, and the settings used for programmed recording.

The 423's back panel is somewhat more complex than most we have seen. There are F connectors for the VHF antenna input and output terminals. Screw connectors for 300-ohm twinleads are used for UHF, but an adapter/splitter is included for systems in which a single antenna cable carries both VHF and UHF. There are two video-input jacks: One, a pin jack, is for normal composite video, while the other, a multipin S connector, receives the separate luminance and chrominance signals provided by other Super VHS decks with S-connector outputs. A nearby switch sets which jack will be used. There are, conveniently, two video outputs, each with a pin jack and an S connector. The first output

### Audio S/N Ratio (re 0-dB output; R/P; A-weighted)

	standard	VHS Hi-Fi
SP	48 1/2 dB	78 1/4 dB
EP	46 1/4 dB	77 dB

### Indicator Reading for 3% Distortion (315 Hz)

VHS Hi-Fi	> +10 dB
-----------	----------

### Distortion (THD at 10 dB input; 50 Hz to 5 kHz)

	standard	VHS Hi-Fi
SP	≤ 1.7%	≤ 0.26%
EP	≤ 2.0%	≤ 0.26%

### Channel Separation (315 Hz)

	71 1/2 dB
--	-----------

### Indicator "Ballistics"

response time	2.0 msec
decay time	≈ 925 msec
overshoot	0 dB

### Flutter (ANSI weighted peak; R/P; average)

	standard	VHS Hi-Fi
SP	± 0.17%	± < 0.01%
EP	± 0.20%	± < 0.01%

### Sensitivity (for 0-dB output; 315 Hz)

recording level at:	detent	maximum
VHS Hi-Fi	360 mV	66 mV
standard	910 mV	910 mV

### Audio Output Level (from 0-dB input; 315 Hz)

VHS Hi-Fi	0.33 volt
standard	0.34 volt

### Audio Input Impedance (VHS Hi-Fi)

	10k ohms
--	----------

### S-VHS Video Record/Play Response

	SP	EP
at 500 kHz	flat	flat
at 1.5 MHz	-1/4 dB	-1 3/4 dB
at 2.0 MHz	-1/4 dB	-2 3/4 dB
at 3.0 MHz	-1 dB	-5 1/4 dB
at 3.58 MHz	-2 1/4 dB	-5 3/4 dB
at 4.2 MHz	-5 1/4 dB	-9 3/4 dB

# Test Reports

## Regular VHS Video Record/Play Response

	SP	EP
at 500 kHz	+ 1/4 dB	+ 1/4 dB
at 1.5 MHz	4 dB	-4 1/2 dB
at 2.0 MHz	-9 1/2 dB	-12 dB
at 3.0 MHz	3 1/4 dB	-5 1/4 dB
at 3.58 MHz	-	-14 1/4 dB
at 4.2 MHz	-	-

## Sharpness Control Range (S-VHS mode)

at 500 kHz	+ 1 1/4 -1 dB
at 1.5 MHz	+ 1 2 1/2 dB
at 2.0 MHz	+ 3/4 -2 1/2 dB
at 3.0 MHz	+ 1 1/4 -2 1/4 dB
at 3.58 MHz	+ 2 -3 dB
at 4.2 MHz	+ 4 1/4 -3 dB

## Luminance Level

	SP	EP
S-VHS	3% low	3% low
VHS	3% low	6% low

Gray-Scale Nonlinearity  $\approx 16\%$

Chroma Level  $\approx 1/4$  dB low

Chroma Differential Gain none

Chroma Differential Phase  $\approx +5^\circ$

Median Chroma Phase Error  $-3^\circ$

\* Too low to measure

## TV Tuner Section

All measurements were taken at the direct audio and video outputs

is meant to directly feed a monitor; the second is for deck-to-deck dubbing. The corresponding audio inputs and outputs are all pin jacks. The front-panel headphone output is a stereo mini-jack.

In most cases, Diversified Science Laboratories found good-to-excellent audio and video performance with the 423. The TV tuner stumbled only in the

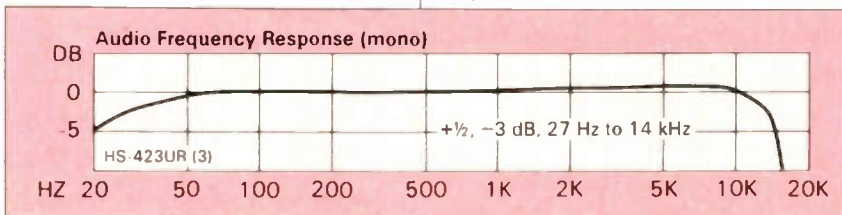


The 423's remote also programs the VCR.

measurement of worst-case audio signal-to-noise (S/N) ratio, a test in which few VCRs or monitors do very well. Video performance is on par with other decks we have measured and seen, both at either SP or EP speed and in both Super VHS and all regular VHS modes. We have seen better monaural edge-track audio performance, but the VHS Hi-Fi system measures much like the others we have examined.

Although Super VHS, like all home VCR systems, still has problems with picture noise and stability, the improvement in picture quality provided by the system is dramatic and worthwhile, even *without* a special monitor being fed from the S-connector outputs (don't be misled into thinking you need to buy an "S-VHS compatible" TV monitor to get any benefit from an S-VHS deck). Since the S-VHS on/off switch can be flipped during recording, it is an enlightening exercise to watch a playback of high-quality material as the deck changes between Super VHS and normal operation. After seeing the increase in resolution with Super VHS on, it's hard to believe viewers have been satisfied with the quality of standard VHS images. Recordings of the classic wedge test pattern showed that the 423 is capable of providing visible horizontal resolution of greater than 350 lines (broadcasts can provide a maximum of about 330). Add this level of video quality to a deck chock-full of useful features, and you have the HS-423UR—a VCR providing close to state-of-the-art home-video performance. □

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## Audio S/N Ratio (mono; A-weighted)

best case (no color or luminance) 52 3/4 dB

worst case (multiburst signal) 14 1/2 dB

## Residual Horizontal-Scan Component (15.7 kHz)

-72 1/4 dB

## Audio Output Level (100% modulation)

level control at detent 0.43 volts

level control at maximum 2.06 volts

Audio Output Impedance 1,000 ohms

## Video Frequency Response

at 500 kHz + 1/4 dB

at 1.5 MHz + 1/4 dB

at 2.0 MHz flat

at 3.0 MHz -1/4 dB

at 3.58 MHz -1 dB

at 4.2 MHz -12 1/4 dB

Luminance Level 3% low

Gray-Scale Nonlinearity  $\approx 11\%$

Chroma Differential Gain  $\approx 30\%$

Chroma Differential Phase  $\approx +7^\circ$

## Chroma Error

	level	phase
red	none	+ 2°
magenta	+ 1/4 dB	+ 3°
blue	none	+ 3°
cyan	-1 dB	-5°
green	+ 1/4 dB	+ 2°
yellow	-1/2 dB	+ 2°
median error	-3/8 dB	1°
uncorrectable error	+ 3/8 dB	+ 4°

## AR TSW-910 Loudspeaker

Since we tested AR's TSW-410 last July, the company has added the three-way TSW-810 and the four-way TSW-910. Both use a larger, 1-inch version of AR's titanium dome tweeter and have a second woofer that fires out the back. The 910, which is almost a foot taller than the 810, also incorporates an 8-inch lower-midrange driver.

The 910's Tetra-Helix mounting plate has a continuously changing radius so that sounds diffracted from its edge cover a broad spectrum; therefore, there is no emphasis on any particular frequency in the reradiation pattern. Surrounding the tweeter and the upper-midrange drivers is an acoustic blanket intended to absorb middle and high frequencies reflected between the grille frame and baffle—a further effort to minimize undesirable radiation. As a final measure, grooves on the inside of the cabinet panels help damp resonances.

The five forward-facing drivers in the 910 are aligned vertically down the middle of the baffle: The tweeter, fitted with an acoustic lens to improve dispersion, is at the top, followed by the two 6½-inch upper-midrange drivers (each mounted in its own subenclosure), the 8-inch lower-midrange unit, and the 12-inch woofer. The rear-firing woofer is positioned a few inches higher off the floor than its companion, just above two pairs of color-coded multiway binding posts. The two sets of amplifier connections enable the 910 to be biamped, in which case the woofers are driven separately by a second amp. Nominal crossover points are 200, 550, and 5,500 Hz. AR says the rear-firing woofer removes any wall-dip effect at middle-bass frequencies.

For its measurements, Diversified Science Laboratories placed the 910s about six inches out from the back wall, following AR's general recommendation for placement "near a wall" (although the company encourages experimentation in this regard). With few exceptions, the resulting curves are quite impressive. Room-corrected ⅓-octave response on-axis is well within ±4 dB from below 40 Hz all the way up to 20 kHz. In fact, it exceeds +3½ dB only at the 630-Hz band, at which point the lower midrange is yielding to the upper-midrange drivers. A floor reflection is clearly responsible for a dip at around 400 Hz. We suspect that the rise between 125 and 200 Hz is related to the 910's proximity to the back wall during DSL's tests; in this spot, the rear woofer is perhaps overcompensating for the wall-dip effect. On the other hand, the off-axis response, which stays within ±3½ dB from below 40 Hz to beyond 16 kHz, has no rise in

the wall-dip region. The 910 can go deep: In both curves, response is down only about 5 dB at 32 Hz. High-frequency beaming becomes evident in the off-axis curve beyond 12 kHz but seems to be minimized by the tweeter's acoustic lens.

Distortion is very low, averaging less than ⅓ percent from 100 Hz up at the lab's lowest test level (85 dB SPL); it exceeded 1 percent only at the bottom of the range (63 Hz). We heard no evidence of distortion during our listening tests. The 910s took the full brunt of our test



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amplifier's output—equivalent to 545 watts, or 27.4 dBW, into 8 ohms—during the 300-Hz pulse power-handling test, resulting in a calculated peak sound pressure level of about 118 dB.

Sensitivity is on the high side at 90½ dB SPL, which you'd expect with such a large speaker. And even though the impedance dips to a low of 3.6 ohms at around 60 Hz (validating AR's nominal 4-ohm rating), it is well-controlled, averaging 5.3 ohms across the spectrum and 5 ohms in the high-energy region be-

**Dimensions:** 15¾ by 52¾ inches (front), 18½ inches deep.

**Price:** \$2,000 per pair in walnut or oak.

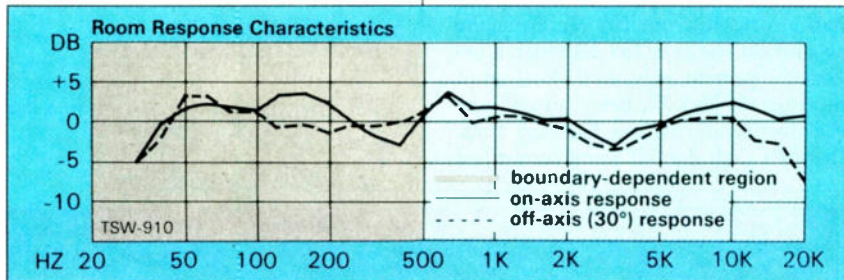
**Warranty:** "Full," five years parts and labor.

**Manufacturer:** Acoustic Research, 330 Turnpike St., Canton, Mass. 02021.

## Test Reports

tween 250 Hz and 6 kHz. Most amps should easily handle the 910s, although you should exercise care in running them in parallel with another pair of speakers.

During our listening tests, we found that moving the 910s two or three feet



Sensitivity (at 1 meter; 2.8-volt pink noise)

90 1/2 dB SPL

Average Impedance (250 Hz to 6 kHz)

5 ohms

out from the back wall provided the most balanced sound. Any closer, and things got a little on the rich side. In fact, we turned down the bass control on our preamp to further lighten up the tone. At no time, however, was the bass boomy or overbearing, even during bass-heavy marches. The speakers never sounded

boxy, and tonal balance varies little whether you're sitting or standing. Stereo imaging is rock-solid even without toeing in the cabinets. That's good news, because when turned at an angle, the sizable 910s may draw undue attention in average-size listening rooms. Having the speakers out in the room also provided a little extra depth to the soundstage.

The bulk of the higher frequencies are actually reproduced by the two upper-midrange drivers—and without a hint of steeliness. The overall effect is rather smooth. Brass instruments and vocals, in particular, emerge free of harshness, although at some expense to the sweetness of high strings (evidenced, perhaps, by the crossover-related dip around 3.2 kHz). The 910's pleasant bottom end brings warmth to thundering orchestral pieces and to low-slung jazz bass lines.

We are impressed by AR's top TSW Series entry and consider them an excellent value. If you've got the space in your listening room, you'd do well to give the 910s an audition. □

## Luxman D-117 Compact Disc Player

**T**he D-117 is Luxman's flagship Compact Disc player. As such, it employs four-times oversampling with a combination of digital and steep analog filtering (the latter fifth-order

model is loaded with extra features.

Among these, we were struck immediately by the connection options. "Serial" jacks on the back panel permit chaining of Luxman components, which can then work off a whole-system remote control. For signal routing, there are five output options. Two are digital—via optical or electrical (pin-jack) back-panel connectors—and are intended to supply a direct link between the digital output of the CD and an outboard DAC like that built into the Luxman LV-117 integrated amp. The other three outputs are analog: the back-panel fixed-level pin jacks, the front-panel variable-level pin jacks, and the headphone jack.

The output level control for the headphone jack also affects the variable line output. Next to it is a switch to turn on the digital outputs. Another button near the drawer open/close switch steps through four time-display modes: elapsed or remaining time within the current track, and elapsed or remaining time within the entire disc or programmed sequence.

The programming buttons (including CHECK and CLEAR) are next, followed by one for repeat and another that sets the start and stop points for A-B segment repeats. Then there's A-SCAN (intro-scan), which samples the first ten seconds of each track in turn—either on the whole disc or in a programmed sequence. The mechanical controls, at the right, comprise all the usual options, including bi-



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**Dimensions:** 17¼ by 3½ inches (front), 12 inches deep plus clearance for connections.

**Price:** \$900.

**Warranty:** "Limited," two years parts and labor.

**Manufacturer:** Lux Corp., Japan.

**U.S. Distributor:** Luxman Division of Alpine Electronics of America, Inc., 19145 Gramercy Pl., Torrance, Calif. 90501.

Butterworth), in conjunction with a laser-trimmed ladder-type digital-to-analog converter (DAC) credited with exceptional decoding accuracy. As in many current high-end products, care has been taken to avoid mechanical resonances or sources of vibrations, and the



All data were obtained using the Sony YEDS-7, CBS CD-1, and Philips 410 055-2 and 410 056-2 test discs

directional scan with two speeds (depending on whether you're in play or pause) plus bidirectional index-point steppers (which also require that you be in play or pause).

The cueing keypad, above the mechanical controls, has ten buttons numbered 1-10 plus one marked "+10" that advances the tens digit. You can thus select any track number up to the CD maximum of 99. The display panel contains numbers that illuminate to show how many tracks are on the disc (up to 20). When you program a sequence, each track's number is surrounded by a red box; the number disappears as the track is played. You can program as many as 16 selections, counting repeats.

All of these controls except the power switch, the headphone level adjustment, and the digital-output switch—and even the drawer open/close—are duplicated on the supplied RD-109 remote. The remote also has one very nice feature missing from the main panel: a single-play option that stops the player at the end of the current track—or recycles to the beginning of that track when the player is in the repeat mode.

Diversified Science Laboratories found the frequency response to be exceptionally flat out to 20 kHz, despite a slight rise at the extreme top when de-emphasis is required. Some treble ripple, attributable to the analog filtering, is detectable in the lab's response traces, but it is so small in amplitude as to be altogether negligible. Ringing in the square-wave and pulse traces also is well damped and nearly symmetrical, reflecting the role of the digital filtration.

The remaining bench-test data are similarly excellent with the sole excep-



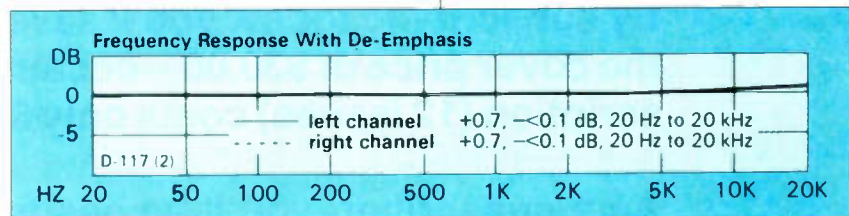
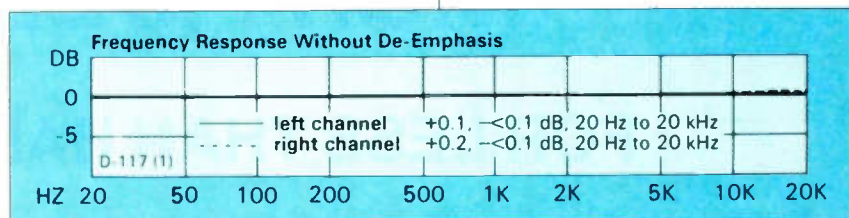
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The full-featured remote for the D-117

tion of those for linearity, which suggest that one digital bit is incorrectly converted. In other respects, however, the D-117's performance is on or above par. Suffice it to say that, in our listening tests, we were unable to spot any audible effect that could be associated with the linearity measurements.

In fact, the listening experience with the D-117 was excellent, thanks in part

to the variety and utility of its many features. In that respect, we have only one reservation. When we program several contiguous tracks (say, to play a portion of an opera act), playback is not seamless. The breaks last barely one second and might not be noticed between movements of a symphony or concerto but are



disturbing in continuous music.

Playing a CD that is a succession of independent selections—such as all manner of pop music—obviates this as a material consideration and qualifies the D-117 as among the most enjoyable of CD players: logical, capable, handsome, and sonically impressive. The comprehensive controls on the remote contribute significantly to that evaluation, as does the intuitive front-panel design.  ▶

#### ABOUT THE dBW

We currently are expressing power in terms of dBW—meaning power in dB with a reference (0 dBW) of 1 watt. The conversion table will enable you to use the advantages of dBW in comparing these products to others for which you have no dBW figures.

WATTS	dBW	WATTS	dBW
1.0	0	32	15
1.25	1	40	16
1.6	2	50	17
2.0	3	63	18
2.5	4	80	19
3.2	5	100	20
4.0	6	125	21
5.0	7	160	22
6.3	8	200	23
8.0	9	250	24
10.0	10	320	25
12.5	11	400	26
16.0	12	500	27
20.0	13	630	28
25.0	14	800	29

Channel Separation (at 1 kHz)	90 dB
Channel Balance (at 1 kHz)	$\pm < 0.1</math> dB$
S/N Ratio (re 0 dB; A-weighted)	
without de-emphasis	97 3/4 dB
with de-emphasis	102 dB
Harmonic Distortion (THD+N; 40 Hz to 20 kHz)	
at 0 dB	$< 0.01\%$
at -24 dB	$\leq 0.061\%$
IM Distortion (70-Hz difference; 300 Hz to 20 kHz)	
0 to -20 dB	$< 0.01\%$
at -30 dB	0.020%
Linearity (at 1 kHz)	
0 to -40 dB	no measurable error
at -50 dB	+0.2 dB
at -60 dB	+0.7 dB
at -70 dB	+2.3 dB
at -80 dB	+6.6 dB
at -90 dB	+12.4 dB
Tracking & Error Correction	
maximum signal-layer gap	$> 900\ \mu\text{m}$
maximum surface obstruction	$> 800\ \mu\text{m}$
simulated-fingerprint test	pass
Maximum Output Level	
line output (back panel)	1.87 volts
headphone output (into 50 ohms)	2.27 volts
Output Impedance	
line output	530 ohms
headphone output	160 ohms

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**Y**ou may not be familiar with Apex, but the company has developed an enviable reputation among professional recordists who use its equipment in their everyday work. As witnessed by the Apex ESP-7000 Enhanced Separation Processor, the company's progression from making professional signal-processing gear to home surround-sound equipment is a natural step.

"Enhanced Separation" refers to the use of internal logic to augment separation between adjacent channels in a surround-sound setup, which otherwise would be limited to 3 dB when the original program is mixed down to two channels. In the 7000, a technique known as vector cancellation subtracts crosstalk elements from the signals in the adjacent channels. Theoretically, this should provide improved separation with fewer audible side effects than with the alternative approach, which relies on gain riding in each channel.

As with other surround-sound processors, the 7000 is designed to be connected between a preamp and a set of power amplifiers (it has no amplification of its own) or fed from the tape-monitor loop of a receiver or integrated amp. Separate jacks are provided for each type of connection. Even if you do choose the preamp-output option, you may find the 7000's tape connections useful to hook up an additional cassette deck or the audio side of a video component.

Each of the 7000's seven outputs has its own output-level trimmer, which provides a 16-dB gain adjustment to match differences in power-amplifier sensitivity. The seven outputs are meant to feed power amplifiers connected to the front left and right speakers, back left and right speakers, center front and center back speakers, and to a subwoofer. Apex says the 7000's internal logic "knows" how many outputs are being used and adjusts its decoding accordingly to derive maximum effect from the setup being used. This enables you to start off with, say, a three- or four-speaker setup and expand the system as your budget allows.

With the exception of **INPUT BALANCE** and **CALIBRATE**, the front panel is devoid of controls. The processor is operated entirely by the wireless remote, which, thanks to a back-panel accessory jack, can power up an entire audio-video system when the optional Apex Master Power Controller is used (the 7000 itself has no AC convenience outlets). The **INPUT BALANCE** provides a  $\pm 6$ -dB level adjustment between left and right inputs to correct for any imbalance in the

source program. When **CALIBRATE** is pressed, the front-channel outputs are muted and the separation-enhancement circuits are defeated, enabling you to adjust the **INPUT BALANCE** for minimum dialog in the back channels.

In addition to on and off power buttons, the remote includes controls for volume; front, back, left, and right balance (with the buttons arranged in a diamond pattern); mute (total); mode, which steps through the three operating modes (Music, Cinema, and Bypass); a tape monitor switch; input, which controls the optional Apex Remote Input Switcher, expanding the audio-video input possibilities to six; SE, which steps

## Apex ESP-7000 Surround-Sound Decoder



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through the four levels of separation enhancement; and **DSR**, which engages the 7000's Dialogue Scatter Reduction (DSR) circuit. DSR blends high-frequency information into the center-front channel to help reduce the "spitting" that can otherwise pop up in the back channels when sibilants are not perfectly recorded and reproduced. (This problem is likely to occur particularly with enhanced-separation surround-sound processors unless special precautions are taken to combat it.)

Front-panel LEDs show the status of the system. The three operating modes are indicated by labeled LEDs, the volume setting by a pair of variable-brightness LEDs, and the balance setting by a diamond-shaped cluster of four LEDs. Three lights show the setting of the sepa-

**Dimensions:** 17 by 1¾ inches (front); 9 inches deep plus clearance for controls and connections.

**Price:** \$995.

**Warranty:** "Limited," one year parts and labor.

**Manufacturer:** Apex Systems, Ltd., 13340 Satcoy St., North Hollywood, Calif. 91605.

## Output at Clipping (at 1 kHz)

main channels	4.4 volts
center front channel	4.4 volts
subwoofer channel	4.5 volts
surround channels	4.4 volts
center back channel	4.5 volts
Maximum Input Level	4.4 volts

## S/N Ratio (re 0.5 volt; A-weighted)

main channels	79 dB
center front channel	79 1/4 dB
subwoofer channel	90 1/4 dB
surround channels	79 1/2 dB
center back channel	48 dB

## Distortion (THD+N; 20 Hz to 20 kHz; 2-volt output)

main channels	≤ 1.4%
surround channels	≤ 1.2%*

## Frequency Response

main channels	+0, -3 dB, 25 Hz to 20 kHz
center front channel	+0, -3 dB, 20 Hz to 20 kHz
subwoofer channel	+0, -3 dB, 20 to 80 Hz
surround channels	+0, -3 dB, 20 Hz to 4.8 kHz
center back channel	+0, -3 dB, 20 Hz to 4.8 kHz

Channel Separation	see text
Input Impedance	72k ohms
Output Impedance	≤ 170 ohms

\*Measured from 20 Hz to 6 kHz

## REPORT POLICY

Equipment reports are based on laboratory measurements and controlled listening tests. Unless otherwise noted, test data are provided by Diversified Science Laboratories. The choice of equipment to be tested rests with the editors of High Fidelity. Samples normally are supplied on loan from the manufacturer. Manufacturers are not permitted to read reports in advance of publication, and no report or portion thereof may be reproduced for any purpose or in any form without written permission of the publisher. All reports should be construed as applying to the specific samples tested. High Fidelity and Diversified Science Laboratories assume no responsibility for product performance or quality.

ration-enhancement circuit. When all the lights are off, the enhancement is defeated and separation reverts to the normal 3 dB; with one lit, separation approaches 6 dB; two lit indicates as much as 18 dB of separation; and when all three are lit, separation is at maximum. Other lamps indicate when the DSR is in operation and when the tape monitor input is selected.

Diversified Science Laboratories tested the 7000 in the Cinema mode, which Aphex states is compatible with Dolby Surround, Ultra-Stereo, and Aphex Surround programs (the last two are formats we haven't encountered in use). The input balance was adjusted for minimum back-channel output with a center-front input, the output-level trimmers were set for maximum gain, and the volume control was adjusted for close to unity gain in the left-front channel. The lab conducted all tests at the maximum separation setting and with the DSR defeated. Dummy plugs were inserted into all output jacks so that the system would assume all seven outputs were in use (i.e., to simulate the full system configuration).

Under these conditions, main front-channel response is within +0, -1 dB from 60 Hz to 20 kHz and down 3 dB at 25 Hz. Center-front response is essentially the same. Response in all three back channels approximates the Dolby standard, although the rolloff (approximately 6 dB per octave) is more gradual than we're accustomed to seeing and begins at a lower frequency (4.8 rather than 7 kHz). Output from the subwoofer feed is flat from below 20 Hz and dips 3 dB at 80 Hz, above which it rolls off at approximately 8 dB per octave.

The separation enhancement comes into play above approximately 40 Hz and is fully effective above 200 Hz (where it is most needed). Separation between the front left and right channels is 35 dB or better from 60 Hz to 20 kHz; with a mono input, movie dialogue stays locked in the center-front channel. Leakage from the center-front to the main front channels is -30 dB or better from 80 Hz to 17 kHz. In the reverse direction, the leakage is even less: -45 dB or better from 100 Hz to 20 kHz. Back-channel leakage to any of the front channels is better than -30 dB from 160 Hz to 20 kHz, and that from front-to-back is less than -35 dB from 100 Hz to the Dolby cutoff of 7 kHz. We'd call this excellent separation all around.

In general, the 7000 is noise-free. A-weighted noise is 79 dB or more below our standard 0.5-volt reference level in any of the front channels and in the two

main back channels as well. Only in the center-back channel does the noise level increase to -48 dB. In the subwoofer channel, the signal-to-noise (S/N) ratio is a commendable 90% dB. Undoubtedly, the quieter-than-average figure for the main back channels is due to Aphex's omission of the Dolby-specified 20-millisecond delay line. Forgoing the delay line also enabled Aphex to design the 7000 with a fully adequate input clipping level (4.4 volts) without the need for an input level control. Maximum output level (at clipping) matches the input clipping level almost precisely, which means the 7000 has more than enough output to drive any home power amplifier.

Output impedance in all channels ranges from 115 ohms to 170 ohms—more than low enough for long cable runs to remote power amps. Input impedance is more than adequate at 72 kilohms. With the volume turned up fully, maximum channel gain varies from 8 1/2 to 9 1/4 dB on the main channels and reaches 20% dB on the subwoofer output. In sum, there should be no problem interconnecting the 7000 with any system.

Although "true" total harmonic distortion (as measured by a spectrum analyzer) is quite low at our standard 2-volt output level, DSL found sidebands around the fundamental distortion component, particularly at low frequencies. In order to include these in the measurement, DSL used a distortion analyzer that indicates total harmonic distortion plus noise (THD+N). On this basis, distortion in the front channels reached 1.4 percent at 40 Hz but was 0.15 percent or less from 100 Hz up. Back-channel THD+N peaked at 1.2 percent at 40 Hz and 100 Hz but was less than 0.15 percent from 200 Hz to 6 kHz (the highest back-channel frequency in our measurements). In any case, the distortion never became audible.

Based on its performance in our listening/viewing room, we give the 7000 high marks for its excellent channel separation. Dialogue stays locked in the center-front channel, which enables you to space the main front speakers for maximum stereo effect. However, we wish Aphex had seen fit to include the back-channel delay, even at some sacrifice to dynamic range. Without the delay, we found ourselves more aware of the back speakers than we'd like. Of course, if we had a really large viewing room, we could have placed the back speakers another 20 feet or so behind our sitting position and created the delay naturally. If you're in that boat, the Aphex ESP-7000 will prove an excellent system. □

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By Drew Kaplan

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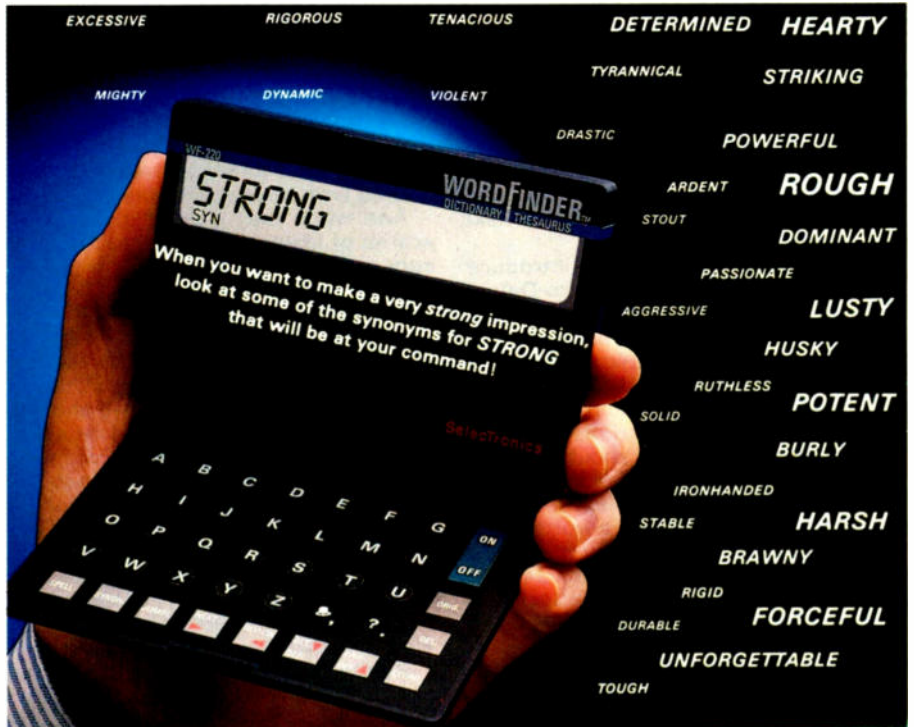
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# Is Escort Scared or Smart?

*Cincinnati Microwave, the maker of Escort and Passport radar detectors, has ignored DAK's third, one-on-one Maxon versus Escort radar challenge. I think they're hiding behind 'independent' magazine reviews and refusing to meet us on the true field of battle. And now, I think I've finally figured out why. I believe they're in a NO WIN SITUATION! Read On.*

By Drew Kaplan

It's time to attack. No more Mr. Nice Guy for me. I've done everything I can to get them out for a conflict.

I've offered \$10,000, then \$20,000, if they could beat Maxon's lowest price \$99<sup>90</sup> detector (now on sale for just \$79<sup>90</sup>) by more than 10 feet. I've even offered to print the results in my next catalog, win, lose or draw.

In a minute, I'm going to introduce Maxon's revolutionary new Micro-Detector that is CORDLESS and built to trounce Escort and Passport, but first let's see what we can do to compare detectors.

## IS THIS FAIR? YOU DECIDE

In their recent ads, Cincinnati Microwave quotes what Car and Driver Magazine's April '87 issue says about Passport, "At \$295 direct from the factory, it's the most expensive piece of electronic protection in the group, but it's worth every nickel in roadgoing peace of mind."

Well, wouldn't you think that Passport obliterated every other detector by a country mile? And, don't you think everyone is going to go out and find the magazine and read the **WHOLE** review???

Well, look what else Car and Driver said in the same article (and not quoted in Passport ad), "As it turned out, the top five brands are so close in their "Overall Sensitivity" scores that a minor juggling of the X/K-band weighting formula would upset the apple cart." Wow, imagine that!

So, Passport didn't beat everyone by a mile. In fact, on the X Band tests, it appears that it came in 3rd in a Dead-Ahead Trap, 3rd in an Over-the-Hill Trap, and 3rd in an Around-the Corner Trap.

But in choosing Passport as best, Car and Driver says, "... an 'excellent' appraisal of support systems (cords, lights, alarms etc.) is well worth several hundred feet of warning distance..."

Which brings me back to the point I've been trying to make since I first challenged Escort. Today, a good detector can often sniff out police radar as much as 60 seconds ahead.

Traveling at 55 mph, you only cover about 80 feet a second. So, whether there's a 10' or even 100' difference in sensitivity, with today's detectors it just doesn't make much difference.

## READ THIS

So, if Passport or Escort lose to the

# A \$20,000 Challenge To Escort

*Let's cut through the Radar Detector Glut. We challenge Escort & Passport to a one-on-one Distance and Falsing 'duel to the death' on the highway of their choice. If they win, the \$20,000 check pictured below is theirs.*

By Drew Kaplan

We've put up our \$20,000. We challenge Escort to take on Maxon's Dual Superheterodyne RD-1 \$99<sup>90</sup> detector (right) (Now just \$79<sup>90</sup>), Maxon's new Mini RD25 \$99<sup>90</sup> detector (middle) or Maxon's Cordless Micro-Trouncer \$149<sup>90</sup> radar detector (left) on the road of their choice in a one-on-one conflict.

The real question today is: 1) How many feet of sensing difference, if any, is there between Maxon's Detectors and Escort's or Passport's? And 2) Which is

\$79<sup>90</sup> Maxon, it would be catastrophic for their advertising. And, even if they beat Maxon by a second or two, are they worth double or even triple the price?

So, that's why I think they're in a no win situation. Without the magazine's loving editorial comments, we'd be down to who won and by how many feet?

And while they may or may not be scared of losing to Maxon, so far, they sure seem to be smart enough to stay out of a footage contest.

## MAGAZINE ROUND UP

Popular Mechanics Magazine in November '86, in their Around A Corner Test said, "The low ranked . . . and Passport had to be rounding the bend and pointing at the radar gun before they'd detect it. Too late then!" (Not quoted by Passport.)

Although in July, after Cincinnati Microwave complained, Popular Mechanics said in an Around A Corner Test, "Consistent with the results of our previous test, Passport was easily the best of the minis." (Quoted in Passport Ads.)

Speaking of 'consistent', the magazines aren't consistent even from issue to issue.

By the way, in July's test they hated Maxon, but at least they said, "No detector in this group had to round the corner before sniffing out Smokey."

Road and Track Magazine (September '86) top rated Passport even though Maxon (a recommended buy) appears to have beaten Passport in Uninterrupted Alert, and Passport beat Maxon in initial alert.

So, when you get right down to which detector protects you, an on-the-road test without all the loving editorial 'quotable remarks' seems to be the only way to go.

We need to win or at least tie, to prove to the world that our challenge is for real, and not, as Cincinnati Microwave said, "an advertising gambit". But, speaking of advertising gambits, read this!

## PROTECTION FROM RASHID \$5?

### WHOOPEE

Last year, Cincinnati Microwave announced to the world, in virtually every magazine I picked up, that all radar detectors but theirs would be obsolete.

It seemed that a K band collision avoidance system called Rashid VRSS would knock out everyone's detectors.

Well, I said then that the \$558 system that recommends cutting a 6½" hole in your grill for installation, wasn't going to

take over the highways.

