

Stereo Review

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SUBWOOFERS! GETTING DOWN TO DEEP, CLEAN BASS

HOW TO CHOOSE
THE RIGHT SPEAKERS
FOR YOUR CAR

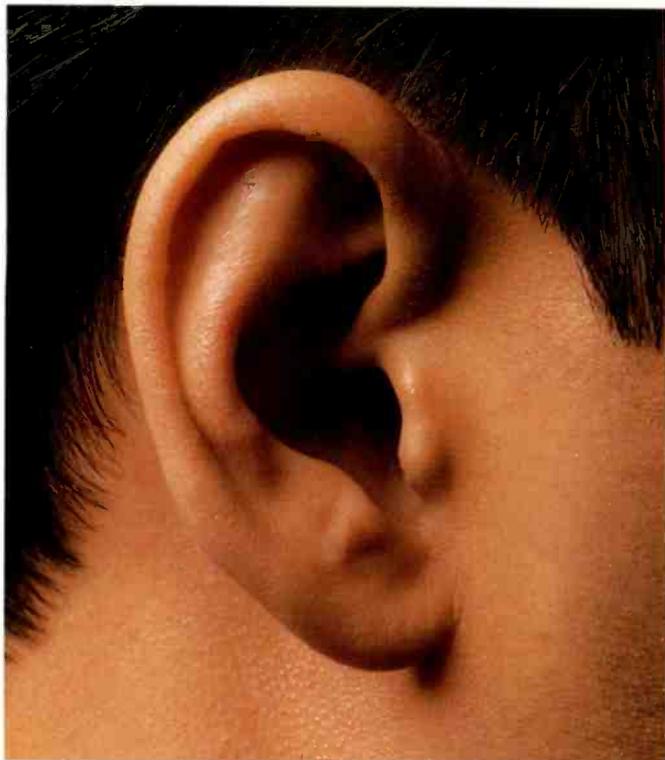
ROBERT FRIPP
ON CD REISSUES

TESTED: BOSTON
ACOUSTICS SPEAKER,
SOUNDCRAFTSMEN
AMP,...AND MORE



MR DAVID S BUCHANAN
8900 YELLOW WOOD PL
LOUISVILLE KY 40242-7772
APR 94
VF04
#QM06
#BXBDHMY*****5-DIGIT 40242
#BCH8900Y091 9#430492
1J



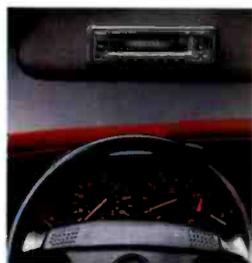


Beauty is in the e

Serious music appreciation involves more than just your sense of hearing.

It involves your individual sense of taste.

Which is why we created a revolutionary new



DSP car audio unit. One that, when added onto your current system, lets you fine-tune your sound with a level of accuracy never before possible.

So that now you can hear music in a completely new way. The way *you* like it.

Introducing the Premier™ DEQ-7500 Digital Signal Processor from Pioneer.®

While most DSP units just let you choose different sound field options, the DEQ-7500 does something radically different. It actually corrects the deficiencies in your sound, caused by an imperfect car interior environment (everything from poor speaker placement to

plush seats, which absorb sound waves). The result: our new DEQ-7500 gives you the premium sound performance your car's interior has been depriving you of.



This is all made possible thanks to Pioneer's dual-chip Digital Signal Processor—high-powered integrated circuitry that carries out thousands of complex functions, all in a unique three-step process.

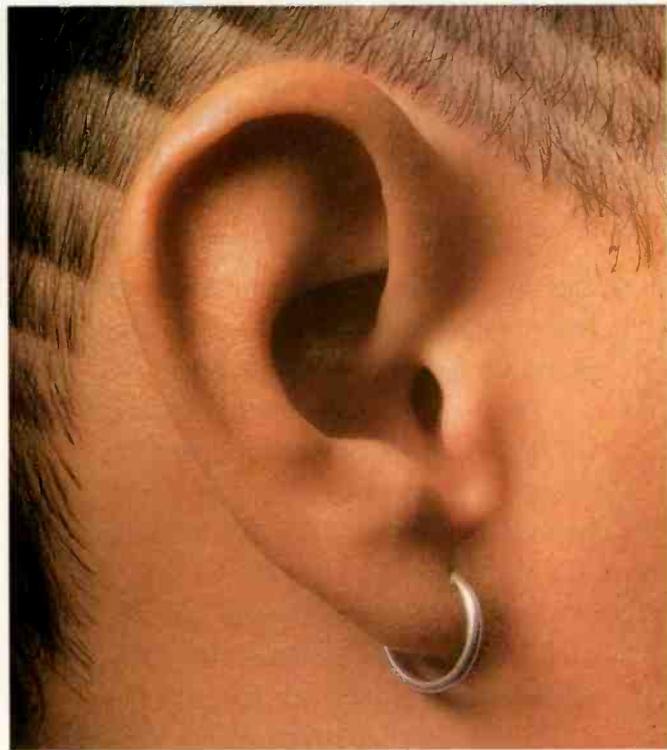
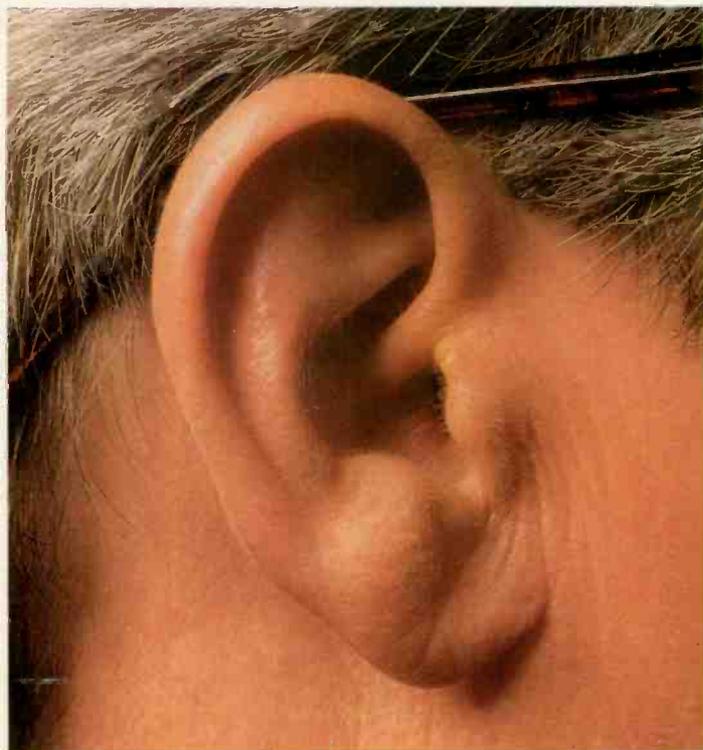
Step one: Correcting your existing sound.

The DEQ-7500 lets you choose between four-band, 1/3 octave parametric EQ or seven-band graphic EQ, to dial in the best overall sound characteristics for your particular car environment.

You can then add parametric bass and treble for even further refinement. And when you're all finished, save these critical adjustments with six user presets.

Step two: Having corrected your sound, you





ear of the beholder.

can then use the Listening Position Selector to move the center stage image around your car. So that no matter where you're sitting, it'll always sound like the best seat in the house. Once you've chosen the position you want, you can use the Image Focus Control for ultraprecise imaging and staging, particularly in vocals.



Step three: At last, you can start enhancing your sound. Choose from any of five listening environments: Studio, Jazz Club, Concert Hall, Cathedral and Stadium.

You can then further fine-tune your sound field, by adjusting the delay time and intensity within each of these particular venue modes.

Of course, while it's nice to sit here and read about the DEQ-7500, it's even

better to sit behind the wheel and experience it for yourself. Which reminds us of one final step: visiting your nearest Premier dealer. He's part of a network of expert craftsmen who install and design sound systems with the utmost care and attention to detail.

PREMIER

If you'd like more information regarding the DEQ-7500, as well as the name and address of the Premier dealer located closest to you, simply give us a call at 1-800-421-1601, extension 904.

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This honor, determined by interviewing hundreds of thousands of people across America, takes into account the many factors that make someone fully satisfied with their purchase.

Denon is especially proud to win in this category, because CD Players, more than any other component, challenge a company's abilities in the electro-mechanical, analog *and* digital domains.

Denon is even prouder, because the ultimate judge in this unprecedented competition was not a reviewer or a magazine editor, but someone just like you.

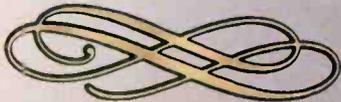
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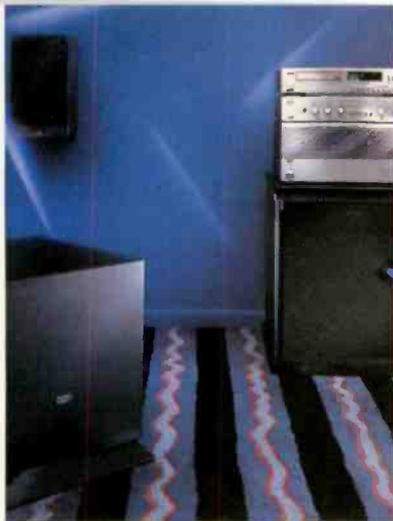


PHONES LEVEL



DISC TRACK TIME VUSIC CALENDAR

① ② ③ 4 10 26m 33s 1 2 3 4 5
④ ⑤ 6 7 8 9 10



Cover

The a/d/s/ SUB10 powered subwoofer (lower left) would be right at home in a system of such components as the a/d/s/ SAT6 satellite speaker and the Adcom GCD-575 CD player, GFP-565 preamplifier, and GFA-555II power amplifier. For more on subwoofers, see page 70.

Photograph by Roberto Brosan
Carpet courtesy of ABC Carpets

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 A unique jazz and classical sampler from Chesky Records

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BULLETIN

by William Livingstone and Glenn Kenny

Pack In the Kit Bag

This spring when the Heath Company announced that it was closing out its line of do-it-yourself kits for amateurs to assemble radios, TV sets, AM/FM receivers, and other electronic products, the news was reported on the front page of the New York Times as a change in the American way of life. The Times said that former Senator Barry Goldwater is among those who have wired more than a hundred Heathkits.

According to Heath, more than 95 percent of its kit customers were men. Fran Dym, a publicist for electronics firms, is the only woman we know who wired more than one kit, and she says, "I built more than



twenty of them when I was in school. It gave me a tremendous sense of accomplishment and made me think more analytically."

Julian Hirsch, the head of Hirsch-Houck Laboratories, says, "Building kits was the nucleus of my entry into this field. I built my first test instruments from kits, and it was a lot of fun. Discontinuing Heathkits marks the end of an era."

DCC Made in USA

American consumer-electronics manufacturing

is about to acquire a higher profile courtesy of Tandy Corporation, the Texas company best known for its chain of Radio Shack stores. Over a year ago Tandy announced its intention to make and market Digital Compact Cassette (DCC) decks, and production is scheduled to begin at its Fort Worth, Texas, facility in June. The decks are expected to be in stores some time in the third quarter of the year. Tandy plans to manufacture blank DCC's at its factory for magnetic products in California.

Popular Music

The Recording Industry Association of America has certified a multi-Platinum award (3 million units sold) to Amy Grant's "Heart in Motion" (A&M), a Platinum award to Red Hot Chili Peppers' "Blood Sugar Sex Magic" (Warner Brothers), and Gold awards to Black Sheep's "A Wolf in Sheep's Clothing" (Mercury) and Mary-Chapin Carpenter's "Shooting Straight in the Dark" (Columbia). . . . On June 2, Ringo Starr begins an international tour that will take him to Europe in July and bring him back to America in August. His band includes (among others) Nils Lotgren, Todd Rundgren, Dave Edmunds, and Starr's son Zak Starkey, who (like his father) is a drummer. . . . Legislation in Washington state to prohibit the sale or distribution of so-called "erotic" recordings to minors becomes law on June 13.

Strides in Car Stereo

Blaupunkt has introduced a ZL series of car speakers featuring Electronic Bass Injection (EBI), provided by an extra woofer voice coil that allows the use of a separate, high-power bass input. The speakers, which fit car manufacturers'

standard mounting holes, are intended to provide better imaging and fader control as well as improved deep-bass response. . . . Infinity Systems (part of the Harman International loudspeaker group) is providing custom-designed sound systems for Vector Aeromotive, a maker of hand-built, high-performance luxury cars. The first of the systems is in the Vector A-WX3 supercar first shown this spring at the Geneva Auto Show (price: over \$750,000). . . . Bose Corporation has developed a new music system for the redesigned 1993 Mazda RX-7 using Bose's patented Acoustic Wave speaker technology—its first appearance in car audio. A Bose executive has described the result as "a unique sound system on wheels that comes with a sports car."

Poster Art Mozart

A print of Mozart at the billiards table, created by Bernard Childs and reproduced in the April 1991 issue of STEREO REVIEW, has been made into a poster in honor of the Mozart Bicentennial at Lincoln Center. The poster is available at the gift shops of Lincoln Center for \$25 or by calling toll free (800) 453-2258. It is also available by mail for \$29 (including \$4 for shipping, tax and handling). Send mail orders with a check for \$29 made out to Lincoln Center for the Performing Arts to Childs Poster, Mozart Bicentennial at Lincoln Center, 70 Lincoln Center Plaza, New York, NY 10023-5393.

Names Making News

Koss Corporation, the leading manufacturer of high-fidelity stereophones, has licensed its Koss brand name to the Dutch firm Hagemeyer for use on audio and video electronic products. Eighteen items

are to be introduced this spring and early autumn. . . . The Energy Conservation Center in Tokyo has given Yamaha its Energy Conservation Vanguard 21 Award, intended to recognize new devices that have significant conservation potential, for Yamaha's Power Stream technology, said to make devices that use switching power supplies smaller and more efficient. . . . Fuji has been named the official brand of photo film, magnetic tape, and computer media of the U.S. Open Tennis Championships to be held August 31 to September 13 in Flushing Meadows, New York.

Honors

The Pulitzer Prize for music was won this year by Wayne Peterson for an orchestral composition titled *The Face of the Night, the Heart of the Dark*. . . . The composers John Harbison and Ellen Taaffe Zwilich have been elected to the American Academy and Institute of Arts and Letters.

JVC Jazz

Dedicated to the New York City jazz musician, this year's JVC Jazz Festival will take place in the Big Apple June 19-27. Among the many jazz stars who will participate in concerts all over town are Dizzy Gillespie, Bobby McFerrin, Lew Tabackin, Wynton Marsalis, Nina Simone, the Modern Jazz Quartet, Astrud Gilberto, Lionel Hampton, Laurindo Almeida, Ray Charles, B.B. King, and many, many others. For information about the festival in New York or its coast-to-coast summer tour, which runs from August 22 to September 12, call (212) 787-2020 or write to the JVC Jazz Festival, P.O. Box 1169, Ansonia Station, New York, NY 10023. □

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I've been part of many exciting projects at Bose, but I can honestly say that the Acoustic Wave® music system is the invention of which Dr. Bose and I are most proud. It was the most challenging, and the most rewarding. And it won the national award for the Invention of the Year in 1987. The Acoustic Wave® music system changed the way I enjoy music. Maybe it will do the same for you.

One more thing. Although we have thousands of dealers worldwide, the Acoustic Wave® music system is only available directly from Bose.

Sincerely,

William R. Short

Dr. William R. Short

Bose Corporation Principal Research Engineer

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mask, finer phosphor
pitch and the
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comb filter.

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LETTERS

Blue on Blonde

I was thrilled by Steve Simels's wonderful review in April of the debut CD, "Blue on Blonde," by my band, Jonathan Gregg and the Lonesome Debonaires, but I must correct the statement attributed to Vernon Reid. While he did cite us (among others) in a radio interview as one of his favorite New York bands, as far as I know he never mentioned my guitar playing in particular.

Nonetheless, it was inspiring to be recognized in your pages, especially considering that we have done the entire project—recording, distribution, and promotion—without any outside assistance. Do-it-yourselfers, take heart!

JONATHAN GREGG
New York, NY

How DAT Went Wrong

Ken Pohlmann missed the point in his April column, "Where Did DAT Go Wrong?" There are only four reasons to make a home recording:

1) To preserve fragile vinyl discs by copying them onto tape and then playing only the tape.

2) To copy discs for playback where using a phonograph is impossible, as in a car or while walking or jogging.

3) To pirate recordings.

4) To record original sounds, of which there are two types: voice ("living letters" or "talking books") and everything else.

The compact disc removed the first two reasons. Why "preserve" a CD when it has a longer expected life than the tape used to copy it? Why install a car DAT player when you can install a cheaper CD player and not have to have two copies of everything? As for portable uses, perhaps if there were a \$29.95 cigarette-pack-size DAT player available it could compete, but even a yuppie would balk at spending \$700 just to listen to Vivaldi while jogging.

Ignoring the lack of morality in pirating recordings, it made economic sense when one could record a \$6 LP onto a tape costing \$1.50. It does not make economic sense to record a \$13 CD onto a tape costing \$10 using a recorder costing \$700.

As for the last reason, for voice recording DAT is overkill. The analog cassette is quite adequate for the task. That leaves only amateur musicians and environmental-sounds enthusiasts, for whom DAT is a godsend. Unfortunately, there aren't enough of them to support the format.

DAT went hopelessly wrong when the designers opted for a unique tape format. Had they chosen the 8mm videocassette, DAT would have been a pirate's

dream machine. So long as there was no large base of users to keep the price of tapes low, the record companies had no reason to fear pirates. That's the real reason for DAT's failure: the high cost of the blank tape.

WILLIAM G. NABOR
Mission Viejo, CA

People who don't record won't buy DAT or DCC. The tapes don't last like CD's. Those who do record will [use these formats] to record, listen, and rerecord—not to store. They'll buy CD's for that. DCC can't compare with DAT as a recording medium, period.

I bought DAT, and I wasn't disappointed. I make less than \$19,000 a year and found it a great value. But if I had known about the data-buffer delay circuits in coming CD players, I might not have bothered.

SCOTT A. SAMLASKA
Sioux Falls, SD

Surround Sound

I was impressed with Peter W. Mitchell's "Surround Sound" in April. On page 46, he describes a do-it-yourself surround system using a 5-watt, 25-ohm potentiometer and a 20-millisecond electronic delay. But these are not everyday Radio Shack parts as he seemed to imply. Also, because of space limitations, if I added rear speakers they could only be about 12 feet back from the front speakers, mounted on the walls on either side of the listener. Would the delay be necessary with this setup?

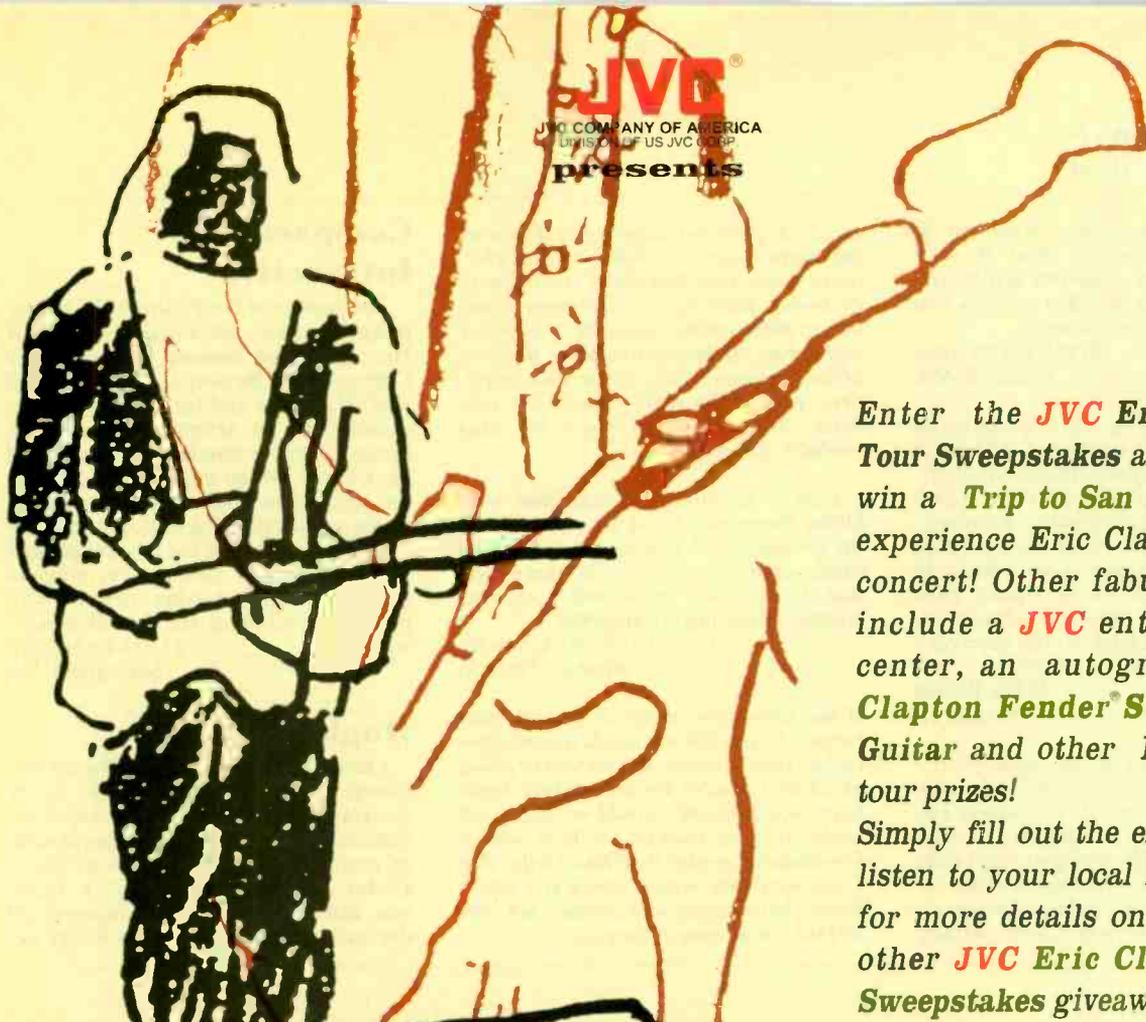
SCOTT D. JONES
Panama City, FL

The potentiometer should be readily available at electronics stores, but if you want delay, you're probably going to have to spring for a Dolby Surround processor. (The do-it-yourself system described in the article didn't include delay.) The closer the rear speakers to the listener, the more beneficial the delay.

A/V Connections

Thanks for Daniel Kumin's excellent article in April on home-theater connections. I have one point to add concerning systems that have both composite-video and S-video inputs and outputs. As Mr. Kumin states, many A/V receivers and amplifiers have pass-through S-video inputs and outputs as well as parallel composite-video hook-ups. Video gear typically has both types of input. If both connections are made, the S-video input overrides the composite-video input. In a system with both types of sources, the only way to see a composite signal is to unplug the S-video cable from the monitor. Some A/V receivers and amps eliminate this problem by automatically con-

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 CITY _____ STATE _____ ZIP _____
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LETTERS

verting composite-video signals to S-video and vice versa. And if your monitor has more than one input, you could use one for S-video sources and another for composite sources.

MARK P. BALDWIN
Issaquah, WA

I was confused by the explanation in "Home Theater Connections" of how to wire a powered subwoofer and a center-channel speaker along with main speakers using only one external power amplifier: "Feed the subwoofer the full-range signal from the receiver's main left/right line-level outputs. These signals must then be returned from the subwoofer's own line outputs back to the receiver's front-channel amplifier inputs."

MARK RAGER
Decatur, IL

The connection described is meant for use with line-level preamp-out and main-amp-in jacks, which many A/V receivers and amplifiers provide in addition to their speaker outputs. These outputs and inputs normally are jumpered together, but the link can be broken to enable insertion of a signal processor, a beefier power ampli-

er, or a powered subwoofer. Powered subwoofers normally have internal electronic crossovers that blend low-frequency signals from the two incoming channels to mono for the subwoofer's amplifier and return the higher-frequency portions of the incoming signals to the main amplifiers. Reread the section under the sub-head "The Next Step," and the idea probably will become clear.

I have an integrated amplifier with Dolby Surround. There's a way to hook up an amplified subwoofer but not a center-channel speaker. Is there any way I can hook up a center speaker without replacing my amplifier?

DOUGLAS C. BEAUCHAMP
Windsor, Ontario

If the subwoofer output is actually full-range, you could use it to add an amplifier and a center speaker. But instead of going to all that trouble for a relatively small gain, you probably would be better off replacing your current amplifier with a five-channel model that has Dolby Pro Logic decoding, which would give much better performance and perhaps not cost all that much more in the end.

Compact Disc Interactive

The review of the Philips CD-I player in April was very informative, but Julian Hirsch omitted mention of the similar Commodore Dynamic Total Vision (CDTV) player and format, which preceded CD-I by several months. Both players support standard CD audio and the CD+G format but different formats for interactive applications. Both support a quickly growing line of interactive recordings, and each has advantages and disadvantages. I strongly recommend that prospective buyers review both products, including the available software.

JAMES EASTLAND
Springfield, VA

Hughes AK-100

I have the Hughes AK-100 Sound Retrieval System (tested in March) in my system and find that the extension of the stereo stage beyond the speakers is rather extraordinary. In Track 5 of Steve Earle's "Copperhead Road," a banjo you can hardly pick out unprocessed distinctly stands out at least 4 feet be-



JUAN MURILLO PERFORMING LIVE AT THE

yond and in front of the left speaker. The organ in several tracks of "The Runaway" by Booker T. Jones is heard the same distance beyond both speakers. The difference the Hughes device makes is less prominent with higher-quality CD's but certainly noticeable.

GEOFFREY WILLIAMS
Carmel, CA

DDD or Die

March "Bulletin" mentioned that the Society of Professional Audio Recording Services (SPARS) recommended discontinuing the use of the SPARS code on compact discs. The explanation given, that current audio technology is too complex, is pure bull! I, for one, will not even consider buying a disc that does not have a SPARS code, and if the code is other than DDD (all digital), I will not buy it at all. I have a huge LP collection and certainly don't want more analog recordings.

C. ANTHONY BENSON
Pacifica, CA

I'm glad that over the last several years I made a maximum effort to buy CD's of all the music most important to

me while it was still possible to tell which ones were *real*—that is, DDD. If the Society of Professional Audio Recording Services is going to grinch the heretofore admirable truth in labeling of CD's so that you can't identify the pseudo stuff—well, I don't really need any more CD's.

No, it is *not* "complex." It is *very simple*: Either the signal *did* pass through an analog *storage medium*, or it did *not*. If it passed through an analog medium, it has *irreducible residual flutter*.

JOHN F. FOX
New York, NY

Replacement Grilles

I read with great interest the "Audio Q&A" item about replacing foam speaker grilles in the April issue. We custom make replacement grilles of all types. And Scott Paper no longer has a foam division—it now operates under the name Foamex International.

BOB SHAFFER
Custom Sound, P.O. Box 463026
Mount Clemens, MI 48046

Radio Shack sells foam that can be cut to fit speaker panels. It comes in 17 x 23-

inch sheets for \$7.95 each (brown, #40-1946; black, #40-1951). NICK DEGARIS
Sandwich, MA

Stereo AM

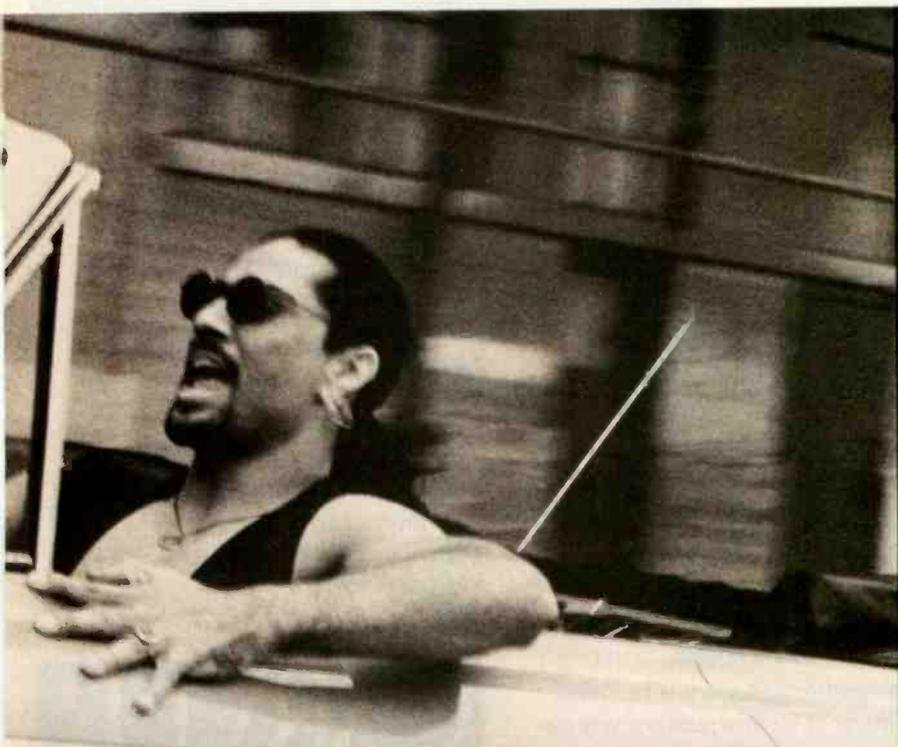
Where's the equipment for stereo AM? I would like to buy a new receiver but can't find one with this feature. There are several stations in my area broadcasting in stereo, but the effort is wasted if there's no receiver to hear the difference.

HERMINIO ESTREMER ACEVEDO, JR.
Ponce, PR

We don't know of any current receiver that has a stereo AM section, and there's only one separate tuner—the Carver TX-11b. Denon has announced a tuner with stereo AM, the TU-680NAB, which we hope to review when it becomes available.

We welcome your letters. Please address correspondence to Editor, STEREO REVIEW, 1633 Broadway, New York, NY 10019.

You should include your address and telephone number for verification. Letters may be edited for clarity and length.



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Our ultra-advanced new SD/A-490t includes two vacuum tubes whose classic design has remained unchanged for over 35 years.

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THE AMPLIFIER THAT DOESN'T AMPLIFY.

Between a CD player's D/A converter and external outputs is circuitry called a buffer amplifier which actually doesn't boost the signal strength at all. Instead, the buffer amp is a unity gain device which increases output current, and acts as a sort of electronic shock absorber, isolating the relatively fragile D/A chip set from the nasty outside world of demanding analog components.

TUBES VERSUS SOLID STATE.

More than 98% of all CD players use solid state devices for buffer amplifiers. A handful of hard-to-find, esoteric designs in the \$1200 to \$2500 range employ one or more tubes instead. As does our readily-available \$699 SD/A-490t.

In ultra-expensive preamplifiers and power amplifiers, tube sound is subjectively described as "mellower", "warmer", "more open and natural" or simply "less harsh than solid state". Objectively, it's safe to say that tubes: 1) Produce even-order distortion versus transistors' odd-order distortion, particularly 3rd harmonics which are especially unpleasant to the ear; 2) Act as a pure Class A device when used in a buffer stage (Class A output is considered the optimal amplifier configuration) 3) "Round off" the waveform when they clip, while over-driven solid state devices cut off sharply, causing audible distortion.

THE SD/A-490t'S OUTPUT SECTION.

Our new CD player uses two 6DJ8 dual triodes placed between the digital-to-analog converter and a motorized volume control. Operated at less than 30% of

their maximum capacity, the tubes achieve a highly linear output voltage with very low static and transient distortion while providing very high dynamic headroom.

And because they're "loafing" at 1/3 their rated current capability, the SD/A-490t's tubes are designed to last the life of the CD player without replacement or need for adjustment.

AN ARRAY OF FEATURES AS RICH AS ITS SOUND.

We've designed the SD/A-490t to be both useful and easy-to-use. 21-key front panel or remote programming. Fixed and variable output. Programming grid display. Random "shuffle" play. Variable length fade. Automatic song selection to fit any length of tape. Even index programming for classical CD's.

Plus our proprietary Soft EQ circuitry which compensates for variables in spacial (L-R) information and midrange equalization found in many CD's mastered from analog tapes.

BRING YOUR TWO BEST CRITICS TO A CARVER DEALER.

It's tempting to further regale you with how well we think the SD/A-490t's tubes and Single Bit D/A circuitry improve the sound of a compact disc. But your own ears should be the final arbiter of quality. Bring them to a Carver dealer and compare tube output with solid state designs costing \$1000 or more. Suffice it to say that almost all critical listeners not only are able to hear a difference, but prefer the sound of the remarkably affordable SD/A-490t's dual triode transfer function.



The Carver SD/A-490t. At \$699, its suggested retail is \$500 less than the nearest competitor with tube output.*



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NEW PRODUCTS

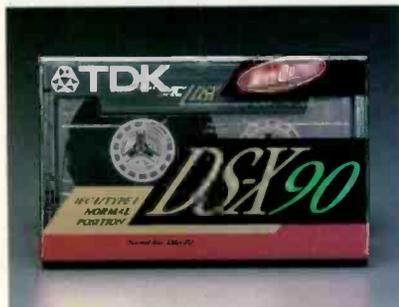


Celestion

The Celestion Digital Loudspeaker Processor (DLP) is designed for use with the company's SL600 and SL600Si compact speakers. Placed in the signal chain between a CD or digital-tape transport and a digital-to-analog converter (using either optical or coaxial connections), the DLP uses digital signal processing to rectify time-domain errors and improve

the phase response of the SL600 or SL600Si. The company claims that when used with the DLP, these speakers show almost perfectly linear phase characteristics at all reproduced frequencies. Price: \$599. Celestion Industries, Inc., Dept. SR, 89 Doug Brown Way, Holliston, MA 01746.

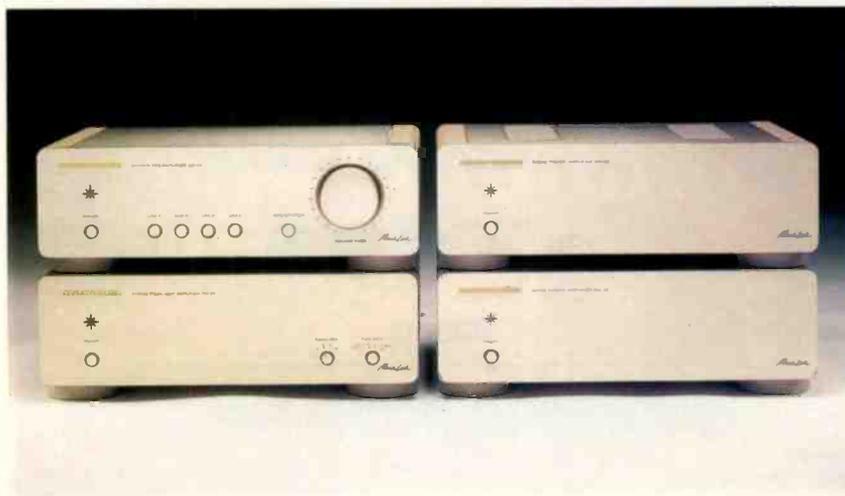
Circle 120 on reader service card



TDK

TDK's normal-bias DS-X cassettes, designed for high-speed dubbing, are said to have greater sensitivity and better bass response than ordinary Type I tapes. The shell mechanism is designed to insure consistent tape-to-head contact at high speeds. Prices: C-60, \$2.49; C-90, \$2.99; C-100, \$3.69. TDK Electronics, Dept. SR, 12 Harbor Drive Park, Port Washington, NY 11050.

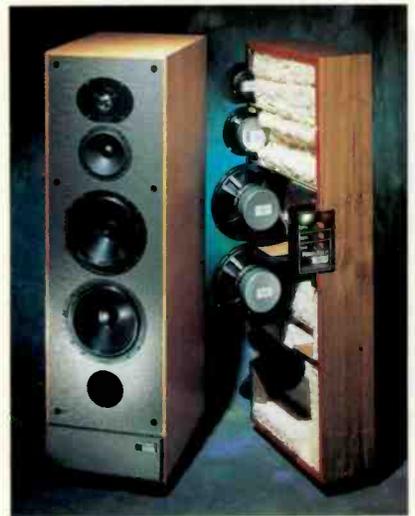
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Paradigm

Paradigm's Studio Monitor three-way speaker system features a pure-aluminum dome tweeter, a midrange driver with a mineral-filled homopolymer polypropylene cone and vented aluminum voice-coil former, and dual woofers with high-pressure diecast aluminum chassis, co-polymer cones, and 40-ounce magnets. Frequency response is rated as 25 to 20,000 Hz ± 2 dB, power handling as 15 to 300 watts. Dimensions are 12 $\frac{1}{4}$ x 43 $\frac{1}{2}$ x 16 $\frac{1}{2}$ inches. Price: \$1,899 a pair. Distributed in the U.S. by AudioStream, Dept. SR, MPO Box 2410, Niagara Falls, NY 14302.

Circle 121 on reader service card



Marantz

The Marantz Music Link half-size components, each less than 10 inches wide, are intended to save on shelf space without sacrificing sound quality. The SC-22 straight-line preamplifier (top left in photo) has four line-level inputs. The PH-22 phono-equalizer amplifier (bottom left) provides RIAA equalization or a choice of three other equalization curves. A pair of 50-watt MA-22 Class AB mono power amplifiers (right, top and bottom) complete the array. Not shown is a 30-watt Class A version of the power amp, the MA-24. Prices: SC-22, \$999; PH-22, \$999; MA-22, \$899 each; MA-24, \$1,249 each. Marantz, Dept. SR, 1150 Feehanville Dr., Mount Prospect, IL 60056.

Circle 123 on reader service card

NEW PRODUCTS



Infinity

Infinity's Video 1 speaker is designed specifically for the center channel in a home-theater setup. Its sharply angled speaker panel projects sound upward toward the listener if the speaker is placed on the floor below a TV set or video monitor (magnetic shielding prevents picture interference). Detachable feet are supplied to adjust the angle, and

the two-way system, with dual 5½-inch woofers and a ferrofluid-cooled tweeter, can also be used vertically. Power handling is rated as 10 to 100 watts. Dimensions are 18¼ x 7 x 5½ inches. Price: \$189. Infinity Systems, Inc., Dept. SR, 9409 Owensmouth Ave., Chatsworth, CA 91311.

Circle 124 on reader service card

Design Acoustics

The Design Acoustics PS-SW subwoofer features a 10-inch driver with a long-throw, carbon-fiber-impregnated cone and dual aluminium voice coils. The design is said to achieve the correct stiffness-to-weight ratio for accurate transient response and low distortion. The cabinet is extensively braced to suppress unwanted resonances. Response is rated as 30 to 130 Hz, nominal impedance as 8 ohms. Recommended amplifier power is 15 to 200 watts. Dimensions are 22 x 16¼ x 11 inches. Price: \$340. Design Acoustics, Dept. SR, 1221 Commerce Dr., Stow, OH 44224.

Circle 125 on reader service card



NEAR

The AES-1.1 compact outdoor speaker from NEAR (New England Audio Resource) is said to be a true waterproof (as opposed to "water-resistant") system. The 5¼-inch full-range driver is made of a hard alloy material, and the cabinet, made of NEAR's proprietary variable-density polyethylene, has a rustproof cast-aluminum frame. Frequency response is given as 65 to 16,000 Hz ± 3 dB, power handling as 100 watts, and nominal impedance as 8 ohms. The AES-1.1 is available finished in black, white, or beige. Dimensions are 7¼ x 7¼ x 7¼ inches. Price: \$299 a pair. NEAR, Dept. SR, 679 Lisbon Rd., Lisbon Falls, MN 04252.

Circle 126 on reader service card



Autotek

The Autotek 7050BTS car stereo amplifier delivers 22 watts per channel into 4 ohms or 50 watts into 2 ohms. It can be bridged for a mono output of 100 watts into 4 ohms, and it features passive bypass circuitry that is said to enable Class A operation at higher output than would otherwise be possible. The amplifier can drive a mono subwoofer and stereo satellite speakers simultaneously. There are bass and treble tone controls and a three-way switch to bypass preamp or EQ circuits for very low-noise operation. The regulated power supply has a tuned induction circuit said to increase efficiency by absorbing power pulses. Price: \$229. Autotek, Dept. SR, 855 Cowan Rd., Burlingame, CA 94010.

