SYSTEMS FOR SMALL SPACES

SPECIAL TEST REPORT:
NAKAMICHI'S DIGITAL AUDIO TAPE RECORDER

ALSO TESTED:
VECTOR RESEARCH CD PLAYER, SNELL SPEAKERS, NIKKO INTEGRATED AMP, AND MORE...
The CDV 488 plays all six disc formats: 3-inch, 5-inch CD, 5-inch CDV, 8-inch/12-inch CD-LDs and the 8-inch LD single.
When Philips invented laser videodisc technology, we envisioned uncompromised video performance. The CDV488 is the result of this philosophy.

In fact, according to *High Fidelity*, it achieves "...a level of performance that cannot be bested in any significant regard by any competitive product..."

The CDV488 provides 300% sharper color fidelity than any consumer videotape, including Super VHS. And Philips' proprietary wide bandwidth CCD comb filter with S-video output enhances color detail and color accuracy even further.

It also produces a remarkable 420+ lines of horizontal picture resolution—greater than many broadcast video recorders.

The universal remote allows you access to digital performance features like rock-solid still frames, single-frame advance and crisp slow motion on all videodisc formats. Add to this the jog shuttle that gives you the freedom to operate these effects from your armchair, and you begin to see why the CDV488 offers a home video alternative to the picture quality and special effects found in professional studios.

Remarkably, its high standards in digital video are matched by its specifications in audio. It features the latest Philips Select Grade TDA-1541-A SI dual D/A Converter System, widely regarded as the premier D/A conversion technology available today.

From the company that created compact disc, now comes the CDV488. For those who insist upon the finest expression of digital sight as well as sound.

Call 1-800-223-7772 for your nearest Philips audio/video specialist, to audition this outstanding CDV player.

**World-Class Technology. European Excellence.**
Jamo

SW 60

"I like that"

she whispered

"In her smoky voice"

"It moves me"

"in a new way"

AMO Hi-Fi USA, Inc.
425 Huleh Rd., Bldg. 3A
Northbrook, IL 60062
312 496-4648
The Basics
Squiggles and pits: recovering audio signals  by Ian G. Masters

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Systems for Small Spaces
Tight quarters? Consider some of today's sound solutions  by Ian G. Masters

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Find The Speakers
A decorator's dream, the in-wall speaker is no longer an audiophile's nightmare  by Warren Berger

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A report from Tokyo  by Bryan Harrell

Riccardo Chailly
"It is such a daily pleasure for me to be with the Royal Concertgebouw Orchestra"  by Roy Hemming

Best Recordings Of The Month
Janet Jackson, Bruckner's Symphony No. 8, Rodney Crowell, and Purcell's Dido and Aeneas

Record Makers
The latest from Kate Bush, Terence Trent D'Arby, Bo Diddley, the Tokyo String Quartet, Phil Collins, and more

Cover: The Proton 600 Series (see page 74) and the Sonance It' in-wall speaker (see page 85). Neon by Neon City, New York City. Design by Sue Llewellyn, photo by Hing/Norton.
DON'T BUY ONE OF THESE UNTIL YOU TAKE A HEARING TEST.

Warning: If you read this ad you'll wind up at your Sherwood dealer. Why? Well, it won't be the fact that our current line of home components is the finest we've ever built. Or because our engineers didn't cut corners to assure excellent, long lasting performance. Or because you'll have enough jacks to handle an entire home entertainment center.

No, the reason you'll see your Sherwood dealer is to listen to these components for yourself. Because putting our sensibly priced components to the test is a heck of a lot more important than anything you'll find in an ad...

If you think they sound good now, wait until you hear them. LIVE PERFORMANCE SOUND™
BUY BRITISH
British global manufacturing company Polly Peck International has agreed to purchase a 51-percent stake in Sansui Electronics for approximately $111 million in cash. If the deal is completed, the Sansui brand name is expected to be extended to TV sets and VCR’s. Polly Peck owns seven other electronics companies, with fifteen factories, and is a worldwide manufacturer of video and portable stereo equipment under a variety of brand names.

DAT RECORDINGS FROM SONY
Sony Classical, which is the new name of CBS Masterworks, will offer a digital audio tape sampler of classical music at the Winter Consumer Electronics Show to preview twenty bat's it has scheduled for release in May. The bat's include two hitherto unreleased recordings: a recital by the late Vladimir Horowitz recorded shortly before the pianist's death last November and a performance of Mahler's Eighth Symphony by the Vienna Symphony under Lorin Maazel.

"PEANUTS" SUPER BOWL
GRP Records is going all out to mark the fortieth anniversary of the popular comic strip Peanuts, collaborating with syndicator United Media on the halftime show at this year's Super Bowl as well as on a CBS television special airing later this month. Also supporting GRP's best-selling album "Happy Anniversary, Charlie Brown!" is a multimillion-dollar arena stage production, Snoopy's World of Magic, which took to the road last November and will play in nearly fifty North American cities this year.

HOME TAPING
To assist Congress in reconciling copyright law with the capabilities of new technology, the Office of Technology Assessment (OTA) has conducted a study of home taping activities and public attitudes toward taping. When the results of the study were published in late October, a measure of victory was claimed by both of the major antagonists on the issue of taping, the Recording Industry Association of America (RIAA) and the Home Recording Rights Coalition (HRRC).

Pointing out that the study showed 40 percent of Americans over the age of ten had taped prerecorded music in the preceding year, Jay Berman, president of the RIAA, said, "I am pleased that the OTA report recognized the serious threat posed by bat and other digital recording technology, but I am disappointed at the OTA's lack of any positive recommendations on how to protect the American music industry against unauthorized copying."

Thomas P. Friel, chairman of the HRRC, said, "The OTA survey confirms what we have been saying all along: most home music tapers are taping their own music, for their own use, on their own audio equipment. OTA's impartial survey results should finally bury the idea of a royalty tax."

INCENTIVES
Customers who use Mitsubishi Three Diamond cards to buy Mitsubishi audio or video equipment between January 18 and 29 can take up to a year to pay off the purchase without interest. Through January 31, selected Musicmasters CD's will include coupons for a free sampler disc of the label's jazz or classical recordings. Bib Audio/Video Products' new Bonus Pak includes an MCA Master Series jazz sampler cassette and an A-625 audio cassette head cleaner ($14.95). From January through June, buyers of Memorex DDS-100 surround-sound system kits are eligible to be reimbursed for $50 worth of videotape rentals. Customers who buy Memorex VHS-100 audio/video headphones get $15 worth of videotape rentals.

MUSIC NOTES
The Who, Bobby Darin, the Kinks, Simon & Garfunkel, and the Four Tops are among the artists being inducted this month into the Rock and Roll Hall of Fame in ceremonies at New York's Waldorf-Astoria Hotel. . . . Bobby Short, Sylvia Syms, Margaret Whiting, Julie Wilson, Hildegard, and Elizabeth Welch were named "cabaret classics" at the First Cabaret Convention, held in New York this past fall and sponsored by the Mabel Mercer Foundation. In Cannes, France, the composer and record producer Quincy Jones is being named Man of the Year at the 1990 MIDEM international music trade show.
Surround Sound

Ken Pohlmann's November article on surround sound was very informative, but it raises some questions: How does a six- or eight-channel speaker requirement alter old recommendations about "sinking the big bucks" for a system in a pair of good speakers? Are large main speakers with excellent imaging qualities less important since imaging and realism are the function of the other (ambience) speakers? Is efficiency a higher priority?

What features are desirable in the ambience speakers? Certainly they need to be smaller as the room fills with speakers, should this be at the expense of good bass response? How can you compare candidates in a showroom? I would think A/B switching would be pretty impractical when you have eight channels.

Robert Lambert
N. Little Rock, AR

In "Surround Sound" Ken Pohlmann states that we can tell "a recording is merely a recording, not the real thing ..." largely by the fact that "the playback system fails to provide the ambience information that should rightly sink your big bucks in your main loudspeakers; ambience to record. When played back in a "dead" studio, so there was no ambience to record. When played back in a concert hall, the recording would sound exactly like the live performer in the Tone Test since the audience would hear exactly the same concert-hall ambience to record. When played back in a "dead" studio, so there was no ambience to record. When played back in a concert hall, the recording would sound exactly like the live performer in the Tone Test since the audience would hear exactly the same concert-hall ambience from the two separate sounds. The audience could never tell whether the sound was from the live performer or the record. (Another reason Edison could pull this off was that early Diamond Disc records had silent surfaces, which primarily provide directional fill, since the directional information is mostly in the middle and high frequencies, small ambience speakers are free. If you want deep bass in a multi-speaker setup, invest in a subwoofer or two. As for listening comparisons, that is a tough proposition. You really have to audition ambience speakers in a surround-sound setup, not as if they were main speakers, and in your own home if possible.

"When Harry Met Sally ..."

Harry Connick, Jr., may be a talented artist, but I was extremely disappointed by Columbia's decision not to use all of the original recordings heard in the movie for the album of When Harry Met Sally. I rushed out after seeing the film and purchased the CD with the expectation of hearing Louis Armstrong, Ella Fitzgerald, and Frank Sinatra, not just Harry Connick, Jr. As a result, none of the wonderful moments of the film are conjured up when I listen to the disc.

Larry Jones
Purchase, NY

Systems

It is quite a distinction to see an example of our work in STEREO REVIEW's "Systems" (November 1989), but I want to give credit to the two companies that made the whole project possible: the architectural firm of Bahr, Vermeer, and Haack, and the interior-design team at Greathouse Associates. Without the design expertise provided by the talented individuals in these organizations, our ideas would have remained just that: ideas.

Dominique J. Cheèene
President, C&C Consultants
Lincoln, NE

Clean Licks

In regard to the Digital Music Products advertisement that appeared on page 144 in the November issue: I sincerely doubt that any musician, let alone a cat, would be able to get a "clean lick" out of a saxophone with a clarinet mouthpiece on it.

Scott A. Armstrong
Sterling Heights, MI

Paul McCartney

Why on earth would you hand Steve Simels a Paul McCartney album to review (October, "Flowers in the Dirt")? Mr. Simels is aligned with John Lennon, the Ramones, Noo Yawk, and anything else that's reasonably abrasive. I feel the same way, but I also like Paul
Only Sony could add this principle to a portable CD player.

Introducing the first CD player with Digital Signal Processing.

The next movement of the digital audio revolution is upon us. It's called Digital Signal Processing (DSP). Simply put, DSP is the biggest breakthrough since the digital Compact Disc itself. So who else but Sony, the inventor of the Compact Disc, could bring it to you first. In the new D-555 Discman® portable CD player.

DSP is such an important step forward because it allows you to digitally enhance CD sound reproduction by utilizing several different functions, without adding undesirable noise, distortion or phase shift.

Just contemplate the possibilities. Add digital bass boost below 80 Hz, for optimizing headphone bass response. Adjust digital dynamic range compression, for listening to CD's in the high ambient noise environment of the car. There's also digital surround and digital graphic equalization at five frequency positions.

The D-555 is also accompanied by an 8X oversampling filter with noise shaping, plus dual D/A converters, for the finest music reproduction available from a portable CD player today.

And for the finale, the D-555 even features an optical output port, for direct interface with other digital components of the future.

The Sony D-555 Discman. It's the only digital CD player that lets you fine tune your music...digitally.

SONY
THE LEADER IN DIGITAL AUDIO™
McCartney—not the My Love treacle that winds up on the radio but the indispensable gems buried in each of his solo albums. (Actually, the new album had a thoroughly enjoyable radio single, My Brave Face).

The best track in “Flowers in the Dirt” is probably Figure of Eight, which Mr. Simels dismisses as “a not-awful bit of power pop à la Squeeze.” What irony! Squeeze has always and affectionately been rooted in the McCartney-esque side of the Beatles.

PRESTON REESE
San Francisco, CA

The Laser Turntable
Whatever happened to Finial Technologies and the laser turntable?
ROGER KULP
Albuquerque, NM

Ralph Hodges wrote about the imminent introduction of the $3,700 Finial LT-1 laser turntable in his March 1989 column, “The High End,” only to find at the last minute that Finial pulled the plug on the product because of higher than expected production costs. The most recent development is that Finial has sold its patent and worldwide distribution rights to a Japanese company, CTI Japan, which has altered the design of the LT-1 to make it more suitable to the rigors of the professional market. It now has a price tag of about $14,000 and will be marketed to libraries, archives, radio stations, and anyone else who can afford it. For more information, write to CTI Japan, #7 Azuma Building, 1-9 Kanda Sakumacho, Chiyoda-ku, Tokyo 101, Japan.

The Speaker Gap
Regarding Ken Pohlmann’s October “Signals” column on “The Speaker Gap”: I am one recordist who has been using consumer loudspeakers when mixing sounds, but I find this is not enough to insure that I hear the work the way the consumer will. My mixing room is a place to monitor sounds; it can be made so soundproof that I feel cut off from the rest of the world. Listening to consumer loudspeakers in this room is not a real-world experience.

I now play cassettes of trial mixes in the kinds of places where the finished product will be heard, including conference rooms, auditoriums, cars, living rooms, and—because a radio show I mixed for years was aired during the breakfast hour—on the radio in my kitchen. All of these different real-world environments “sound” very unlike my studio.

DAVID BATES
Swarthmore, PA

Subliminal Message
I recently discovered something very disturbing: a backwards message in the Emergency Broadcast Network announcement, as heard in the TeeVee Toons album, “Televisions Greatest Hits.” The discovery happened quite by accident when a DJ at the University of Western Ontario radio station cued the record in the normal manner by spinning it in reverse. It was immediately obvious that there was a backwards message recorded behind the first four words, “This is a test…” The subliminal message is, “Sex is a sin.”