But Cincinnati Microwave kept advertising about Rashid. (My opinion of an advertising gambit). It's been a year and nobody I've talked with has run into a Rashid. I challenged Cincinnati Microwave to prove that there were even 500 on the road in the whole U.S., but they've been silent. (I wonder why???)

Anyway, just to prove that we had the technical expertise, Maxon has developed and implemented an Anti-Rashid circuit in the new Micro-Detector.

It's added about \$5 to your cost which we all think is a waste, but at least we won't get any more letters saying that the only reason we think it's worthless is because Maxon doesn't have it.

## TRUE BREAKTHROUGH NO. FIVE

Unlike the questionable value Anti-Rashid circuit from Cincinnati Microwave, Maxon has now leapt ahead. Now you can have a micro detector that operates from 6 AA rechargeable batteries (included).

Now you can forget plugging your radar detector into your cigarette lighter. A revolutionary circuit design gives you cordless freedom and improved protection.

Maxon is using a circuit used in jet fighters and other military applications which replaces the traditional Gunn diode oscillator with a DRO (Di-electrically Resonated Oscillator).

The efficient DRO circuit is much more stable when subjected to temperature extremes and vibration (hence its use in the military, especially aircraft). Its only disadvantage is that it costs more.

The new detector also has incredible "support systems". Its bright LEDs, dim themselves at night. And speaking of dimming, they can be switched off so you can't be spotted from the rear.

And, as for the separate X and K warning tones, not only is the volume adjustable, 'Mute' lets you silence the alarms without adjusting volume. They will automatically reset after the alert passes.

You can plug the Micro into your cigarette lighter, you can run it for about 8 hours on its rechargeable batteries, and it automatically recharges from your cigarette lighter overnight or while you use it plugged in during the day.

OK, now it's time to prove that Maxon is Number One. Cincinnati Microwave, eat our dust!

more accurate at interpreting real radar versus false signals?

So Escort, you pick the road (continental U.S. please). You pick the equipment to create the false signals. And finally, you pick the radar gun.

Maxon and DAK will come to your highway with engineers and equipment to verify the results.

And, we'll have the \$20,000 check (pictured) to hand over if you win!

## BOB SAYS MAXON IS BETTER

Here's how it started. Maxon is a mam-

moth electronics prime manufacturer. They actually make all types of sophisticated electronic products for some of the biggest U.S. Electronics Companies. (No, they don't make Escort's.)

Bob Thetford, the president of Maxon Systems Inc. and a friend of mine, was explaining their anti-falsing Dual Superheterodyne Radar detector to me. I said "You know Bob, I think Escort really has the market locked up." He said, "Our new designs can beat theirs".

...Next Page Please

**Challenge Continued**

So, since I've never been one to be in second place, I said, "Would you bet \$20,000 that you can beat Escort?" And, as they say, the rest is history.

By the way, Bob is about 6'9" tall, so if we can't beat Escort, we can sure scare the you know what out of them. But, Bob and his engineers are deadly serious about this "duel". And you can bet that our \$20,000 is serious.

We only ask the following. 1) The public be invited to watch. 2) Maxon's Engineers as well as Escort's check the radar gun and monitor the test and the results.

3) The same car be used in all tests. 4) We'd like an answer from Escort no later than December 31, 1987, and 60 days

1/4 second gives you protection from signals from other detectors, intrusion systems and garage door openers.

So, when the lights and X or K band sounds explode into action, take care, there's very likely police radar nearby. You'll have full volume control, and a City/Highway button.



Maxon detectors are backed by Maxon's standard limited warranty.

There are many cheap imports that aren't very good. My quarrel with them is that except for themselves, I don't know who they think is any good!

**CHECK OUT RADAR YOURSELF RISK FREE**

Put a detector on your visor, dash or windshield. When it sounds, look around for the police. There's a good chance you'll be saving money in fines and higher insurance rates.

If you aren't 100% satisfied, simply return it in its original box within 30 days for a courteous refund.

(RD-1 Pictured to Right.) To get your Maxon, Dual Superheterodyne, Anti-Falsing Radar Detector risk free with your credit card, call toll free or send your



notice of the time and place of the conflict to alert the public. And, 5) If Escort can prove that there are even 500 Rashid units in operation, we will present them with a check for \$5,000 at the conflict.

**HOW'S THIS FOR FAIR?**

Cincinnati Microwave will be deemed the winner and given the check if either Escort beats Maxon's RD-1 or RD-25 by 10 feet in both uninterrupted and initial alerts or equals the Micro-Trouncer, OR if Passport beats Maxon's RD-1 or RD-25 by 2 seconds at 55mph in both uninterrupted and initial alerts or equals the Micro-Trouncer. So, DAK wins only if we beat both the \$295 Passport and \$245 Escort Radar Detectors.

**SO, WHAT'S DUAL SUPERHETERODYNE?**

OK, so far we've set up the conflict. Now let me tell you about the new dual superheterodyne technology that lets Maxon leap ahead of the pack.

It's a technology that tests each suspected radar signal 4 separate times before it notifies you, and yet it explodes into action in just 1/4 of one second. (1/10th second for the Micro-Trouncer.)

Just imagine the sophistication of devices that can test a signal 4 times in less than a 1/4 of one second. Wow!

But, using Maxon is easy. These long range detectors have all the bells and whistles with separate audible sounds for X and K radar signals.

LED Bar Graph Meters accurately show the radar signal's strength. And, you won't have to look at a needle in a meter.

Keep your eyes on the road, you'll see these meters with your peripheral vision.

You'll have a very high level of protection. Maxon's Dual Conversion Scanning Superheterodyne circuitry combined with die-cast aluminum ridge guide wide-band horn internal antennas, really ferret out radar signals.

And the key word is 'radar', not trash. The 4 test check system that operates in

Note from Drew: 1) Use of radar detectors is illegal in some states.

2) Speeding is dangerous. Use your detector to help keep you safe when you forget, not to get away with speeding.

**DON'T WASTE MONEY**

As I've said, good radar detectors today are very similar. The RD-1 is great. It is much smaller than Escort at just 3 1/2" wide, 4 3/4" deep and 1 1/2" tall.



If you want an even smaller detector, the RD-25 at just 2 3/4" wide, 4 1/2" deep and 1" tall, with its included windshield mount and identical specs is for you.



If you want the very best, or if you want to forget cords and be able to slip a



4 1/2" wide, 3 3/4" deep, 3/4" tall (It mounts sideways to the rest) detector into your shirt pocket, choose the Micro-Trouncer.

I'd love to tell you that the Micro-Trouncer is light years ahead in detection, because its circuitry certainly is.

But, I'd be into advertising gambit-land if I claimed that 1 or 2 seconds of improvement over Maxon's other detectors or even over Escort and Passport really make a significant difference.

Caution: Cincinnati Microwave is right.

check for DAK's \$79<sup>00</sup> sale price (\$4 P&H). Order No. 6150.

Note: An optional suction cup windshield mount and extra coiled power cord (we can't afford to throw them in for free) is just \$5<sup>00</sup> (\$2 P&H) Or. No. 4800.



(RD-25 Pictured in Middle.) To get your Maxon, Dual Superheterodyne, Anti-Falsing Mini Radar Detector complete with 2 Power Cords, Window Suction Cup, Dash and Visor Mounts risk free with your credit card, call toll free or send your check for just \$99<sup>00</sup> (\$4 P&H) Order No. 6151. CA res add tax.

(Micro-Trouncer Pictured to Left.) To order Maxon's Top-Of-The-Line, DRO Circuit Radar Detector with Mute, 4 Second LED Meter Hold, Dark Switch, Cordless Battery Operation (6 AA Ni-Cad Batteries Included) with Windshield, Dash, and Visor mounts and 2 power/charging Cords risk free with your credit card, call toll free or send your check for this revolutionary \$249 suggested retail detector at DAK's market breaking price of just \$149<sup>00</sup> (\$6 P&H) Order No. 6152.



OK Escort, it's up to you. We've got \$20,000 that says you can't beat Maxon on the road. Your answer, please?

Escort and Passport are registered trademarks of Cincinnati Microwave. Rashid VRSS, and Rashid Radar Safety Brake are registered trademarks of Vehicle Radar Safety Systems, Inc.

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**Any Other Inquiries. . . . 1-800-423-2866**  
 8200 Remmet Ave., Canoga Park, CA 91304

# The Great \$99<sup>90</sup> Copier Blow-Out

DAK has obliterated the \$349 suggested retail price. Now for just \$99<sup>90</sup>, you can copy price lists at trade shows, articles in libraries, receipts in your car, stock quotes on airplanes, recipes at home or blueprints on a construction site.

By Drew Kaplan

You're in a restaurant. An important meeting is in progress.

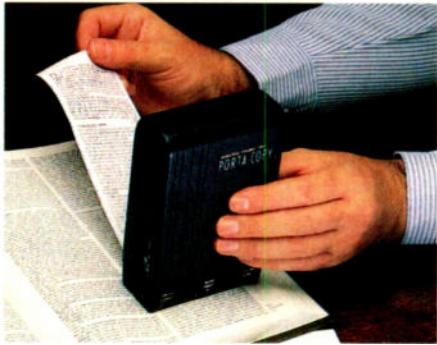
The person you're meeting with shows you a confidential price list. You whip out your new Silver Reed Industrial Pocket Copier and make yourself a copy.

**Great Idea, but..** While thousands of rich executives are currently increasing their productivity by using this sophisticated copier at meetings, in hotels, and of course at home, it's simply been too expensive for the rest of us to use.

**Well, no more.** Silver Reed couldn't find as many rich executives as it needed, so DAK bought all their copiers for cash! Now, for just \$99<sup>90</sup>, which I've been told is \$40 below the Japanese manufacturing cost, we can all make full size, crisp, flawless copies wherever we are, instantly.

Now we can all enjoy the productivity and luxury of the rich. We can forget the \$349 suggested retail price.

We can forget the 1987 Confidential \$230 Dealer Price List Cost. Cordless, hand held copying is now a reality while our limited supply lasts, for just \$99<sup>90</sup>.



## HOW IT WORKS

Dozens of magazines have reviewed this product because of its revolutionary miniaturized technology and utility.

Just glide this less than 2 pound copier over any printed surface including words, pictures and graphs. And, your permanent copy will instantly emerge.

This copier uses the newest sophisticated CCD image sensors to scan the material to be copied.

It then digitally converts the image. Finally, much like a laser printer, it prints an image so sharp and crisp and with such incredibly fine dots, that it can even have more contrast than the original.

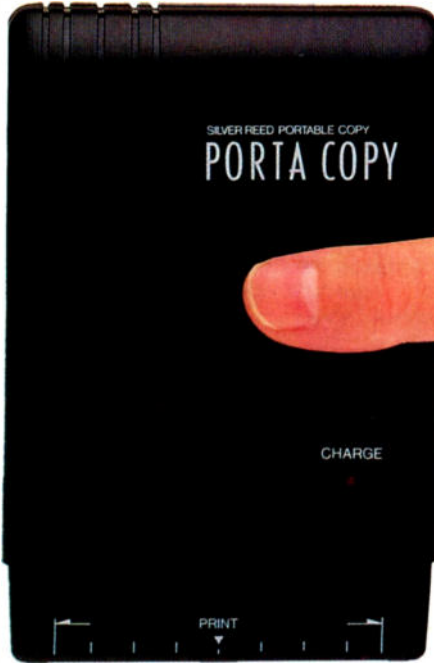
Since it uses the newest thermal technology, there are never any chemicals or powders to bother with. And best of all, absolutely no maintenance is required.

**It's a phenomenal amount of technology for just \$99<sup>90</sup>. Plus, look at everything you get!**

It comes with built-in rechargeable ni-cad batteries. So, you won't have to buy batteries. And, even the charger is included. There's a leatherette carrying case and it all fits easily into your briefcase, purse or overcoat pocket.

## HERE AND THERE

So, if you want to copy a column out of an encyclopedia, or a document that can't be removed from a file room or library, or stock quotes from the paper, Silver Reed has the solution.



## FINAL CLOSE-OUT

List Price was \$349  
DAK sold it for \$299

**NOW JUST  
\$99<sup>90</sup>**

At home you can copy checks, recipes or airline ticket schedules.

On the road, you can copy your expense receipts as they occur. If you're like me, you often lose half of them, so this copier is saving me a lot of money.



**And look at this.** It's ideal for copying numbers & addresses from phone books in phone booths. Now you don't have to scribble notes; just pass the copier down the pages and you'll have a perfect copy, even from the yellow pages.



## BUT IT'S ONLY 3" WIDE

It copies a 3" wide path, as long as you like, flawlessly. So, it's really great for sections of blueprints, computer printouts and hard to copy items like box labels in the warehouse or on the dock.

You can copy a typical 6" letter (that's the average text amount) in two quick passes. So, for letters, checks, research or newspaper articles, you can now copy where no copier has gone before.

## ALL THE CORDLESS USES

From copying EKG results for doctors to bibliographies for students and professors, you'll be more productive.

Forget taking tedious notes. Just copy paragraphs or sections you need. You'll have error free permanent records.

You can copy charts or music. Copy an income statement or a balance sheet.

And, if you've ever stood in line at a federal, state or city archive as I have, you can now copy anything instantly.

And, speaking of aggravation, being stuck in a hotel room or on a commuter train can just devastate my productivity.

I can't copy my notes. I can't copy sections of articles I'm reading to show my fellow DAK executives, and I hate writing notes on original spec sheets.



If you make house calls to sell insurance,  
...Next Page Please



... Copier Blow-Out Continued or real estate, or if you simply work on school projects at other peoples' homes as my wife does, this copier is a must.

You can copy title reports, old medical forms, or even original blueprints. For working on school projects, you can instantly copy class phone/address lists and save lots of tedious note taking.

You can copy the front and back of a check. Or, you can copy a map so you won't get lost. It's all really easy.

Copy driver's licenses if you own a store and cash checks, or if you have an accident. Hospitals can copy health cards or IDs for permanent, error free records.

And if you're into government espionage (our side only please), this copier should replace your old spy camera.

Of course, the most common use is at your desk. You'll be amazed at how many things you'll copy when a copier is at your side. As I mentioned, if I read an article, I like to copy the important parts for others at DAK, to maximize my efforts.



#### BUT IS IT REALLY GOOD?

OK, if you're standing next to your desktop copier, which copier should you use? Well, the answer is simple. Assuming you don't have to wait for the desktop copier to warm up, (the Porta Copy is instant on) the answer is the desktop.

But, you'll love the quality of this copier. You'll love all the places you can take it. And, now that it doesn't cost \$349, you'll love how much cheaper it is.

The quality of the copy is nothing short of superb. So, you won't be sacrificing quality for portability.

It's just 6 $\frac{1}{2}$ " tall, 4" wide and 1 $\frac{3}{4}$ " deep. It weighs less than two pounds (Wow). It has a copy density control that lets you adjust for imperfect originals.

It comes complete with a carrying case, a roll of paper and the recharger for its internal ni-cad batteries. It's backed by Silver Reed's limited warranty.

#### Desktop Blow-Out Too

If you don't need cordless portability, DAK also bought all of Silver Reed's top of the line desktop copiers too. Forget the \$449 suggested retail price. Forget the 1987 Confidential \$280 Dealer Cost.

For an incredible \$229 you can copy full 8 $\frac{1}{2}$ " X 11" papers and even books, flawlessly. It is maintenance free and doesn't require toner or powders.

Take a moment and journey back with me to about 1978. My very first real luxury was renting a Xerox® machine for my office at home.

Every time I made a copy of a letter or a magazine article, I felt successful.

My wife copied recipes and a never ending series of school projects for our kids. I could copy checks, tax returns or receipts. But, it cost me \$100 per month

for the rental, plus a charge per copy.

Well, now at home or in my own office at DAK, I can make perfect copies of letters and reports. I can make 8 $\frac{1}{2}$ " wide copies from 3" to 11" long.

This copier is absolutely silent. There are no fans to disturb you. The only sound you'll hear is a gentle whirr during the actual copy process. It's absolutely perfect for your desk at work.



At DAK, we have several large expensive copiers. But, we have a 64,000 square foot building. So, they are never nearby. I can buy 12 of these copiers for the cost of just one standard machine.

And since the copy quality is so good, several departments at DAK have their own. They're thrilled and I'm happy because they save time.



Just switch it on and in 3 seconds you're ready to make great looking copies. There's even a contrast control to compensate for imperfect originals.

It uses the same breakthrough CCD image sensing circuitry as the portable. The revolutionary computerized thermal technology that makes these copiers possible, provides you with crisp, dramatically sharp copies with contrast that can even surpass the original.

My wife often says she married me because I had a copier at home. (She was a teacher at the time.) And, we all use it a lot. From homework assignments to road maps to report cards, our copier is always running.



We had to send a copy of our cancelled check for a house payment to our bank. And, I copied a poem from a book for my son to learn. We even made copies of my son's 3rd grade speech.

This desktop copier is just 16" wide, 14 $\frac{1}{2}$ " deep and 4 $\frac{1}{4}$ " tall. It's backed by Silver Reed's standard limited warranty.

#### THE UGLY SERVICE PROBLEM

Everyone knows that copiers need ser-

vice. But Silver Reed's sophisticated maintenance free thermal copiers eliminate the problem. Forget powders, toners and drum cleaning. Just turn these copiers on and enjoy the luxury of making copies whenever and wherever you want.

#### MAMMOTH COPIER BLOW-OUTS RISK FREE

I love having a copier. I never have to get in the car when I need a copy of a document when I'm at home. And now, I can even make flawless copies in an airplane, a hotel room or on a loading dock.

If you're not 100% thrilled with either copier, return it to DAK in its original box within 30 days for a courteous refund.

To order Silver Reed's Hand Held Porta Copy Cordless Copier complete with built-in ni-cad batteries, charger, carrying case and a 30' roll of paper risk free with your credit card, call toll free, or send your check for DAK's limited blow-out price of just \$99<sup>00</sup> (\$6 P&H). Order No. 6211. CA res add tax.

Extra 30 foot rolls of Thermal paper are just \$1<sup>49</sup> each. A box of 5 is just \$7<sup>46</sup> (\$1 P&H). Order No. 4679.

To order Silver Reed's DeskTop AC Powered Copier with CCD Imaging, 3'-11" long Copying, for home or office use risk free with your credit card, call toll free or send your check for DAK's limited blow-out price of just \$229 (\$12 P&H). Order No. 6212.

100' Rolls of Pure White Thermal Paper are just \$4<sup>00</sup> (\$1 P&H). Order No. 4836.

Having a copier at home or in your briefcase is one of life's true luxuries. And, once you have it, you'll realize that it's a money saving necessity as well.



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# BSR's Endangered Colossus

Prepare for bone jarring bass and dramatically clear highs from these newly developed 15" 3-way 5 speaker systems that nearly missed their chance to charm an audiophile's ear. BSR moved its dbx and ADC divisions into one facility and these speakers almost became orphans. So now, they're yours at a close-out price.

By Drew Kaplan

It's a shame. But, it's also a great opportunity to get a pair of 15" audiophile loudspeakers with the newest in stereo imaging at a market-breaking price.

Imagine a precisely matched mirror image pair of top-of-the-line BSR speakers that can effortlessly recreate the cataclysmic impact of a full orchestral crescendo at full volume and yet offer flawlessly subtle sound detail to 21,500hz.

You'll thrill to thunderous bass all the way down to 26hz. Incredibly rich, full, vibrant sound at low volume will explode with life as you increase the volume.

But before we examine the front speaker complement, the twin overlapping crossovers and the top mounted sonic placement and ambiance speakers, let's see why they were almost orphaned.

You see, BSR, the half billion dollar electronics giant, is the parent company of two of the best names in up-scale audio, dbx and ADC.

Last year dbx developed a new multi-thousand dollar speaker system called the Soundfield One which lets you sit virtually anywhere in your room and have full stereo imaging and terrific sound.

BSR decided to consolidate ADC and dbx into one building (still 2 companies) and put all its speaker efforts into dbx.

## POOR JACK

Well, while dbx's engineers were off designing their multi-thousand dollar masterpieces, BSR's Senior Acoustical Engineer (he had been Fisher's Chief Engineer for 10 years during its top end component stereo days), was designing BSR's radically new speaker line.

The revolutionary top of the line 15" stereo imaging pair pictured above will let you enjoy superb stereo imaging without sitting directly in front of your speakers.

But unfortunately, in the consolidation move, BSR's speakers went by the wayside, and so did Jack.

Enter DAK. After a few fearful negotiations and considering the engineering costs BSR had already expended, they agreed to make the speakers just for DAK.

Because there's virtually no BSR overhead left on these speakers, and the R&D was all but complete, we've gotten these speakers for virtually the component costs plus a little BSR labor.

And don't worry about Jack. BSR had him finish the engineering (they really are great people) and they'll pay him a royalty on each speaker we sell. Besides, by the time you read this, Jack is sure to be snapped up as the Chief Engineer at another esoteric audio company.

## WHAT'S STEREO IMAGING?

Stereo imagery is the logical separation and interaction between channels. It's the successful creation of a panoramic wall or stage of music rather than the confined, easily located 2 speaker sound. IT'S WHAT'S INSIDE THAT COUNTS

Imagine the full thunder of a kettle drum, or the pluck of a string bass being explosively recreated in your living room. BSR's 15" sub-bass acoustic suspension driver will revolutionize your concept of

low clean bass.

Its magnetic structure weighs a thundering 48 ounces. But that's not all. The magnetic field is developed by the rare earth metal Strontium for state of the art massive but flawlessly controlled bass.

A 38mm voice coil with a 200° centigrade temperature capacity, will handle the most demanding digital or analog recordings. And, a new super rigid cabinet design virtually eliminates coloration due to uncontrolled cabinet resonance.

At low volume, the bass will fill in and envelop you. At high volume, your room, your walls and your neighbors will shake. (Not for apartment dwellers please.)



## MATCHED PAIRS

The mid-range and high end of BSR's speakers are truly unique. Front mounted B" polypropylene mid-range drivers provide rich sound while top mounted 5" polypropylene mid-range drivers provide an open, lifelike ambiance.

Front mounted exponential horn tweeters provide awesome brilliance to 21,500 hz, while top mounted tweeters enhance separation because they are mounted to the outside edge of each speaker.

So, this system has a specific left and a specific right speaker. You'll find wide, but interactive separation that will vastly widen your ideal listening area.

The imagery will give the illusion of musicians actually playing in front of you. Your music will take on a three dimensional quality. You'll enjoy superb stereo imagery regardless of each speaker's specific placement in your room.

## MORE SPECIFICS

The exponential horn tweeters, both in front and on the top of these systems, employ 25mm rigid phenol diaphragms for stability and accurate response.

Polyamid-imid binders and ferro-fluid coolant allow for a 300% increase in heat dissipation so you can drive the voice coils up to 200° centigrade.

Now, the mid-range. Both the 8" front firing and the 5" top firing polypropylene drivers reproduce the mid-range frequencies like no ordinary speakers.

It's amazing that so many speaker manufacturers simply slap in 5" paper mid-ranges to reproduce what's really the major portion of the sound spectrum.

BSR's B" and 5" polypropylene mid-ranges are rigid, exacting drivers that deliver incredibly pure uncolored sound.

They have matched 25mm voice coils, also protected by ferro-fluid and polyamidimid to 200° centigrade. They are driven by powerful barium ferrite magnetic fields.

## NOT QUITE FINISHED YET

To prevent phase shift and cancellation, two totally separate crossover networks are employed in these speakers.

All frequencies below 800 hz are directed to the 15" woofer. The front system routes frequencies above 800hz to the B" mid-range to take full advantage of its superb reproduction capabilities. Frequencies above 3400hz are routed to the horn tweeter.

The top mounted system routes only frequencies above 1200hz to the 5" polypropylene mid-range driver, and frequencies above 3400hz are routed to the top sonic placement tweeter.

There are level controls for both the top and front mounted speakers so that you can voice the speakers to match your musical taste and environment.

Note: Only the top tweeters are mounted at the the edges. The front mounted tweeters are conventionally mounted for acoustical symmetry.

Each speaker is fuse protected for up to 200 watts peak, 150 watts continuous power. You can operate these super efficient speakers with as little as 20 watts.

## AND OH WHAT A PRETTY FACE

The speaker systems are 30" tall, 19 1/2" wide and 10 1/2" deep. Their lovely oak wood-grain appearance is enhanced by the dark removable grill cloths that beautifully contrast with the rich wood-grain tones. They're a statement of audio elegance when placed in any room. They're backed by BSR's 2 year limited warranty.

## A COLOSSAL DREAM COMES TRUE RISK FREE

You'll hear depth of sound at low levels that was previously unobtainable. And yes, when you crank up the volume, your music will explode with realism and drama.

Try these speakers in your own system. Then compare them at any Hi-Fi Store with any pair of speakers up to \$1000. If they don't beat all the competition hands down, simply return them to DAK in their original boxes within 30 days for a courteous refund.

To order your matched pair of BSR top-of-the-line 15" 3-way 5 speaker systems with unique stereo imaging risk free with your credit card, call toll free or send your check for DAK's market-breaking price of just \$299 for the MATCHED PAIR plus \$34 for Postage and Handling. Order No. 4868. CA res add tax.

It's a dream system for an audiophile. Sonically pure, thunderously powerful, these BSR speakers will make your future listening years an on-going fabulous, if not earthshaking experience.



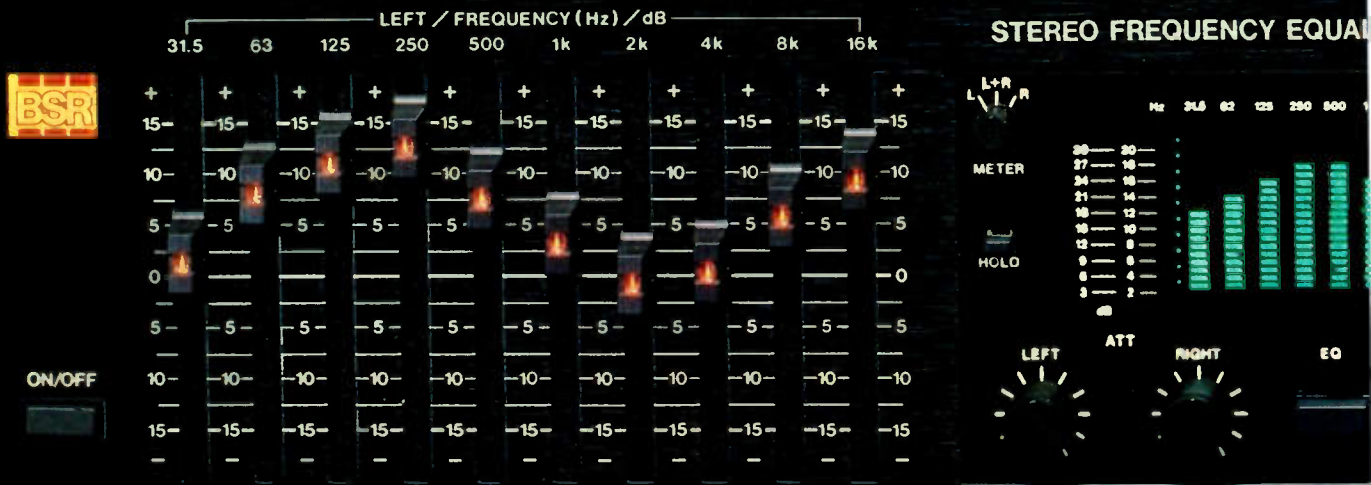
**DAK INDUSTRIES INC.**

Call Toll Free For Credit Card Orders Only  
24 Hours A Day 7 Days A Week

**1-800-325-0800**

For Toll Free Information, Call 6AM-5PM Monday-Friday PST  
Technical Information. . . . 1-800-272-3200  
Any Other Inquiries. . . . . 1-800-423-2866  
8200 Remmet Ave., Canoga Park, CA 91304

**FLASH** We've been lucky enough to get another production run of this incredible equalizer at the same \$149 close-out price!



# Smart Sound Detonator

*Obliterate the wall between you and the individual instruments in your music. Infuse your own stereo system's sound with a breathtakingly vibrant 30 to 50% improvement in sound quality that you can measure with this superb BSR Equalizer/Spectrum Analyzer limited \$149 close-out.*

By Drew Kaplan

Close your eyes. Touch a button. And you'll hear your stereo system literally explode with life.

You'll hear the gentle brushes on a snare drum, the startling bone-jarring realism of a thunder clap, or the excitement of a full cymbal crash.

You'll hear string basses and other deep low instruments emerge from bass (that will sound murky by comparison), with such clarity and such definition that you'll feel you can almost touch each instrument.

This astoundingly distinct yet powerful bass adds such a full bodied warm feeling to your music, you'll feel as if you've been lovingly wrapped in a warm soft blanket on a cold winter's night.

**But don't take my word for the sound quality improvement.** With the Pink Noise Generator, Calibrated Electret Condenser Mike and the 220 Element Spectrum Analyzer, you can instantly measure each and every improvement you make.

Plus, there's more. A subsonic filter effectively adds the equivalent of many watts onto the power of your amplifier.

Plus, with its provision for two separate tape decks including two way dubbing, you'll have much more than just greatly improved sound.

You can count on great sound from this top of the line Equalizer/Analyzer. It has a frequency response from 5hz to 100,000hz  $\pm$  1db. And, it has an incredible 100db signal to noise ratio.

BSR, the ADC equalizer people, make this super Equalizer/Analyzer and back it with a 2 year standard limited warranty. Our \$149 close-out price is just a fraction of its true \$379 retail value.

**FIRST THE EQUALIZER  
YOUR STEREO'S HIDDEN SOUNDS**  
Your stereo can sound incredibly bet-

ter. Just a 5db roll-off at the high end, up around 14,000hz to 16,000hz, can just decimate the harmonics that give you the open feeling you'd experience at a live concert. A similar roll-off at 60hz, causes the fundamental bass notes to just fade away into the 'murk'.

An equalizer isn't some magical device that manufactures sounds that don't exist. Most of the frequencies that will make your music really vibrant, are actually already recorded in your music.

You'll be able to prove this with a few simple tests we'll try when we discuss the Spectrum Analyzer.

You see, certain frequencies are simply not reproduced with as much volume as are the mid-range frequencies which stretch from about 800hz to 2,000hz.

An equalizer simply lets you establish accurate control of all frequencies to fit your equipment, your recordings, your taste, and your listening environment.

## TOTAL MUSICAL CONTROL

And, what a job it can do. It's totally unlike bass and treble controls which simply boost everything from the mid-range down for bass, or everything up for treble. You can boost the low-bass at 31.5hz, 63hz and/or 125hz to animate specific areas or instruments.

And, when you boost the part of the bass you like, you don't disturb the mid-range frequencies and make your favorite singer sound like he has a sore throat.

The high frequencies really determine the clarity and brilliance of your music. The problem is that highs are very directional. Wherever you move in your listening room, you'll find a big difference in high end response, as you'll see when we test the Analyzer.

No recording engineer or equipment manufacturer can even begin to control your listening environment.

You can control the highs at 4,000hz, 8,000hz and/or 16,000hz, to bring crashing cymbals to life at 16,000hz while at the same time you can cut tape hiss or annoying record scratches at 8,000hz.

But there's more. Don't leave out the mid-range. You can boost trumpets at 300 to 500hz or a clarinet at 1000hz. You can boost or cut any part of the frequency spectrum a full  $\pm$  15db.

## TAPE DECK HEAVEN

You can push a button and transfer all the equalization power to the inputs of two tape decks. Now you can pre-equalize your cassettes as you record them and get all the dramatically enhanced sound recorded right on your cassettes.

This is an especially great feature when you play your cassettes on bass-starved portables or high-ended starved car stereos.



## SIMPLY PLUG IT IN

Use your tape monitor circuit, but don't lose it. Now your one tape monitor circuit lets you connect two tape decks.

Just plug the equalizer into the tape 'in' and 'out' jacks on your receiver or preamp. We even supply the cables.

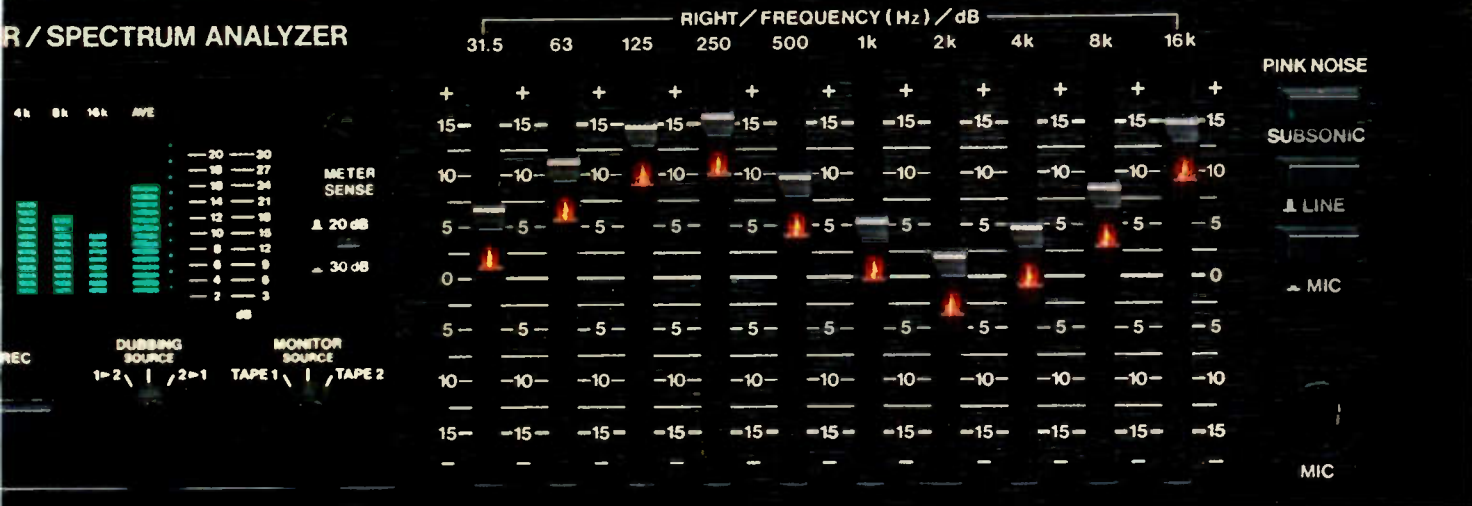
As you listen to your records, FM or any 'Aux', any time you push the tape monitor switch on your receiver you'll hear your music jump to life.

The output from your receiver is always fed directly to your tape deck(s) for recording, and with the touch of a button, you can choose to send equalized or non-equalized signal to your deck(s).

When you want to listen to a tape deck, just select which tape deck you want, turn the switch on the equalizer,

# \$149 CLOSE-OUT

## REC / SPECTRUM ANALYZER



3000

and your tape deck will work exactly as it did before. Except, now you can listen with or without equalization.

Look at this. You can dub tapes from deck 1 to deck 2, or from deck 2 to deck 1 with or without equalization.

### THE SUBSONIC FILTER

Much of the power drawn from your amplifier is used to drive your woofers. When you drive the amplifier too hard, it clips and you end up with distortion.

A subsonic filter removes a lot of non-musical material you can't hear that exists below 20hz. So, it relieves your amplifier of a lot of work. It doesn't actually create more watts (Please, no letters from my 'technical' friends) for your amplifier.

But, it's like turning off the air conditioning in your car. It saves you using about 7hp of what you have. And therefore, you'll have more watts for clean powerful sounding music.

### THE SPECTRUM ANALYZER

Now you can scientifically analyze your stereo listening room and test your equipment by using BSR's Real Time Frequency Spectrum Analyzer.

Plus, you'll see your music not as a single level on a VU meter, but as a kaleidoscopic parade of 10 individual 20 element VU meters.

Each is tuned to a specific octave of the sound spectrum. An eleventh 20 element meter averages all levels.

The effect is awesome. You can visually isolate a string bass or cymbal, and actually see each individual instrument almost as a wave moving across the 220 individual fluorescent elements.