Circle 127 on reader service card



Introducing the New Bose® Acoustimass®-5 Series II Speaker System.

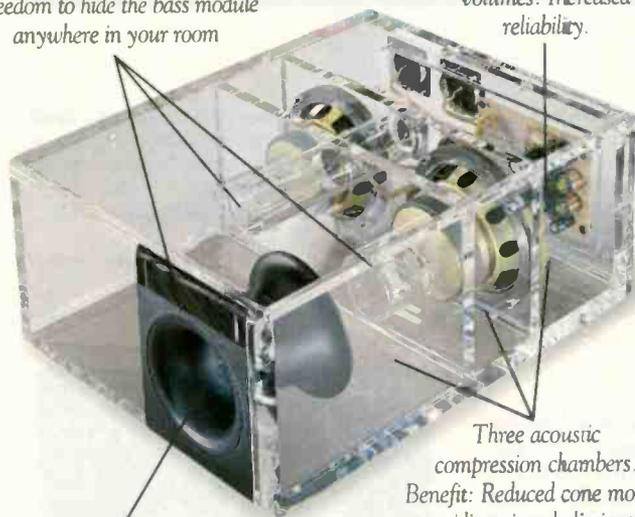
The part you see.



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Three acoustic masses provide 36dB/octave acoustic crossover rolloff!
Benefit: Soundstage determined by cube speakers. Complete freedom to hide the bass module anywhere in your room

New system protection circuit.
Benefit: More system protection at high output volumes. Increased reliability.



New elliptical toroid conduit for the radiating air mass provides for laminar air flow.
Benefit: No audible noise caused by turbulence, even at high loudness levels.

Three acoustic compression chambers.
Benefit: Reduced cone motion providing virtual elimination of audible distortion.

(Plexiglass model for illustration purposes only)

Your eyes won't believe your ears.

When you place an Acoustimass-5 speaker system in your home, all you see are two tiny cube speaker arrays (shown left). You can easily hide the compact bass module (lower left) anywhere in the room, out of view.

You may find it difficult to believe the small size because of what you hear: sound so spacious and lifelike, it approaches the realism of a live performance.

The cube speaker arrays feature Bose Direct/Reflecting® speaker technology. They can re-create a natural balance of reflected and direct sound that conventional speakers cannot match. Rotate the arrays to cause big rooms to sound more intimate, or small rooms more spacious. You can listen from almost anywhere in the room and still hear full stereo. All the music, even the lowest bass notes, appears to come from the small cubes, regardless of where the bass module is hidden.

The Acoustimass bass module contains technology unlike that of any conventional speaker. It launches sound into the room by an air mass, rather than directly from a vibrating surface. Some benefits of this patented Bose technology are shown in the pictorial on the lower left.

Compare the sound to conventional speakers costing far more.

The best way to appreciate the benefits of this technology is to ask your dealer to demonstrate it side by side with conventional speakers costing far more. For more information about Bose products, and names of Bose dealers near you, call toll-free;

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NEW PRODUCTS



Audio Control

Audio Control's C-131 thirty-band (one-third-octave) mono graphic equalizer (top in photo) features Constant Q circuitry, which automatically adjusts the bands adjacent to the one that the user is adjusting for quicker, more precise results. It also has a four-position, switchable infrasonic filter to suppress unwanted signals at frequencies below the audible range. Signal-to-noise ratio is rated as 112 dB. The R-130 real-time analyzer (bottom), designed to be used in conjunction with a pair of equalizers, also has thirty bands. It has a digital pink-noise generator and comes with a calibrated stereo microphone. The dot or bar display can show the left or right channel or both together. Distortion is rated at 0.002 percent. Prices: C-131, \$529 each; R-130, \$649. Audio Control, Dept. SR, 22313 70th Ave. W., Mountlake Terrace, WA 98043.

Circle 128 on reader service card

PSB

The Alpha is the first in a series of budget-price speakers from the Canadian manufacturer PSB. The two-way bookshelf system has a 6½-inch foam-suspended polypropylene woofer and a ½-inch ferrofluid-cooled dome tweeter. The low-diffraction design is said to preserve midrange and treble clarity and enhance natural stereo imaging. Bandwidth is given as 50 to 21,000 Hz, and power handling is 60 watts. Dimensions are 8¼ x 12½ x 9½ inches. Price: \$199 a pair. PSB, Dept. SR, 633 Granite Ct., Pickering, Ontario L1W 3K1.

Circle 129 on reader service card



Cooustic

Cooustic's CC-55 car CD changer holds up to ten discs. It features dual 1-bit digital-to-analog converters and also has a digital output. Supplied with a remote control, the CC-55's programming features include shuffle play, track repeat, disc repeat, and reverse/forward music

search. It can be connected to any head unit that has an auxiliary input or through a car's antenna loop using an optional RF modulator. Price: \$599. Cooustic, Dept. SR, 4260 Charter St., Vernon, CA 90058-2596.

Circle 130 on reader service card

Case Logic

Responding to the growing popularity of CD changers, Case Logic is introducing the first carrying case for CD magazines. The Model M-1 magazine holder will store seven six-disc magazines or four ten-disc magazines. The black case is lined with thick, high-density, closed-cell foam padding for maximum protection, and it has an adjustable Velcro interior divider. Price: \$19.95. Case Logic, Dept. SR, 6930 Winchester Circle, Boulder, CO 80301.

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- The Cult:** Ceremony (Reprise/Sire) 11133
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- Paul Simon:** Negotiations And Love Songs 1971-86 (Warner Bros.) 20461
- Metallica:** ...And Justice For All (Elektra) 00478
- Bryan Adams:** Reckless (A&M) 51540
- The Bonnie Raitt Collection** (Warner Bros.) 00569
- Dave Brubeck:** Quiet As The Moon (MusicMasters) 40290
- Boyz N The Hood/Sdtrk.** (Qwest) 24419
- Aretha Franklin:** What You See Is What You Sweat (Arista) 72220
- Hi-Five (Jive)** 10542
- Desmond Child:** Discipline (Elektra) 24472
- Fourplay** (Warner Bros.) 10723
- Anita Baker:** Compositions (Elektra) 00921
- Traveling Wilburys, Vol. 3** (Warner Bros.) 24817

- Jodeci:** Forever My Lady (MCA) 90177
- Anita Baker:** The Songstress (Elektra) 40154
- Miles Davis/Michel Legrand:** Dingo-Sdtrk. (Warner Bros.) 64201
- Piaclido Domingo:** The Broadway I Love (Atlantic) 30015
- Linda Ronstadt:** Mas Canciones (Elektra) 50090
- Happy Mondays:** Live (Elektra) 10599
- Tone-Loc:** Cool Hand Loc (Delicious Vinyl) 20039
- Ratt:** Ratt & Roll 8191 (Atlantic) 60098
- David Benoit:** Shadows (GRP) 00284
- The Rippingtons:** Curves Ahead (GRP) 20610
- Patti Austin:** Carry On (GRP) 10520

- Dave Grusin:** The Gershwin Connection (GRP) 10620
- Keith Sweat:** Keep It Comin' (Elektra) 80100
- Michael Crawford Performs Andrew Lloyd Webber** (Atlantic) 74128
- Oleta Adams:** Circle Of One (Fontana) 25028
- House Party II/Sdtrk.** (MCA) 63345
- Allman Bros. Band:** A Decade Of Hits 1969-1979 (Polydor) 35031
- Gerald Albright:** Live At Birdland West (Atlantic) 14096
- Eric Clapton:** Slowhand (Polydor) 25094
- Cathy Dennis:** Move To This (Polydor) 25100
- Black Box:** Mixed Up! (RCA) 53463
- Chick Corea Electric Band:** Beneath The Mask (GRP) 20660
- Andy Gibb:** Greatest Hits (Polydor) 25124

- John Mellencamp:** Whenever We Wanted (Mercury) 74582
- Kathy Mattea:** Time Passes By (Mercury) 44575
- Skid Row:** Slave To The Grind (Atlantic) 54433
- Kentucky Headhunters:** Electric Barnyard (Mercury) 25138
- Kiss:** Double Platinum (Casablanca) 25149
- Grease/Sdtrk.** (Polydor) 35125
- Engelbert Humperdinck:** His Greatest Hits (Mercury) 35131
- Glenn Miller:** Chattanooga Choo Choo-The #1 Hits (Bluebird) 11052
- James Ingram:** The Power Of Great Music (Warner Bros.) 11131
- Depeche Mode:** Violator (Sire) 73408
- Dire Straits:** Brothers In Arms (Warner Bros.) 14734
- Billy Idol:** Vital Idol (Chrysalis) 54038

- Richard Marx:** Rush Street (Capitol) 15574
- The Doors/Sdtrk.** (Elektra) 54289
- Janet Jackson's Rhythm Nation 1814** (A&M) 72386
- The Very Best Of Nana Mouskour:** Only Love (Philips) 64615
- Maceo Parker:** Mo' Roots (Verve) 64645
- ZZ Top:** Recycler (Warner Bros.) 73969
- Eagles:** Greatest Hits 1971-1975 (Asylum) 23481
- The Very Best Of Righteous Brothers:** Unchained Melody-(Verve) 44658
- The Who:** Who's Better, Who's Best (MCA) 00790
- Vangellis:** Chariots Of Fire (Polydor) 24869
- U2:** Rattle And Hum (Island) 00596
- Slaughter:** Stick It Live (Chrysalis) 20666
- Starship:** Greatest Hits (RCA) 90270
- Best Of B.B. King** (MCA) 23935

- EMF:** Schubert Dip (EMI) 05604
- Pet Shop Boys:** Discography-The Complete Singles Collection (EMI) 05605
- Travis Tritt:** It's All About To Change (Warner Bros.) 64147
- George Strait:** Ten Strait Hits (MCA) 25425
- Tanya Tucker:** What Do I Do With Me (Capitol) 25536
- Gary Burton:** Cool Nights (GRP) 63652
- Best Of Grateful Dead/Skeletons From The Closet** (Warner Bros.) 83892
- Richie Sambora:** Stranger In This Town (Mercury) 64685
- Spinal Tap/Sdtrk.** (Polydor) 34691
- Rythm Syndicate** (Impact/MCA) 62320



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The Pogues: Essential (Island) 15459

Emmylou Harris & The Nash Ramblers At The Ryman (Reprise) 25475

The Best Of Split Enz: History Never Repeats (A&M) 35201

Donna Summer: On The Radio—Greatest Hits Vol. I & II (Casablanca) 24715

The Best Of Stevie B (LMR) 53460

Bon Jovi: Slippery When Wet (Mercury) 43465

Tevin Campbell: T.E.V.I.N. (Owest/Warner) 35412

Stevie Wonder: Jungle Fever/ Sdtrk. (Molown) 54197

Neil Young: Ragged Glory (Reprise) 34621

Van Halen (Warner Bros.) 14620

De La Soul Is Dead (Tommy Boy) 64101

Frank Sinatra: Sinatra Reprise/The Very Good Years (Reprise) 80304

The Cars: Greatest Hits (Elektra) 53702

The Alice Cooper Show (Warner Bros.) 11103

Jesus Jones: Doubt (SBK) 44654

Joe Jackson: Look Sharp I (A&M) 25192

Styx: Paradise Theatre (A&M) 25243

Marky Mark And The Funky Bunch: Music For The People (Interscope) 53860

Dire Straits: On Every Street (Warner Bros.) 74151

Anthrax: Attack Of The Killer B's (Megaforce/Island) 25154

Paul Simon: The Rhythm Of The Saints (Warner Bros.) 10455

Barry White: Put Me In Your Mix (A&M) 15248

Trisha Yearwood (MCA) 64033

Supertramp: Breakfast In America (A&M) 25246

Traffic: The Low Spark Of High Heeled Boys (Island) 25169

The Commitments/ Sdtrk. (MCA) 74016

Roy Hargrove: Public Eye (Novus) 54579

Concrete Blonde: Bloodletting (I.R.S.) 84212

Kenny Rogers: 20 Great Years (Reprise) 25449

Bobby Blue Bland: Portrait Of The Blues (Malaco) 73458

Kenny Kirkland (GRP) 63554

Gerardo: Mo'rimo (Interscope) 43803

P.M. Dawn: Of The Heart, Of The Soul & Of The Cross (Gee Street/Island) 15156

Van Halen: For Unlawful, Carnal Knowledge (Warner Bros.) 10016

The Cure: Disintegration (Elektra) 01109

Scorpions: Best Of Rockers 'N' Ballads (Mercury) 63492

Extreme: Pornograffiti (A&M) 43557

Sinead O'Connor: I Do Not Want What I Haven't Got (Chrysalis) 33512

Steve Winwood: Refugees Of The Heart (Virgin) 54232

The Big Chill/Sdtrk. (Molown) 33970

K.T. Oslin: Love In A Small Town (RCA) 74327

Chick Corea Akoustic Band: Alive (GRP) 10721

Jimmy Buffett Live!: Feeding Frenzy (MCA) 24853

Southside Johnny & The Asbury Jukes: Better Days (Impact) 61604

The Best Of Stevie Nicks: Timespace (Modern) 10940

Eagles: Greatest Hits, Vol. 2 (Asylum) 63318

The Best Of The Doobie Brothers (Warner Bros.) 43738

Clint Black: Put Yourself In My Shoes (RCA) 24690

Fine Young Cannibals: The Raw & The Remixed (MCA) 53904

Bryan Ferry/Roxy Music: Street Life-20 Greatest Hits (Reprise) 10490

Marc Cohn (Atlantic) 82983

Carreras, Domingo, Pavarotti: 3 Tenors (London) 35078

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Another Bad Creation: Coolin' At The Playground Ya Know! (Molown) 10456

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SIGNALS

by Ken C. Pohlmann

CD Recorders For Sale

IT'S human nature, I guess. Whatever you have, you always want a little more. A hundred dollars in your checking account? Two hundred would be better. A Hyundai in your driveway? Gosh, that new Cadillac STS looks nice. The same thing is true with audio technology. About five minutes after the compact disc was introduced, someone asked, "Is there any way you could make it recordable?" Understandably, after sinking hundreds of millions of dollars into the development of the CD, Philips and Sony couldn't understand why a compact and sturdy disc able to hold 74 minutes of high-fidelity stereo audio wouldn't be enough to satisfy people.

Nevertheless, the questions about recording capability kept coming, and ten years later audio manufacturers have fulfilled that desire and begun to market CD recorders (CD-R). These devices aren't cheap (they are aimed at professional recordists and high-end enthusiasts), but they fulfill the dream of loading a blank disc and recording your own music. Moreover, once recorded, the disc can be played back on any CD player.

The task of modifying the original CD specifications to permit recording proved to be almost as challenging as the invention of the CD itself. Complete data-encoding circuitry had to be added to the player, and a new disc had to be designed. The playback-only CD was designed to hold prerecorded

data in the form of tiny pits, and playback is accomplished by shining a laser beam on the surface and monitoring the changes in intensity of the reflected beam. To be playable in standard CD players, a recordable disc would have to use the same playback mechanism. Thus, the recording medium would have to be about as reflective as a standard CD. After considerable research, a disc was developed that is 73 percent reflective (the CD standard calls for at least 70 percent) and permits heat-mode recording. To achieve the required reflectivity, however, the recording layer must be backed with a gold layer.

The disc is made of a polycarbonate substrate, a solid-dye recording layer, a gold reflective layer, and a top protective layer. A writing laser with 4 to 8 milliwatts of power passes through the substrate and heats the dye layer to 250° C. It melts, and the adjacent polycarbonate layer swells, creating a pit. To read data, the same laser beam (now at 0.5-milliwatt power) is reflected from the pit and its changing intensity is monitored. Up to 74 minutes of audio can be recorded, but the disc cannot be erased and rerecorded. (An aside: LP-sentimentalists will be happy to learn that grooves are back! To increase compatibility, CD-R discs are manufactured with a spiral groove to guide the recording laser.)

With some CD-R recorders, those adhering to the Orange Book I standard, you must record through an entire disc without pause. When the end of the disc is reached, the recorder automatically records a table of contents (TOC) in the lead-in portion of the disc so that a standard player can read it. Newer, Orange Book II recorders offer a significant advantage. A disc can be recorded piecemeal, one or a few tracks at a time. A partially recorded disc can be played on the CD-R recorder, but it cannot be played on a regular player until the TOC is recorded in the lead-in area.

A CD-R disc looks like a regular CD but is distinguished by its gold layer and the blue dye used for the recording layer (which looks green against the gold backing). In addition, if you look very closely, you might notice additional data areas within the inner data

circumference, the program-calibration area (PCA) and program-memory area (PMA). The recorder uses them to make a test recording to determine optimal laser writing power and to store a temporary table of contents until the recorder writes the final TOC. A CD-R recorder is the same size as a regular player but has additional buttons for recording and other features. For example, some recorders let you delete an unwanted track (perhaps a false start) from the TOC so that the CD-R player will skip over it (regular CD players will continue to play the track).

Both CD-R discs and recorders have entered the marketplace. Credit for solving the knotty engineering ob-

About five minutes after the compact disc was introduced, someone asked, "Is there any way you could make it recordable?"

stacles in disc design goes to the Taiyo Yuden company, but already big blank-media companies such as TDK are also offering discs. Price? About \$35 to \$40 apiece in small quantities. A number of companies are making CD-R recorders. Perhaps the slickest is the Marantz CDR-1, an Orange Book II model with track-editing capabilities and Philips Bitstream 1-bit analog-to-digital and digital-to-analog converters as well as optical and coaxial digital inputs and outputs. Price? \$7,000. Not cheap, but less than other CD-R recorders and even some high-end CD players. Will prices come down? Let history be your guide: The reading laser in first-generation CD players cost \$300. Now it costs \$18.

Without question, the advent of recordable CD's is a great accomplishment—every bit as remarkable as the development of the original CD. Once again, audio manufacturers deserve our unbounded, heartfelt gratitude. Thanks, guys.

Now, do you think you could make them erasable?

A warning to those with toupees, small vulnerable house pets, and a fear of flying: Maxell has taken high bias tapes to an even higher level of performance.



Compared to other tapes, XLII-S has a higher density of magnetic particles.

The tape is XLII-S. The power behind it is Black Magnetite—a unique magnetic material recently

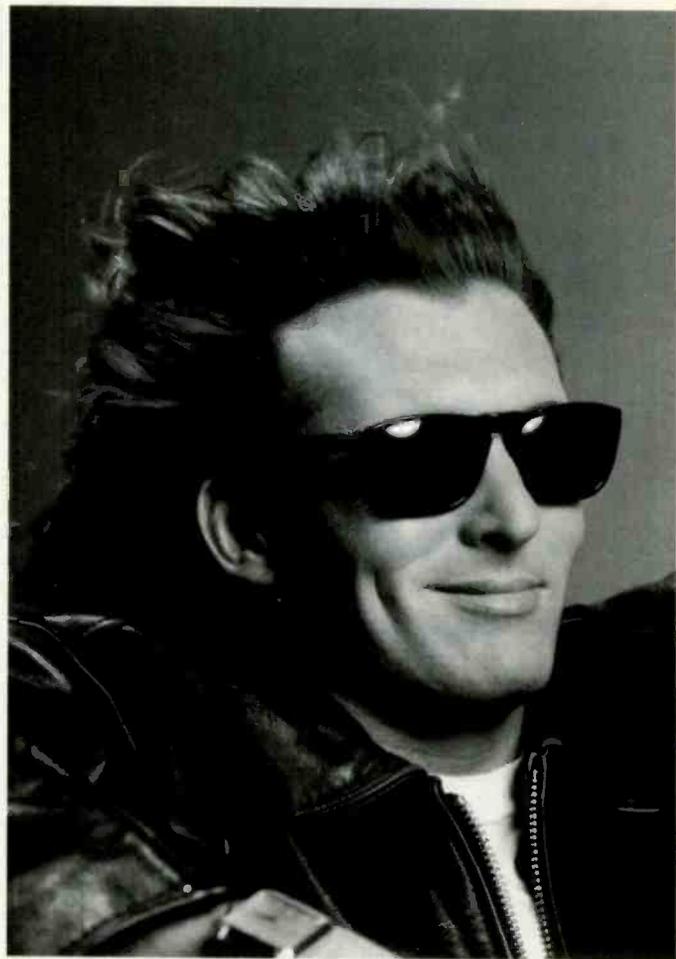
harnessed by Maxell engineers.

With 13% greater power than the magnetic coating on all other high bias tapes, Black Magnetite helps XLII-S deliver higher maximum output levels and wider dynamic range.

Black Magnetite's tiny magnetic particles are not only more powerful than conventional gamma ferric oxide particles, they're smaller and more uniform in shape. This enables us to pack more particles more densely onto the surface of the tape.

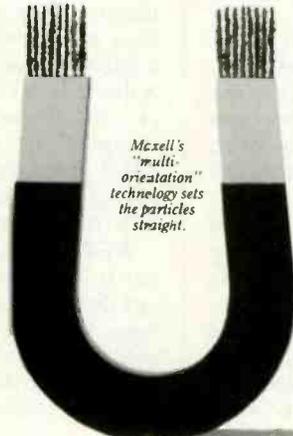


Many tapes' magnetic particles go on in a snarl.



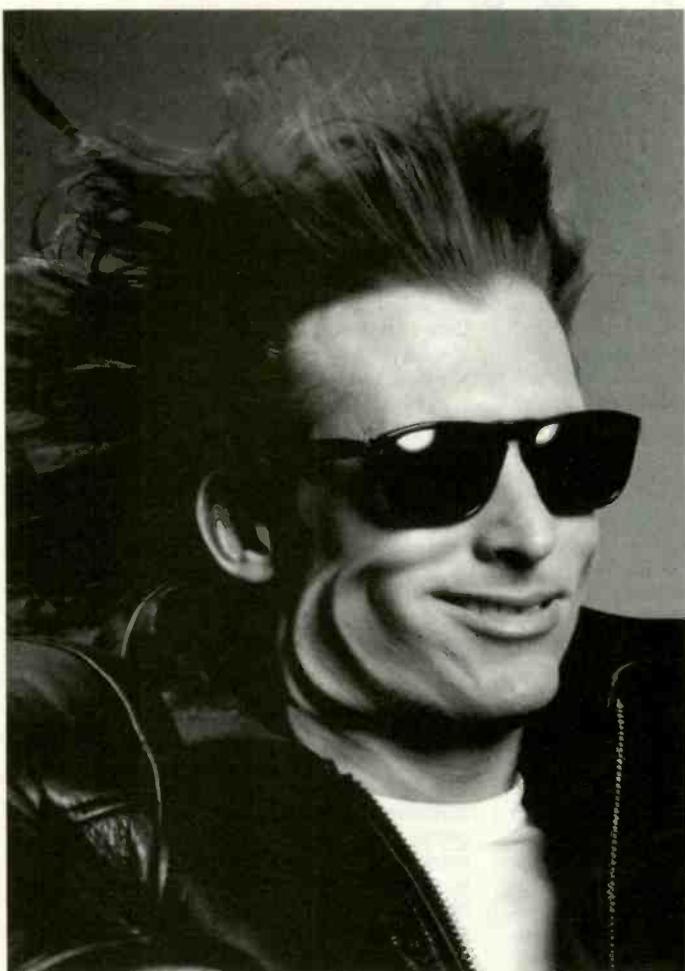
HIGH BIAS

During manufacture, conventional tapes run through a magnetic field where many of the magnetic particles adhere any-old-which-way. Like flies on flypaper.



Maxell's "multi-orientation" technology sets the particles straight.

But at Maxell, we employ a complex process called "multi-orientation" to set the particles straight. The result is a



BLACK MAGNETITE

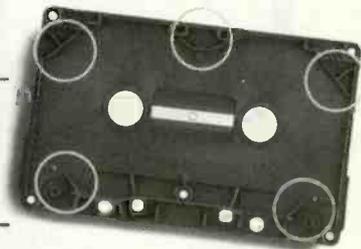
smoother magnetic coating, which produces less AC bias noise.

Unwanted noise is further reduced by our patented *dual-surface base film*. One side of the film is super-smooth for closer tape-to-head contact. The other is rough, deliberately so, for a stable ride through your transport mechanism with the least possible friction and tape jitter.

These innovations, however, are no

more remarkable than the cassette shell that houses them.

More rigid and weightier than standard cassettes, the XLII-S *high resonance-damping cassette* has been precision engineered to reduce



XLII-S vibration-damping cassette shell has five support points for increased rigidity and durability.

modulation noise. By making the window smaller, for instance, we were able to build in more anti-resonant material and five support points instead of three.

All of which helps XLII-S maintain phase accuracy as well as an extremely low noise threshold.

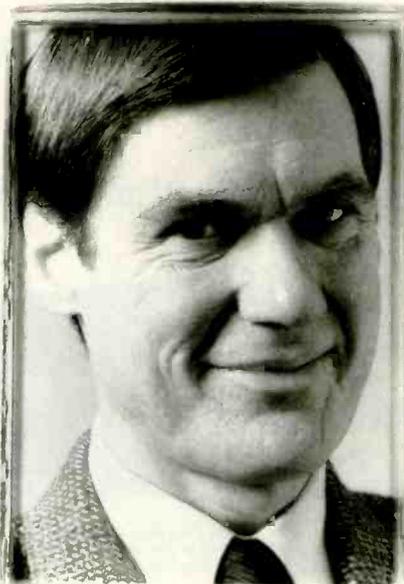
You can feel a difference in XLII-S just by picking up the cassette. Of course, it's nothing compared to what you'll feel the moment you press 'play'.



**TAKE YOUR MUSIC
TO THE MAX.**

AUDIO Q&A

by Ian G. Masters



Sampling Rates

Q I'm interested in the new digital recording formats, but I'm confused about the different sampling rates used. Does the 48-kHz rate employed by DAT and DCC machines sound any better than the compact disc's 44.1 kHz?

ERIC ACREE
St. Louis, MO

A In digital audio, the only requirement of a sampling rate is that it be at least twice the highest frequency the medium is required to carry. The 44.1-kHz CD standard, and the 48-kHz rate used by the different recordable media, were chosen for a variety of nonaudio reasons, but both are comfortably above the bare-minimum 40 kHz required to reproduce a full 20,000-Hz signal bandwidth. The CD standard does allow a slightly narrower overall recording bandwidth, but that has nothing to do with sound quality. The proposed digital broadcast satellites will use 32 kHz, and that does restrict the system to a maximum of 16 kHz, but most of us can't hear much above that anyway; FM radio goes only to 15 kHz, and most people consider it high fidelity.

Microphone Inputs

Q I want to use my tape deck for live recordings, but it doesn't provide microphone inputs. Is there a way to connect microphones to the recorder's line inputs? If not, what do I need to make live recordings?

ROGER WHEATLY
Dallas, TX

A The standard line inputs provided on a cassette deck are designed for much higher signal levels than a microphone can produce. There are a few recorders on the market that do have separate microphone inputs, so you

might consider trading in your present deck on one of those. Perhaps a more practical solution, however, would be to buy an inexpensive mixer with built-in microphone preamps. This would not only match signal levels properly but would enable you to blend the signals from several microphones and control the levels of each one individually. For a start, check out Radio Shack, which has several inexpensive models that might do the trick.

Surround Speakers

Q Various audio salespeople have suggested that the sound quality in a surround system will be degraded if all the speakers are not purchased as a set (from them, of course) and powered equally. I realize that all speakers have their own personalities, but how critical is it for, say, the center speaker in a Dolby Pro Logic system to match the main speakers?

TURNER LYLE
Charlottesville, VA

A It's definitely desirable for all the speakers in a surround-sound system to have similar sonic characteristics. Otherwise, effects moving from one channel to another would change in character as well as position. And, in general, the more power available to drive any speaker, the less likely you are to encounter distortion from amplifier clipping at dramatic (loud) moments.

Still, it's not really necessary for all channels to be identical. For one thing, the surround channel in Dolby Surround rolls off below about 100 Hz and above about 7,000 Hz, so the rear speakers can be smaller than the front ones, with much less extended response. And assuming that the front channels are adequately powered and that the rear speakers are at least as sensitive as those in the front, you can usually get by with a quarter to a third as much power for the rear speakers.

The center speaker is more critical, however. In fact, the center channel is the main channel in most Dolby Surround mixes, which means that, ideally, it should have as much power available to it as the left and right front speakers. It should also match the tonal quality of the left and right speakers as closely as possible, at least from the lower mid-range through the treble. This means that it's almost always best to use a center speaker from the same manufacturer as that of the main stereo speakers, if not exactly the same model. Fortunately, the Normal mode in Dolby Pro Logic sends center-channel bass information (below 100 Hz or so) to the left and right front speakers, enabling you to

use a smaller speaker for the center without losing low-frequency impact or running into power-handling limitations. If the three front speakers are properly matched, the system should perform well. As for the surround speakers, exact matching is less crucial, although if they sound too different from the front speakers they may begin to affect the system's overall balance.

Level Matching

Q When I make tapes to play in my car, I have a lot of difficulty keeping the sound level consistent from one song to the next. I assume radio stations do it by using some sort of automatic black box. Is such a thing available to ordinary folks?

CARL SHRADER
Albertson, NY

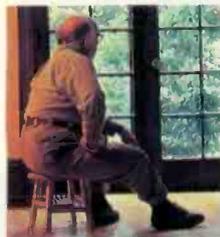
A Some broadcasters do use various forms of signal processing—primarily compression and peak limiting—both to maximize their output and to homogenize their sound. Whatever the commercial justification for such processing, audiophiles and equipment manufacturers have usually considered it a reduction of fidelity, so there has been little demand for consumer versions of the equipment. Switchable compression circuits have been included occasionally in car CD players, however, and some NAD home players incorporate such a circuit, primarily for use in making tapes for the car or for playing background music.

For most of us, the only satisfactory way to achieve good balance from selection to selection is by ear. The main thing to realize is that the level meters on your tape recorder are not necessarily a reliable guide for assembling different pieces of music into a program. Nowadays, most such meters indicate peak level, and that's useful for preventing overload, but our impression of apparent loudness has more to do with the average level of a signal, which most meters don't show (although older VU meters did approximate it). For example, a piece of music with a lot of high-frequency percussive content will read relatively high on peak meters, yet come out sounding quiet, while a "warmer" piece can be pushed to a higher average level and still not overload. Only experience and a lot of trial and error will tell you the proper corrections to make. □

If you have a question about hi-fi, send it to Q&A, STEREO REVIEW, 1633 Broadway, New York, NY 10019. Sorry, only questions chosen for publication can be answered.



Henry Kloss Does It Again. And Again.



"Henry Kloss has demonstrated a rare talent for spotting important new concepts and incorporating them into readily affordable consumer products. His new models have stemmed from a deeply rooted desire to move audio technology forward and provide buyers with previously unavailable benefits." Audio Magazine, February 1992

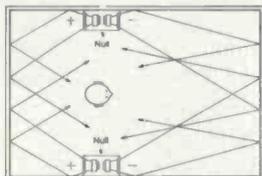
Audio Hall of Fame member Henry Kloss created the dominant speakers of the '50s (AR), '60s (KLH) and '70s (Advent). Now he's created a new *kind* of audio company with factory-direct savings... Cambridge SoundWorks.

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The Surround II is specifically designed for use as a rear/side speaker in Dolby Surround or DSP systems. They "surround" the listener with *non-directional* ambient sounds, unlike conventional speakers that are designed to create a precise stereo "stage."

The Surround II is a dipole radiator. Mounted on the side walls of your listening room, the sound is directed towards the front and rear of the room, using

The Surround II delivers dipole radiator, surround sound performance at a fraction of the cost of competing speakers using similar technology.



phase cancellation to create a null in the direction of the listener. The sound then reaches the listener from *all* directions, the way it was meant to be heard. The acoustic performance of The Surround II is essentially identical to that of our original surround speaker, The Surround*. At \$249 pr., The Surround II is *the* value on the market.

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Henry Kloss designed Ambiance In-Wall with

Our Ambiance In-Wall speakers use a true acoustic suspension sealed cabinet for optimum bass response.

a wide dispersion tweeter delivering accurate response over a wide area. Place Ambiance In-Wall where it *looks right* in your wall (or your ceiling), and still have it *sound right* no matter where you are in the room.

Stereo Review said Ambiance "easily held its own against substantially larger, more expensive speakers." Ambiance In-Wall is also very simple to install—it's a custom installer's and do-it-yourselfer's delight.† At \$329 a pair (\$165 each), direct from the factory, it's an outstanding value.

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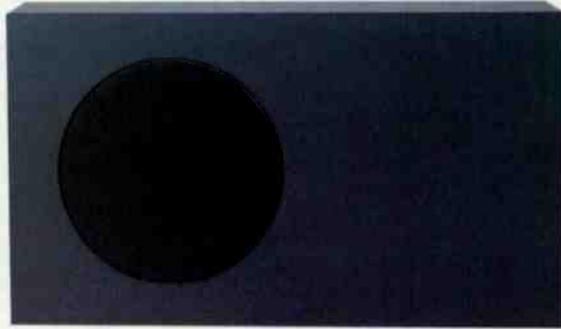
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The Critics Love Ensemble And Ensemble II. What's The Difference, Anyway?

Cambridge SoundWorks changed the audio world when we began direct-marketing Ensemble® by Henry Kloss. Ensemble is a revolutionary dual-subwoofer/satellite speaker system offering all-out performance, without cluttering up your room with huge speaker cabinets. Available *only* factory-direct from Cambridge SoundWorks, with no expensive middle-men, Ensemble is priced at hundreds less than it would have sold for in stores. *Audio* magazine says Ensemble "may be the best value in the world."

And Then There Were Two.

Now Cambridge SoundWorks has introduced Ensemble II, a more affordable version of Ensemble using only one cabinet to hold both subwoofer drivers. Ensemble II has joined Ensemble in the ranks of the country's best-selling speak-



The real difference is in the subwoofer.

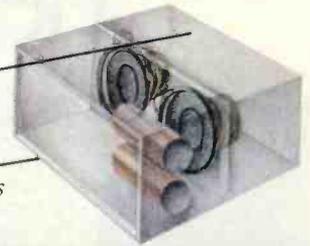
ers. We believe Ensemble II is a better system than the new Bose® AM-5 Series II. And because we sell it factory-direct, it's half the price. *Stereo Review* said "Ensemble II performs so far beyond its price and size that it can be compared only with much larger speakers at substantially higher prices." We agree with the writer who said, "It's hard to imagine going wrong with Ensemble." The question is, which Ensemble system is right for *you*?

The Same Satellite Speakers.

When you listen to either Ensemble system, almost 90% of the music you hear is being reproduced by the satellite speakers. Both Ensemble and Ensemble II use satellite speakers that are virtually identical.* Unlike many competing systems, Ensemble's satellites are true two-way speaker systems, each containing a high performance tweeter and a 4-inch woofer. *Stereo Review* said, "The Ensemble satellites delivered a smoother output than

True acoustic suspension, sealed subwoofer cavity.

Cavity acts as acoustic band-pass filter.



"Ensemble may be the best value in the world."
Audio



many larger and more expensive speakers."

Small (8½" x 5¼" x 4") and unobtrusive, they'll fit into the decor of any room. They're available in scratch-resistant gunmetal grey Nextel, or primed so you can paint them any color you wish.



Ensemble satellite speakers are available primed for painting, so they can match your decor exactly.

The Same Overall Sound.

In many rooms, Ensemble II sounds virtually the same as Ensemble, especially when Ensemble's two subwoofers are placed right next to each other. The real difference between the two systems is that Ensemble, with its two ultra-compact subwoofers (12" x 21" x 4½"), gives you *ultimate placement flexibility*.

The Same Attention To Detail.

Ensemble and Ensemble II are constructed with the very best materials and no-compromise workmanship. Their subwoofers use heavy-duty woofers in true acoustic suspension enclosures. The satellites are genuine two-way systems with very high quality speaker components. Individual crossover networks are

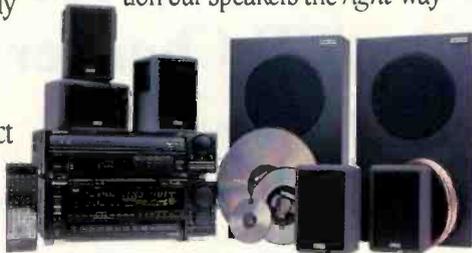
built into every cabinet for maximum wiring flexibility. Robust construction is used throughout, featuring solid MDF cabinets and solid metal grilles.

The Same Factory-Direct Savings.

Cambridge SoundWorks products are available *only* factory-direct. By eliminating the middle-men, we're able to sell Ensemble and Ensemble II for hundreds less than if they were sold in stores.

The Same 30-Day Total Satisfaction Guarantee.

Choosing a loudspeaker after a brief listen at a dealer's showroom is like deciding on a car after one quick trip around the block. So we make it possible to audition our speakers the *right way*—



Stereo systems featuring Ensemble and Ensemble II speakers with Pioneer or Philips electronics start at only \$799, including CD player. Dolby Surround Sound systems start at only \$999.

in your own home. You get to listen for hours without a salesman hovering nearby. If within 30 days you're not happy, return your speaker system for a full re-

fund. We even reimburse original UPS ground shipping charges in the continental United States.



The only difference in satellites is that the original Ensembles use gold-plated connectors that allow use of even the heaviest gauge wire.

The Real Difference: The Ultimate Placement Flexibility Of Dual Subwoofers.

Placement of bass and high-frequency speakers in a room—and how those speakers interact with the acoustics of the room—has more influence on the overall sound quality of a stereo system than just about anything. As an alternative to spending hundreds (or thousands) of dollars on this or that "latest" amplifier or CD player design, you should invest some of your time experimenting with various speaker positioning schemes. Ensemble's two ultra-slim (4½") subwoofers give you more placement flexibility than any speaker system we know of (including Ensemble II), and is most likely to provide the performance you want *in real world...in-your room*.

How To Order.

The dual-subwoofer Ensemble system is available in two versions. With handsome black-laminate subwoofers for \$599. Or with black vinyl-clad subwoofers for \$499. Ensemble II is priced at \$399. For more information, a free 48-page catalog, or to order...

CALL 1-800-FOR-HIFI

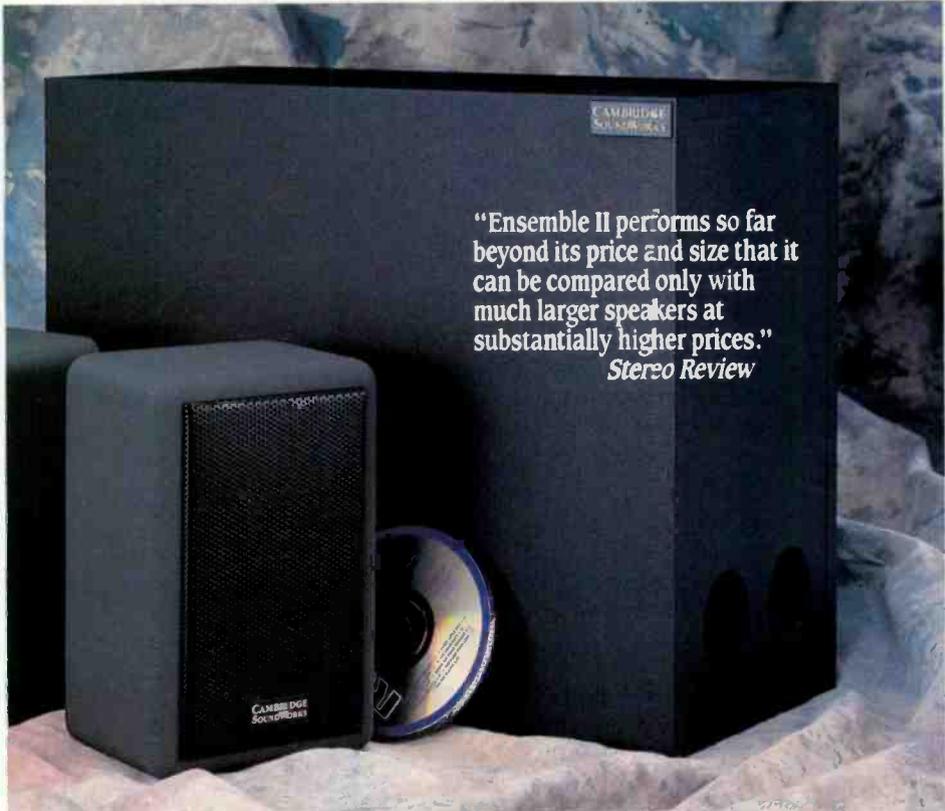
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"Ensemble II performs so far beyond its price and size that it can be compared only with much larger speakers at substantially higher prices."
Stereo Review

CAR STEREO



Alpine 7980 In-Dash Tuner/CD Changer

Ken C. Pohlmann, Hammer Laboratories

EVERY once in a while, a product comes along that is so groundbreaking, so practical, and so desirable that a really objective review is almost impossible. The Alpine 7980 is just such a product: About 3 seconds after unpacking it, I knew that I had to have one for my car.