It was clear to all of us who first heard it that when the bombs are flying, the government wishes to discourage copulation at all costs. In democracies like ours, this sort of thing should not happen. In short, be wary of groups of men in trenchcoats with short haircuts and identical sunglasses. They have been following me ever since the discovery of the message at 9:45 p.m. on November 1, 1989.

MICHAEL PAUL LAMMEREN
London, Ontario

CD Prices
I am concerned about the high cost of CD’s. In Houston, the nation’s fourth largest city, with a population of between three and four million, there is just a handful of places where one can purchase classical and jazz CD’s. Most of them charge $15.95, and one with a limited selection charges $13.95. I’ve been told that the actual production cost of CD’s is around $3, with the rest going to performers, record companies, producers, agents, ASCAP, BMI, and so forth.

I may be wrong, but I believe that we are being taken to the cleaners. A few years ago $8 or $9 for an LP was considered high. Now a CD for $9 is considered a bargain. It’s ironic how the record companies have changed our perception of value and increased their revenues from an album by 50 percent just by changing the format. I’m not against their making a profit. I just believe I’m being gouged, and I don’t like it.

HOWARD E. BROWN
Houston, TX

Address Change
The October “New Products” section included an item about the Cerca Classic 120 loudspeaker made by Pearl and Oakley Acoustics of Wales. The U.S. distributor, Intecas, notified shortly after the issue appeared. The new address is Anteca, 5816 Corporate Ave., Suite 170, Cypress, CA 90630.
Starting with the first digital recording of music in 1972, Denon has produced an unbroken string of digital audio breakthroughs.

Denon's LAMBDA processor bilaterally offsets the digital waveform to eliminate the distortion that occurs when low-level waveforms cross the zero line.

The LAMBDA Super Linear Converter: Another significant digital audio first from the first company to record music digitally.

Denon's CD player innovations include the Super Linear Converter, the 20-bit digital filter, the real 20-bit converter and noise-shaping filter circuitry.

Denon's latest digital advancement is the LAMBDA Real 20-Bit Super Linear Converter in the DCD-1560. The LAMBDA system's digital offset processor and dual 20-bit converters eliminate the most common source of distortion in CD players: the zero crossings of low-level signals.

Denon's consistent leadership in digital audio technology may explain why earlier generation tenons often sound better than current competitors' models. And why a leading hi-fi journal found that a moderately-priced Denon equalled or outperformed all others tested, including machines costing over $1800.

What makes Denon CD players better? Perhaps it's that Denon performs every step in the music chain from recording artists through pressing CDs. And that Denon has concentrated on one thing and only one thing for 80 years. Music.

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"The sound is superbly balanced and totally effortless."  Stereo Review Magazine
“Matthew Polk’s SRS Speakers Bring You the Ultimate Listening Experience”

“Spectacular... it is quite an experience.” Stereo Review Magazine

The Joy of Owning the Ultimate Dream Speakers

Music lovers who are privileged to own a pair of SRS's will share in Matthew Polk's dream every time they sit down and enjoy the spine-tingling excitement of listening to their favorite music. Demonstrating them to admiring friends ultimately increases their pride-of-ownership. "Awesome" is the word most often used to describe the sound of an SRS system. They are capable of playing at live concert levels for long periods of time, with a surprising lack of effort and without producing ear-fatigue.

The bass response can literally move your body any time the music requires it, yet they perfectly reproduce all of the subtle nuances of a string quartet and are just as enjoyable at a low volume level as when played loud. Music and ambience surround the listener in an almost 360-degree panorama of sonic splendor that is, in the words of High Fidelity magazine, "Mind-boggling... Astounding... Flabbergasting." But words alone cannot possibly describe the experience of listening to these ultimate speaker systems, you simply must hear them.

SRS 1.2 tl

Two time Audio Video Grand Prix Winner

The ultimate expression of Polk technology, this limited production flagship model sets the industry standards for imaging, detail, dynamic range, and bass reproduction.

SRS 2.3 tl

Audio Video Grand Prix Winner

This scaled-down version of the SRS 1.2 tl incorporates all of flagship's design innovations without significantly compromising its awesome performance.

Polk Audio's SRS: The Quest for Perfection

The goal of Matthew Polk's Signature Reference System (SRS) speakers is to bring an unparalleled level of life-like musical reproduction to your home. Perfect musical reproduction, long the dream of every speaker designer, is approached so closely by Matthew Polk's SRS's that it will seem as if the musicians are performing right in your listening room. This stunning achievement combines technology and creative insight to bring you a listening experience that you will never forget.

1. Patented SDA True Stereo Technology — The first and only speaker systems to maintain full stereo separation all the way from the source to your ears.

SRS speakers seem to disappear as musical images fill your listening room and seem to immerse you in a fully three-dimensional soundfield of startling realism.

2. Multiple Driver Arrays — The use of multiple drivers allows each separate element to work less hard and lowers distortion even at live concert levels. Power handling is increased to 1,000 watts per channel, providing a seemingly limitless dynamic range.

3. Time-Compensated Driver Alignment — Time-coherent driver placement insures that the entire spectrum of sounds reaches your ears at the same time. The sound is better focused, balanced and less fatiguing.

4. Wavelength Optimized Line-Source — Vertical driver arrays focus the sound waves into the room in a way which greatly reduces floor and ceiling reflections. Progressive reduction of the acoustical length of the arrays maintains constant vertical dispersion and eliminates "comb" filtering effects that limit other multiple driver systems. The result is extraordinary clarity and detail, great flexibility in room placement and precise stereo imaging from virtually any place in the room.

5. Planar 15" subwoofer — SRS bass performance is breathtaking. The use of small active drivers (eight in the SRS 1.2 tl, six in the SRS 2.3 tl) coupled to a huge sub-bass radiator achieves a bass response that is extraordinarily tight, fast (no boominess), deep and distortion free. In fact, the distortion at 25 Hz is lower than that of many audiophile-quality tube amplifiers.

6. Bi-amp Capability — The optional use of separate amplifiers for the high and low frequencies further improves clarity, lowers distortion and increases dynamic range.

7. Hand-Crafted Limited Production — The one-at-a-time attention that goes into the production of every Polk SRS speaker system means that your pair will sound and look as good as Matthew Polk's own.

Where to buy Polk Speakers? For your nearest dealer, see page 136.

CIRCLE NO. 90 ON READER SERVICE CARD
The most remarkable breakthrough in digital technology since the introduction of compact disc players. That's 3D Bit Stream. Exclusively from Harman Kardon.

3D Bit Stream turns digital data into musical experience at 33,868,800 times per second. (100 times faster than conventional CD players.)

The 3D Bit Stream CD players offer unsurpassed linearity, low-level accuracy, and freedom from phase irregularities. Or, quite simply, 3D Bit Stream lets the music flow.

A more musical experience. That's Harman Kardon.

From the delicate sound of a classical Spanish guitar to the driving rhythm of a bass, 3D Bit Stream captures all the dynamics, dimension, and drama of a live performance.

Harman Kardon has a history of firsts: from the world's first high fidelity receiver. The first cassette deck to incorporate Dolby*. The introduction of the active tracking tuner. And now, bit stream technology with totally discrete analog circuitry in compact disc players.

That's Harman Kardon. Pioneering technology for people who love music.

Take your favorite CD to your Harman Kardon dealer. Listen. And experience the music as you never have before.

Also ask for a detailed explanation of 3D Bit Stream, or write: Harman Kardon, Engineering Dept., 240 Crossways Park West, Woodbury, NY 11797.
PHILIPS

The FR780 audio/video receiver from Philips is rated to deliver 70 watts rms per channel into 8 ohms. It allows the user to mix any audio source with any video source and to select AM or FM tuner frequencies by direct numerical entry as well as with conventional scan tuning or the nineteen station presets. The motorized volume knob can be operated by the RC-5 remote control, which is also compatible with other Philips audio and video components. An alphanumeric display shows which A/V sources have been selected. Price: $549. Philips Consumer Electronics Co., One Philips Drive, P.O. Box 14810, Knoxville, TN 37914-1810. Circle 120 on reader service card

CELESTION

The Celestion Model 5000 speaker has an 8-inch die-cast polyolefine-cone woofer and a midrange/treble ribbon driver for frequencies from 900 to at least 20,000 Hz. The complementary third-order crossover is biwired with star-ground return feeds. The ribbon driver is housed on the inside corner of the cabinet at a 45-degree angle from the woofer's axis in order to minimize cabinet diffraction and create a wider listening "window." Bass response is rated as –3 dB at 66 Hz and –6 dB at 49 Hz, sensitivity as 86 dB sound-pressure level, power handling as 100 watts, and impedance as 4 ohms. Dimensions are 25½ x 13 x 13 inches, and the cabinet finish is walnut veneer. Prices: $2,299 a pair; $399 a pair for the optional Celestion K stand shown. Celestion Industries, 89 Doug Brown Way, Holliston, MA 01746. Circle 122 on reader service card

SHARP

The Sharp MV-D100 combi-player is also a five-disc carousel CD changer. It can play any combination of 3- and 5-inch CD's and 5-inch CD-v's as well as single 8- and 12-inch videodiscs. Features include an eight-times-oversampling digital filter, dual digital-to-analog converters, an optical digital output terminal, and an S-video output terminal. Price: $1,499.95. Sharp Electronics Corp., Dept. SR, Sharp Plaza, Mahwah, NJ 07430-2135. Circle 123 on reader service card

TERK

The Pi/2 is Terk's latest FM antenna to use the company's patented Gamma Loop design, which Terk claims rejects multipath and noise better than standard dipole antennas. Its gain is variable from –20 to +38 dB, enabling users to reduce the received signal level to overcome overloading or to boost the level to pull in weak stations. Impedance is 75 ohms; a 300-ohm adaptor is supplied. The circular Pi/2 measures 5 inches in diameter and 1 inch thick. Its reception pattern is omnidirectional when it is laid flat and directional when it is stood upright on its base. The antenna is available in matte black, gray and white finishes. Price: $79.95. Terk Technologies, Dept. SR, 56 Harrison St., New Rochelle, NY 10801. Circle 121 on reader service card
SONY

Sony's MDR-CD999 headphones are part of its Digital Monitor Series. The oval circumaural ear pieces are said to lock in sound and block out background noise; a soft-cushion headpiece provides listening comfort. Frequency response is rated as 3 to 30,000 Hz. The phones use Class 1 linear-crystal oxygen-free copper Litz cable for high-fidelity signal transfer without losses. The gold-plated stereo Unimatch input plug, which can fit either mini or standard phone jacks, is said to provide superior conductivity. Price: $250. Sony Corp. of America, Dept. SR, Sony Dr., Park Ridge, NJ 07656.

A/D/S/

The a/d/s/ L9e three-way bookshelf loudspeaker is part of the moderate-price L series. The L9e's 8-inch woofer is made of Stifflite, the company's proprietary air-filled cellulose composite, whose cross-linked, randomly oriented fibers are said to minimize coloration. The 1-inch soft-dome tweeter is made of a copolymer material with a high internal damping coefficient, and the 1 1/2-inch dome midrange is designed for high efficiency. The system's frequency response is rated as 38 to 22,000 Hz ± 3 dB, its nominal impedance as 4 ohms. Dimensions are approximately 21 1/2 x 11 1/2 x 10 1/2 inches, and the cabinet is available in walnut veneer or a textured finish. Price: $800 a pair. a/d/s/, One Progress Way, Wilmington, MA 01887.

FOSGATE

The Fosgate AS 602 in-wall speaker was designed for surround-sound and home-theater applications. It has a 6 1/4-inch polypropylene woofer/mid-range, a 1-inch soft-dome tweeter, and a 24-dB-per-octave crossover that incorporates air-core inductors and low-loss film capacitors. A protective device automatically cuts off power to the tweeter in the case of signal overload and resets instantly when power is reduced to a safe level. Impedance is rated as 8 ohms, sensitivity as 88 dB at 1 meter with a 1-watt input, and frequency response as 70 to 22,000 Hz. A mounting frame to fit existing walls is supplied; a construction kit for new walls is available. Price: $425 a pair. Fosgate, Dept. SR, P.O. Box 70, Heber City, UT 84032.

MITSUBISHI

Mitsubishi's first videodisc product is the M-V7010 combi-player, which plays 5- and 3-inch audio CD's, CD-V's, and 8- and 12-inch videodiscs. Both sides of a two-sided disc can be played automatically without turnover. The player has four-times-oversampling digital filters, dual digital-to-analog (D/A) converters, and a fiber-optic port for use with an outboard D/A converter. Other features include twenty-track programming, automatic program editing for dubbing CD's onto cassettes, shuffle play, and intro-scan, which plays the first 8 seconds of each track or chapter on a disc. A remote control is supplied. Price: $1,099. Mitsubishi Electric Sales America, Dept. SR, 5757 Plaza Dr., P.O. Box 6007, Cypress, CA 90630.

Circle 124 on reader service card

Circle 125 on reader service card

Circle 126 on reader service card

Circle 127 on reader service card
AUTOMOTIVE STEREO AMPLIFIERS AND COMPONENTS

HIFONICS is the one single manufacturer supplying all of the auto stereo users' needs. With amplifiers from 40 to 1200 watts (RMS power into 4 ohms) in 1, 2, 4 and 6 channels. ALL DESIGNED AND MANUFACTURED IN THE U.S.A.

HIFONICS also manufactures parametric equalizers, electronic crossovers, a full range of loudspeakers and accessories.
ACOUSTIC RESEARCH

The Studio Partner powered speaker is a larger version of AR's Powered Partner. The system uses electronic equalization to create a bass sound said to equal that produced by larger speakers. Each speaker has an 8-inch, large-magnet woofer with a 1 1/2-inch voice coil that crosses over to a low-resonance tweeter at 2,000 Hz. One speaker in each pair contains a stereo amplifier, powered from AC line current, that is rated to deliver 16 watts per channel with no more than 1 percent total harmonic distortion. The speakers come with a two-year warranty (parts and labor) and are guaranteed to perform within ±1 dB of specifications for five years from date of purchase. Price: $379 a pair. Acoustic Research, Dept. SR, 330 Turnpike St., Canton, MA 02021.