### THE MOUTH AND EARS

It talks. The Analyzer speaks with a voice of pure calibrated Pink Noise. Pink Noise is the standard composite 'sound' of all frequencies used for testing in labs around the world. All frequencies from 20hz to 20,000hz are generated at the exact same level at the exact same time.

It listens too. If you are testing a cassette or a component in your system, use the 'Line Button'. If you're testing your whole system with speakers, use the matched calibrated electret condenser

microphone (included). Either way, you'll have a quick, easy and accurate way to evaluate the total sound of your system.

### HOW TO TEST SPEAKERS, EQUIPMENT AND TAPE

Testing your speakers in your listening room is the really crucial test. Simply place the calibrated microphone where you normally sit to listen to your stereo.



At the end of an 18 foot cord is the ear of the system. Just clip the mike wherever you sit and test your room.

Turn on the Pink Noise. You can switch to Left Channel, Right Channel or both. There's a meter range button, a sensitivity control, and even a switch that lets you freeze the meter.

Just sit down at the equalizer. Start with one channel. You'll see all 10 octave bands on the meter. Just slide the corresponding controls to increase or decrease any area that needs help.

You have now set up your system to its maximum capability. But as you'll see, location is very important. Move the microphone 5 feet to the left or right.

Then turn on the Pink Noise and check the Spectrum Analyzer. Now you can see why the specifications that come with your system are only a starting point.

Here's a way to test your tape deck and tape. First record Pink Noise for 3 minutes at -20VU. Then play it back and note the readings on the meters.

Now, record the Pink Noise again at 0VU or +3. Wait till you see how much the high end falls off. Now you'll see why all specifications are listed at -20VU.

With the Equalizer/Analyzer you can enjoy the finest stereo sound from your system and be a test lab too.

### WHY SO CHEAP

BSR now only sells equalizers under their ADC name. Well, as Detroit comes out with new cars each year, ADC comes out with new equalizers. We got them to supply us with just 30,000 of last year's

ADC model before they shut it down.

They had already paid for all the tooling, all the research and design, so we were able to buy these for less than half the normal price, for cold hard cash.

### THE FINAL FACTS

There are 20 slide controls, each with a bright LED to clearly show its position. Each control will add or subtract up to 15db. (That's a 30db range!)

There are separate sound detonation slide controls for each channel at 31.5hz, 63hz, 125hz, 250hz, 500hz, 1,000hz, 2,000hz, 4,000hz, 8,000hz, and 16,000hz.

BSR backs this top of the line Graphic Equalizer/Spectrum Analyzer with a 2 year standard limited warranty. It is 1 7/8" wide, 3 1/2" tall and 8 3/4" deep.

### MAKE YOUR MUSIC EXPLODE RISK FREE

It's startling. Music so vibrant with life you'll swear it's 3 dimensional. Sculpture your music any way you want it. If you're not 100% satisfied for any reason, simply return it to DAK within 30 days in its original box for a courteous refund.

To order your BSR EQ3000 Smart Sound Detonator 10 Band Graphic Equalizer with Real Time Spectrum Analyzer and Calibrated Mike, with Subsonic Filter and Two Way Tape Dubbing risk free with your credit card, call toll free, or send your check, not for the \$379 retail value. Don't even send the \$227.97 dealer cost. Send just \$149 plus \$8 for postage and handling. Order No. 4100. CA res add sales tax.

The sound of your stereo will explode with life as you detonate each frequency band with new musical life. And, you can see and measure exactly what you've done.

**DAK**  
INDUSTRIES INCORPORATED

**TOLL-FREE ORDER LINE**  
For credit card orders call 24 hours a day 7 days a week  
**CALL TOLL-FREE. . . 1-800-325-0800**  
8200 Remmet Ave., Canoga Park, CA 91304



Geneva Continued  
gram and all the things it can do for you.  
It comes with a great tutorial.

Plus, there's a scheduler program for setting up appointments with day by day calendar screens that you can print out.

Of course, there's a vast reservoir of programs you can buy or download **FOR FREE** from electronic bulletin boards by using the included modems.

#### IT GOES WHERE YOU GO

During the day, you can use it at your desk, in the warehouse or in the field for work. It's simply great for writing, inventory taking or sales forecasting.

At night, take it home to finish a project. Then using its internal modem, you can study your stock portfolio or log onto bulletin boards to check the latest price of gold, the status of your stocks, play games or download new programs.

And look at this bonus. I've included a \$39 value (we sold it for \$24) CompuServe Membership Package, with \$25 worth of free on-line time. Most bulletin boards are free, but CompuServe has some great things for Genevas.

#### HOT LINK

You can directly connect this Epson computer to any IBM PC or Clone or virtually any other computer with a serial interface and any standard communication program, simply by using its cable.

You can download (receive) a file from your desk PC to the Epson to take with you, or upload (send) a file from the Epson to your desk PC for your secretary.

In fact, this system is an incredible replacement for a secretary's typewriter. Portable WordStar will let you edit, correct and move paragraphs or sentences.

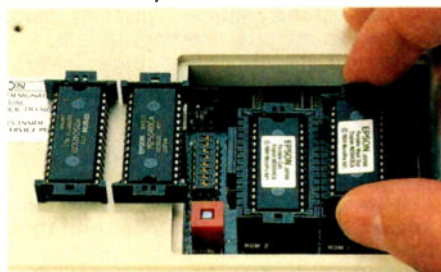
If you use another program, don't despair. You can still send the file. You'll just have to use it under the commands of your program.

#### ALL THE THINGS YOU'LL GET

Epson's 64K Geneva Computer has a suggested retail of \$995. It is just 1.87" high, 11.58" wide and 8.42" deep. It has 3 CPUs. It has 72 keys. Plus 'Number Lock', lets you have a standard 10 key pad for fast entry of numerical data.

You'll have up to 10-20 uninterrupted hours of computing from its internal nicad batteries. Then it will automatically shut down. Even after battery-low shutdown, your memory will be protected by the internal backup battery.

Of course, the AC adaptor/charger is included. So, you can operate from AC or DC to suit your needs.



This \$995 Computer comes complete with 4 powerful software programs plus a group of Utility Programs. The programs are stored on ROM Chips (see below) that simply slip into either of 2 sockets on the back of the computer.

Again, like a hard disk, these ROM chips are fast and load automatically. You get Portable WordStar, Portable

Calc and Portable Scheduler. Plus, you get a powerful form of Basic. This system can run virtually any CP/M programs.

There are two ports on the back of the Geneva. One is a serial port for the optional disk drive(s). The other is a fully programmable RS232 serial port for the superb printer we have included. Or, you can use it to communicate with other computers and external modems.

#### THE EXTRA 64K FLYING WEDGE

Epson makes a \$360 accessory (I've included) called a Multi-Unit, which gives you an added 64K RAM disk.

It's a small wedge that attaches to the bottom of the computer and doesn't increase its footprint on your desk at all.

And there's more. Inside the Multi-Unit Wedge is the 300 baud auto-answer, auto-dial, Tone & Pulse Modem. It comes with a modular phone cable that you plug into any standard phone jack.

You'll also get Epson's \$129 acoustic coupler modem (included). It fits on pay phone and hotel room handsets.

#### PRINTER HEAVEN

We've acquired a superb \$299 List Price NLQ (Near Letter Quality) printer from Seikosha, Epson's sister company. It can take single sheet plain paper or letterhead or fan fold computer paper.

And its printing is so good that I think Near Letter Quality doesn't do it justice.

It's fast, quiet and easy to use. It's AC powered. It features Bold, Underline, Condensed and Expanded Type capabilities.



#### THE BEST FREE PART OF ALL

We've written an easy to understand, step by step instruction book that really gets you going with this computer.

#### WHY SO CHEAP?

It's a terrific \$1,968 system. And, that's just the problem. Epson designed and built very sophisticated equipment. But they relied on salespeople to explain what was needed to consumers.

Many salespeople don't understand why you need each component.

Enter DAK. Epson was stuck with 6714 computers. We made them a ridiculously low offer for everything. Well, 6714 computers isn't very much to a company the size of Epson, so they accepted.

Every Epson Component is backed by Epson's standard one year limited warranty. And, the printer is backed by Seikosha's 2 year limited warranty.

#### THE COMPLETE COMPUTER SYSTEM RISK FREE

Just imagine working at your desk, on the patio or in a hotel room. I actually wrote an ad on a flight from Atlanta to Boston. I'm 100% sold on this computer.

If you're not 100% satisfied with its typing or computing or communications capabilities, simply return it in its original boxes within 30 days to DAK for a refund.

To order your Epson Geneva 64K portable computer complete with Portable

WordStar, Calc, Scheduler, Basic and CP/M Utilities, On-Board Direct Access Microcassette Deck, Built-In Ni-Cad Batteries, AC/Charger Adaptor, Extra 64K RAM Disk Wedge with 300 Baud Modem, External 300 Baud Acoustic Modem, Communication Software, NLQ Sheet and Fanfold Printer, plus Cable and Connectors, forget the suggested retail price of \$1,968. Call toll free or send your check for DAK's incredible close-out price of just \$499 plus \$18 for P&H. Order Number 4610. CA res add tax.

#### OPTION

If you don't need a modem and you're into writing long novels, we have the complete system less the modem and CompuServe package, but with a Wedge that gives you a 120K RAM Disk (Wow that's 120,000 characters without saving to cassette or disk!) for just \$599 (\$18 P&H). Order No. 4612.

Note: You can still use an external modem.

For the many people who already own basic Genevas, you can purchase the \$460 retail, 120K RAM disk for just \$200 (\$5 P&H). Order No. 4613.



#### OPTIONS FOR EVERYONE

For massive storage we have Epson's state of the art 3½" floppy disk drive. It's rated at 320K. It has internal Ni-Cad Batteries and an AC Adaptor/Charger. Epson's retail is \$599, plus \$19 for the Cable and \$17 for the Utility Disk for the drive. It plugs directly into the Geneva's serial port and boots automatically. This \$635 value is yours for just \$229 (\$5 P&H). Order No. 4614.

A box of 10 Double Sided Double Density 320K Floppy Disks is just \$34 (\$1 P&H). Order No. 4615.

High Grade 30 Minute Microcassettes are just \$2<sup>90</sup> (\$0.50 P&H). Order No. 4616. 60 Minute Microcassettes are just \$3<sup>90</sup> (\$0.50 P&H). Ord. No. 4617.

The Seikosha printer comes with a unique long life ribbon (up to 2½ million characters). Extra ribbons are just \$7 (\$1 P&H). Order No. 4618.

You'll receive a list of software that DAK stocks for the Geneva, including Ashton-Tate's dBase II, and the step by step instructions with your computer.

For your desk, your home or for the great outdoors, now you'll be able to write, forecast, and compute with mammoth power and in real style.

#### FINAL CLOSE-OUT NEW BONUS & OPTIONS

We've gotten a \$139 retail value set of 3 programs on 3 ROMs. Now you can keep track of your appointments, your time and your expenses, included FREE.

**EXTRA SPECIAL:** If you don't need the printer, you can order the system for just \$369 (\$14 P&H). Order No. 4952. The System with the 120K RAM disk without the printer is just \$469 (\$14 P&H). Order No. 4953. Wow!

# \$3 Rip-Offs Exposed?

Who says people can't make money with their computers? There are people downloading games, utilities and word processing programs for FREE from public bulletin boards, and then selling them to you for \$3 to \$6. Well, now you can get thousands of programs for your IBM PC, clone or other computer, mostly for FREE, plus help the American Cancer Society!

By Drew Kaplan

Get free programs yourself! If you own a computer, this may be the most important article you ever read.

Imagine printing 10 foot long banners, playing dozens of arcade style action and adventure video games (no joysticks required), using spreadsheet programs, typing labels automatically, speeding up the use of your computer and doing everything, from listing out text files to making DOS easy.

Well, there are over 2,000 numbers you can dial right now, and on many of them you will find hundreds of disks full of exciting 'Public Domain' software.

These are hobbyist boards. Most of the System Operators, or SysOps as they are called, operate these electronic bulletin boards for fun.

You can leave messages, people sell things (not businesses), and there's a wealth of Public Domain software. Why is there Public Domain Software?

## THE AMERICAN DREAM

Many computer engineers find that they have special needs and so they write sophisticated programs.

Since they aren't in business, they place these programs on bulletin boards for everyone to use. That way their name gets known and everyone benefits.

In other cases, programs are developed at universities or under government grants where sale is prohibited.

Another class of programs called Freeware is released to the public for limited use. Along with the program is a request for contributions if you like the program.

It's totally up to you, but if you like the program and some guy spent 5 months writing it, usually sending him \$10-\$25

will get you an expanded version, some new documentation and his undying love and gratitude. But it's up to you.

Imagine programs that let you track your stocks, generate forms, play solitaire, golf or sail, make your computer into a piano (wow!), diagnose the speed and accuracy of your computer, rename and re-sort directories and much more. **BUT PEOPLE ARE MAKING MONEY**

It's OK to copy these programs for yourself and you are actually encouraged to make copies for friends. This way the software really gets spread around.

But, there's a loophole that allows you to make and distribute copies and to 'recover distribution costs'.

Well, now there are companies making money (by downloading free programs and selling them to you for \$3 to \$6) on the backs of these generous programmers who have actually done the work.

So, if you pay \$3-\$6, is it a rip-off, or is it still a good deal because the software is obviously worth many times the price? It's up to you to decide.

## ENTER DAK

OK Martha, here's the catch. No, there's no catch. You don't have to buy 10 tapes or disks. You don't even have to buy a modem from DAK.

Of course, you'll need a modem, but you can even borrow a friend's and both benefit from the great software.

I started DAK as a hobby 22 years ago when I was a student at UCLA. And, I've tried to keep it a hobby ever since.

So here's what I'm going to do. I want you to have all the productivity, and yes fun, you can with your computer. So I've put together two packages so you can vastly broaden your computer's use.

# Computer Floodgates ON SALE

You'll be deluged with free programs, information and incredible entertainment when you connect these Hayes Compatible 1200 baud auto-answer/auto-dial modems to your computer, at DAK's smashing new \$79<sup>90</sup> and \$69<sup>90</sup> prices.

By Drew Kaplan

Get ready. If you're just using your computer for word processing or spread sheets, boy, have I got a surprise for you!

With a modem, you can dial any of the thousands of electronic bulletin boards across the country and download (I'll explain in a minute) programs that will literally knock your socks off.

And forget expensive long distance calls. With thousands of electronic bulletin boards, there are likely to be several right in your own area.

## FREE FREE FREE

I just printed out a 10' banner for my son's birthday. The program prints on any printer, daisy wheel, dot matrix or ink jet. Wow, and it was free.

I'm really enjoying three action video games (without joysticks). In Striker, a helicopter game, I have to pass through enemy territory to recover my spies, get supplies and more. I haven't won yet. In Beasts, I keep getting eaten, and in Pango, well, it's arcade action at its best.

I've designed forms using a form pro-

gram. I've compared my Visual Computer's speed to a true PC (100%), and an AT Clone came in over 600% faster.

If you're like me, whenever you type a DOS command and make a mistake you get frustrated.

Well, there's a program that not only remembers your last few entries, it lets you use the up arrow to retrieve them and you can edit them without retyping the entire line. Great!

What you're reading about is the wonderful world of Public Domain Software. From File Utilities to Diagnostic and Debugging to Multi-Tasking, you'll find thousands of programs to experiment with.

And, you won't be alone. Enclosed with your modem will be step by step instructions on how to use the bulletin boards.

So, don't be shy. Get your feet wet. Once you're on-line, everyone is friendly and glad to help.

## PHONE LINE BLUES

So, you don't have a spare phone line? Don't worry. You can use your regular phone line. You won't hurt it at all.

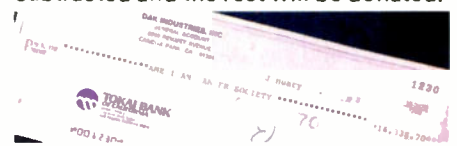
I have a list of 2,000+ electronic bulletin boards. AND, I've packed a ton of the great programs from the bulletin boards for IBMs and clones onto two (2) disks, to show you a little of what you'll find.

## AMERICAN CANCER SOCIETY

Unfortunately I can't afford to give you everything for free, but look at this. I'll send you the list of 2,000 electronic bulletin boards for \$2 (\$1 P&H). Order No. 4888. And/Or two (2) disks full of programs for \$3 (\$1 P&H) for both disks. Order No. 4889. Ca add tax.

DAK will donate to the American Cancer Society all proceeds from the sale of the List and Disks beyond the cost of producing and distributing them.

And what's more, the cost of this 'ad' will NOT be included in my costs. So, the disks, the duplication, the printing, the typing, packing and postage etc., will be subtracted and the rest will be donated.



You're the greatest. Here's the first check you made possible for DAK to donate to the American Cancer Society. And, it only represents your efforts through December. Everyone wins. Thousands of you are on-line. The Cancer Society is thrilled and I feel great.

## URGENT, DON'T CALL DAK

I've set up a special P.O. BOX for this service. Send your order with checks only (no cash or credit cards) with the words 'LIST' and/or 'DISKS' to DAK, P.O. BOX 3045, Canoga Park, CA 91306.

Please, no phone orders or phone inquiries. All information must be handled through the P.O. BOX. Even if you order anything else from DAK, these items still **MUST** be ordered separately.

## HAVE I LOST YOU YET?

First, I may have hit you with some 'Jargon' that isn't familiar. Well have no fear. Everything will be explained with your modem, but look at this.

An Electronic Bulletin board is nothing more than a computer, just like yours, hooked to an auto-answer modem.

Instead of word processing software, it runs a bulletin board program and has lots of storage capacity. Simple?

I mentioned downloading. Well, it's simply like bringing up a program from your own floppy or hard disk.

All you do is use your modem to connect you to the bulletin board and then when you download, you're bringing a file from the bulletin board's hard disk to your own computer. The distance may be great, but the principal is identical.

## INFORMATION FOR EVERYONE

For stamps, coins, soccer, football, American Indians, chocolate, coffee, mortgages, banking, ulcers, steel production and more, the information is . . . Next Page Please



...Computer Floodgates Continued instantly available and often free.

### PAY PAY PAY PAY

No, it's not all free. There's lots of information that you can buy. It's like an electronic bookstore. And, it's great.

When I buy stocks, I want to know about the company. Now I can get the inside information instantly by using my modem. I can get the Company profile, SEC filings, officers' names and salaries.

So, now I can check out companies that I do business with or that compete with me. With a modem, you can instantly read or download complete information on over 9,000 public companies.

### SO MUCH MORE

If you write, you can send your copy by modem directly to typesetters. Want a date? There are matchmaking bulletin boards. What fun. Most of these boards seem to be free. But, some are X rated.

### INTERNAL OR EXTERNAL MODEMS

There are two types of modems. Internal modems can be plugged into the slots of your IBM PC or clone.

External modems can be connected through the serial port of any computer.

The internal (plugged in) modem is less expensive because it doesn't require a separate power supply. The choice is yours. Operationally they are identical.

### MODEM PHYSIOLOGY 1A

I call these modems 1200 Baud Smart Ducks. Because, IF they walk like a duck, sound like a duck, and look like a duck, they darn well better act like a duck. And, these Hayes Compatible 1200 baud auto-answer/auto-dial, tone/pulse modems are great ducks.

Hats off to Hayes. They've just about written the book on specs and protocol for the 1200 baud modem market.

Every professional modem bills itself as 'Hayes Compatible'. But the big question is, how much does it really cost to make a top-of-the-line 1200 baud modem? Or, who's getting rich?

For DAK's new breakthrough prices of \$79<sup>90</sup> and \$69<sup>90</sup>, you'll not only be getting ducks that quack properly to Hayes modems, but sing like nightingales.

### DUCK SOUP

I owned a Hayes 1200 baud modem for about 4 years. I just unplugged it and plugged in BSR's to operate my Hewlett-Packard terminal which I use at home to monitor DAK's computer.

The only differences I noted were improved monitor sound, more screen displays and a help menu. And, oh yes, one last extra. I use a few local data bases whose phone lines are always busy.

Well, BSR's intelligent modems in combination with our bonus modem programs recognize busy signals, hang up and keep retrying the number.

### 1200 BAUD POWER

These modems will communicate at 1200 baud (about 120 characters per second) or 300 baud (about 30 characters per second) automatically.

They come with modular phone cords that simply connect to any standard mod-

ular jack. And, they use standard Bell 103 and 212A protocols. (Don't worry.) They operate in half or full duplex.

Built-in microprocessors let you automatically answer incoming (auto-answer) calls and act on all Hayes commands.

### WHY SO CHEAP?

BSR's made modems under both the ADC and BSR name in the Capetronic factory. Using three names wasn't very clever



marketing. And, they are now stuck with small quantities of each brand.

They have the exact same parts from the same factory. And, they have the same 1 year limited warranty. We bought all three. And, as long as our limited supply lasts, you can save a bundle.

### HOOKING IT UP MADE EASY

The internal modem is IBM compatible. The external modem can be used with any computer with a serial port.

If you own an IBM PC or a Clone and if you choose the external modem, you'll probably find an RS232C serial port built-in. All you need is our cable and the modem program on disk, which we've packaged together for just \$19<sup>90</sup> (\$3 P&H). But, before you order a cable, you may need a short sex education course.



Sex Education 1A. You need to determine whether your computer's RS232 connector is male or female.

If you look at the picture above, you'll



note that BSR's RS232 Modem connector has holes going in. It's a female. If it had copper pins sticking out, it would be a male. Now wasn't that simple?

So, if yours is female, order our male

cable Order No. 4353. If you have male pins sticking out, order our female cable, Order No. 4354. With either cable you'll get a great free modem software bonus.

For your Apple IIC, your serial interface is built-in. All you need is our cable and modem program on disk. They are just \$19<sup>90</sup> (\$3 P&H). Order No. 4356.

For your Apple IIE, you'll need a serial interface with an RS232 port, a cable

and a modem program. It's all yours for just \$69 (\$4 P&H). Order No. 4357.

### EVERYTHING YOU'LL NEED

### 1200 BAUD SMART DUCK

### RISK FREE

For business or pleasure, you'll communicate, gather information and save time. If you aren't 100% satisfied, simply return it in its original box to DAK within 30 days for a courteous refund.

To Order Your BSR/ADC/Capetronic External 1200 Baud Intelligent Auto-Answer, Auto-Dial Modem risk free with your credit card, call toll free or send your check for DAK's market busting price of just \$79<sup>90</sup> plus \$6 P&H. Order No. 4955. CA res add tax.

To Order Your BSR/ADC/Capetronic Internal 1200 Baud Intelligent Auto-Answer, Auto-Dial Modem with bonus modem software risk free with your credit card, call toll free or send your check for DAK's market busting price of just \$69<sup>90</sup> plus \$6 P&H. Order No. 4951.

It is said that knowledge is king. With the information you can acquire through a modem, you'll have the informational power of 10 kings. And, you'll have a full range of entertainment thrown in.

Hayes, IBM, and Apple IIE & IIC are registered trademarks of Hayes Microcomputer Products, International Business Machines and Apple Computer.

### PRICE SLASHED

The External Modem was \$169

DAK slashed it to \$119<sup>90</sup>

Now you can have your choice of an external or internal modem. You'll have EVERYTHING you'll need to get on-line as soon as it (and cables with the external modem) arrives. Wow, all for just \$79<sup>90</sup> or \$69<sup>90</sup>.

### THE EXTERNAL MODEM

NOW JUST \$79<sup>90</sup>

Use Order No. 4955 plus (\$6 P&H)

### THE INTERNAL MODEM

NOW JUST \$69<sup>90</sup>

Use Order No. 4951 plus (\$6 P&H)



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8200 Remmet Ave., Canoga Park, CA 91304

# 15" Thundering Subwoofer

Man's best friend meets the audiophile's best friend at an earthshaking bone jarring new price. Now you can add the impact of a 15" subwoofer to any stereo system for just 99<sup>90</sup>.

By Drew Kaplan

A puppy may be man's best friend. Woof, Woof. . . But, now I've got a new friend you can add on to your stereo system. It doesn't need to be taken on walks, washed or fed. But, it makes a great cocktail table for you when you're being fed. And, oh what a woof it has.

## GREAT SOUND FOR EVERYONE

It's called a subwoofer. And, normally it is the beloved pet of only the most ardent audiophiles.

It's not generally understood that it can be used with virtually any speaker system in any stereo. And, in addition to substantially increasing and perfecting the bass response, it has a significant impact on the mid-range clarity too.

Before I tell you exactly how marvelous your stereo will sound when you connect this subwoofer to it, there are two things you should know.

**First**, you'll be getting your new friend at a phenomenal price. DAK has sold over 10,000 of Cerwin-Vega's 12" subwoofers. They had a retail price of \$332, but we sold them for \$164<sup>90</sup>.

**Second**, your new friend comes complete with a paid up health insurance policy in the form of a 2 year limited warranty from its father, BSR.

By the way, the puppy sitting on top of the subwoofer is the same puppy I used with Cerwin-Vega's, but wait till you hear what's under him now. You'll have BSR's 15" massive infusion of explosive bass, added to your system for just \$99<sup>90</sup>.

**But don't be misled.** BSR bass is clean and tight; never sloppy or overpowering. It adds a feeling of depth and fullness to your music that you simply can't get with two or 3-way speaker systems.

## HERE'S WHAT IT DOES

Basically, the problem with most speaker systems is that the bass overpowers the system. In a 3-way system, a woofer may be crossed over at about 800hz. And, in a 2-way system as high as 3000hz.

So, the woofer must handle movements of up to an inch at frequencies below about 80hz, while at the same time attempting to reproduce the very fine vibration type movements of the mid-range frequencies.

It is this difference in movements that causes both the bass to be weak or not precise, and the mid-range to become muddy (intermodulation distortion).

Even the best 3-way systems fall prey to these problems. And, it's why a subwoofer can do so much for your mid-range clarity as well as your bass.

## PROBLEM SOLVED

BSR's subwoofer has a specially engineered crossover network that sends frequencies above 120hz to your regular speakers and reproduces just the mammoth movement frequencies from 120 hz down to 22hz with a special floor firing dual wound super subwoofer.

If you have downstairs neighbors, this subwoofer isn't for you. The woofer is a very special hybrid. It has a mammoth one and one half inch voice coil which allows the speaker to make the very large



movements required to reproduce the very low frequencies.

But, it would do a lousy job of reproducing mid-range, which is why, cost aside, manufacturers don't put big voice coils in normal 10" or 12" woofers.

To make the massive movements accurate, this woofer has a very large magnetic structure. This magnetic structure also makes the subwoofer system extremely efficient. (The sensitivity is 91.5 db at 1 watt at 1 meter.)

So, whether you have two or three-way speaker systems, with 8", 10" 12" or even 15" woofers, you'll find the sonic improvements staggering.

You'll hear and feel the awesome effect of thunder rumbling through your home. You'll hear a depth and dramatic fullness to your music that won't be heavy but will thrill you with its massive strength.



Here's a 'floor's eye view' of the subwoofer. You'll feel and hear bass so alive, you'll think it is.

## EASY HOOKUP

It's easy to connect. Simply run the right and left speaker wires from your amplifier to the input terminals of the subwoofer. It works with any system from 20 to 150 watts per channel.

Then, you simply connect the speaker

wires from your two standard 8 ohm stereo speaker systems to the output terminals on the subwoofer. They receive the exact signal that they did before except that everything from 120hz down is routed only to the subwoofer.

Placement of your regular speakers is just as critical as usual for stereo imaging, but the subwoofer can be placed anywhere because low frequency material is totally non-directional.

The subwoofer makes a perfect cocktail or end table. Its rich wood-tone appearance matches any decor. It is 24½" long, 16¼" high and 20" wide.

## TRY AUDIOPHILE'S BEST FRIEND RISK FREE

The fullness, richness and depth is awe inspiring. Wait till you connect this subwoofer to your system and experience truly massive force from your music.

If you aren't 100% satisfied, simply return it to DAK in its original box within 30 days for a courteous refund.

To order BSR's Thundering Subwoofer with its dramatic 15" Dual Wound Voice Coil Subwoofer risk free with your credit card, call toll free, or send your check for DAK's breakthrough price of just \$99<sup>90</sup> (\$14 P&H). Or. No. 4514. CA res add tax.

You can't replace the love and softness of a warm puppy. But, wait till you experience the richness and depth this subwoofer will add to your bass and the clarity you'll hear in your mid-range.



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# Sounding Off



*An Interview  
With Stan Curtis  
Of Cambridge Audio  
By Gordon Brockhouse*

Stan Curtis's interest in audio dates back to his days as a free-lance musician playing guitar, bass, keyboards, and tenor sax for various rock groups. His musical activities eventually took him into the recording studio, but, in the late '60s, Curtis abandoned his musical career to become chief engineer for the British importer of Studer Revox.

A few months later, his employer purchased Cambridge Audio, a young company that had developed a novel amplifier that Curtis characterizes as the "first transistorized amplifier to work properly." After buying Cambridge Audio, Curtis's boss made him technical director of the firm, but Curtis left in the mid-1970s to become a free-lance electronics consultant and a contributor to British audio magazines.

In 1984, after Cambridge Audio had fallen on hard times, an opportunity arose for Curtis and his wife to buy the company. "Having been there at the very beginning of the company, and then gone away, I always had an emotional attachment to it," he recalls. "I'm rather like the boss of Remington: I liked the company, so I bought it."

Curtis is now technical director, and Cambridge Audio has, in four years, come from "basically nothing" to \$4 million in annual sales. Historically, the company's strength has been midline amplifiers and preamps, but at the 1985 Winter Consumer Electronics Show, Curtis startled many observers by showing a \$2,500 two-box CD player. Last fall, the company introduced the 16-times-oversampling CD-2 at \$1,700. And, at the 1988 Winter CES, Cambridge introduced the CD-1 Series Two, a "32-bit," 16-times-oversampling player expected to sell for \$3,500. Cambridge Audio products are handled in the U.S. by Celestion Industries, Inc., of Holliston, Massachusetts.

**GB:** *Until a couple of years ago, Cambridge produced midline amplifiers and preamps. What inspired you to introduce no-holds-barred CD players?*

**SC:** It arose because I was convinced digital recording could work. I've listened to dozens of digital master

tapes at Decca Studios, and they're very good. Nonetheless, the average CD player didn't sound very good three years ago. I spent a lot of time trying to produce a CD player that would be a good [music] source so that I could evaluate what was going on as I made changes to amplifier de-

signs. The end result was the CD-1—one only—and I brought it to the CES to demonstrate my amplifiers. People who heard it said immediately, "I've got to have one." So we threw it into production with virtually no changes. We've been back-ordered ever since.  
**GB:** *What inspired this interest?* ▶

*What do you think was so radical about the CD-1?*

**SC:** We started with the best transport we could find—the Philips high-end transport. If you're producing something like 35,000 transports a day, as Philips does, they come off the line on a statistical Gaussian curve. Some are good, some are all right, and some are a bit marginal. We knew what specifications they should work to, and we adjusted each one to be "bang-on blueprint." We developed a device to count digital errors, which we later put on sale. This let us adjust the mechanism *in situ*, such that the reading errors of the test disc fell to a minimum.

We developed a dual suspension at a time when suspensions were hardly considered in CD-player design. And then we came to the conversion stages. According to dynamic measurements we made, even the best [digital-to-analog] converters [DACs] had about 14 bits of linearity. Bits 15 and 16 were a bit unpredictable. So we designed our own system with three converters per channel. That gave us better than 18 bits of linearity. To this day, you can measure the output level of -90 dB off a test disc with a CD-1, and it will be within 0.4 dB of the mark—the merest fraction of a bit.

There was also an option. The Quality Assurance (QA) module will show you the number of uncorrected errors on the disc, the number of corrected errors, the number of drop-outs from pinholes and manufacturing defects, the number of scratches—these sorts of things.

**GB:** *How audible are these errors?*

**SC:** If you correct them completely, there is no sonic effect, because you've replicated the missing data exactly. But with large numbers of errors, the sound becomes noticeably harsh. Linear interpolation, which is used to correct gross errors, is essentially dot-joining. You have good information here and good information there, and you connect the two. This changes the harmonic content: You're increasing high-frequency harmonics when you get these interpolations, and the sound harshens.

**GB:** *What did the QA device reveal*

*about the variation in pressing quality of different CDs?*

**SC:** It revealed a lot. We have found that certain manufacturers consistently achieve a higher standard than others. This could be either a better manufacturing standard or a QC [quality control] standard. With hit-parade successes, we've found that you've got a very high risk of buying a poor disc. As in vinyl pressing, the injection molds are working day and night to meet customer demand. It does seem, from our measurements, that the molds run longer than they would under ideal circumstances.

**GB:** *What has the QA module told you about the effectiveness of CD cleaners and about accessories like rings and mats that one attaches to CDs?*

**SC:** When a disc is soiled, the number of errors shoots up; when it's cleaned, the number of errors should shoot back down. We've only come across one cleaner that does that. Many of the disc cleaners sold as \$10 accessories do more damage than good. They put a lot of small scratches on the surface that you'll never get rid of.

On our players, I've yet to find a damping ring that has any benefit. One manufacturer of a particularly massive damping disc pointed out to me how the flywheel effect gives excellent speed stability. I was absolutely appalled, since this person was a so-called designer. With a CD, you [need] constant linear, but not rotational speed.

**GB:** *How did you come to build the CD-2?*

**SC:** Our amps start just below \$500 and go up to \$1,500 for the most expensive—a pair of mono 250-watt amps. So, at \$2,500, the CD-1 didn't represent our normal price point. We had a great demand for a low-cost player, and we wanted something that would achieve very high performance without any adjustment.

From our work with the CD-1, we knew that one stage in every CD player has a terrible effect on the sound—the integrator stage. When the signal comes out of the converter, it's effectively a stepped waveform. You get rid of all the rough edges through an integrator. You have a choice of

either a little integration—in which case you get harsh sound but plenty of detail—or plenty of integration, which gives you a very smooth top end but no detail. So we wanted to get rid of the integration stage.

I had the idea of going to eight-times resampling, because then we could use a simple analog filter. I got that to work with a lot of struggling. Then my wife, who is our marketing director, said "16 x 16" has a lovely ring to it. We're not in the numbers game, but there's a certain appeal there.

The main advantage of 16-fold sampling is to change the effective sampling rate from 44.1 to 705 kHz. That's way up in the AM-radio-station area, and you've got 16 tiny steps instead of one. The waveform out of the converter is virtually smooth instead of being a jagged stepway. The spurious frequencies are up at 705 kHz, so the simplest filter—a passive, small-value capacitor—gets rid of them. And that's all you need. You come straight out of the DACs and add a coupling capacitor to the output jack! There is nothing else. What's better than the finest analog stage is no analog stage.

The key thing about the CD-2 is that it's entirely digital, with no adjustments. You make them, and they will either work or they won't. If they work, they'll work identically.

**GB:** *How were you able to get the CD-2 to handle such high data rates?*

**SC:** It's not without problems. Converting at that speed has not been done till now. We had to use four converters per channel, eight in total. Sample 1 hits the first converter, sample 2 the second, and so on. Then sample 5 comes back to the first converter. So the converters are working at the speed normally associated with a four-times-oversampling machine, but, having four of them, we can resample 16 times.

**GB:** *The new CD-1 uses 32-bit processing and 16-times resampling, as you call it. Are you playing a numbers game here, or are there real sonic benefits? And how do you get 32 bits of data from a 16-bit source?*

**SC:** To do any processing with a 16-bit

# MATRIX 801

WE'LL CHANGE YOUR IDEAS

S E R I E S 2

B&W's Model 801 – the recording industry's Reference Standard Monitor – was the inspiration for innovation. Dramatic developments in technology and enclosure design have lit the fuse. B&W's Matrix 801 Series 2 personifies the state-of-the-art ten years on. This magnificent successor sets the new standard for professional and home user alike. With no commercial compromise. Rich in Matrix technology, 801 Series 2 registers accurately even beyond audibility. Phenomenal sound. Clean and utterly uncoloured. Outstanding imagery with tight unbooming bass. An instrument destined to occupy a special place in world esteem.