The 7980 is an in-dash CD player with an AM/FM tuner. Nothing particularly remarkable about that nowadays, except that it loads and plays not one CD but three. It is, in fact, an in-dash CD changer, combining the convenience of the hands-on disc selection of a dashboard player with the convenience of hands-off multidisc playback of a trunk-mounted changer. In-dash CD players with the capability of controlling a changer come close to this level of convenience, but the extra cost of an outboard changer, the hassle of installing it, and the trunk space it gobbles up are all drawbacks.

The 7980's front panel is pure Alpine, featuring the company's trademark array of six large, green-lighted translucent buttons. The styling is subtly different from that of past Alpine equipment, however, with a smoother, more rounded look that gives a fresh, contemporary appearance. A knob is used to control a variety of functions: volume, treble, bass, balance, and fader. The knob is continuously variable so that any setting in any mode is instantly available. You monitor your adjustments via an alphanumeric liquid-crystal display (LCD) that indicates which mode you

are in and its setting. The bass and treble controls have an interesting hidden feature: Their settings are automatically and individually memorized for AM, FM, and CD playback. Whenever a source is selected, the bass and treble controls return to its settings. To switch between modes, you simply press the knob repeatedly until you get to the one you want. Power is switched with a small nearby pushbutton.

Above the knob is a cluster of small buttons. The D.SEL/DX button is used to select one of the three loaded discs when listening to CD's or to switch between distant and local sensitivity when listening to the radio. The eject button is used to eject the three-disc cartridge. The mono button switches the tuner between stereo and mono, and the button labeled P.SCAN sequences through the tuner presets, giving you a brief sample of each station (automatically skipping any that may have become too weak for clean reception). When the tuner is in use, the DISP/TUNE button switches between manual tuning, automatic-seek tuning, and automatic-store tuning, which loads the six strongest receivable stations into the selected preset bank. During CD playback, the button switches the display between disc/track numbers and elapsed time.

A mechanical button levers a handle forward so that the 7980 can be removed from its mounting chassis. The handle is made of sturdy metal, and, unlike the cheesy plastic handles on some other head units, it should re-

main unbent even after extensive use.

There are three small buttons on the front panel's far right-hand side. The DISC button is used to switch to CD playback and to toggle between play and pause. The DAP (direct access preset) button enables you to store any combination of AM and FM station frequencies in a bank of six DAP memories. The remaining eighteen presets are grouped in three banks selected with the TUNER/BAND button.

Directly to the right of the display are the six large, green buttons. In tuner mode they let you choose among the presets in a selected bank. In CD playback, the same six buttons take on distinct disc-related functions: MIX, which initiates random track selection; REPEAT, which is used to replay a single track or an entire disc; SCAN, which plays the first 12 seconds of each track; PTM (preferred track memory), which you can use to program a sequence of as many as six tracks from the three discs; and CLEAR, which deletes tracks from the PTM.

A vertical rocker button to the left of the display is used to tune up and down the radio band, to skip from track to track on a CD (when pressed briefly), or to scan forward or backward on a disc (when held down). Besides CD disc and track numbers and elapsed time, the display has indicators for the tuner preset number, band, stereo, distant sensitivity (DX), and other operational modes. The green illumination is quite effective, and all buttons and controls are backlit.

Why Other Loudspeaker Companies Can't Run This Ad.

There are almost 400 speaker companies in the United States.
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Nestled beside the lone knob is an infrared window to receive commands from a wireless remote control. The supplied remote is the length and width of a credit card and about three times as thick. It has nine buttons: MODE, to switch between CD and tuner; MUTE, which reduces the volume by 20 dB; a pair of up/down volume buttons; another pair of up/down buttons for stepping through station presets or CD tracks; BAND for selecting the tuner band and preset bank; and UP/SEEK/DISC, which tunes across the radio band or selects the next CD. Designed to work with a number of Alpine head units, the remote also has an EXT/DAT button that is inactive with the 7980.

The front panel's most prominent feature is the tall loading slot (giving the 7980 a look very reminiscent of old eight-track tape players) designed to accept a three-disc cartridge. CD's slip into three partitions inside the cartridge, label side up, and are ejected by mechanical levers. You load a cartridge into the head unit by pushing it into the slot until it docks. That the player's interior is very cramped is evident whenever a disc is changed: The cartridge temporarily pushes part-way out, protruding about 3 inches in all, to make room for the disc-change operation, then slides back in. Three-inch CD's can be loaded into the cartridge with ring adaptors.

The changer mechanism's space requirements forced the tuner circuitry into a separate hideaway chassis, which also serves to isolate the 7980's analog output electronics from the high-frequency clock signals in the CD player. The tuner/output chassis connects to the dash unit by a single eight-pin DIN cable. To increase installation flexibility, Alpine thoughtfully supplies a 6-foot-long extension cable. There are no user controls on the hideaway unit—just four phono jacks for stereo front and rear line outputs to downstream power amplifiers. A power harness on the hideaway has leads for chassis ground, ignition, battery, remote turn-on, power antenna, and audio mute, and, of course, there is also an antenna lead.

The removable CD chassis connects to its mounting sleeve by an eleven-pin socket that floats slightly to prevent docking-alignment problems. The mounting sleeve sprouts a pigtail DIN



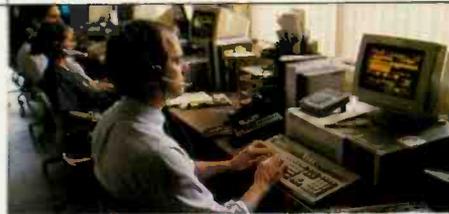
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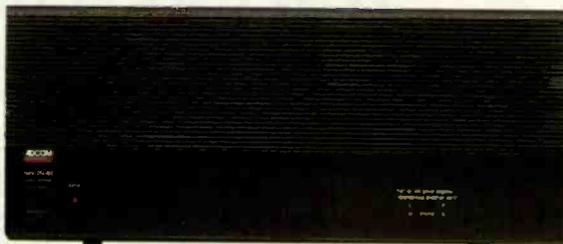
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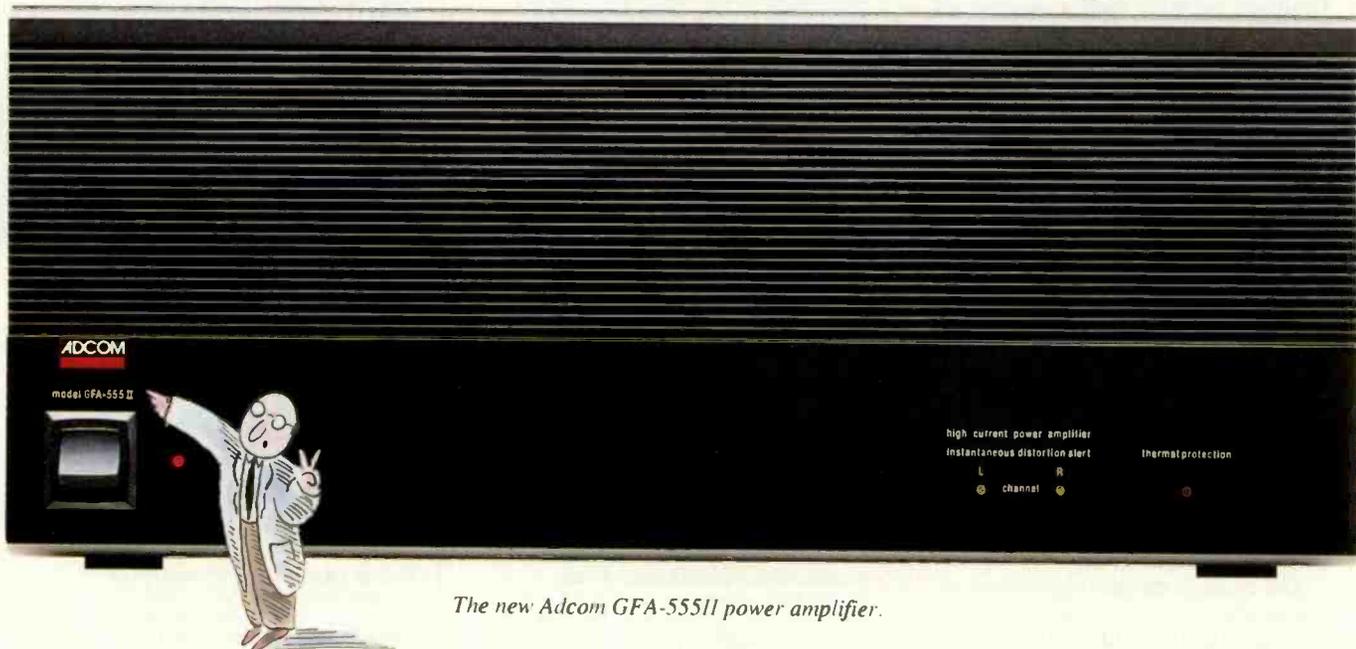
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CAR STEREO

cable that connects to the one from the tuner chassis and a dimmer lead so that the brightness of the front-panel illumination can be regulated by the car's lighting circuits.

Inside the head unit is an eight-times-oversampling filter feeding hybrid 1-bit/20-bit digital-to-analog (D/A) converters. Like most other modern tuners, the 7980's uses phase-locked-loop digital frequency synthesis. The head unit also contains a temperature sensor, which shuts it down if things get too hot.

Lab Tests

The Alpine 7980 performed well on the test bench. The CD player's frequency response was flat within about half a decibel across the audio band, and its distortion was quite low. Dynamic range and signal-to-noise ratio (S/N) likewise were quite good. D/A linearity error at -90 dB was a mere 0.4 dB (excellent even for a home deck), and de-emphasis error was out-

standingly low. Defect tracking was good though not great.

The tuner section also performed well, turning in excellent sensitivity and alternate-channel selectivity figures (adjacent-channel selectivity was just average). Image and AM rejection were both good, and noise and distortion were low in stereo as well as mono. In the preproduction sample supplied to us, the bass and treble controls were slightly erratic—exhibiting different boost and cut ranges at different times, for example—possibly because of a software glitch.

Installation

Installing the Alpine 7980 was marginally tougher than average, but far easier than putting in a typical head-unit/changer combo. It was an easy matter to fit the mounting sleeve into my car's dashboard, bending tabs where necessary and securing a rear mounting strap. The head unit itself simply slipped into the sleeve. If you

LABORATORY MEASUREMENTS

• Compact Disc Section

Maximum output level: 2.24 volts

Frequency response: 20 to 20,000 Hz +0.08, -0.45 dB

De-emphasis error: -0.04 dB at 16,000 Hz

Channel separation: 60.3 dB at 1,000 Hz, 57.2 dB at 20,000 Hz

Dynamic range (A-weighted): 97.2 dB

Signal-to-noise ratio (A-weighted): 96.1 dB

Harmonic distortion (THD + N at 1,000 Hz): 0.028% at 0 dB, 0.038% at -20 dB

Linearity error: +0.4 dB at -90 dB

Interchannel phase shift: 0.2 degree at 20,000 Hz

Defect tracking: tracked 1,250-micrometer errors on Pierre Verany #2 test disc

• **Tuner Section** (all measurements FM only except frequency response)

Usable sensitivity (mono, 75-ohm input): 13.8 dBf

50-dB quieting sensitivity (mono, 75-ohm input): 23.0 dBf

Harmonic distortion (THD + N) at 65 dBf: mono, 0.44%; stereo, 0.76%

Signal-to-noise ratio at 65 dBf: mono, 70.3 dB; stereo, 51.2 dB

Channel separation at 1,000 Hz (65 dBf): 37.2 dB

AM rejection (65 dBf): 48.6 dB

Capture ratio (65 dBf): 2.0 dB

Selectivity: alternate-channel, 90.6 dB; adjacent-channel, 7.2 dB

Image rejection: 67.0 dB

Frequency response: FM, 30 to 15,000 Hz +0, -1.9 dB; AM, 30 to 3,000 Hz +0.6, -7.5 dB

Maximum output voltage (FM, 100% modulation): 0.74 volt

• Preamplifier Section

Treble-control range: +10.3, -10.2 dB at 10,000 Hz

Bass-control range: +10.7, -10.5 dB at 100 Hz



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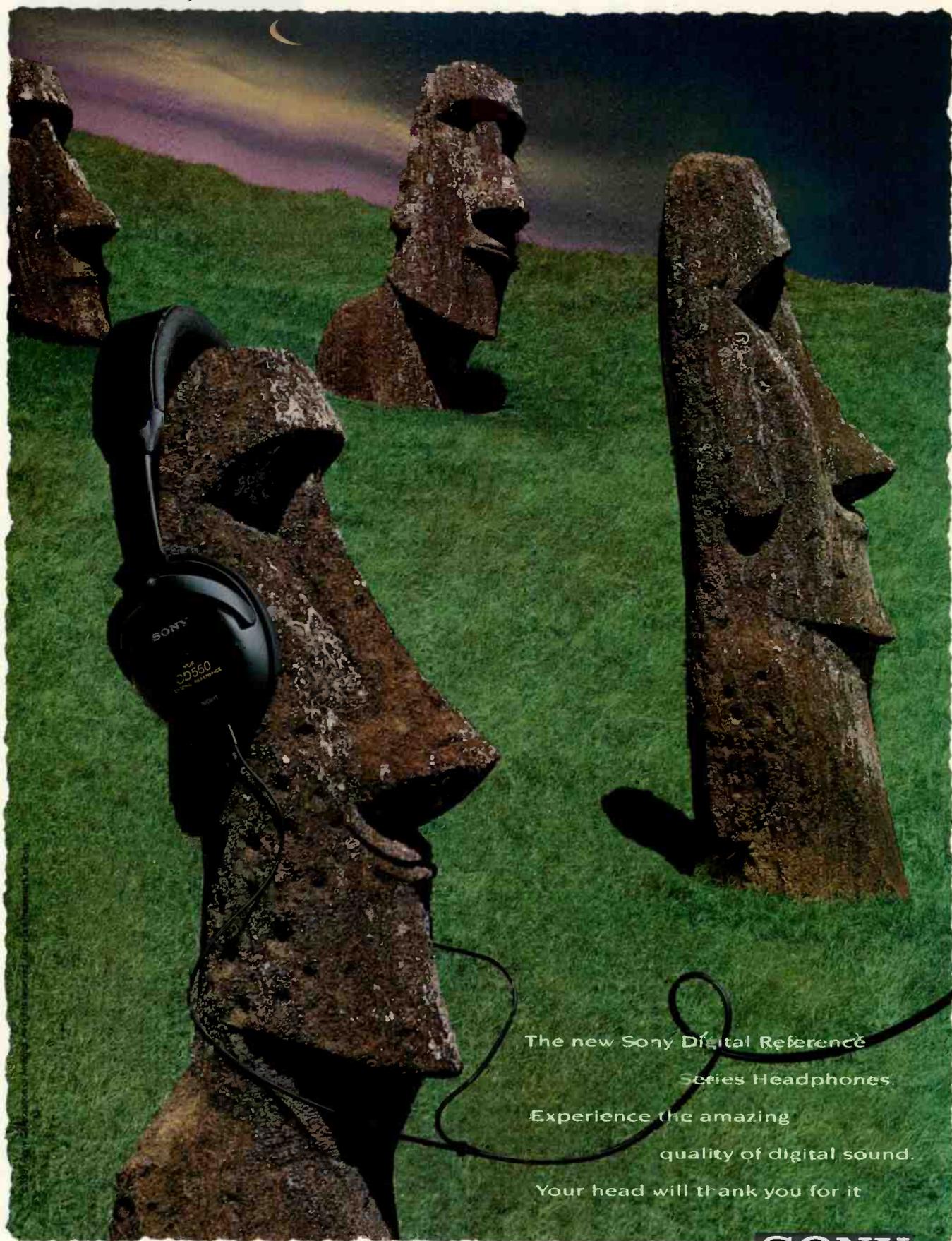
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CAR STEREO

don't need removability, the unit can be permanently installed without the mounting chassis.

Next I mounted the tuner chassis in my car's front trunk. It could be located almost anywhere, even stuffed inside the dashboard, but I hate to leave things dangling and preferred to mount it securely. Unfortunately, the tuner chassis has no integral mounting brackets, so a little custom metal bracket work was required. Finally, I attached the DIN cable between the units, hooked up the tuner's power harness and antenna leads, and connected the four audio outputs.

Road Tests

I loaded three CD's into the cartridge, filled up a CD wallet as well, and hit the South Florida roadways. The changer's mechanical operation was pretty smooth, with the normal sound of gears and motors when it was changing discs. It took about 18 seconds to change discs—not fast, but not too bad. The in-and-out cycling of the cartridge during disc changes took some getting used to, though. Also, when ejecting the cartridge, you have to wait while the cartridge pushes out to unload the playing disc, pulls in again, and then pops out (total time, about 12 seconds). If you try to pull the cartridge out too soon, the player stubbornly won't let go. A minor problem to watch for: In my car, it was impossible to shift into second gear while the cartridge was protruding to change discs—not enough clearance.

Sonically, the player was absolutely superb. There was no hint of distortion

or noise, and even a fade-to-zero test signal failed to elicit any audible low-level nonlinearity. In short, Alpine did not cut any corners when adding multidisc capacity to this player; indeed, this changer performs better than many single-disc players. It did skip when I drove across seismic-quality railroad tracks, but about half of the CD players I've evaluated have failed this very abusive test.

The tuner section was an altogether worthy companion to the excellent CD player. Alpine's design team made a wise decision in moving the tuner electronics to an external box instead of trying to squeeze it into the head unit itself. Undoubtedly, the extra space permitted the use of more sophisticated tuner circuitry, which performed better than the tuners in most other head units. Reception of weak stations was quite good—aided by the option of manually selecting distant or local sensitivity and of switching to mono when necessary—and multipath distortion was low even in the shadows of skyscrapers. Sound quality was more than satisfactory, especially under strong signal conditions.

The Alpine 7980 is one of the most exciting car audio products to come along in years. Development work on in-dash CD changers had been rumored for some time, and undoubtedly we will see competing models in the months to come, but Alpine was the first to bring one to market, and it has done a superlative job in the design and execution. And I'm not just saying that so they'll give me a good deal when I buy one. □



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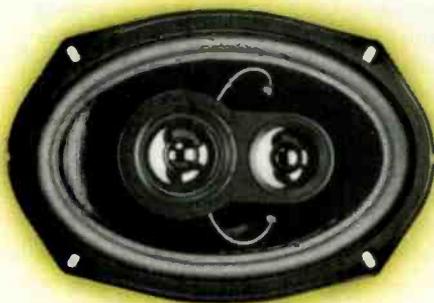
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Critically Speaking

**Reproducing the signal—seventh
in a series on the practical business of
buying audio equipment**

IN an audio system, what begins as sound eventually has to end up as sound, and the devices that make that happen, called transducers, are speakers and headphones. In both cases, a form of linear motor pushes air back and forth in step with the electrical audio signal coming from an amplifier. The pressure differences are what we hear as sound.

In some ways, these devices are the simplest in the audio chain, but they are also the most critical. Converting a varying electrical signal to sound is far from easy, and all speakers are flawed to some degree. The extent and the specific nature of the flaws in any given speaker have to be assessed and carefully weighed. In the end, you'll choose speakers whose deficiencies you can live with.

What you choose will determine how your whole system sounds. Sonic differences can occur at other points in an audio system, but they are insignificant compared with the variations in sound from one speaker to another. The only way to find out what you like is to get out and do the shops. There are hundreds of speaker models, so don't expect the process to be a speedy one.

Bear in mind as well that your speakers will make up only half of an acoustic system; the other half is your listening room. The materials on your walls and furniture can have a profound effect on the sound you hear. So can the shape of the room, where you choose to sit, where you place your speakers, what kind of music you listen to, and what you use for amplifica-



tion. Before you head for the stores, then, take some time to figure out where the speakers will be placed, how big they can be, how loud they will need to play, how much deep bass they will need to reproduce, and so forth. Then you can avoid spending time looking at products that will turn out to be unsuitable.

Headphones are easier to choose

because you can listen to them in a dealer's showroom and know immediately whether you like them or not. Speakers will eventually have to interact with your room, and the result may be unexpected and unpleasant. For that reason, it's important that you buy from a dealer who will allow you to exchange your speakers if they fail that last, critical test.

The Lingo

When hi-fi people discuss speakers, they use some of the most whimsical terms in audio. But some of the phrases are important nonetheless.

WOOFERS AND TWEETERS.

Although most of us look at a box and say "there's a speaker," we should really call it a speaker *system*. Old-style radios and TV's contained single speakers that were called upon to handle the whole audio range, but virtually all hi-fi speakers divide the band into two or more parts, with separate speakers, or *drivers*, to handle each. Treble notes are reproduced by a *tweeter*, bass ones by a *woofer*. Some systems contain a third driver for frequencies in the middle, called a *midrange* (at one time there was some effort to dub this a *squawker*, but even audiophiles rebelled at that). Occasionally a system contains extra drivers for the extremes of the spectrum, *supertweeters* and *subwoofers*, but "subwoofer" now usually refers either to a separate unit added to enhance performance in the lowest octave or to the low-frequency part of a *satellite/subwoofer system*, which typically features tiny speakers to handle the midrange and highs.

A speaker system with only a woofer and a tweeter is a *two-way* system; add a midrange and you get a *three-way*. Actually, these terms refer to the way the spectrum is divided, not the number of drivers. Theoretically, you could have a system with nine tweeters and four woofers and still call it a two-way. The appropriate parts of the signal are distributed to the drivers by a *crossover network*. Some speakers let you connect the different parts of the crossover to the amplifier by separate wires, a technique called *biwiring*. If separate amplifiers are used to power the various drivers, the system is *bi-amplified* or *tri-amplified*, which may require the use of a separate electronic crossover before the amplifiers.

BOXES. The various drivers have to be mounted in something, and speaker designers have come up with a number of *enclosure* types over the years. By and large, the variations in enclosure design concern only low-frequency performance, their main job being to prevent the energy radiated by the back of the woofer from creeping around and canceling the front wave. One way is to use a sealed box that simply absorbs the back wave. This is called an *acoustic-suspension* design. The other popular type of enclosure for hi-fi use employs a *port* or *vent* that allows the back wave to escape, in phase, to reinforce the front wave. Most ported speakers are called *bass-reflex* systems, but other names are used for specialized variants, such as *passive radiators* and *transmission lines*. A few *horn* speakers still exist, although this is mainly a professional design technique, and a number of boxless, flat-panel speakers are available, mostly using both front and back radiation to create a spacious sound stage (such speakers, usually *electrostatic* designs, are known as *dipole radiators*).

OVER AND AROUND. Headphones come in two basic forms, depending on how they relate to a listener's outer ear. If the phones use ring-shaped pads that rest on the head without touching the ear, they are *circumaural*. If they use pads that rest on the ears themselves, as most of today's lightweight phones do, they are *supra-aural* (or *open-air*). Circumaural models may have closed backs for increased acoustic isolation, but they can also be open instead (and you may not be able to tell the difference without carefully reading the manual). At one time, closed-back phones were the only way to achieve real bass. But today headphones of all types boast fine low-frequency performance, even the tiniest in-ear, or *earbud*, models in which the transducer couples directly to the ear canal.

WHAT MATTERS

There is really only one thing that means anything when it comes to speakers and headphones, and that's what they sound like. How a designer makes them sound that way is of importance only to him. What you need to do is to spend time—*lots* of time—listening to what a transducer does. Before you start, however, there are a few matters that you should take into account, even if that only helps you to eliminate some models.

- **SENSITIVITY.** Loudspeakers vary widely in the amount of sound—specified in decibels of sound-pressure level (SPL)—they are able to produce from a given amount of amplifier power. Even if you don't intend to play music at ear-shattering levels, both your listening habits and your listening room will impose some requirements on the amplifier/speaker combination. A very large room, or a very "dead" (nonreflective) one, will require greater acoustic output than a small, "live" space. Higher output can be achieved by using more amplifier power, but beyond a certain point you run the risk of increasing distortion to high levels or even of frying your speakers. The alternative is to choose a fairly sensitive speaker that can make the most of the watts you have available.

- **POSITIONING.** Most of us have only a few places we can *put* a pair of speakers, so make sure that the ones you're considering don't have placement requirements you can't satisfy. If you can put speakers only on a shelf against a wall, for example, avoid those that must sit away from the room boundaries for best results. And if the speakers' ultimate locations will be dissimilar acoustically—one next to a wall, the other in open space, say—choose models that are relatively insensitive to placement. If you can, have the dealer set up your top candidates in positions that come as close as possible to your own setup, and audition them from the equivalent of your own listening position. This will never give you a perfect idea of what the speakers will sound like at home, but it can provide a rough guide.

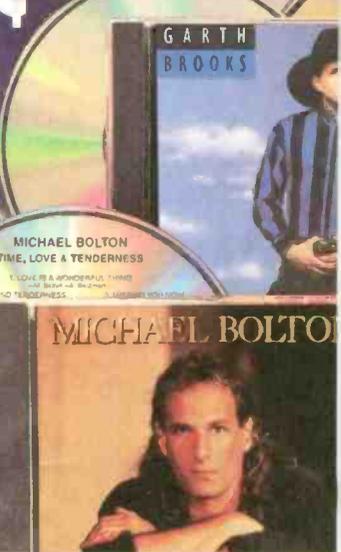
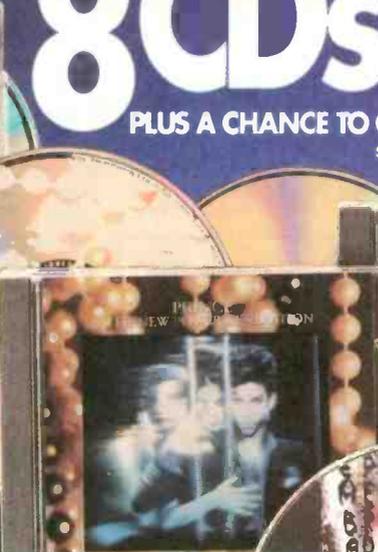
- **IMPEDANCE.** Many amplifiers are unhappy driving speakers with too low an impedance; distortion or even am-

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plifier damage may result. But the "nominal impedance" spec that most speaker manufacturers give is of limited utility: The single number is an average over the frequency range or the value at a single frequency and may mask potentially damaging impedances at certain frequencies. If the dealer doesn't know about the impedance characteristics of an otherwise attractive speaker, and you still want it, make sure your current amplifier or the one you are buying works well with it.

• **CONSTRUCTION.** A speaker enclosure should be solid, or it is likely to buzz or resonate—eventually if not immediately. A few sharp raps with your knuckle on all surfaces should tell you what you need to know. If the box makes any noise other than a dead thud, it's probably too resonant. Another fairly reliable guide for full-range speakers and subwoofers is overall weight: the heavier the better (within reason).

• **APPEARANCE.** What a speaker looks like has nothing to do with how it sounds, but in most cases a speaker will be the one component that can't be stashed away out of sight. You—and everyone else in your family—will have to live with the speakers you choose, so it only makes sense to clear the design with whoever is going to have to stare at them. If you can't come to a consensus, it may be worthwhile to investigate three-piece or in-wall speakers, which can be made very inconspicuous, but they aren't the solution for all tastes or rooms.

• **COMFORT.** Headphones are the only audio component that we actually wear, so it's important not only that they sound good but that they *feel* good as well. Check out the weight for a start, and then make sure the headband isn't uncomfortable—different heads have different shapes. Also make sure that the phones clamp securely to your head and won't fall off. If you are choosing earbuds, make sure that they fit tightly enough to stay in your ears, but not so tightly that they hurt.

WHAT DOESN'T

Speakers have more mythology and misinformation surrounding them



than anything else in audio. Here is a small selection:

• **FREQUENCY-RESPONSE SPECIFICATIONS.** Speaker response can be measured, and the measurements can be used to predict sound quality, but the actual curves are tricky to produce and even trickier to interpret, so manufacturers usually don't publish them. The overall response figures they do quote are fairly useless as a basis for choosing a speaker. You're better off simply trusting your ears.

• **PRICE AND NAME.** Sad to say, spending more money will not necessarily buy you better sound. Some of the best-sounding speakers are relatively inexpensive, and there are some abysmal high-ticket models. More money might buy you better construction quality or more power-handling capability, but these should be considered only after you have found a sound you like. By the same token, manufacturers are by no means consistent when it comes to speakers. Last year's models may be wonderful, this year's unlistenable (although the variations within one brand are rarely that dramatic). Choosing a name brand because you know you will be able to get service later, or even for the status of

the name is okay, but only if the speaker sounds good, too.

• **DESIGN DETAILS.** Excellent loudspeakers have been produced using a bewildering variety of design techniques. In the end, that means that no design approach has an automatic advantage over the others. So it's safe to ignore things like crossover frequencies, the materials of the driver cones and domes (or whether cones or domes are used), the nature of the enclosure, and even the number of drivers used.

GET WITH IT

In most systems, the speakers are placed at a considerable distance from the amplifiers that drive them, so it's important that nothing untoward happens to the signal as it travels from one part of the listening room to the other. Adequate cables are a must, therefore, for your speakers to give their best.

For short runs, ordinary 18-gauge zip cord is probably enough, but for runs longer than about 10 feet, 16-gauge cable should be considered a minimum, especially with low-impedance speakers. For runs greater than 25 feet or so, you probably should consider moving up to 14- or even 12-gauge wire. Specialty audio cables sometimes contain heavy-gauge wire, but they are typically much more expensive than ordinary cable offering equivalent performance. Definitely avoid the skinny, transparent stuff often sold as "speaker wire."

When you're considering a particular speaker, have a look at the owner's manual to see if there are special positioning or mounting instructions. Many speakers are designed to function best when they're placed on stands, which may or may not be included with the speakers. It's usually wise to trust the speaker designer in this matter, so if stands are recommended, buy them.

Things like spikes to improve a speaker's physical coupling to the floor are a matter of some controversy. Some audiophiles swear by them, while others believe they do no good at all. If you can, get the dealer to let you hear the speakers with and without such accessories. If you can't hear a difference, save your money.

NEXT: *Signal processors*



TECHNICAL TALK

by Julian Hirsch

Flight of the Bumblebee

THE title of this month's column was inspired by a letter from a long-time reader who raises some very logical questions about loudspeakers. A "common-sense" approach failed to resolve them in his mind, and I was reminded of the probably apocryphal aerodynamic analysis proving that a bumblebee simply cannot fly.

His first question concerns using a passive radiator or a port so that the back radiation from the woofer cone enhances the bass output from the front of the cone. He asks how this can be, since the back pressure wave of the driven cone is perfectly out of phase with its front wave. Shouldn't the back wave cancel the front wave, as happens with an un baffled speaker?

There is no fundamental difference between a simple ported enclosure and one with a passive radiator. Both operate by shifting the phase of the back radiation, using the volume of the box and the mass of the air in the port or duct as a tuned circuit that resonates at a frequency below the resonance formed by the box volume and the mass of the driven woofer. The dimensions of the active and passive drivers, their mechanical properties, and the box dimensions are all interrelated and must be considered in the system design. The result, if properly executed, is output from the passive cone or port only at frequencies in the desired enhancement range, below the

woofer's low-frequency cutoff, and in phase with the woofer output in that range.

My correspondent's next question concerns the use of a number of small speaker drivers to reproduce the full audio spectrum, citing the well-known Bose 901 design in which nine 4½-inch drivers operate together over the full audio range. He recognizes that with appropriate enclosure design and equalization, as in the Bose 901, multiple small drivers can handle the low frequencies, but he wonders how drivers as large as 4½ inches can also be effective treble radiators.

Actually, a 4½-inch cone can do a pretty good job of radiating the upper audio frequencies. True, its response will roll off in the upper octaves compared to that of, say, a 1-inch dome tweeter, but if the system's several drivers are properly designed for their purpose, the high frequencies can be enhanced by equalization to provide full coverage of the audio spectrum. Since the signal is divided among several drivers, no one of them is required to handle a large low-frequency signal, which might produce intermodulation products with other frequencies.

A potentially more serious problem when a relatively large cone handles high frequencies is the narrow dispersion ("beaming") that inevitably results. A 10- or 12-inch driver cannot satisfactorily cover the listening area at high frequencies. But the small Bose drivers fall between the dimensions of most midrange and treble drivers, and by using a number of them radiating in different directions, together with electronic equalization applied to the amplifier, the speaker meets the requirements of a good home music system.

The reader's final question is a good one that most of us have probably puzzled over. How can a single driver cone simultaneously reproduce the complex, and totally different, vibration patterns of a kettledrum, a violin, and a flute—or a full orchestra?

To understand this, consider the precise analog of the cone's action that took place when the recording was made. All of those sounds, with their individually complex waveforms, impinging on the diaphragm of a microphone (usually several microphones,

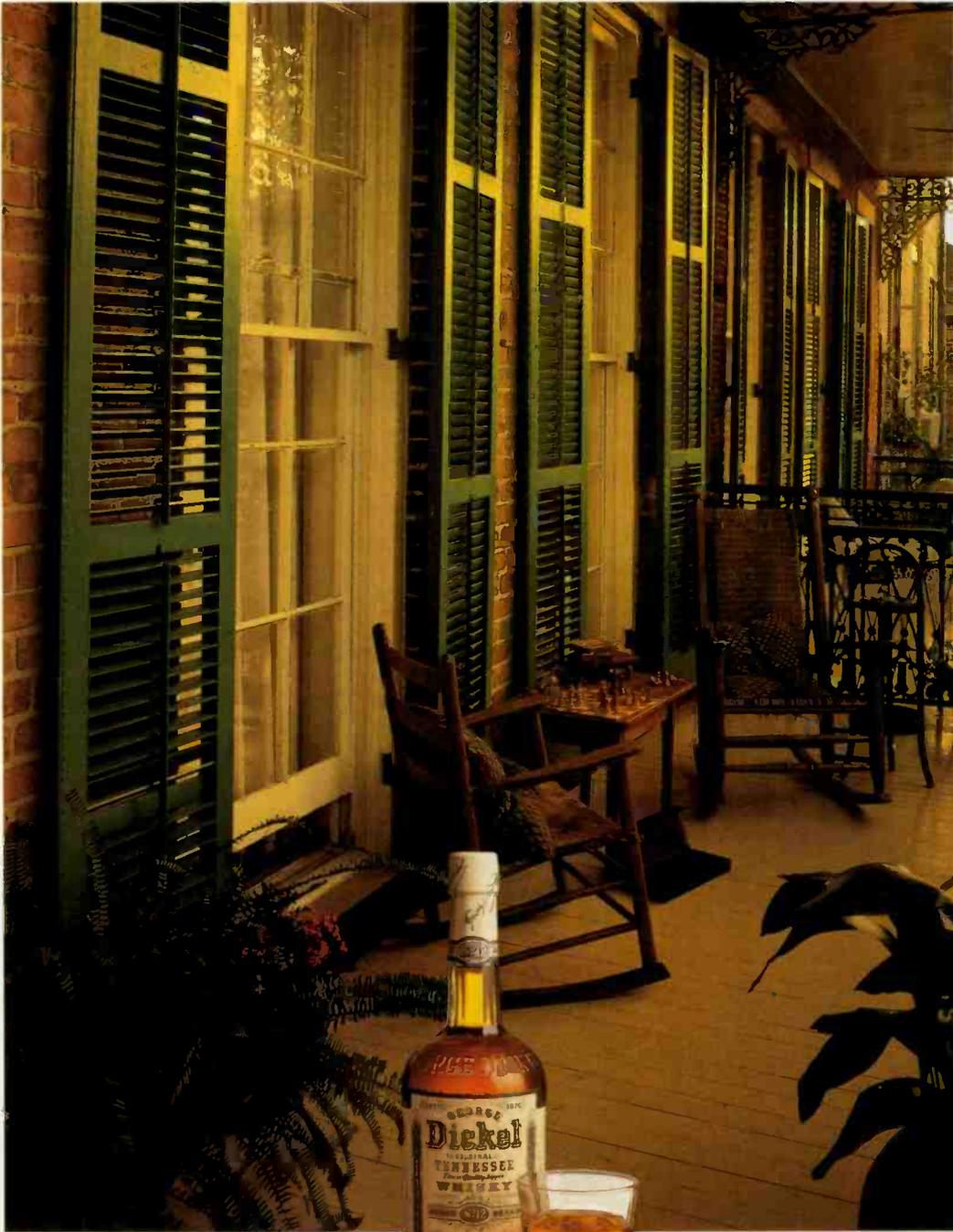
but a single microphone is easier to explain). That diaphragm vibrated just as a speaker diaphragm does, and its motion generated a single complex electrical signal containing all those nuances that will later be regenerated in acoustic form by a loudspeaker.

The key to understanding this process is to distinguish between the same information presented in the *frequency domain* and in the *time domain*. Many signals can exist simultaneously at different frequencies, which is the cause of my correspondent's confusion. But even the most complex spectrum of frequencies is mathematically and electrically equivalent to a waveform that has just a single value at any instant in the time domain. That waveform corresponds to the complex voltage output of the microphone, which is later recreated by the playback device, amplified, and eventually used to drive your speaker cones.

So instead of having to create an infinite number of waveforms simultaneously, your speaker cone "merely" generates a single waveform representing the instantaneous sum of all the countless frequency components of the original sound. This is impressive in itself, but you must keep in mind that, no matter how complex the signal may be, in the time domain it has only a single value at any instant of time. The speaker cone is never required to be in more than one place at a time, no physical laws are violated, and there is no mystery to it.

The bumblebee doesn't have to be an aerodynamic expert—it just knows how to fly without understanding advanced mathematics. Similarly, you don't have to grapple with an apparent paradox or get deeply involved in mathematics to understand how your loudspeaker reproduces a huge variety of different sounds simultaneously. Just keep in mind that any number of simultaneous frequencies is equivalent to a single-valued waveform at each moment and that is all your speaker is called upon to generate. The conversion to a frequency spectrum takes place in the listener's ears and brain. Fortunately, you no more have to be an expert in Fourier transforms to enjoy the sound than a bumblebee has to be an aeronautical engineer before it can fly. □

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TEST REPORTS



MTX Soundcraftsmen A200 Power Amplifier

Julian Hirsch, Hirsch-Houck Laboratories

MTX SOUNDCRAFTSMEN says its A200 power amplifier was specifically designed to drive loudspeakers of any impedance likely to be encountered in a home music installation, from 2 to 32 ohms. Its high current capability is said to give the A200 the headroom needed to handle the high-level dynamic peaks often found in digital recordings.

The A200's output stages use MOSFET's (metal-oxide semiconductor field-effect transistors), which, like vacuum tubes, are voltage-driven in contrast to the current-driven operation of ordinary bipolar transistors. MOSFET's have the advantage of being self-protecting, since the hotter they get, the less current they pass, unlike bipolar transistors, which pass more current as they get hotter and can destroy themselves in the process. This enables the A200 to dispense with

current-limiting protection circuits, which can degrade performance under some conditions.

Other features of the A200's circuits include automatic offset correction to eliminate any DC component in the outputs of its direct-coupled amplifiers (input-blocking capacitors protect the speakers from damage should there be a DC component in the input signal). The amplifier is protected against overload damage by thermal disconnects that shut it down if the heat-sink becomes dangerously hot.

The Soundcraftsmen A200 is a powerful amplifier, rated to deliver 125 watts per channel into 8-ohm loads, or 190 watts into 4-ohm loads, from 20 to 20,000 Hz with less than 0.05 percent total harmonic distortion (THD). Its midrange power rating (at 1,000 Hz) is 140 watts per channel into 8 ohms, 200 watts into 4 ohms, and 300 watts into 2 ohms.

Rated frequency response is 20 to 20,000 Hz ± 0.1 dB. Slew rate is specified as greater than 40 volts per microsecond, damping factor as greater than 200, and signal-to-noise ratio (S/N) as greater than 105 dB (referred to the rated output).