Circle 128 on reader service card

R. F. ENGINEERING

R. F. Engineering's SI-2 switching system enables users to connect the same loudspeakers to both a stereo television set and a stereo audio system. It automatically detects which of two amplifiers is attempting to run the speakers and allows only that amplifier to drive them, eliminating the need to buy separate speakers for a stereo TV set or to run the audio signal from the set through the hi-fi system's auxiliary input. The SI-2 can switch up to 120 watts. Price: $49.95.

Circle 129 on reader service card

SAMSUNG

Samsung's CD-22R compact disc player has sixteen-track programming capabilities and can play 3-inch discs without an adaptor. Features include an index selector, repeat of one or all tracks, a headphone jack, and a slider volume control. It uses a three-beam laser pick-up and comes with a fifteen-function remote control. Price: $209.95. Samsung Electronics, Dept. SR, 301 Mayhill St., Saddle Brook, NJ 07662.

Circle 130 on reader service card

ONKYO

The Onkyo A-8700 integrated amplifier is rated to deliver 105 watts rms per channel into 8 ohms from 20 to 20,000 Hz with no more than 0.008 percent total harmonic distortion. It features Onkyo's AEI (Anti-Electromagnetic Interference) transformer, which uses a special core configuration and silicon-steel shielding to reduce flux leakage from the core and coil by 22 to 34 dB, and Onkyo's Opto-Drive power-amplifier circuit, which uses a phototransistor to convert light energy into an electrical audio signal free of spurious elements. Other features include a Delta power supply, linear switching circuitry, a charging noise filter, and heavy-duty four-way speaker terminals. Price: $529.95. Onkyo, Dept. SR, 200 Williams Dr., Ramsey, NJ 07446.

Circle 131 on reader service card

COAST MANUFACTURING

The Coast CD-30 compact disc case is made of soft, durable nylon and padded for protection. It can accommodate four double CDs and has a total capacity of thirty discs. The adjustable shoulder strap can also be used as a handle. The removable tray can be wall-mounted; extra trays can be purchased separately. Dimensions are 10 1/2 x 8 1/2 x 5 1/2 inches. Price: $17.95. Coast Manufacturing Co., Dept. SR, 118 Pearl St., Mt. Vernon, NY 10550.

Circle 131 on reader service card
Don Henley — The Innocence Of Where We Grew Up (Capitol)

Guns N' Roses — Appetite For Destruction (Epic)

Joey Ramone — Songs The Lord Taught Us (Columbia)

Barry Manilow — Some Other Time (Atlantic)

Roy Orbison — The All-Time Greatest Hits (EMI)

Dance With The Devil In The Hands Of God (Warner Bros)

The B-52's — Cosmic Thing (Reprise)

Lloyd Cole & The Commotions — 1984-1989 (Capitol)

Bora Gereden — Headstrong (Virgin)

The Cure — Disintegration (Elektra)

Indianapolis — Hangin' Tough (Warner Bros)

Tom Petty & the Heartbreakers — Into The Great Wide Open (Warner Bros)

Canadian Brass — Romance (CBS Masterworks)

The Chick Corea — Akoustic Band (Atlantic)

Tone-Loc — Loc'd After Dark (Elektra)

Skid Row — Skid Row (Atlantic)

Madonna — Like A Prayer (Warner Bros)

Martiika (Capitol)

Don't Judge Me (Capitol)

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How the Club works: About every 4 weeks (12 times a year) you'll receive the Club's music magazine, which describes the Selection of the Month—all 10 selections. In addition, up to 6 times a year you may receive offers of Special Selections, usually at a discount off regular Club prices.

If you wish to receive the Selection of the Month, you need do nothing—it will be shipped automatically if you prefer an alternate selection, or none at all. If at any time you are not satisfied for any reason, simply return the Selection of the Month within 10 days and you will have no further obligation. If you decide to continue as a member you'll be eligible for our bonus plan. It lets you buy any CD at 10% off Club prices. And you'll have no further obligation.
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New York Times
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"The sound was lively, full of punch and power, and extremely true on the nuances..."

Rich Warren
Chicago Tribune
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Rich Warren Chicago Tribune
Nationally Syndicated Audio Columnist

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Fifteen years of unmatched experience places M&K at the forefront of the subwoofer industry. No other manufacturer offers as wide a variety of styles and sizes of high-performance subwoofers. From the very affordable to the state-of-the-art, M&K subwoofers are unsurpassed in audio and audio/video system performance.

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Announcing the Sixth Annual

RODRIGUES CARTOON

CAPTION CONTEST

Hear ye, hear ye. The Sixth Annual Rodrigues Cartoon Caption Contest is now officially open. Once again the editors of Stereo Review have commissioned the artist Charles Rodrigues to supply a drawing, and we invite the readers to submit funny captions for it. Fame and fortune may await you.

The person who sends in the caption judged to be the most amusing will receive the original drawing shown below, a cash prize of $100, and the distinction of seeing his or her name in this magazine along with the winning caption when the contest results are announced.

Anyone may enter, and there is no limit to the number of times you may enter, but each caption submitted must be on a separate sheet of paper that also contains the clearly legible name and address of the person who submits it. Entries with more than one caption per page will be disqualified. All entries must be received by Stereo Review no later than March 1, 1990.

In addition to members of the editorial staff of Stereo Review and Rodrigues himself, the distinguished panel of judges will include the winners of the five previous contests: Thomas Briggle, Michael Binyon, Bruce Barstow, Matt Marpaul, and Marc Welenteychik. Entries will be judged on the basis of originality, appropriateness, and humor. The decision of the judges will be final.

So take a look at the drawing on this page and think a little. Who are those outlandish creatures? Are they androids, steroids, or Monsters from the Id? And what on earth are they doing with that terrestrial audio equipment and those household appliances? We editors want to know, Rodrigues wants to know, Enquiring Minds want to know, and only you can tell us! Sharpen your wits, turn on your word processors or electric typewriters, and let those captions fly. Be creative, be inventive, and above all be funny. You are competing with thousands of other bright readers.

The winning caption (and a selection of runners up) will be published in the June or July issue. Every year we plan to announce the winner in June, but eliminating the duds from the really funny captions takes longer than we think, and so far we have never made it until July. This year we may surprise you.

The usual restrictions and disclaimers are printed below. Send entries to:

Rodrigues Cartoon
Stereo Review
1633 Broadway
New York, NY 10019

No purchase is necessary. Anyone may enter except the staff of Stereo Review and its parent company (Diamandis Communications Inc.) and their immediate families. All entries become the property of Stereo Review, and none will be returned. If you wish to be notified of the results of the contest by mail, send a stamped self-addressed envelope to the above address.

In the unlikely event of duplicate entries, the one first received will be considered the winning entry. The names of the winner and perhaps a dozen runners-up will be published in Stereo Review and may appear in promotional literature for the magazine. Submitting an entry will be deemed consent for such use.

Stereo Review will arrange the delivery of the prize; any tax on it will be the responsibility of the winner. The judges have every intention of reaching a decision in time for the publication of the results in the June 1990 issue, but Stereo Review reserves the right to delay the announcement until July if the response is as overwhelming as last year's.
If you've vowed not to compromise this time around, consider the rich rewards of owning Carver. Each component includes unique innovations designed to confront and solve real-world sonic problems.

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CIRCLE NO. 173 ON READER SERVICE CARD

C LoupeDisc Fun Club 1990

AUDIO Q&A

by Ian G. Masters

bass, you could detect a low-frequency sound to one side if the level difference were great enough, but that would be a rare occurrence. Because most listening is through speakers, where bass directionality is unimportant, recording engineers almost always place the bass right in the center because it takes up slightly less room on a vinyl disc if recorded that way.

VCR Rumble

Q When I play rented movies with hi-fi sound I can sometimes hear a sort of rumbling sound on the audio track. It goes away when I switch to normal audio. Not all rental tapes have this problem, and the ones I record myself sound fine. Is there anything I can do to prevent this?

ROB SLOAN
Westmont, NJ

A This is a fairly common phenomenon with prerecorded videotapes containing audio-frequency-modulated (AFM) hi-fi soundtracks. Unlike normal recordings on analog audio tape, or the linear soundtracks on videotapes, an AFM audio soundtrack is discontinuous: Instead of being recorded down the length of the tape in one unbroken track, it is recorded diagonally across the tape by a pair of heads mounted on opposite sides of a rotating drum. When one of these heads reaches the end of a diagonal track, the other should be picking up the start of the next track, resulting in an uninterrupted signal. Sometimes the timing isn't perfect, however, resulting in a switching noise that sounds like a soft purr. This doesn't happen as often with tapes that are played on the same machine that recorded them, because the alignment is the same for both operations. But there are often slight differences between the duplicating deck that made a rental movie and a home VCR that plays it back, resulting in the sound you describe. It is therefore a problem built into the tape, and there's not much you can do about it.

Amplifier Dust Covers

Q Would it hurt my integrated amplifier to place a light cloth over the top to protect it from dust? Or is such protection even necessary?

TRENT MOBRAATEN
Richfield, MN

A Except when it comes to turntables, dust is mainly an aesthetic problem and is unlikely to interfere very much with the performance of your other equipment. If you do live in a particularly dust-prone area, however,

Stereo Review January 1990
Years ago, I was working my way through med school and bought my first system. The only place I splurged was on speakers. I bought a pair of KLIPSCH HERESYS, but to save money I got them in unfinished wood cabinets.

Now I'm a doctor and, frankly, making some bucks. So I recently went back to the same dealer and dropped a bundle for all new electronics and a different brand of speakers.

When I set up the new equipment, I wanted to hear the improvement, so I hooked up the old HERESYS next to the new speakers.

I was quickly disappointed. The old HERESYS sounded a lot better than the new speakers. They just had more life and clarity. I felt like I had wasted my money on speakers.

My dealer was great about it. He let me exchange those speakers for a beautiful new pair of KLIPSCHORNs. They have the biggest, most lifelike sound I've ever heard.

The old HERESYS? I'm not sure what to do with them but they're definitely not for sale. Neither are the KLIPSCHORNs.

For your nearest KLIPSCH dealer, look in the Yellow Pages or call toll free, 1-800-223-3527.
a cloth over your amplifier is not a bad idea, assuming you don't mind how it looks, but I would recommend removing it when using the system. Amplifiers produce a fair amount of heat, and adequate ventilation is a must; even a light cloth might impede the air flow around an amplifier, causing it to overheat. In extreme cases this might cause it to shut down or even cause it some permanent damage.

Unnecessary Inputs

Q I have amassed a collection of classical LP's and have no intention of switching to compact discs. I would like to buy a new preamplifier, but I don't want to pay hundreds of dollars for CD, tape, and auxiliary functions I will never use. Are there any that have only phono and tuner inputs?

FREDERICK LINDGREN Milwaukee, WI

A There are a number of specialized phono preamps on the market, at both the high and the low end, but these usually don't include any high-level (line) inputs. Preamps that do have line inputs almost always have several of them, as that is what most buyers require. In any event, additional high-level inputs for CD, hi-fi video, and the like involve only extra switch positions and a few extra input and output jacks. These do add to the cost, but not to the tune of hundreds of dollars; tens would be more like it.

Cassette-Deck Compatibility

Q A cassette recorded on my own deck plays back perfectly when I play it at home and seems to sound fine in my car deck, but when I play it on a friend's machine—a very similar model from the same manufacturer—it sounds terrible. Tapes made on my recorder sound exactly as they did when played on mine. A well-respected local dealer has suggested that the decks may have been set up to different standards, even though they are made by the same company. Is this possible?

RANDY WRIGHT Grover, MO

A It's possible, but I doubt that's the problem. While it is certainly important for a cassette deck to be matched exactly to the tape used in it, and even machines from a single company may be optimized for different tapes, most such incompatibilities affect recording, not playback. Once you have successfully made a recording, the match between the tape and the playback deck is relatively unimportant. The major exception is the tape's output level: If it is too high or too low, it may cause the Dolby noise-reduction circuits to mistrack. In your case, it would seem that there is nothing wrong with your ability to record, as your tapes sound fine when you play them back on your own machine.

I suspect that this is a case of head misalignment, probably to do with azimuth. If it is your recorder that's out of adjustment, your tapes would still play properly on it but nowhere else. Since they sound correct on your car deck, however, the problem is likely to be in your friend's machine. His tapes would still sound right on his own deck but not on yours, and vice versa.

Dissolving Data

Q One of my recent CD acquisitions turned out to be less than enjoyable, so I decided to put it to use as a decoration in my fish tank. The colors reflecting off the disc looked great there, but after a few weeks I noticed that the lettering on the label was starting to become visible from the other side of the disc. After a month, the CD had become completely transparent except for the label information. My fish seem unaffected by this, but will the same thing happen in time to the rest of my collection from humidity in the air?

JEFF BELLANTE Brooklyn, NY

A That seems highly unlikely, but the returns on CD longevity aren't all in yet. There has been an incredible amount of press coverage—and numerous letters to STEREO REVIEW—about what is called "CD rot," but in truth nobody really knows the extent of the problem, or if it is a problem. Optical-disc technology is new enough that there isn't a large body of data about what happens to compact discs over time. Accelerated aging tests have been performed by a number of companies, but how well they represent real-world conditions isn't yet known.

What does seem clear is that a small number of discs do deteriorate, but that this is largely a matter of quality control on the part of the manufacturer. Air or moisture trapped within the disc, or allowed into contact with the aluminum because improperly chosen label inks have eaten through the protective layer, can cause the metal to oxidize. But this seems to be extremely rare and almost never happens with discs from the major labels.