*The* **MATRIX**  
*Revolution*

piece of data, you need more than 16 bits of processing power. Digital filtering occurs by multiplying a 16-bit sample by another number called a coefficient. If you multiply a 16-bit word by another 16-bit word, the answer is a number with more than 16 bits. But if you only have 16 slots, the extra digits fall off the end; they're rounded off. With average music content, we found that we needed 24 bits to ensure that none of the calculations were rounded.

So we built a proprietary 32-bit digital filter using 40-bit registers. We now have a digital filter that takes 16 bits and produces 32-bit sound. We have produced no new information; we've just put that information into another format because of the calculations we've done. If we don't put it into a different format, it's gone forever.

Having succeeded in obtaining 32-bit words from the filter, we needed a 32-bit DAC to convert them. No one had ever made a 32-bit DAC. So we developed a proprietary 32-bit DAC. It's not a great 32-bit DAC—by the time you get to bit 27, it's not very good at all. But we needed a good converter of at least 24 bits, and this is what we got. The first 25 bits are converted with no errors. After that, it's a bit dodgy, but we haven't got any useful data there, so you don't have to worry. Furthermore, we wanted to avoid going back to analog stages, so again, we used 16-times sampling. We finished up with eight 32-bit DACs. That's a lot of DACs.

Where we thought the CD-2 gave out a lot of information, the new CD-1 has revealed another layer of information. It's shown us that high-end audio enthusiasts should not write off the CD system until we reach the point where we've heard everything on the disc.

**GB:** *Given the limits of the CD system itself, are there limits as to how far you can go with the player in extracting that information? Is there information there that a 32-bit 16-times player will not extract?*

**SC:** There is something further we can do, which costs a lot of money and which we may introduce later in the year. That's really going to the abso-

lute limit in getting the information off the disc. But with the new CD-1, we're close to getting everything. And when we get to the point where we reproduce the disc exactly, we have to look at the original recording. I believe the system is capable of development.

The work we've done on CD is going to find its way into other products. We already have a DAT machine on the bench, but we don't plan to produce it soon. We'd rather let the big Japanese corporations sort out the politics.

Again, our prototype DAT machine uses a 16-times system on playback, but we've also done something radical on the recording side. If we're getting rid of all the analog filters on the playback, let's not have them on the recording side, either. So we use a 16-times-oversampled recording system. We record at a 768-kHz sampling frequency, so we don't need filters. So, unless your microphone is picking up radio stations, there's nothing to worry about.

However, we finish up with a vast amount of data—16 samples for every one we need. There's no room on the tape for all of it, so we have a processing chip that averages every 16 samples into one. We put that average sample on tape. We finish up with the same 16-bit word on tape, but we've avoided any filtering. It's compatible with everyone else's hardware, but we've added another layer of transparency.

**GB:** *Do you have any plans to build digital preamplifiers? All your CDs have digital outputs. Do you have any plans to exploit them?*

**SC:** We already have amplifiers that are entirely digital back at the plant. We take the input from a CD or DAT machine in raw digital form and then do balance, volume, tone control, and mild room equalization entirely in the digital domain. The signal is then fed to a DAC system built into the power amplifier.

We have these amps running, but I don't think the market will be ready for a few years. By then, we'll have DAT and CD, direct satellite broadcasts in digital format, and perhaps HDTV broadcasts with digital audio.

**GB:** *What will be the sonic benefits of doing signal processing in the digital domain?*

**SC:** You can do things that would not be acceptable in analog. Not long ago, I demonstrated a rumble filter that came in at about 17 Hz and fell off the edge of a cliff below that frequency. It was absolutely flat to 17 Hz, and at 15 Hz there was nothing there. Among many experienced listeners, no one heard it. Building an analog filter to do that is very difficult, and it would have had a horrendous effect on the sound quality.

Similarly, you can make tone controls that alter the sound only in the way intended by the listener. Even the best potentiometers degrade the sound. To get the signal across a block of carbon to a piece of metal scraping the carbon will inevitably cause degradation. To emulate the tone controls in the digital domain, all we're looking at is a mathematical exercise. Take a 16-bit number, multiply it by another number, and finish up with a third number, which is the output. We avoid all the degradation caused by additional circuitry, the limits in components, the colorations in capacitors, etc.

**GB:** *Digital processing, then, will eventually enable you to get superb results in a cost-effective manner.*

**SC:** I've always had to design equipment to be sold at sensible prices. I see no great skill in designing a power amp that sells for \$5,000, because if you can't make a good one—when you're spending that sort of money on the parts—you shouldn't be calling yourself an audio designer.

I've done circuits for some Far Eastern companies where they give you a bill of materials of \$30 and tell you to make it sound good. You actually question whether to use two inches of wire or five inches, because you save money if you use two inches. You question the effect of every component you put in, because you don't want many of them. Coming from that background, I tend to look for a more elegant way of doing things. □

*Gordon Brockhouse has been an editor of Canadian audio and computer industry trade publications.*

# How a 77-year-old became the first name in digital audio.

Denon has been involved in every phase of music reproduction since the days of wind-up record players. So after seven decades of breakthroughs in studio recording, disc pressing, home audio and professional recording equipment, we were uniquely prepared to take the next step. A tape recorder so fundamentally different, it would ob-



DENON STUDIO A: ALL OUR COMPONENTS REFLECT LESSONS LEARNED IN THE RECORDING STUDIO

solete every previously accepted notion of how good recorded sound could be.

In 1972, Denon researchers achieved their goal. The world's first digital recorder worthy of commercial record production, the legendary Denon DN-023R. We quickly put our digital innovation to use, producing digital processors, digital editors, digital



WHAT OTHER AUDIO COMPANY HAS THESE CREDENTIALS?

mixers, and the world's first digitally-recorded LPs.

Today, Compact Disc players, regardless of brand, reflect the influence of the original Denon DN-023R. But this heritage runs strongest in CD players from

Denon. Because the same engineers who design Denon pro machines design Denon home audio. And the same ears that guide Denon recording sessions evaluate the sound of Denon playback components.

***"One of the most finely engineered pieces of audio gear on the planet."***

Ken Pohlmann,  
Digital Audio, on the DCD-3300

For example, the digital-to-analog converter found in every

But Denon occupies an unusual position in the digital audio world. They (Nippon Columbia, in Business-Speak) are one of the few companies to engage in all three industries that bring digitally recorded music to your ears: digitally mastered recording (on their own label), digital pressing (on Denon and Compact Disc pressing plants), and CD player manufacture (all shares that function similarly in the industry as does Denon). Which you list first is a Denon recording on a Denon disc, through a Denon player, you're hearing exactly what Denon intended.

they've variously hailed our CD players as "a winner on every count," "the player I recommend most highly," "superlatives have to be used," and "in several respects, the best I've ever heard."

Reactions which simply demonstrate one point. It's a lot easier to make audio sound like music



THE NEW DCD-1500II ITS SUPER LINEAR CONVERTER COMES STRAIGHT OUT OF DENON STUDIO RECORDERS

Denon CD player comes directly from Denon studio recorders. Unlike conventional designs, Denon's Super Linear Converter detects and corrects D/A transfer distortion.

Perhaps that's why each succeeding generation of Denon CD players is eagerly anticipated by the world's audio critics. And why

***"A look into the interior of this player reveals that Denon engineers were not taking any shortcuts whatsoever."***

Germany's Hi-Fi Vision,  
on the DCD-1500

when you really know what music sounds like.

# DENON

DESIGN INTEGRITY

## Swiss Mix

The B-250 integrated amplifier (\$2,000) and the matching B-260 FM tuner (\$2,000) are distinctively Revox in both design and function. Virtually all of the operating parameters for each component can be programmed by the user.

What's to program for an integrated amp, you ask? Among other things, the input-sensitivity levels for all sources, a choice of three phono-input loads, and the maximum power-output limits for two different pairs of speakers. As for power, the B-250 is rated at 100 watts (20 dBW) per channel into 8 ohms and 150 watts (21.8 dBW) per side into 4 ohms, with more short-term power available on peak signals.

Revox's programmable design really comes into its own in the B-260 FM tuner (that's right—no AM). Here, reception characteristics can be tailored for individual stations, 60 of which can be preset—along with an alphanumeric designation—in six ten-slot banks. Among the parameters are two levels of stereo blend, complete mono, and a wide or narrow IF bandwidth. The output level of each station can be set as well. But perhaps the most significant features of the B-260 are its two antenna inputs, either of which can be assigned to a particular preset station. There

are two ways to use these: You can connect two FM antennas with different orientations and assign the one that delivers the best signal (a sort of manual diversity-tuning approach), or you can hook up a different source to the second antenna—say, a cable company's FM feed.

The B-208 infrared remote (\$160) operates both the amp and the tuner. It is similar to the company's B-205

remote, but covers some of the additional features on the new components. Coming toward the end of this year is the B-200 outboard video switcher, which will endow the B-250 amp with additional remote-controlled switching options.

For more information, contact Revox Div., Studer Revox America, Inc., 1425 Elm Hill Pike, Nashville, Tenn. 37210.



*Revox's B-260 FM tuner can preset 60 stations and their reception modes.*



*Operating parameters can be programmed into the B-250 integrated amp.*

## Way Down Under

From New Zealand comes Perreaux's most prodigious power amp, the model PMF-5550, rated at 500 watts (27 dBW) per channel into 8 ohms.

The amp operates Class A to 50 watts (17 dBW) a side, beyond which it shifts to Class B. As you might expect, massive heat sinks are necessary to dissipate the thermal energy generated by Class A operation. The 5550 is handcrafted from components that are individually selected, calibrated, and matched. Retail price is \$4,295.

On a smaller but certainly not modest scale is the PMF-2350, rated at 200 watts (23 dBW) per channel. Replacing the less powerful PMF-1850 while maintaining the same

\$1,895 price, it operates Class A to 20 watts (13 dBW).

For more information, contact Perreaux, 4701 Hudson Dr., Stow, Ohio 44224. □



*Perreaux's PMF-5550 amp*



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MG-2.5/R  
wins my  
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...for the (1987 Summer CES), providing a real high-end listening experience for \$1,550 pr."

*High Fidelity  
September, 1987*

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*Hi-Fi News &  
Record Review  
December, 1987*

"...the musical performance is definitely superior to that of direct competitors ... speed and precision are strong points of these new speakers."

*Suono  
December, 1987*



**MAGNEPLANAR® MG-2.5/R**

**||| MAGNEPAN**

1645 Ninth Street  
White Bear Lake, MN 55110

\* Speaker photographed with magnetic structure removed.



## In speakers as in cars, the make is everything.

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# VIDEO IN LIMBO

BY GORDON BROCKHOUSE



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The state of home video technology as revealed  
at the January Consumer Electronics Show

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**A**s with all branches of high technology, consumer video hardware has thrived on change and innovation. But right now, an uncertain anticipation prevails in home video. In the past few years, technical developments have occurred at such a breakneck pace that you'd think business would be booming—but it isn't burgeoning as in the recent past. The small number of significant new video products shown at this year's International Winter Consumer Electronics Show (CES) in Las Vegas reflects not so much a decline in engineering creativity as problems with the software end of the business.

Will the new formats (Super VHS, ED Beta, CD-V singles) succeed, or will they end up in the consumer-electronics scrapyard? While technically impressive, the new hardware developments require software to catch on. Can these formats engage public interest before the next big waves in consumer video—digital video recording and high-definition television (HDTV)—wash over them?

Although HDTV and true digital video recorders won't be available until the '90s, you won't have to wait that long for higher-quality viewing. The past year's advances haven't all been in blue-sky products, and there has been progress that requires neither

junking your entire video-equipment investment nor a complete rewriting of the NTSC video signal standard (as some HDTV systems would require).

For example, progressive-scan (noninterlacing) monitors are touted as providing improved pictures with standard NTSC signals, while maintaining the standard MTS sound capability and the NTSC 4:3 aspect ratio. At January's CES, Toshiba demonstrated an advanced noninterlace TV, the Improved Definition Television (IDTV), that detects whether a picture is still or moving, then chooses the appropriate means of scanning the image. For still or slow-moving images, the unit uses the otherwise smear-prone field-memory double-scanning. With it, a field ( $\frac{1}{60}$  of a second) of video information is stored in memory so that a full frame—composed of information from the current and previous fields—can be scanned at 60 Hz, twice its normal rate. For rapidly moving images, line-memory double-scanning is used to prevent smearing. Demos comparing it with Toshiba's previous progressive-scan set (the CZ-2697) showed that the IDTV provided a significantly better picture. It was not, however, immensely better than a good standard monitor (progressive-scan has so far proven to be a minor advance). The IDTV is slated

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*NEC's AVX-910 has extensive audio-video switching facilities as well as digital video noise reduction.*

for October delivery, and other manufacturers may be planning noninterlace sets for late '88. Mitsubishi, Panasonic, and Sony have all displayed such units at other industry trade shows.

Without going through the trouble or expense of replacing your monitor, you can obtain improved image quality with two new video accessories from Multivision. Its MVip video detail processor (\$219), incorporating technology licensed from Yves Faroudja and similar to the detail-enhancement technique used in VHS-HQ decks, increases apparent detail in both horizontal and vertical directions without deleterious visual side effects. Multivision's MVnx video noise reducer (\$199), said to be the first such outboard device, treats the low-level components of the signal and, according to the company, is effective against snow and ghosts.

## PICTURE PROCESSING

Taking a hint from Multivision's earlier outboard picture-in-picture (PIP) accessories, virtually all of the major manufacturers are applying digital technology to their video products. Some of these devices merely manipulate images; others improve them.

Falling into the latter category are the three NEC VCRs (the DX-2500, DX-3500, and DX-5000) that incorporate various forms of digital video noise reduction. This is accomplished by adding information from current and previous video fields. The process entails a trade-off between noise reduction and the smearing of fast-moving objects; it is performed differently with each model. The company's AVX-910 audio-video switcher incorporates a version of it. At the CES, NEC showed a Super VHS model incorporating

an extended-bandwidth digital video noise reduction system, the DS-8000 (price not available). As demonstrated, the new VCR made significant improvements in the picture noise that otherwise still plagues S-VHS recordings.

In the past year, almost every major video manufacturer has introduced VCRs and TV sets with a variety of digital picture-manipulation functions. The precise mix varies from model to model, but common features include PIP, strobe, off-air still frames, PIP channel scan, and digitally clean special effects (still frame, slow motion, etc.). Some features are genuinely useful. Digital indexing, for example, compiles an illustrated table of contents at the beginning of the tape, consisting of the first frame of each of nine index-marked video segments. Another useful feature, offered by Fisher and by Sanyo (in the latter's \$1,000 VHR-8700 S-VHS VCR), is Digital Memory Signal Search, which provides comprehensible audio during forward and reverse high-speed searching.

## SUPER VHS

Decks like the Sanyo VHR-8700 incorporate the most important video technology introduced in 1987: Super VHS. By an in-

crease in luminance bandwidth of 60 percent, S-VHS machines are said to offer horizontal resolution of more than 400 lines and a video signal-to-noise ratio of 46 dB. Even though the system's actual performance seems to fall short of these claims, it is still a decided visual plus. S-VHS technology therefore garnered immediate support from many hardware manufacturers. Decks and camcorders for the format are available from most of the major Japanese camera and electronics manufacturers.

But while manufacturers rushed to provide S-VHS product—and despite very favorable reviews of the system—consumers have been quite patient. 3M, which first developed the special tape employed by the format, has backed off on earlier sales projections for S-VHS: The new technology will account for only 5 percent of VCR sales in 1988, not 20 percent as predicted last June. 3M cites huge inventories of conventional machines yet to be sold, but the high cost of S-VHS products is also a factor. All S-VHS machines are high-end models with Hi-Fi sound, multiple heads, and many other bells and whistles, and they're priced accordingly (as is the high-performance tape).

Another factor holding back S-VHS is the mistaken impression (created by some of the early promotion for the system) that you need a special type of monitor (one with a multipin S connector) to obtain any benefit from S-VHS. While optimum results can theoretically be obtained only with monitors having this special input, the increase in resolution provided by the system can be seen on any decent television set or standard monitor.

The final hurdle for S-VHS is the availability of program sources that show off the system's abilities. Right now, the only programs that fully exploit the format's potential are a few well-mastered videodiscs, the rare high-quality live broadcast, and home movies created on



*Sanyo's VHR-8700 S-VHS deck can provide normal-speed audio in its picture-search modes.*



# VIDEO IN LIMBO?

Super VHS camcorders. This will change. Video-duplication firms are now installing Super VHS equipment, and a few titles could be available by midyear. At the CES, Super Source introduced the first-ever tapes released in S-VHS: the verbosely titled *River Song: A Natural History of the Colorado River in the Grand Canyon* and *Impact Zone*, said to be "a spectacular tribute to the popular sport of wind surfing." Fer shure.

## BETTER BETA

Not to be outdone by the VHS camp, Sony announced the Extended Definition, or ED Beta, system in mid-1987. It works on the same general principle as Super VHS, except that the resulting luminance bandwidth is wider still, yielding a horizontal-resolution spec of 500 lines. At this winter's CES, Sony announced that its first ED Beta VCR, the long-awaited ED-V9000, should be available as you read this. It's a loaded package, with four video heads, Hi-Fi, MTS, and the prodigious cueing, editing, and special-effects capabilities of Sony's previous flagship model, the Super Beta SL-HF1000. No price was given for the ED model or for the new metal-particle videocassettes it requires for ED recording.

An ED camcorder from Sony is slated for release this summer. Unlike earlier record-only Beta Movie units, the ED unit will offer full playback capability and, instead of a fixed lens, will likely employ interchangeable C-mount lenses. Again, no price was announced, but a Sony spokesperson said it will be "very expensive," apparently because a professional-quality optical system is needed to exploit ED Beta's potential resolution.

Perhaps the biggest news from Sony during the CES was the revelation—more like a news leak that soon turned into a flood—that it will start selling VHS home decks in Europe this spring and in North America this fall. The models and their features hadn't been determined as of press time. Sony's first VHS models will be made by another company (to Sony specs, it may be presumed). Puzzlingly, there are no plans to offer Super VHS hardware. Commented a Sony representative, "By adding S-VHS, we wouldn't gain much. In a high-band [extended luminance-resolution] recording system, ED Beta offers better quality."

Sony has since taken great pains to point out that this development does not mean an abandonment of Beta: as evi-



*The Pioneer CLD-1030 CD-V combi-player handles all home optical-disc formats.*

dence, the company points to the "upward-compatible" ED Beta system. Sony claims—with some justification—that it now can serve both the entire home and professional video markets. The official story is that the VHS decision was made so that Sony could sell to those who watch rented VHS movies. Consumers who want a better-quality machine for time-shifting can have the already-available Super Beta VCRs. For those seeking the best possible quality for movie playback, there's Sony's new laser videodisc player (see "CD-Video: Where's the Beef?" below). For "personal video" and home movies, there's the well-supported 8mm system. And for the ultimate quality in home-made video productions, there's ED Beta.

## COUCH-POTATO NIRVANA

Unlike the luminance-bandwidth extension characteristic of S-VHS and ED Beta VCRs, most features introduced recently in the VCR field are oriented toward convenience rather than video performance. For example, last summer Akai unveiled Quick Start VHS machines, which keep the tape threaded during all transport modes (Beta decks operate in this manner). This dramatically speeds up tape handling, allowing access to playback from any other mode within 1.5 seconds, and makes the VHS format as convenient to use as Beta always has been. At January's CES, Toshiba introduced two models with a similar feature.

Recently, manufacturers have been trying to simplify the methods used to program VCRs for unattended recording. Only a few have succeeded. The most popular new approach uses the remote control to enter programming commands, with readouts visible on the monitor screen. A few models display the menu choices on an LCD in the handset itself. After information is entered in the remote, it can be transmitted to the VCR. This approach

obviates turning on the TV.

Panasonic and some of its followers use a bar-code scanner and a sheet with codes for date, start and stop times, channel, and so forth. You scan the appropriate codes with a penlike bar-code reader, which transmits the information to the recorder. The company hopes codes will be printed in TV-program listings, thereby extending the feature's utility. On some of its high-end VCRs, Toshiba includes a light pen used to check off choices displayed on the screen.

Given the relative ease of on-screen programming, bar-code sheets and light pens might actually complicate matters by adding extra devices and more steps to the process. Perhaps some enterprising company with expertise in voice synthesis will come out with the ultimate in programming aids: a talking VCR. Just imagine your exasperated deck lamenting, "Do you really want me to tape another episode of *Monty Python*?"

## CD-VIDEO: WHERE'S THE BEEF?

CD-Video—which originally encompassed the renaming of the Laservision videodisc system plus the introduction of the CD-sized CD-V single—was launched with enormous hoopla last June. The mammoth multistory CD-V exhibit mounted by 29 hardware and software supporters reportedly cost \$1.5 million. An indication of how far the system has come and how far it still has to go was the CD-V booth at January's CES: one table with a couple of brochures.

In other words, CD-Video has not yet amounted to much, despite its glittery baptism. Last June, the format's supporters promised hardware and software by fall. But by year's end, combination CD-V/videodisc ("combi") players were available only from Pioneer, Magnavox, and Yamaha. The promised "5-inch" (actually 12-centimeter) CD-V singles (hold-

# VIDEO IN LIMBO?

ing 5 minutes of video and 20 minutes of audio) have yet to materialize. Other companies that showed hardware at the original unveiling—including Denon, Hitachi, Technics, and Toshiba—held off to see how the market would react.

Sony's announcement that it will introduce CD-Video players in North America this spring was the biggest—and practically the only—boost the CD-V format got at January's CES. Sony's basic combination machine will be available this spring for around \$800. A high-end model with digital video effects will follow in the summer. Both models play three-inch audio-only CDs as well as regular CDs and all videodisc sizes.

At the Winter CES, Pioneer showed two new videodisc players. The first, the CLD-1030 combi-player (\$900), has two-times-oversampled digital-audio playback and also handles three-inch discs without using an adapter. Video resolution is given as 420 lines, compared to the earlier CLD-1010's 400 lines. Also announced was a six-disc CD-V-single changer, the PVM-77, with four-times-oversampling filters and the ability to play three-inch CDs with an adapter. No price or shipping date was given. Yamaha also introduced a CD-V-single player, the CDV-S100 (\$499), which should be available by the time you read this. Meanwhile, Matsushita plans to sell CD-V players in Japan. In Las Vegas, Denon exhibited a "second-generation prototype" combi-unit, the LA-1500C, with analog and digital audio outputs. Other features include dual 16-bit DACs, four-times oversampling, and 20-selection programmability. Final design and production plans for the 1500C remain undetermined, as do the fates of the CD-V units shown by Teac, Hitachi, and Toshiba.

Hesitation about CD-V was characteristic of companies that showed players at last June's extravaganza. The reason is simple: the lack of software for the CD-V-single. Record companies promised 250 music-video titles for the fall launch, with another 40 to follow each month there-

*The Yamaha CDV-S100 CD-V single player also plays standard audio discs.*

*NEC's PJ-4680 46-inch rear-projection monitor/receiver has a built-in Dolby Surround processor.*

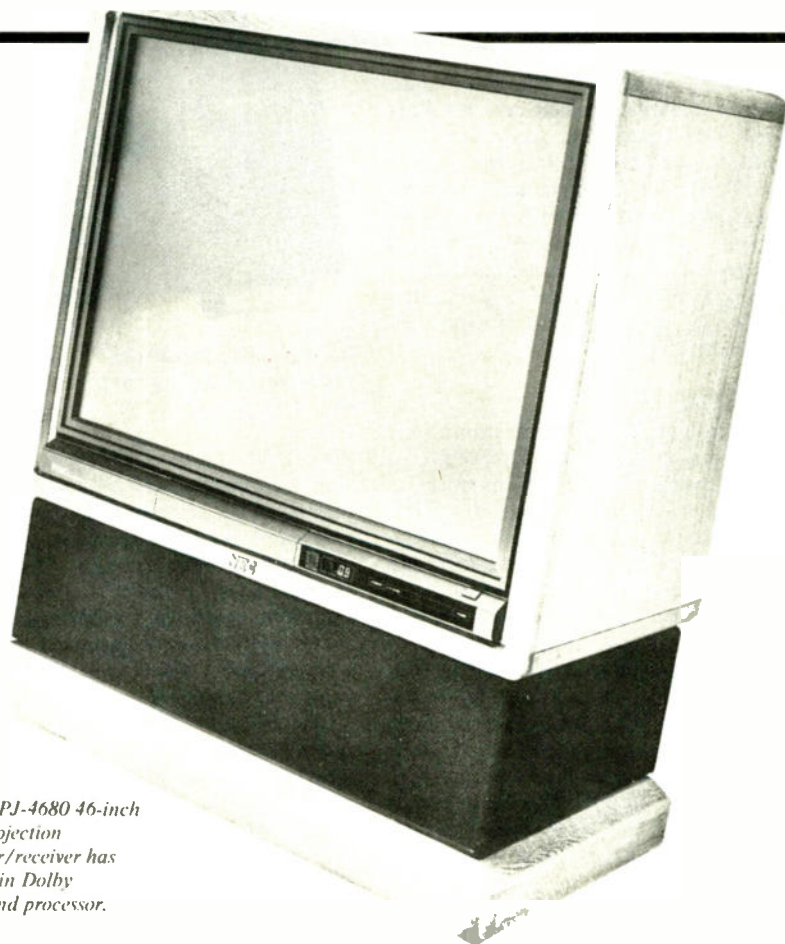
after. We are told that new royalty arrangements had to be negotiated with artists and that replication and mastering problems have also been encountered. Record companies have also had to confront questions about marketing, packaging, and repertory. All CD-V players have access to the 15,000-title audio-CD catalog, and combi-players can still play the 2,500 Laservision titles available. But the CD-V singles that were to give the format its identity as an attractive extension of audio-CD technology are still "brochureware." Only about 25 CD-V singles were available for demonstration at CES, but backers say that several hundred titles

should be available by this June. However, we've heard this tune before.

## TV TECHNOLOGY

Except for bare-bones models, nearly every new 20-inch-or-larger TV set from a major brand seen at the January CES incorporated a multipin S connector for the separate luminance and chrominance signals from Super VHS and ED Beta units. A few upmarket sets now offer some sort of built-in surround-sound processor, including RCA's 31-inch direct-view sets and NEC's top-of-the-line 46-inch rear projector (the \$3,700 PJ-4680).

At the opposite end of the scale are pocket-size color LCD TVs. Impressive models have been shown by Casio, Hitachi, Panasonic, and Toshiba, among others. The high-brightness Sharp 3ML-100 (only \$600!) garnered much attention. The unit's 3-inch backlit display, which contains 92,160 pixels, is said to be capable of showing a 60:1 contrast ratio. A better bargain in LCD TVs might be Casio's 3 1/2-inch VF-3000, which, for \$1,399, comes built into a portable VHS VCR.



# VIDEO IN LIMBO?

## STEREO VIDEO

At January's CES, Toshiba and Fisher gave demonstrations of three-dimensional (3-D) video systems, which, judging by the crowds attending them, appeared more popular than previous showings of similar technology. The two companies employ slightly different 3-D principles and, like the 3-D movie formats of old, viewing does indeed require special glasses.

Fisher's demo was the more spectacular, as it uses a 100-inch projection TV fed by a specially encoded videodisc. Left- and right-eye images are alternately flashed on the screen. One image is polarized vertically, the other horizontally. Viewers wear special glasses whose polarization is synchronized to the projected image and which block the light to the left eye when the right-eye image is displayed, and vice versa. To avoid the flickering that would occur if images were flashed at 30 times a second, the system used for Fisher's demo had a 120-Hz field rate.

The images were spectacular in all but one respect. The system works well as long as you don't wear eyeglasses in addition to the 3-D glasses. If you do, there is noticeable crosstalk between the eyes, and viewing eventually becomes uncomfortable.

Toshiba's demonstration was equally interesting, though, as it involved a real product. The company's 3-D camcorder (the 3D-CAM) is scheduled to ship this summer. Together with a pair of liquid-crystal viewing glasses and a controller box, it will retail for \$2,850. The 3D-CAM records images from side-by-side CCD sensors onto VHS-C tapes that can be played over a conventional monitor. During playback, viewers wear glasses with liquid-crystal lenses. As the monitor alternately shows left- and right-eye images, the lenses occlude one eye when the image for the other eye is being shown (under control of an adapter connected to the VCR).

The Toshiba 3-D effects are impressive. But because the effective frame rate is only 30 Hz, the system suffers from an annoying flicker. The 3D-CAM will let you make a 1980s version of *House of Wax* or *The Mask* or (even more horrific) 3-D movies of your kid's birthday party. But keep the Excedrin handy if you plan to watch tapes from this baby for more than a few minutes.

Toshiba has acknowledged the flicker problem and demonstrated a display designed to deal with it. The flickerless monitor uses digital storage and double scan-



Canon's  
F1000S  
S-VHS unit.

ning to deliver an effective 60-Hz frame rate. But the company has no plans to produce the monitor, saying it was shown to demonstrate the technology. That's a pity, because without the double-scanning display, Toshiba's 3-D system is unsatisfying. Perhaps the forthcoming high-frame-rate progressive-scan monitors can be adapted for 3-D playback.

## CAMCORDERS

In the more familiar category of two-dimensional camcorders, the anticipated battle-to-the-death among formats hasn't yet materialized. Instead, the competing formats have settled for peaceful, if uneasy, coexistence. The reason is simple: Since camcorder tapes can be easily copied onto other formats for editing (or played directly on a TV set), compatibility is a nonissue. To their credit, even consumers who aren't video aficionados have come to understand this.

Generally speaking, consumer-electronics manufacturers have lined up behind VHS (both full-size and compact versions), while (film) camera manufacturers seem to favor 8mm. There are notable exceptions (such as Sony, the driving force behind 8mm), and several companies are offering both formats. In what was probably the most impressive series of camcorder debuts at CES, Canon joined the ranks of the fence-sitters, introducing a full-size Super VHS unit to go with its

new and versatile 8mm lineup.

Most midline and upscale camcorders now offer variable "shutter" speeds (video cameras don't actually have light-blocking mechanical shutters). Faster speeds are more effective in reducing smearing during slow-motion or still-frame playback. But because more light (a wider iris opening) is required at fast shutter speeds, depth of focus is decreased, at least indoors. Another feature of several up-market camcorders is a wired remote control that makes it possible for videographers to be included in their own creations. The same can be done to some extent with the self-timers available on a number of camcorders.

The camcorder-accessory market seems to be moving away from head cleaners to more interesting products. Among these are Audio-Technica's ATR-55 "shotgun" microphone (\$90) for situations where very directional sound pickup is desired. Sima showed a wireless FM mike (the \$150 Mini SoundCatcher) that broadcasts its signal to a receiver connected to the camcorder mike input.

And for those still photographers who have yet to attain jump-to-video speed, Casio showed at the January CES the first consumer-affordable (barely, at \$1,500) still-video camera. Recording as many as 50 shots on a special floppy disk, the VS-101 is capable of playing back photos immediately after they are shot and can reuse its "film."

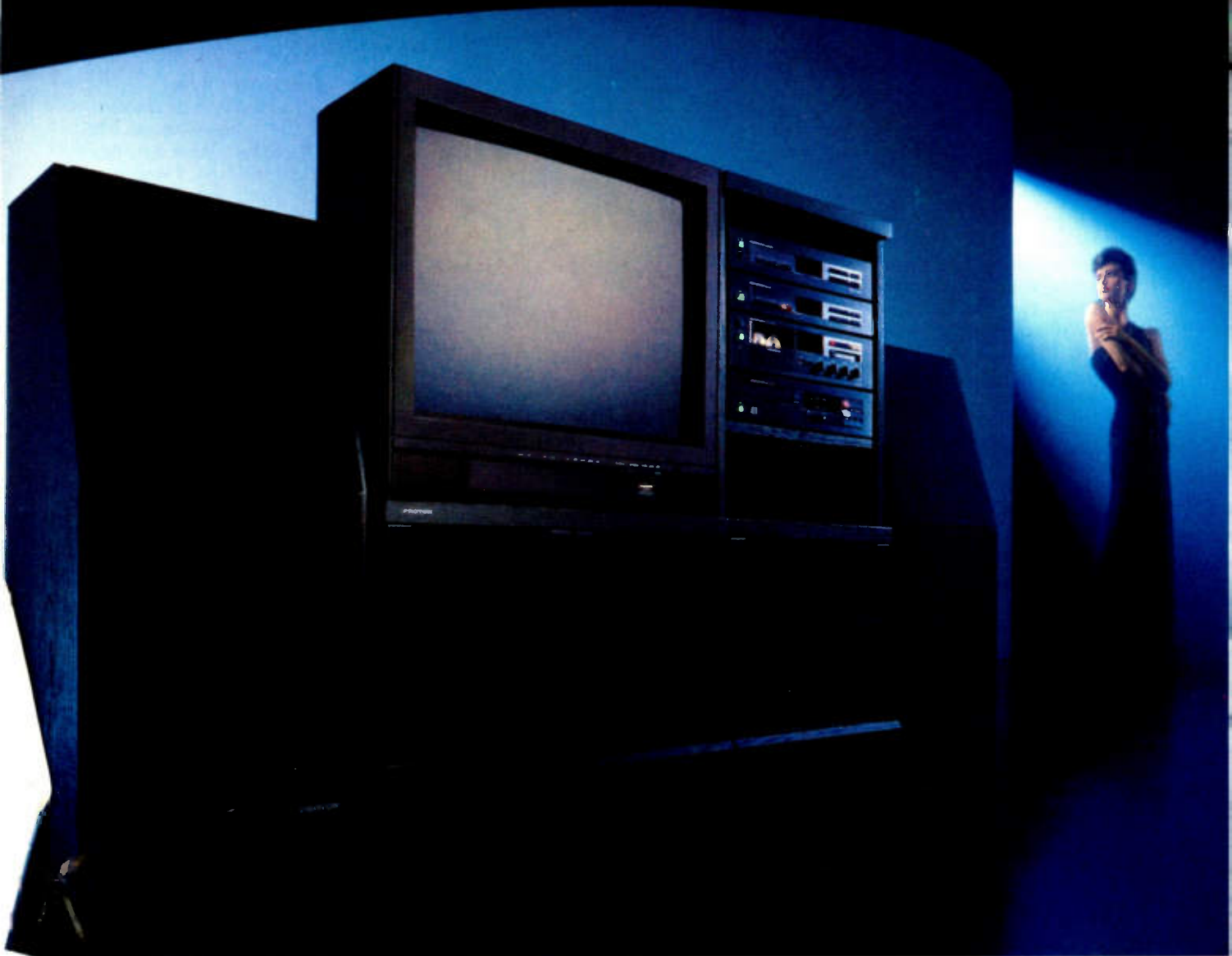
So there you have it—some of the past year's most significant developments in consumer video. It will be years before we can gauge the full impact of some of these products and systems, but the fog of uncertainty surrounding such developments as CD-Video, Super VHS, and ED Beta should begin to lift by midyear. Programming and crucial software-availability issues should be fine-tuned by then. □



Toshiba's 3D CAM and goggles. Note the two lenses of the camcorder.



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# DIGITAL UPDATE

BY E. BRAD MEYER

# '88

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The main evolutionary trends of digital audio were evident  
at January's Consumer Electronics show in Las Vegas.

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**F**rom the comfortably narrow perspective of the audio enthusiast, it is easy to imagine that digital audio is the culmination of years of effort directed toward the perfection of recorded sound. But in the larger scheme of things, digital audio is an almost incidental by-product of the increasing power and decreasing cost of digital computation and semiconductor technology over the last 20 years. Advances in these fields were again evident in the new digital audio products on display at January's Consumer Electronics Show. There, the main trends in digital audio—increased data-converter resolution, lower prices and increased versatility in component design, new digital playback and recording media, and advanced digital signal processing—were exemplified in products incorporating the latest in integrated-circuit and computer-processing technology.