Like all other Soundcraftsmen components, the A200 is manufactured in the company's California factory. It weighs 24½ pounds and measures 17 inches wide, 10¾ inches deep, and 5¼ inches high. The all-black exterior features a sculptured front panel with only one control, a square power button. A small red LED is the power pilot light, and two small LED's at the right of the panel serve as clipping (overload) indicators. Soundcraftsmen describes these as true peak-clipping indicators, which monitor the amplifier's feedback circuit to determine when its linear limits have been exceeded. Price: \$470. MTX Soundcraftsmen, Dept. SR, 220 S. Ritchey St., Santa Ana, CA 92705.

Lab Tests

During the 1-hour preconditioning period prior to measurements, with both channels driving 8-ohm loads at one-third rated power, the A200's heat sinks became quite warm, though not

TEST REPORTS

too hot to touch. In normal use, the amplifier ran completely cool.

The clipping-level power output at 1,000 Hz into 8-ohm loads was 165 watts. Into 4 ohms it was 230 watts, and into 2 ohms it was 450 watts. Dynamic power, during 20-millisecond bursts, was 190 watts into 8 ohms (dynamic headroom of 1.8 dB), 350 watts into 4 ohms (headroom 2.65 dB), and 460 watts into 2 ohms.

The amplifier's frequency response was flat within +0, -0.2 dB from 20 to 20,000 Hz. Total harmonic distortion

The Soundcraftsmen A200 is a rugged, high-quality power amplifier with more than enough output capability for any home listening requirements.

(THD, excluding noise) at 125 watts into 8 ohms was 0.005 percent. At 250 watts (one channel driven) into 4 ohms, the distortion was 0.01 percent. The amplifier's sensitivity for a reference output of 1 watt was 0.11 volt, and its A-weighted noise, relative to 1 watt, was -93.5 dB, easily exceeding Soundcraftsmen's specification when the difference in reference levels is accounted for.

During high-power operation into 4- and 2-ohm test loads the heat sinks became quite hot, and at one point the thermal-protection circuit shut the amplifier down (power returned in 10

or 15 minutes). At no time did the rest of the external metalwork become uncomfortably warm. In normal listening, the exterior, including the heat sinks, remained at room temperature.

Comments

As our measurements show, the Soundcraftsmen A200 is a rugged, high-quality amplifier with more than enough power for any home listening requirements. It had no problems driving very low-impedance loads, and it is well protected against overheating. The amplifier sounded as good as it measured, too, imparting no audible characteristic of its own to signals passing through it.

The A200 is quite literally a "black box" component, devoid of the visual displays that are found on some amplifiers. The AC pilot light and the peak-clipping lights are so small that one is hardly aware of their presence, and our experience suggests that the amplifier can be tucked away and forgotten (although it is a handsome, attractively styled component).

Our sole criticism of the A200 concerns the sharp corners on its heat-sink fins, which extend 2 inches behind the rear apron of the chassis. They can deliver painful scratches to the unwary, and the amplifier should be handled with care (the main part of the chassis and the front panel have no sharp edges or corners).

The Soundcraftsmen A200 is not only a very powerful, rugged, and attractively styled amplifier, but its price is very moderate for what it delivers. It is a strong performer and an excellent value. □

LABORATORY MEASUREMENTS

1,000-Hz output power at clipping: 165 watts into 8 ohms, 230 watts into 4 ohms, 450 watts into 2 ohms

Clipping headroom: 8 ohms, 1.2 dB; 4 ohms, 0.83 dB

Dynamic power output: 190 watts into 8 ohms, 330 watts into 4 ohms, 450 watts into 2 ohms

Dynamic headroom: 8 ohms, 1.8 dB; 4 ohms, 2.65 dB

Frequency response: +0, -0.2 dB from 20 to 20,000 Hz

Maximum distortion (THD + noise from 20 to 20,000 Hz into 8 ohms): 0.13% at 1 watt output

Sensitivity (for a 1-watt output into 8 ohms): 0.11 volt

A-weighted noise (referred to a 1-watt output): -93.5 dB

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OH-Audio Craft: Akron, Cleveland, Mayfield Hts., Toledo, Westlake.
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SC-Dashboard Stereo: Charleston • Stereo Video: Greenville • Upstairs Audio: Columbia.
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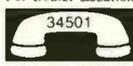
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TEST REPORTS



Celestion 11 Loudspeaker System

Julian Hirsch, Hirsch-Houck Laboratories

CELESTION earned its reputation in the U.S. hi-fi market with the SL series of compact, innovative speakers, which offered exceptional sound quality and stereo imaging but at relatively high prices. Over the last few years, however, the company has introduced a line of more affordable speakers that have brought a new level of quality to the lowest price brackets. The first, and perhaps most stunning, example was the Model 3, a diminutive two-way system that we reviewed in June 1989.

Since then Celestion has added four larger speakers to the series, including the Model 5, which we reviewed in May 1991, and most recently the Mod-

els 9 and 11, which are three-way systems differing only in the size of their woofers and cabinets. The larger of the two, the Model 11, is based on an 8-inch woofer with a felted fiber cone in a ducted-port enclosure.

The Model 11's woofer is constructed with a one-piece chassis and mounting ring, molded of polycarbonate to minimize resonances, and has an improved surround for better acoustic termination of its cone-edge. At 1,000 Hz there is a crossover to a new 4¼-inch midrange driver, also constructed on a resonance-free molded-polycarbonate chassis. It is housed in a separate internally ribbed and acoustically damped enclosure that isolates it from the woofer.

The second crossover, at 4,000 Hz, is to a 1-inch titanium-dome tweeter. Both crossovers use 12-dB-per-octave slopes. The input connectors, recessed into the rear of the enclosure, accept single banana plugs, wires, or spade lugs. Their 1½-inch spacing prevents the use of dual banana plugs. The woofer port is on the rear of the enclosure, just above the binding-post terminals. The internal duct leading to the port is placed at an angle to the rear of the cabinet, permitting a greater length within the enclosure, and a curved plastic mouth provides a smooth transition at the port for minimum turbulence.

The Celestion 11's cabinet measures 22¼ inches high, 9¾ inches wide, and 12 inches deep. It is covered in oak or black ash woodgrain vinyl. The black cloth grille, on a molded plastic frame, plugs into retaining holes on the front panel. Each speaker weighs 20½ pounds.

Specifications include a frequency response of 50 to 20,000 Hz \pm 3 dB (-6 dB at 42 Hz), sensitivity of 89 dB sound-pressure level (SPL) at 1 meter with a 1-watt input, nominal impedance of 8 ohms, and maximum power-handling capacity of 120 watts. Price: \$699 a pair. Celestion Industries, Inc., Dept. SR, 89 Doug Brown Way, Holliston, MA 01746.

Lab Tests

The Celestion 11 is designed for optimum performance when it is placed relatively close to the wall behind it, unlike many speakers (including Celestion's high-price models) that are at their best when well away from the room boundaries. Most of our listening was done with the speakers on 19-inch Celestion stands that placed the tweeters just below ear height for a seated listener. For practical measurement reasons, however, we did most of our testing with the speakers (still on the stands) several feet from any wall.

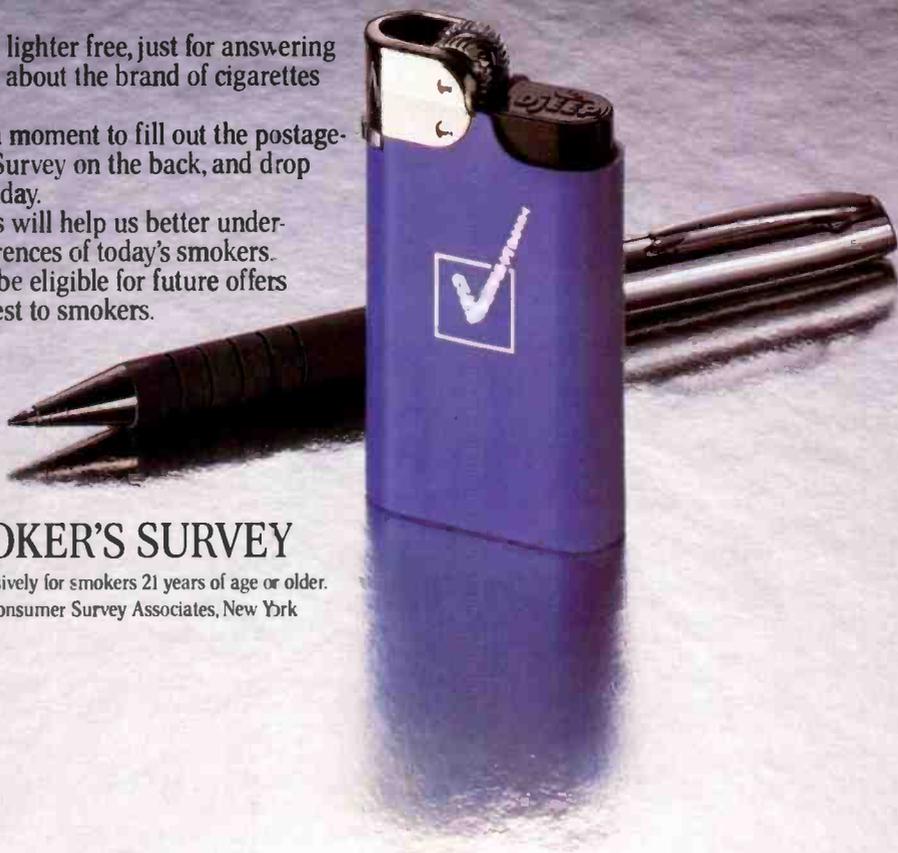
The composite frequency response, combining the averaged and smoothed room response of the two speakers and the quasi-anechoic bass response measured close to the woofer (and the port), was both unambiguous and consistent with what we heard. Overall variation was \pm 3 dB from 25 to 20,000 Hz, with a slight elevation (2 to 2½ dB) in the output from 80 to 400 Hz and a

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By responding to the following survey and signing below, I certify that I am a cigarette smoker 21 years of age or older. I am also willing to receive free samples of cigarettes and incentive items in the mail, subject to applicable state and federal law.

Signature
 (required) X _____

Birthdate
 (required) _____ / _____ / _____
 Month Day Year

1. What is your regular brand of cigarettes—that is, the brand you smoke most often?

_____ (brand name)

2a. Is your regular brand...? (Check one.)

Regular/King Size, 100's or 120's

2b. Is your regular brand...? (Check one.)

Menthol or Non-Menthol

2c. Is your regular brand...? (Check one.)

Filter or Non-Filter

2d. Is your regular brand...? (Check one.)

Lowest/1 mg Tar
 Ultra/Extra Low Tar
 Light/Mild
 Medium
 Full Flavor

3. Do you usually buy it by the...?

Pack Carton Both Ways

4. How long have you smoked this brand?

Less than 1 yr. 3 to 5 yrs.
 1 to 2 yrs. Over 5 yrs.
 2 to 3 yrs.

5. What, if any, was your previous brand?

_____ (brand name)

6. The next time you go to the store, if your regular brand were not available, what would you do? (Check one.)

Go to another store to buy my regular brand.
 Buy another type or length of my regular brand.
 Wait until the store has my regular brand.
 Buy a different brand entirely.

7. Out of the last 10 times you bought cigarettes, how many times did you use money-off coupons?

None 3 to 6 times
 1 to 2 times 7 or more times

8. If your regular brand were not available, which of the following brands would you consider buying? (Check all that apply.)

Alpine Merit
 Benson & Hedges Misty
 Montclair
 Bristol Newport
 Bucks Now
 Cambridge Parliament
 Camel Salem
 Capri Store/Generic
 Carlton Superslims
 Doral Vantage
 Kent Virginia Slims
 Kool Winston
 Magna
 Marlboro
 Other _____ (brand name)
 None

9. How many packs of cigarettes did you smoke in the past month?

(Note: 1 carton = 10 packs) Total # Packs _____

10. Of these total packs, how many were your regular brand and how many were other brands?

Regular Brand # Packs _____

Other _____ # Packs _____
 (brand name)

Other _____ # Packs _____

Other _____ # Packs _____

11. Where do you usually buy your cigarettes? (Check one.)

Supermarket chain
 Neighborhood grocery
 Convenience/Gas
 Drug Store/Pharmacy
 Discount store

12. Are there other smokers in your household, 21 years of age or older, that are willing to receive free samples of cigarettes and incentive items in the mail? Please print full names and birthdates.

First Name _____ M.I. _____ Last _____

Birthdate _____ / _____ / _____

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TEST REPORTS

similar shallow depression from 4,000 to 13,000 Hz.

We measured the lowest bass frequencies at the port, whose output exceeded the cone's contribution below 65 Hz. Our composite curve is intended to show what the speaker actually delivered into our room from about 400 Hz to 20,000 Hz and what it *could* do in an anechoic environment below 400 Hz.

Other response measurements made with several techniques, including swept noise and FFT (MLS), generally confirmed the shape of the speaker's room response. Although we would not have expected this speaker to actually reproduce the lowest audible frequencies, it proved that it could put out a relatively clean and very audible signal down to 30 Hz.

Our impedance measurements confirmed the manufacturer's 8-ohm rating. The minimum impedance was about 6.5 ohms at 200 and 10,000 Hz. Elsewhere it averaged well over 8 ohms, with peaks of 29 ohms at 65 Hz, 23 ohms at 1,000 Hz, and 17 ohms at 3,000 Hz.

Sensitivity was 90 dB, slightly higher than rated. Woofer distortion at that level was between 0.6 and 1.2 percent from 60 to 1,600 Hz, except for a rise to 2 percent at 600 Hz. In the low bass, the distortion was a surprisingly low 2 to 4 percent from 45 Hz down to 20 Hz. The midrange driver's distortion was less than 0.8 percent in the range of 650 to 3,900 Hz.

The tweeter's horizontal dispersion was as good as one can expect from a 1-inch dome. The response 45 degrees off-axis was about the same as the on-axis response (down about 2 dB) up to about 6,000 Hz, where the two curves began to diverge. Their difference reached 6 dB at 10,000 Hz, 8 dB at 15,000 Hz, and 12 dB at 20,000 Hz.

Group delay (linearity of the speaker's phase response) was very constant (within ± 0.25 millisecond) over the full tweeter range above 4,000 Hz. Because of the microphone's distance from the speaker, measurements below that frequency were not necessarily representative of the speaker's actual performance.

The Celestion 11, rated for use with amplifiers up to 120 watts output, was able to absorb much higher levels for short periods. At frequencies from 100 to 10,000 Hz, a single-cycle burst of

sine-wave signal clipped our amplifier (at power levels ranging from 550 to 1,030 watts) before the speaker showed any audible distress.

Comments

The Celestion 11 sounded very much the way its response curves looked. Obviously smooth and peak-free, it had a slight warmth that probably came from the gently accentuated lower midrange. The highs were all there, but without a trace of sharpness or sizzle. All in all, the speaker gave the sonic impression of being much larger (and more expensive) than it actually is.

The big surprise was its bass performance. During some of our response

The Celestion 11's sound was smooth and peak-free, with a slight warmth. All in all, it gave the sonic impression of being a much larger (and more expensive) speaker than it actually is.

measurements, the low bass was very evident down to 30 Hz or so, although there had been no suggestion of its presence in preliminary casual listening to musical program material. Despite the slightly warm overall sound, there was none of the artificial heaviness on male voices, such as those of most radio announcers, that is usually associated with an accentuated upper-bass or lower-midrange response.

More listening confirmed the reality of the Model 11's low-bass response. Certain recordings with occasional deep-bass content produced sounds that one would never expect from a box of this size. We found only minor changes in overall quality between placements of the speakers within 1 foot of the wall or 4 feet in front of it.

Previous experience testing the Celestion Model 3 and Model 5 had given us a deep respect for the talent of the company's designers. The Model 11 reinforced that impression and left no doubt that it is another winner. □

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TEST REPORTS



Boston Acoustics Voyager Outdoor Loudspeaker

Julian Hirsch, Hirsch-Houck Laboratories

THE Voyager, from Boston Acoustics, is an unusual indoor/outdoor speaker featuring attractive styling, rugged construction, and weatherproof design and claiming true high-fidelity sound quality. It is a two-way system with a 5¼-inch woofer and a 1-inch dome tweeter in a cabinet formed of Lexan, a very strong plastic that is able to withstand ultraviolet light, salt spray, heat, cold, and vibration.

The Voyager's external hardware is made of stainless steel or brass to make the entire speaker exceptionally resistant to corrosion. Its enclosure is extremely rigid and nonresonant, as evidenced by the inert "thud" produced by rapping it with the knuckles. The Voyager measures 6½ inches wide, 10½ inches tall, and 6¾ inches deep, and it weighs a mere 7 pounds.

A stainless-steel speaker grille that matches the color of the cabinet protects the drivers. For mounting on walls or ceilings, the Voyager is supplied with a stainless-steel bracket that fastens to the cabinet with a large knob

at each end. In addition to their corrosion-resistant material, the bracket and grille are finished with a heat-cured epoxy paint. The bracket, like the rest of the speaker, can be repainted as required.

Although the Voyager's weatherproof design makes it ideal for installation on a patio or boat, or in a recreational vehicle (which will usually require use of the support bracket), it is equally at home on a bookshelf or floor stand. In these cases, the bracket can be removed and the speaker placed on one end. The bracket's retaining knobs are faced in rubber, and if they are replaced after removing the bracket the thickness of the knob permits the speaker to stand level on a flat surface. It can also be placed on its side if desired.

The Voyager's specifications include a frequency response of 70 to 20,000 Hz ± 3 dB, nominal impedance of 8 ohms, and sensitivity of 89 dB. The crossover frequency is 2,500 Hz, and the recommended amplifier power is 5 to 60 watts. The woofer cone is

made of a copolymer, and the soft-dome tweeter is similar to those used in other Boston Acoustics products. According to the manufacturer, a magnetic shorting-ring reduces woofer distortion, and the tweeter is cooled by ferrofluid. Price: \$400 a pair. Boston Acoustics, Dept. SR, 70 Broadway, Lynnfield, MA 01940.

Lab Tests

The averaged room response of the two Voyager speakers, mounted on stands well away from the walls, was flat within ± 2.5 dB from 300 to 20,000 Hz except for a peak of 5 dB at 15,000 Hz. The close-miked woofer response was flat within ± 2 dB from 100 to 1,200 Hz (the close-miked measurement is not valid at higher frequencies) and fell off at 12 dB per octave from 100 Hz down to 20 Hz.

The bass curve spliced unambiguously to the averaged room response, resulting in an excellent composite response of ± 2.5 dB from 80 to 13,000 Hz (20,000 Hz if the additional 2-dB output at 15,000 Hz is disregarded). A response curve that was run by Boston Acoustics on our test samples closely matched the salient features of our measurement.

The Voyager's minimum impedance was 3.6 ohms at 260 Hz, with maximum readings of 19 ohms at 90 Hz and 17 ohms at 2,500 Hz (the crossover frequency). It was interesting to note that there was not the slightest trace of a crossover dip or rise in any of our frequency-response measurements.

The horizontal dispersion of the tweeter was good up to 10,000 Hz, where the output was down 5 dB at 45 degrees off the speaker's axis compared to its on-axis output. The difference increased to 15 dB at 20,000 Hz.

The speaker's sensitivity was slightly higher than rated, with a 90-dB sound-pressure level (SPL) measured at 1 meter with an input of 2.83 volts of pink noise. At that input level the woofer distortion was very low, between 0.3 and 0.4 percent, from 200 to 800 Hz, increasing to 2 percent at 80 Hz, 5 percent at 50 Hz, and 10 percent at 30 Hz.

The Voyager was able to absorb very high peak power levels at middle and high frequencies. With a single-cycle tone-burst signal, our amplifier clipped at 945 and 1,015 watts at 1,000

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and 10,000 Hz, respectively, before the speaker's output was significantly distorted. At 100 Hz, however, the woofer cone "bottomed" with an input of 65 watts.

Comments

In a brochure describing the Voyager, Boston Acoustics asks, "When is the last time you heard speakers made for the outdoors that sound as good as the ones you have indoors?" As a matter of fact, this was my first time. Of course, it has been some time since I evaluated an outdoor speaker, and in those days they were far from meeting the hi-fi standards of the time. Still, if the comparison is taken with a degree of looseness, it is true that, within its useful frequency range, the Voyager sounded about as good as most hi-fi quality home speakers, and better than many.

About 4½ hours after being immersed in a tub of water, the Boston Acoustics Voyager measured and sounded as it had originally.

As a matter of fact, under some conditions the Voyager sounded *better* than many highly regarded home speakers. Very few larger systems are as flat over the range of 100 to 10,000 Hz as this one is, and the absence of lower-midrange coloration is one of the most striking aspects of its sound. The low bass is lacking, but that is to be expected from a 5¼-inch woofer. When the program has no significant content below about 80 Hz, this speaker will hold its own with most you could name up to several times its price. When true bass is present, of course, the comparison is pointless.

On an unrelated subject, I feel that the speaker's 8-ohm rating is not justified by our actual measurements. It would be more accurate to call it a 4-ohm speaker. Whatever the rating, it should not overstrain any amplifier likely to be used with it.

The brochure, commenting on the Voyager's waterproof seals, mentions

that it is not only water-resistant but also buoyant. Although our winter weather when we tested the speaker did not encourage me to install it outdoors, I could not resist the implied challenge. After all our other tests were completed, I placed one of the speakers in a bathtub, ran the shower on it for about 5 minutes, then filled the tub with enough water to cover the speaker. It never fully submerged: As the water level rose, the speaker began to rise, turned over with the grille down, and floated as claimed.

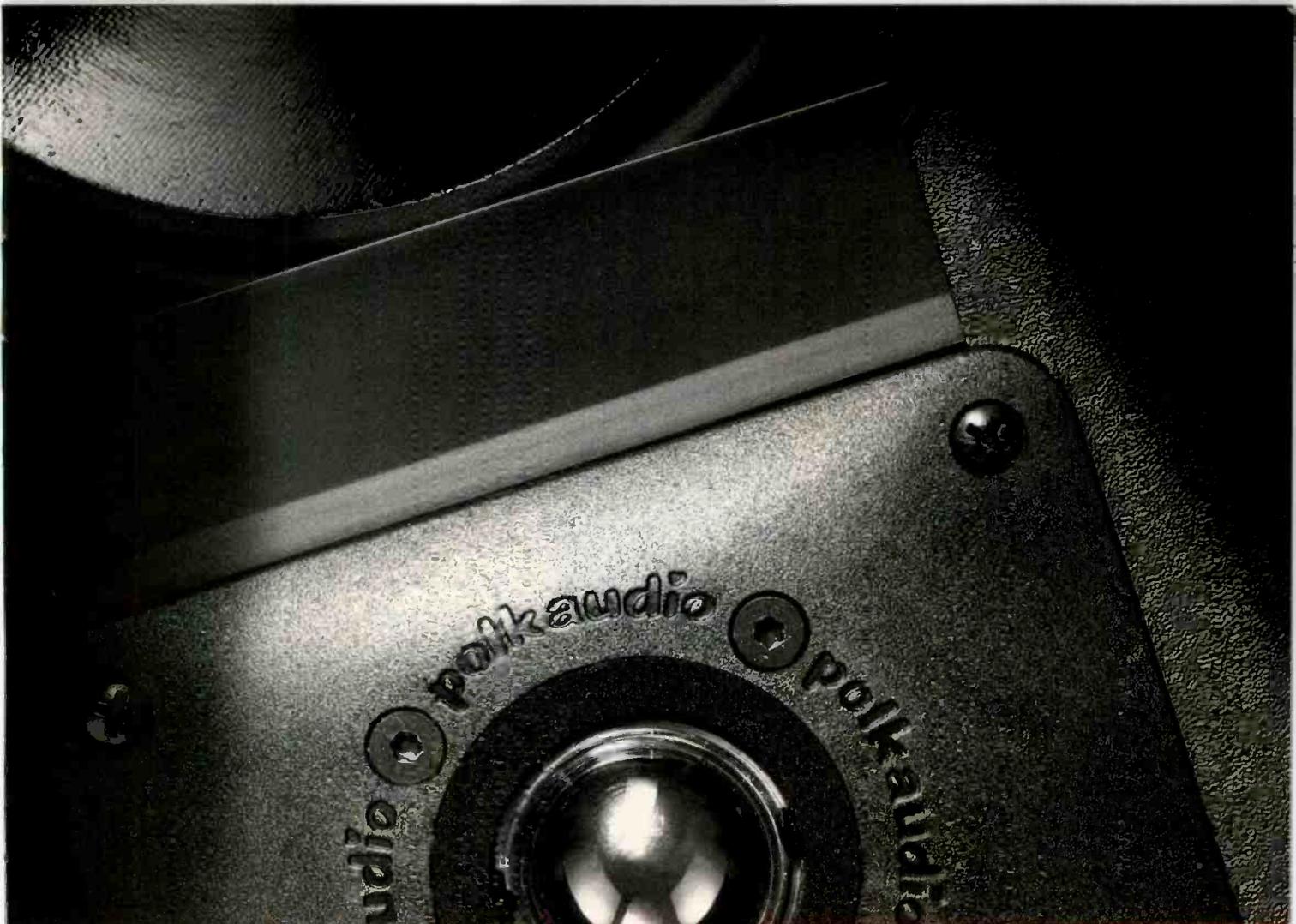
That was impressive, but the real question was whether the speaker's functioning had been affected by its aquatic adventure. I removed the speaker after about 10 minutes' immersion, dried it off as much as possible, and took it back to the lab to plot its impedance curve, since practically anything that might affect its sonic performance would almost certainly alter the impedance characteristic in some way.

About 10 minutes later, the woofer's resonant frequency had shifted from its normal 90 Hz to about 120 Hz, and the resonant impedance had fallen from 19 to 9 ohms. An hour later, its frequency was 150 Hz, and the impedance had fallen to 5 ohms. There were only minor changes above 200 Hz and none at all in the tweeter range.

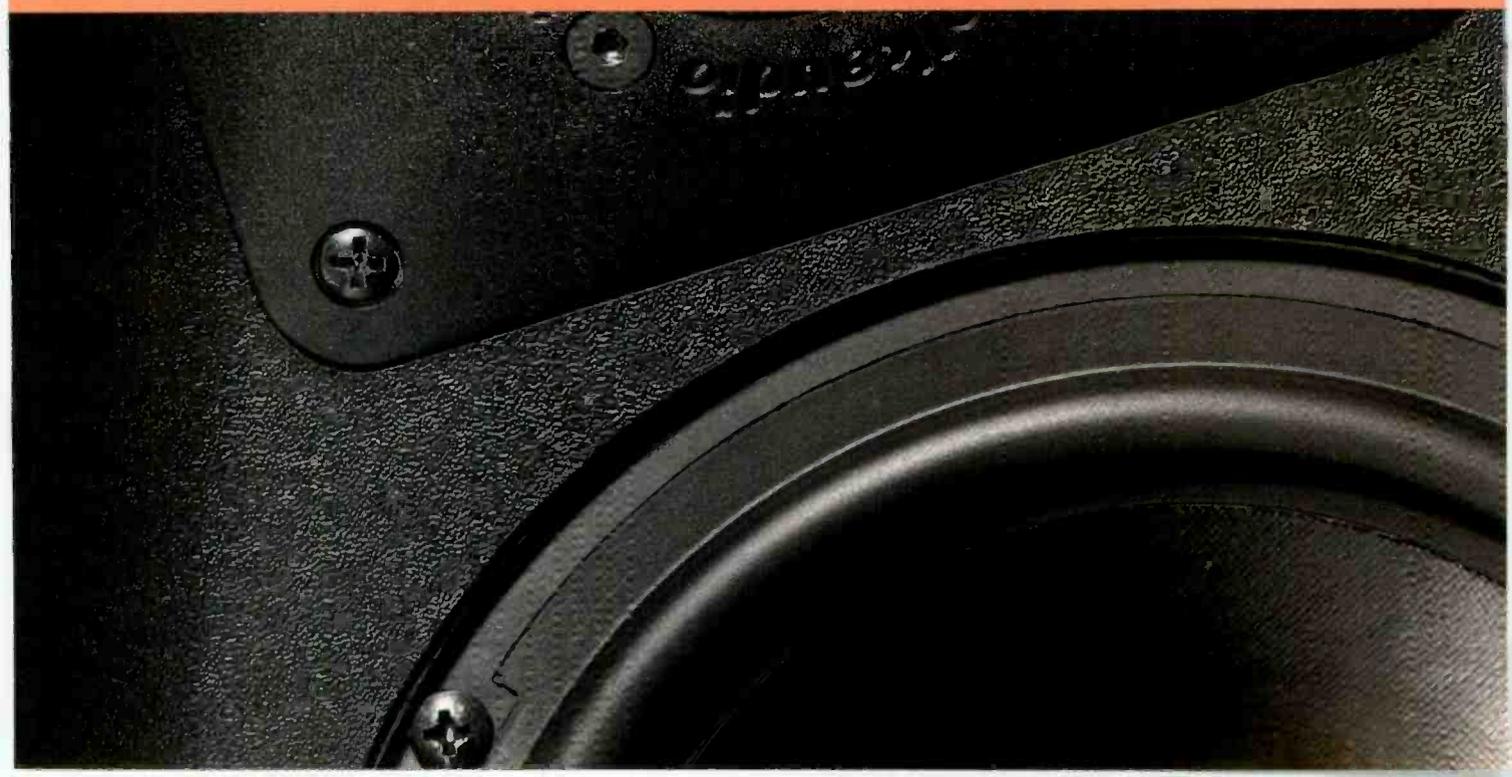
I continued to monitor the speaker's impedance characteristic as it slowly returned to normal. The entire process took about 4½ hours, after which the speaker measured and sounded as it had originally. During the drying period, occasional listening checks showed degraded sound quality and reduced sensitivity, both of which improved gradually as the speaker's impedance returned to normal.

In general, indoor/outdoor speakers should *not* be immersed in water (unless they are designed for continuous submerged operation, which these are not). But certainly no conventional home speaker could be totally immersed without *permanent* damage.

Our experience shows that the Voyager is a rugged, versatile, and fine-sounding speaker. When some exposure to the elements is likely, it would be an excellent choice. And even in an indoor installation, its sound quality should be fully competitive with that of conventional speakers well above its price. □



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...from speakers that seduce the

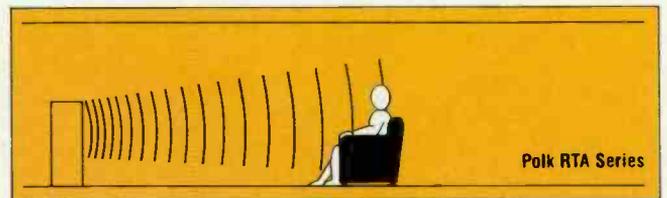
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Working with the Johns Hopkins University Center for Non-Destructive Testing, Polk engineers utilized Laser Interferometry to test tweeter designs and materials. They found that ultimately, by vapor-depositing stainless steel and aluminum to a polyamide dome surface, an



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NSM CD 3101 Compact Disc Changer System

Julian Hirsch, Hirsch-Houck Laboratories

NSM calls the CD 3101 a Favorite Program System, which falls well short of describing the true nature of this unusual product. Calling it a CD changer, though less unwieldy, isn't much better (it's a bit like calling a modern automobile a horseless carriage). For one thing, it is truly a *system*, consisting of a control unit and a Disc Library (the changer section). The control unit, which can be used to play single discs in the usual way, is actually a modified Philips CD player with all the typical features, including Philips's Bitstream 1-bit digital-to-analog (D/A) converters.

The Disc Library is a black steel box measuring 18½ inches wide, 13¾ inches high, and 8¼ inches deep. Opening its hinged, tinted-glass front reveals a CD transport mechanism at the center bottom, flanked by two disc magazines, each about 8½ inches high and 5¼ inches square. The magazines,

which hold up to fifty CD's apiece, swing out for loading or unloading discs, and they can be removed entirely. Additional magazines (supplied with dust-excluding cases) can be purchased for storing large collections.

A magazine has fifty thin plastic disc holders, which slide into numbered slots on the plastic frame. The accompanying simple yet effective cataloging system consists of a loose-leaf notebook with twenty-five clear-plastic pages. Each page has two pockets that accept the printed inserts found in CD jewel-box packages. Numbered labels (from 00 to 99), supplied with the magazine, can be affixed to the pages next to the pockets holding the inserts. After you locate a disc in the catalog file, you can select it for play by number, without further handling.

The changer section connects to the control unit through a multiconductor (RS-232) cable that carries the digital

control signals between the two units. A separate optical-fiber cable carries the digital playback signal to the control unit, where it is processed by the Bitstream D/A converters and appears at the analog audio jacks on the rear apron of the control unit. Both fixed- and variable-level output jacks are provided, together with a headphone jack on the front panel of the control unit. There is a front-panel volume-control knob for the headphone outputs, plus internal electronic volume-control circuits, operated by the system's wireless remote control, for the variable-level line outputs. All the controls and features of the CD 3101's control unit can be used either for the discs loaded into the Library or with a single disc loaded in its own drawer. Most of the time the system will be operated using the remote control.

When the control unit is turned on (manually), the interior of the Library is softly illuminated and the words **INSERT DISC** appear in the control unit's display window. A single disc is played in the usual way, by pressing the open/close button on the disc drawer and loading the disc manually. To load a disc from a magazine, you press the **DISC** button on the remote control, which brings up **LOAD DISC** in

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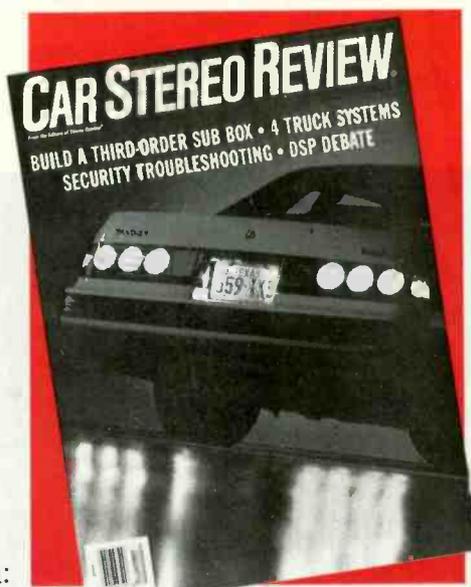
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the window. Keying in the desired number on the remote control causes the changer to pull out that disc from its magazine and lower it to the playing mechanism in the bottom of the Library. The control unit's display now shows DISC ## READY, its total number of tracks, and the total playing time. Pressing the play button changes the display to PLAY ##, TRACK 1, and the elapsed time in that track. Any track can be selected at any time by pressing PAUSE, then the track number, and then PAUSE again (which returns to play). At the end of a disc, or when STOP is pressed, the changer mechanism lifts the disc from the drive spindle, loads it into the correct slot in its magazine, and returns to the original standby condition.

The NSM CD 3101 system is fully programmable, including the Favorite Program System (FPS), similar to the Favorite Track Selection that has been a feature of Philips CD players for

some time. Up to ninety-nine individually customized programs, each containing up to one hundred tracks (or full CD's), can be stored in the system's nonvolatile memory, for a maximum of 4,000 items. The FPS memory is retained when power is removed from the system, but it can be edited or erased entirely at any time.

The system's other features are too numerous to describe in detail but include conventional programming by disc and track, direct index access, random-order playback, repeat of one or all discs in a magazine or program, and repeat of a selected portion of a disc (A-B repeat). A scan mode plays the first 10 or 20 seconds of each track on a selected disc.

A number of characteristics can be preset according to personal preference, including the brightness of the display, the initial sound level from the player, automatic fade-in and fade-out over a period adjustable up to 20 sec-

onds, pauses of up to 5 seconds between tracks, and automatic play (on turn-on) of all discs in the changer, in a program, or in an FPS program. These operating conditions can be stored in the system memory and will be activated automatically whenever the system is turned on.

An idiosyncrasy of the CD 3101 is that the shut-down process requires opening and closing the disc drawer of the control unit. This can be done directly, by pressing the button on the drawer, or from the remote control. When the drawer opens, any disc in the playing mechanism is returned to its slot in one of the magazines. Another press on the button closes the drawer, leaving INSERT DISC in the display window (AC power must be shut off manually, which also turns off the power to the changer unit).

The CD 3101 control unit weighs about 9 pounds. The empty Disc Library weighs about 33 pounds; fully

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loaded, it can weigh 50 pounds or more. The connecting cables are each about 6 feet long. Price: \$4,000; additional magazines, \$150 each. NSM America, Dept. SR, 5207 N. Rose St., Chicago, IL 60656.

Lab Tests

We tested the NSM CD 3101 system much like any ordinary CD player or changer, except that the test discs were loaded into one of the fifty-disc magazines (we repeated certain measurements with a disc in the control unit's drawer).

The system's output voltage, from a 0-dB 1,000-Hz test signal, was 1.92 volts. Slew time from Track 1 to Track 15 of the Philips TS4 test disc was a very fast 1 second. The time required to change discs depended on the slots they were loaded into, which governs how far the mechanism must travel to pick up and return a disc before going to pick up the next one.

The worst-case change time, going from the beginning of Disc 00 to the beginning of Disc 51, typically required about 15 to 20 seconds. Going between adjacent discs usually required only a few seconds.

Probably because of its considerable mass, the changer unit was impervious to external shock. Blows with a fist or palm on any of its external surfaces failed to induce a skip. The control unit, on the other hand, was fairly sensitive to finger taps on its side (next to the disc-playing mechanism) but required a moderately hard slap on its top cover to induce a skip.

The control unit's defect tracking was satisfactory, though far from the best of today's CD players. The system played through errors of 750 micrometers on the Pierre Verany #2 test disc without audible problems but mistracked at 1,000 micrometers.

Frequency response was +0.15, -0.02 dB from 20 to 20,000 Hz. Re-

sponse ripples above 1,000 Hz had a peak-to-peak amplitude of 0.08 dB. De-emphasis response error varied from +0.14 dB to -0.22 dB, from 1,000 to 16,000 Hz. The levels of the two channels differed by only 0.05 dB.

Channel separation was between 87.5 and 89.2 dB from 100 to 20,000 Hz left to right and very similar (86.9 to 89.1 dB) from right to left. Total harmonic distortion (THD) plus noise at 1,000 Hz was almost independent of level, 0.0056 percent from -10 to -60 dB and 0.0063 percent at 0 dB. At the 0-dB level, THD plus noise was 0.006 percent from 20 to 2,000 Hz, rising to 0.035 percent at 20,000 Hz.

The D/A converters' linearity error at 1,000 Hz increased from -0.5 dB at a -60-dB level to -0.9 dB at -70 dB, -2.2 dB at -80 dB, and -3.5 dB at -90 dB. The A-weighted noise level in the player's output was -94.4 dB, the quantization noise was -84.6 dB, and the dynamic range was 98 dB. Fre-

uses a remarkably light yet rigid microcell diaphragm material. Creating a tweeter that recovers and responds virtually instantly to any audio signal.

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quency (speed) error was +0.0012 percent. The maximum interchannel phase shift was 0.6 degree at 20,000 Hz.

Comments

Considered simply as a CD player, the NSM CD 3101 system was a good performer, though not at all exceptional. Most surprising was the low-level nonlinearity, which resembled that of a good but unremarkable multibit D/A converter (low enough not to be audi-

bly objectionable). On the other hand, many other 1-bit converters have shown essentially perfect linearity.

But that is really a small matter in the context of the system's overall performance, and the CD 3101 was a pleasure to use. It is undeniably complex, if you intend to use many of its features, but the instruction manual is complete and quite specific. Still, don't expect to be able to use its programming and special operating

features without a good bit of hands-on practice.

The real convenience of the CD 3101 is its performance as a library of CD's. If you have a few dozen discs, and mostly listen to only a few of them, you won't be able to take full advantage of this remarkably versatile system. A simple five-disc changer would probably meet your needs with far less complexity and at far less cost. But if you have at least one hundred discs, and especially if you have several hundred, the NSM 3101 will give you uniquely easy access to anything in your collection.

The mechanical process of selecting a disc, carrying it to the playing platform, and later returning it is highly ingenious and effective. It worked with unflinching accuracy and incredible speed in our tests (unfortunately, the tinted window makes it difficult to follow the action, and opening the glass panel instantly shuts down the changer). But it was also very noisy, considerably more audible than the internal actions of a typical carousel or magazine-type CD changer.