In your case, I suspect you did get hold of a faulty disc and performed your own accelerated aging by submerging it (particularly if it was in a saltwater tank). Chances are you'll never get another one.
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Dirty Dancing: Original Motion Picture Soundtrack * RCA 82522

Molly Cule: Feels Good 33928

Janet Jackson's Rhythm Nation 1814 I Miss You Much, etc. A&M 72386
The Double Brothers: Cycles * The Doctor, One Chain, etc. Capitol 73187
Tchaikovsky, 1812 Overture; more. SONY/Chicago, London Dig. 25176
The Beach Boys: Endless Summer * Good Vibrations, etc. Capitol 25359
Aerosmith: Pump 63678

1. Lawrence Imperial: My Name Is Law * Kiss Me Goodnight, etc. BMG Direct 64339
2. Metallica: And Justice For All * One, Blackened, title song, etc. Elektra 00478
3. Vangelis: Direct * The Motion Of Stars, etc. Arista 00476
4. Reba McEntire: Sweet Sixteen * Cathy's Clown, etc. MCA Digital 44435
5. The Digital Fox * Organist Virgil Fox Plays Bach, etc. Barnbridge 62886
6. Chieftain*A: Akousic Band * Spain, etc. GRP Digital 01006
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Linda Ronstadt: Cry Like A Rainstorm Howl Like The Wind * Elektra 52221
Starship: Love Among The Cannibals * It's Not Enough, etc RCA 44488
Anderson, Brufod, Wakeman, Howe Brother Of Mine, etc Arista 01115
Alanis: Southern Star * Song Of The South, Title song, etc RCA 00914
Van Halen: OU812 * Feels So Good, Cabo Wabo, etc Warner Bros 59913
Kissim: Rechmanns, Piano Con. No 2; 6 Etudes-tableaux * RCA Dig 00915
An Evening With Louie, Armstrong Perdido, Kokomo, etc. GRP (RCA 71018
Bird: Original Recordings Of Charlie Parker * The Bird, etc. Verve 01044
The Cult: Sonic Temple * Fire Woman, Sun King, etc. Sire/Reprise 01015
Elton John: Sleeping With The Past * Regency 10449
Expose: What You Don't Know * When I Looked At Him, etc Arista 00937
Skid Row * 18 & Life, Youth Gone Wild, I Remember You, etc. Atlantic 01038
George Strait: Beyond The Blue Neon * Title hit, etc RCA Digital 01025
Guns N' Roses: Greatest Hits * Live In Mexico, etc. Warner Bros 23790
Jazz CD Sampler * Ella, Armstrong, Getz, etc. GRP Digital 34647
Blue Murder * Valley Of The Kings, Jelly Roll, etc. Geffen 01050
R.E.M.: Green * Orange Crush, Pop Song 89, etc. Warner Bros 02716
The Police: Every Breath You Take-The Singles * A&M 73924
Eurythmics: We Too Are One * Title song, etc. Arista 63954
George Benson: Tenderly * Stardust * Steely Dan: The Best Of, etc Atlantic 01013

The Glenn Miller Orchestra: In The Digital Mood * GRP Digital 34293
Def Leppard: Pyromania * Photographs Rock! Rock!, etc. Mercury 70402
Jill Black: Killin' Time * A Better Man, etc. RCA 64407
Beastie Boys: Paul's Boutique * Hey Ladies, Egg Man, etc Capitol 53976
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Here's How To Get Your Savings...
THE TWENTY-FIRST CENTURY

by Ken C. Pohlmann

A ll technology ages. Some really choice ideas, like the wheel, age very gracefully, while others, like weapons, are obsolete almost before they are perfected. The compact disc falls somewhere in the middle. It is an outstanding piece of technology, although it is evolutionary rather than revolutionary. For example, its round shape, rotational motion, and spiral data track can be traced back to the earliest audio technology. But before the book is closed on the CD, a number of exciting new chapters will be written.

The CD is a great way to store data—audio and other kinds. The CD-ROM (CD read-only memory) has already capitalized on this for archiving large databases. A Navy cruiser, for example, requires for its running crew about 5.32 million pages of documentation weighing about 36 tons, but it could all be stored on about twenty CD's weighing about 10 ounces. A CD+V (CD video) stores digital audio and analog video on a laser-read disc, whether CD-size or 8 or 12 inches. Everything from music videos to operas is already available in the catalog.

Even if you don't want a lot of video on your CD, you may like a little. That is the aim of the CD+G (CD + graphics) format. It adds digital video information to audio discs. Every CD contains space for subcode information representing about 3 percent of the total disc. On a regular CD most of that space is unused—recorded with zeroes, in fact. On a CD+G, pictures of performers, lyrics, liner notes, etc. are stored in these empty subcode channels and can be displayed on a television set or video monitor. This idea initially bombed, but a new data-compression format permits greater storage capability and hence a better display.

Another CD format storing extra information in the subcode channels is the CD+M (CD + MIDI) format. MIDI (musical information digital interface) is the common control protocol for synthesizers and other electronic musical instruments. When MIDI information is stored on a CD along with audio information, the disc can act as a controller for a MIDI system, playing back MIDI instruments along with the recorded music, printing out scores, etc. Although CD+M will not interest most consumers, it could be a real treat for musicians.

The subcode area on discs is wide open for many other applications. It would be natural to link a CD player with a digital ambience processor. The acoustical characteristics of a particular performing locale could be stored in a CD's subcode and applied to the processor to re-create that set of acoustical characteristics. The hall size, equalization, reverberation time, and other parameters could all be set automatically so that playback was optimal in your listening room.

The CD-I (CD interactive) format stores a combination of audio, video, graphics, animation, and software on a single multimedia, interactive disc. When CD-I hardware and software are released later this year, look for some entirely new kinds of recordings that will work like a cross between Nintendo and a library card catalog. The CD-I format could be successful as both entertainment and education and may reveal wholly new ways of manipulating information. My personal feeling is that CD-I will provoke a revolution in publishing.

One of the hottest areas in audio engineering today is data compression. Rather than store the entire sequence of 16-bit words that make up a digital audio program, it is possible to store shorter words of compressed data. The CD-I format uses an encoding method called ADPCM (adaptive delta-pulse-code modulation) that offers several levels of data compression. For example, a single CD-I can store 20 hours of speech.

Although the 3-inch CD has been all but dropped in the U.S., it is certainly possible that small-diameter CD's could return. The computer industry is switching to 3 1/2-inch disks and has even introduced 2-inch disks. Thanks to data compression, it would be possible to store several hours of high-fidelity music on a 2- or 3-inch CD. If you're like me, your beloved CD collection is already a pain because of its size and weight and you'd welcome a smaller disc size provided it had high fidelity and a long playing time—even more so for portable and automotive applications.

The CD will also evolve from a playback-only medium to one that is fully recordable and erasable. Exactly which manufacturer will be the first to announce a recordable audio CD, using which of several incompatible technologies, and at what price, is the next billion-dollar question in the industry.

Over its lifetime, the CD format will serve more and more applications, and the discs will become recordable, will store greater quantities of data, and will perhaps get smaller. But the essential problem will remain: It's a mechanical medium with a lot of spinning, moving parts that have a tendency to break or wear out.

Imagine a recorder in which the storage medium is stationary—that could be the CD's ultimate success. Like the compact disc, it will be an optical system. The medium, perhaps the size of a credit card, will hold compressed data at a very high density. The recorder will use a laser to read and write data, and the beam will be deflected optically, sweeping across the surface of the card.

Sound fantastic? There are already prototypes. The only question is whether it will be worthwhile to market them. Eventually, solid-state memory devices will have enough capacity to hold compressed audio programs. At that point, music will probably be stored digitally on chips.

If its potential successors are already visible on the far horizon, should we shed a tear in anticipation of the CD's passing? No, not at all. Its ultimate success will be as a pioneer, paving the way for entirely new forms of both optical and electronic data storage and the recording/playback media of the twenty-first century.

STEER0 REVIEW JANUARY 1990 25
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you get a lot to like.
For music purists with an unlimited budget.

In the relentless pursuit of musical perfection, Infinity has created some of the world's best sounding speakers. Including one for the decidedly well-heeled: the 7½ foot, $50,000 Infinity Reference Standard V. Acclaimed internationally as the most sonically-accurate speaker ever made. (With unlimited space and budget you might choose the imposing sound—and imposing presence—of the IRS V.)

Now Infinity introduces another Reference Standard for people whose passion for music must be in harmony with their living space: the Environmental Reference Standard Series. Infinity ERS environmental in-wall speakers use no floor or shelf space, and they can be painted to match or accent your room's decor. In short, they offer the best of both worlds—filling your rooms with spacious, extremely accurate stereo sound, but without imposing on your environment.

Audition the phenomenal ERS Series speakers and pick up your copy of “Infinity Answers Your Questions On Environmental Sound.” Only at a selected Infinity ERS dealer.

For music purists with limited space.

For literature and the name of your nearest Infinity dealer, call (800) 765-5556. In Canada, call (416) 294-4833, H. Roy Gray, Ltd.
Recovering the audio signal—the fourth in a series on the basics of audio.

BY IAN G. MASTERS

However good the rest of an audio system might be, it will produce inferior sound if it doesn’t have quiet, undistorted signals to work with. Those signals must come from the components feeding the inputs of your preamp, amplifier, or receiver. Most of us listen to music from a number of sources, including radio, records, compact discs, and tapes. In every case, however, the original signal—whether mechanical, optical, or electromagnetic—must be translated into a standard electrical audio signal that’s strong enough to overwhelm the inherent noise of the system but not so strong as to cause overload distortion. Getting the audio level right is the easy part; it’s in the conversion to an audio signal that things can go wrong.

Record Playing

For most of the past forty years, high fidelity has meant the playing of vinyl LP’s, and the equipment for that purpose has undergone tremendous refinement during that period. There are three main parts to a record-playing system: the phono cartridge, which extracts the audio information from a record groove; the tonearm, which holds the cartridge and enables it to move across the record surface, guided by the groove; and the turntable itself, which supports the disc and causes it to rotate at a constant speed.

A phono cartridge consists of two elements: the stylus, which actually makes contact with the disc, and the transducer, which translates the stylus movement into an electrical signal. In all modern high-fidelity cartridges, the stylus is a diamond that’s been carefully ground and polished to the desired size and shape. For component-grade pick-ups, the original spherical or conical stylus tip has largely been superseded by elliptical shapes. At the top of the heap are higher-performance variations known generically as multiradial or line-contact stylis, but they are basically similar to ordinary ellipticals. They are narrow from front to back to improve tracking of high frequencies, particularly in the inner grooves, and broad from side to side to conform to the geometry of the record groove.

The stylus is mounted on one end of a cantilever that carries its motion into the body of the cartridge to be converted to electricity. The great majority of high-fidelity cartridges are magnetic. The oscillations the stylus picks up from the groove cause variations in the relative positions of a magnet and a coil of wire, thus generating an electrical voltage. This can be done in either of two basic ways. A moving-coil, or MC, cartridge has a very small coil attached to the stylus assembly, so that the coil moves in relation to a fixed magnet. The more common moving-magnet, or MM, cartridge has a tiny magnet secured to the stylus assembly, so that the magnet moves within a fixed coil.

In a moving-coil cartridge, it is necessary to minimize the number of turns of wire on the coils to keep the stylus assembly’s moving mass from becoming too great, which would impair the cartridge’s high-frequency tracking ability. Use of such small coils often results in an electrical output from the cartridge so low that a step-up device—a transformer or additional preamplifier stage—is required ahead of the standard phono section in a preamplifier, integrated amplifier,
You're looking at something unusual in the audio spectrum: a series of high-end components and an integrated remote that truly work in concert. Introducing the Mitsubishi® E-5200 audio system. A system designed so that the amp, tuner/preamp, graphic equalizer, dual cassette deck, CD changer and speakers on the left are under total and complete control by the programmable remote on the right. In fact, we call it a “responding” remote, because unlike other remotes ours features an LCD that not only shows you what the system is actually doing but also confirms that the tuner/preamp has executed your commands. So you and your orchestra are always in perfect harmony.

The Conductor.

The LCD readout is instantly updated with a signal from the tuner/preamp, giving you a complete visual report at all times.

Program your 5-disc CD changer with digital optical output and 4X oversampling.

You have control of 360 degrees of Dolby Surround sound. Because you can adjust the volume of two 4-way speakers with laminated drivers up front, plus the two speakers in the rear.

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Turn on a 150-watt-per-channel® amplifier.

Have complete control of a dual auto-reverse cassette deck featuring Dolby® B, C, HX Pro™ and full logic controls.

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or receiver. Moving-coil cartridges also tend to be expensive to manufacture. Moving-magnet cartridges, on the other hand, are cheaper to build and produce higher output, but their frequency response typically depends somewhat more on the impedance of the phono input and tonearm cables to which they are attached. With modern materials and designs, neither type has any inherent sonic advantage over the other.

The signal from a phono cartridge must be processed before it can be used by the rest of the audio system. The output level of even an MM cartridge is much lower than that of other signal sources, so every preamplifier must include an extra stage of amplification to bring the level up. This phono-preamp stage frequently includes a further boost for MC cartridges, often called a head amp or pre-preamp. All phono input stages contain equalization circuitry to restore flat frequency response by reversing the standard equalization applied to records when they are mastered.

The cartridge is mounted at the end of a tonearm, usually in a headshell. A tonearm is, in essence, simply a rod that holds the cartridge in the right place, but there are many possible variations. Most tonearms are pivoted, so that the cartridge moves through a shallow arc as it plays a record. On such an arm, the headshell is mounted at a slight inward slant, or offset, to minimize the difference between the angle of the playback stylus to the record groove and the perfect tangency achieved by the cutting stylus that engraved the groove in the original master disc. The greater this horizontal tracking-angle error, the greater the distortion produced by the cartridge.