Encoding audio digitally produces a vast amount of data, and that data has enormous storage requirements. Twenty years ago, a computer that could encode and decode high fidelity audio in real time—that is, as fast as the music happened—could be found only in an unusually well-equipped and prosperous laboratory. Ten years ago, the digital recorder was a commercial product, but you needed at least \$35,000 to buy one and a small van to

carry it around. By 1979, you could buy a digital-audio-to-video converter and the video deck used with it for about \$7,000. In 1981, with the introduction of the classic Sony PCM-F1 adapter, the price dropped to \$2,700 and the size to that of a single suitcase. At the CES, Casio displayed a DAT (digital audio tape) deck the size of a large paperback book that was slated to be sold for \$1,100.

CD players only require simple-to-build digital-to-analog converters (DACs)—and not, like digital recorders, analog-to-digital devices as well—but their price history has been equally dramatic. The first CD players, introduced in 1983, cost about \$850. Today, the list price of some portables has fallen to less than \$100, and home models sprout new features while retaining, at least for the moment, the old price levels.

If it's relatively easy to build a good DAC, why should anyone pay more than the bare minimum for a "plain vanilla" CD player unless certain special features are desired? First, a merely *good* replica of the encoded analog signal isn't enough for some people—perfection is the goal. Second, CD players, being computer-controlled, can be easily taught to do interesting and easily audible tricks. And finally, people take pride in owning beautiful machinery. But in pursuit of these various

principles, the makers of CD players seem determined to recapitulate the automobile horsepower war of the 1960s.

The first generation of Japanese CD players had 16-bit DACs followed by steep analog low-pass filters used to smooth the output waveform. Their European (Philips-originated) counterparts instead used steep digital filters, which calculated their results at four times the normal CD sampling rate (176.4 kHz instead of 44.1 kHz), followed by 14-bit converters and a simple analog output-smoothing network (I'll call this a 14 x 4 system). The basis of the Philips scheme has come to be called "oversampling," even though no new digital samples are generated (as is required by the strict definition of the term). We will follow here the example of Cambridge Audio's Stan Curtis and instead use the more accurate term "resampling." (Note that the early "14-bit" players do not, as is popularly supposed, ignore the bottom two bits of data on the CD: The mathematics of the digital-filtering process use these bits. I won't go into the math here, but I actually understood it once—for about ten minutes one afternoon in February 1987.)

Resampling and digital filters permit the use of gentler analog filters, and the combination generates less phase shift. Although this has been one of the principal selling points of digital filters, controlled tests indicate that the phase shift of a well-designed *analog* low-pass filter is about 15 times too small to be heard. Nonetheless, digital filters are consistent in frequency response. And because their phase linearity provides a better-looking waveform in oscilloscope photos, they have been designed into virtually all but low-budget players.

The success of digital-filter players has furthered the numbers game. For the second generation of CD players, many Japa-

*Sony's top CD player, the CDP-707ESD (\$1,800). An eight-times-resampling, 18-bit design, the player has an array of programming features called Custom File.*



*Pioneer's premier CD player, the PD-91, is an eight-times-resampling, 18-bit model. It is said to have the fastest access time of any CD player. List price is \$1,300.*

nese companies used doubly resampled digital filters with 16-bit DACs (a 16 x 2 system). As 16-bit DACs became faster and less expensive, both European and Japanese companies introduced 16 x 4 players. Most audiophile-brand CD players now use variously tweaked versions of Philips's 16 x 4 circuit.

Early in 1987, Yamaha introduced a player with a system it called Hi-bit, in which a level-sensitive circuit called a gain-ranger digitally amplifies the signal by two bits (12 dB) during soft passages while attenuating the final DAC output by 12 dB. This lets the system perform almost as if it had 18 bits of total dynamic range. Originally confined to relatively expensive models, Hi-bit circuitry appeared at the January CES in Yamaha CD players selling for as little as \$319. Technics's new players use two DACs per channel together with a gain-ranging system similar to Yamaha's. At the CES, the escalation continued with the appearance of the first high-end CD players with 18 x 8 filters and true 18-bit DACs. Among them were Sony's CDP-707ESD (\$1,800), Pioneer's PD-91 (\$1,300), and Onkyo's DX-G10 (about \$2,200).

At this point in the race, we must dif-

ferentiate between the signal processors that work strictly in the digital domain—in filters, for instance—and the DACs used to produce the final analog waveform. The former can easily process audio data in words of 24 or more bits at multiples of the 44.1 kHz sampling rate used for the CD, but affordable DAC technology cannot yet convert information with that dynamic range back to analog at those speeds. In an attempt to skirt these limitations, Cambridge Audio's CD-2 (\$1,600) feeds the data from its 16 x 4 digital filter sequentially into four different DACs per channel. The averaged outputs of the DACs are scanned in turn and fed to a resistive adder, all of which is said to smooth the waveform enough to give the equivalent of a 16 x 16 conversion. The only analog filtration used is a single output capacitor, which forms a very gentle 6-dB-per-octave filter at around 300 kHz. The implied engineering philosophy here—using lots of additional digital processing to avoid an extra analog stage—represents an interesting new direction for high-end design, which traditionally pooh-poohed digital technology in favor of analog processes.

The present leader in the numerical bit battle is Cambridge's latest version of the two-chassis CD-1, which uses in its filter circuit the top 24 bits of a 32-bit processor designed for digital audio mixing consoles, plus the same four-DAC scheme as the CD-2. The company's fact sheet claims that the CD-1 is in effect a 32 x 16 player (32 bits, 16-times resampling); it will sell for about \$3,500.

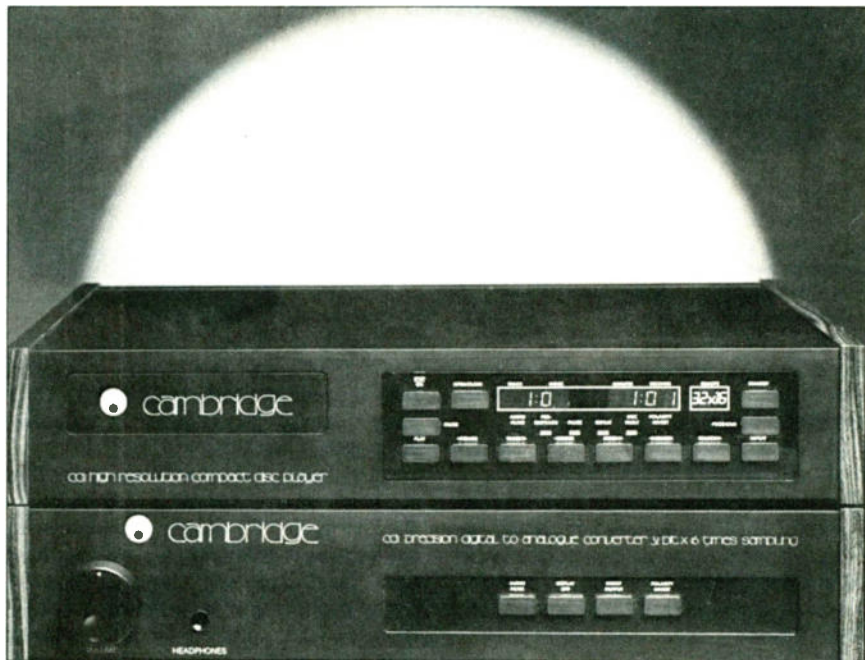
Does this extra processing afford you anything? After all, the original digital signals are still limited by their 16-bit word length and 44.1-kHz sampling rate. In fact, although one can trade additional computing for fewer analog stages, com-

putation can add no new sonic information to the original signal. The situation is different for the final digital-to-analog conversion: The use of an 18-bit DAC (or a very high-quality 16-bit unit) does not add additional information, either, but the extra DAC resolution necessary for 18-bit operation can mean lower distortion in the upper 16 bits that are actually used. Many so-called 16-bit DACs found in everyday CD players achieve only a 14- or 15-bit level of accuracy; the lowest levels are not lost, but suffer increased distortion. In effect, then, the extra precision of 18-bit converters helps a new player perform as well as its predecessors were *supposed* to. One clear application for 18-bit converters combined with additional computation—an accurate digital realization of CD deemphasis—has yet to appear.

## BELLS AND WHISTLES

Though recent audible improvements in performance may be slight or nonexistent, CD players continue to acquire new control features. For would-be DJs, Technics has two new models with rotary-search controls that allow cueing to a precision of 40 milliseconds. The company hasn't forgotten home tapers, though: Each of the four new Technics models has an automatic peak-level search mode that zips through the disc at 20 times the normal speed to find the loudest passage, which it then plays repeatedly to help set recording levels. An Edit Guide function then figures out how many tracks will fit on your cassette; the player will calculate for the three most popular tape lengths, or you can enter your own on a numeric keypad.

Sony's latest wrinkle is a set of three programming features collectively known as Custom File. Here, a player stores information about a particular disc together with its identification number, which it automatically recalls each subsequent time the disc is inserted. For Program Bank operation, the stored information is a sequence of tracks. Disc Memo remembers as many as ten alphanumeric characters and cycles through the display when the disc is loaded. Custom Index stores as many as six locations—precise within 0.15 second—for easy access to favorite passages. (Until DATs become plentiful, this feature is the most useful for subjective evaluation of audio components.) Certain aspects of Custom File are similar to Philips's Favorite Track Selection function introduced a few years ago in the classic Magnavox CDB-650 player



*The Cambridge Audio CD-1 player, a "32-bit," 16-times-resampling device*

and still offered by the latest Philips models (such as the top-of-the-line CD-960).

## THE MORE THINGS CHANGE . . .

Although CD changers were slow to catch on, they are growing more popular at every CES. At the January show, several manufacturers, including Denon, Marantz, and NAD, introduced their first multidisc models. Changer sales have been slow because people don't seem to like loading CDs into a magazine before playing them, and because each brand has its own, noninterchangeable magazine. Ironically, the smaller manufacturers who enter this market actually increase the de-

gree of magazine compatibility: Several of them may buy changer mechanisms from one original manufacturer, whose magazines will work in all the units it makes, regardless of brand.

The NAD 5170, the most interesting of the new changers, features a six-disc magazine, a single-disc drawer, a digital bit-stream output, random play of cuts from all discs, a motor-driven volume control adjustable from a remote handset, and the company's CDR compressor circuit for making CD dubs with a dynamic range suitable for car or Walkman playback. Sony introduced two new carousel models, in which a wide drawer opens to accept



*The Technics SL-P990 CD player has a high-precision, knob-controlled search-and-cueing system as well as features designed to help the home Compact Disc recordist (\$825).*



Denon's DCM-555 (\$550) CD changer takes a six-disc magazine and incorporates the company's proprietary Super Linear converter circuitry.

five CDs in the standard drop-in receptacles. So far, no other company has adopted this clever quick-change concept.

Several manufacturers have shown high-capacity changers over the years. This January's entry was the AudioAccess PX-240, which, as the model number implies, stores as many as 240 discs in a circular array reminiscent of an old jukebox, all for about \$5,000. For those with very large CD collections (and big bucks), as many as ten units can be linked. An RS-232 port allows selection and programming by computer. Built-in programming features include 81 separate categories to which individual cuts can be assigned; this way, you can ask the machine to play all your string quartets, slow-dance numbers, or zither instrumentals. The company also makes a hard-wired control unit for operation from another room.

#### SMALL STUFF

The moribund CD-V single format (see "Video in Limbo?," p. 49) was originally meant to be the mass-distribution medium for pop-music videos. CD-V backers thought that it would appeal to younger listeners, ignoring the fact that these potential consumers had to be pretty well-heeled to afford a CD-V player. The other recent new format aimed at the youth market is the 3-inch CD, which seems to be slowly gaining acceptance by hardware manufacturers and record companies.

Right off the bat, 3-inchers have more going for them than CD-V singles. In theory, all CD players will play the minidisks, although some require snap-on adapter rings to load them successfully. In contrast to the CD-V system, which was led by recording giant Polygram, it has been the independent labels that have led the way with 3-inch CDs—and with classical music at that! Delos has a catalog of about 25 3-inch titles, mostly classical, while Telarc handed out at the CES a 20-minute sampler in the format.

Of the hardware makers, only Sony fully supports the new size. All of the company's new players (except the multidisc Disc Jockey models) will load the minidisks without an adapter. Sony agrees that the small disc is important in broadening the CD market to include younger listeners, and the company is currently working on a tiny 3-inch-only player to be introduced this spring or early summer. A four-month joint minidisc promotion by Sony and Warner/Elektra/Atlantic Records should be under way as you read this. Pioneer's new CLD-1030 combination LaserVision/CD-player handles everything: 3-inch and 5-inch audio CDs, 5-inch CD-V singles, and 8- and 12-inch LaserVision videodisks. Also showing players taking the minidisks were Denon, Onkyo, and Technics.

Although the dedicated 3-inch player has not yet arrived, Sony has also upped the ante in the miniaturization contest with its D-15 portable CD player, which is even thinner than the Belgian-waffle-thin Sony D-10. Aiding in the reduced "form factor" (a computer-jargon concoction meaning something like "size and shape") is a two-hour rechargeable battery that fits within the player's case.

#### DAT

Manufacturers are still reluctant to bring DAT machines into the U.S. for fear of

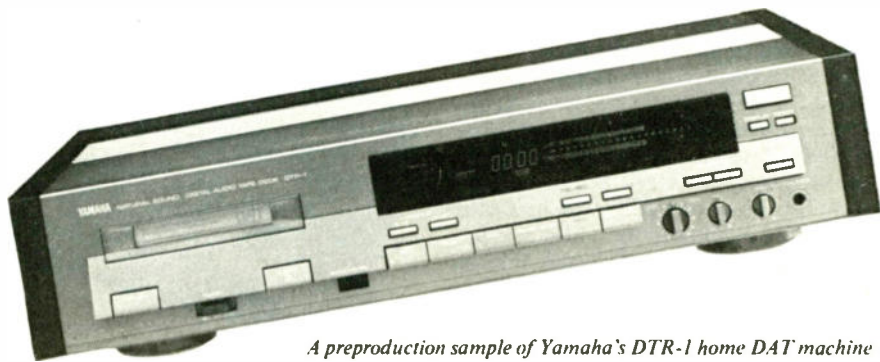
arousing further protectionist sentiment in Congress. As we go to press, no manufacturer has officially announced an on-sale date for a home DAT machine in this country. The National Bureau of Standards will have released the results of its tests of the CBS Copy Code system by the time you read this; rumors at the show were that the notch filter's effects had been found to be audible but not severe, leaving Congress back where it started on the issue. A CES panel discussion—which included Representatives Robert Kastenmeier (D, Wis.) and Joseph Barton (R, Texas) and the U.S. Register of Copyrights, Ralph Oman—indicated that the Copy Code bill probably wouldn't pass, but that the home taping war was not yet



Smallest player: Sony's D-15 (\$350)

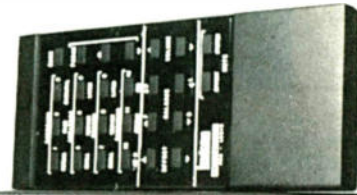
over. Oman advocated a tape and recorder royalty tax as a compromise most likely to satisfy all parties and to start the wheels of commerce turning. This is probably what the record companies wanted all along, despite assurances to Congress that they preferred Copy Code.

Meanwhile, back on the show floor, several different manufacturers showed DAT decks, with the portables attracting the most attention because they had not been shown at a CES before. The smallest was Casio's 4¼ by 5¼ by 1¼ model. The Technics and Sony portables have more features and will likely come in at more than \$2,000. The Technics SV-MD1 gar-



A reproduction sample of Yamaha's DTR-1 home DAT machine

*A preproduction sample of Lexicon's CP-1 digital hall-simulator/artificial reverberator/Dolby Surround decoder. Unlike earlier devices, the CP-1 can also provide a useful degree of enhancement with a normal two-speaker stereo system.*



nered praise for the ingenious resampling and phase-corrected filters used in its A/D section. To anyone tired of lugging around an open-reel deck (or even a VCR/PCM-adaptor combination) to make live concert tapes, all these machines are godsend.

## DIGITAL PROCESSORS

The main advantages of digital audio are that digital information is easy to store and retrieve without distortion and easy to manipulate by computer. Converting the audio to numbers is hard, but once done, a computer can do complex calculations on the data. It can also simply delay the data and then spit it out with no loss of sound quality. The simplicity of digital-delay circuits has spawned quite a few professional digital-reverberation generators and hall simulators, in which multiple repetitions of the signal are delayed and blended together to simulate the echoes in real acoustic spaces.

The best-known consumer digital processor is the Yamaha DSP-1 (HIGH FIDELITY'S 1986 Product of the Year), which operates with either four or six speakers to simulate various performing spaces by providing sets of individual early reflections or adjustable reverberation. The DSP-1 also has a surround-sound mode for video use, but its primary design emphasis is audio.

At the CES, Lexicon, a Waltham, Massachusetts, company known for its professional digital-reverb units (and not to be confused with the Florida-based maker of hand-held language translators), showed its first consumer product. The CP-1 is a remote-controllable reverberator, hall simulator, and surround-sound processor that does nearly all its work—including the Pro Logic steering used in Dolby Surround decoding—in stereo and entirely in the digital domain. In contrast with earlier

surround-sound processors, the CP-1 can provide effective enhancement with two, four, or six loudspeakers. In a conventional two-speaker setup, the CP-1 uses a crosstalk cancellation process to provide a stereo image that extends beyond the speakers' spacing (an effect similar and superior to that obtainable from Carver's Sonic Hologram). This can then be combined with reverberation or surround effects processed in a similar manner. The Dolby Surround function compensates automatically for channel-imbalance or head-azimuth errors in the film-to-video transfer by adjusting the relative level and phase shift of the supposedly identical versions of the dialogue track in the two channels. Leakage of front-center dialogue to the rear or side channels is considerably reduced. The CP-1 is expected to sell for about \$1,200.

## FLYING BY WIRE

Finally, in a tantalizing application of the powers of digital processing, a start-up

company called International Cablecasting Technologies (ICT) proposed at the CES what boils down to a digital-audio-via-cable-TV network. In the ICT system, your local cable-TV company would carry the ICT digital audio signal (which masquerades as a video signal and would be distributed by satellite). A special home tuner would be able to decode the eight stereo channels of CD-quality digital audio encoded on the ICT signal. Provisions have been made in the encoding for such cable-TV-style facilities as pay-per-listen, instant decoder authorization, and auxiliary computer-data transmission. Since the music would theoretically not be interrupted by commercials, the ICT service would be the equivalent of a cable-TV "premium" channel—you'd have to pay for the service every month. Like no other product at the CES except the Lexicon CP-1, this proposal gave proof—as if any were needed—that there are more interesting things to do with a digital audio signal than just storing and retrieving it. □



*A mock-up of a proposed tuner/decoder for ICT's system of delivering stereo digital audio via a cable-TV system. Eight different stereo programs may be received, each having the same sampling rate and quantization resolution as the CD system. The ICT system also provides for multiple channels of digital-data transmission.*



**Edited by Ted Libbey  
and Ken Richardson**

## MIDEM Well Met

**W**ell, it wasn't shirtsleeves weather, as my optimistic colleague Ted Libbey had predicted ["Medley," February]—in fact, the rain and mist gave way to sunshine for all of an afternoon. But what better weather for getting one's feet wet, as did a delegation from *HIGH FIDELITY* and its sister magazine, *MUSICAL AMERICA*, attending MIDEM for the first time. Each January, scores of record companies, publishers, concert presenters, and artist managers flock to Cannes for a week of meetings, trade exhibits, deal-making, concertgoing, and assorted politicking, but Americans have traditionally been in short supply, particularly on the classical side.

Invited to present a full-day seminar, "Music in America, 1988," Ted and Benjamin S. Dunham, executive vice-president of the National Music Council, chose seven key colleagues to join them on the panel, creating an impressive model of the American musical infrastructure. Composers, performers, presenters, granting agencies, and the recording industry were all represented by at least one advocate, and a number of panelists demonstrated experience in several of these areas. Dean Stein, executive director of Chamber Music America, noted that his organization supports both performers and presenters of chamber music, and, among other things, administers an important commissioning program. And Ezra Laderman, president of the National Music Council and a former director of the music program at the National Endowment for the Arts, spoke particularly persuasively from his perspective as an eminent composer.

The session found its resonant frequency early on, when a member of the audience commented on the "amazing" number of premieres in the United States each year. This was music to the ears of Nancy Clarke, executive director of the American Music Center, which promotes the creation, performance, and recognition of contemporary American music. She and Laderman explained that the state of health of contemporary music today owes a great debt to the Bicentennial celebrations, which prompted a flood of commissions and elevated Americana—even the up-to-the-minute, 20th-century variety—to a respectable position. Today, programs such as the American Symphony Orchestra League's "New Music Reading Sessions," outlined by chief executive officer Catherine French, help to secure an audience for new music in a country of more than 50,000 composers.

Rounding out the panel were Stanley Gortikov (representing the RIAA), Clinton E. Norton (International Society of Performing Arts Administrators), and George Moquin, director of summer music programs at the University of Maryland. *Patricia Reilly*

## CD: Casualties of More

**M**y friend Robert is a nice guy, a decent guy. He used to stop by the office from time to time to tell me about the new Compact Discs he had bought. Not long ago, he said his wife, Laurie, was giving him a hard time, complaining that they needed to spend money on something other than CDs. I told Robert that I sometimes heard the same sort of noise, and we laughed.

The next day, he told me he'd discovered he owned so many CDs that Laurie couldn't tell what was new unless she saw him bring it in. So he brought things in when she wasn't home. And hid them in his closet. No problem.

A few days later, Robert told me he'd bought that portable CD player he'd been thinking about. He said it sounded great. He also said the best thing about it was that Laurie hadn't said anything. After Robert and I talked a bit more, he admitted she hadn't found it yet.

He stopped by again to ask me how I liked the Joan Armatrading CD he'd seen on my desk. I told him it's great and then asked him if he'd seen the CD players that hold six discs at once and can be programmed to play any of them. Sure, he said, asking me if I knew the best thing about them. Probably the 420 minutes of music you can play at one time, I replied. That was good, he admitted, but not as good as the fact that the model he wanted to buy looked just like his old CD player. Laurie would never know the difference. And it would be a piece of cake to get it home while she was working. No problem.

Robert came by to see me the other day. He was looking for an apartment. Laurie told him to take his CDs, records, equipment, and all those magazines and hit the road. Well, Robert allowed, sometimes love is tough—and she didn't know much about music anyway. By the way, he asked, would I like to buy some of his CDs for seven bucks a piece to help him raise a security deposit?

I got some great buys that day. Poor guy. But it made me wonder how many Roberts there are in the world, hiding CDs in the closet, juggling bills because a new batch of the Beatles is out, or—worst of all—choosing their new gear based not on how it sounds but on how much it looks like their old gear and on how long the Lauries of the world will take to notice the extra lights.

I've been buying stuff since I was eight. I've got music I've never listened to—or heard once, maybe. More lights, more power, more wires out the back. It's fun, great fun. I know I'm addicted. *Jon Trzcinski*

*Mr. Trzcinski, one of our readers, lives in Oklahoma City, Oklahoma. Readers may submit a 400-word article for this portion of "Medley" to Ken Richardson, Popular Music Editor, HIGH FIDELITY, 825 Seventh Ave., New York, N.Y. 10019. We pay \$100 for each published article.*

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# FRED GAISBERG AN American Original

The first in a series of occasional portraits of phonographic pioneers BY ROBERT LONG

**E**arly in April 1901, the weather turned warm in Petersburg, and by the afternoon of the fifth, the snow was melting rapidly. Among the shoppers picking their way through the slush along the Nevsky Prospect was a couple who appeared somewhat out of the ordinary. We know little about the woman except that she was married to a handsome, well-educated Russian-American named Rodkinson, who had recently been appointed manager of the London-based Gramophone Company's interests in Petersburg.

It is the man who claims our attention. His clothes were decidedly foreign, and his lively conversation was carried on in English with an unmistakably American accent. He was strikingly short, but his animation and high spirits easily compensated. With his mischievously twinkling eyes, his wavy and somewhat unruly dark hair parted in the center, and his lavish mustache, he had a face that, but for its intelligence, would fit our image of a turn-of-the-century singing waiter.

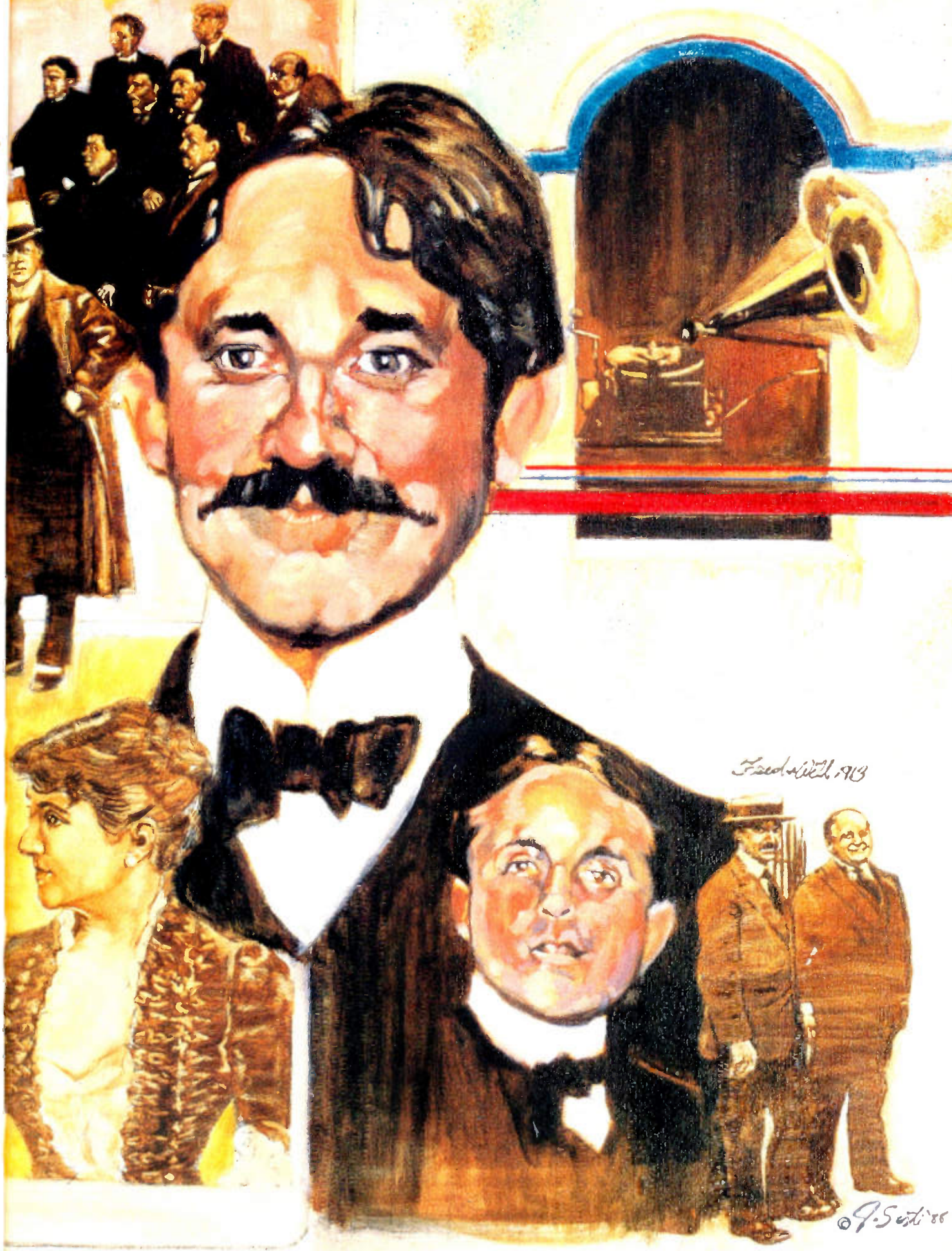
This was Fred Gaisberg—Frederick William, as he had been



*He called himself a "recorder," but Fred Gaisberg was much more than an engineer. Part impresario, part businessman, and part dreamer, he was an adventurer extraordinaire and, above all, a musician with the instincts of a pioneer and a gifted ear for his medium.*

*Pictured to his left, from top, are Tetrazzini, Chaliapin, and Patti; to his right are his brother Will and his beloved gramophone.*





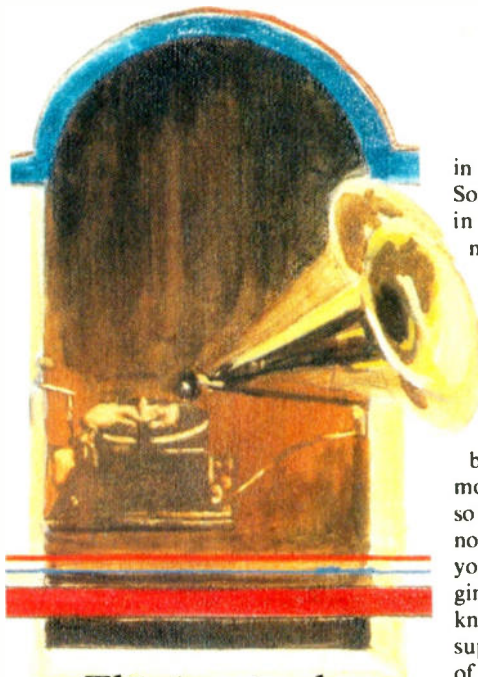
*Fred Astaire 1913*

*© J. Sestini '88*

christened in Washington, D.C.; "Professor Gaisberg," as the teenager had been billed on cylinder records; "Freddy," as some acquaintances insisted on calling him even after he had grown elderly. He was 28 and referred to himself as a "recorder," meaning he recorded discs for the infant phonograph industry—or gramophone industry, as it would be known in Europe in deference to his employer, the Gramophone Company, Ltd., of Maiden Lane, London. He had come a long way in the decade since he had talked Charles Sumner Tainter into expanding his after-school job—playing piano for Tainter's experimental cylinder records—into full-time employment. He had graduated from accompanist to recorder under the tutelage of his second employer, Emile Berliner, the Washington-based inventor of the flat disc record as we know it. In 1898, Berliner had founded the Gramophone Company, with Gaisberg as resident recorder, and, from the beginning, Gaisberg had demonstrated a remarkable instinct for locating musical talent.

On this, his second visit to Russia, he had finally persuaded some singers of the Imperial Opera to perform for the recording horn he had set up in Rodkinson's premises. Now, as Gaisberg and Mrs. Rodkinson continued along the Nevsky Prospect, they entered an arcade that housed some of St. Petersburg's most elegant shops. Looking into one window, Gaisberg caught sight of a familiar face—that of Mrs. Raphoff, wife of the Gramophone Company agent who had hosted him on his first Russian visit the year before. Realizing that there might be some enmity between the wives of the rival agents, Gaisberg excused himself from Mrs. Rodkinson and entered the shop. Inside, he found not only Mrs. Raphoff but her husband as well. Mr. Raphoff proudly showed Gaisberg around his new gramophonic salon, the first of this grandeur Gaisberg had ever seen. Raphoff then suggested they adjourn elsewhere to share a bottle of wine. Gaisberg knew something was up; with Raphoff, conspiracy was a reflex as natural as breathing.

Raphoff had come to the conclusion that the gramophone was more than a novelty. With a partner in Moscow, he intended to form a new company to make and sell deluxe records of the great singers—and to charge their wealthy customers accordingly. Would Gaisberg join in their venture? Remembering that Raphoff had failed to produce major artists for him to record on his previous visit, Gaisberg pointed out that he had already begun recording the Imperial Opera stars—most notably, the tenor Leonid Sobinov. And



## The ten-inch records could hold three minutes of music.

Gaisberg pointed out that the quality of recordings was changing remarkably. A year before, on a visit to the States, he had seen the wax mastering process newly perfected by Eldridge Johnson (whose Victor Talking Machine Company would shortly take over the business of the beleaguered Berliner Gramophone Company in the U.S.). The process drastically reduced the noise inherent in the seven-inch etched-zinc masters that had been the company norm since the beginning. More important, it would make possible large records, ten inches across, that could hold as much as three minutes of music—and therefore an entire opera aria with little or no truncation. In short, within weeks the Gramophone Company would be in a unique position to offer the sort of recordings Raphoff had in mind.

Raphoff quickly recovered his loyalty to the Gramophone Company and even made some suggestions. It was imperative to record other big stars: Chaliapin, for one, and the Figiers. Johnson's paper labels must be enhanced to make this series even more impressive—perhaps a scarlet background would lend the right note of opulence—and the price must be raised radically. Each one of these suggestions was implemented before long.

Three days later, Gaisberg was in London, making his first ten-inch masters. Soon, though, he was back in Russia. With the music season over in St. Petersburg, he went to Moscow, where he cut 67 masters

in five days, mostly in the large format. Some featured the singers he had recorded in April, but among the new operatic names were those of Alexander Davidov and Joachim Tartakov. Gaisberg was able to record major gypsy singers as well, but the great Chaliapin—already a major star, though newly risen—still eluded him.

In March 1902, Gaisberg and his brother Will went to Italy. Will had been hired, at Fred's insistence, a few months before; with the business growing so quickly, the company needed more top-notch recorders. At La Scala in Milan, a young tenor named Enrico Caruso was beginning to make a name for himself. Fred knew instantly that the voice would record superbly. Ignoring the cabled prohibition of William Barry Owen, the Gramophone Company's managing director, Gaisberg lured Caruso into his hotel-room studio with the promise of £100 for ten selections, which he paid out of his own pocket. All ten masters seemed perfect. But lest they be spoiled in transit, and the brothers incur the company's wrath for their foolhardiness, Fred and Will carried the waxes out of Italy themselves for processing in the Hannover plant (the foundation of today's Deutsche Grammophon). The ten records were ready for sale in London when Caruso arrived in May for his Covent Garden debut, and one or more of them were said to have convinced the Metropolitan Opera to hire him for the coming New York season. All in all, Gaisberg was amply forgiven his transgression, though only the company and the singer were to get rich from the proceeds it ultimately generated.

On the strength of Caruso's records and rapidly growing international acclaim, other European stars started drifting toward the recording horn. Pol Plançon, Antonio Scotti, and Emma Calvé (among the names best remembered today) began the parade. Landon Ronald, a young conductor/pianist well connected in musical circles, had been recruited by Gaisberg to ease the stars into the Maiden Lane studio; once they arrived, Ronald saw to their comforts and their accompaniment, while the Gaisbergs saw to their waxes.

By the summer of 1902, Will Gaisberg was competent to record on his own. In fact, Fred always credited his brother with the greater talent as a recorder. So the Gramophone Company (or, more precisely at that period, the Gramophone and Typewriter Company—Owen doubted the future of the record business and felt it necessary to diversify) could send Fred out into the field while Will manned the

studio on Maiden Lane and, presently, the new and more respectable quarters on City Road.

On September 22, 1902, Fred set sail for an around-the-world recording junket that was to last almost a year. His assistant was George Dilnutt. They carried with them equipment especially designed for ease of transport and use on the road, away from such urban amenities as ready electrical sources. Wax blanks had been shipped ahead from England; once recorded, they were shipped back for processing in Hannover.

With or without the help of company agents, Gaisberg would bring local talent before the horn in his improvised studio (usually a hotel room) and try to capture the sense of the music in spurts of up to three minutes—not an easy task when a raga, for instance, could easily run to a quarter of an hour. He would go out on the town (an unfamiliar one, often with an unfamiliar language) and discover the hot acts for himself. In this, as in everything, his resourcefulness seemed endless.

By August, 1903, when Gaisberg returned to London, several important changes had taken place. Will had recorded the aging Francisco Tamagno, the tenor who had first sung Verdi's *Otello*, on 12-inch discs (a size Fred had never seen) under a contract in which the company lawyers had allowed the artist three firsts: royalties (in addition to a £2,000 advance), a proprietary label (green) for the records, and a premium price (£1). This was to set the pattern for the major stars of the music world, each of whom would want a unique label color and a selling price higher than anyone else's.