Most people who choose the CD 3101 for their home music systems will probably wish to locate the Library unit well away from the listening area, allowing the control unit to replace both the usual CD player and the normally visible collection of discs in the listening room. The standard 6-foot cables make this difficult, though you could place the Library unit in a soundproofed enclosure, but it should be possible to obtain longer RS-232 and optical cables if desired.

Our only unhappy experience resulted from taking one of the magazines out of the Library unit and tilting it slightly to examine its construction. Unfortunately, there is nothing to hold the disc trays inside, and the result was a number of discs and trays scattered about the floor. The manual does not warn of this possibility.

Nevertheless, our overall impression of this system, both in its concept and its execution, was overwhelmingly positive. As complex as it is, it performed flawlessly right out of the box. We used it only as a music library and found it to be ideal for that purpose. If you also find the Favorite Program System feature useful, there is really no substitute for the NSM CD 3101. □

FEATURES

- Modified single-disc CD player connects to Disc Library (changer unit) through optical data cable and RS-232 control cable
- Bitstream 1-bit D/A conversion
- Wireless remote control duplicates most front-panel functions, plus added features
- Forward and reverse scan and track skipping
- Direct numerical access to stored discs, index points (through remote only), and tracks
- Favorite Program System (FPS) stores up to ninety-nine sets of programmed disc/track sequences
- Repeat of FPS program, entire disc, programmed sequence, selected portion of disc (A-B repeat)
- Scan feature plays first 10 or 20 seconds of each track or disc
- Edit feature selects tracks to fit recording time of cassette
- Random play of discs, tracks, or programmed sequences
- Headphone jack with volume control
- Preset selection of display brightness, default operating mode, output level, fade-in and fade-out at beginning and end of play, pause of up to 5 seconds between tracks for tape dubbing
- Disc Library contains disc-playing mechanism, one or two storage magazines
- Each magazine holds up to fifty standard-size CD's; easily removable from Disc Library for changing magazines or shipping unit
- Magazines supplied with loose-leaf catalog notebook for CD insert booklets
- Front of Disc Library protected by lockable, tinted-glass hinged cover
- Fixed- and variable-level analog outputs

LABORATORY MEASUREMENTS

Maximum output level: 1.92 volts

Frequency response: +0.15, -0.02 dB from 20 to 20,000 Hz

De-emphasis error: -0.22 dB at 1,000 Hz

Channel separation: 88 dB at 100 Hz, 89 dB at 1,000 Hz, 87 dB at 20,000 Hz

Dynamic range (A-weighted): 98 dB

Signal-to-noise ratio (A-weighted): 94.4 dB

Maximum interchannel phase shift: 0.6 degree at 20,000 Hz

Linearity error: -0.5 dB at -60 dB, -0.9 dB at -70 dB, -2.2 dB at -80 dB, -3.5 dB at -90 dB

Distortion (THD + N at 1,000 Hz): 0.0063% at 0 dB

Defect tracking: tracked 750-micrometer errors on Pierre Verany #2 test disc

Slewing time: 1 second

Speed error: +0.0012%

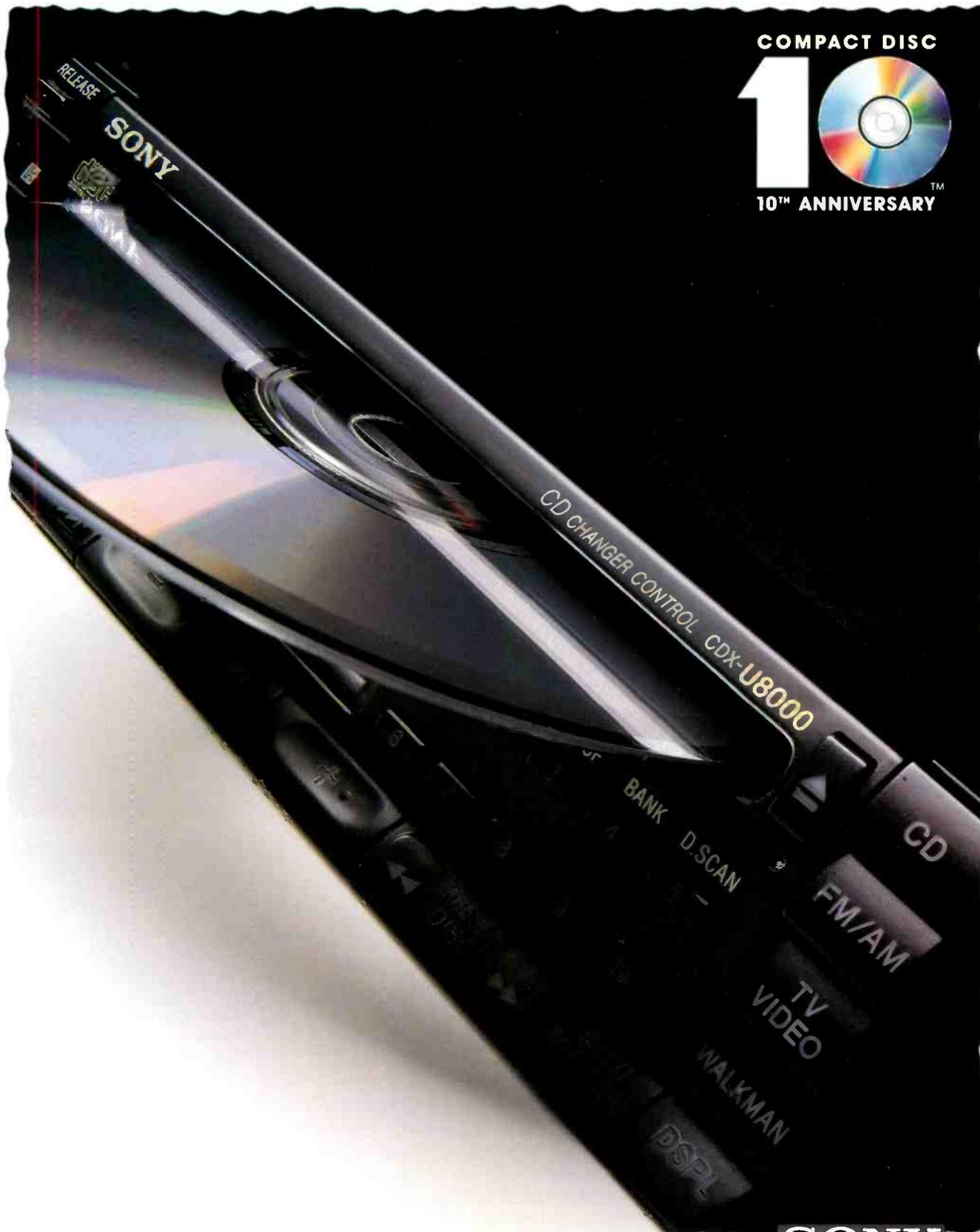
Impact resistance: control unit, B on top, C on side; changer, A + anywhere

Compact Disc: On a Roll.

COMPACT DISC



10TH ANNIVERSARY



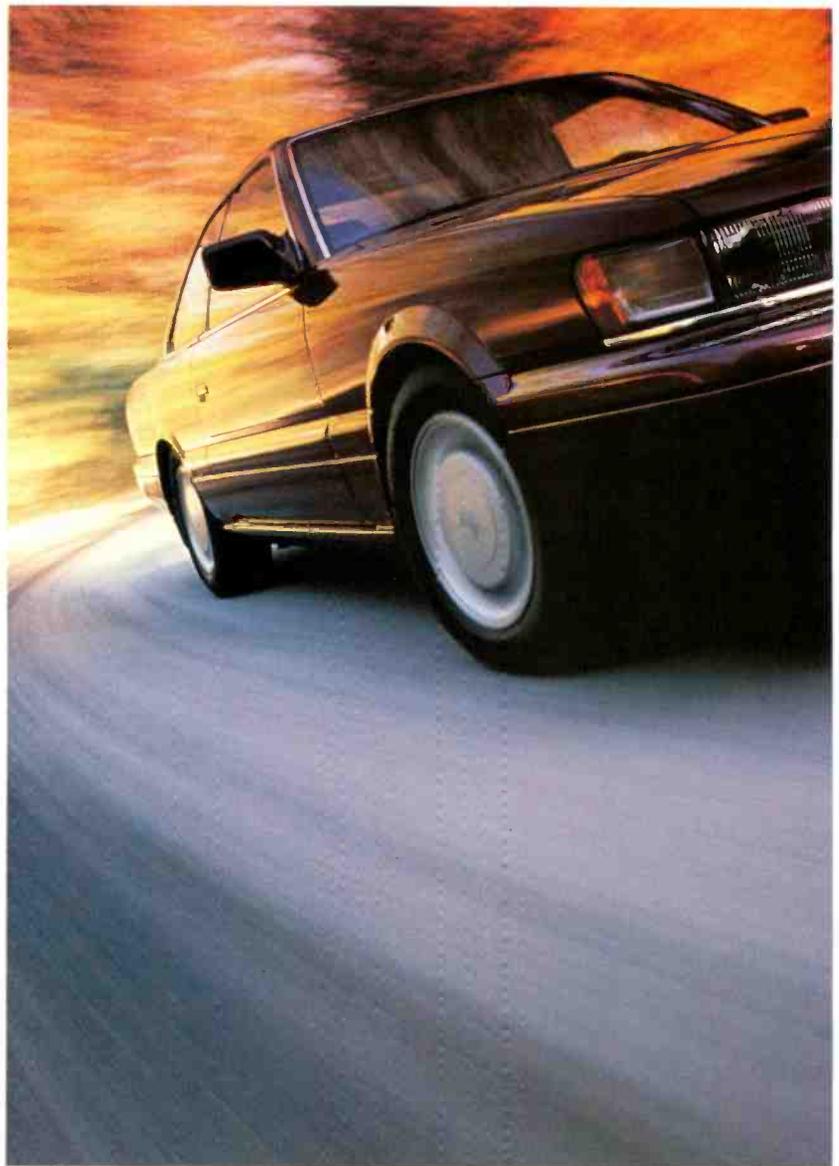
SONY

CD Takes a Road Trip.

Grab your driving gloves, your darkest shades and a few of your favorite CD's. Come with us as Sony celebrates the 10th Anniversary of the Compact Disc the best way we know how. By taking to the streets. Because your car is the ultimate place to enjoy the ultimate sound. In fact, we had your car in mind when we first introduced the Compact Disc 10 years ago.

You see, when Sony invented the Compact Disc, we knew the brilliance of digital audio would make any car stereo system sound its best. The CD's resistance to dust, dirt, fingerprints and scratches was ideal for the less-than-clinically clean car environment. Even the CD itself—at 4¾ inches in diameter—was just the right size for car CD players.

Americans have already bought over 40 million CD players and 1 billion CD's. So we know that many of you have CD's at home. But if you're not enjoying CD in the car, you're missing half the fun. Why miss out? Putting CD in your car is easier than ever. It's also far less expensive, thanks to a new generation of Sony car CD players and our Car Discman® models. These versatile performers go anywhere: home, outdoors or into your car. On the road, a Discman player can be powered from your cigarette lighter and delivers music to your



car stereo system by way of an ingenious cassette adaptor.

Of course, Sony Discman players were the world's first CD portables. So it's no surprise that today's Discman designs enjoy all the best: the sonic quality of 1-bit pulse converters, the sonic tailoring of Digital Signal Processing (DSP) and the convenience of 22-track programming. Even the buttons are carefully considered: they're back-lit for easy use at night. Just another way car Discman players make the song of the open road infinitely more alluring.



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SONY

CAR Discman

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COMPACT
disc
DIGITAL AUDIO

OPEN

STOP/
DISPLN OFF/
CHARGE

PLAY MODE DSP MODE LEVEL MAX

MODE
DSP

EFFECT

REPEAT/
ENTER

06 03:57
TRACK STEP/MIN SEC L R

PLAY MODE

RESUME
OFF ON

D-808K

HCLD

LOCK
OVER
MODE

EQ ZONE

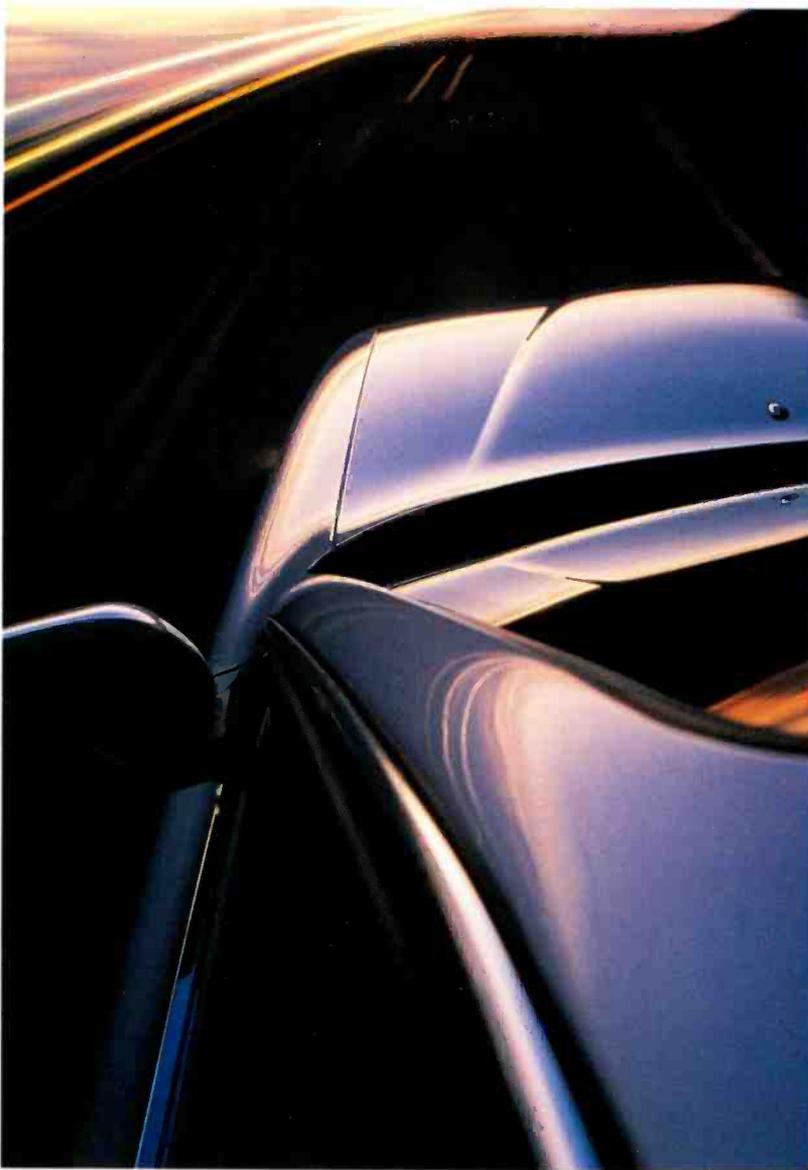
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5 135

LOUD

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A.MEM/ALSCAN

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MUTE

SELECT

1

2

3

FM

INTRO

REPEAT

SHUF

AM

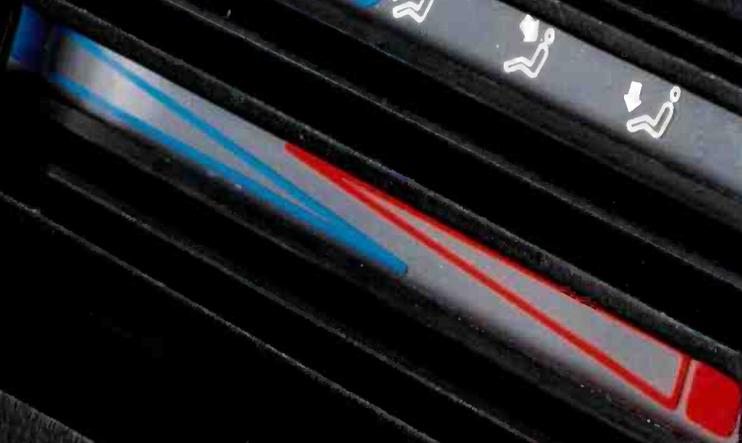
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10 COMPACT DISC MAGAZINE
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10 DISC MAGAZINE
D/A CONVERTER SYSTEM COMPACT DISC CHANGER

SONY

D/A CONVERTER SYSTEM CDX-U500

MOBILE ES: Where Car Stereo Is.

Mobile ES: Where Car Stereo Is Heading.

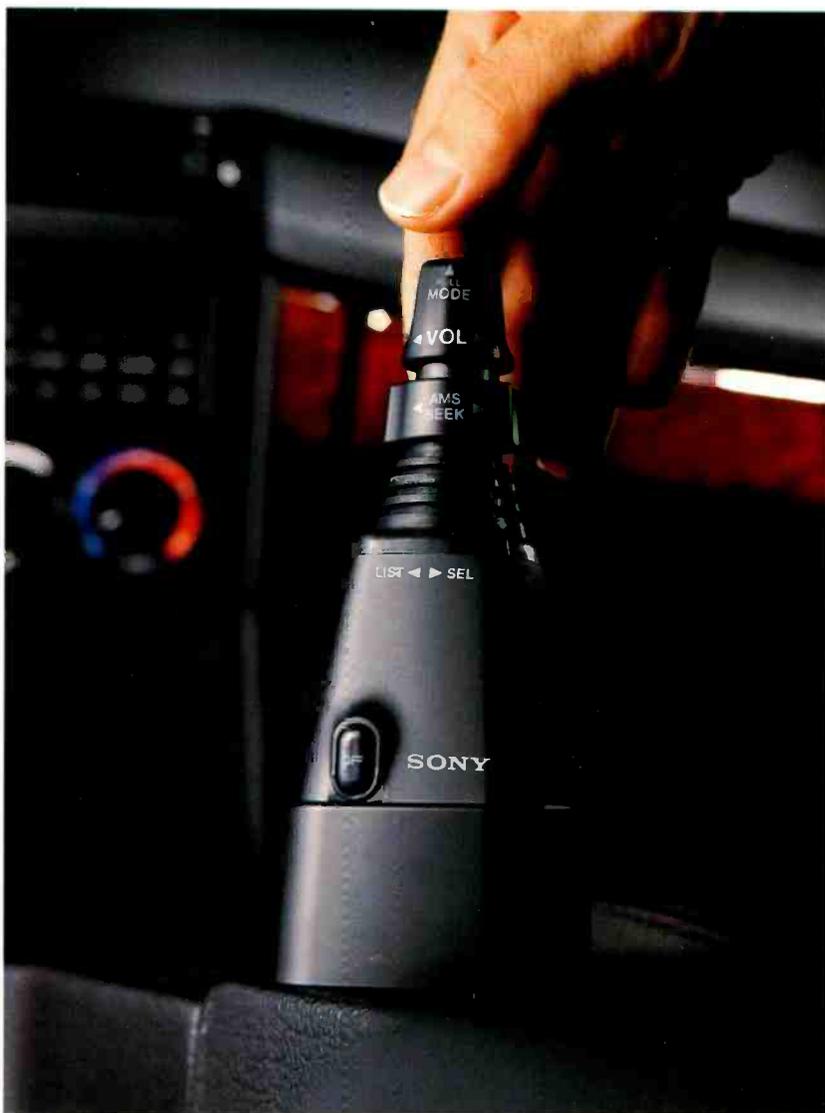
Many consider CD the last word in car stereo. But at Sony, it's just the beginning. Our Mobile ES extends CD's digital technology throughout the entire car stereo system—a breakthrough of profound proportions. In fact, high fidelity critic Len Feldman proclaimed that Mobile ES, "may well be the most revolutionary concept to hit car audio in decades."¹

Mobile ES starts with Sony's finest DiscJockey CD changer, and continues with Digital Signal Processing (DSP) preamplifier, digital crossover and frequency-optimized amplifiers. Taking it all in, *Car Stereo Review* exclaimed, "Add Mobile ES to topnotch speakers and you finally may have a system that won't need upgrading in your lifetime."²

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¹Len Feldman quote from the April/May 1991 issue of *Jazziz*. Reprinted with permission.

²*Car Stereo Review* quote by Bill Wolfe, appearing in the September/October 1991 issue. Reprinted with permission.

SONY

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National Operations Headquarters
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SPECIAL CD OFFER

A UNIQUE JAZZ AND CLASSICAL SAMPLER



CHESKY RECORDS, a young company with a loyal following among audiophiles, has created a dynamite sampler disc exclusively for STEREO REVIEW readers. The sixteen tracks on the disc have a total playing time of 73:16, and they give an excellent overall view of the artists and repertoire that make up Chesky's tightly focused catalog. To get your copy simply fill out the coupon below with your name and address and send it to Chesky with a check or money order for \$4, which includes handling and postage.

Founded only five years ago by the brothers Norman and David Chesky, the company is best known for its cutting-edge approach to technology. In pursuit of a completely natural sound, Chesky engineers use minimalist miking techniques, and the company was the first in the world to use 128-times oversampling in its digital recordings. At exhibitions like the Consumer Electronics Show, many manufacturers use Chesky records to demonstrate the quality of their equipment.

Norman Chesky, the president, says, "The high-end community helped establish our company as one of the leading audiophile labels in the world. Now it is my goal to take us to the next level by discovering and developing new and unique artists." David Chesky, who is a pianist and composer, functions as the director of artists and repertoire, and he says the label's focus should be on the musician. "I imagine a company that will give musical artists an arena in which they can express themselves freely without inhibition or limitation."

Among the artists on the Chesky roster—and on the special STEREO REVIEW sampler—are such outstanding jazz musicians as Phil Woods, Clark Terry, John Pizzarelli, and McCoy Tyner. When new pop or folk-oriented artists, like Sara K. or Kenny

Rankin, begin recording for Chesky, they are encouraged to go off in new directions. The saxophonist and clarinetist Paquito D'Rivera and the Brazilian singer Ana Caram give a Latin flavor to Chesky's list. David Chesky's own music is a synthesis of Latin pop with jazz and classical influences, and the chamber ensemble Orquesta Nova combines Latin American popular music with classical.

Chesky's established classical stars include the American piano virtuoso Earl Wild and the harpsichordist/conductor Igor Kipnis (new to the label) as well as the rapidly rising flutist Gary Schocker. Along with Fred Hersch, Bruce Dunlap, and Tom Harrell, all the artists mentioned here are represented on the sampler with tracks from their recent releases. See complete contents above. All new! All digital! All wonderful! All yours for a mere four bucks! At this price you can't afford not to order it.

.....

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• Include a check or money order for \$4 (which covers postage and handling) payable to Chesky Records. Outside the United States send US\$6. Do not send cash. Offer void after July 31, 1992.

•

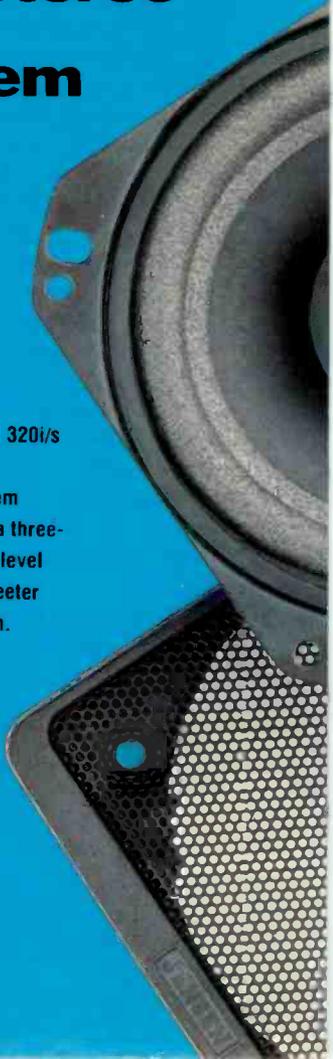
DRIVE TIME

YOU'VE spent a ton of money on your car stereo. Your CD changer features eight-times oversampling and 1-bit D/A converters. The changer connects to the head unit via fiber optics. The tuner has triple phase-locked-loop circuitry and high-performance ceramic filters. Your equalizers contain only discrete electronics and your crossovers are all active, and both have been tuned to perfection using a professional real-time analyzer. In a fit of passion, you even pulled out your cassette tape player and installed a DAT player instead. But

your system doesn't sound very good. In fact, it sounds downright bad.

Whether you've invested \$200 or \$20,000 in your car's sound system, it won't make the grade unless the fidelity of the loudspeakers is at least as high as the fidelity of the rest of the system. Smart car audio installers and enthusiasts know that the secret of great sound is in the loudspeakers. In fact, because differences in sound quality between electronic components are so much smaller than differences between speakers, careful speaker selection

Choosing the right speakers for your car stereo system



The a/d/s/ Model 320i/s two-way stereo component system (\$570) features a three-position tweeter level control and a tweeter protection switch.

BY KEN C. POHLMANN



Originally sold as a marine speaker, Pioneer's full-range TS-MR163 (\$139 a pair) has found its way into cars, trucks, and utility vehicles, particularly those that are regularly driven open or exposed to the elements.



Jensen's JXL-401 full-range speaker (\$50 a pair) uses a dual-cone driver. Its sensitivity is rated as 88 dB and its power handling as 30 watts. The mounting depth is 1 1/4 inches.

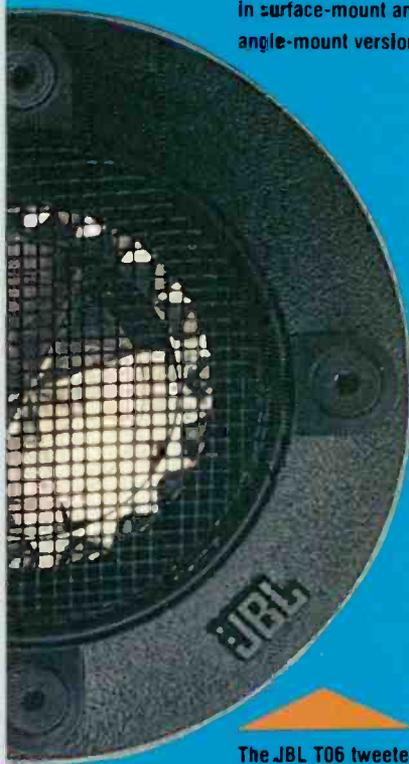


MB Quart's QM 160 KX coaxial speaker (\$279 a pair) has a 6 1/2-inch woofer, a 3/4-inch titanium-dome tweeter, and a rated power-handling capability of 80 watts. The system can be biamplified.





The Model 6.2 single-channel component system from Boston Acoustics (\$430) has a 6½-inch copolymer-cone woofer and a 1-inch tweeter. The tweeters are available in surface-mount and angle-mount versions.



The JBL T06 tweeter (\$129 a pair) has a pure-titanium diaphragm. It can be surface-mounted or flush-mounted. Power handling is rated as 50 watts, sensitivity as 92 dB.

and placement can make a modest system competitive with a much more expensive installation.

Getting Started

Good sound can start with a system using as few as two speakers, preferably mounted in the front doors. The most basic setup is a pair of coaxial or triaxial speakers. Such speakers contain two or three drivers in a single frame, making installation easy, and they often provide reasonably satisfactory frequency response.

First, examine your car's doors to see what size speaker can be installed. Beneath the interior trim, most car doors have cut-outs for the speakers available in factory-option sound systems. If you are squeamish about exposing your car's innards, any professional installer can instantly tell you whether it can accommodate 4- or 6-inch round speakers or some other configuration. Next, listen to coaxials and triaxials that will fit in your car. Because speaker performance is so dependent on installation, it is important to try to listen to speakers installed in a car instead of on a speaker demo board in a showroom. Play music that you are familiar with through amplifiers with power ratings similar to that of your amplifier.

Although they have their limitations, specifications can help you trim down your list of candidates. Make sure that the rated frequency response is reasonably smooth, but be aware that different measurement techniques can give very different results and that the installation and your car's interior design will greatly affect response. Pick a speaker whose rated power-handling capability exceeds your amplifier's rated output. If its power-handling capacity is too low for your amp, its voice-coil temperature could rise to dangerous levels, possibly even to the point of melt-down. If the power-handling capability isn't specified, remember that speakers with large voice coils, vented pole pieces, and vented dust caps always dissipate heat better than unvented models with small voice coils.

Also check the speaker's rated sensitivity: The more efficient it is, the less power needed to drive it. If sensitivity isn't rated, check the magnet size—in theory, a doubling in magnet size doubles efficiency (all else being equal). In addition, edge-wound voice-coil wire increases efficiency over round wire.

Coaxials and triaxials are handy be-

cause they can drop into factory-cut speaker locations. Another type of full-range system is called a plate speaker, which places the drivers side by side in a rectangular baffle. Plate speakers are usually surface-mounted on a car's rear package tray.

A number of good coaxials are available. JBL's T600 has a 6½-inch woofer and a ½-inch titanium tweeter (\$149 a pair). The MB Quart QM 130 KX has a 5¼-inch woofer and a ¾-inch titanium-dome tweeter with an external crossover (\$249 a pair). Or you may want to try a triaxial. The Jensen J1401 has a 4 x 10-inch woofer, a 2-inch midrange driver, and a 2-inch tweeter (\$130 a pair). The Infinity RS 6903 has a 6 x 9-inch woofer, a 2-inch midrange, and a ¾-inch tweeter (\$200 a pair). Altec Lansing's ALS-500 is a good example of a plate system, with a 1-inch tweeter, a 5¼-inch woofer, and a crossover (\$260 a pair).

Step by Step

While a pair of coaxial, triaxial, or plate speakers is a good choice for a modest car audio system, if your goal is to build toward a showpiece system you'll want to use separate component speakers, adding components as your budget permits. Midrange and low-frequency speakers are the place to start. As with coaxials and triaxials, determine the size that best fits your car, but be careful to choose models that can be integrated easily with additional speakers later on. In other words, plan ahead so the upgrading process will be as smooth as the desired sound.

BY themselves, of course, mid-range or low-frequency speakers cannot cover the entire audio frequency range. They are selected primarily to provide a solid mid-range sound spectrum. A number of good models are available, including the Soundstream SS 4.0 4-inch midrange speaker (\$115 a pair), the JBL T51 5¼-inch woofer (\$139 a pair), and the Pioneer TS-MR163 6½-inch dual-cone full-range speakers (\$150 a pair). Although marketed primarily as a marine speaker, the TS-MR163 has found some popularity in the auto-sound arena.

Higher fidelity requires the addition of separate tweeters to bring presence and realism, clarity and nuance to the sound system. Satisfactory tweeter performance is more elusive than one might think. The ear is forgiving of low-frequency distortion, and, indeed, the low-frequency sound many listeners prefer is far from hi-fi. But

when it comes to high frequencies, everyone agrees that a brittle, harsh, or shrieking sound is big trouble. When auditioning tweeters, choose music with natural high-frequency content and listen carefully for realism and smooth sound quality. Any tweeter that is harsh or fatiguing, especially after extended listening, no matter how clean or bright it initially seems, must be ruled out. Instead, find a tweeter that imparts openness to the music, blending with the middle frequencies to provide a cohesive whole. One other point: Hearing varies from person to person most at high frequencies. Choose the tweeter you like, not necessarily one recommended to you.

On the one hand, tweeters are easy to install because they are small and do not need enclosures. On the other hand, because of their directionality, their placement is critical. Moreover, the best tweeter locations, ear level and forward, are unfortunately already occupied by the windshield. Some installers place the tweeters in the front doors, perhaps nestled near an arm rest. This is not ideal, however, because hands and arms can block the sound from reaching your ears. Other installers find nooks and crannies in the instrument panel—some even sacrifice creature comforts and hide tweeters in air-conditioning vents. That *can* work well, but the tweeters will often be quite low, which tends to pull the entire sound stage down around your knees. Other installers choose locations on the top of the dashboard, aiming the tweeters upward so their sound reflects from the windshield to the listener's ears. Although that, too, is workable, the reflections cause imaging to be quite fuzzy, and a phenomenon known as NSL (near-site localization) tends to distort the sound stage further.

Perhaps the best tweeter position is at the bottom of the A-pillar where the outside rear-view mirror is usually attached. This area is usually free (although some cars have manual mirror-positioning controls there) and provides an unobstructed path to the ears. In addition, it is relatively high, near ear level. But because one tweeter is so near each front seat, the stereo panorama is sometimes pulled to the side. This problem can be solved by crossfiring the tweeters—aiming each one across the car to the opposite seat.

Popular 1-inch tweeters include the G&S NS DT1 (\$37 each), the Boston Acoustics 701 (\$100 a pair), and the KEF KAR-33 (\$120 a pair). A more exotic approach can be found in the

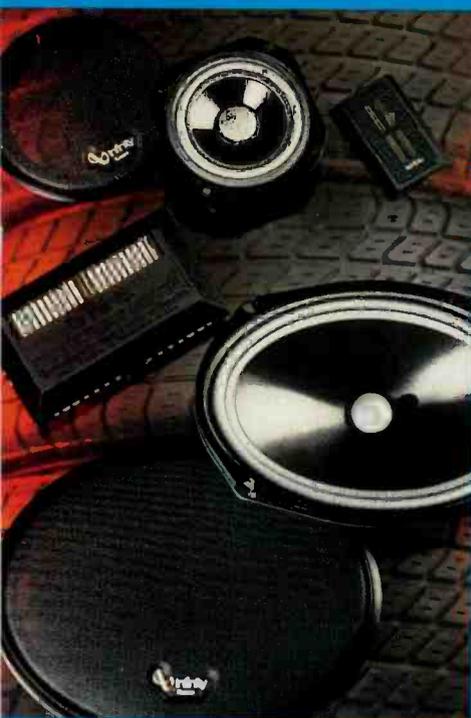
The "TBX" in the Boston Acoustics TBX8 (\$400 a pair) stands for Truck Box. Designed especially for use in trucks, the wedge-shaped two-way system contains a 6½-inch woofer, an 8-inch passive radiator, and a 1-inch tweeter.



The Polk C4 Compound Mobile Subwoofer System (\$350) contains four 6 x 9-inch drivers. Its flat bottom and rounded top make possible a neat fit in a hatchback or van.

Soundstream's SS 4.0 full-range speaker (\$115 a pair) uses a computer-optimized center cone that is said to enhance high-frequency dispersion. It is designed to fit standard 4-inch car speaker cutouts.





The Infinity EMIT-N tweeter (top in photo) is featured in the CS-1A component system (\$440 complete; tweeter, \$190 a pair). The surface-mount driver is rated for 50 watts power handling, 93 dB sensitivity.



Advent's Model 5.21 coaxial (\$119) couples the tweeter diaphragm to the woofer's voice coil, eliminating the need for a crossover.

planar-magnetic Infinity RSDS EMIT-N (\$190 a pair), although its large size (1½ x 2¼ inches) may make placement more problematic. Some coaxials enable you to separate the tweeter from the midrange driver for greater flexibility. The Nakamichi SP-65C coaxial contains a 6½-inch woofer and a removable 1-inch tweeter, and it comes with a crossover and switchable attenuator (\$330 a pair).

Subwoofers

The next step to improved sound is to add subwoofers. The low-frequency foundation they provide is essential to achieving the ultimate in fidelity, but their cost and size dictate a significant commitment on your part. Moreover, both the cost and size are greatly augmented by the speaker enclosures that are critical for good bass performance (not to mention the cost of extra amplifiers). On the up side, subwoofer placement is absolutely *not* critical. In fact, some subwoofers are designed to be mounted in the trunk, with their output reaching the passenger compartment through the rear seat cushions.

While 12- and 15-inch subwoofers certainly look impressive, not all cars (or owners) can readily accommodate speakers of such magnitude. Fortunately, ample bass can be obtained with 8- or 10-inch woofers, if they're properly installed. Whatever the cone diameter, good bass is most certainly not achieved by simply cutting out holes and dropping in speakers. Almost certainly you'll get an inadequate, muddy, muffled boom, probably distinguished by a highly resonant "one-note bass" sound that annoys people within a hundred-yard radius. This effect is too often confused with real bass response, which is strong and accurately balanced across the entire low-frequency range. To achieve this, you must either place your car in the hands of a professional installer, tackle the job of designing a custom enclosure yourself (see "Designing Subwoofer Enclosures" on the facing page), or consider buying a manufactured bass cabinet.

When selecting a subwoofer, check on its mounting requirements. The manufacturer should state whether the speaker has been designed for a sealed or vented enclosure or for free-air operation, and for best results you should not deviate from this. Also consider the speaker's sensitivity and power-handling capability. Because of the high power levels required to reproduce good bass, the speakers

should be as efficient, and protected, as possible.

Speaking of protection, also check the subwoofer's impedance. To increase the number of drivers, but not amplifiers, subwoofers are often wired in parallel across amplifier outputs. But if the combined impedance drops below 2 ohms, the resulting current draw could damage the power amplifier. To be safe, limit yourself to a pair of paralleled 8-ohm subwoofers, yielding a combined 4-ohm impedance. To simplify the installation, you might consider ready-made subwoofer systems with the driver prepackaged in an enclosure. Some of these models even contain their own power amplifiers.

The number of subwoofers available is staggering. Good examples of 8-, 10-, and 12-inch models are the JBL T80 (\$119 each) and the Altec Lansing ALS-10 (\$325 each) and ALS-12 (\$375 each). The Collins CST 1203S is a 12-inch subwoofer in a tube enclosure (\$550 a pair). The Southern Audio Services T82A Bazooka is an 8-inch subwoofer in a tube enclosure that also contains a crossover and 40-watt amplifier (\$349 each).

Matched Separates

Rather than pick and choose, you may want to buy your speakers in a matched set—many manufacturers market their speaker separates as packages, selling, for example, a tweeter, midrange, and woofer together. That helps to narrow down the bewildering number of car speaker choices and almost infinite number of possible combinations, making your life easier. In addition, it helps guarantee that the speakers you buy will work well together in terms of power-handling capacity and combined frequency response—although the way the individual speakers are installed will still greatly affect the resulting performance. In addition, as with any package deal, you may save a little money. On the other hand, you may not like all the speakers in a set and end up with a tweeter, say, that doesn't suit you. In practice, many dealers will agree to break up the sets and sell you any individual speaker you wish.

A few of the available sets are the Boston Acoustics Model 4.2, a two-way system with a 1-inch tweeter, 4-inch midrange, and crossover (\$379); the MB Quart QM 335CX, a three-way system with a 1-inch tweeter, 4-inch midrange, 8-inch woofer, and crossover (\$799 a pair); and the a/d/s/ Model 320i/s, a two-way system with a

1-inch tweeter, 5¼-inch woofer, and crossover (\$570).

Some folks prefer ready-made boxes that contain pairs of tweeters, mid-ranges, and woofers as well as crossovers—just like home speakers except there's one box instead of two. In particular, such systems make sense in hatchbacks and pick-up trucks where conventional installations are difficult or impossible. And if your car is a temporary one, or if you want to move the speakers between several cars, or if you simply cannot bear to cut into your car's precious vinyl, drop-in speaker boxes fill the bill. They're also fast: If you don't have time for a custom installation, buy a box, drop it in, and go.

ON the down side, all-in-one boxes take up a lot of space and are the easiest speakers to steal—many of them even have handles. Moreover, because they are designed to sit in the back of the vehicle, the entire sound field is launched from the rear—not an entirely satisfactory arrangement. For this reason, some installers prefer to use boxes only when independent front-mounted speakers are also installed. The combination, in fact, can sound surprisingly good.

There are a number of excellent boxes to choose from, and the most popular are three-way systems. The MTX BTE-10W Blue Thunder contains a pair of 1-inch tweeters, two 5-inch midranges, and two 10-inch woofers (\$440); 20-inch-long ducts in the rear of the box help augment bass response. Stillwater Designs' Kicker TLM (\$630) uses two 1-inch tweeters, two 4-inch midranges, and two 10-inch woofers; the midrange drivers are augmented with ducted ports.