One drawback of pivoted tonearms is that the offset produces an effect called skating: The stylus pulls toward the center of the record, reducing the force against the outer groove wall and thereby increasing the probability of mistracking. To counteract this effect, virtually all pivoted arms have anti-skating mechanisms. An alternative is to eliminate both skating and horizontal tracking-angle error entirely with a tangential arm, also called a straight-line-tracking arm, which imitates the motion of the cutting stylus by moving straight across the record along a radius rather than through an arc. Such arms tend to be mechanically complicated, however, and therefore more delicate than pivoted designs.

For most of the past forty years, high fidelity has meant the playing of vinyl LP's, and the equipment for that purpose has undergone tremendous refinement during that period.

Whatever sort of tonearm is used, it must be matched with the cartridge mounted in it, since the two work as an integrated system. First, the cartridge must fit. Most are mounted in the headshell by means of screws, but some arms are designed to accept only modular P-mount cartridges that simply plug in. The mass of the cartridge is important because the effective total mass of the arm and cartridge affects their low-frequency reso-
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turns at 33⅓ or 45 rpm and the platter is mounted directly on the motor shaft. Because of the motor's slow speed, its vibration is concentrated at very low frequencies. The exact speed is controlled electronically through a servo system. This permits very accurate speed regulation, particularly when a quartz oscillator is used to establish a reference frequency for the servo.

**Records Without Grooves**

The conventional record-playing components are now giving way to the much more technically advanced compact disc (CD) system. In a CD recording, the audio signal is converted to a digital code, which is in turn molded into a plastic disc as a series of pits (actually, they're bumps—the pits are in the master from which the CD is made). In playback, a laser beam is reflected off the disc into a light-sensitive receptor; the deformations interrupt the beam, reproducing the code.

As on an LP, the information on a CD is recorded in a spiral, although in this case the spiral starts at the center of the disc and works outward. But because there are no physical guides (grooves) for the sensing device to follow, the laser must be located electronically, using positional information in the signal itself.

Once the laser-optical signal has been transformed into an electrical one, it passes through a digital-to-analog converter, or DAC, and emerges as a conventional analog audio signal. In the process, ultrasonic "images" of the audio signal generated by the conversion process must be removed by an analog filter. These images are centered on multiples of the sampling frequency used by the player, which in early machines was the same 44,100-Hz rate used for recording CDs—just slightly more than an octave above the top of the audio band. Consequently, a very sharp analog filter was necessary.

The nature of analog filters is to produce an effect called phase shift; the sharper the filter, the greater the effect. In addition, making an extremely sharp filter that has low noise and distortion and flat frequency response within the audio band is both difficult and costly. For these reasons, most manufacturers now combine a relatively shallow analog filter with a digital filter. Digital filtering requires a process called oversampling, in which extra samples are mathematically derived from the samples coming off the disc and interpolated between them. Oversampling increases the amount of digital data and the playback sampling frequency by two, four, or eight times (occasionally even more). The digital filter removes ultrasonic noise between the top of the audio band and the image centered on the oversampling frequency. This permits the use of a fairly simple analog filter that cuts in well above 20 kHz, reducing both cost and phase shift. Without oversampling and digital filtering, the analog filter's phase shift is measureable, and some feel, despite theoretical and experimental evidence to the contrary, that it is audible as well.

All CD's are recorded using an error-correction system. The audio signal is encoded with extra data that enable the circuitry in the player to detect missing or corrupted bits of information and, up to a point, to replace them with precisely the information that was supposed to be there. Error correction enables the player to ignore small scratches and pieces of dirt on a disc and to keep the audio signal unimpaired when the laser beam strays momentarily from its path; such transitory problems are inaudible unless they go beyond the error-correction circuit's ability to cope with them. Players vary in their ability to take advantage of this system, the higher-priced units usually being somewhat better at it than their more modest brethren.

One problem with digital audio is that until the data are converted to analog, the audio signal is at very high frequencies—radio frequencies, in fact—which can sometimes cause interference in the player's analog circuits. To reduce this interference, many manufacturers try to separate the digital portion of a player from the analog portion by providing for an external DAC, which may even be part of the amplifier rather than of the CD player itself. Moving the signal from the player to the converter therefore requires a digital output. Early ones were coaxial, using a conventional RCA-type jack and a wire between the player and the DAC. Many later players either replace or supplement the coaxial digital output with a fiber-optic output, which is much less susceptible to cable losses between parts of the system.

Most of the other differences between CD players have to do with their flexibility of operation. The ability to program complex sequences of tracks is a common feature of today's players, for instance. Recognition of favorite discs and storage of the sequence of selections you like to hear is another. An increasingly popular option is the CD changer. Changers can hold anywhere from five to twelve discs at a time and program track sequences that intermix cuts from any of the discs. Most current machines will accept 3-inch CD's, and a few will play CD-V (CD video) discs as well. Usually the latter are combi-players, which can handle all optical discs, audio or video, including full-size 12-inch videodiscs.

Next: Amplifiers, preamps, tuners, and receivers.

**THE BASICS**

STEREO REVIEW JANUARY 1990
Turn on, tune in, turn up and enjoy your Adcom music system everywhere...
Adcom announces a new concept in home music systems. Through a revolutionary approach to its remote control system, the new Adcom GTP-500 II tuner/preamplifier gives you full control of your entire music system from any room. Together with any one of Adcom's critically acclaimed power amplifiers, this unique audio product will give cost-minded, serious music lovers a superior alternative to the common AM/FM receiver. And with optional speakers and remote sensors you will be able to turn on, and listen to your music system anywhere in your home.

Complete System Control
At Your Command

The full function, wireless remote control system of the GTP-500 II offers superior flexibility and integration with other components. Control your system's power on/off, select your favorite pre-programmed FM and AM stations, scan the entire FM dial, adjust volume level and select different sources...all with Adcom's handheld remote controller.
To enjoy your Adcom music system throughout your home, simply add a pair of loudspeakers and an Adcom remote sensor in each room. Your Adcom remote controller will perform all of its remote functions, giving you full control of your system. (In some cases, it will be advisable to use one of Adcom's multiple speaker selectors, so please discuss your system requirements with your Adcom dealer.)

Remote control of the basic functions of Adcom's much heralded GCD-575 CD player is also achieved with the GTP-500 II remote system, thereby simplifying control of your Adcom system. For total music system integration, the GTP-500 II remote sensors will also receive and re-transmit commands to any other remotely controlled component. Regardless of brand, you can control your cassette tape deck and VCR, using their respective controllers through the GTP-500 II's sensor system.

This remarkable and well thought-out remote control design gives you full command of your audio system and will virtually change the way you listen to music throughout your home.

(over please)
The Adcom GTP-500 II:
Its value is measured by its performance.

The overall performance of the new GTP-500 II is demonstrably superior through its evolutionary design improvements and the use of today's most advanced, high grade component parts. Adcom's fundamental design objectives of creating a quieter preamplifier, an FM tuner with improved RF performance and an AM tuner with flatter frequency response and reduced distortion were all achieved.

The Preamplifier
Adcom's unique low-impedance RIAA compensation provides lower noise and distortion in the phono input stage. To further reduce noise and distortion in all stages, all switching devices are buffered.

Specifications

<table>
<thead>
<tr>
<th>Preamplifier</th>
<th>FM Tuner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total harmonic distortion: 0.004%</td>
<td>IHF sensitivity, mono: 12.2 dBf</td>
</tr>
<tr>
<td>IM distortion: 0.005%</td>
<td>Signal strength for - 50 dB quieting,</td>
</tr>
<tr>
<td>Frequency response: 5 - 65 kHz ± 0.5 dB</td>
<td>mono/stereo: 14/36 dBf</td>
</tr>
<tr>
<td>Maximum Output Level: &gt;10V</td>
<td>Capture Ratio: 1.7 dB</td>
</tr>
<tr>
<td>Input sensitivity for rated output:</td>
<td>AM suppression: 60 dB</td>
</tr>
<tr>
<td>Phonon: 4 mV</td>
<td>Alternate channel selectivity: 75 dB</td>
</tr>
<tr>
<td>High level: 320 mV</td>
<td>Total station presets: 16</td>
</tr>
<tr>
<td>Tone controls:</td>
<td>Separation at 1 kHz: 50 dB</td>
</tr>
<tr>
<td>High filter: (20 kHz) - 4dB</td>
<td>THD/stereo at 1 kHz: 0.09%</td>
</tr>
<tr>
<td>Low filter: (20 Hz) - 3dB</td>
<td>Maximum signal-to-noise ratio,</td>
</tr>
<tr>
<td>Output Impedance: 100Ω</td>
<td>mono/stereo: 80/75 dB</td>
</tr>
<tr>
<td>Voltage: 120V/50 - 60 Hz</td>
<td>Frequency response: 30 - 15 kHz ± 0.5 dB</td>
</tr>
<tr>
<td>Dimensions: 17&quot; × 3¼&quot; × 12¼&quot; D</td>
<td>Antenna Impedance: 75 Ω/300 Ω</td>
</tr>
<tr>
<td>(432mm × 83mm x 324mm D)</td>
<td>Optional accessories for GTP-500 II:</td>
</tr>
<tr>
<td>Weight: 16 lbs. (7.3 Kg.)</td>
<td>Available with white front panel,</td>
</tr>
<tr>
<td></td>
<td>XR/500 II and SPM/500 II remote sensors,</td>
</tr>
<tr>
<td></td>
<td>RM-3 rack mount adaptors.</td>
</tr>
</tbody>
</table>

GTP-500 II/GFA-555 (200 watts/ch)*

And to simplify the signal path and minize degradation, tone controls, contour and filters are out of the circuit until and unless they are needed.

To ensure that long term adherence to circuit design objectives is accomplished, 1% Roederstein resistors are used in all critical applications as well as a new low-loss, printed circuit board. Throughout all circuits, the GTP-500 II uses state-of-the-art component parts for the highest performance possible during its lifetime.

The AM/FM Stereo Tuner
Through a careful balance of sensitivity and selectivity, the GTP-500 II optimizes FM performance whether you're in an urban area troubled with excessively strong FM signals, or you're in a rural area with weak signals. Also contributing to a significant reduction in distortion is an improved IF stage. Indeed, the quality of FM stereo reproduction through the GTP-500 II is as good as the broadcast itself.

Sixteen stations, eight FM and eight AM, can be programmed for instant retrieval at the touch of a button. And, a bi-directional FM scan feature makes it easy to find your favorite source of FM stereo music.

More Sound, Less Money
Adcom stereo components have gained a reputation for sounding superior to components costing two and three times as much. The new GTP-500 II promises to keep faith with this tradition of more sound for less money.

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*Power output, watts/channel, continuous both channels driven into 8 ohms, 20 Hz-20kHz 0.09% THD.

CIRCLE NO. 60 ON READER SERVICE CARD
by Julian Hirsch

HOLDING THE PRICE LINE

PROBABLY you have noticed that in spite of the ongoing inflation throughout much of the world, the prices of many hi-fi components have remained fairly constant over the past several years. Some, notably CD players, have even dropped considerably in price during that time, even while performance has improved significantly.

Have you wondered how this could be so during a time period in which car prices have increased perhaps 50 percent and housing costs have doubled in many areas of this country? I have, especially since the several hundred audio components I have tested over that time have, in general, offered enhanced performance as well as new (and often useful) operating features, apparently without sacrificing reliability.

Having visited a number of manufacturers, both here and in the Far East, during those years, I have been aware of the trend toward automated assembly procedures as a means of reducing manufacturing costs and improving reliability. Clearly, in a time of rising labor costs, this could be a major factor in helping to keep costs within bounds.

A number of years ago, on a visit to Matsushita Electric (Technics and Panasonic) in Osaka, I was intrigued to see a pilot assembly line producing stereo receivers with limited human participation. Not only did it include automatic loading of components onto printed circuit boards, and perhaps a certain amount of further automatic assembly, but the final testing (and, I believe, the alignment) of the receiver was done by a computer-controlled system. Only in the event of an actual fault was the product set aside for a human troubleshooter.

A few years later, I saw similar procedures being used on a regular production line at the Technics plant. Most hi-fi production was still being done in the conventional manner, however, along assembly lines facing conveyor belts that carried the equipment in process. At work stations along the line, the assemblies were removed by human operators as required, the necessary operations were performed, and then the assemblies were returned to the belt to proceed to the next step in the procedure.

Recently I visited Technics facilities in Sendai and Fukushima, which are certainly among the most highly automated electronic assembly plants currently operating. The change, in only a few years, was dramatic. As before, vast floors were filled with assembly lines, but the “workers” were now, for the most part, robots (there were several robots for each human worker in the plants). In appearance these robots were much closer to the popular conception than previous factory machines, more versatile than the admittedly impressive circuit-board loaders that pick up components of all types and values and insert them with dazzling rapidity into the correct holes in the board. Incidentally, the loading machines have also been improved, operating with higher speed than previously—taking less than half a second for each insertion.

But the assembly robots are true general-purpose machines, used to perform specific operations but adaptable to a wide range of activities by changes in their computer programs. They join parts of an assembly much as a human being would, except that their “fingers” grip a part with just the right force and never seem to drop or break anything (I was envious, I must admit). I was impressed and amused to see one whose “finger” was a Philips-head screwdriver. It inserted four tiny screws into their holes and proceeded to tighten them with awesome speed and gentleness (no stripped heads on those screws).

Another unexpected operation was the soldering of several small components that apparently had to be inserted after the main assembly had been completed (perhaps they were selected trimming adjustments). Since the complete assembly could no longer be run through a wave-soldering machine, the robot’s finger was essentially a small pencil-type soldering iron, with the solder fed through another finger. It reached in and delicately but firmly soldered each component lead into place a lot faster and better than most human beings could have done. And machines don’t get tired or take coffee breaks . . . .