Nellie Melba, whom Gaisberg was to record both in her London home and at City Road, agreed to a test in 1904. She added a new condition: A 50-piece orchestra had to be squeezed around the recording horn, set up in her drawing room. By October, she had been cajoled into the City Road studio. Once Melba had capitulated, there were few closed doors left to open.

The legendary Adelina Patti stood behind one of them. Essentially retired at sixty-two and living in a Welsh castle, she finally consented to give recording a try. Dragging the equipment into the wilds of Wales in December 1905 was more trying than bringing it to Melba's house in Great Cumberland Place. But when Fred and Will arrived, they were treated with an understanding, if condescending, courtesy unknown to the caustic and touchy Melba.

Patti, too, had her little ways, however. For two days, she looked at the Gaisbergs'

equipment from time to time but made no move to record. Then, for the next four, she devoted one hour a day to the task. Of the resulting 21 masters, 14 were issued (with special pink labels; Melba's had been lilac). All things considered, it was a good ratio. Fred was invited back for a second series the following summer.

In June 1907, Gaisberg staged the first composer-directed complete recording of a major opera: *Pagliacci*. House conductor Carlo Sabajno was the actual conductor, but Gaisberg persuaded Ruggero Leoncavallo to sit through the sessions as technical adviser. The music was chopped into three- and four-minute segments and re-

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## Fred knew instantly that Caruso's voice would record superbly.

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corded on 10- and 12-inch sides, whichever was most efficient. Continuous playback of the mixed record sizes, sometimes arbitrarily coupled for double-sided issue, was something of a chore. Still, it was a major step forward in operatic recording and one that Gaisberg was to build on with Pietro Mascagni and *Cavalleria rusticana* in 1916.

Luisa Tetrazzini, Mattia Battistini, Titta Ruffo, Celestina Boninsegna, Fyodor Chaliapin, Leo Slezak, Maria Galvany, Ignace Jan Paderewski (who sent roses to Gaisberg's mother, then living in London, whenever he was in town), Jan Kubelik, Arthur Nikisch—these and so many more chained into the vast galaxy of stars Gaisberg recorded, many for the first time. That is, until the world suddenly changed.

The outbreak of war in August 1914 cut the company off from the Hannover pressing plant. Fortunately, the new facility in Hayes, Middlesex, had just been completed. But the Riga plant that had supplied the company's most lucrative market—Russia—was at risk if Germany were to sweep across Poland and attack the Czar. Astonishingly, Gaisberg continued to crisscross Europe, despite the war. In July 1915, he took his last shot at recording in Russia; despite chaotic conditions, he made some 200 masters in Tiflis, but they all disappeared in transit. He was back in the fall, desperately attempting to move the Riga equipment to St. Peters-

burg. In the end, however, the operation was doomed by the Russian Revolution, as Gaisberg had come to realize even before the fact.

In October 1918, seeing that the War to End All Wars was drawing to a close and that there might never again be an opportunity to do so, Will Gaisberg took recording equipment into the trenches near Lille to capture the awful sound of war before it disappeared forever. It cost him his life. At the front, he was gassed, which weakened his constitution and made him easy prey to the influenza epidemic when he returned to London. Will's death was a terrible shock to the family, but particularly to Fred, who felt responsible for having drawn him into the calling that had claimed his life. Adding to his distress, Fred was not even with Will when he died. He had been in Italy for months—among other things, making the first recordings of Private Beniamino Gigli and seeing a new pressing plant into production.

In the years following the war, the techniques of recording grew ever more accomplished. The business side remained much as it had been before the war, though the names were gradually changing. Gaisberg was changing, too, growing less interested in recording technique than in the artists he recorded, many of whom had become close friends. It was to him that Chaliapin applied for help when he and his family finally escaped from Russia in 1921. Tetrazzini, Ruffo, and others needed Gaisberg's support in the twilight of their careers and knew they could rely on him to give it.

But when 1925 arrived, Gaisberg found himself suddenly in the twilight of his own career. The new electrical process had, in one swipe, made obsolete all the knowledge of the recording art he had so painstakingly acquired. His interest in the artists remained, and he continued in the International Artists Department of the company (now known as His Master's Voice and soon to be part of EMI) until his retirement in 1939. But it wasn't really the same. By 1942, when he wrote his memoirs, his native modesty had devolved into self-doubt; he repeatedly resorted to name-dropping to establish his credential with readers living in a world that he passed him by.

But it was a world that could not have been as it was without Fred Gaisberg. Without his energy, charm, persist and commitment, the history of recording and of the world's acceptance of it as a full vehicle for musical communion would have unfolded differently, more slowly, more shabbily. What he accomplished was staggering.



## MINI-REVIEWS OF THE LATEST COMPACT DISCS

By Robert E. Benson, David Hurwitz, Robert R. Reilly, Terry Teachout, and James Wierzbicki

### SAINT-SAËNS "SAMSON ET DALILA": PARIS OPERA, PRÊTRE

This performance of *Samson et Dalila* is one of the greatest specimens of French opera ever preserved. Recorded in 1962, it sounds as good as new on CD. Jon Vickers and Rita Gorr throw themselves into their roles with an intensity that makes something very real out of these biblical characters. In these days of virtuoso conductors, one often forgets that, in the final analysis, it's the singing that makes or breaks opera performances. And this is superb singing. Georges Prêtre and the Paris Opera Orchestra stay out of everyone's way with genuine distinction. An indispensable two-CD set. Playing time: 111:00. (Angel EMI CDCB 47895.) *D.H.*

### STRAVINSKY WORKS: ORPHEUS

This "new" recording by the conductor-less Orpheus Chamber Orchestra, which couples the 1947 version of Stravinsky's *Pulcinella* Suite with his *Dumbarton Oaks* Concerto and Eight Instrumental Miniatures, seems to be a Deutsche Grammophon reissue of a 1982 recording originally released on Pro Arte and still listed in the catalog. Whatever the source, the results are delightful, the playing full of charm and crisp finesse. The *Pulcinella* Suite is completely banded, but the Eight Instrumental Miniatures are crammed onto a single eight-minute track. Playing time: 45:59. (Deutsche Grammophon 419 628-2.) *T.T.*

### MOZART CLARINET QUINTET, CONCERTO: SHIFRIN

A special feature of this new recording of Mozart's Clarinet Concerto (K. 622) and Clarinet Quintet (K. 581) is David Shifrin's use of an authentically reconstructed Mozart clarinet, the extended-range instrument for which Mozart wrote these two pieces. But the real attraction is the mellifluousness of Shifrin's performance. These works are so beautifully played that there is a sort of dreaminess about them. Some may prefer a heartier sound, but I am happy to bask in the serenity and loveliness offered by the mostly Mozart Chamber Orchestra (conductor Gerard Schwarz) and the Northwest are elegantly

poised and rhythmically alert—perfect partners for Shifrin in the concerto and the quintet, respectively. Delos's superb sound makes this CD irresistible. Playing time: 62:09. (Delos DCD 3020.) *R.R.R.*

### BACH FANTASIAS: KIPNIS

Titled *The Complete Fantasias of Johann Sebastian Bach*, Igor Kipnis's latest recording is all that and more. *The New Grove Dictionary of Music and Musicians* lists only four keyboard pieces that feature the word "fantasia" in their titles (B.W.V. 903, 904, and 906, plus 903a, an early version of 903); *Grove's* list of works attributed to but probably not actually written by Bach, on the other hand, contains three fantasia-fugue couplings and at least a half-dozen isolated fantasias. Kipnis performs the four authentic pieces on this recording, and, to fill out the disc, he mixes them with five of the doubtful works (B.W.V. 917, 918, 919, 922, and 961—the latter, properly speaking, a fughetta) plus the genuine but hardly fantasialike Fugue in A minor (B.W.V. 944).

The music, then, is somewhat inconsistent—but not Kipnis's performances. Doubtless guided by the idea that, in Bach's day, the word "fantasia" denoted not only a musical form but also a manner of playing, he injects into these pieces a very large measure of rhythmic freedom. Whether written by Bach or not, the fantasias indeed sound like inspired improvisations, and even the fugues benefit, to a certain extent, from Kipnis's feigned impetuosity of phrasing and ornamentation. The excellent recorded sound is especially vibrant in the four pieces Kipnis plays on clavichord (B.W.V. 919, 922, 961, and 903a). Both the clavichord and harpsichord heard here were built by Carl Fudge, of Boston, after German models. Playing time: 65:59. (Arabesque Z 6577.) *J.W.*

### BRITTEN CHORAL WORKS: KING'S COLLEGE CHOIR

An admirable idea, recoupling all of the King's College Choir recordings of Britten's choral music onto a tightly packed CD. The music is wonderful, and the performances of *A Ceremony of Carols*, *Rejoice in the Lamb*, *Hymn to St. Cecilia*, the

*Missa brevis*, and two shorter pieces—conducted by Sir David Willcocks and Philip Ledger—are virtually perfect. In the initial remastering of this disc, the final refrain of *Hymn to St. Cecilia* was omitted. Angel subsequently recalled the defective stock, and the CDs on sale now should be complete. Playing time: 71:15. (Angel EMI CDC 47709.) *T.T.*

### HOLST "SĀVITRI": CITY OF LONDON SINFONIA

Holst's chamber opera *Savitri*—scored for three singers, women's chorus, and 12 instruments—is one of his most perfect works. The music and Holst's own text (based on the *Mahābhārata*) create an atmosphere of mystery, simplicity, and sober beauty in this story of a woodcutter's wife who cheats Death into restoring the life of her husband. Soloists Felicity Palmer, Philip Langridge, and Stephen Varcoe sing with eloquence and restraint; Richard Hickox directs the City of London Sinfonia and his own women's chorus. As a lovely filler to the opera, which lasts a mere half-hour, soprano Patrizia Kwella joins Hickox and the orchestra in "The Dream-City," a cycle of ten songs to texts by Humbert Wolfe arranged and orchestrated by Colin Matthews from Holst's Twelve Songs, Opus 48. Hyperion's production values are, as usual, exemplary, and its support of unusual but worthwhile repertory gratifying. Playing time: 58:03. (Hyperion CDA 66099. Distributed by Harmonia Mundi, U.S.A.) *D.H.*

### DVOŘÁK STRING QUINTET: PORTLAND QUARTET, KARR

Dvořák gave the double bass its chance to sing in his early Quintet in G for strings and double bass. It is an endearing work that I came to love in a recording by the Berkshire Quartet and Murray Grodner on the Vox label. A new Arabesque CD has taken its place in the catalog, offering a fine performance by the Portland String Quartet and Gary Karr. This account has the distinction of restoring the quintet to its original five-movement form by reinstating the first of two slow movements, and the CD sound is certainly an improvement over the Vox LP sonics. However, a heavy emphasis on the bass muddles the string texture, and the balance is some-

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what unnatural. Arabesque has coupled the quintet with Dvořák's famous String Quartet No. 12, in F major (*American*), to make this generous offering more appealing to those who might not otherwise risk the investment to hear an early—and now fully restored—piece by this lovable master. Playing time: 65:52. (Arabesque Z 6558.) R.R.R.

### HINDEMITH "MATHIS DER MALER": HORENSTEIN

Jascha Horenstein's London Symphony recordings of Hindemith's symphony *Mathis der Maler* and Richard Strauss's *Death and Transfiguration*, formerly available in this country on Nonesuch, have been reissued by Chandos. Better recordings of the Strauss are easy enough to find on CD, but Horenstein's *Mathis* is a first-rate performance, straightforward and unhurried. The digitally remastered sound is slightly congested at climaxes but otherwise satisfactory. A welcome addition to the dismally small list of works by Hindemith on CD. Playing time: 51:05. (Chandos CHAN 8533. Distributed by Harmonia Mundi, U.S.A.) T.T.

### BRAHMS PIANO MUSIC: LUPU

Radu Lupu's analog recordings of the Brahms Opus 79 Rhapsodies and the last three volumes of piano pieces (Opuses 117–119) have been remastered and recoupled on a London CD. The performances are handsome, though rhythmically stiff in places and scarcely as memorable as the truly remarkable playing heard on Van Cliburn's *My Favorite Brahms* recital on RCA, long overdue for transfer to CD. The sound is unpleasantly tubby on the earlier sessions and very good (though full of grunts, groans, and squeaks) on the later ones. Playing time: 70:56. (London 417 599-2.) T.T.

### MENOTTI "AM AHL AND THE NIGHT VISITORS"

Gian Carlo Menotti's *Amahl and the Night Visitors*, the most frequently performed opera in the world, now appears on CD as part of RCA's Gold Seal budget line. This original-cast performance was recorded shortly after the premiere, which was broadcast by NBC on December 24, 1951. The performance, conducted by Thomas Schippers under Menotti's direction and featuring Chet Allen in the title role, remains exemplary. The digitally remastered mono sound is good enough. *Amahl* itself is still the same old opera: sweet, amiable, well made, and frankly manipulative, but surprisingly moving all the same. If you liked it then, you'll like it now. A libretto is included, and each number is separately banded. Playing time: 46:19. (RCA 6485 2 RG.) T.T.

### PROKOFIEV "CINDERELLA": LONDON SYMPHONY, PREVIN

Prokofiev's *Cinderella* lacks the symphonic continuity of his *Romeo and Juliet*, so a disc of highlights makes sense, especially when it contains more than 70 minutes of music. This performance by André Previn appeared at the same time as Vladimir Ashkenazy's account of the complete ballet, available on a two-CD set from London. Previn is warmer, Ashkenazy more brilliant and acerbic, and the recorded sound matches the respective interpretations. The choice, then, is whether to opt for the complete ballet or excerpts—either way, the music is delightful in Prokofiev's romantic yet gawky manner. Playing time: 70:58. (Angel EMI CDC 47969.) D.H.

### WEILL-BRECHT-BLITZSTEIN: "THE THREEPENNY OPERA"

Marc Blitzstein's English-language adaptation of *Die Dreigroschenoper* ran for 2,707 performances off-Broadway between 1954 and 1961. The original-cast album, newly transferred to CD, enshrines a few still-vital performances, notably Beatrice Arthur's "Barbara Song" and Lotte Lenya's "Pirate Jenny." Tastes in Weill style have changed, though, and the Blitzstein translation is likely to strike modern ears as euphemistic, the production as well-meaning but bland. The mono recording, digital remastering notwithstanding, is dismayingly flat and bass-shy.

There are three other *Threepenny* recordings in the catalog that should have been transferred to CD before this superannuated relic: Lotte Lenya's complete version in German (CBS Masterworks M2 37864); the New York Shakespeare Festival performance, which uses a new translation (CBS Masterworks PS 34326); and the *real* original-cast version with Lenya, transferred from the original Telefunken 78s on Teldec 641991. Any of these would have been an improvement over the present performance. Playing time: 53:07. (Polydor 820 260-2. Distributed by Polygram.) T.T.

### SCHUBERT "UNFINISHED": CONCERTGEBOUW, HAITINK

There is glorious music-making in these Schubert performances—the musicians sound as if they were all truly enjoying themselves. Bernard Haitink's account of the Eighth Symphony, in B minor (*Unfinished*), D. 759, is one of the most glowing ever recorded, and the same affection is evident in his extraordinary performance of excerpts from *Rosamunde*, D. 797. The original *Rosamunde* LP from which this material was gathered included three additional choruses and a romance for contralto, but to accommodate the limited space on this coupling, the reissue producers selected the seven purely orchestral

movements, which include all of the familiar music. The symphony was recorded in 1975 and *Rosamunde* in 1965, but the recorded sound for both is among the most natural the Philips engineers have ever achieved in the Concertgebouw, with sonorous low strings, clarity, and a wonderful depth and perspective that have been missing from many recent digital recordings. This CD is essential to any orchestral collection. The near-maximum playing time and budget price make it even more attractive. Playing time: 69:29. (Philips 420 715-2.) R.E.B.

### SUSANN MCDONALD: "HARP SPECTACULAR"

Susann McDonald is a virtuoso harpist who can coax a wide variety of seductively rich sounds from her instrument; one can only wonder at her extraordinary dexterity. The high point of this well-filled disc is a transcription by Henriette Renié, McDonald's teacher, of Liszt's Concert Etude in D flat for piano. Also included are two other transcriptions and two original works by Renié. Music of Fauré, Glinka, Godefroid, Hovhaness, Salzedo, Tournier, Prokofiev, and Pierné fills out this CD. Though these are analog recordings, the reproduction is stunning by any standards, with virtually nonexistent background noise and remarkable dynamic range. Highly recommended for both musical values and sonic quality. Playing time: 64:35. (Klavier KCD 11004. 4475 Vineland Ave., North Hollywood, Calif. 91602.) R.E.B.

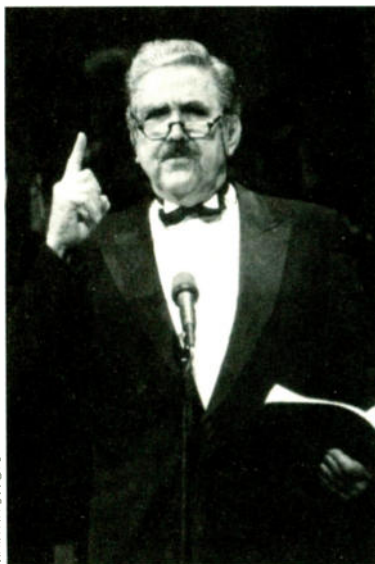
### DEBUSSY "PELLÉAS": BERLIN, KARAJAN

Debussy's *Pelléas et Mélisande* is one of the greatest and most hauntingly beautiful of operas. It's also extremely elusive, since much of the action occurs at a very subdued dynamic level. In live performances of this work, with the ambient distractions of restless, bonbon-sucking operagoers, it's often impossible to focus on the stage with the necessary concentration; on record, the clicks and pops of vinyl provide the home equivalent of the cellophane candy wrapper. In short, the piece was made for CD—and now we have it, in a three-CD reissue set from Angel EMI.

*Pelléas et Mélisande* can be counted among Herbert von Karajan's finest opera recordings. Although his slow tempos and occasional tendency to swamp the singers may annoy some listeners, he has cast this opera from strength. Richard Stilwell is an ardent Pelléas, Frederica von Stade a touching Mélisande, and José Van Dam a thoughtfully tortured Golaud. The Berlin Philharmonic plays with customary finesse, and the sound is very good—and very quiet. Playing time: 162:08. (Angel EMI CDCC 49350.) D.H.

# Satirical GERSHWIN

MARTHA SWOPE



The cast, all Broadway-bred, came to the recording fresh from performances in Brooklyn.

## GERSHWIN: *Of Thee I Sing*; *Let 'em Eat Cake*.

McGovern, Kert, Gilford; Orchestra of St. Luke's, New York Choral Artists, Thomas. CBS M2K 42522 (D, 2). ©

In the late 1920s, the Gershwins turned from their usual carefree approach to the musical stage to try their hand at satire—once defined by George S. Kaufman as “what closes on Saturday night.” With Kaufman contributing to the book, they penned *Strike Up the Band*, in which the United States declares war on Switzerland over the price of cheese. The show failed on the road before it ever reached Broadway the first time around, in 1927; resuscitated in 1930 (with revisions to the book by Morrie Ryskind), the show opened at the Times Square Theatre but still didn't last very long.

Even so, the Gershwin brothers decided to try satire again, this time with Ira keeping an ear on the lyrics of William S. Gilbert. The result, with a book by Kaufman and Ryskind, was *Of Thee I Sing*, a show about the presidential campaign of one John P. Wintergreen, who runs—and wins—on the “Platform of Love.” In the Gershwins' hands, it was more a comic op-

era than a musical, and it didn't close on Saturday night; starting on December 26, 1931, it ran for 441 performances and went on to win the Pulitzer Prize for drama.

From the opening campaign song “Wintergreen for President” (the choral setting of which anticipates the complexities of *Porgy and Bess*) through such beguiling tunes as “Love Is Sweeping the Country,” “Who Cares?,” “Because, Because,” and “The Illegitimate Daughter” (with its allusions to *An American in Paris*), the score sounds as fresh as ever. The 1933 sequel, *Let 'em Eat Cake*, was put together by the same set of collaborators and featured the same stars, but despite its almost wearily ingenious score—the most elaborate George had ever attempted—the public didn't go for it. The story line, in which the same characters deal with an attempted homegrown fascist takeover of the American government, hewed a little too closely to actual events of the day in Europe to be comfortably amusing. Die as it did, *Let 'em Eat Cake* yielded such treasures as the enduring love song “Mine.” Hearing the rich, melodic development of this work today, the level of musical sophistication Gershwin was

able to achieve is surprising. No wonder he called it the best work he had yet done—and his “composer's claim to legitimacy.”

These scintillating accounts from Michael Tilson Thomas, the New York Choral Artists, and the Orchestra of St. Luke's fill a noticeable gap in the catalog and go much farther than earlier attenuated efforts to reflect the richness of the two scores. In the case of *Of Thee I Sing*, the recent discovery of the missing original orchestrations has made it possible to present the music much as it first sounded on Broadway; *Let 'em Eat Cake*, with its original orchestrations still missing, has been restored as faithfully as possible with the help of George Gershwin's colleague Kay Swift.

It is a pleasure to be able to report that, for once, there are no opera singers on hand to distort or inflate the musical-comedy qualities in either of these productions. The cast, all Broadway-bred, is the same one that revived both pieces at the Brooklyn Academy of Music early in 1987 to mark the 50th anniversary of George's death. Thomas, fresh from conducting both scores at BAM, along with several Gershwin television specials, breathes

glowing life into the proceedings. Larry Kert, in fine voice as President John P. Wintergreen, cannot quite rival William Gaxton's original treatment of the role; nor can Jack Gilford, droll as he is, come close to Victor Moore's fumblingly funny Vice-President Alexander Throttlebottom. But both men are engaging enough, and Kert, of course, can really sing. Maureen McGovern, with all those lovely melodies to warble as Mary Turner, is splendid, while Paige O'Hara sings convincingly in a comic French accent as the beauty-contest winner Diana Devereaux in *Of Thee I Sing*, and with just the right drawl as Trixie Flynn in *Let 'em Eat Cake*. Most vigorously satisfying are the contributions made by the members of the excellent chorus and orchestra, who are kept relentlessly busy performing passages of uncommon complexity and difficulty for musical comedy—especially in the stunning sustained finales that distinguish these scores from those of any other musicals of the period. Playing times: *Of Thee I Sing*: 69:00; *Let 'em Eat Cake*: 74:29.

Paul Kresh

**BEETHOVEN: Piano Concerto No. 4, in G, Op. 58; 32 Variations on an Original Theme, in C minor, WoO. 80.**

Arrau; Dresden State Orchestra, C. Davis. Volker Straus, prod. Philips 416 144-2 (D). ©

Evaluating an artist of Claudio Arrau's stature poses special problems for a critic. Arrau has been a presence on the international concert scene for more than six decades. During that time, he has brought music to millions of listeners whose lives are richer for having heard him. He has established himself as a penetrating interpreter of Beethoven through countless performances of uncompromising integrity. Set against this lifetime of musical dedication and achievement, any criticism would appear to count for little—and that is as it should be. Arrau has earned the right to have his latest thoughts on Beethoven's most profound piano concerto recorded for posterity.

How gratifying, then, that those thoughts remain as relevant and penetrating as ever. Arrau was eighty-one when he recorded this performance of the Piano Concerto No. 4, and his technical prowess was still such as compels admiration. The first thing one notices is the sheer beauty of tone he draws from the piano. Every chord gleams from top to bottom, and the

sound never becomes brittle, despite the closely placed microphones. Indeed, so gorgeous are the sounds Arrau produces that it is easy to forget that he places himself entirely in the service of the music. The first movement proceeds at a measured pace, its elegiac serenity given more weight than usual and its Mozartean elements minimized. Arrau's natural seriousness of expression suits the slow movement especially well, and the icy darkness



Arrau: *Commandeur de la Légion d'honneur*

at its close is unforgettable. If the finale seems more dogged and determined than truly happy, it nevertheless follows inevitably from what has come before. The thrilling orchestral response supports this viewpoint.

Colin Davis and the Dresden State Orchestra collaborate as full equals with Arrau, providing an altogether outstanding foil for his distinctive interpretation. The recording, which was made in collaboration with East Germany's VEB Deutsche Schallplatten, is one of Philips's best. The 32 Variations in C minor makes an appealing encore to a probing and profound musical journey. Playing time: 50:06.

David Hurwitz

**BRAHMS: Sonatas for Clarinet and Piano, Op. 120: No. 1, in F minor; No. 2, in E flat.**

Leister, Oppitz. Wolf Erichson, prod. Orfeo C 086841 (D). © (Distributed by Harmonia Mundi, U.S.A.)

I have the impression that a clarinet as sonata partner for the piano bothers the majority of people. With its lack of the vibrato that enhances the timbre of stringed and other wind instruments, the clarinet remains a bit aloof, a bit cool. For the open-minded music lover interested primarily in high-quality performances of great music, this disc ought to overcome a few such prejudices.

These sonatas—Brahms's valedictory to instrumental composition—contain some of his richest and most mature music. If you have yet to discover them, you should seize this opportunity, for you may never hear them better performed. Orfeo, to its shame, provides not one word about the two remarkable artists who collaborate on them here. I remember Karl Leister, with admiration, from numerous live concerts as the exemplary first clarinet of the Berlin Philharmonic. Gerhard Oppitz won first prize at the second Arthur Rubinstein International Competition in Israel—and the fact that a young German won that prize ought to tell you a good deal about his gifts.

I wish I could wax enthusiastic about the recording itself, which comes as a surprise from this customarily excellent label. Oppitz's Bösendorfer sounds slightly muffled, and the music comes through with such a heavy leaven of bass that it forced me to adjust my system to compensate—something I almost never need to do. Playing time: 44:35.

Paul Moor

**BRITTEN: Songs.**

Luxon, Willison. Brian Couzens, prod. Chandos CHAN 8514 (D). © ABRD 1224. © ABTD 1224. (Distributed by Harmonia Mundi, U.S.A.)

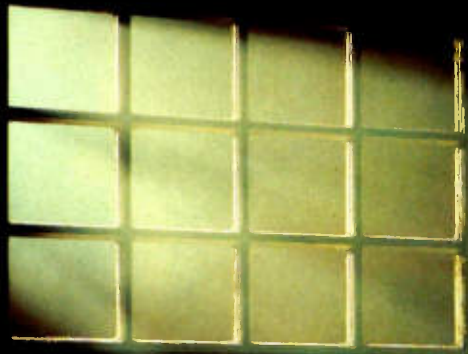
*Five British Folksong Arrangements (Lemady: Bonny at Morn; I Was Lonely and Forlorn; Lord! I Married Me a Wife!; She's Like the Swallow); Three Early Songs (Beware; O That I'd Ne'er Been Married; Epitaph: The Clerk); Tit for Tat (five songs to poems by Walter de la Mare); Three British Folksong Arrangements (O Waly, Waly; Sweet Polly Oliver; The Salley Gardens); Songs and Proverbs of William Blake, Op. 74.*

The passage of time since Benjamin Britten's death in 1976 makes the magnitude



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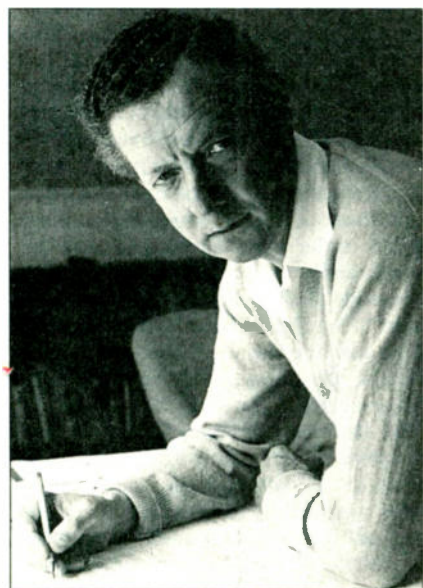
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of his genius ever clearer. This selection, taken from the numerous songs he wrote, provides a striking sampler from the beginning to the end of his creative life.

Britten wrote the substantial (23:46) Blake cycle fairly late—Dietrich Fischer-Dieskau sang its world premiere in Aldeburgh in 1965. It shows Britten dipping a tentative toe into the modish waters of dodecaphony; the last of the 14 songs even contains a tone row. At the other extreme, we have some youthful, even juvenile, efforts Britten excavated late in life but still judged worthy of publication. He wrote one of them at the amazing age of nine and another at ten, but you'd never guess it to hear them. The first five folksong settings come from eight he did during the last



Britten: the master at work

summer of his life; the other three, by now almost classics, come from the collections he published in the 1940s.

Benjamin Luxon has almost everything one could wish for in a baritone: a rich voice with a robust vibrato but not a trace of tremolo, the intelligence to accord the text as much attention as the music, the diction to make the poetry comprehensible, and the dramatic ability to act out the songs in the best sense of the term. David Willison's expertise at the piano results from 25 years of collaboration with this exceptionally fine singer. Playing time: 54:09. *Paul Moor*

**BYRD: In tempore paschali; Regina coeli; In Assumptione Beatae Mariae Virginis; Ave Regina caelorum; Ave Regina.**

*Chanticleer. Robina Young, prod. Harmonia Mundi HMC 905182 (D).* © HMC 5182. © HMC 405182.

Harmonia Mundi, the French record label that prefers to lower-case its name, shows

its imaginative heterodoxy in other ways as well. When it came to establishing an American branch, René Goiffon, president of Harmonia Mundi, U.S.A., and Robina Young, its artistic director, gave the effete East Coast the go-by in favor of Los Angeles—conceivably because its Provençal climate resembled that of Arles, the parent company's own unorthodox home base. They also set about finding outstanding, undiscovered musical ensembles on the West Coast. Here we have their first recording of Chanticleer, San Francisco's first-class male chamber chorus, which takes its name from Chaucer's rooster in *The Canterbury Tales*.

William Byrd (1543–1623), one of the greatest composers of his day and a Catholic, had to lead a furtive life because of his religion, but the favor of a rich Catholic patron, Sir John Petre, permitted him not only to survive but to flourish. He composed much of his music expressly for performance at clandestine celebrations of the mass in chambers off-limits to everyone but the Petre family and a few trusted outsiders. Since Chanticleer performs these settings with only a dozen singers, we hear them much as the Petres probably did.

San Francisco's Symphony and Opera have recently had to move over to make room for Chanticleer, which hit the international big time with a successful appearance at the 1986 Salzburg Festival. Purity of style, musical sensitivity, beauty of timbre, and sumptuous recording make this a disc to cherish for connoisseurs of this period and of choral singing in general. Playing time: 51:19. *Paul Moor*

**CRUMB: An Idyll for the Misbegotten\*; Vox balaenaef; Madrigals, Books I–IV\*\*.**

*Mueller\* †; Gottlieb\*; Herman\*: Payson\*; Sherry†; Gemmell†; DeGaetani\*\*; the University of Pennsylvania Chamber Players, Wernick\*\*.* *Marc Aubert and Joanna Nickrenz, prods. New World NW 357-2 (D, A).* ©

In an era when composers have taken to switching styles almost as easily as square dancers switch partners, George Crumb stands apart as one who has held steady for a full quarter-century. That's not to say he has been wholly successful. Yet, since Crumb first attracted attention in 1962 with his *Five Piano Pieces*, the vast majority of his compositions have employed more or less the same means to accomplish more or less the same ends. His music has been consistently rich in sonic effects that are not only colorful in themselves but evocative of mysterious imagery. In the same way, it has been built of gestures whose expressive content is unequivocally human and whose timing is unerringly right. Crumb has yet to attempt an opera,

but his music—the purely instrumental works as well as those that involve texts—is among the most theatrical of our time.

That Crumb's aesthetic has changed little over the years is especially evident from this recording. Two decades separate the first two books of the *Madrigals* (1965) from the nine-and-a-half-minute rhapsody for flute and three bass drums titled *An Idyll for the Misbegotten*. The *Vox balaenae*, or *Voice of the Whale*, dates from 1971. Discounting the variations in quality of recorded sound, a listener not privy to the chronology would be hard-pressed to guess it. The specific timbres and the intensities of the gestures are, of course, different, but not the subtlety with which they are manipulated—and certainly not




DeGaetani has set the standard for Madrigals.

the sureness with which they are positioned within their respective time frames. The new piece is as ear-catching and haunting as the older works; along with demonstrating how little Crumb's writing has changed, this package demonstrates how little his writing has *needed* to change in order to remain potent.

The *Madrigals* recording, featuring soprano Jan DeGaetani, is a relatively noisy analog one from 1969, originally issued on the Acoustic Research label; *Vox balaenae* was recorded digitally in 1985 but mixed with analog equipment. Only the *Idyll* is all-digital and entirely free of tape hiss. A much cleaner recording of *Madrigals* can be found on a 1985 BIS CD (BIS CD 261, with mezzo-soprano Anne-Marie Mühle), and a slightly more leisurely one from 1974—featuring Elizabeth Suderburg, for whom the first two books were written—was until recently available on Turnabout (TV-S 34523). But DeGaetani's vintage handling of the vocal lines remains unsur-

passed in terms of dramatic force and communicative depth. The performance of *Vox balaenae* by flutist Zizi Mueller, cellist Fred Sherry, and pianist James Gemmell is every bit as vivid and well-paced as that of the Aeolian Chamber Players on the 1974 recording for Columbia (M 32739); it is not a superior performance, though, and improved sound quality is its only real advantage. Playing time: 62:44. *James Wierzbicki*

**PROKOFIEV: Symphonies: No. 4, in C, Op. 47 (original version); No. 7, in C sharp minor, Op. 131.**

Orchestre National de France, Rostropovich. Michel Garcin, prod. RCA Erato ECD 75322 (D). 

Those for whom Mstislav Rostropovich's name represents the last word in interpretive excess should hear these poised, elegant—even restrained—performances of two of Prokofiev's least familiar symphonies. Since both works share a relationship with the composer's ballets, they make a logical coupling. The Fourth Symphony employs material originally earmarked for *The Prodigal Son*, itself an excellent and underappreciated piece. With the Seventh Symphony, the link to the later ballets is more one of style, especially in the second movement.

Rostropovich directs serious and thought-provoking performances of both works. His tempos tend to be slow, though never unduly so. This permits details to register most effectively: Listen to the pointed string phrasing, the rasping ponticello effects, the sharp sforzandi, and the muted horns and brass—all of those special sounds that make Prokofiev's orchestral universe so distinctive.

The Seventh in particular blossoms in Rostropovich's hands: He treats it as a fragile apotheosis of Prokofiev's characteristically bittersweet lyricism. Rostropovich reminds us that Prokofiev was a supremely gifted melodist, which is easy to forget. The work seems bigger, more serious, but also more intimate than ever before, with the original quiet ending perfectly appropriate in this context. The Fourth is brasher, less obviously attractive, but no less interesting. Rostropovich again emphasizes the work's curiously haunting melodic content, uncovering much beauty in the process.

L'Orchestre National de France plays very well, and Erato's recording is warm and rich, admirably suited to the performances. Prokofiev was one of Rostropovich's friends and mentors, and these sober performances speak eloquently of the respect and affection that must have characterized their relationship. The next installments in the cycle are eagerly awaited. Playing time: 61:50. *David Hurwitz*

## FORMAT KEY

- |  |   |
|--|---|
|  LP           |  Videocassette |
|  Cassette     |  Videodisc     |
|  Compact Disc |   |


### RECORDING INFORMATION

(A) Analog original (D) Digital original


Large symbol at left margin indicates reviewed format. Small symbols following catalog number of reviewed format indicate other available formats (if any). Catalog numbers of formats other than the reviewed format are printed only if their basic numbers differ substantially from that of the reviewed format.

Arabic numeral in parentheses indicates number of items in multi-item set.

**RUBINSTEIN, A.: Symphony No. 2, in C ("Ocean").**


 Slovak Philharmonic Orchestra, Gunzenhauser. Leos Komarek, prod. Hong Kong 8.220449 (D). (Distributed by Harmonia Mundi, U.S.A.)