After he's covered the basics, a true enthusiast will detect a frequency-response dip that calls for additional "fill" speakers in the rear package tray, decide that a center-channel speaker is a necessity for perfect imaging, and even discard his spare tire to make room for yet another subwoofer cabinet. A system that began modestly with two speakers may evolve into a transducer phantasmagoria with twenty or more speakers. Well, the ability to expand your system, and to be very, very creative in its design, is half the fun of car stereo. But when it comes to the loudspeakers, quality is infinitely more important than quantity. If you run out of space for speakers before you run out of money, chances are you're very rich, or you have a bad-sounding car sound system. □

DESIGNING SUBWOOFER ENCLOSURES

THE design of loudspeaker enclosures used to be entrusted only to rocket scientists. Today, with the help of a computer program, anyone can design an enclosure that optimizes the performance of a speaker to within a hair of its ideal operating characteristics. Loudspeaker enclosures are the province of woofers and subwoofers; higher-frequency drivers do not need the augmentation provided by an enclosed air volume and are designed to operate without one. Woofers and subwoofers, including midrange speakers that have to reproduce low frequencies as well, must be placed in enclosures specifically designed for their operating characteristics and the desired response of the finished system.

Designing a proper woofer or subwoofer enclosure requires the use of certain key specifications, normally provided by the driver manufacturer. They are known as the Thiele-Small parameters, after A. N. Thiele and R. H. Small, the engineers who originally defined them and formalized their application. Using these specifications and the right equations, one can choose appropriate drivers and design and build optimal enclosures for them. This process used to be very tedious because of the complexity of the equations and the interactions between them, but it has been much simplified and streamlined by the advent of equation-solving computer programs. Moreover, with fast and powerful personal computers and

loudspeaker-enclosure software programs that do the math and guide the user through the design process, almost anyone can achieve professional results.

For example, the TERM-1 loudspeaker program can be used to design sealed, ported, or isobarik enclosures and explore the effects of changing such things as port size or the number of ports. Frequency response and power output can be evaluated graphically using a cross-hair cursor to pinpoint specific values on the graphs. The program enables you to design either rectangular or wedge-shaped boxes and to vary parameters such as wood thickness. TERM-1 also includes a program to design passive crossovers. It can model low-pass, bandpass, or high-pass filters with different slopes and cutoff frequencies; it even generates a schematic complete with component values.

Best of all, although it is a very sophisticated program, TERM-1 is easy to use. Even beginners can complete their own designs. But to take full advantage of the program, a more thorough knowledge of the principles involved is very helpful. Books such as Vance Dickason's *The Loudspeaker Design Cookbook* (Marshall Jones Co.) are ready to assist. TERM-1, which runs on IBM-compatible personal computers, is available from the Perfect Interface division of Rockford Corporation, 649 S. Rockford Dr., Tempe, AZ 85281; telephone (800) 366-2349, extension 3026. Retail price is \$299.



Altec Lansing's ALS-10 10-inch subwoofer (\$325) is rated for a frequency response of 30 to 5,000 Hz and sensitivity of 98 dB.

SYSTEMS





A LOT has changed in the twenty-one years since Richard Packer first had his stereo system profiled in STEREO REVIEW. The paneled walls of his listening room have gone from dark pine to light oak, and the deep-red shag rug has given way to a contemporary mauve low-pile carpet. The family TV—a new 32-inch Toshiba CF3254J monitor/receiver—is now connected to the audio system, and the number of speakers has increased by three to accommodate Packer’s Dolby Pro Logic surround-sound system.

All of the electronic equipment has been replaced, too. “We sold the old system to help pay for a new one,” Packer says. Infinity 8 Kappa speakers, which he uses for the front channels, have replaced his early model Bose 901’s. Packer and his wife, Jill, chose the Kappas because their sound resembled that of Symphony Hall in Salt Lake City, where the couple attend concerts by the Utah Symphony. The Kappas also pack enough bass to eliminate the need for a subwoofer. Packer saved two old Lafayette speakers from an earlier system for the surround channel, and he built a cabinet/TV stand around a leftover Radio Shack speaker for the center channel. The decision to employ retired speakers was financially driven, but “they do the job,” he says.

Where one Sansui 5000a receiver sufficed twenty years ago, today Packer uses an Adcom GFA-555 200-watt-per-channel power amplifier to drive the Kappas, and a five-channel Pioneer VSX-9500S Dolby Pro Logic receiver delivers 125 watts to the center speaker and 30 watts per side in the rear. Source equipment includes a Sony CDP-C67ES carousel CD changer, a Pioneer CLD-3070 combi-player, and a JVC HR-S5500U S-VHS VCR. Conspicuous by its absence in the new system is Packer’s old Teac A-6010 open-reel tape deck—or any audio tape deck, for that matter. “The difference in sound from tape to CD is so dramatic that I haven’t had the impulse to hook up the reel-to-reel,” says the former disc jockey, who owns more than three thousand 7-inch reels. There is a turntable, but the Dual CS 620Q doesn’t see a lot of action these days.

The change in equipment parallels a shift in the Packers’ musical

habits from rock-and-roll to classical. “I was around when rock-and-roll was born,” says Packer. “That’s what led me into radio in the early 1960’s. “Roy Orbison, Buddy Holly, the Everlys, the Beatles . . . that music was my first love.” Now he and his wife love the classical masters, too—Wagner, Tchaikovsky, and Strauss. “I always liked classical music, but it was scratchy on records,” he says. “You could hear all the pops and hisses in the quiet passages.” The CD changed all that, and “now we listen to classical more than anything else.”

The 60 x 17 x 28-inch coffee-table/equipment cabinet that Packer designed and built, of white ash

with accents of South American purpleheart, was designed originally “for stereo within easy reach.” Although that purpose has been largely supplanted by remote controls, Packer says that changing discs and tapes is still much easier at arm’s length from the couch. But now he can also control the system from his desk in the adjacent room by pointing his Pioneer universal remote at the Zapit infrared repeater that sits on one of the rear speakers.

Although there’s room for storing a few discs and tapes in the cabinet, most are kept in drawers in another room. Packer, now a woodworker by trade, was concerned that the Adcom amp would run too hot inside the cabinet, so he built a wooden caddy for it and placed it on the side. If he’s using the system all day, he’ll open the cabinet’s tambour doors to allow air to circulate so that the other components don’t become overheated. Monster Cable speaker wires and extension cords for the equipment run through troughs that Packer cut in the heavy foam padding between the carpet and the concrete floor underneath.

As advanced as Packer’s entertainment system is now, it’s not likely to stay the same for long. He’s already weighing replacing the turntable with a Digital Compact Cassette (DCC) deck as soon as he can get one, and he might just put those extra amplifier channels in the Pioneer receiver to work driving a pair of speakers in another room. But when it comes to music, he’s not likely to stray from his favorites—both nineteenth century and 1950’s. □

A 1970’s Classic Updated

by Rebecca Day

ALL ABOUT SUBWOOFERS

PART 1

Really deep,
really clean
bass, and
other good
reasons for
having a
subwoofer

A DECADE ago the subwoofer was a rare and exotic species of loudspeaker, found in the homes of only a few relatively wealthy audiophiles. But in recent years the breed has flourished. STEREO REVIEW's 1992 *Stereo Buyers' Guide* lists more than a hundred "true" subwoofers, not including those sold as part of three-piece subwoofer/satellite systems. The appeal of subwoofers was stimulated by four developments:

- *The compact disc.* CD's, unlike LP's and analog tape cassettes, are able to reproduce very low frequencies without restriction. CD players have flat response to below 10 Hz, and the inclusion of high-level bass does not cause distortion, print-through, or shortened playing time as it does with LP's and tapes. CD's contain a lot of low-frequency information that you won't hear unless your speakers have strong response in the bottom octave (20 to 40 Hz). The newest digital audio media, DCC and Mini Disc, have the same unrestricted low-frequency range as the CD.

- *Cinema sound.* During the last fifteen years the sound in movie theaters has been transformed by Dolby Stereo, surround sound, Spectral Recording, and (very recently) digitally encoded sound on film. And while VCR's and television sets were mono and low-fi a decade ago, wide-range stereo sound is now commonplace in laserdiscs, videocassettes, and TV broadcasts. Most surround-sound decoders have a socket on the back labeled SUBWOOFER—a clear invitation for you to enjoy at home the

spaceship rumble and booming explosions that you hear in the theater.

- *Car stereo.* Ordinarily an 8-inch woofer in a 2-cubic-foot box rolls off below 50 Hz. But if you put the same woofer in a car its response actually rises, producing powerful lows that you can feel all the way down to 20 Hz. This is because of the small size of the "room." When the dimensions of the listening space are smaller than a half-wavelength, sound waves have no room to travel; the woofer simply acts as an air pump, uniformly pressurizing the car's interior. And once you have felt the visceral impact of a bass drum in a car, you may wish to experience the same sensation in the larger and more difficult environment of your living room.

- *The subsat concept.* In the early days of stereo, people wanting full-range sound usually bought large, expensive three-way speakers that were likely to dominate their living rooms. Then designers noticed that the lowest frequencies, which require a relatively big box, could be relegated to a bass cabinet hidden in a corner. Everything above 100 Hz, including all of the spatial and directional cues of two-channel stereo reproduction, could be reproduced by very small satellite speakers. With this division of responsibility, full-range sound can be both economical and inconspicuous.

Satellite speakers become nearly invisible when they are mounted in a wall and covered by grilles painted to match their surroundings. In-wall speakers also have no dangling wires to trip over. But there are practical

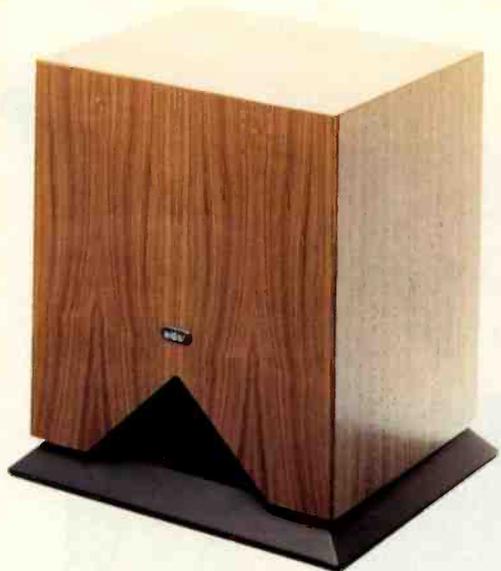
ILLUSTRATION BY HENRIK DRESCHER

BY PETER W. MITCHELL



BARK WOOF

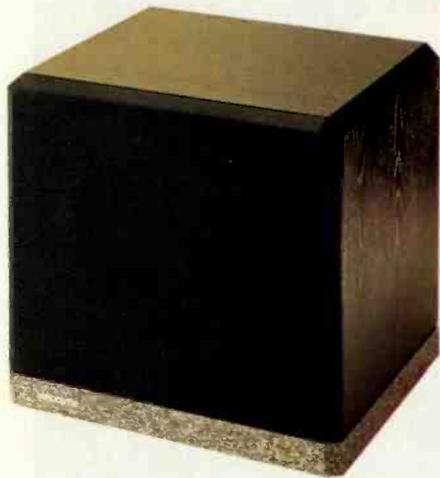
By HR Ym D. Miller AG 1992



The a/d/s SUB12 powered subwoofer (\$1,895) features a 12-inch driver and a built-in 350-watt amplifier.



Cerwin-Vega's SW-12B (\$320) is a vented design with a floor-facing woofer; its rated power range is 5 to 125 watts.



At 250 watts, the Servo F-1500 (\$995) is the highest-powered model in Velodyne's line of Foundation amplified subwoofers.

limits to how much bass you can get from them. Woofers usually work best in a large enclosure, and the cavities in most walls don't provide enough space.

Even if a woofer could be made to work well in a wall, in-wall speakers inescapably transmit some of their vibration directly to the wall. An in-wall woofer might turn the entire wall into a sounding-board, adding a thick and boomy resonance to your music. A better-sounding and more cost-effective alternative is to use in-wall speakers only above 100 Hz, while sending lower frequencies to a separate bass cabinet.

Many of the principles and comments in this article apply both to true subwoofers and to the bass cabinets used with small satellites or in-wall speakers. Since "sub" means under, the term "subwoofer" should properly apply only to speakers that operate below the range of normal woofers. A conventional 8-inch woofer can work well down to about 50 Hz, so a true subwoofer should extend a system's response from there down to 30 Hz, 20 Hz, or even lower. But subwoofers also provide other benefits besides deep-bass response.

Invisibility. Since low frequencies are nondirectional, a subwoofer can be hidden in a corner or used as an end table, while the stereo image is formed entirely by small speakers that don't conflict with the room's decor. Compact minispeakers may also sound better in the midrange than speakers in big boxes, since they produce less panel resonance and cabinet-edge diffraction.

Imaging. All-in-one speakers often suffer from a placement compromise. For the best sound quality and stereo imaging, speakers should be located away from large surfaces. When strong floor and wall reflections combine with a speaker's direct sound, irregular frequency response and smeared imaging result. For this reason, many audiophiles mount loudspeakers on stands in the middle of the room. But a woofer should be close to walls and floor (within a quarter-wavelength) because in-phase reflections from any nearby boundary surfaces strengthen the bass at no cost.

A separate subwoofer resolves this conflict. It can be installed where it produces the most bass while the placement of your main speakers is optimized for the clearest sound and best stereo image.

Reduced distortion. Adding a subwoofer allows you to keep the low bass out of your main speakers—insuring, for example, that bass-reflex speakers won't be overdriven by frequencies below their design limits. If your main speakers are two-way systems, the addition of a subwoofer gives you a three-way system in which midrange frequencies are no longer produced by the same cone that handles lows.

When a woofer is driven beyond its linear range to produce a deep-bass tone at high volume, midrange tones from the same cone are distorted. For example, when you play the opening passage of *Also Sprach Zarathustra* by Richard Strauss (featured in the soundtrack of *2001: A Space Odyssey*), do the organ pedal tones cause the trumpet sound to warble, or is it steady? Keeping powerful bass tones out of your main speakers may also alleviate cabinet-resonance problems that are muddying the lower midrange. Improved midrange clarity may be the greatest benefit of a subwoofer.

What's Down There?

A badly designed or maladjusted subwoofer that produces excess mid-bass output (the 50- to 100-Hz range) may boom constantly. But a good subwoofer alters the sound very little—most of the time. Very few musical instruments are able to produce significant sound below 50 Hz, and even those are called upon to do so only occasionally.

The lowest key on a grand piano is nominally pitched at 27.4 Hz, but it produces mainly harmonics; the fundamental is too weak to hear. The contrabassoon, tuba, and bass fiddle have a few notes below 50 Hz, but most of their music lies between 50 and 100 Hz. A Mahler symphony may end with a massive 35-Hz bass-drum roll, but it occupies less than a minute in an hour-long composition. Large pipe organs emit floor-shaking pedal tones as low as 16 Hz, but many organs built in the Baroque style cannot even manage the low C at 32 Hz.

For classical music and acoustic jazz, owning a subwoofer is rather like owning a 200- or 300-watt amplifier. Most of the time its expensive capability goes unused, but the cost seems fully justified in those moments when its full capacity is called into play. Once you have heard the lowest octave reproduced correctly, you may not want to live without it. Hearing (and, equally important, *feeling*) the tonal foundations of a Bach fugue or a

DEEP-BASS REPRODUCTION

Psychoacoustics and the Iron Law

Lowest audible frequencies are the most difficult and costly to reproduce. As frequency is halved, a direct-radiating speaker diaphragm must move back and forth twice as far to produce the same acoustic output. But that is not enough: At low frequencies you actually need *more* output, because the ear is less sensitive to them. This is illustrated by "equal-loudness" curves, often called Fletcher-Munson curves; the modern variants shown in the graph were measured by Robinson and Davenport. Millions of years of biological evolution have made the human hearing system most sensitive to the frequencies of a speech signal (2,000 to 4,000 Hz). Note the shape of the lowest curve in the graph, which represents the faintest sound we can hear (threshold of audibility) at each frequency.

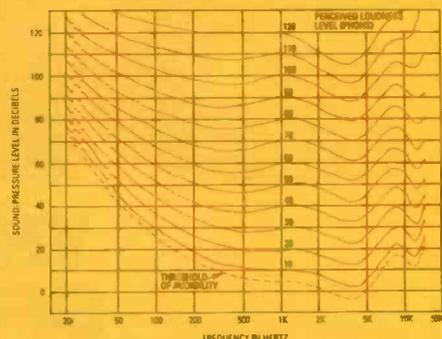
At low frequencies you may be able to hear sounds as low as 0 dB sound-pressure level (SPL). But a 30-Hz tone must be 60 dB SPL level or you won't hear it. In daily life, our hearing adapts; without it we would be kept awake at night by the furnace in the basement, the traffic of buses eight blocks away, and the siren of an ambulance 10 miles distant. We are not adapted to hear because they are below the threshold of audibility.

Note also the shape of the curves in the middle of the graph. Soft music and quiet conversation involve average levels around 60 to 70 dB SPL. To produce the same perceived loudness level at 30 Hz a subwoofer must generate SPL's exceeding 100 dB! That's easy to accomplish in the small volume of a car, but in a living room it requires moving a lot of air—which

usually means a large woofer cone and a lot of amplifier power.

One aspect of the loudness curves works in your favor. At midrange frequencies you need a 10-dB rise in measured SPL to double the perceived loudness of a sound. But at low frequencies the curves are closer together; at 30 Hz an increase of only 3 or 4 dB produces a subjective doubling of loudness. Once you have managed to raise the bass level above the audibility threshold, you need only a modest further increase to produce really satisfying bass.

The greatest difficulty in low-bass reproduction is imposed by the laws of physics. Hoffman's Iron Law, described by Henry Kloss in the mid-1950's and later turned into exact mathematical form by the engineers Thiele and Small, governs the behavior of woofers. Essentially, it says that a woofer's efficiency is proportional to the volume of its cabinet and to the cube of its cutoff frequency. To put this into practical terms, suppose you have a woofer



whose response is flat down to 40 Hz in a 2.0-cubic-foot box. In order to make it flat down to 20 Hz, the volume of its cabinet must be multiplied by eight (to 16 cubic feet) or you'll need eight times as much amplifier power to achieve the same acoustic output. This, in a nutshell, is why flat response to 20 Hz is rare.

better reproduction of the lowest audible frequencies? Or are you hungering for more mid-bass power? The chest-thumping impact of the bass in a disco or at a rock concert is not produced by frequencies below 40 Hz, but by very high levels at frequencies in the 40- to 80-Hz range. Achieving high-intensity bass requires powerful amplifiers and very efficient woofers. If that's your aim, you'll also need tolerant (or distant) neighbors.

NEXT: *How to choose a subwoofer and install it in your system*



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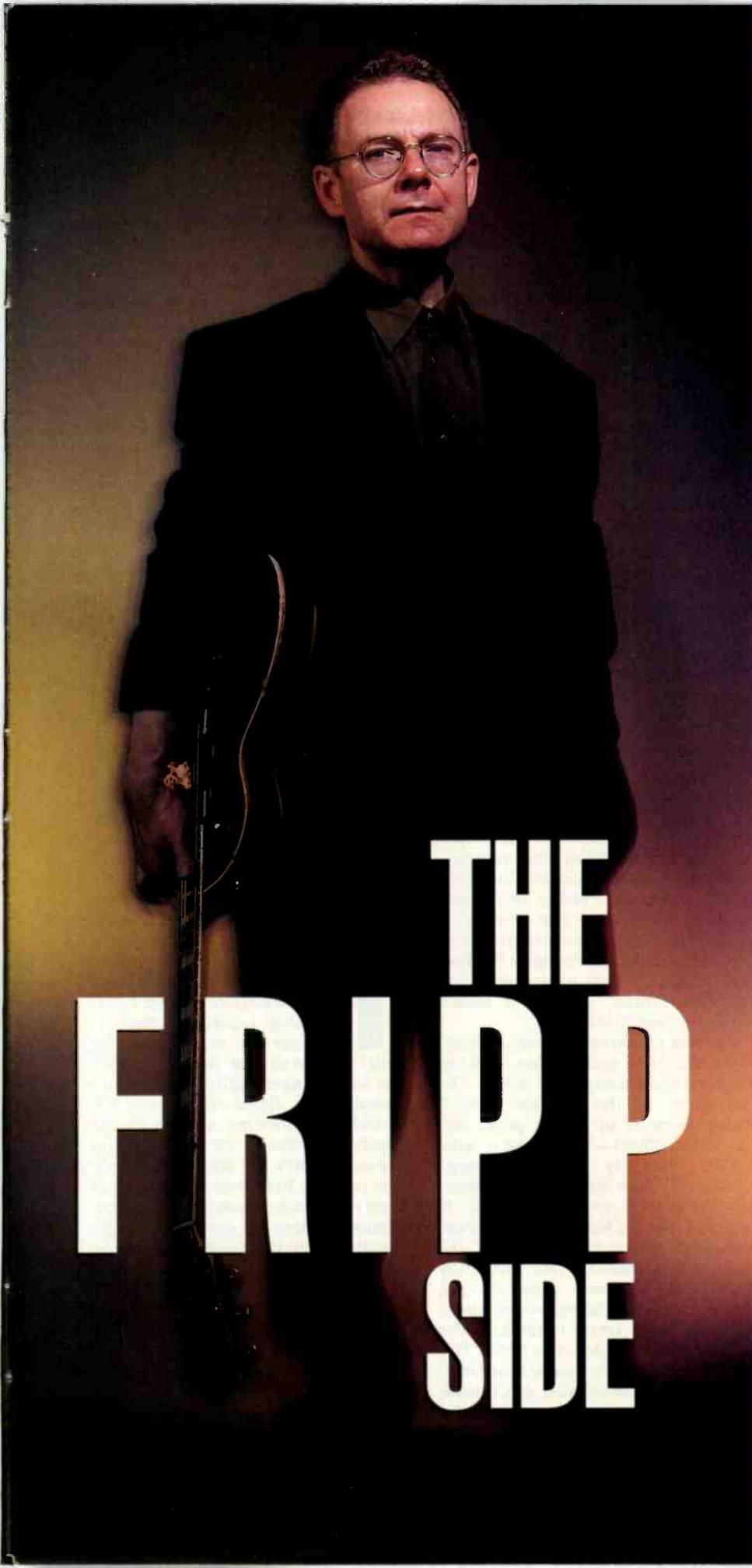
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THE FRIPP SIDE



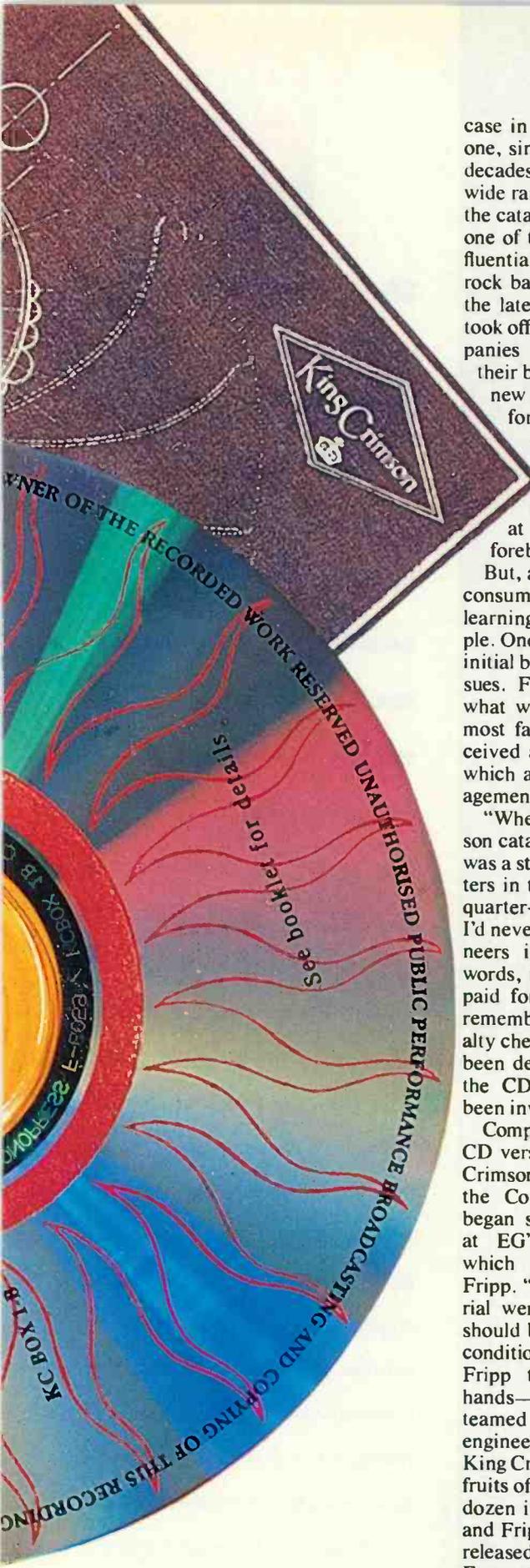
The guitar luminary and King Crimson kingpin Robert Fripp didn't like what he heard on the CD reissues of his back catalog. So he took matters—and masters—into his own hands.



by Glenn Kenny

“None of the mechanics of reproducing music interest me at all,” Robert Fripp admits midway through a conversation on that very subject. “What interests me are the rare moments when music leans over and takes you into its confidence.” But the composer/guitarist’s altogether reasonable belief that such moments as have been documented on vinyl should make the transition to a new music-storage medium intact has forced him to take an active interest in those mechanics.

For Fripp, a particularly pressing



case in point—although not the only one, since his work over the past two decades and more has generated a wide range of reissued recordings—is the catalog of his band King Crimson, one of the most controversial and influential of the so-called progressive rock bands that began popping up in the late 1960's. As the compact disc took off in the mid-1980's, record companies began reissuing items from their back catalogs on CD. Since the new format boasted "perfect sound forever," and since it could replicate highs and lows that were effectively unreproducible on vinyl, many assumed that CD reissues would sound at least as good as their vinyl forebears, if not better.

But, as a legion of professionals and consumers have learned, and are still learning, it's not necessarily that simple. One early example of that was the initial batch of King Crimson CD reissues. Fripp was not even aware of what was happening to some of his most famous recordings until he received a royalty statement from EG, which at the time was both his management firm and his record company.

"When EG first released the Crimson catalog on CD," Fripp recalls, "it was a straight transfer from copy masters in the 15-ips [inches per second] quarter-inch format done by people I'd never met, probably assistant engineers in various studios. In other words, it was done badly. The [band] paid for the cost of that transfer. I remember quite well receiving my royalty check and discovering £5,000 had been deducted from my royalties for the CD transfer, although I hadn't been involved in it at all."

Complaints about the noisy, muddy CD versions of such albums as King Crimson's legendary 1969 debut, "In the Court of the Crimson King," began showing up in the press and at EG's offices—"sentiments with which I heartily concurred," says Fripp. "My view was . . . if that material were to be available on CD, it should be in the best format and best condition reasonably available." So Fripp took matters into his own hands—at his own expense—and teamed up with the renowned audio engineer Tony Arnold to remaster the King Crimson catalog once again. The fruits of their efforts can be heard on a dozen individual reissues of Crimson and Fripp albums and on the recently released four-disc box set "Frame by Frame: The Essential King Crimson."

It wasn't easy. In most cases, par-

ticularly with the earliest King Crimson recordings, the original master tapes—that is, the tapes used to create the first vinyl version—were unavailable. Fripp and Arnold had only "copy masters" to work with, second- or third-generation masters supplied to companies releasing the record outside of its country of origin.

"When 'Court' was cut in America from the quarter-inch copy master, there was a fault in the right channel. What we did to balance it at that time was to add 10k [10,000 Hz] and let the right side break up . . . And when we remastered it in 1989, instead of using a fixed-band EQ we used dynamic equalization with an Aphex. The currently available remastered 'Court' has things on it you can't hear even on the original vinyl. But the master [we had to use] was flawed, probably because the original two-track machine at Wessex Studio in 1969 that made it had either a worn or damaged head on the right channel, or else there was dirt on the head which wasn't recognized at the time. The original master—I have no idea where it is. I'm only working from the best copy masters I can get. The eight-track of *21st Century Schizoid Man* was stolen from the Wessex tape stock, which in those days was a cupboard that anyone could go into and lift a tape out of. You see, [pop] recording in 1969 was by and large not a professional concern."

THE difficulties Fripp describes are not unusual ones. What is shocking is the music industry's apparent tendency to overlook such difficulties when preparing back-catalog recordings for CD reissue. A recent *Billboard* article reported that Roger Nichols, the ace engineer behind Steely Dan's sound, made digital transfers of the already deteriorating masters of the Steely Dan albums for MCA's use in the early 1980's, but MCA ran off only one pressing from those transfers and then reverted to second- or third-generation masters for subsequent runs. Another calamity revealed was the use of equalized masters for CD transfers. Such masters are intended solely for use on vinyl, with equalization on cuts near the end of a side to compensate for potential groove-tracing problems. Under the microscope of digital recording and CD playback, such equalization can sound gruesome.

Fripp is familiar with all these horror stories—he's been embroiled with his former label and management firm

PHOTOS OF "FRAME BY FRAME" SET BY DAVE KELLY; PHOTO OF ROBERT FRIPP COURTESY EG RECORDS



“What it comes down to is this: I’ve got to be eternally vigilant about my catalog.”



over CD transfers and much, much more for a good number of years (he does seem to enjoy friendly relations with Virgin, which now owns EG’s record catalog). Still, after detailing a litany of fairly outrageous music-industry abuses, he says, “I’m not cynical about it. What it comes down to is this: In a democratic society the price of freedom is eternal vigilance. I’ve got to be eternally vigilant about my catalog.”

Although Fripp is far happier with his own King Crimson reissues than with the initial batch, he insists that, given more time and money, he could do even better. Fripp and Arnold are continually looking at both analog and digital equipment that will enable them to improve their efforts.

“Since we did those remasters, technology has moved on again. I’m about to go into the studio with Tony Arnold again to experiment with the very latest technology in noise reduction. This system is being pioneered by a man who worked for the English Ministry of Defense, in radar. And what he’s done is use that technology to hunt hiss. Arnold himself is now off to check the latest on-the-market noise-reduction system—£1,000 a day to hire. His test for such systems is to put through them this old tape he has of a drummer using brushes. And if the noise reduction removes the brushes along with the hiss, the noise reduction is not effective. So we may be able to move the format along a little further for future releases.”

Not that Fripp is completely pleased with the CD format to begin with. In the vinyl vs. CD debate, he falls into the vinyl camp, but only in ideal terms: “I accept that people with real ears probably would prefer vinyl to CD’s. However, if you use vinyl, you’ve got to have virgin vinyl, you’ve got to have a superb pressing plant, you’ve got to have superb metal work. And you’re not going to get it.”

All this might suggest that Robert Fripp is living in the past, but that’s far from the truth. He recently completed a mini tour of Japan with musicians David Sylvian and Trey Gunn and performed in a Guitar Masters series at New York City’s World Financial Center, both solo and with students from his own Guitar Craft school. And for this year’s end he’s planning the next incarnation of, yes, King Crimson. “The players are in place,” he says, smiling a Cheshire Cat smile that means, no, I’m not going to tell you their names and, yes, it will be worth the wait to find out. □

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Stereo Review's critics choose the



outstanding current releases

Michelle Shocked's Heroes and Homemade Jam

NO matter what you think of Michelle Shocked's artistry and vocal personality—punk-rock/folk-country genderbender with in-your-face politics—you can't say she's predictable. Who expected the exhilarating "Short, Sharp, Shocked" after the rawness of "The Texas Campfire Tapes"? And who, except the most skilled periscope operator, could have possibly seen the arch but seductive "Captain Swing" on the horizon?

Now, three years later, Shocked is back with what she calls the final installment in a trilogy begun by "Short, Sharp, Shocked." Her idea was to do an album for each of her musical influences. If "Short . . ." reflected her fondness for such Texas songwriters as Guy Clark, and "Captain Swing" displayed her blues/swing bent, the new record, "Arkansas Traveler," captures the "homemade jam" years Shocked spent growing up playing mandolin and guitar with her father and brother. Mostly a country and rural-blues record, "Arkansas Traveler" is still not like anything you might expect. And that, of course, makes it a typical Michelle Shocked album.

Recorded on a mobile unit in as many places as there are songs, the album is built around fiddle tunes Shocked adapted for her mandolin and augmented with offbeat tale-spinner's words. She took to the road to record them in loose, extremely informal performances with her heroes and respected contemporaries—Doc Watson, Clarence "Gatemouth" Brown, the Red Clay Ramblers, Levon Helm and Garth Hudson, Pops Staples, Alison Krauss, Taj Mahal, and others.

The album opens with two pieces that stand on their own but offer no warning of the kind of fragmented, rough-hewn jamming that is to follow. *33 RPM Soul*, recorded in Chicago with Pops Staples on guitar and vocal, mates a grungy r-&-b groove with a litany of lyric references to a captain's widow who cavorts with pretty boys,

the importance of consecrating your soul, and "the hellfire brimstone blues." The Don Was-produced *Come a Long Way*, a folky travelogue of L.A. as seen from the back of a repossessed motorbike, enhances Shocked's self-mythology as she reports on everything from sighting nude gay boys in the window to making the scene "like the one that took little Jimmy Dean."

After that, Shocked-the-boho-sophisticate gets as down-home as they come. Not all of this material works as well as it should, and most of it takes a lot of getting in the mood. But when it cooks, as it does in *Secret to a Long Life*, *Strawberry Jam*, and *Prodigal Daughter* (*Cotton Eyed Joe*), it seeps under the skin and floods the brain.

Shocked has been accused by some of putting music second to image, but if she's more interested in being outra-

geous than performing a song, she doesn't show it here. Instead, she takes a back seat to most of the guest performers and gives her label the next to most uncommercial record of her career. That may be part of her eccentric unpredictability, but it also speaks of a woman who has more real music in her heart than anything else.

Alanna Nash

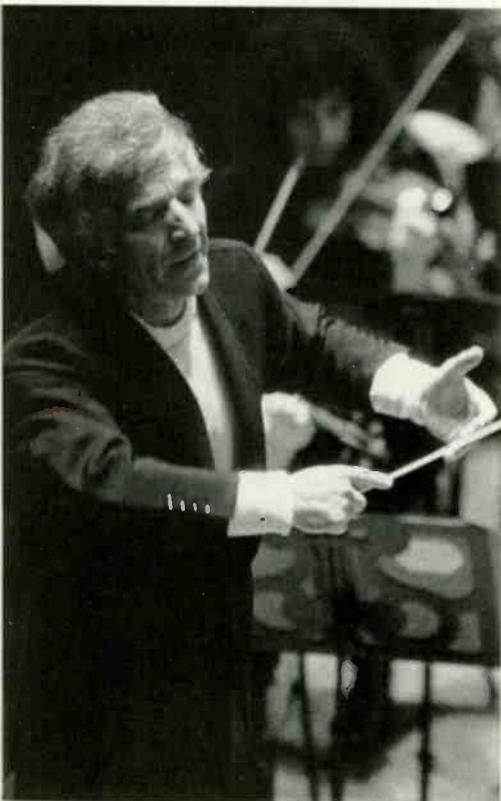
MICHELLE SHOCKED: *Arkansas Traveler*. Michelle Shocked (vocals, guitar, mandolin, giggles); other musicians. *33 RPM Soul*; *Come a Long Way*; *Secret to a Long Life*; *Contest Coming* (*Cripple Creek*); *Over the Waterfall*; *Shaking Hands* (*Soldier's Joy*); *Jump Jim Crow*; *Hold Me Back* (*Frankie & Johnny*); *Strawberry Jam*; *Prodigal Daughter* (*Cotton Eyed Joe*); *Blackberry Blossom*; *Weaving Way*; *Arkansas Traveler*; *Woody's Rag*. MERCURY © 314 512 101-2 (59 min), © 314 512 101-4.



Shocked: eccentric, unpredictable, and heartfelt



Ashkenazy's Knockout Shostakovich



ONE of the several conductors engaged in recording the complete cycle of Shostakovich symphonies is Vladimir Ashkenazy, who is making his way through them with the Royal Philharmonic for London. While the earlier installments in his series—Nos. 1, 4, 5, and 6—may have been less than compelling, his new recording of No. 10 has the strongest all-round appeal of any version available now.

The Tenth, probably the greatest of Shostakovich's fifteen symphonies, has been recorded a lot lately. What Ashkenazy has achieved, though, is one of those realizations so fulfilling in their own right as to render comparisons fairly pointless. He has the RPO playing on a level it has not reached in years, playing not only with brilliance to burn but with evident commitment to match Ashkenazy's own. There are no encumbering gestures. The music comes at us with irresistible force, in the lyric passages as well as the ferocious ones, and London has surpassed itself with the overall realism and power of its sonic frame.

And there is more. While most re-

cordings of the Tenth either take up a whole CD or have an innocuous little overture or ballet suite as filler, this one comes with the composer-authorized Rudolf Barshai transcription of Shostakovich's String Quartet No. 8 as the Chamber Symphony, Op. 110a. Barshai himself made a fine recording of this piece not long ago with the Chamber Orchestra of Europe, but I think Ashkenazy's is even more persuasive. It is more consistently true to the spirit of the original, its impact again unimpeded by any gratuitous interpretive overlay. It is, in any event, an apt companion piece for the Tenth Symphony because of the prominence of the "D.Sch." motto that marks both works as being among the composer's most personal utterances. Both would seem to have great personal significance to Ashkenazy as well, for he has given us nothing finer in his many recordings as a conductor.

Richard Freed

SHOSTAKOVICH: *Symphony No. 10, Op. 93; Chamber Symphony, Op. 110a.* Royal Philharmonic Orchestra, Vladimir Ashkenazy cond. LONDON © 433 028-2 (75 min).

PHOTO: JACK VAN ANTWERP/CLEVELAND ORCHESTRA

Garland Jeffreys: State of the Union?

GARLAND JEFFREYS has written only eight studio albums in twenty years, but while he might not be prolific, he more than makes up for it in quality. His newest album, "Don't Call Me Buckwheat," is a career high-water mark, and how many other fortysomething rockers can make such a claim?

The somewhat startling theme of the album is race relations—startling because the issues are treated not with rage (*à la* Public Enemy) but with an honesty, passion, and basis in fact that are even more focused and forceful. The autobiographical quality of many of the thirteen songs here reflects Jeffreys's mixed lineage: black, white, and Puerto Rican. He grew up in New

York City and is a one-man melting pot with an authoritative perspective on the thorny matter of prejudice. If this were simply an album of lyrics that connect with the force of a roundhouse right ("Don't call me nig, nig, nig, nig," for instance, from the title track), it would stand as a potent piece of literature. But the words are welded to music that's equally strong, from rock-steady reggae grooves to polished urban r-&-b balladry to sweet street-corner *a cappella*, and that makes "Don't Call Me Buckwheat" a recording that deserves to be heard, pondered, and even *taught*.

The opener is a breathtaking harmony number, *Moonshine in the Cornfield*, which dissolves with the force of





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a whipcrack into the blunt black and white of the ska-tinged *Welcome to the World*. Though the music is minor-keyed in songs like *Welcome* and *Lonelyville*, the beat is indomitable, and the spirit is never defeated. Jeffreys's songs possess a cinematic sweep as verses segue from incidents on a modern-day city street to recollections drawn from childhood to a date-studded recounting of black history. *Color Line* salutes those pioneering black athletes who took the risk of competing in a whites-only world, and *Hail Hail Rock 'n' Roll* traces the roots of rock in rhythm-and-blues. Along the way, Jeffreys unburdens himself of a personal confession in the sly, in-

sinuating *I Was Afraid of Malcolm*, which is set to riffy, big-beat music reminiscent of Gary Glitter's *Rock and Roll, Pt. 2*.

The real point of this album is that while racism can be considered and decried in broad terms, it is the fear and loss of self-esteem on an individual, day-to-day level—hostile stares in a store, watching an on-duty cab pass by your outstretched hand, living scared of being gunned down in the ghetto's unending bloodbath—that is the real tragedy of racial inequality, no less in the 1990's than in the 1950's or even the 1850's. It just won't go away, but neither does the search for an answer. Garland Jeffreys has come up

with one worth remembering in a song called *The Answer*: "Ain't no preacher gonna teach us 'bout the meaning of love / It's up to you and me to give what we got plenty of / Give it up and kick it out / Lift yourself up just like a dancer . . . / Lift yourself up and you'll find the answer."

Parke Puterbaugh

GARLAND JEFFREYS: *Don't Call Me Buckwheat*. Garland Jeffreys (vocals); other musicians. *Moonshine in the Cornfield*; *Welcome to the World*; *Don't Call Me Buckwheat*; *Color Line*; *Murder Jubilee*; *I'm Not a Know It All*; and seven others. RCA © 07863 61112-2 (52 min), © 07863 61112-4.