The final wrap-up, literally, came after the assembly and test process (incidentally, human beings still do the final testing of such products as amplifiers or receivers, checking every aspect of their performance). Instead of having a person outside the test booth to wrap the finished product in plastic and box it for

Tested This Month
Vector Research VCD-410R CD Player
dbx SF5000 Soundfield Speaker
Nikko IA600 Integrated Amplifier
Cambridge SoundWorks Ambiance Speaker
Snell E/III Speaker
IS YOUR CLASSICAL MUSIC SUFFERING FROM POOR HOUSING CONDITIONS?

High resonance housing will put any tape in a nasty mood. Especially when pests, such as modulation noise, gnaw on the purity of digitally sourced music.

At TDK, we believe the formula for perfect reproduction includes not only technologically superior tape, but housing that enhances its performance.

Our incredible new SA-X, for example, features an ultra low resonance SP-ARII mechanism. By utilizing our unique co-molding technique, the unified two-layer shell realizes maximum total rigidity to improve reliability. Which drastically reduces modulation noise—an enemy of clear, pure sound that even noise reduction systems are powerless against.

This undesired “noise” is also attacked by SA-X’s revolutionary magnetic characteristics and smooth, flat tape surface. First, there are the densely packed and uniformly distributed ultra fine Super Avilyn magnetic particles. Then, there is the advanced dual coating technology.

Together, the result is an unbelievably quiet tape with an exceptionally low bias noise of ~61.0 dB. Plus, low and high frequency MOLS of +5.0 dB and -6.5 dB respectively.

And SA-X, which provides transparent reproduction of the most powerful digital sources, is available in convenient lengths of 46, 60 and 90 minutes.

The robot assembly machines in automated factories join parts together much as a human being would, but their “fingers” grip a part with just the right force and never seem to break or drop anything.

shipment, a machine does the wrapping, including heat-sealing the plastic, and the product moves to a vertical conveyor that takes it to a lower floor where (presumably) it is boxed—perhaps by a person, although I did not see that part of the operation.

When you look at the overall manufacturing process, it is not hard to see how the price line has been held in spite of constantly increasing labor costs in Japan as everywhere else. These machines work faster and more accurately than any human being, never tire or slack off, and are almost instantly retrainable for any other job by changing their computer software. Probably of equal importance is that there is no more opportunity for human error in assembly. Critical parts are inspected (also automatically) when they are received, and the machines insert them correctly (they stop automatically if something does not proceed according to plan). Presumably the reject percentage is extremely low and the reliability of the finished product is much higher than could have been guaranteed in the days of manual assembly.

Of course, these robots are expensive to manufacture, although they are made by another division of Matsushita, which also sells them to other companies. Nevertheless, it seems probable that this trend, even if not always carried to such a degree as at Matsushita, is responsible in considerable measure for the continued affordable prices and constantly improving performance and quality of consumer electronic products, including video and hi-fi equipment.
Speakers are the most important part of your stereo system. It is the speaker that turns amplifier signal into sound and so ultimately determines what you hear. If your speakers do not perform well, your stereo system will simply not sound like music.

The search for musically satisfying speakers, however, can lead to some very expensive products. And if you have already bought those high priced speakers, then you better not listen to Paradigms. But if you haven't, better not miss them. Why? Because from the time they were first introduced, Paradigm's sheer musical ability utterly amazed listeners. But what caused even more amazement was the unprecedented low price.

So go ahead, get expensive sounding speakers... without the expense. Visit your authorized Paradigm dealer... and listen.

The critics agree:

"... For once we wholeheartedly agree... the Paradigm is most definitely a no-compromise two-way design capable of outperforming systems costing several times as much."

- Hi Fidelity Magazine

"... natural, open and clear... excellent depth... lots of hall sound... big, expansive soundstage... well defined... a rare achievement for any loudspeaker, but when the price is taken into account the Paradigm's performance must be considered as nothing short of remarkable."

- Sound & Vision Magazine

In the U.S.: AudioStream, MPO Box 2410, Niagara Falls, New York 14302
In Canada: Paradigm Electronics Inc., 457 Fenmar Drive, Weston, Ontario M9L 2R6

CIRCLE NO. 97 ON READER SERVICE CARD
Now that the digital Compact Disc is a musical triumph, Sony presents the encore.

Introducing the world's first Digital Signal Processing Receiver.

Sony has news for the millions of music lovers who hailed our invention of the Compact Disc. That was merely our first act in digital audio. Now comes the world premiere of Act II: Sony AM/FM Stereo Receivers with DSP.

DSP stands for Digital Signal Processing, a Sony revolution that gives you note-by-note control over every aspect of your music. Yet with all this control, DSP actually maintains the Compact Disc's sound quality throughout your high fidelity system. This is technology no analog component can equal, resulting in sonic purity no analog component can match.

On Sony's STR-D2010 Receiver, DSP replaces conventional tone controls with the pinpoint precision of a digital parametric equalizer. We've equipped our Dolby* Surround circuitry with digital delay and digital noise reduction for eye-opening playback of movie soundtracks. And DSP places your music into a choice of Hall, Stadium and Live soundfields. Direct digital inputs for your Compact Disc player, digital dynamic suppression, and 130 watts per channel (front) plus 15 watts per channel (rear), combine to reserve a place in hi-fi history for the D2010.*

To audition the STR-D2010 with DSP and the entire line of Sony Receivers, visit your Sony high fidelity dealer. And be prepared to applaud.

© Copyright 1989 Sony Corporation of America. All Rights Reserved. Sony and The Leader in Digital Audio are trademarks of Sony. Dolby is a trademark of Dolby Laboratories Licensing Corp. *For those who read footnotes, the D2010 also has audio/video switching, programmable remote control, Sony's LOW noise Direct Comparator FM tuning, discrete output transistors and front power output up to 130 watts per ch, cont. RMS, both ch driven into 8 ohms, 20–20,000 Hz, 0.008% THD; rear power output of 15 watts per ch, cont. RMS, both ch driven into 8 ohms, 20–20,000 Hz, 0.05% THD.
THOUGH priced near the bottom of the range for home compact disc players, the Vector Research VCD-410R features dual 18-bit digital-to-analog (D/A) converters and eight-times-oversampling (at 352.8 kHz) digital filters. Its operating features include a repeat function for one track, an entire disc, or any selected portion of a disc. The player is programmable to play as many as twenty tracks in any order.

The display window, with its highly legible bright-yellow characters, normally shows the track number and its elapsed time as well as the status of the play, pause, and repeat functions. The usual transport-control buttons, including track skip and fast scan in both directions, form a row at the bottom of the panel. The play/pause button toggles between those functions. Above the transport controls are several narrow buttons, including programming controls marked STORE, CALL, PLAY, and CLEAR, a REMAIN button that changes the display to show the remaining time on the disc, and an INDEX button to replace the track number with the current index number where applicable.

The VCD-410R does not provide direct keypad access to numbered tracks, but they can be selected by multiple operations of the skip buttons. In programming, after a track number is selected, pressing STORE enters it into the memory. The CALL button displays the programmed sequence, and the program PLAY button starts playback of the sequence. The CLEAR button erases the current track from the program (in the stop mode, it erases the entire program).

The disc drawer opens and closes at the touch of a button and accommodates CD-3's as well as normal-size CD's. The front-panel headphone jack has no volume adjustment. The rear apron contains only the two audio line outputs. The player is furnished with a fifteen-key infrared remote control that duplicates all its front-panel controls except power switching and disc-drawer operation.

Dimensions of the Vector Research VCD-410R are 17 x 11 x 3¼ inches, and it weighs about 8½ pounds. Price: $269.95. Vector Research, Dept. SR, 1230 Calle Suerte, Camarillo, CA 93010.

Lab Tests
The VCD-410R's frequency response without de-emphasis was flat within 0.05 dB from below 20 Hz up to about 15,000 Hz, falling to about −0.3 dB at 20,000 Hz; maximum de-emphasis error was −0.24 dB at 16,000 Hz. Channel separation decreased steadily from approximately 125 dB at 100 Hz to about 80
For most people, buying a CD player is a lot like taking a short stroll along the Amazon. And forgetting your map. Sooner or later, you’re going to get lost. That’s because the “jungle of misinformation” about CD players makes it difficult to know what’s really important. And what isn’t. Take a quick look at some of the claims—digital bit structures (what are they, anyway?) ranging from 1 to 45. Oversampling rates from 2x to (quick, who’s got the latest?) 16x. All this for the sake of a numbers race. And not necessarily for the sake of the music. Well, Onkyo offers you a real way through this undergrowth.

Of course, we have an impressive variety of both single- and multiple-disc players. With extraordinary levels of technology in even our most affordable models. For example, we individually calibrate the critical Digital-to-Analog Converters in our DX-1700 and DX-2700 players to fine-tune their linearity and minimize distortions peculiar to the digital process. Most of our models also benefit from Opto-Coupling, an Onkyo-developed technology that transmits data optically rather than through conventional wiring for more accurate CD sound. But for Onkyo, outstanding products are just the beginning. We’ll make your journey through the CD jungle even easier with two indispensable guides. The first is an in-depth explanation of digital bit structures and how they affect musical performance. The second is a down-to-earth journey through all the claims you’re likely to run into, as well as the hard facts you’ll need to master the CD jungle. And they’re available at your Onkyo dealer now.

Onkyo. We’ll give you more than just superb CD players. We’ll also give you the knowledge you need. Because it is a jungle out there. And only the fittest survive.
to 85 dB at 20,000 Hz. Interchannel phase shift was between 0 and -0.3 degree from 5,000 to 17,000 Hz, rising to +0.6 degree at 20,000 Hz.

The linearity of the D/A converters was very good down to -60 dB, with a slight error (less than 1 db) appearing at -70 db. At -90 db, the output of one channel was 4 db high while that of the other channel was 2 db low. Total harmonic distortion (THD) plus noise at a 0-db level was a constant -90 db (0.0032 percent) from 20 to 20,000 Hz. At 1,000 Hz, the THD plus noise was -94 db (0.002 percent) from -20 to -80 db, rising to a maximum of -90 db (0.0032 percent) at 0 db.

The noise level during a "zero-infinity" (null-signal) track on a test disc was less than -110 db in one channel and less than -125 db in the other from 30 to 20,000 Hz. The A-weighted noise level was -103 db in one channel and -112 db in the other. Quantization noise during playback of a 0-dB, 20-Hz test signal was -94 to -95 db, and the EIAJ dynamic range was 96 to 97 dB.

The operating frequency (speed) range was 1,500- and 2,000-micrometer sections of the disc we heard one or two faint clicks. These clicks were apparently associated with the transition from an unmodulated section of the test disc to this very severe and demanding test, in which the low-priced VCD-410R actually outperformed any other player we have tested to date.

On the other hand, the VCR-410R was unusually sensitive to physical impact. Even a light finger tap on any part of the player's exterior was enough to produce a crackle of noise from mistracking, and a moderate finger tip caused an interruption in playback, often accompanied by a jump to another track.

Comments

The Vector Research VCD-410R is an impressive example of how rapidly advancing technology can bring last year's "state-of-the-art" performance to today's modestly priced equipment. It was not long ago that only a few prestigious, and fairly expensive, CD players boasted of their "new" 18-bit D/A converters and four- or eight-times-oversampling digital filters. And now we see those features in a truly budget-priced product. In such key categories as noise, distortion, and channel separation, this player met very high standards. And it outperformed all others in our experience in its error-correction ability.

But the VCD-410R's low price does impose some limitations. Although the player has a number of the convenience features common to most others, its operation can be a bit cumbersome. For most people, stepping to Track 11 by pressing a button eleven times will pose no great problem, but when we had to press that button fifty or sixty times to get to some of the tracks on our test discs, we really missed direct keypad access to any track. Also, while the headphone volume was very good, with no level control the headphone output was much less useful than it might have been.

Our major criticism of the VCD-410R concerns its sensitivity to physical impact. Even the act of placing an empty CD jewel box on top of it would often send a cracking noise through the speakers or jump the laser pickup to another part of the disc. We have no way of knowing how typical this is of the product, but it unquestionably marred its otherwise superb performance. On the other hand, once you are aware of the problem, it is not difficult to avoid jarring the player while it is operating. And then you have a $270 CD player that can hold its own against many others with higher prices.

Circle 140 on reader service card
Engineered for the sophisticated audio enthusiast, the Coustic CD-3 represents a remarkable achievement in advanced mobile audio technology and system design.
About six years ago, dbx introduced an innovative loudspeaker system, the Soundfield One, that was designed to provide a firmly fixed stereo stage over a wide range of listening and speaker positions. In contrast, conventional speakers of the time (like most of today's speakers) either did not generate a stable stereo image or provided it only in relatively restricted areas of the room. In essence (although the specifics of the design were quite complex), dbx achieved a relatively stable sound stage by shaping each speaker's pattern of horizontal directivity toward the center of the room. As a listener approached one speaker, its contribution to the total perceived sound decreased while the contribution from the other speaker increased, thus keeping the apparent sources of the sound fixed regardless of the listening position.

The Soundfield One, which is no longer in production, did its assigned job very effectively, but it was large and very expensive (each speaker unit contained fourteen drivers and a complex crossover network). Subsequently, dbx refined the design to achieve comparable results with much simpler and more competitively priced speakers.

The latest, smallest, and—at $450 a pair—least expensive Soundfield speaker is the dbx SF5000, which provides the essential qualities of the basic design in a bookshelf-size speaker (although it is not really intended for shelf placement). The SF5000 achieves its controlled radiation pattern by having two angled speaker panels, which give the speaker enclosure a triangular cross section. It is designed to be used in mirror-image pairs.