**LIADOV: Orchestral Works.**

 Slovak Philharmonic Orchestra, Gunzenhauser. Leos Komarek, prod. Hong Kong 8.220348 (D). (Distributed by Harmonia Mundi, U.S.A.)

*Baba-Yaga, Op. 56; Intermezzo No. 1, Op. 8; About Olden Times, Op. 21b; The Enchanted Lake, Op. 62; Village Scene by the Inn, Op. 19; Nénie, Op. 67; Polonaise, Op. 49; Polonaise, in D, Op. 55; Kikimora, Op. 63; Fragment from "From the Apocalypse," Op. 66.*

**SCHUMANN: Concerto for Piano and Orchestra, in A minor, Op. 54; Introduction and Allegro appassionato, Op. 92; Introduction and Allegro, Op. 134.**

 Costa; Gulbenkian Orchestra, Gunzenhauser. Teije van Geest, prod. Hong Kong 8.220306 (D). (Distributed by Harmonia Mundi, U.S.A.)

As far as one can ascertain, these three discs mark the recording debut of a notable American conductor. Though his name might suggest otherwise, Stephen Gunzenhauser is indeed American, although like many American musicians, his musical training and experience are largely European. Currently, he is music director of the Delaware Symphony Orchestra, which, according to circulated reports, is rapidly turning into an ensemble of international caliber. The two orchestras he conducts on these three discs aren't necessarily of that rank (the Slovak Philharmonic, in these recordings at least, has a clearly undersized string section), but Gunzenhauser gets precise playing from them at every turn, and—most important—he injects a wholesomely positive personality into his interpretations.

The chief curiosity here is Anton Rubinstein's *Ocean Symphony*. Gunzenhau-

ser's is the first recording of the composer's definitive seven-movement edition of 1880. Even during his own lifetime (1829–94), Rubinstein was more highly regarded as a musical pedagogue than as a composer. But his works—particularly his Fourth Piano Concerto—always show a high degree of technical proficiency, melodic fecundity, and structural cohesion, if seldom top-drawer inspiration. It can't be said that the *Ocean Symphony*—especially in its Brobdingnagian seven-movement form—is anything much to raise one's pulse.

The barely informative liner notes state that the seven movements represent the seven seas. It is not indicated which movements depict which seas, but to these ears, there is little or no relationship between any of them and the vast expanses of the Atlantic, the Pacific, or even the Mediterranean. The symphony's first movement begins, promisingly enough, in the vein of Mendelssohn's *Hebrides Overture*, although it sounds a bit more inland—perhaps Rubinstein was thinking of the Black or Baltic seas, both of which at least have outlets to the ocean. From that point on, Rubinstein's tone-painting becomes increasingly landlocked. The indicated seas seem to be the Azov and the Caspian, along with the Russian lakes Aral, Baikal, Ladoga, and Onega. It's a case of diminishing currents throughout; each movement alternates between pomposity and pussyfooting without really succeeding on either level. Nevertheless, Gunzenhauser's committed conducting gives the work all the composer could have asked for, and the 70-minute-plus playing time is generous.

Much more rewarding is the disc devoted to orchestral works of Anatoly Liadov. Liadov (1855–1914) is perhaps best known as the man who *didn't* compose *The Firebird*—his legendary laziness got in the way, so Sergei Diaghilev replaced him with Stravinsky. However, Liadov was an accomplished composer of miniatures, and the ten pieces on this CD are exquisite gems of the short-tone-poem genre. Pure enchantment reigns over nine of them, while in the tenth, *Fragment from "From the Apocalypse,"* Liadov proved he could write music of epic stature in a relatively brief essay. If only this superbly performed disc included the *Eight Russian Folk Dances* and the *Musical Snuff-Box*, it would contain the complete Liadov canon. At a playing time of less than 60 minutes, it easily could have.

With its virtually no-name soloist and orchestra, Gunzenhauser's Schumann collection wouldn't seem to be of much interest at first glance. Nonetheless, from the conductor's point of view, these are wonderfully bracing performances that re-

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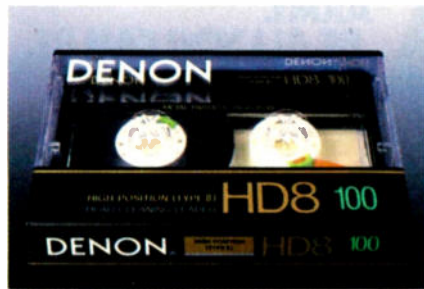


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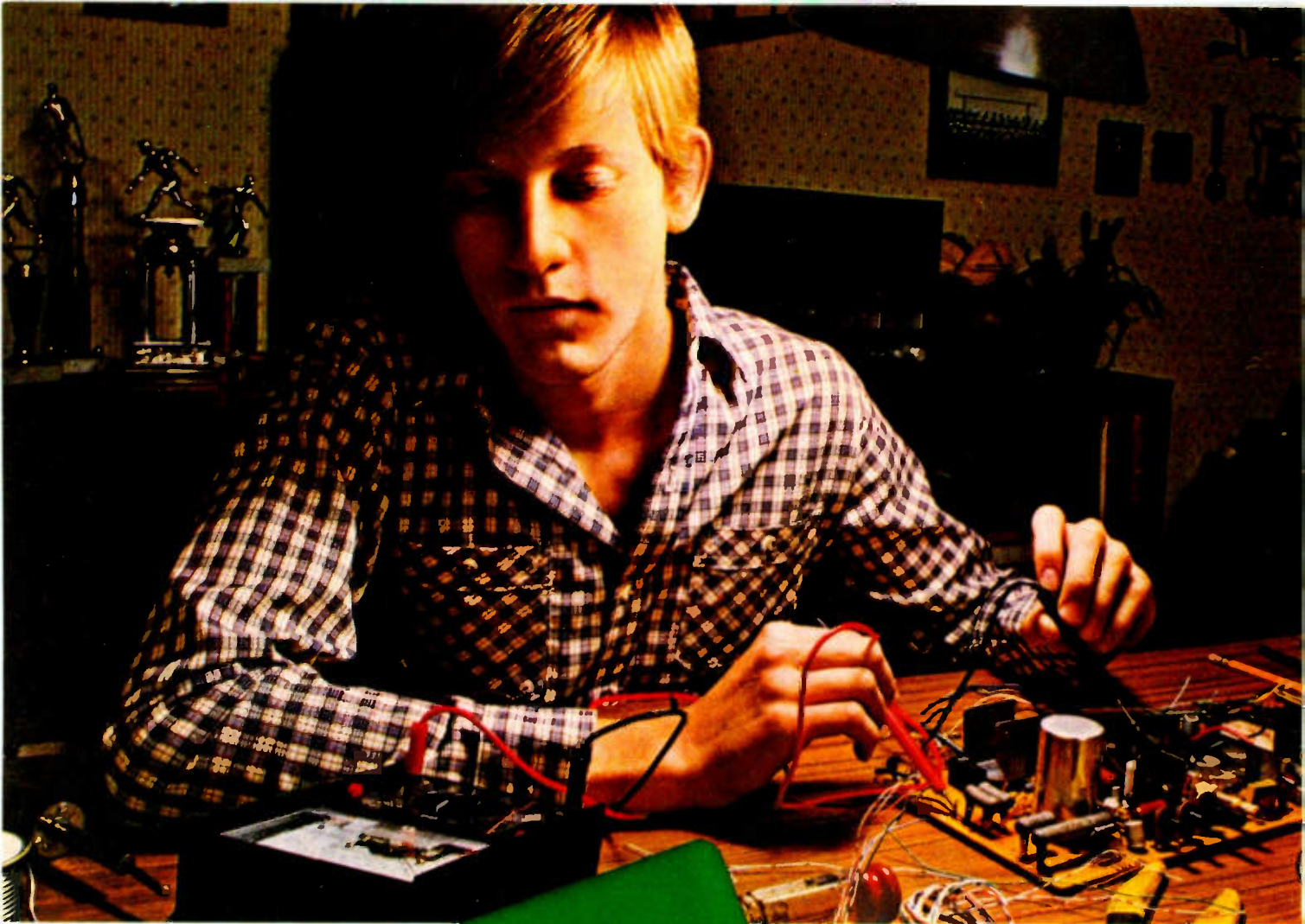
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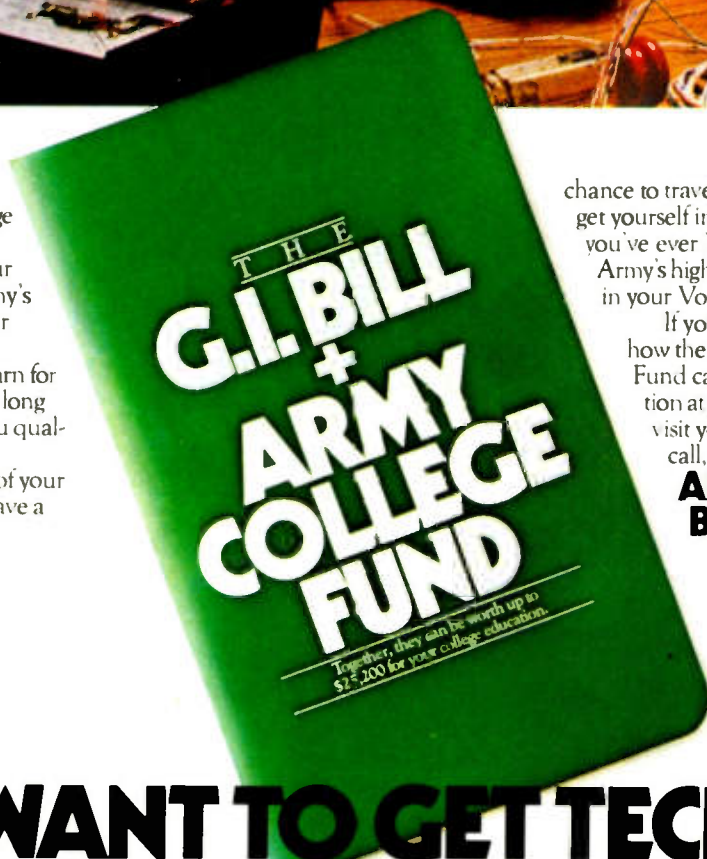
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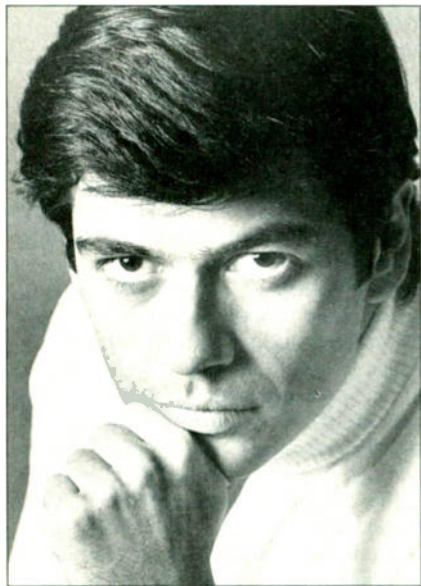
fresh the ear at almost every measure. In fact, if there's anything wrong with them, it's that Sequeira Costa's playing is not as freewheeling or elastic as Gunzenhauser's conducting. Nevertheless, the recording is well worth investigating. Though the collection rates only two thumbs up for intrinsic musical interest, it's decidedly three thumbs up for Stephen Gunzenhauser. More recorded examples of his conducting would seem in order. Playing time for Rubinstein: 72:39. Playing time for Liadov: 57:34. Playing time for Schumann: 57:41.

*Bill Zakariassen* [Effective at press time, Hong Kong Records will be shifting its releases of Western repertory to the Marco Polo label, reserving Hong Kong for Asian music. Depending upon the movement of stock in your local record store, you may find these three CDs under either imprint; the catalog numbers, however, will remain the same.—Ed.]

**SESSIONS: Symphony No. 4; Symphony No. 5; Rhapsody.**

*Columbus Symphony Orchestra, BADEA. Elizabeth Ostrow, prod. New World NW 345-2 (D).* Ⓞ

Roger Sessions was one of America's greatest symphonists, and the neglect of his work on records and in concert halls is



*A triumph for Badea and Columbus*

simply shameful. It's also understandable, since Sessions developed a totally distinctive style that happens to fall under the dreaded classification "atonal." This places him beyond the pale for most listeners and musicians. The problem, of course, is that there is good atonal and bad atonal.

Sessions is good atonal. In fact, it's just plain good music. The magnificent Fourth Symphony shows the composer masterfully handling his material to create coherent

emotional statements, just as in any other great music. The opening "Burlesque" is a satirical romp with motives that are easily recalled even after only casual listening. The second movement ("Elegy"), by turns subdued and angry, portrays two different states of grief. The concluding "Pastorale" grounds the tensions of the previous movements in a series of lyrical, yet oddly disturbing, episodes. Both the Fifth Symphony and the *Rhapsody* for orchestra are equally satisfying. This may be serious and difficult music, but it offers rewards in proportion to its difficulties—which is more than you can say for most modern classical music. Best of all, it's never dull.

Christian Badea and the Columbus Symphony turn in performances that are astonishing. The orchestra sounds absolutely world-class. Special praise must go to the violins for managing the perilously high writing so cleanly. It would be difficult to imagine a more impressive debut, either musically or technically, as the recording matches the quality of the playing. Dare we hope for a series? Playing time: 54:12.

*David Hurwitz*

**STRAVINSKY: Petrushka (original version, 1911); Symphony in Three Movements.**

*London Symphony Orchestra; Rozhdestvensky. Alan Wiltshire, prod. Nimbus NI 5088 (D).*

The *Oxford English Dictionary* defines nimbus as "a bright cloud, or cloudlike splendour, imagined as investing deities when they appeared on earth; a bright or golden disk surrounding the head, especially of a saint." Any way you slice it, I don't recall ever having heard such a sonically well-articulated recording as this brilliant Nimbus disc. It really does sound as if the orchestra is right in the room with you, and you hear approximately what the conductor's ears must have heard during the performance.

Tiny details emerge with an almost supernatural clarity, and all without distorting the musical experience. The leaflet says, "Nimbus will use the edit to save a performance, not to create one." That attitude may explain one fugitive clinker (the third of the quintuplet notes 46 seconds into the Carnival scene of *Petrushka*) and some unfortunate noise during the long hiatus between the final two notes of the work. Except for such trifles, one has to give this offering the very highest marks.

Gennady Rozhdestvensky has never had the recognition in this country that he deserves, a state of affairs this recording might help to remedy. The music shows him at his best, and the London Symphony Orchestra gives him its considerable all. Stravinsky's scorched-earth, goose-step *Symphony in Three Movements*

(1942–45)—a miracle of organization, especially considering the absence of even one single tune in the entire work—makes imposing demands on any conductor, but Rozhdestvensky comes through brilliantly. Playing time: 59:02.

*Paul Moor*

**VAN DE VATE: Distant Worlds\*; Dark Nebulae; Journeys; Concertpiece for Cello and Small Orchestra.**

*Miryński\*, Lapinski†; Polish Radio and Television Symphony Orchestra of Cracow, Kawalla, Jerzy Noworol, prod. Conifer CDCF 147 (A).* Ⓞ (Distributed by Allegro Imports, 2317 Northeast 15th Ave., Portland, Ore. 97212.)

Nancy Van de Vate's catalog of published music dates back to the late 1950s and includes compositions in most of the standard instrumental and vocal forms. Until recently, however, she's been represented on record mainly by chamber works of relatively early vintage (the 1964 Viola Sonata, the 1969 String Quartet No. 1, and the 1976 *Music for Viola, Percussion, and Piano*, all on Orion, and two pieces from 1978—the Piano Sonata and the Nine Preludes—on Coronet and Opus One, respectively). The present release brings listeners up to date on Van de Vate's style and also, to a certain extent, on her activity. She has not abandoned writing for forces smaller than full orchestra, but she has lately been as interested in color as she always had been in musical architecture. Not surprisingly, most of her efforts in the last decade have been channeled in the direction of the orchestra.

The earliest work recorded here is the 1976 *Concertpiece*. Except for the ostinato patterns in the interludes and the occasional glittery splash for percussion, this rhapsodic essay for cello and chamber orchestra has little in common with other works on the disc. *Dark Nebulae* (1981) stands out from the crowd because of its lyric "themefulness." *Journeys* (1984) is distinguished by its references to gamelan sonorities and the resonant major triads that illuminate key structural points. *Distant Worlds* (1985), scored for violin and orchestra, exploits the contrast between eloquent but soft-spoken violin solos and aggressive brass/percussion interjections. Yet all three of these later works are shaped in more or less the same way. In the earlier *Concertpiece*, the materials are exposed and then developed; here, they are exposed and then juxtaposed. The music's considerable dynamic motion derives as much from the gradual thickening of texture and acceleration of surface activity as from an increase of volume level.

Van de Vate's current orchestral techniques, which include solos set against tone clusters and aleatoric smudging of accompanimental figures, are reminiscent of

Lutoslawski's. Her musical structures, and her means of achieving orchestral climaxes, call to mind Penderecki's in the 1960s. Perhaps because of these affinities, Polish artists have responded favorably to her work. In any case, these performances—led by Szymon Kawalla and featuring Janusz Miryński and Zdzislaw Lapinski as soloists on violin and cello, respectively—are remarkably forceful and vivid. The recording is as clean and vibrant as any analog transcription. Playing time: 52:18. *James Wierzbicki*

## RECITALS AND MISCELLANY

### KRONOS QUARTET: *White Man Sleeps*.

*Kronos Quartet. Judith Sherman, prod. Nonesuch 79163 (D). ⊕ ⊕*  
**KEVIN VOLANS:** "White Man Sleeps," Nos. 1 and 5. **CHARLES IVES:** Scherzo ("Holding Your Own"). **JON HASSELL:** *Pano da costa*. **THOMAS OBOE LEE:** *Morango... Almost a Tango*. **ORNETTE COLEMAN (arr. Graves):** *Lonely Woman*. **BEN JOHNSTON:** *Amazing Grace*. **BÉLA BARTÓK:** *String Quartet No. 3*.

I had not heard of the composers of five of these eight pieces, and I can tell you nothing whatever about them because the leaflet accompanying this release provides nothing more than their names and year and place of birth. This deliberate omission evidently intends to convey some

cryptic message from the Kronos Quartet. But whatever its motivation, it strikes me as sophomoric and pigheaded, not to say downright stupid, since it largely affects new works by relatively obscure composers. I can't help wondering how the composers themselves feel about this omission.

Generally speaking, most of the music performed here gets an inordinate amount of temporal mileage (in the case of the Hassell piece, 19:21) out of a remarkably scanty quantity of impoverished musical material. Rhythmic and harmonic ostinatos go on and on till the world looks level, with a remarkable preponderance of the jagged, asymmetrical rhythms that started becoming commonplace almost 75 years ago when *The Rite of Spring* touched off a worldwide epidemic of emulation and outright plagiarism.

The Ives trifle (1:23) makes one sit up and take notice, and the Bartók, especially after the slick meretriciousness of most of what precedes it, comes as a sort of gutsy, vehement benison. With the same impartial lack of discrimination that characterizes their selection of this program, these four remarkably proficient musicians perform everything with extraordinary musical expressivity and almost superhuman virtuosity. When the Bartók piece finally provides them with some music they can really sink their teeth into, the breath-stopping result makes one hope that Nonesuch, or someone, will record them in Bartók's other five quartets as well.

Such a set could, I'll bet, have as electrifying an effect as did the Juilliard's trail-blazing championing of Bartók in the 1940s and '50s. Playing time: 65:41.

*Paul Moor*

### GERVASE DE PEYER: French Music for Clarinet and Piano.

*De Peyer, Pryor. James Burnett, prod. ⊕ Chandos CHAN 8526 (D). ⊕ ABRD 1236. ⊕ ABTD 1236. (Distributed by Harmonia Mundi, U.S.A.)*

**DEBUSSY:** *Arabesque No. 2; La fille aux cheveux de lin* (from "Préludes," Book 1, No. 8); *Première rapsodie*. **PIERNÉ:** *Canzonetta, Op. 19*. **POULENC:** *Sonata for Clarinet and Piano*. **RAVEL:** *Pièce en forme de habanera*. **SAINT-SAËNS:** *Clarinet Sonata, in E flat, Op. 167*. **SCHMITT:** *Andantino, Op. 30, No. 1*.

### GERVASE DE PEYER: English Music for Clarinet and Piano.

*De Peyer, Pryor. James Burnett, prod. ⊕ Chandos CHAN 8549 (D). ⊕ ABRD 1237. ⊕ ABTD 1237. (Distributed By Harmonia Mundi, U.S.A.)*

**ARNOLD, M.:** *Sonatina*. **FINZI:** *Five Bagatelles, Op. 23*. **HARVEY, P.:** *Suite on Themes of Gershwin*. **HOROVITZ:** *Sonatina*. **IRELAND:** *Fantasy-Sonata*. **RICHARDSON, A.:** *Roundelay*.

**SCHUBERT:** *Sonata in A minor, D. 821* ("Arpeggione").

**SCHUMANN:** *Fantasiestücke, Op. 88; Three Romances, Op. 94*.

**WEBER:** *Seven Variations on a Theme from "Silvana," J. 128*.

*De Peyer, Pryor. James Burnett, prod. ⊕ Chandos CHAN 8506 (D). ⊕ ABRD 1216. ⊕ ABTD 1216. (Distributed by Harmonia Mundi, U.S.A.)*

British clarinetist Gervase de Peyer came on the London music scene in the early 1950s, shortly after Reginald Kell—a clarinetist 20 years his senior—left England for the United States. De Peyer studied with Frederick Thurston, not with Kell, and almost two decades separate the beginnings of Kell's and de Peyer's tenures as the principal clarinet of the London Symphony Orchestra. Yet the distance between them is not great. Many clarinetists in England today follow Kell's example and produce a sound characterized by malleable timbre and overtly expressive vibrato. But most of them do it only to an extent; few, if any, come as close to actually imitating Kell's deliberately inconstant sonic ideal as does de Peyer.

These three albums, which offer original works and transcriptions for clarinet and piano, were recorded in 1982 and 1983 in Hampstead's Rosslyn Hill Chapel. Only the liner notes for the Schubert/Schumann/Weber disc, however, reveal that the clarinet being used is a new model



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of the wide-bore instrument developed in England in the 1930s, which de Peyer says offers the player "more scope for flexibility in the production of . . . sounds" and "for varying the color of the sound to enhance vivid and communicative phrasing in performance." About the instrument used for the other recordings one can only guess. In the French and English music, the clarinet sound contains less close-range noise, but the basic tone is hardly different. Nor is there much difference in the variations on that basic sound: In all these works, de Peyer's tone is like a chameleon, smoothly changing color to suit the mood of the phrase at hand. It is most pliant—and most generously flavored with downward portamento effects and puckish hints of klezmer-style "laughs"—in the works by Poulenc and Horowitz.

While de Peyer's sound may not be to everyone's taste, his musicianship is universally appealing, and doubtless there will be little argument about the general excellence of these interpretations. Pianist Gwenneth Pryor joins in all of them except Paul Harvey's 1975 *Suite on Themes of Gershwin*, a charming unaccompanied fantasy in which the Gershwin tunes—"I Got Rhythm," "It Ain't Necessarily So," and "Summertime"—are barely discernible beneath all the virtuosic fili-

gree. De Peyer's interest in "coloring" his clarinet sound is wholly compatible with his interest in animating the music and filling it with character. These performances would be lively and interesting even if, when it came to tone, he had played it straight. Playing times: 50:35 (CHAN 8526); 58:28 (CHAN 8549); 48:33 (CHAN 8506). *James Wierzbicki*

**VARIOUS ARTISTS:  
Hoffnung Festival, Vol. 1.**

Various artists; *Hoffnung Festival Ensemble*. Harmonia Mundi HMC 90768 (A).

The 3,000 tickets available for the gala event in London's Royal Festival Hall had sold out in only two hours, and many of England's most illustrious musical names studded the audience. Before things began, T. E. Bean, secretary general of the Royal Festival Hall, appeared on stage and said, "Ladies and gentlemen, I have to ask your indulgence for an announcement. Owing to circumstances over which the [London County Council] and the management of the hall have no control, tonight's program will be given exactly as advertised." So began the Hoffnung Festival, a pinnacle of British musical high camp unmatched before or since.

Gerard Hoffnung first became famous

as a wildly whimsical caricaturist who did to musical instruments what Rube Goldberg in this country did to machines. He became a BBC producer and the darling of both Oxford and Cambridge. The event recorded here took place in 1956; three years later, Hoffnung, at the age of only thirty-four, died tragically. That, and the extraordinary galaxy of musical stars involved here (however fleetingly), made this an event for the ages. Now we have it electronically rejuvenated on CD.

The great hornist Dennis Brain blows one movement of a Concerto for Garden Hose and Orchestra, after Leopold Mozart. Franz Reizenstein, an otherwise quite reputable composer, has put together a *Concerto popolare* in which he tips his hat to Tchaikovsky, Grieg, Gershwin, Rachmaninoff, and Addinsell while giving a passing nod to the "Beer Barrel Polka." William Mann, the scholarly music critic of *The Times*, no less, collaborated with Reizenstein on *L'Opéra pipé* (or *Le Conte d'Hoffnung*), in which leading London opera stars weave together bits and pieces of, by my count, at least 18 operas, including what you might call *Donna Giovanna*.

If you enjoy P. D. Q. Bach, you'll enjoy this, and the better you know music, the bigger the kick you'll get out of it. Playing time: 70:40. *Paul Moor*

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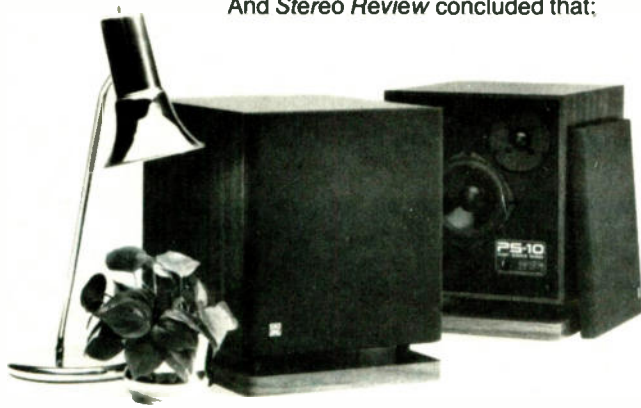
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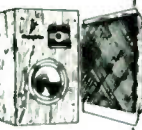
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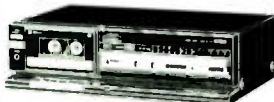


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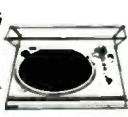
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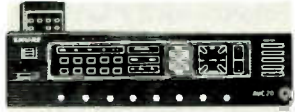
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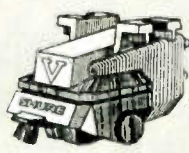


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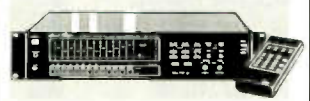
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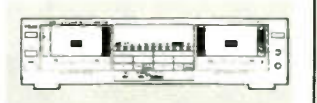
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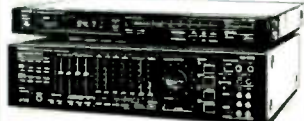
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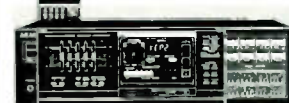
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*Toad sees the laser: the runt in front of Utopia,  
tuning for the 1977 release Ra*

HIGH FIDELITY ARCHIVES

# We Gotta Get You a CD Player

The transfer of past recordings to Compact Disc continues along two main avenues: the rerelease of an artist's entire catalog and the reissue of various material from the vaults of a single company. The first method is most prevalent in rock, as we have seen with artists from the Beatles and the Rolling Stones to King Crimson and Frank Zappa. The second method is favored in jazz, where historic sessions by a host of performers are emanating from the likes of MCA/Impulse!, Columbia, and RCA/Bluebird. This month, BACKBEAT presents another in-depth report on CDs. In rock, we cover the back catalogs of Todd Rundgren and Brian Eno. In jazz, we review various recordings from the libraries of Fantasy and Polygram. And we close with a look at the greatest-hits packages of seven pop groups on four labels because, hey, too much method leads to madness.

## TODD RUNDGREN

There is a passel of Todd Rundgrens: Todd the humorist, Todd the sharp observer of the human condition, Todd the pop music visionary who writes great songs, Todd the multi-instrumentalist who performs them, Todd the producer who makes his songs (and those of others) jump through hoops. All these Todds have been active for 20 years, and even his earliest work has themes and sounds that carry over to the present—which becomes evident on Rhino's lovingly done transfer of Rundgren's first five solo LPs to Compact Disc.

Ever the completists, the people at Rhino begin the CD release of Rundgren's 18 Bearsville albums with his first two (long out of print) records, 1970's **Runt** and 1971's **The Ballad of Todd Rundgren** (Rhino/Bearsville RNCD 70862 and 70863). *Runt*, the band, includes the sons-of-Soupy rhythm section of Tony Sales on bass and Hunt Sales on drums (the latter replaced by former Mountain man N. D. Smart), with Todd playing nearly everything else. *Runt*, the album, includes the humorous No. 20 pop hit "We Gotta Get You a Woman" but in hindsight is fascinating for "There Are No Words," a precursor to Todd's sparkling *A Cappella* (1986), and "Who's That Man?," a melodic throwback to "Open My Eyes," one of the best-known songs from Rundgren's first recorded band, Nazz. Both *Runt* and *The Ballad of Todd*

*Rundgren* fuse Beatlesque pop with Todd's native Philly soul, the first album far more effectively than the second. And both sound luminous on CD (how'd they get rid of the tape hiss?).

But this is just prologue. Rundgren's 1972 release, the double LP (and double CD) **Something/Anything?** (R2DD 71107), brings all the elements together in simply one of the most brilliant albums ever recorded—layers and layers of Todd, eschewing almost all other musicians. In the liner notes, he says this about "I Saw the Light": "If there's a single on this album, this is it, so I put it first, like at Motown." (Some years later, however, Rundgren would tell me the song, which did reach No. 16, is "such a string of clichés it doesn't have lasting impact for me.") He also digs back to Nazz for that band's other stab at immortality, "Hello, It's Me," and makes it truly immortal, with the help of the Brecker brothers, among others (the song reached No. 5).

While these are just two songs that happened to go pop, they are representative of the quality of music on *Something/Anything?* The vocal overdubs alone, especially on "One More Day (No Word)," are worth the price of admission, and Rundgren's one-man studio band is as sharp as any road group. He digs back even further for "My Roots," two 1966 tapes of primeval Rundgren bands covering "Money" and "Messin' with the Kid," both sounding like they're coming out of an old AM radio. This is particularly ironic on CD, as is "Intro," also known as "Sounds

of the Studio," the track that used to lead off Side 2 but is now buried in the middle of the first CD. Here you get all those noises that modern technology was supposed to have eliminated, including a record scratching. It leads into the instrumental "Breathless"; Vince Guaraldi fans will recognize the copped bridge from "Treat Street." But as Voltaire said, loosely translated, "Hacks borrow. Artists steal." *Something/Anything?* introduces Todd the artist.

It also introduces Todd the eccentric, an identity he carries over to 1973's **A Wizard/A True Star** (RNCD 70864), where six rapid-fire songs in a row ("Never Never Land" to "You Don't Have to Camp Around," each clocking in at less than two minutes) span styles from neo-metal to *Ummagumma* Pink Floyd. This sort of underdevelopment also plagues "Just Another Onionhead," which trashes one of Todd's finest hooks, "You want the obvious/You'll get the obvious." The obvious is something that *Wizard* doesn't deliver. It has its sublime pop moments, like "Just One Victory" and the medley of '60s soul, but the more demanding music, like the Brechtian "Zen Archer," makes it more of a critics' pet.

With 1974's **Todd** (R2CD 71108), Rundgren goes off the deep end. It has some of his funniest songs, ("An Elpee's Worth of Toons"), some of his most poignant ("The Last Ride"), some of his prettiest ("A Dream Goes On Forever"). He pays tribute, maniacally, to Gilbert and Sullivan on "Lord Chancellor's Night-

mare Song" and, slavishly, to Jimi Hendrix on "Number 1 Lowest Common Denominator." This double album (on one CD) also has something that didn't show up on a Rundgren record before: unmitigable filler ("Drunken Blue Rooster," "In and Out the Chakras We Go," "The Spark of Life"). While much of the album is another Todd-on-all-tracks affair, several tunes feature the musicians who would, later the same year, become Utopia.

Rhino should be commended for the care with which the cover art and liner notes have been preserved (all that's missing is the 10,000-fan-name poster in *Todd*) as well as for the way these recordings have made the transfer to CD. The details of the very intricate music cut through, yet the hiss that plagued some of the original versions has miraculously disappeared.

Hank Bordowitz

## RUNDGREN/UTOPIA

"Wait another year, Utopia is here," predicted Todd Rundgren on 1973's *A Wizard/A True Star*. Sure enough, 1974 saw him devoting half of his live show to a backing band called Utopia, which quickly evolved into a more democratic unit that shared writing and arranging duties. By the release of **Todd Rundgren's Utopia** (Rhino/Bearsville RNCD 70865) later that year, the band and its stage show had become a full-blown cosmic concept that many fans and most critics were unable to accept. Much to their chagrin, the master of the short pop song was playing long progressive pieces, with lyrics that smacked of psychedelic science fiction on the way to Eastern mysticism.

Actually, although the next ten Utopia albums would never live up to the original band's promise, that first album contains some of the best high-energy fusion of the era. The live performance of the "Utopia Theme" captures the band at its pinnacle: six masterful musicians soloing simultaneously, yet no one player detracting from a perfectly unified focus. Most impressive is frenzied drummer Kevin Ellman, who is nicely punched up on Compact Disc. In fact, the hour-long album is filled out all around in the digital format.

This depth is even more evident on the CD of the following year's **Initiation** (RNCD 70866), the Rundgren solo album that has been waiting for digitization to liberate its 67½ minutes from tightly crammed LP grooves. Throughout, colors are richer, printthrough is wiped away, and layers of sound are sorted out and sharpened. The first half of *Initiation* shows Todd's writing at its most mature

and has a couple of his finest guitar solos. What follows—the 36-minute "Treatise on Cosmic Fire," a study in synthesized excess—is no less of a mess on CD but still worth the improvement in sound.

A less than spectacular live production is eminently enhanced on the digital version of 1975's **Another Live** (RNCD 70867), but Utopia by this time had already begun its rapid decline. Although the band is still augmented by three keyboardists and still tackling long, Zappa-



The hermit of Bearsville in 1978

like arrangements, Ellman and his energy are gone. Nevertheless, the album has the first of many fine guitar/synth duels between Rundgren and Roger Powell, and "The Wheel," an acoustic clapalong, has stunning presence on CD.

Back in solo mode, Todd plays studio wizard again, but the precisely redone '60s tunes on 1976's **Faithful** (RNCD 70868) were never more than an interesting exercise. Five of the album's six Rundgren originals are far more worthwhile, particularly in digital splendor.

With the personnel in place for all succeeding Utopia albums, 1977's **Ra** and **Oops! Wrong Planet** (RNCD 70869 and 70870) are the first serious disappointments in Rundgren's catalog. No longer "Todd Rundgren's" Utopia, the band has completed its democratization, and other vocalists take the lead. Aside from a sprawling fantasy or two on *Ra*, songs get shorter and tamer, and the layers of keyboards are stripped away in favor of a balanced interplay between guitar and synthesizer—all fine in theory, but most of

the writing from this period isn't very good. *Ra* has its moments, and the CD sparkles with clarity; *Oops!* is noteworthy only for Rundgren's irresistible "Love in Action."

Alone, Todd follows up with 1978's **Hermit of Mink Hollow** (RNCD 70871). These songs harken back to *Something/Anything?*, yet most of them lack greatness. Gone are the LP's arbitrary labels, "Easy Side" and "Difficult Side"; now it all sounds too easy. But CD-wise, dig those incisive effects in "Onomatopoeia," especially those for "ding" and "clank."