Global Rachmaninoff

THE combination of a relatively little-known Japanese conductor and a Welsh orchestra playing the Rachmaninoff Second Symphony uncut, in all its gorgeous sprawling length, would seem unlikely to yield an outstanding recording. But the new Nimbus CD with Tadaaki Otaka leading the BBC Welsh Symphony is just that.

Otaka is in his middle forties and has been in charge of the Welsh orchestra since 1987. His recording of the Rachmaninoff Second shows not only that he has welded his Welsh players into an absolutely first-rate ensemble but also that he is an interpreter of the late-Romantic repertory who will bear watching in years to come.

I was impressed from the very opening pages of the symphony by Otaka's phrasing, which is flexible yet stays completely within the bounds set by the music's basic pulse. He builds slowly and organically to his climaxes, and he takes great care both with the proportions of his dynamic scheme and with the music's essential structure. I felt at the end of the long opening movement that the progression had been an inevitable one. The scherzo is paced with care, with the balances between brass and strings expertly managed. The coda is as spookily menacing as I have ever heard it. The slow movement with its long opening clarinet solo, faultlessly executed here, is a challenge to a conductor in terms of sustaining the



Conductor Tadaaki Otaka

line and timing the arrival of its huge climax—actually the high point of the whole work. It takes some real doing to make the final movement sound all of a piece, but Otaka and his players pull it off.

The 6-minute *Vocalise* may seem something of an anticlimax after the symphony, but it is a pleasure to hear it done with such tenderness and delicacy, and not a trace of sentimental swooning. In both works Nimbus has done a simply superb job of recording at Swansea's Brangwyn Hall. There is a sense of space and warmth from start

to finish and first-rate lateral and depth imaging.

There have been a number of exceptionally distinguished recordings of the Rachmaninoff Second Symphony, notably those of Ashkenazy, Rozhdestvensky, and Temirkanov. This one by Otaka and his Welsh orchestra belongs in that august company.

David Hall

RACHMANINOFF: *Symphony No. 2, Op. 27; Vocalise, Op. 34, No. 14*. BBC Welsh Symphony Orchestra, Tadaaki Otaka cond. NIMBUS © NI 5322 (66 min).

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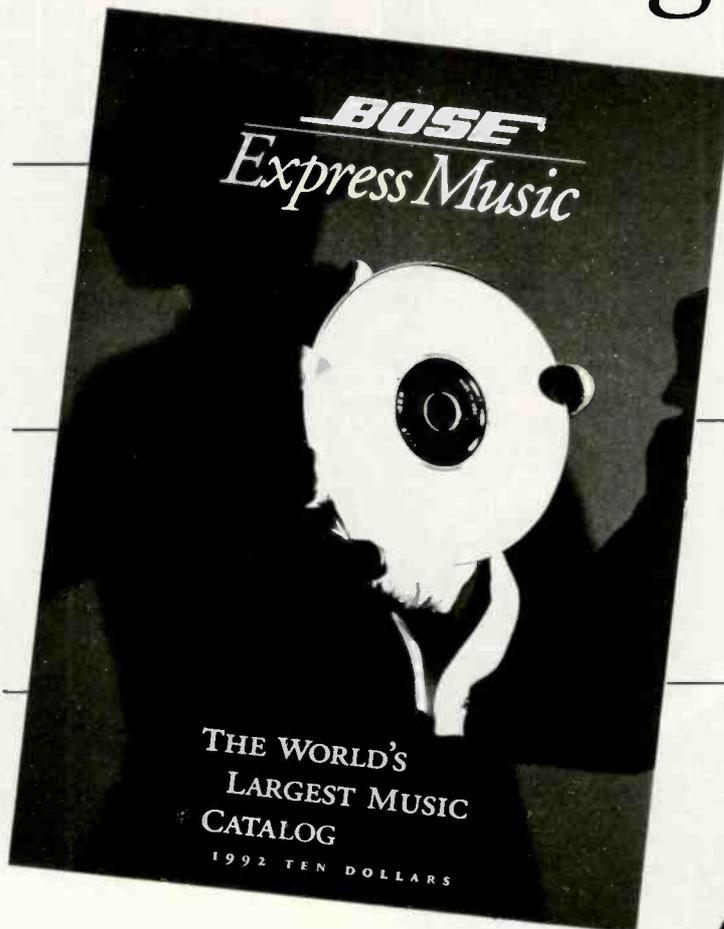
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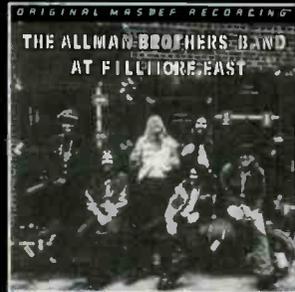
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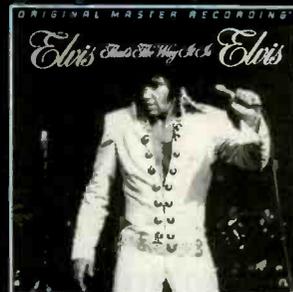
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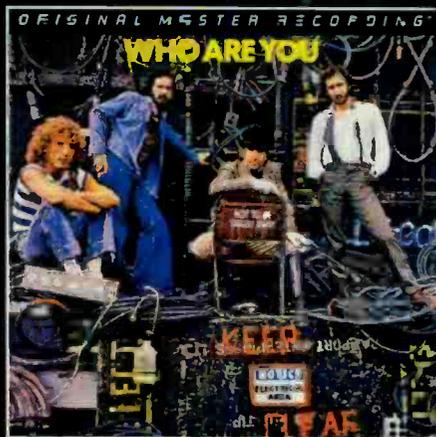


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Discs and tapes

reviewed by Chris Albertson,
Phyl Garland, Ron Givens,
Roy Hemming, Alanna Nash, Parke
Puterbaugh, and Steve Simels

TORI AMOS: *Little Earthquakes*. Tori Amos (vocals, piano); other musicians. *Crucify; Girl; Silent All These Years; Precious Things; Winter; Happy Phantom*; and six others. ATLANTIC © 82358-2 (57 min), © 82358-4.

Performance: *Strong stuff*
Recording: *Good*

Let's hear it for the confessional singer, the heart that cannot help but pour out its innermost feelings, the soul that cannot help but cast out its deepest secrets. Since rock-and-roll stormed the pop-music fort, there have been singers liberated enough to treat each listener as best friend, clergyman, therapist. That's certainly the attitude behind "Little Earthquakes," the debut album by Tori Amos. Amos tells us the awful, the painful, the exhilarating stories of her life—and they hit us like body blows.

As with any pop singer who wears her life on her sleeve, the resemblances to Joni Mitchell are obvious, both in the way Amos rumbles through a song on piano and in the way she pushes her voice and her lyrics to extremes. You almost want to tell her to relax a little bit. And yet if she weren't willing to relive the cruelty of adolescent sex in *Precious Things*, we wouldn't have its nasty, purple, acidic lyrics. And if she weren't bold enough to tell us about a one-nighter gone wrong in *Leather*, we wouldn't have such sardonically vulnerable lines as, "I could just pretend that you love me/The night would lose all sense of fear/But why do I need you to love me/When you can't hold what I hold dear."

Of course, Amos sometimes goes too far—"Little Earthquakes" wouldn't be so good if she didn't. But she almost always redeems her excesses with her voice, which can move from a whisper to a howl to sigh. The music behind her is carefully calculated to put the capital "R" back in Romantic: lurid strings, depth-charge backbeats, layers of her own overdubbed back-up vocals. Obviously not an album for the squeamish,

"Little Earthquakes" is convincing proof that sometimes more is more. R.G.

BAHIA BLACK: *Ritual Beating System*. Bahia Black (vocals and instrumentals). *Retrato Calado; Capitão do Asfalto; The Seven Powers; Uma Viagem del Baldes de Larry Wright; Follow Me*; and four others. AXIOM © 314-510 856-2 (42 min), © 314-510 856-4.

Performance: *Multicultural*
Recording: *Good*

It's not important whether you bang the drum slowly or bang the drum quickly as long as you bang the drum right. Bahia Black is the name of an ad hoc group of musicians from Brazil and the U.S., including the singer-guitarist Carlinhos Brown, the percussion group Olodum (which played in Paul Simon's *The Obvious Child*), and the jazz players Wayne Shorter and Herbie Hancock. They come together in various combinations for an amazing musical mix, most spectacularly in *The Seven Powers*, where the chugging, marching-band polyrhythms of Olodum act as a percolating counterpoint for the swirling post-bop filagrees of Shorter and Hancock. Far simpler, but just as impressive, is *Uma Viagem del Baldes de Larry Wright*, which features the dazzling plastic-bucket firestorm of Larry Wright, a street musician whose quick-handed efforts on homemade instruments are slightly augmented by rolls on tiny Brazilian drums. If you live for the beat, this album is a must. R.G.

TEVIN CAMPBELL. Tevin Campbell (vocals); other musicians. *Round and Round (soul-mix edit); Interlude/Over the Rainbow and On to the Sun; Tell Me What You Want Me to Do; Lil' Brother; Strawberry Letter*; and eight others. QWEST/WARNER BROS. © 26291-2 (50 min), © 26291-4.

Performance: *Wow!*
Recording: *Fine*

This is one of the best debut vocal albums I have heard in many, many years, and that's without taking into consideration that Tevin Campbell is only fourteen years old. Far more than just a cute kid who has learned how to go through the paces technically, he sings with an authority of attack, certainty of tone, and maturity of interpretation that immediately command respect. There is a passion in his work that marks the true artist.

In spite of his youth, Campbell is not exactly a newcomer, but this solo album demonstrates musical growth beyond his previous work on records by Quincy Jones and Prince. Even the texture and pitch of his voice have developed, causing him at times to sound a bit like the

young Stevie Wonder. He's had production assistance from Jones, Narada Michael Walden, and Al B. Sure!, along with some good songs, but all that would amount to nothing if he could not put over the material. While the emphasis is on highly melodic, tastefully fashioned songs bound to appeal to a large audience, Campbell reflects his generation by indulging in a little light rapping. His age becomes the focus in the humorous *Lil' Brother*, he moves comfortably through the strutting rhythms of *She's All That* and Shuggie Otis's *Strawberry Letter 23*, and he is fully up to the lovely



Amos: Romantic with a capital "R"

lyrical quality of the ballads *Alone with You, Just Ask Me To*, and *Confused*. His searing performance in *Tell Me What You Want Me to Do*, where he revises the melody and reaches up into the stratosphere for tingly vocal effects, suggests his full potential. Here's one prodigy who is well on his way to a brilliant future. P.G.

MELISSA ETHERIDGE: *Never Enough*. Melissa Etheridge (vocals, guitars, piano); Kevin McCormick (bass, background vocals); Stuart Smith (guitar); other musicians. *Ain't it Heavy; 2001; Dance Without Sleeping; Place Your*

PHOTO: ATLANTIC RECORDS

Explanation of Symbols

- Ⓢ = Compact disc
- Ⓒ = Tape cassette

Hand; Must Be Crazy for Me; Meet Me in the Back; and four others. ISLAND © 314-512 120-2 (46 min), © 314-512 120-4.

Performance: *Heart attack*
Recording: *Very good*

Two and a half years after "Brave and Crazy," her second album, Melissa Etheridge will surprise those who know her mainly as a high-octane rocker. In her new album, "Never Enough," the hot and sexy libidinal teases are easy enough to find. But Etheridge proves equally adept at cerebral dance music, especially in *2001*, which vaguely addresses the ominous threats to the planet. And she positively shines in her ballads about loneliness, emptiness, and desperation, hitting her stride in *The Letting Go*, a mature and finely wrought song about recovering from the pain of romantic separation. Etheridge stumbles at times in her attempts to branch out into other styles. *Place Your Hand*,



Etheridge: hitting her stride

for example, a song about being beset by demons and hoping for sexual healing, gets lost in an arty British folk-rock bridge. But overall this is an impressive, fully rounded album, one that sacrifices no emotional intensity or cut-to-the-bone playing in helping Etheridge show the full range of her writing and performing skills. A stunner. A.N.

JOHN FAHEY: *Old Girlfriends and Other Horrible Memories*. John Fahey (guitar); Terry Robb (guitar); Melody Fahey (ukulele). *Twilight Time; The Sea of Love; A Rose and a Baby Ruth*; and nine others. VARRICK © VR 031 (43 min).

Performance: *Typically personal*
Recording: *Good*

John Fahey has been making solo albums of steel-string guitar music since

1958, setting a standard for an entire generation of younger guitarists including Leo Kottke (whom he discovered) and Michael Hedges. Weaving strands of blues, folk, classical, and ethnic music with a folk-bluegrass fingerpicking style, Fahey can be spellbinding, but he can also be lethargic. In "Old Girlfriends and Other Horrible Memories," a title that's snappier than any of the tunes, he slips into a sentimental mood. That's not necessarily good. Covers of *The Sea of Love*, *Blueberry Hill*, and *Don't* (which Leiber and Stoller wrote for Elvis Presley) evoke the Fifties, all right, but the decade's worst qualities: tameness, conservatism, and reliance on nostalgia instead of passionate expression.

Of the original pieces, the 4-minute *In Darkest Night: The Objectification and Recurrent Sightings of Bizarre and Catecheted Screen Memories (from Below)* Along the *Sligo* sounds like the noise a six-year-old would make if he picked up a guitar, the nearly 8-minute *Dianne Kelly* works a very earthy Mississippi Delta blues vein before changing into baroque folk, and *Fear & Loathing at 4th & Butternut*, which utilizes an uncredited instrument I can't identify—imagine a harmonica with the drone of a bagpipe—is pleasantly ominous. Buyer, be interested, but beware. A.N.

FALLING FROM GRACE. Original motion-picture soundtrack. Lisa Germano: *Bud's Theme*. Nanci Griffith: *Cradle of the Interstate*. Larry Crane: *Whiskey Burnin'*. Dwight Yoakam: *Common Day Man*. John Mellencamp: *It Don't Scare Me None*. And eight others. MERCURY © 314 512 004-2 (50 min), © 314 512 004-4.

Performance: *Rootsy*
Recording: *Good*

Larry McMurtry wrote the script, John Mellencamp directed and starred, and Mellencamp and friends produced the nifty soundtrack for *Falling from Grace*. The film's musical souvenir is a collection of songs cohering around the shared sensibilities of the artists involved, including Mellencamp, Dwight Yoakam, John Prine, Nanci Griffith, Janis Ian, and Mellencamp's former guitarist, Larry Crane. Some of the strongest songwriting comes from Crane, such as the two songs Mellencamp performs: the churchy *Nothing's for Free* and a twangy survivor's tune called *It Don't Scare Me None* that contains the album's best lines. "I wrestle with my conscience/But my conscience never wins." Crane sings his own *Whiskey Burnin'*, a lament for hard times in a small town that's changing too fast. Mellencamp, for his part, casts original songs in the direction of Yoakam (the righteous, countrified *Common Day Man*) and the Buzzin' Cousins, a folk-rock-country group with Prine, Joe Ely, James McMurtry, Yoakam, and Mellencamp (*Sweet Suzanne*). Add in the sweetest love song in a blue moon, *Hold Me Like You Used to Do*, performed by QKYUMBRZ, and ster-

ling contributions by Griffith and Prine, and you've got a real winner that casts Mellencamp and Co. in a ruminative, folksy light. P.P.

GEORGE FOX: *Spice of Life*. George Fox (vocals); the Enjoyers (instrumentals); other musicians. *There Goes My Love; Fell in Love and I Can't Get Out; Only the Best; I Know Where You Go; Wastin' Time*; and five others. WARNER BROS. © 26566-2 (31 min), © 26566-4.

Performance: *Easygoing*
Recording: *Good*

George Fox, a Canadian with a country itch, does his best to scratch it in "Spice of Life," his second American album. All in all, he does a decent job. Fox has good song sense—he pays homage to Buck Owens (*There Goes My Love*), favors traditional pedal-steel guitar lacing (*It Don't Really Matter Why*), handles modern bluesy material well (*Wastin' Time*), and co-writes with Rory Michael Burke, Charlie Black, and Bob DiPiero. He also has an earnest if not remarkable tenor, which means he's usually just as good as his material.

Fox makes his strongest mark here with Roger Ferris's *I Know Where You Go*, a snaky, Gordon Lightfootish tune that takes place in the mind of a man who's waited up all night and half the morning for his little cheater to return. A guy can go half bonkers in a situation like that, and Fox's reading is insinuating enough to race the imagination. Danger becomes him more than nice-guyism ever could. A.N.

A HARD TIME TO BE SINGLE (Brian Gari). Larry Victor, Janet Kirker, Angela Warren, Michael McAssey (vocals); Brian Gari (piano); Jeff Olmsted (various instruments). ORIGINAL CAST © OC913 (54 min), © OCT913.

Performance: *Persuasive*
Recording: *Good*

Even harder than being single is for a talented young composer to get an original musical show into a Broadway theater these days—especially one that doesn't duck the changing nature of personal relationships in the age of AIDS. That's why Brian Gari's clever, sharply perceptive, and musically attractive *A Hard Time to Be Single* had to settle recently for extended engagements in a pseudo-revue format in several different New York City cabaret rooms. Happily, the four original singers were able to get into a recording studio before the end of one run to make this album, and other cabaret performers have quickly picked up some of the best songs for their acts.

Despite the understandably limited and essentially soft-rock arrangements, Gari shows a fresher and stronger melodic flair than do the composers of several recent shows that have made Broadway. And his lyrics neatly mix the urbanely comic and the seriously insightful, sometimes in the same song. The

young performers make a good case for most of the songs, although both of the women's voices sometimes come across more stridently in the recording than they did when I heard them live. *R.H.*

HIGHWAY 101: *Bing, Bang, Boom.* Highway 101 (vocals and instrumentals); other musicians. *Bing Bang Boom; Whenever You Are; The Blame; Storm of Love; Restless Kind;* and six others. WARNER BROS. © 26588-2 (35 min), © 26588-4.

Performance: *Refreshing*
Recording: *Very good*

When Paulette Carlson left Highway 101 to go solo, naysayers insisted that Carlson was Highway 101 and that without her lead vocals and songwriting input the band would flounder. Wrong. New vocalist Nikki Nelson brings loads of strengths to the job, namely a true country-sounding soprano and a feisty and heartfelt delivery. Without Carlson's songs—many of which actually sounded somewhat like parodies of country tunes—the band has a new vitality. The overall sound now straddles the fence between modern (*Bing Bang Boom*) and traditional country (*The Blame*), largely through the songwriting efforts of Michael Henderson and band members Cactus Moser and Curtis Stone. Hender-

son's *Restless Kind* contains a great line, "People sure get nervous when a girl is free," and Nelson knows just how to put it across. She also puts across a remake of Tammy Wynette's *Till I Get It Right*. Look for Highway 101 to solidify into a far more credible quartet than Carlson ever dreamed. *A.N.*

THE HOLMES BROTHERS: *Where It's At.* The Holmes Brothers Band (vocals and instrumentals); other musicians. *That's Where It's At; The Love You Save; You Can't Hold On to a Love That's Gone; I've Been a Loser; High Heel Sneakers;* and six others. ROUNDER © CD 2111 (48 min), © C 2111.

Performance: *Ouch!*
Recording: *Satisfactory*

After years of obscurity, the Holmes Brothers began attracting public recognition in 1989 with the release of their first album, "In the Spirit." This new album ranges from blues staples (Big Maceo's *Worried Life Blues*) to r-&-b classics (*Drown in My Own Tears*) to authentic country (Hank Williams's *I Saw the Light*). Highlighting the set are the full-bodied and inspired instrumentals by Wendell Holmes on guitar, Sherman Holmes on bass, Popsy Dixon on drums, Gib Wharton on pedal-steel gui-

tar, the Hell's Kitchen Horns, and Jon Cleary's convincing keyboards.

The album would be thoroughly delightful, in fact, except for the utterly awful, ear-wrenching voice of Wendell Holmes, who sings lead in all but one selection. I know that blues singers aren't supposed to sound like helden-tensors, and a healthy portion of grittiness makes their vocals earthier, but there are limits. Holmes sounds like he's choking on a fish bone the whole time. I've heard more melodious snores. Until they release a karaoke version, listen at your own risk. *P.G.*

GARLAND JEFFREYS: *Don't Call Me Buckwheat* (see Best of the Month, page 80)

PATTY LOVELESS: *Up Against My Heart.* Patty Loveless (vocals); vocal and instrumental accompaniment. *Jealous Bone; Nobody Loves You Like I Do; I Already Miss You (Like You're Already Gone); Hurt Me Bad (In a Real Good Way);* and six others. MCA © MCAD-10336 (32 min), © MCAC-10336.

Performance: *Rich*
Recording: *Very good*

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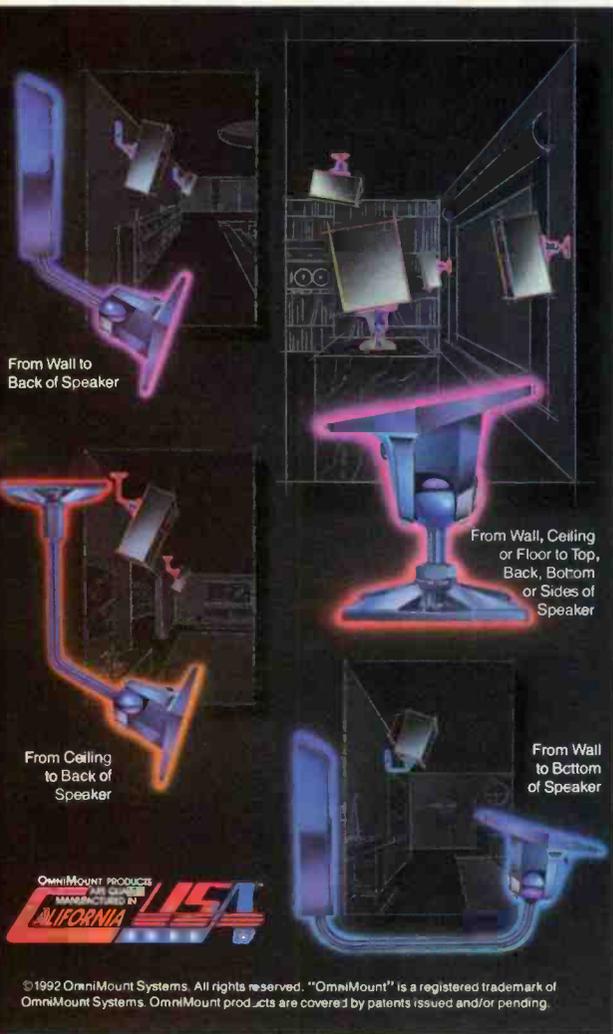
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and she's done it by being true to herself. "Up Against My Heart," her fifth album, is a prime example. Clearly, she loves smack-dab-in-the-middle country. You can hear that loyalty in every throb of *Can't Stop Myself from Loving You*, a reasonable facsimile of Patsy Cline's classic work. But Loveless also has neotraditional instincts, which come out in the blend of amplified guitars with mandolins and dobros. She sounds thoroughly modern yet convincingly retro in *I Already Miss You (Like You're Already Gone)*, where her voice has a smoky-hollow sadness, and *I Came Straight to You*, with its hit-kicking fiddle. Sometimes she sounds simply like a woman in love with a tune, no matter what style you call it. *Jealous Bone*, for example, sounds more rocky and bluesy than anything else, and she sings it with a hard, unyielding edge.

Fortunately for us, Loveless has a thing for all ten of the songs in "Up Against My Heart." From the heart-break of *If You Don't Want Me* to the resolute determination of *God Will*, Loveless takes us on a roller-coaster tour of love. The trip gets a little bumpy at times, but it's always a thrill. R.G.

archival performances from the Fifties (the era when the mambo ruled). But then you'd miss the point of *The Mambo Kings*, which is to introduce this music to a new audience by adding a few contemporary wrinkles as points of entry for the uninitiated. A wild and joyous romp it is, too. Mambos, with their syncopated 4/4 tunes performed by an army of horn players (with trumpets screeching over the top) and percussionists (congas, bongos, timbales), are always a feast of rhythm and romance.

The bandleader Tito Puente and his twenty-one-piece orchestra shine in the bold, brassy *Ran Kan Kan* and steal the show in *Para Los Rumberos*, which to rock-trained ears will sound like Santana with horns. The vocal numbers range from Celia Cruz's fiery, accented take on three songs, including the familiar *Guantanamera*, to Antonio Banderas's poised, suave delivery in *Beautiful Maria of My Soul*. The mambo is all about feeling good, and its revival is a timely and welcome antidote to the recessionary blues. P.P.

MY BLOODY VALENTINE: *Loveless*. My Bloody Valentine (vocals and instru-

swarm of electronic bees circling your head—but to me this stuff more often seems like nasty canned music. R.G.

YOUSOU N'DOUR: *Eyes Open*. Youssou N'Dour (vocals); other musicians. *New Africa; Am Am; Marie-Madeleine la Saint-Louisienne; Live Television; No More; Hope; Africa Remembers*; and seven others. 40 ACRES & A MULE MUSICWORKS/COLUMBIA © CK 48714 (74 min), © CT 48714.

Performance: *Irresistible*
Recording: *Very good*

You can hear a lot of world music these days, but there are very few *world musicians*. The best, in my opinion, is Youssou N'Dour. Since bursting upon the international scene in the mid-1980's, this Senegalese singer-drummer has broadened his horizons beyond the *mbalax* style of his native Senegal. In the new "Eyes Open," N'Dour continues to pump out a propulsive sound that's dazzling in its rich combination of rhythms and irresistible in its melodic urgency. But his musical vocabulary now includes American jazz, gospel, and pop as well as other exotic colorations from Africa. Listening to all these elements—James Brown horns, stuttering Senegalese bass, impassioned gospel piano, zesty talking drum, fluttering jazz flute, chimy sub-Saharan guitar, fusion keyboards—flowing together can be intoxicating. And that's just the launching pad for N'Dour's incredibly expressive voice, a keening high tenor that packs a lot of emotion and moral force into each heart-breaking melisma.

"Eyes Open" draws out a gentler, more reflective N'Dour than in his earlier albums—he's just as committed to social justice and peace as before, but he's less likely to grab you by the lapels. If it were mandatory listening for everybody on the planet, the world would be a better place, and all of its citizens would have a hell of a good time. R.G.

LEON RUSSELL: *Anything Can Happen*. Leon Russell (vocals, keyboards); Bruce Hornsby (keyboards); other musicians. *Anything Can Happen; Black Halos; No Man's Land; Monkey Business; Angel Ways; Life of the Party*; and four others. VIRGIN © 91821-2 (36 min), © 91821-4.

Performance: *All over the map*
Recording: *Okay*

It's been a decade since Leon Russell made his last record, and we might still be waiting to hear from this talented eccentric again if Bruce Hornsby hadn't interceded. Thanks to Hornsby, we've got "Anything Can Happen," a collection of sardonic-going-on-maudlin songs filled with Russell's squinty-eyed observations on life and love. Also thanks to Hornsby, Russell's pungent lyrics and vinegary vocals are wrapped up in glossy, synthesized arrangements. I'm not saying Hornsby is strictly responsi-



Tito Puente and His Orchestra: scenes from a Mambo

THE MAMBO KINGS. Original motion-picture soundtrack. Celia Cruz: *La Dicha Mia*. Tito Puente: *Ran Kan Kan; Cuban Pete*. Arturo Sandoval: *Mambo Caliente*. Linda Ronstadt: *Quiereme Mucho*. And eleven others. ELEKTRA © 61240-2 (49 min), © 61240-4.

Performance: *Lively*
Recording: *Excellent*

You don't have to be an expert on the mambo to love the music in *The Mambo Kings*. In fact, it might help *not* to be an expert, because if you were you'd probably nit-pick over the presence of Linda Ronstadt and Los Lobos or carp about the pristine digital sound and the lack of

mentals). *Only Shallow; Loomer; Touched; To Here Knows When; When You Sleep; Come In Alone*; and five others. SIRE/WARNER BROS. © 26759-2 (49 min), © 26759-4.

Performance: *Grungy*
Recording: *Appropriately murky*

My Bloody Valentine is the seminal band in the dream-pop genre, which is beginning to invade the States from across the Big Pond. The frequently catchy riffs and melodies, as well as the limpid vocals, come swathed in thick layers of distortion. The combination certainly has its energizing moments—*To Here Knows When* sounds like a

ble for the sound here, nor am I saying the music is bad. But I do miss the whiskey sting of the old Russell, and the piano here more often sounds like the sweet tinkling of Bruce than the rollicking barrelhouse of Leon.

That said, there's some cool stuff in this album. Russell conjures up a Middle Eastern apocalypse in *Black Halos*, cackles bitterly about being ditched in *Life of the Party*, and tells a Bible story in *Jezebel*. If the musical style seems to range a little farther and wider than you'd think humanly possible, well, that's just Leon Russell catching us up with what's been on his mind for a real long time. It's good to hear from our old friend. *R.G.*

MICHELLE SHOCKED: *Arkansas Traveler* (see Best of the Month, page 79)

TOM VERLAINE: *Warm and Cool*. Tom Verlaine (guitar); Patrick A. Derivaz (bass); Billy Ficca (drums); other musicians. *Those Harbor Lights*; *Sleepwalkin'*; *The Deep Dark Clouds*; *Saucer Crash*; *Depot (1951)*; *Boulevard*; *Harley Quinn*; *Sor Juanna*; and six others. RYKODISC © RCD 10216 (52 min), © RCC 10216.

Performance: *Stark*
Recording: *Pristine*

Fans of Tom Verlaine should approach "Warm and Cool" with caution, for it is neither like his previous song-oriented solo albums nor like Television redux. It is, instead, an instrumental album that finds Verlaine exploring new avenues of expression on the guitar, applying a thinking postmodern rocker's minimalism, a jazzman's improvisational skill, and a vintage Fifties guitarist's predilection for reverb and twang. As such, it's an entertaining side trip into uncharted realms: New Age music for New Wave people, and definitely *not* your typical guitar hotshot's solo record.

As weird as Verlaine gets (the nearly 7-minute *Lore*, which builds in waves of pointillistic dissonance), he still offsets the offbeat with fond, discernible nods to the guitar-instrumental craze of the Fifties and Sixties. There are echoes of Duane Eddy's deep, reverberant tunnel of twang, the Ventures' proto-rock workouts, and obscurities like the Viscounts' evocative version of *Harlem Nocturne*. In a few spots Verlaine noodles like a lost spelunker without a light, but when he hinges his improvisations to a bit of structure—as in the spacy, tremolo-filled *Saucer Crash*, the sprightly, jig-like *Boulevard*, and the album's melodic centerpiece, *Harley Quinn*—"Warm and Cool" becomes an engaging trip into realms of pure sound. *P.P.*

WHITE ZOMBIE: *La Sexorcisto: Devil Music Vol. 1*. White Zombie (vocals and instrumentals). *Knuckle Duster (Radio 1-A)*; *Thunder Kiss '65*; *Black Sunshine*; *Soul-Crusher*; *Cosmic Monsters Inc.*; *Spiderbaby (Yeah-Yeah-Yeah)*; and eight



White Zombie: mud-wrestling trough of the mind

others. GEFEN © GEFD-24460 (58 min), © GEFD-24460.

Performance: *Bloodcurdling*
Recording: *Sonic sludge*

If you were to cross the corrosive sound of Metallica with a Grade B monster movie in a mud-wrestling trough of the mind, it would come out something like White Zombie. These hirsute New Yorkers play high-decibel sludge-rock in which the guitars roar and grumble like a chain saw carving through a cadaver while the vocalist grunts and groans menacingly, the unintelligible lyrics usually resolving to a troglodytic "Yeahhh-uhhh." The songs are connected by sound bites from Fifties zombie flicks and knob-twiddling excursions down the radio dial, all meant to suggest some higher (or lower) concept that's not as easily divined or as amusing as may have been intended. Thunderous rave-ups like *Thrust!* and (especially) *Black Sunshine* are a gas, if you don't mind a white-knuckle ride with a pack of reprobates who make like they're on a three-day pass from the local lock-up.

In its half-funny, half-heavyhanded way, "La Sexorcisto" is reminiscent of early Alice Cooper (though the songs aren't as good), the Dictators' first album (though the satire isn't as sharp,

and prime Black Sabbath (though the concept isn't as obvious). In other words, the cues—whether to laugh or to bang your head—aren't as clear as they ought to be. Perhaps the group itself doesn't know. *P.P.*

Collections

I SHALL BE UNRELEASED: *The Songs of Bob Dylan*. Rod Stewart: *Only a Hobo*. Joan Baez: *Love Is Just a Four-Letter Word*. Manfred Mann: *If You Gotta Go, Go Now*. Eric Clapton and His Band: *Walk Out in the Rain*. Ron Wood: *Seven Days*. And thirteen others. RHINO © R2 70518 (64 min), © R4 70518.

Performance: *Erratic*
Recording: *Variable*

The idea behind this interesting anthology was simple: performances by famous folk of Bob Dylan songs that Dylan himself never released. Between the idea and realization, of course, Dylan actually made most of the numbers here available, in his 1991 "Bootleg Series" boxed set, but "I Shall Be Unreleased" is (by and large) a fun album anyway.

Two of these covers were actually hits—Manfred Mann's 1965 *If You Gotta Go*, which holds up just fine, and Joan

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Baez's 1969 *Love Is Just a Four Letter Word*, which doesn't (get that sitar outta there!). Most of the rest, except for Rod Stewart's *Only a Hobo* from his superb "Gasoline Alley," are obscurities plucked from albums few people bothered with when they came out (in the case of Blue Ash, Ohio's gift to early-Seventies power pop, make that *nobody* bothered with). But almost all are rewarding on some level, if only as camp; check out the Raiders track, which has far too long a title to repeat here, and you'll see what I mean. And the best is very definitely saved for last—a live Dream Syndicate version of *Blind Willie McTell* done up like the most intense Dylan and the Hawks bootleg you've ever heard. (Personal aside to Ron Wood, here heard mangling the eminently mangleable *Seven Days*: no more solo albums, okay?) S.S.

Jazz

THE HARPER BROTHERS: *You Can Hide Inside the Music*. Philip Harper (trumpet); Winard Harper (drums); other musicians. *Segment*; *Since I Fell for You*; *P.S. I Love You*; *'Round Midnight*; and eight others. VERVE © 314-511-820-2 (58 min), © 314-511-820-4.

Performance: *Mixed*
Recording: *Very good*

The Harper Brothers run one of the most rewarding jazz groups around. Their three previous Verve albums firmly established these young men, and in this fourth one they extend their hands to four veteran performers: trumpeter Harry "Sweets" Edison, saxophonist Jimmy Heath, organist Jimmy McGriff, and singer Ernie Andrews. Unfortunately, some of this reaching out is less beneficial to the Harper Brothers. Andrews's voice has become wobbly, and he has an awful time getting through the title song. But he is far more comfortable with *Since I Fell for You*, a fine Heath arrangement, and he really hits his groove with *She's Got the Blues for Sale*, a straight-ahead number featuring strong, appropriately funky input from McGriff. Trumpeter Edison proves his worth in *'Round Midnight* and *I Wish I Knew*, but the Harper Brothers shine brightest when they go it on their own, which they do in several tracks. C.A.

THE SULLIVAN YEARS: *Big Band All-Stars*. Harry James: *Lester Leaps In*; *Blues for Sale*. Woody Herman: *My Favorite Things*; *Apple Honey*. Lionel Hampton: *Blues in E Flat*; *It Don't Mean a Thing*. And six others. TVT © TVT 9431-2 (35 min), © TVT 9431-4.

Performance: *Splendid*
Recording: *Good*

For twenty-three years the *Ed Sullivan Show* was the ultimate TV grab bag, a

Sunday-night entertainment stew that mixed jugglers and acrobats with classical virtuosos, Hollywood celebrities, and pop, rock, and jazz stars. "The Sullivan Years" is a series of compilation recordings preserving fascinating moments from the show. "Big Band All-Stars" offers appearances by six jazz orchestras, all in splendid form, from 1957 to 1967.

Things kick off with two Harry James numbers featuring crisp work by the leader, a spirited 1960 version of *Lester Leaps In* (arranged by Ernie Wilkins) and *Blues for Sale* from seven years later. Then it's on to Woody Herman's *My Favorite Things* and a superb 1960 version of *Apple Honey* that captures all the spirit of the 1945 original. Two 1959 Lionel Hampton selections are rendered in typical Hampton style, which means that they swing joyfully, and Benny Goodman's theme, *Let's Dance* (1957), leads nicely into a 1960 version of *Sing, Sing, Sing*, a highlight of Goodman's historic 1938 Carnegie Hall concert. Goodman is in excellent form, and Moussey Alexander does well in Gene Krupa's role. Next is a 1957 track by the posthumous Glenn Miller Orchestra, but a clone band is a clone band.

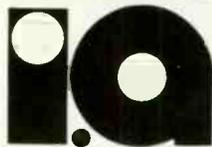
The last three tracks are 1959 and 1960 swingers by Count Basie's orchestra, which at that time included Joe Newman, Frank Wess, Frank Foster, and a rhythm section with guitarist Freddie Green, bassist Eddie Jones, and the ever propulsive Sonny Payne. Joe Williams is heard in top form in *Roll 'Em Pete*, further enhanced by a liquid Frank Wess flute solo. A 35-minute playing time is skimpy for a CD, but there's a lot of exciting music packed into this one. C.A.

PHIL WOODS AND JIM MCNEELY: *Flowers for Hodges*. Phil Woods (clarinets, saxophones, vocal); Jim McNeely (piano, synthesizer). *Lost*; *Hodges*; *I Didn't Know About You*; *Lotus*; *Jazz Morning*; and five others. CONCORD JAZZ © CCD-4485 (55 min), © CJ-4485-C.

Performance: *Mixed*
Recording: *Excellent*

Phil Woods ranks high on my list of favorite contemporary saxophone players, but I was somewhat disappointed by "Flowers for Hodges," a new album with his regular pianist, Jim McNeely. Some of these duet performances lived up to my expectations, but Woods, who plays with characteristic excellence throughout, takes some unbecoming side trips. McNeely is a musician of the fusion generation, and it is when he switches to a synthesizer that the music sounds diluted. Fortunately, most of the 55 minutes offers music of substance, and even the Kenny G-like background fails to completely disarm Phil Woods. *Hodges*, however, is horrible: a Woods tune in which he sings (if you can call it that) a contrived lyric that does justice neither to him nor to its inspiration, Johnny Hodges. C.A.

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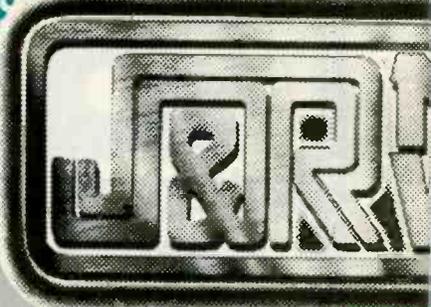


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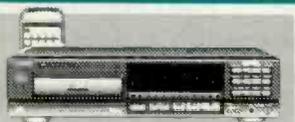
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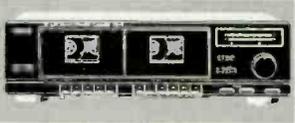
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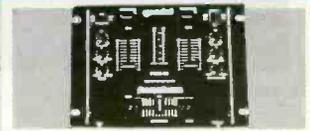
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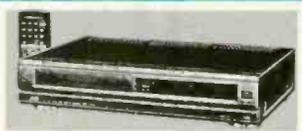
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R · E · C · O · R · D

by Robert Ripps,
Maryann Saltser,
& Steve Simels

NIMBUS has released the soundtrack from the latest Merchant Ivory film, *Howards End*, based on the novel by E. M. Forster. The film score was composed by Richard Robbins, who also wrote the music for the Merchant Ivory films *Maurice*, *Mr. and Mrs. Bridge*, and *A Room with a View*. Robbins incorporated pieces by the British composer Percy Grainger that were popular in the Edwardian England *Howards End* so evocatively depicts. A video release is expected by this fall.

BRTAIN's Jesus and Mary Chain, led by vocalist Jim Reid and guitarist William Reid, has released its first al-



Jesus and Mary Chain: banned by the BBC

tour dubbed "Rollercoaster." It's loosely fashioned after last year's "Lollapalooza" tour, one of the few successful offerings in a dismal concert season plagued by recession. Lollapalooza '92 kicks off in the U.S. next month.