The inward-facing panel of each speaker unit, which makes an angle of about 30 degrees with the forward axis of the system, contains a 6½-inch long-throw woofer in a vented enclosure, a 2½-inch midrange cone with fluid cooling, and a fluid-cooled ½-inch wide-dispersion tweeter. The outward-facing panel, which is 45 degrees off the forward axis, has a similar ½-inch tweeter at its top and the woofer port just below it. The rear of the enclosure, normally positioned parallel to the wall behind it, contains recessed banana jacks for the amplifier connection. Plugs are furnished with the speakers, and the jacks also accept standard dual banana plugs.

The entire exterior of the cabinet is finished in an attractive walnut-grain or black vinyl veneer. Each speaker panel is covered by a removable cloth grille retained by plastic snaps. The cabinet dimensions are 11¾ inches wide, 7¾ inches deep, and 15½ inches high, and each speaker weighs 13 pounds. Although dbx states that the spatial properties of the system are relatively unaffected by speaker placement or listener location, placing the speakers 7 to 12 feet apart and 4 to 12 inches out from the rear wall is recommended.

The rated frequency response of the SF5000 is 65 to 20,000 Hz ± 3 dB over a forward angle of more than 100 degrees. Its sensitivity is given as 89 dB sound-pressure level (SPL) at 1 meter with an input of 2.83 volts. The nominal impedance is rated as 6 ohms, with a minimum of 4 ohms. The recommended amplifier power is 30 to 150 watts per channel into 4 ohms. The crossover frequencies are given as 1,600 and 4,500 Hz.

Lab Tests

We placed the SF5000 speakers on 26-inch stands about 7 feet apart and 15 to 30 inches from the rear wall. The averaged room response sloped downward smoothly over an 8-dB range from 1,000 to 20,000 Hz. Combining the close-miked woofer response with the output of its port yielded a bass response that extended smoothly to 20 Hz, reaching its maximum at 120 Hz and sloping downward to join the room curve for an overall composite response variation of ± 5 dB from 50 to 20,000 Hz.

Quasi-anechoic FFT response measurements on the tweeter axis showed a sizable resonance of about 15 db at 16,000 Hz, which was also revealed by close-miked measurements with a swept sine wave. The outward-facing tweeter had a generally similar response but with a more complex double resonance at 12,000 and 15,000 Hz.
Simple Impression.
Ergonomically simple, technologically impressive.

Our new 700 Series car radio/cassettes epitomize Coustic’s commitment to PRODUCT EXCELLENCE. A balanced synthesis of technology, functionality and ergonomics aptly describes the 700 Series, which is the best selection of car radio/cassettes available today.

A full range of models boasting the technologically Advanced FM Optimizer IV Circuitry incorporating a QUASI 4-GANG HI-GAIN, LOW NOISE TUNED FRONT END. This circuitry continuously monitors FM signal strength to selectively adjust and delivers a 3-dimensional “life-like” sonic performance.

**THERE IS MORE ...**

Cellular Phone Interrupt - You will never miss a call on your mobile phone (with "Call Alert") again! Our new I-SENS™ Circuitry instantaneously mutes the audio system when it detects an incoming call.

**RX-738 CAR RADIO/CASSETTE**

Stereo separation and audio bandwidth. Automatically eliminating signal overload and the picket-fencing effect of multi-path interference to produce the best stereo performance and cleanest FM reception possible.

The Auto-Aligned Azimuth (A³)™ System is standard on all 700 Series auto-reverse cassette mechanisms. This unique A³ System employs a 2-track (instead of a fixed four-track, crosstalk prone) tape head that shifts linearly (up or down) into perfect azimuth alignment whenever tape direction is changed. This minimizes high frequency loss and delivers a 3-dimensional “life-like” sonic performance.

**RX-738 LCD DISPLAY**

Blending technology and simplicity the 700 series feature Preset Scan, Dolby B & C Noise Reduction Systems, Tape Program Search (TPS), Metal Tape Equalization (MTL), CD/AUX Input for digital program source, Radio Monitor (R.MON), Active Bass & Treble Tone Controls, Front/Rear Pre-Amp Outputs for flexible system expansion and removable chassis option.

A custom oversized Liquid Crystal Display (LCD) provides easy identification day or night of frequency settings and each accessed function such as TPS, MTL, CD, etc.

The 700 Series - simply impressive!
its output was about 6 dB lower than that of the other tweeter.

Measuring the output of the complete speaker, on its normal forward axis, yielded a generally flat curve, with only minor irregularities, from 180 to 7,000 Hz. The level of the higher frequencies was about 10 dB lower than that of the lower frequencies. The phase coherence of the total front radiation was good (an unexpected result in view of the drivers' being on two angled planes), with an overall group-delay variation of 0.4 millisecond.

The system's impedance was 4.2 ohms at 40 and 200 Hz, with the actual minimum of 3.8 ohms occurring at 6,000 Hz. The maximum impedance of 12 to 13 ohms occurred at 95 and 1,150 Hz. Overall, the impedance curve justified the speaker's nominal 6-ohm rating. The system's sensitivity was 88.5 dB SPL at 1 meter with 2.83 volts input. The woofer's distortion at a drive level corresponding to a 90-dB midrange SPL was about 1 percent at 100 Hz, rising smoothly to 2.7 percent at 50 Hz. Conventional distortion measurements at lower frequencies were hampered by the sharply reduced output from the cone, but our Audio Precision System One was able to plot distortion down to very low signal levels, revealing that the total harmonic distortion (THD) plus noise was 10 percent at 30 Hz. Although these readings are quite good for a speaker of this size, the acoustic output level under 50 Hz was too low to be useful, and the port output had a relatively high distortion level.

The SF5000 was able to absorb very high short-term power inputs, at least at middle and high frequencies. At 1,000 Hz, our amplifier clipped at 625 watts (into 11.5 ohms), and at 10,000 Hz it clipped at 1,265 watts (into 5 ohms), in both cases before the speaker's acoustic output was significantly distorted. In the woofer range (100 Hz), the cone bottomed audibly with a pulse input of 170 watts, which is still very respectable performance for a small vented-cone driver.

Comments

The spatial characteristics of the dbx SF5000 lived up to expecta-

tions, having the same basic qualities that had impressed us years ago in the Soundfield One. When we listened to a program having distinct left/right positioning of some of its sound sources, it was possible to stand in front of one of the speakers and walk to the front of the other while the apparent source positions remained fixed. Moving about elsewhere in the room had a similar effect—no significant change in the apparent placement of identifiable sound sources. The only deviation from this characteristic (and it may have been related to a less-than-ideal room environment) was a tendency for the image position to shift slightly, and momentarily, at two points near the center of the sound stage during the lateral listener transit. Under ordinary listening conditions, the imaging was rock-stable.

The sound quality itself, apart from its spatial characteristics, was excellent for a speaker of this size and price. The bass, in particular, was solid and clean, with an impact that was surprising for such a small system. The overall sound impressed us as being smooth and slightly distant, with no evidence of the excessive "presence" effect that results from a midrange emphasis. At the same time, there was an occasional edginess to the highs that may have resulted from the large tweeter resonances, although the resonances themselves occur well above the frequency range that can normally impart an audible coloration to the sound. The dbx SF5000 does not create the kind of broad sound stage that extends beyond the speakers in all directions. That quality is not often encountered, especially in inexpensive speakers, and the full effect of an extended sound stage is usually audible only over a limited listening area. In contrast, the sound stage from the SF5000's, although less spectacular, being limited to the area between the speakers, presented the same imaging characteristics throughout the room. The clear imaging did not need any critical placement and angling of the speakers, nor did it require listeners to remain in a limited "sweet spot" that may not be consistent with room decor or might accommodate only a couple of people.

This trade-off between sonic spaciousness and noncritical speaker/listener placement may well be fundamental to loudspeaker reproduction. In any case, the dbx SF5000 is the smallest and least expensive speaker we know of that can do what it does so effectively. Altogether, it embodies a rare and happy combination of qualities!
Impress your system. And your system will impress you!

Impress your car audio system with our Power Logic series of component speakers and your system WILL impress the discriminating you.

From 15" monstrous subwoofers, to powerful mid/woofers, to super tweeters and multi-driver speaker systems, our Power Logic component speakers are ready for any frequency response and sound pressure level (SPL) requirements with minimum distortion.

Your power amplifier will be pleasantly surprised to find that POLYIMIDE DIAPHRAGMS are built into the tweeters to ensure structural integrity and significantly minimize distortion when subjected to high power.

Your system will concur with our research findings that HIGH DENSITY, POLYPROPYLENE-LAYERED, AIR-DRIED, DOUBLE-RIGID PAPER CONE carries the lowest second and third harmonic distortion characteristics, manifesting the best sound quality. This cone material is standard on all Power Logic component speakers.

Your power amplifier system will certainly appreciate the combination of HIGH TEMPERATURE ALUMINUM VOICE COIL and HI-ENERGY STRONTIUM MAGNET STRUCTURE built for maximum heat dissipation and extreme power handling capability, with more accurate cone displacement resulting in faster transient response and lower distortion.

The Power Logic component speaker series rigorously produces, in an anti-acoustic automotive environment, crisp high frequency response, sumptuous midrange, tight and distortion-free low bass, superb instantaneous power handling and precise stereo imaging. In short, the illusion of life-like musical performance with superior clarity and 3-dimensional imaging.

Our Power Logic component speakers will no doubt impress your system. All it takes is for your system to impress YOU.

CIRCLE NO. 98 ON READER SERVICE CARD
NIKKO IA600 INTEGRATED AMPLIFIER

Julian Hirsch, Hirsch-Houck Laboratories

The Nikko IA600 is a powerful integrated amplifier, rated to deliver 120 watts per channel into 8-ohm loads from 20 to 20,000 Hz with no more than 0.01 percent total harmonic distortion (THD). The specifications also include dynamic power ratings of 170 and 270 watts into 8- and 4-ohm loads, respectively.

The multilingual instruction manual, although quite explicit concerning the installation and operation of the IA600 amplifier, provides no information on any of its circuit or construction features. It is, however, a rather large and heavy unit, measuring about 17 1/2 inches wide, 16 1/4 inches deep, and 5 3/4 inches high and weighing 32 pounds.

The front panel has two parallel rows of light-touch rectangular pushbuttons that provide independent selection of the program source for the audio (monitor) outputs and for the tape-recording outputs. A small LED in each button shows when that source has been selected, glowing green for the monitor program, red for recording. There are seven high-level inputs: CD, tuner, auxiliary, tape 1, tape 2, video 1, and video 2. The "video" inputs are actually conventional line-level inputs for the audio portion of a video program or any other comparable signal. The single phono input is switchable for a moving-magnet (MM) or moving-coil (MC) cartridge by a front-panel button. Another button inserts an external signal processor, such as an equalizer, into the signal path to either the monitor or recording outputs (but not both simultaneously).

Similar pushbuttons independently connect the two sets of speaker terminals to the amplifier outputs. Both sets of speakers can be silenced for listening through headphones via the front-panel jack. Small round buttons parallel the channels for mono operation, switch the phono input for operation with an MM or MC cartridge, activate the "subsonic" (infrasonic) filter and loudness-compensation circuits, and reduce the audio output by 20 dB.

Small round knobs operate the bass, treble, and balance controls.
We shed a lot of flavor on the subject of light.

Most ultra low tar cigarettes are a compromise: low tar, and low taste. Some compromise! Only Merit has figured out how to deliver low tar and great flavor in an ultra light cigarette. Perhaps that's why we're America's fastest growing ultra light. Is that the sound of a light going on in your head?

Enriched Flavor™ ultra low tar. A solution with Merit.

Merit Ultra Lights

SURGEON GENERAL'S WARNING: Quitting Smoking Now Greatly Reduces Serious Risks to Your Health.

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Kings: 5 mg "tar," 0.5 mg nicotine av. per cigarette by FTC method.
Cambridge SoundWorks has created Ensemble, a speaker system that can provide the sound once reserved for the best speakers under laboratory conditions. It virtually disappears in your room. And because we market it directly, Ensemble costs hundreds less than it would in stores.

The best sound comes in four small packages.

Ensemble consists of four speaker units. Two compact low-frequency speakers reproduce the deep bass, while two small satellite units reproduce the rest of the music, making it possible to reproduce just the right amount of energy in each part of the musical range without turning your listening room into a stereo showroom.

No matter how well a speaker performs, at home the listening room takes over. Room acoustics emphasize and de-emphasize various parts of the musical range, depending on where the speaker is placed in the room. If you put a conventional speaker where the room can help the low bass, it may hinder the upper ranges, or vice-versa.

Your listening room works with Ensemble, not against it.

Ensemble, on the other hand, takes advantage of your room's acoustics. The ear can't tell where bass comes from, which is why Ensemble's bass units can be tucked out of the way—on the floor, atop bookshelves, or under furniture. The satellites can be hung directly on the wall, or placed on windowsills or shelves. No bulky speaker boxes dominate your living space, yet Ensemble reproduces the deep bass that no mini speakers can.

Unlike seemingly similar satellite systems which use a single large subwoofer, Ensemble uses two separate, compact bass units. They fit more gracefully into your living environment, and help minimize the effects of the listening room's standing waves.

*Ensemble & Ambiance are trademarks of Cambridge SoundWorks, Inc.*
Not all the differences are as obvious as our two subwoofers. Unlike seemingly similar three-piece systems, Ensemble uses premium quality components for maximum power handling, individual crossovers that allow several wiring options and cabinets ruggedly constructed for proper acoustical performance. We even gold-plate all connectors to prevent corrosion. An even bigger difference is how we sell it.

Thousands agree: the best showroom is your living room.