**Back to the Bars** (R2DD 71109) is a reasonably well balanced career retrospective (*The Ballad of Todd Rundgren to Faithful*) culled from a 1978 tour. With raw vocals and frequently ragged playing, it revels in the imperfections of these small-club performances, for which Rundgren enlisted a potpourri of performers, including former and current Utopians and the Hello People. Although his wicked guitar in "Black Maria" gets a little lost under the crisp drums on CD, the digital transfer does wonders for the soaring sax in "Zen Archer" and the ringing acoustic guitar in "Cliché." Also, the double CD restores seamlessness in two spots that were broken up for the four-sided LP.

In '79 and '80 came two more band projects. **Adventures in Utopia** (RNCD 70872) is the best of the streamlined group's efforts, with excellent pop (both funny and funky), a hint of older adventures ("Caravan"), and only one dud (the Queen-like "Love Alone"). As usual, the CD is sharper and brighter, but with all the high-pitched vocals, intensified cymbals, and screechy solos, one might wish that the bass response had been bolstered a bit in remastering. On **Deface the Music** (RNCD 70873), Utopia offers Beatles-inspired originals, but the ripoffs sound more like homage to the Rutles and seem to have been written by the band in its sleep. Moreover, the half-hour CD offers little aural improvement.

**Healing** (RNCD 70874) benefits from CD almost as much as *Initiation* (highlights include razor-sharp acoustic guitars over busy synthesizer patterns, as well as stunningly clear glockenspiel-like tones). Ironically, this 1981 collection of songs about humanness is Rundgren's synthiest solo album; still, he mostly outshines the bloated technology. The three-part "Healing" suite is a Monarch Notes version of *Initiation*'s "Treatise," complete with simplified instructions on how to achieve inner peace—hokey, but really quite soothing, and the atmospheric effects come alive on CD. "Time Heals" and



"Tiny Demons"—originally a bonus single, now included on the rereleased LP—round out the 54-minute CD.

**Swing to the Right** (RNCD 70875) is Utopia's most blatant political statement, including three or four reasonably good songs, four or five bad ones, and a dark-horse favorite, "Shinola," that encapsulates the album's anti-right sentiment even better than the title track. Digital improvements over the 1982 recording are very subtle outside of some nifty fingersnaps and handclaps.

After quickly releasing an eponymous Utopia album on the Network label (not part of the Rhino reissue series), Rundgren finished off his Bearsville commitment with 1983's **The Ever Popular Tortured Artist Effect** (RNCD 70876). The one-man product includes his now familiar mix of ballads, upbeat numbers, something spiritual, something goofy, and a singalong that should have been a hit (here, "Bang the Drum All Day"). The best tracks by far are the mesmerizing "Drive" and a cover of Small Faces' "Tin Soldier."

Although Rundgren's in-and-out-of-Utopia period has had its hits and misses, Rhino's handling of his Bearsville catalog is consistently commendable. The digital sound is almost always top-notch, and great care has been taken with the CD packaging, which frequently contains photos not included with the original albums. Those who remember when Todd was God now have a classy 18-chapter bible for reference. *Andrew Nash*

### FANTASY'S "ORIGINAL JAZZ CLASSICS"

Much of the appeal of Fantasy's "Original Jazz Classics" reissue series was to collectors: Many of these sides from the '50s and early '60s had already been reissued on twofers but were then restored to their single LP format with the original cover art and liner notes. As the OJs appear on Compact Disc, the replication factor alone may not be enough to move one to purchase. It really depends on whether you buy CDs mainly for the superior sound and the extended length, in which case several of these discs must be judged a disappointment, or whether you're satisfied with the benefits of easy storage and a durable artifact. Although the word "classic" is used loosely, the initial batch of releases sampled here offers several historic sides that you may have to buy only this one last time.

Miles Davis's **Dig** (Prestige OJCCD 005-2) is certainly historic, with young fu-

ture stars Jackie McLean and Sonny Rollins bopping like old pros, but the sound on this 1951 date is so-so, especially on the uptempo cookers, where the tinny drums are like tuned garbage cans and the bass line is often buried. Playing time: 34:15. (Unless otherwise noted, all of these CDs are mono and run between 35 and 45 minutes.) The sound is slightly better on that portion of Davis's **Collectors' Items** (Prestige OJCCD 071-2) taken up by a 1953 date whose main point of interest is a



WILLIAM JAMES CLARSON, HIGH FIDELITY ARCHIVES

*Brubeck: at his peak in two 1953 college dates*

rare Charlie Parker appearance on tenor sax. The remainder is a '56 session with Davis and Rollins having evolved from the flurries of bebop to the more pared-down and varied lines of their maturity (the sound is cleaner, too).

Pianist Dave Brubeck's quartet is represented by two 1953 college dates, **Jazz at Oberlin** and **Jazz at the College of the Pacific** (Fantasy OJCCD 046-2 and 047-2). Brubeck and alto saxophonist Paul Desmond were at their peak during this period, and either disc will delight fans—but if you can spring for only one, the Oberlin set has both the better sound and the more responsive audience. Another *sui generis* pianist is featured on **Thelonious Monk Plays Duke Ellington** (Riverside OJCCD 024-2). Recorded in 1955 by Riverside in an attempt to make the antic stylist more accessible, this pleasant if not quite inspired trio set has some noticeable tape hiss that becomes annoying only during the a cappella piano intros. **Thelonious Monk and Sonny Rollins** (Prestige OJCCD 059-2) draws from three

separate sessions (in '53 and '54) and still runs only 34 minutes. The two most interesting cuts are *sans* Rollins, and though Monk completists may be pleased, this is no bargain any way you approach it.

Rollins has a pair, too: 1954's **Moving Out** (Prestige OJCCD 058-2, with a playing time of 31:22) and 1957's **The Sound of Sonny** (Riverside OJCCD 029-2). The first is a jam session by Sonny the rapid bopper; the second, mostly standards, consists of ten shorter cuts (including the CD addition "Funky Hotel Blues") explored by Sonny the sound sculptor. Both have hiss, most distracting during the solo sax numbers on *Sound*. That other tenor titan, John Coltrane, is in his post-bop, premodal quintessence on '57's **Traneing In** and '58's **Settin' the Pace** (Prestige OJCCD 189-2 and 078-2). Both are must-haves, the sound is clean, and *Pace* is in stereo, serving mainly to isolate the bass, which is always helpful.

Another seminal set is Bill Evans's **New Jazz Conceptions** (Riverside OJCCD 025-2), a rambunctious 1956 trio session with an added alternate take, bringing the time to 49:24. Hiss draws attention during the three short solo piano pieces, but for the most part this is a hard-swinging, even funky Evans whom fans of his later style may find surprising.

Abbey Lincoln's **Abbey Is Blue** (Riverside OJCCD 069-2) is a 1959 stereo session, a torchy set whose smoky period sound actually abets the mood. Lincoln's phrasing is rather conventional; her characteristic emotion, a melancholy strength, is conveyed tonally. The blues cry "Let Up" and Ellington's "Come Sunday" are highlights.

Once you get to the '60s material, the sound quality of these discs improves considerably. Art Blakey and the Jazz Messengers' **Caravan** (Riverside OJCCD 038-2), from '62, not only has good stereo but features one of Blakey's best groups (Wayne Shorter, Curtis Fuller, and Freddie Hubbard form the frontline) and ear-catching arrangements, especially on Shorter's "This Is For Albert." Two alternate takes have been added to give it a decent playing time of 51:37. Grab it. Also grabbable is **The Cannonball Adderley Sextet in New York** (Riverside OJCCD 142-2), another '62 stereo date with good sound and an exciting band (Yusef Lateef and Joe Zawinul are on hand). And though this is one of the few Cannon records from that period not to yield a funky hit, it still has those groovy "live" party vibes.

Finally, an undisputed classic: Eric Dolphy's debut as a leader, **Outward Bound** (New Jazz OJCCD 022-2), re-

corded in 1960 and in living stereo. Beautiful sound, Dolphy is timeless, and trumpeter Hubbard was one of jazz's MVPs at the time. Of course, Fantasy could have paired this with Dolphy's second record, *Out There*, without any strain. Oh well, there's always the Fantasy twofers on CD to look forward to. *Richard C. Walls*

### POLYGRAM'S "COMPACT JAZZ"

Early last year, Polygram announced its "Walkman Jazz" collection, a series of cassettes featuring its most popular jazz artists. Technology has marched on, and now those tapes, along with a host of other recordings, have been issued on midline Compact Discs as "Compact Jazz." Each disc offers nearly an hour of music, annotated accurately (but too briefly) by James Isaacs.

Some of that music is indispensable, and some of it sounds more immediate and vibrant than ever before. **Charlie Parker** (Verve 833 288-2) offers perhaps the greatest improviser in jazz in selections from virtually all of the sessions he made for Norman Granz in the late '40s and early '50s. Here as throughout the "Compact Jazz" series, the selections are arranged to please the casual listener: There are no complete sessions, and a small band cut such as the brilliant "Au Privave" will precede the big band "Repetition." It is to avoid repetition that relatively weak cuts such as "Night and Day," played by a large orchestra, are found here. But there is plenty to crow about: "Now's the Time" (with its famous blues line), "K. C. Blues," "Confirmation," and "Just Friends," played incandescently by the alto saxophonist over a thin-sounding string section he makes irrelevant.

Another bebop legend, Dizzy Gillespie, doesn't fare as well. Gillespie recorded for Mercury during the height of what Billy Taylor has called "the short-lived fad of playing lovely Brazilian melodies with a pseudosamba beat." The fad lives on at Polygram. **Dizzy Gillespie** (Mercury 832 574-2) finds him playing, to no great effect, "One Note Samba" and "No More Blues" and loafing through a couple of Caribbean features, "And Then She Stopped" and "Fiesta Mo-Jo." The trumpeter sounds much better elsewhere: Polygram has the rights to the stunning big-band sides from the mid-1950s and to his collaborations with Sonny Rollins, Sonny Stitt, Stan Getz, and Roy Eldridge. The chosen material doesn't compare.

There are two CDs dedicated to musicians who were at the heart of the bossa

nova fad: **Stan Getz** and **Astrud Gilberto** (Verve 831 368-2 and 831 369-2). I find Getz irresistible, even when playing "Desafinado," his opening track, or "How Insensitive" and "Manha de Carnaval." As these selections suggest, Polygram isn't taking any chances here: This disc has 60 minutes of Getz hits, all played with his breathy, tart lyricism and gentle swing. A most listenable collection. Gilberto has a much more fragile talent. When she's singing "The Girl from Ipanema" with Getz, the saxophonist's solos, mild in tone though they are, sound like welcome eruptions. When she is accompanied by the organ-playing of Walter Wanderley, there's nothing to counter the mood estab-



HERMAN LEONARD / HIGH FIDELITY ARCHIVES

*Parker: plenty of important sessions, good sound*

lished by her delicate piping. Much of her disc sounds like background music.

The radiant, thoughtful lyricism of **Bill Evans** (Verve 831 366-2) is infinitely more satisfying. Included are cuts from the pianist's '60s trios, such as "My Foolish Heart," and three overdubbed solo pieces: "Love Theme from *Spartacus*," "How About You," and "Round Midnight." It also has two numbers with a large orchestra and one lively duet with guitarist Jim Hall. Pianist Erroll Garner was a more rough-and-ready artist, whose freewheeling improvisations were endlessly popular in the '60s. **Erroll Garner** (Mercury 830 695-2) has his "Misty" and 13 other ebullient offerings from the previous decade. And there are two discs of characteristic music by Garner's sole rival for popularity: I find **Oscar Peterson**

**Plays Jazz Standards** (Verve 833 283-2) slightly more substantial than **Oscar Peterson** (Mercury 830 698-2), but both are well-chosen collections.

**Gerry Mulligan** (Mercury 830 697-2) contains 12 marvelously intelligent and sprightly numbers, half of them by the lightly swinging sextet the baritone saxophonist led in the mid-1950s (Bob Brookmeyer, Zoot Sims, and Jon Eardley were the other horns). The swing era is represented by a group of discs, including **Count Basie** (Verve 831 364-2), with its familiar hits from the '50s, and **Duke Ellington and Friends** (Verve 833 291-2), a misleading and disappointing collection with only three numbers by Ellington's band (the other eight are by alumni). I should say that **Best of the Big Bands** (Verve 833 281-2) is nothing of the kind: It consists mainly of remakes by famous leaders of their own early hits. **Best of Dixieland** (Verve 831 375-2) is even more perplexing: It includes some good performances by great musicians like Louis Armstrong and Jack Teagarden, but half of the disc is given over to British revival groups who are trying to resuscitate what they never lived.

Misfires are perhaps inevitable in a project like this, frankly given over to pleasant collections of popular jazz. Luckily, some great music is also popular, so we have, next to 60 minutes of lightweight **Chuck Mangione** (Mercury 830 696-2), two hours of glowing performances on **Sarah Vaughan and Sarah Vaughan Live!** (Mercury 830 699-2 and 832 572-2) and two more hours of thrilling vocals on **Dinah Washington and Dinah Washington Sings the Blues** (Mercury 830 700-2 and 832 573-2). **Ella Fitzgerald** (Verve 831 367-2) has some of that star's most extroverted live performances; Ella's showboating is like no one else's.

The wranglings over ballads and blues on **Coleman Hawkins/Ben Webster** (Verve 833 296-2) are essential lessons in mature tenor-playing. **Wes Montgomery** (Verve 831 372-2), however, has the guitarist sounding sheepish playing "California Dreamin'"; his best work was done earlier for Riverside. Finally, organist Jimmy Smith's best is right on **Jimmy Smith** (Verve 831 374-2), with its swagging big band arrangements by Oliver Nelson and Lalo Schiffrin. Smith never did anything more exciting than his entrance on "Walk on the Wild Side." After the band's long, loping introduction, we hear only the drums and sleigh bells. A couple of bars later, Smith pounces. It's thrilling, and thanks to Polygram's new series, it's available sounding better than ever.

*Michael Ullman*

## BRIAN ENO

A genuinely interesting artist and an important collaborator in much adventurous popular music of the last 15 years (Roxy Music, David Bowie, Devo, Talking Heads, and U2), Brian Eno at first briefly pursued and since has been pursued by an influential, marginal, and diffuse career as solo recording artist. His small, unconventional record labels, EG and Editions EG, have ignored conventional industry wisdom (or what passes for same) and supported his work—however experimental—with remarkable dignity, making it available and keeping it available in all formats. Which now include the Compact Disc. The releases reviewed here fall, not entirely neatly, into two distinct groups: the four avant-pop albums made between 1973 and 1977, which adhere more or less to the traditional song form, and then some of the much longer experimental works that continue to the present, largely "ambient" or intentionally undemanding and unobtrusive-cum-ignorant.

The fab four first. When he left Roxy Music in 1973, Eno was the group's plumed serpent, a visual/intellectual foil for Bryan Ferry's lounge lizard just as the band was achieving stardom. Though he had already begun investigative collaborations with Robert Fripp, **Here Come the Warm Jets** (EG EGCD 11), released late in the year, was suitably reptilian, a fin-de-siècle mix of foppery and male prerogatives featuring the expected Velvet Underground-derived avant-pop with unusual sounds, manipulated overlays, and a lovely, late-Beatles sensibility inflecting melodies and arrangements. Art-school grad Eno seems, from the beginning, to have understood pop music as art/product: art that is entirely constructed and doctored in the studio. Myths and methodologies from art dilute and reinterpret myths and methodologies from music, to interesting and promising ends. With "On Some Faraway Beach," Eno also introduces avant-Easy Listening, a delightfully seductive genre laden with hummable "simplistic keyboards" and massed Phil Spector echo. The Compact Disc version is not only brighter and clearer than the LP, but the digital format is simply better able to reproduce and support more kinds of sounds and effects.

The following year's **Taking Tiger Mountain (By Strategy)** (EG EGCD 17) develops a sophisticated band momentum with ex-Roxy playmate Phil Manzanera as co-arranger and assistant producer. The ten tracks are largely built up from simple melodies and simple rhythms laid

down complexly by players like Robert Wyatt, Phil Collins, and Manzanera, garnished with some astonishing solos and elliptical lyrics and then layered and treated 'til the pop is altogether avant. There is a sweet folk song, "China My China," with an overlay of typewriters, and "Taking Tiger Mountain" ("we climbed and we climbed") is a beautiful keyboard-based ballad about whatever. The CD provides brilliant clarity for all layers, however faint, trebly, or peculiar.

In 1975, Eno recorded the remarkably atmospheric **Another Green World** (EG EGCD 21), on which he extends avant-Easy Listening to a new plateau with 14 short tracks, half of them cool yet evocative solo instrumentals laced with sound effects (avant-Martin Denny?). As much as I love listening to its jazz-inflected quietude ("Zawinul/Lava"), tropical quietude ("In Dark Trees"), or seaside quietude ("Over Fire Island," "Be-calmed"), I can't help thinking that, as Lou Reed said in an entirely different context, "It's the beginning of a new age."

As if to underline this, 1975 also saw the release of **Discreet Music** (Editions EG EEGCD 23), Eno's first full-blown

ambient project. One part comprises three cut-up exercises based on Pachelbel's Canon in D, which sound surprisingly calm and unexperimental. "Discreet Music," though, is a placid gem: a half hour of hermetically generated and regulated reed and woodwind sounds, perfect for drifting off to sleep. Of course, as the music gets quieter, the utter transparency of the CD makes a substantial difference if you stay awake.

In the last work of the pop quartet, 1977's **Before and After Science** (EG EGCD 32), Eno seems caught between, say, Denny's "Quiet Village" and the highly polished international-technopop style that he was just then perfecting in sessions with David Bowie. Their "Heroes" was one of the very best singles of the '70s, but nothing here has such power or urgency, polish and painstaking construction notwithstanding. The Velvets-grooved "King's Lead Hat" presages Eno's sympathetic relationship with Talking Heads. Otherwise, a little fusion, a bit of funk, some shimmering and languid songs with his best realized vocals, all worthy . . . and here Brian Eno's pop ca-

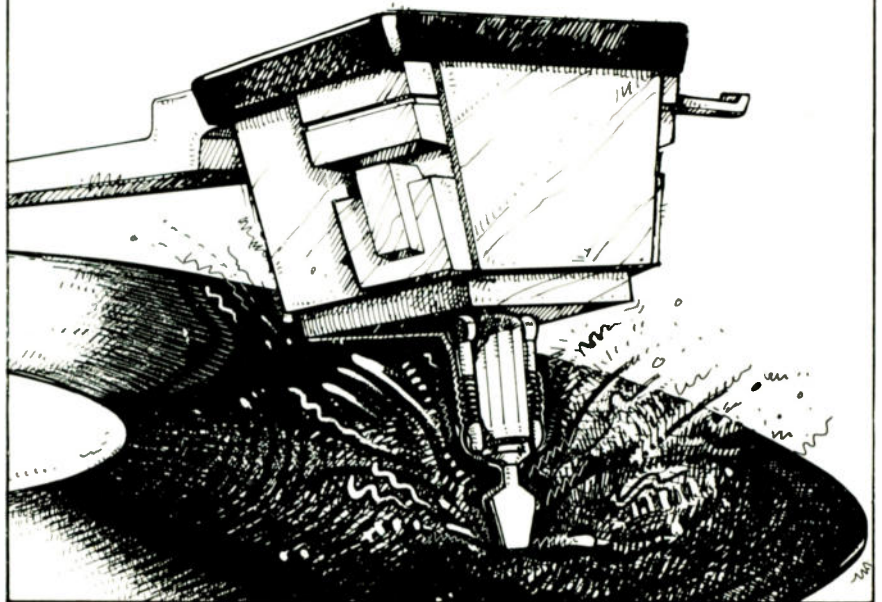
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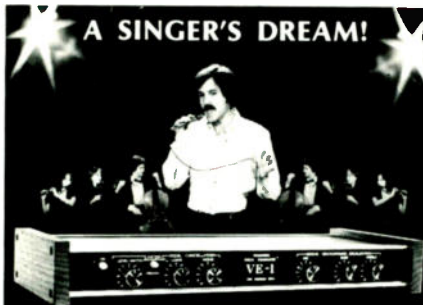
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(Continued from page 89)

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Jeff Nesin

## SIXTIES COLLECTIONS

Whether your tastes run to Jeff Beck and Neil Young or to Peter Noone and Gary Puckett is a matter between you and your sound system. I'm not here to explain (ahem!) The Sixties or argue the merits of the seven representative bands in this review. Their music and its relative importance is known. The CDs of their hits, on the other hand, invite scrutiny. Is the digital package worth our dollars?

Let's start with the British Invasion, specifically **Yardbirds: Greatest Hits, Volume One (1964-1966)** (Rhino RNCD 75895). As is customary with Rhino CDs, this one is full of extras: 18 tracks, a playing time of 52:59, generous artwork, and extensive liner notes and discographical information. There are a few discrepancies: The release date of "Heart Full of Soul" is given correctly in the notes (mid-1965) but incorrectly in the discography (October 1964), and although the notes say that "Eric Clapton and Jeff Beck are represented in approximately equal measure," the guitarists in fact appear on nine cuts each. The biggest mistake is Rhino's failure to order the tracks chronologically, which would have helped the listener follow the band's development as well as given more linear logic to Parke Puterbaugh's otherwise fine notes.

Because this is *Volume One*, the CD includes "For Your Love," "Heart Full of Soul," "I'm a Man," and "Shapes of Things" but not the group's two other Top 40 songs (from 1966), "Over Under Sideways Down" and "Happenings Ten Years Time Ago" (the first has Beck, the second

both Beck and final guitarist Jimmy Page, whose later version of the band, the New Yardbirds, would become Led Zeppelin). The rest of these "greatest hits" are culled from U.K. A-sides and B-sides and from U.K. and U.S. LPs. Sources are "first-generation tapes still in existence or best-quality second-generation tapes, all of which were recorded in mono"—and overall, the sound is quite good. When it's a bit shabby, as on the three 1964 concert tracks from *Five Live Yardbirds* (with Clapton), it doesn't really matter because the performances are so explosive. Indeed, this CD is well worth its price simply for Clapton's siren and Beck's dirt.

Unlike the Yardbirds collection, **The Best of the Animals** (Abkco 4324-2) is a CD version of an actual LP. My vinyl copy of *The Best of the Animals*, originally released by MGM in February 1966, contains 11 tracks; the new CD replaces "Roberta" and "I'm Mad" with six other covers (including Eric Burdon's laughable six-minute retelling of the story of "Bo Diddley"), upping the playing time to 46:27. Although the CD includes the band's six hits from '64 and '65—"House of the Rising Sun," "I'm Crying," "Don't

Let Me Be Misunderstood," "Bring It on Home to Me," "We Gotta Get Out of This Place," and "It's My Life"—it could have accommodated the 1966-and-after hits as well, such as "Don't Bring Me Down," "See See Rider," "When I Was Young," "Monterey," and "Sky Pilot." It also could have accommodated some intelligent liner notes instead of "Lifelines of the Animals, 1964": favorite food, most thrilling experience, pets (if any), etc. The mono sound is hiss-free but strikes my ears as somewhat harsh.

Strange family tree, that British Invasion. Graham Gouldman, who wrote "For Your Love" and "Heart Full of Soul" for the Yardbirds (and who later formed 10cc), also wrote "Listen People" and "No Milk Today" for Herman's Hermits, who shared the Animals' producer, Mickie Most. **Herman's Hermits: Their Greatest Hits** (Abkco 4227-2) is another CD-from-LP affair (the original appeared in 1973). The 16 tracks include all of the group's 1964-67 Top 20 hits sung by the teenaged Peter (Herman) Noone—from "I'm Into Something Good" and "Mrs. Brown, You've Got a Lovely Daughter" to "Dandy" (written by Ray

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Davies) and "There's a Kind of Hush"—but they still amount to only 39 minutes of playing time. That's forgivable for a three-minute-singles band. Not forgivable is Abkco's decision to keep the tracks in random order and to print only the original, unedited fawnings of Gloria Stavers and Toby B. Maxis. Like the *Animals* CD, this one is mono, but the sound here is more balanced.

As Parke Puterbaugh explains in his notes for **The Best of the Beau Brummels (1964-1968)** (Rhino RNCNCD 75779), the San Francisco band was formed by singer Sal Valentino to "answer the challenge of the English sound." Though only three of their songs became hits—"Laugh, Laugh," "Just a Little," and "You Tell Me Why"—the Brummels answered well, as becomes clear in this nearly 50-minute CD, whose 18 tracks also include rare LP cuts and even rarer A-sides and B-sides. Ron Elliott's guitar-picking is fully showcased in this chronological journey from the band's hits on the Autumn label to its final two Warner Bros. LPs, *Triangle* and *Bradley's Barn*. "Due to the age and deterioration of some two-track masters," Rhino says, "all selections on this Compact Disc were remixed from the original multitrack tapes for the best fidelity and dynamics. . . . Many tracks appear in stereo for the first time anywhere." The result is excellent sound, with "Laugh, Laugh" coming across even better than it does on Warner Special Products' *Highs of the Sixties*. Puterbaugh's notes can go overboard at times (the Beach Boys' unreleased *Smile* is "the one other album that could have equaled *Triangle's* gentle reach as a work of the imagination"), but they are always well written and informative (bet you didn't know that the Brummels' early work was produced by Sly Stone).

Another CD from Rhino, **The Turtles: 20 Greatest Hits** (Rhino RNCNCD 5160), doesn't measure up. Yes, everything is here—"It Ain't Me Babe," "Happy Together," "She'd Rather Be with Me," "She's My Girl," "Elenore," "You Showed Me"—and the CD clocks in at a respectable 52:26. However, the title *20 Greatest Hits* really means nine greatest hits supplemented by 11 also-rans and curios, only some of which are finds ("Me About You," for example). Also, Rhino cofounder Harold Bronson has lots of room to accurately chart the Turtles' 1965-69 chronology in his liner notes, but somebody ruins the effort by botching the CD's ordering of tracks no less than three times. And finally, the sound of this disc, originally transferred in 1984, simply isn't up to the company's current standards.

The tracks are in stereo, but no indication is given as to whether first-generation or second-generation masters were used, and several of the numbers are not as dramatic as expected, with intrusive tape hiss. By the way, Bronson claims the following in his notes: "It's doubtful that the quality of the hits contained in this Compact Disc could be matched by any other American rock band of the 1960s. They were that good." Well, hmmm . . . Creedence Clearwater Revival or the Rascals, anyone?

Not surprisingly, the Sixties are heavily represented in the midline CD series launched by various major labels. Included in Atlantic's "Super Saver" series is an absolute winner, **Retrospective: The**

it to *Buffalo Springfield Again* and, hence, *Retrospective*. Then again, this is a "Super Saver." And you can't argue with the super sound (in fine stereo), which gives much-needed depth to the bass on "Bluebird" and, throughout, clarity to the harmonies and acoustic guitars.

Very near the bottom of the barrel is **Gary Puckett and the Union Gap's Greatest Hits** (Columbia CK 1042). No, friends, I'm not talking about Gary himself; remember my vow up there in the first paragraph? I'm talking about a CD with a total of 32 minutes and 20 seconds of playing time, a stereo CD so flat it sounds like it was mastered from a vinyl LP copy of the album on which it is based. This is one



The original *Buffalo Springfield* (from left): Bruce Palmer, Young, Stills, Furay, Dewey Martin

**Best of Buffalo Springfield** (Atco 38-105-2), originally released on LP in 1969. It leads off with the groundbreaking American band's only hit, "For What It's Worth," which reached No. 7 in 1967. The rest of the CD is indeed the band's best, offering such classics as Richie Furay's "Kind Woman," Neil Young's "Mr. Soul" and "I Am a Child," and Stephen Stills's "Bluebird," "Rock and Roll Woman," and "Go and Say Goodbye." True, the two-record anthology *Buffalo Springfield*, released by Atco in 1973, would have provided much more CD playing time than the mere 40 minutes taken up by the 12 tracks on *Retrospective*. At the very least, Atco should have given us the original nine-minute version of "Bluebird," resurrected for the double anthology, not the edited four-minute version that made

of many titles in the CBS midline series "Collector's Choice," but any old way you choose it, it's not worth your money. It does have all the 1967-69 hits, though—"Woman, Woman," "Young Girl," "Lady Willpower," "Over You," "This Girl Is a Woman Now"—so if you want the singles and can't find them as budget oldies, the CD might be your last resort. Or maybe you should buy *Paul Revere and the Raiders' Greatest Hits* instead, another "Collector's Choice" CD. Did you notice I didn't put that title in boldface type? That's because I'm not actually reviewing it. That's because, of those two "Collector's Choice" CDs, it was the one that was stolen from me before I had a chance to pop it into the CD player. Maybe the crook knows something we don't.

Ken Richardson



## CROSSTALK

(Continued from page 15)

tape-output jacks of your receiver will provide a tuner signal uninfluenced by the setting of the receiver's volume or tone controls. Connect this signal to the tuner input of your new amplifier, and you'll be off and running.

## Tape Clicks

*I recently bought a new cassette deck that produces loud "clicks" on some of my pre-recorded tapes. I was about to return the deck to the dealer when my brother encountered the same problem with another brand of recorder and also on certain tapes. Head cleaning and demagnetizing doesn't seem to help. What could be wrong?*

**Ricardo Gomez**  
Tucson, Ariz.

It sounds like you have a bad case of static electricity exacerbated by your region's dry climate. The buildup of static electricity caused by the moving tape can be a severe problem when there is not enough moisture in the air to provide a discharging leakage path. During New York City winters, for instance, I've seen sparks around the reels of an open-reel deck operating in a dry, steam-heated apartment.

I suspect that the cassettes' internal

"slip sheets"—part of whose purpose is to bleed off static charges—are inadequate, faulty, or missing altogether. You can prevent future problems by running a humidifier in the room when playing or recording tapes. Ultrasonic vaporizers have come down substantially in price, work very well, and are virtually silent during operation. But if the clicks occur at exactly the same point during each play, then they are permanently embedded in the program material—and there's nothing you can do about them.

## Headphone Listening

*I do most of my listening through headphones plugged into a 45-watt amplifier with the speakers off. Will the amplifier section or any other part of the receiver be damaged if this is done excessively?*

**John Makrona**  
Monterey Park, Calif.

Considering the number of receivers with headphone jacks and speaker switches, it would be strange if headphone use—excessive or otherwise—caused damage. In the days when all amplifiers had tubes, it's true that you could cause output-tube arcing by accidentally operating without a load, but today's transistor amplifiers don't really care whether they are loaded or not—as long as the load impedance

doesn't get too low. Besides, a typical amplifier headphone jack is directly driven (through a voltage-dropping resistor) by the speaker amplifier, so the amp is always loaded with a headphone plugged in.

## Bass-Amp Clipping

*What happens if the bass amplifier in an electronic-crossover system is driven into clipping? I realize the tweeter is not in danger, but surely it must be necessary to interpose a high-cut filter between the bass amp and speakers to prevent the powerful high-frequency signals that are produced by clipping from reaching the woofer.*

**Randy Winney**  
Garland, Tex.

I've never heard of a woofer being damaged by clipping in a bass amplifier. Unlike a tweeter, a woofer has the built-in thermal protection of a heavy, heat-absorbing voice coil and forced-air cooling from its large cone excursion. Woofer damage usually occurs not because of amplifier clipping, but because the woofer itself is being forced to handle more low-frequency energy than it should. The result is physical and thermal damage to the woofer's suspension and voice-coil wiring. □

*We regret that the volume of mail is too great for us to answer all questions.*

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# C U R R E N T S

(Continued from page 14)

## Lower Lows

Altec Lansing's PSW-10 powered subwoofer (\$800) has a built-in 250-watt (24-dBW) amp driving a 10-inch, long-throw woofer that is said to reach as low as 26 Hz (at -3 dB). A slope of 18 or 24 dB per octave can be assigned to one of four crossover points—50, 80, 100, or 150 Hz—to match the rolloff characteristics of a wide variety of loudspeaker systems. The subwoofer turns on automatically when it senses an input signal and shuts off shortly after the signal is terminated. A dynamic loudness circuit gradually increases the subwoofer's output level as the system volume is decreased. The square cabinet measures less than 18 inches per side. *Altec Lansing Consumer Products, Milford, PA. 18337.*

## Denon Doings

Included with Denon's DRA-425 and DRA-625 receivers is a system remote control that operates a number of the company's past and present cassette decks and CD players. Both receivers use discrete output transistors and have heavy-duty, multiway speaker binding posts. Operating features include 16 tuner presets, two-speed tuning steppers, a variable loudness-compensation control, and a motorized volume-control knob. The DRA-425 (\$450) is rated at 50 watts (17 dBW) per channel, the DRA-625 (\$550) at 65 watts (18.1 dBW) per side. The latter also has a stereo/mono mode switch and a set of preamp outputs.

Denon's first CD changer is the six-disc DCM-555 (\$550), which uses the company's Super Linear Converter with a four-times-oversampling digital filter. Features include 32-step programming, three random-play modes (all discs, programmed tracks only, or each disc in sequence), and remote control (not related to the above-mentioned system remote).

In the prototype stage is a "true" digital preamplifier—that is, one that contains an analog-to-digital circuit for converting analog signals (such as those from a cassette deck or tuner) to digital. In this manner, the signals can be more accurately processed through the preamp's three digital tone controls and digital loudness-compensation circuit (or through next-generation outboard digital signal processors). The preamp's analog outputs are derived from its internal digital-to-analog converters. *Denon America, Inc., 222 New Road, Parsippany, N.J. 07054.*

## Compact Shooter

Mitsubishi's HS-C30U Super VHS-C camcorder (\$1,600), the first built by the company itself, has an f/1.2, 6:1 power zoom lens that includes a macro setting for extreme close-ups. Besides a familiar array of automatic focusing and exposure functions, the camcorder features three option-



al high shutter speeds, a fader control, and the Video Address Search System, which marks points on a tape to facilitate cueing. Built-in audio and video inputs enable recording from an external source. As with other S-VHS products, the HS-C30U can record in the regular VHS mode as well. *Mitsubishi Electric Sales America, Inc., 5757 Plaza Dr., Cypress, Calif. 90630.*



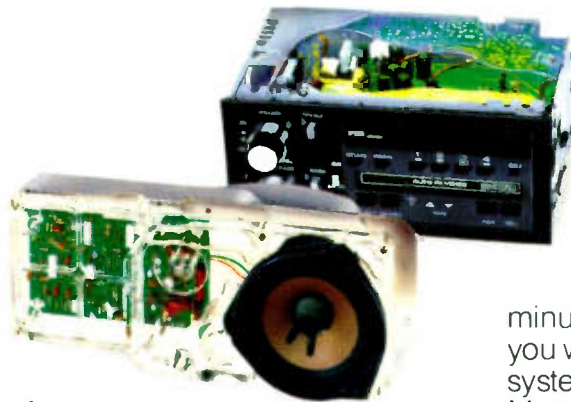
The Denon DRA-625 receiver with system remote control



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The new Yamaha CDV-1000 breaks new ground in home audio-video entertainment.

It starts with those four discs up there. Together, they represent the highest quality source material on the market today.

And the CDV-1000 plays each and every one of them flawlessly. So now you can watch rock concerts and movies on 8" and 12" laser discs. Listen to a symphony on a regular compact disc. Or watch your favorite music videos on the new 5" CD Video discs.

The CD Video disc is a combination of audio and video. So when you play one on the CDV-1000, you not only get an incredible 425-line horizontal resolution of the video, but also the clear, clean audio that can only come from digital technology.

Of course, we wanted to keep the CDV-1000 simple

and easy to use. That's why we gave it fast access. And a super-tracking tilt servo laser head for accurate tracking.

All of which makes the CDV-1000 an incredibly versatile, high performance component. And one that no home theatre environment should be without. Just ask your Yamaha audio dealer for a demonstration.

Then hear, and see, for yourself what we're driving at.



## YAMAHA®

YAMAHA DIGITAL HOME THEATRE

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