THE pianist Stefan Vladar, winner of the 1985 Vienna Beethoven Competition, was signed last year to an exclusive contract with Sony Classical. The twenty-seven-year-old Vienna-born Vladar admits to an "ambivalent relationship" with Beethoven but claims that Mozart's piano works "lie closest to my heart as a musician." You can be the judge, since his first Sony recording, released last year, was of Mozart sonatas, and this March Sony released his CD of Beethoven's "Diabelli" Variations. In between came a disc with the Brahms Piano Sonata No. 1, Op. 1. Vladar's upcoming U.S. ap-



Vladar: Vienna's own

pearances include the Ravinia Festival with André Previn this August.

LANDING the coveted position of music director/arranger for Jay Leno's post-Carson *Tonight Show* would be more than enough for most people. But the saxophonist Branford Marsalis is also hosting *Jazzset*, a weekly National Public Radio series, and has been busy putting the final touches on a new blues album scheduled for a June release on Columbia. Guest stars include B.B. King, John Lee Hooker, and brother Wynton Marsalis. June also brings the premiere of *The Music Tells You*, an hour-long documentary-style film featuring Marsalis at work in a wide variety of settings, from the recording studio to student workshops.

THE violinist Anne-Sophie Mutter has returned from a year's sabbatical revitalized, judging by her upcoming activities. This summer brings three U.S. festival debuts: Ravinia on June 26, where she performs and records (for Deutsche Grammophon) the Berg concerto with the Chicago Symphony and James Levine; the opening concert at Tanglewood on July 3 with the Boston Symphony and Seiji Ozawa; and the July 7 and 8 opening concerts of Mostly Mozart with Gerard Schwarz conducting.

Mutter's latest releases are a Mozart disc with Neville Martinson on EMI and the Bartók Violin Concerto No. 2 and Moret's *En Rêve* with Ozawa and the BSO on DG. She returns to North America in October for concerts in Toronto, Boston, New York, Princeton, Chicago, Detroit, and Washington.

THE Chicago Symphony Orchestra made its first visit to Carnegie Hall with its new music director, Daniel Barenboim, early in April prior to departing for a European tour. One of the two programs presented in New York, which were repeated abroad, included John Corigliano's Symphony No. 1. The Erato recording of the work won both a Grammy and a STEREO REVIEW Record of the Year



Anne-Sophie Mutter

Award for Barenboim and the CSO. Their two most recent discs are Mahler's *Das Lied von der Erde* and excerpts from Wagner's *Ring*, both to be released this spring.

THE Texas band Downy Mildew, whose basic sound has reminded critics of R.E.M. and 10,000 Maniacs, is getting its first album on a major label. After four previous records on Texas Hotel and Triple X Records, the band's "An Oncoming Train" is being released this month on High Street/Windham Hill. Downy Mildew is the first rock band ever to be handled



Howards End

bum in three years, "Honey's Dead," on Def American, the band's first for that label. The Reid brothers wrote and produced nearly everything in the new album, including the controversial first single, *Reverence*, which features the lyric, "I wanna die just like Jesus Christ / I wanna die just like JFK." The song was promptly banned by the BBC after entering the British pop charts at No. 10. (At press time it hadn't entered *Billboard's* U.S. chart yet.)

The JMC will be hitting the road in the U.K. this spring, along with a number of other alternative acts such as My Bloody Valentine, Blur, and Dinosaur Jr., for an ambitious

M · A · K · E · R · S

CARL STUDINA/HIGH STREET RECORDS



Downy Mildew: on the high road

by Windham Hill, known as a bastion of New Age music. "An Oncoming Train" was mixed by Tchad Blake, who has provided similar services for Crowded House, Los Lobos, and, most recently, the re-formed Spinal Tap.

FORMER angry young punk **Jah Wobble** has returned with his first album as a group leader. "Rising Above Bedlam" by Jah Wobble's Invaders of the Heart, on Atlantic, features the former **Public Image Ltd.** bassist continuing his unique fusion of reggae, heavy funk, and Islamic trance music. Special guest is **Sinéad O'Connor**, who sings in *Visions of You* (the first single and video) as well as *Sweet Divinity*. Wobble had earlier played on O'Connor's breakthrough album, "I Do Not Want What I Haven't Got." "Sinéad is a very special person," Wobble says, "and I don't just mean in terms of her voice; I mean in terms of everything."

MUSICMASTERS has released the last recordings by the legendary jazz clarinetist **Artie Shaw**, recorded in New York and Hollywood in 1954 just before his retirement. The two-CD set, "The Last Recordings: Artie Shaw Rare & Unreleased,"

ATLANTIC RECORDS

features Shaw and his very last Gramercy Five: **Hank Jones** (piano), **Tal Farlow** (guitar, replaced on the second CD by **Joe Puma**), **Tommy Potter** (bass), **Joe Roland** (vibes), and **Irv Kluger** (drums). The selections include several Shaw originals as well as such standards as *My Funny Valentine* and *Someone to Watch over Me*.

THE Australian-born French-horn player **Barry Tuckwell** has a new record due out this month on the Etcetera label, "French Music

for Horn and Piano." Tuckwell and pianist **Daniel Blumenthal** perform works by Saint-Saëns, Gounod, Dukas, Poulenc, and others. Carrying a baton instead of a horn, Tuckwell will lead the Maryland Symphony in the annual Fourth of July Concert at the Antietam Battlefield. The program includes patriotic songs, Sousa marches, a medley of Civil War tunes, and Tchaikovsky's *1812 Overture* (with fireworks and cannons, of course).

GRACENOTES. Upcoming reissues from Rhino include a four-CD boxed set devoted to soul pioneer **Jackie Wilson** and "The Bo Diddley Beat," a collection of songs by various artists who have employed the only rhythm named after a musician, Fifties rocker **Bo Diddley**. . . . The Second Symphony by the great conductor/composer **Wilhelm Furtwängler** was recorded in January by the BBC Symphony under **Alfred Walter** for Marco Polo Records (distributed by Harmonia Mundi U.S.A.). Due for release this fall, it completes Marco Polo's Furtwängler cycle, of which the First and Third Symphonies and the Piano Concerto are already available. . . . Narada has just

released **David Arkenstone's** "The Spirit of Olympia," the follow-up to his Grammy-nominated 1991 album "In the Wake of the Wind." A collaboration with Arkenstone's fellow Narada recording artist **Kostia**, the new album features **Daryl Steurmer**, the tour guitarist for **Genesis** and **Phil Collins**, on several tracks. . . . **Pops Staples**, the founder and

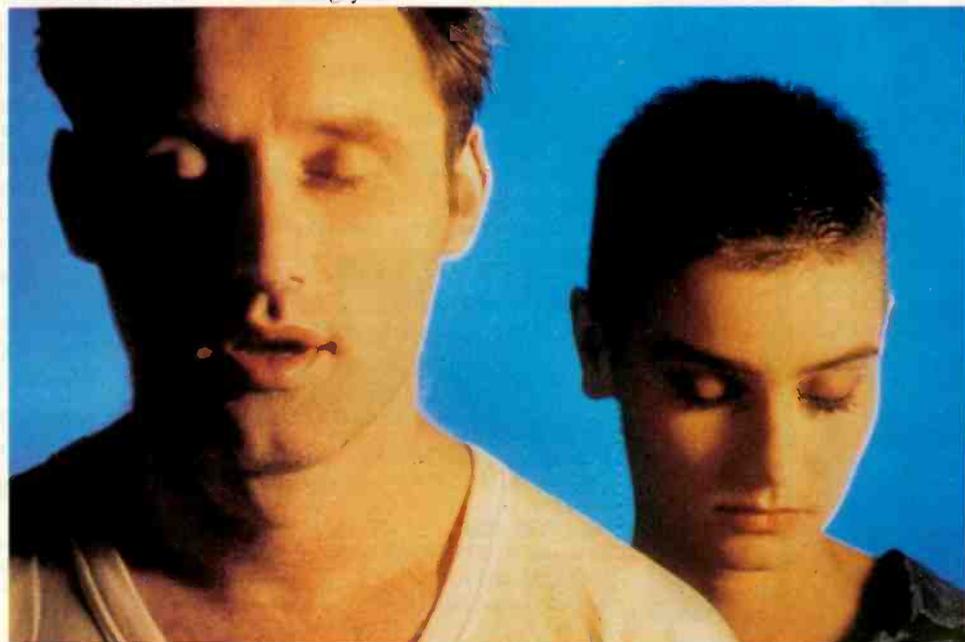


Barry Tuckwell

still leader of the **Staple Singers**, got a little help from his friends for his new Pointblank/Charisma album, "Peace to the Neighborhood." **Ry Cooder** is featured on two tracks, and **Jackson Browne** and **Bonnie Raitt** join in for a cover of Brown's *World in Motion*. □

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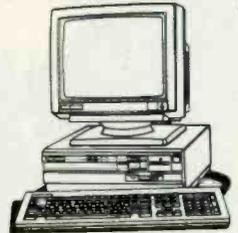
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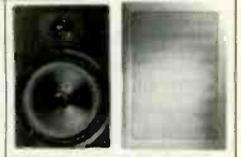
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BARBER: *The Lovers, Op. 43; Prayers of Kierkegaard, Op. 30.* Sarah Reese (soprano); Dale Duesing (baritone); Chicago Symphony Chorus and Orchestra, Andrew Schenck cond. KOCH INTERNATIONAL CLASSICS © 3-7125-2H1 (51 min).

Performance: *Earnest*
Recording: *Good live job*

After the failure of his *Antony and Cleopatra* on the opening night of the new Metropolitan Opera house at Lincoln Center in 1966, Samuel Barber still had fifteen years to live, but he wrote very little music. The one major exception is a surprising one: *The Lovers*, a big and sensuous work for baritone, chorus, and orchestra based on erotic poetry by the Chilean poet Pablo Neruda. Although this cycle of nine pieces ends up in a twilight mood, it has a down-to-earth quality and a certain joy in life that are engaging as well as refreshing and unexpected. I much prefer it to the all-purpose religiosity of the better-known *Prayers of Kierkegaard*, for soprano, chorus, and orchestra.

The earnest performances here were recorded live in Orchestra Hall, Chicago. I enjoyed the quality of the sound, and I liked the energy of Dale Duesing, the baritone in *The Lovers*. He captures some of the earthiness and sensuality of Neruda's poetry, qualities that rubbed off on Barber's music but not quite enough on these performances. *E.S.*

BARTÓK: *Violin Concerto No. 2; Sonata for Solo Violin.* Christian Tetzlaff (violin); London Philharmonic Orchestra, Michael Gielen cond. VIRGIN CLASSICS © 91483-2 (63 min).

Performance: *Excellent*
Recording: *Excellent*

Christian Tetzlaff plays two of this century's greatest works for his instrument on this CD, Bartók's big Violin Concerto (the one now called No. 2) and the same composer's sonata for unaccompanied violin. These are profoundly musical

performances. Tetzlaff deals comfortably with every demand made upon him, he maintains a stunningly handsome tone, and if he comes no closer than any other fiddler to matching Bartók's incredibly precise timings for the concerto, he is in every other respect more scrupulously faithful to the score than most.

The conductor Michael Gielen is an ideal partner. He lets no felicity of the scoring go unnoticed yet allows none to be so showcased as to impede the flow, and he maintains the sort of perspective that insures optimal balance between soloist and orchestra while allowing for genuine interaction between them. Virgin's engineering team has preserved that balance superbly.

In the solo sonata Tetzlaff is fairly dazzling, and again not because he deals so effortlessly with the work's challenges but because he distills so much music from them. He is one of those players for whom technical problems simply do not exist, who are able to devote all their energies to interpretive ones. As is often the case with such musicians, however, he also tends to show greater strengths on the intellectual level than on the emotional one. But his playing is so communicative on its own terms, and he is so persuasive in the sonata, that many listeners will want this disc even though it may not replace existing favorites. *R.F.*

BRAHMS: *Piano Concerto No. 1, Op. 15.* Elisabeth Leonskaja (piano); Philharmonia Orchestra, Eliahu Inbal cond. TELDEC © 46459-2 (50 min).

Performance: *Aristocratic*
Recording: *Warm*

Elisabeth Leonskaja makes it clear with her first entrance that she is not about to be bowled over by the big and burly qualities of this work. She certainly has the power for that sort of approach, but she opts for a somewhat more intimate one that pays rich dividends in listening pleasure, and she could hardly have asked for a more sympathetic partner than Eliahu Inbal. They share a clear-eyed, no-nonsense approach that allows sentiment its due without indulgence but gives pride of place to an aristocratic sense of proportion. Pacing is fluid but unrushed (how engagingly the adagio moves along!), orchestral textures exemplary in their clarity, the piano tone unflinchingly handsome, the integration of the two elements altogether exceptional. Listeners who choose to sample the disc by trying the finale first might find it a shade underanimated, but in the context of the whole it works beautifully. Indeed, the feeling of continuity throughout the long work is another exceptional factor here, and Leonskaja's elegant

playing makes this finale one I'm far more likely to encore than any of those by the more traditional thunderers. The recording aims for warmth rather than brilliance, and that suits both the work and this performance just fine. *R.F.*

DVOŘÁK: *Piano Quintets No. 1, Op. 5, and No. 2, Op. 81.* Rudolf Firkušný (piano); Ridge String Quartet. RCA VICTOR © 60436-2 (67 min).

Performance: *Excellent*
Recording: *Very good*

It was in 1887, while looking over his very early Piano Quintet, Op. 5, with an eye to revising it, that Dvořák was moved to compose his masterpiece in the genre, the Quintet No. 2, Op. 81. It therefore makes good sense to put both works on a single CD.



Elisabeth Leonskaja

The early quintet is in three movements, lacking a scherzo. The opening movement is imbued with an impulsive verve echoing Beethoven and Schumann. The Schumann aspect comes even more to the fore in the slow movement, which boasts a fine coda endowed with the melodic richness characteristic of Dvořák. The *Allegro con brio* finale fully lives up to its designation in this performance.

With Op. 81, some performers tend to over-sweeten the lyrical element. Not so Rudolf Firkušný and the expert young players who make up the Ridge Quartet. The opening movement, complete with exposition repeat, is done on a big, truly Brahmsian scale, with Firkušný displaying imposing pianistic power. In the following *Dumka* movement, his command

Explanation of Symbols

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Mozart Magic

LATE entries in the Mozart Year Sweepstakes: recordings of *The Magic Flute* led by Roger Norrington (EMI) and Charles Mackerras (Telarc). The sets were issued (in this country at least) in the waning days of 1991, making them the fourth and fifth (or was it fifth and sixth?) *Magic Flutes* of a very long Mozart year. And they just might be the best of the bunch.

For most Mozart lovers, the current competition will be Neville Marriner's recent Philips version featuring such stellar performers as Kiri Te Kanawa, Cheryl Studer, Samuel Ramey, and José van Dam. Choosing among these three recordings is not an easy task.

If you want a comforting, classical, and quite reassuring performance of the traditional *Flute*, I recommend Marriner's. The Mackerras set is an excellent compromise between a familiar contemporary classical style and a lively early-music approach. I find Norrington's version the most challenging, the most refreshing, and the truest to Mozart and the eighteenth century—and the most fun!

The most striking thing about both of the new recordings is the lightness and quickness of the tempos. The Romantics started slowing down and museumizing the classics early on. "Andante" is not a slow tempo to an Italian-speaker (such as Mozart); the word means "moving

along." *The Magic Flute*, for all its underlying seriousness, is a popular musical comedy. Pamina's second-act aria is absurd as high tragedy; as performed by Dawn Upshaw with Norrington or Barbara Hendricks with Mackerras, it is a moment of exquisite sorrow that interrupts the course of true love.

Both Norrington and Mackerras, working with talented and musical singers, understand the value of the old ornaments: appoggiaturas, the improvisational flourish or two. Somewhat more dubiously, Norrington includes all the surviving dialogue, and Mackerras (who cuts the dialogue judiciously) includes a Tamino-Papageno duet that seems to have first appeared in 1802 and is not likely to be by Mozart.

So far, it's just about even Steven. But there are big differences, too. Norrington is, incorrigibly, the early-music man. The orchestra is his own excellent London Classical Players: small, tuned to a lower pitch, tuned in to the eighteenth century, and set up like an old pit band with cellos and basses scattered around, horns and woodwinds at the back, first and second violins divided up front, the brass split left and right, and the conductor in the middle at the fortepiano. The tempos are even lighter and quicker than Mackerras's; the phrasing, in great part based on the text, has a matching wit and grace.

Mackerras might have an edge in casting with his fresh, strong Pamina (Barbara Hendricks), a dashing Tamino (Jerry Hadley), an unforgettable, ultrabass Sarastro (Robert Lloyd), and an amusing, idiomatic, Fischer-Dieskau-like Papageno (Thomas Allen). Norrington typically casts lighter, younger, and much less operatic voices, not only in the fresh-sounding leads (Anthony Rolfe Johnson and Dawn Upshaw) but also in traditionally heavier roles like Sarastro and the Queen of the Night (Cornelius Hauptmann and Beverly Hoch).

The stumbling block in all these modern, international-cast *Flutes* is the text. In spite of all the pieties and platitudes, *Die Zauberflöte* is, if taken literally, both sexist and racist, a slapstick comedy full of heavyhanded, old-fashioned Viennese comedy scenes that record awkwardly, even with native German-speakers. There are no ideal solutions. One recent recording suffers because it uses a separate dialogue cast; others, like Norrington's and Mackerras's, suffer because they don't.

Norrington does catch the fun and high spirits in the music while keeping the Masonic mumbo-jumbo to a minimum. Marriner and his Sarastro, Samuel Ramey, take over 4 minutes for the solemn "In diesen heil'gen Hallen." Mackerras and Robert Lloyd perform it in 3:44, and Norrington and Cornelius Hauptmann make it a full minute shorter than that. Fast numbers are uptempo, too; Papageno's second-act song in Norrington's set is a good half-minute faster than anybody else's. Too fast? For some, maybe. I like it, and I think it is perfectly Mozartian.

It's hard to imagine putting Marriner third on any Mozart list, but I have to rate Norrington's *Flute* No. 1, with Mackerras a strong second. Truth to tell, any of the three would be a good choice.

Eric Salzman



Jerry Hadley
as Tamino
in the Met's
production

MOZART: *Die Zauberflöte*. Dawn Upshaw (soprano), Pamina; Anthony Rolfe Johnson (tenor), Tamino; Andreas Schmidt (baritone), Papageno; Beverly Hoch (soprano), Queen of the Night; Cornelius Hauptmann (bass), Sarastro; others. Schütz Choir; London Classical Players, Roger Norrington cond. EMI CLASSICS © 54287-2 (139 min).

MOZART: *Die Zauberflöte*. Barbara Hendricks (soprano), Pamina; Jerry Hadley (tenor), Tamino; Thomas Allen (baritone), Papageno; June Anderson (soprano), Queen of the Night; Robert Lloyd (bass), Sarastro; others. Scottish Chamber Chorus and Orchestra, Charles Mackerras cond. TELARC © CD-80302 (152 min).

of subtly shaded dynamics is a joy to the ear. The folk-dance-style scherzo comes off with a light hand and makes its most telling effect in the lovely trio section. The polka-style finale is both lucid and spirited, especially in the fugato leading up to the recapitulation. The recorded sound is clear and full-bodied. *D.H.*

ELGAR: *Cello Concerto in E Minor, Op. 85*. **TCHAIKOVSKY:** *Variations on a Rococo Theme, Op. 33*. Mischa Maisky (cello); Philharmonia Orchestra, Giuseppe Sinopoli cond. DEUTSCHE GRAMMOPHON © 431 685-2 (46 min).

Performance: *Virile*
Recording: *Splendid*

Elgar's last completed major work, the once-neglected Cello Concerto from 1919, is now represented on compact disc by more than a dozen interpretations. The team of Mischa Maisky and Giuseppe Sinopoli has come up with yet another, and it ranks with the very best. The reading is virile and volatile without becoming gruff, ardent without lapsing into sentimentality. Maisky's virtuosity in the *moto perpetuo*-style scherzo episode is dazzling, and the passages of lamentation in the finale just before the "chin up" conclusion are deeply moving. Add the fine work of Sinopoli and the Philharmonia Orchestra in the warm acoustic of Watford Town hall, and you have a first-class recording.

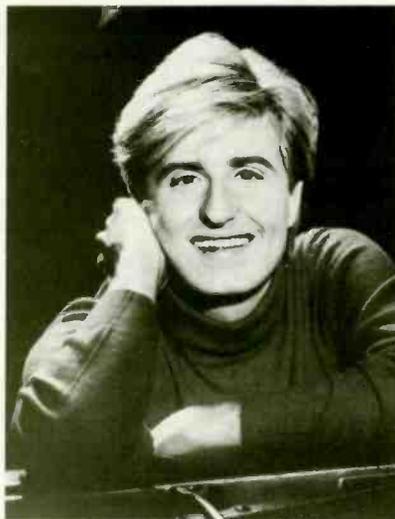
I have two minor gripes: the short playing time of the disc and the choice of the stylistically incongruous Rococo Variations by Tchaikovsky as a filler. Still, it's a fine showcase for Maisky, who uses the Fitzhagen edition employed by all but two of the cellists who have recorded the work. He brings out not only the music's pyrotechnics but a good deal of poetry as well. *D.H.*

HAYDN: *Symphony No. 61; Symphony No. 103 ("Drum Roll"); Cello Concerto No. 2*. Janos Starker (cello); Scottish Chamber Orchestra, Gerard Schwarz cond. DELOS © DE 3063 (80 min).

Performance: *Conscientious*
Recording: *Very good*

The lively and extroverted Symphony No. 61 seems the best suited to Gerard Schwarz's temperament of the three works on this exceptionally well-filled CD. The outer movements have plenty of verve. Schwarz and the Scots players do well with the tender slow movement, and there is ample vigor in the minuet. The "Drum Roll" Symphony, one of my favorites, fares less well. The slow introduction is very slow indeed, and the superb variations movement that follows seems a mite hasty. The minuet is a trifle too sedate, and its trio section is rhythmically slack. Matters are redeemed, however, by the spirited finale.

The Cello Concerto No. 2 seems to have been recorded by just about every cellist of note, and certainly Janos Starker is one of the stars in that firm-



Jean-Yves Thibaudet

ment. His solo work here is a fine amalgam of the aristocratic and the brilliant, but I find Schwarz's tempos something of a drag. The sonics are excellent throughout. *D.H.*

LISZT: *Piano Concertos Nos. 1 and 2; Hungarian Fantasy; Totentanz*. Jean-Yves Thibaudet (piano); Montreal Symphony Orchestra, Charles Dutoit cond. LONDON © 433 075-2 (69 min).

Performance: *Gorgeous*
Recording: *Transparent*

Jean-Yves Thibaudet and Charles Dutoit make a fine team, and they seem to be having a wonderful time here with Liszt. Thibaudet shows an exceptional sense of freedom and flexibility, and his sound is downright gorgeous. His runs and trills embody a degree of poetry as well as brilliance; his phrasing is always pointed enough to command attention, while never in the least degree eccentric. Dutoit and his splendid orchestra match him in alertness and commitment, and there is at every step of the way that heady level of stimulating exchange in which the listener can feel the two principals not merely responding sympathetically but building on each other's response. These are, in short, performances that give nothing but pleasure, in abundance, and they are enhanced by rich, vivid sonics that make the most of Thibaudet's pearly tone and the contributions of the various orchestral soloists as well as the body of sound. *R.F.*

MAHLER: *Symphony No. 1*. Berlin Philharmonic Orchestra, Claudio Abbado cond. DEUTSCHE GRAMMOPHON © 431 769-2 (55 min).

Performance: *Very good*
Recording: *Could be better*

Recorded in concert in 1989, this CD has many musical virtues, not least the wondrously delicate reading of the symphony's magical opening pages. Claudio Abbado's view of the work as a whole is

more akin to the refinement of Christoph von Dohnányi's recording with the Cleveland Orchestra than to the rumbustious romanticism of Leonard Bernstein's New York and Amsterdam versions. Thus, the vulgar element in the middle movements is somewhat tempered. Transparency of texture and rhythmic address seem to be the prime goals. The finale is done with great brilliance, the lyrical episodes lingered over lovingly but not mawkishly.

Unfortunately, the recorded sound simply does not measure up to the best of the half-dozen other competitive versions. I hear no genuinely solid and sustained bass line. The brass is too loud and forward relative to the musical texture as a whole, and in the pauses between movements, one is all too aware of the respiratory ailments afflicting the Berlin audience. It really is a shame not to have Abbado's current view of this work preserved better. *D.H.*

MUSSORGSKY: *Boris Godunov*. Nicolai Ghiaurov (bass), Boris Godunov; Josef Frank (tenor), Prince Shuisky; Michail Svetlev (tenor), Grigory/Dimitri; Nicola Ghiuselev (bass), Pimen; Stefka Mineva (mezzo-soprano), Marina Mnishek; others. Sofia National Opera Chorus; Sofia Festival Orchestra, Emil Tchakarov cond. SONY CLASSICAL © S3K 45763 three CD's (221 min).

Performance: *Good*
Recording: *Very good*

Sony's worthy series of the great Russian operatic masterpieces recorded in Bulgaria has come to an end with the recent untimely death of conductor Emil Tchakarov. This last entry may not be the ultimate account of Mussorgsky's *Boris*, but it is a well-prepared and frequently moving one that ranks relatively high among several equally well-intentioned and imperfect contenders.

Sony labels the set "original version," but it is actually the composer's second version, from 1872, plus the dramatically essential St. Basil Scene from the 1869 original, the same composite currently used at the Metropolitan Opera and other theaters. Mussorgsky's own austere orchestration is used, possibly with occasional touches by Shostakovich (the annotation is ambiguous).

There is a certain lack of theatrical excitement, but Tchakarov paces the opera sensibly and makes all the needed dramatic points. The orchestra reveals no weaknesses, and the chorus is up to the high Bulgarian standard. Nicolai Ghiaurov recreates his familiar melancholy Boris, who never rants where eloquent, inflected singing will do. At sixty-three, his tones do not ring out with the solidity of earlier years, nor are the top notes free of strain, but this remains a moving characterization and a star turn.

The supporting cast is, in the main, impressive. Nicolai Ghiuselev is a firm and sonorous Pimen, nobly representing probity and historical values. Michail

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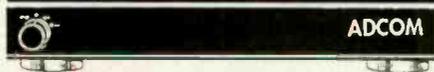
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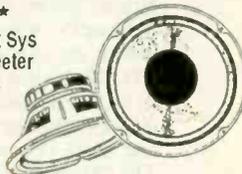
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Svetlev's tenor is a size too small for the Pretender's music; he forces a lot but sings cleanly and with considerable expression. Stevka Mineva certainly ranks with the better Marinas on records, and the minor roles are generally well done. Only the Hostess in the Inn Scene falls below the level of acceptability—not a bad showing for such a large cast.

Except for a certain haziness in the choral portions of Act III, the engineering creates a rich and well-balanced sound. I find this set superior to the Bolshoi-originated Philips set and thus the best bet among the "original" (not Rimskyfied) alternatives. Sony's packaging is exemplary. *G.J.*

PROKOFIEV: *Symphony No. 2, Op. 40; Symphony No. 7, Op. 131.* Berlin Philharmonic Orchestra, Seiji Ozawa cond. DEUTSCHE GRAMMOPHON © 435 027-2 (70 min).

Performance: *Excellent No. 2*
Recording: *Richer in No. 2*

Prokofiev said that his Second Symphony, laid out in the two-movement pattern of Beethoven's Op. 111 piano sonata, was "made of iron and steel." It pleased



William Christie

him little more than it did the audience at its dismal Paris premiere in 1925, but Seiji Ozawa makes an especially strong case for it here, finding the lyrical thread and stressing the melodic content. He is less persuasive in the Seventh Symphony, which is normally far more ingratiating, characterized by an affectionate fairy-tale wistfulness. That's the element Ozawa misses, though he makes all the right choices in respect to tempo and balances, honoring Prokofiev's express

wish that his alternative bang-up conclusion be ignored in favor of the original quiet ending. Mstislav Rostropovich is more successful in bringing out the charm and wit of this work, as well as its deeper emotions, in his recording with the Orchestre National de France, reissued recently at midprice on Erato. The sound quality of Ozawa's Seventh, recorded in the Philharmonie, is markedly dry, too, compared with that of the Second, taped in the Jesus-Christus-Kirche, Dahlem. *R.F.*

RACHMANINOFF: *Symphony No. 2* (see *Best of the Month*, page 82)

RAMEAU: *Pygmalion; Nélée et Myrthis.* Soloists, Chorus, and Orchestra of Les Arts Florissants, William Christie cond. HARMONIA MUNDI © 901381 (78 min).

Performance: *Mostly wonderful*
Recording: *Fine*

While none of Rameau's stage works have the popularity they deserve, the one-act ballet *Pygmalion* turns up with some frequency, partly because it's short (45 minutes) and has a decent libretto. Though not exactly a French Baroque *My Fair Lady* (which is based on the same myth), *Pygmalion* follows a simple dramatic trajectory: The title character falls in love with the statue he has created, the statue comes alive, and everything ends happily, with lots of ingratiating music along the way. This is the third recording of the work in the past ten years, and in many ways it's the best. William Christie has a special way of directing Rameau's recitatives, bringing out a great deal of nuance and expression while shaping their phrases and tempos to meld fluidly with the surrounding dances and airs.

The performance is full of memorable moments, especially the one where the statue comes alive. As the statue, Donatienne Michel-Dansac projects a combination of girlish innocence and the sexiness of a creature that exists only for love. The only drawback is Howard Crook in the title role. While he is alert to the drama in the recitatives, he becomes self-conscious in the airs, too concerned with hitting the notes.

The disc offers a significant bonus in what appears to be the first recording of *Nélée et Myrthis*, a more modest ballet that has yet to be dated but seems characteristic of middle-period Rameau, with moments of brilliantly innovative scoring. He could turn a short dance number into a miniature concerto for orchestra, and he did just that here. *D.P.S.*

SCHUBERT: *Impromptus.* Krystian Zimerman (piano). DEUTSCHE GRAMMOPHON © 423 612-2 (65 min).

Performance: *Personal*
Recording: *Excellent*

Krystian Zimerman has never been one to make "just another" recording of anything, and that's especially the case

here. Increasingly, Schubert is thought of as an important musical ancestor of Mahler, both in the originality of his chord constructions and in the confessional emotionalism of his late works. Rarely has this Mahlerian side of Schubert been explored so uncompromisingly or convincingly as in this recording of his two sets of impromptus.

The C Minor chord beginning the first impromptu (Op. 90, No. 1) is given a rhetorical weight that suggests Zimerman considers the music explicitly programmatic. And so it goes with all eight of these descriptive pieces, but there's none of the romantic posturing you hear with pianists such as Ivo Pogorelich. Zimerman's ideas are deeply thought out and clearly rooted in Schubert's sound world (Op. 90, No. 2, for example, suggests the horrific supernatural elements of *Erlkönig*). But however much he expands the expressive range of these works, his piano sound has an unpedaled, bell-like clarity that suits the unaffected youthfulness of Schubert's musical temperament.

For those who think Alfred Brendel's recording on Philips approaches the final word on this music, Zimerman's may seem fussy, cheeky, and over-interpreted to the point of deconstruction. But for those who do not consider a performance successful if it hasn't challenged their ideas about a piece, this recording offers rare stimulation. *D.P.S.*

SCHUBERT: *Symphony No. 9, D. 944.* NDR Symphony Orchestra, Günter Wand cond. RCA VICTOR © 09026-60978-2 (53 min).

Performance: *Insightful*
Recording: *Very good*

Günter Wand's new live recording of the Schubert Ninth replaces an analog recording he made some fourteen years earlier with the Cologne Radio Orchestra. There is actually little difference between the performances; the contrast is chiefly in terms of sound quality, and the 1991 digital recording does offer definite advantages in range, definition, and all-round impact. As in the Cologne version, there is a bit more gear-shifting than we are accustomed to nowadays, particularly in the slow movement, and the trio in the third movement seems a tad overdeliberate in respect to the tempo of the scherzo proper, but in general Wand manages his tempo variations with remarkable subtlety, giving an overall impression of convincing fluidity rather than stops and starts. His is not the last word on this great work—no single interpretation is likely to be that—but it is a deeply satisfying account distinguished by its sense of proportion, its momentum, and the insight, both affectionate and enlivening, we have come to expect from him in this repertory. *R.F.*

SCHUMANN: *Symphonies No. 2, in C Major, Op. 61, and No. 3, in E-flat Major, Op. 97 ("Rhenish").* London Philhar-

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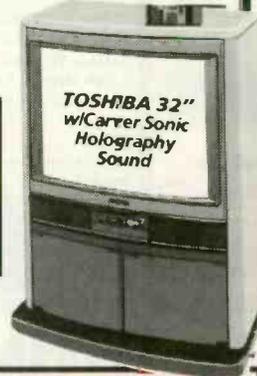


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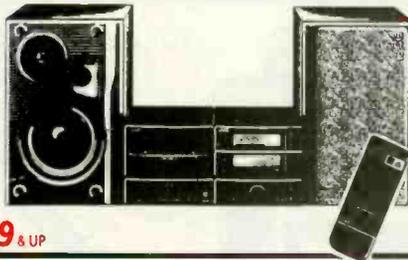
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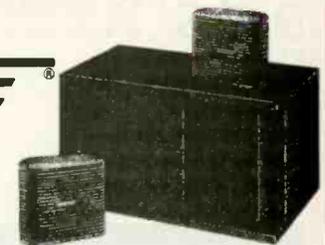


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Performance: *Brisk and bracing*
Recording: *Very good*

Kurt Masur's Teldec recording of Schumann's two other symphonies with the LPO was one of last year's most appealing orchestral releases. This companion disc again surpasses the Schumann performances Masur recorded earlier in Leipzig and is enjoyable in its own right, but not as surpassingly so as the one of Symphonies Nos. 1 and 4. I like the fleet pacing and fine sense of momentum in No. 2. At 8 minutes flat, this is probably the fastest performance of the work's slow movement on records, but there is not a hint of breathlessness, and the finale is utterly free of rhetorical gestures. The "Rhenish", too, is generally to the good. What is missing is a sense of tenderness, of intimacy in the slow portions of both symphonies. Of course, that sort of thing tends to be overdone in Schumann performances. Masur's non-nonsense approach is certainly to be preferred, but I think some other conductors have struck a more attractive balance. For the same coupling, I'm still partial to Wolfgang Sawallisch's twenty-year-old recording with the Dresden State Orchestra on Angel. R.F.

SHOSTAKOVICH: *Symphony No. 10; Chamber Symphony* (see Best of the Month, page 80)

TCHAIKOVSKY: *Variations on a Rococo Theme* (see ELGAR)

TELEMANN: *Suite in B Minor for Flute, Oboe, Bassoon, and Basso Continuo; Concerto in G Major for Flute, Oboe d'Amore, and Basso Continuo; Six Canonic Sonatas, Op. 5.* European Baroque Soloists. DENON © 81757 9614-2 (44 min).

Performance: *Expert, graceful*
Recording: *Homogenized*

Telemann is sometimes described as the German Vivaldi, but the charming and graceful Suite in B Minor here is a French pastorale in the Couperin or Rameau vein, and the curious and learned Canonic Sonatas—they are unaccompanied duets for flute and oboe, and the canons are as literally note for note as *Three Blind Mice*—could only have been written in Germany. The Concerto in G Major, however, a double concerto without orchestra, is quite in the Italian vein.

All these style switches are neatly handled by these early-music specialists in a recording that makes a mere handful of musicians—a fivesome, a quartet, and even six dry duos—sound like a whole Baroque orchestra. It always baffles me, though, when the special and crisp qualities of old instruments are so mashed down and homogenized by empty-chapel acoustics (here a Schlosskapelle near Salzburg) that you can hardly tell the difference anyway. E.S.

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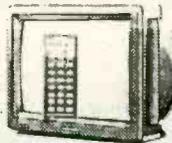
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June



THE HIGH END

by Ralph Hodges

Seizing the Day

THE time was when Dolby Labs was a quiet sort of company, patiently and humbly peddling its noise-reduction systems successfully (home and professional recording, cinema sound) or not (FM broadcasting), holding its modest beacon aloft to attract the rational and cost-conscious, and eschewing any grandiose schemes. Then, early this year, Dolby spokesmen appeared in New York to explain how the company was positioned to take over audio—all of audio, or very close to that.

The tale begins in the motion-picture theater, or rather three such theaters where a major film has been playing with a Dolby SR-D soundtrack. SR-D refers to a new fully digital audio format wherein the data are photographically recorded on the blocks of film base that alternate with the sprocket holes. Anyone who has seen the damage an inept projectionist can do to a film's sprocket-hole track will probably groan at this revelation, but the reason the SR-D information is assigned its unlikely location is to leave room for a conventional Dolby Stereo track, to which the projector automatically switches if the SR-D feed stops making sense.

Just for the record, SR-D provides five totally discrete full-range channels: left, center, right, and stereo surround plus a low-frequency subwoofer channel. But SR-D is not really the subject for today. The way it will serve as a precursor of and foundation for future home media is.

The mechanism by which surround information from motion-picture releases winds up on video tapes and discs, for extraction in a home theater by special decoders, is now familiar to most audiophiles. In like fashion, Dolby SR-D soundtracks are destined to be transferred to future generations of the same media via SR-D's digital encoding format, called AC-3. AC-3 is a rather radical digital data-compression scheme in which approximately 1.3 megabits of information per second are tucked into a 400-kilobit-per-second package. This feat is accomplished by ignoring any audio signals that can be expected to be inaudible anyway because of psychoacoustic masking. In concept it resembles the well-publicized PASC scheme that Philips has developed for its Digital Compact Cassette, although it is not yet clear whether there will be any degree of useful compatibility between the two. (On this point, a Philips spokesman advises that the DCC system is nailed down, so any yielding on operational characteristics will have to take place in the Dolby camp.)

It seems to be Dolby's expectation that once the cinema system is established, other applications will develop as a consequence, certainly in home theater and perhaps also in audio-only media such as the CD, as is even now happening with Dolby Surround, exploiting the growing number of compatible decoders in the field. Does this mean that there could someday be a thing that is physically a DCC mechanism but magnetically an AC-3 recording? Surely, and especially if high-end audiophiles, should they accept data compression at all, decide that Dolby's process is the better one.

Just now, however, neither of the players anticipates such a scenario. For one thing, DCC was deliberately conceived as a *recording* format, whereas AC-3 is a "front-loaded" arrangement whereby producers of pre-recorded software undertake most of the expense and complexity, while the end consumer need invest only in a single-chip decoder package. In this respect, the two systems appear to be entirely different animals.

Still, in the 1980's, cassette-related enterprises constituted a good third of Dolby Labs' business. It will be hard

to part with, even if the transition to digital tape technologies is as gradual as expected. Therefore, the company is mounting a strong assault on the back door, hoping to capture territory that Philips will not be able to secure through a frontal entry—or at least that's the way I read the situation.

And then there are those who believe that it doesn't really matter, that the game is already over. Among them is Richard Clark, president of American Multi Media, this country's largest independent producer of prerecorded cassettes, and certainly its strongest innovator. In a recent telephone conversation, Clark offered comments that suggest he is prepared to abandon such contact media as magnetic tape and embrace optical-pickup alternatives like Mini Disc or the recordable CD that is rapidly drawing nigh. He cites factors such as the rapid-access

Once Dolby's new SR-D digital cinema sound system is established, applications in home theater and audio-only media may develop.

capabilities of disc-based material and the limited bandwidth of current digital media, which he doesn't see the tape-system proposals striving to overcome. He also finds the conditions that Philips is imposing on potential DCC duplicators oppressive. If he is correct that tape is doomed in the consumer sector, Dolby could wind up with more room to maneuver.

In the interim, Dolby is going public, informationally. Those of you who have access to modem-equipped computers can subscribe to America Online, (800) 827-6364, where you'll find the Dolby Audio/Video Forum addressing such topics as, "What Is Dolby Surround?" and "Cassette Technologies from Dolby." The software is free, although the service isn't. It purports to inform you about films worth catching, however.

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