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 Ensemble the right way—in your own home. In fact, Ensemble is sold only by Cambridge SoundWorks directly from the factory.

"They were designed to play music—and make it sound like music. This they do very well, in a most unobtrusive way, at a bargain price... it's hard to imagine going wrong with Ensemble."

Stereo Review

You get to listen for hours without a salesman hovering nearby. If after 30 days you're not happy, return Ensemble for a full refund (we'll even reimburse the original UPS shipping charges in the continental U.S.)

At only $499—complete with all hardware and 100' of speaker cable—Ensemble is the value on today's speaker market.

"You get a month to play with the speakers before you have to either return them or keep them. But you'll keep them."

Esquire

Try them risk-free for 30 days. Call 1-800-AKA-HIFI (1-800-252-4434). Our toll-free number connects you to a Cambridge SoundWorks audio expert. He or she will answer all your questions, take your order (you can use Visa, MasterCard or American Express) and arrange surface shipment via UPS. Your Cambridge SoundWorks audio expert will continue as your personal contact with us. We think you'll like this new way of doing business.

In Canada, call 1-800-525-4434. Audio experts are on duty 9 AM to Midnight, Eastern Time, seven days a week. Fax #: 617-332-9229.

CAMBRIDGE SOUNDWORKS
Suite 102J California St., Newton, MA 02158

CIRCLE NO. 157 ON READER SERVICE CARD
An arc of green lights surrounding each knob shows its setting. A large volume-control knob is located at the right of the panel. Between it and the other controls is a small pushbutton marked CD DIRECT, which connects the CD input to the amplifier regardless of the setting of the monitor selector, bypassing all circuits except the volume control and -20-dB attenuator. All the knobs have soft rubber rings that make their adjustment exceptionally easy. Those for tone and balance have light center detents.

The rear apron contains the signal input and output connectors, preamp-out and power-amp-in jacks (normally joined by jumpers), and the speaker terminals. Although the manual's illustrations and text indicate that the speaker terminals are spring clips that accept stripped wire ends, our test amplifier was equipped with large binding posts. Unfortunately, they did not accept banana plugs. Two of the three AC outputs are switched. Price: $660. Nikko Audio, Dept. SR, 5830 S. Triangle Dr., Commerce, CA 90040.

**Lab Tests**

The 8-ohm clipping output of the Nikko IA600 was 146 watts per channel at 1,000 Hz, corresponding to a clipping headroom of 0.85 dB. The output into lower impedances was appreciably higher, measuring 225 watts into 4 ohms and 376 watts into 2 ohms (for which the amplifier is not rated). Dynamic power into 8 ohms was 175 watts (corresponding to a dynamic headroom of 1.64 dB), slightly surpassing the manufacturer's rating; it rose to 312 watts into 4 ohms and an impressive 462 watts into 2 ohms.

Total harmonic distortion plus noise into 8 ohms was about 0.003 to 0.004 percent at middle and low frequencies for power outputs from 12 watts up to the rated 120 watts. It increased slightly at higher frequencies and power outputs, with maximum figures at 20,000 Hz ranging from 0.01 percent distortion at 12 watts to 0.031 percent at 120 watts. The amplifier's slew factor was 5. At 1,000 Hz, THD plus noise was typically about 0.003 percent for power outputs up to 120 watts into 8 ohms.

The Nikko IA600 integrated amplifier feels (and is) heavy and solid, and its performance in the lab was consistent with those qualities.

### FEATURES

- Audio inputs for MM or MC phono, CD, tuner, auxiliary, two audio tape decks, two video sources
- Independent selection of program for listening and tape recording
- Switching for external signal processors
- Preampifier outputs and power-amp inputs joined by removable jumpers
- Bass and treble tone controls
- Balancing control

### LABORATORY MEASUREMENTS

| Output power at clipping (1,000 Hz) | 146 watts into 8 ohms, 225 watts into 4 ohms, 376 watts into 2 ohms |
| Dynamic power output | 175 watts into 8 ohms, 312 watts into 4 ohms, 462 watts into 2 ohms |
| Dynamic headroom | 1.64 dB into 8 ohms |
| Harmonic distortion (THD + noise at 1,000 Hz into 8 ohms) | 1 watt, 0.011%; 10 watts, 0.0038%; 120 watts, 0.0033% |
| Maximum full-power distortion (20 to 20,000 Hz into 8 ohms) | 0.031% at 120 watts (20,000 Hz) |
| Sensitivity (for a 1-watt output into 8 ohms): CD, 13.5 mV; phono, 0.23 mV (MM), 0.025 mV (MC) |
| Phono-input overload (MM): 94 to 138 mV |
| A-weighted noise (referred to a 1-watt output): CD, -83 dB; phono, -81.3 dB (MM), -76.5 dB (MC) |
| Phono-input impedance (MM): 47,000 ohms in parallel with 380 pf |
| RIAA equalization error: +0.35, -0.1 dB from 20 to 20,000 Hz |
| Tone-control range: ±10 dB at 100 and 10,000 Hz |
| Frequency response: ±0.1 dB from 10 to 30,000 Hz |

The loudness-compensation circuit did not affect frequencies above 100 Hz but reduced the response by 2 dB at 20 Hz and 5.5 dB at 10 Hz. The loudness-compensation circuit boosted low frequencies by 10 dB and high frequencies by 6 dB, relative to the level at 1,500 Hz, as the volume setting was reduced.

With the volume control at maximum, an input of 13.5 millivolts was required to produce a 1-watt output from any of the high-level inputs. A-weighted noise was -83 dB relative to 1 watt. The phono sensitivity was 0.23 millivolt (mV) with a -81.3-dB noise level at the output.
Ultimate Upgrade.
Simply the best receiver in the world.

The Luxman R-117 combines the state-of-the-art technology of separate components into one affordable receiver.

TOTAL SONIC INTEGRITY
All Luxman receivers incorporate massive power supplies to deliver high dynamic power. The R-117 measures over 700 watts of dynamic power per channel (2 ohms) to ensure distortion-free transients. The pre-amplifier section combines several Luxman exclusive circuits to optimize sonic accuracy, and the AM/FM stereo tuner is sonically competitive with the finest separate tuners in the world.

In all, the R-117 receiver provides the purity and musical warmth of the original source, plus the high dynamic power output necessary to ensure total sonic integrity at all volume levels.

AUDIO/VIDEO REMOTE CAPABILITY
The R-117 includes a hand-held remote to control the major functions of each Luxman audio component. In addition, the R-117 handpiece can select up to three video sources, and professional-grade video amplifiers are incorporated to maintain a high-quality picture.

This single component will function as a complete audio and video control center with total remote capability.

MULTI-ROOM EXPANDABILITY
The R-117 also interconnects with an external remote eye to allow complete system operation from any room in your house. With a simple installation of cables and accessories, virtually all functions of the master system can be controlled at each remote location. This multi-room concept can be expanded at anytime in the future to include additional rooms.

LONG-TERM DURABILITY
A previous advantage of separate components over receivers has been in the area of durability. The R-117 is designed with a no-compromise approach to long-term reliability and is backed by a 5 Year Parts and Labor Warranty — the best in the industry.

The Luxman R-117 Receiver is simply the finest sounding, most versatile, most reliable receiver in the world...the ultimate component to upgrade your audio/video system.
Bose® engineers use advanced design systems to bring the benefits of new technologies to the constantly-refined 901® Direct/Reflecting® speaker. The Intergraph InterAct 32 CAD/CAM system (above) at Bose Corporation's Framingham, Massachusetts worldwide headquarters is part of this commitment to "better sound through research."
The Bose® 901® Direct/Reflecting® speaker system:
A technological breakthrough 20 years ago—
pushed to the edge of today’s technologies.

Twenty-five years ago Dr. Amar Bose directed a
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of this effort provided the theoretical
basis for the design of the first Bose 901
Direct/Reflecting® speaker system five
years later. Its introduction in 1968 was
greeted with the highest critical acclaim
ever accorded to a loudspeaker.

"... I must say that I have never heard
a speaker system in my own home
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—Julian Hirsch, Stereo Review 1968

“There is no doubt that the much-
abused and overworked term, ‘break-
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“Many people swear by these speakers as
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—Complete Buyer’s Guide to Stereo Hi-Fi Equipment 1975

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is the technological flagship of Bose
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**Test Reports**

MM setting and 0.025 mV with a —76.5-dB noise level at the MC setting. The MM phono-input impedance was 47,000 ohms in parallel with a rather high 380-picofarad capacitance. The MM phono input overload level was about 135 mV at middle and low frequencies and approximately 94 mV at 20,000 Hz. Like some other phono stages we have tested, this one overloaded in a peculiar fashion at 20,000 Hz: The waveform collapsed suddenly instead of merely clipping or distorting. The collapse took place at such a high level, however, that we would not expect an overload to occur with any likely combination of cartridge and record.

**Comments**

As our measurements clearly show, Nikko has not skimped in the design or construction of the IA600. It feels (and is) heavy and solid, and its performance was consistent with those qualities. We were also pleased to find it about as “bulletproof” as an amplifier can be, although we made no deliberate effort to destroy it in our tests.

The controls operated with a smooth and positive action, although the balance and tone-control detents on our sample were sometimes difficult to feel. All the switches operated without any electrical or acoustic noises, reinforcing the impression of quality conveyed by the amplifier’s construction and appearance. As with other products we have seen that have a similar feature, the CD DIRECT mode was not measurably or audibly different from normal operation (at their flat settings the tone controls did not modify the basic amplifier performance in any way we could detect). But given the ambiguity of their center positions, being able to bypass the tone and balance controls might turn out to be a useful feature in this case, especially for highly critical listeners.

Although Nikko has been in the U.S. hi-fi market for many years, the company has been relatively quiet for some time. If the IA600 is typical of its current products, we look forward to seeing some of the others.

**Circle 142 on reader service card**

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**Authorized dealers:**

**CALIFORNIA**
- Sherwill, Canoga Park
- Fry’s, Fremont
- Ventura TV, Fresno
- Mark Spencer, La. Pepperdine
- Riverside—Don To, Earth Stereo
- Mark Spencer, Pacific Heights, Sound Quest
- Santa Monica—Fry’s, Surmavue
- San Diego—Fry’s, Surmavue

**COLORADO**
- Sound Co., Colorado Springs
- Sound Co., Denver

**DISTRICT OF COLUMBIA**
- The Edition

**FLORIDA**
- BrandsMart, Miami

**IDAHO**
- Brandin, Boise—Inexp, Idaho Falls—Mic, Queens, Twin Falls

**ILLINOIS**
- J. J. Cleveland, Arlington Heights
- Enterprise, Chicago Il.
- Sound Service, Midway, Aurora
- The Shoppe, Palatine
- Sound Shop, Rollingwood

**INDIANA**
- Audio, Mishawaka
- A.R.C., Bloomington

**MASSACHUSETTS**
- Arthur, Wellesley

**MONTANA**
- New Horizon, Billings

**NEVADA**
- Jaron Premium, Las Vegas

**NEW JERSEY**
- A. R. Can, Fair Lawn
- Total Car Co., Totowa

**NEW MEXICO**
- New (Core), Clovis

**NEW YORK**
- PC Richard, all locations
- FOCUS Electronics, Brooklyn
- J & R Music World, J. & R Music World
- Sound Source, Long Island
- Sound Source, Manhattan

**OHIO**
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- Proper, Lakewood
- Sound Service, Parma

**PENNSYLVANIA**
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- G. W. World, Central PA
- Sound Source, University
- Sound Source, West Chester
- Sound Source, Lancaster
- Sound Source, Scranton
- Sound Source, Allentown, 3 W. Schoole Blvd.
- Sound Source, Great Valley

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- Inexp, all locations
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CIRCLE NO. 31 ON READER SERVICE CARD
THE Ambiance is the second speaker designed by Henry Kloss for his Cambridge SoundWorks. Like the first, the four-piece Ensemble, it is sold directly by the manufacturer instead of through dealers. The Ambiance, however, is simply a small two-way system with a 6½-inch long-throw, acoustic-suspension woofer and a 1-inch dome tweeter. Each sealed wooden cabinet measures only 10⅜ x 7⅛ x 5½ inches and weighs 8½ pounds.

The removable black-metal grille fits snugly into a slot around the edge of the front panel. The cabinet walls are ¾ inch thick, and the heavy-duty multiway binding posts, which also accept single or dual banana plugs, are recessed into the back panel, which also has a keyhole slot for wall-mounting the speaker.

Cambridge SoundWorks says that the Ambiance outperforms many other speakers of its size and is at least the equal of any of them, regardless of price. Unlike most other small speakers, the Ambiance does not exaggerate its output in the upper bass, around 100 Hz, at the expense of the lower bass. The company claims that the Ambiance rolls off smoothly in the bass yet has more output around 40 Hz than any other speaker its size.

This performance is said to result from the use of high-quality materials and components, backed by extensive listening tests. To obtain the required bass extension, some efficiency had to be sacrificed (a fundamental tradeoff), but the speaker can be used with almost any amplifier capable of at least 15 watts output. It is ideal for tight quarters, such as a den or a college dorm room, as an extension speaker, or in a surround-sound system.

The Ambiance is available primed so that it can be painted as desired, finished in gunmetal-gray Nextel, or housed in a solid oak cabinet. Prices: $109 each for the primed and Nextel-finished versions, $129 each for the oak version; optional metal stands, $99 a pair. Cambridge SoundWorks, Dept. SR, Suite 102, 154 California St., Newton, MA 02158.

Lab Tests

No specifications were furnished with our early samples of the Ambiance speakers. The speakers' minimum impedance measured 7.5 ohms at 200 Hz, and the maximum impedance was 30 ohms at the bass-resonance frequency of 80 Hz. Above 500 Hz, the impedance remained between 11 and 18 ohms, and the phase angle of the complex impedance was less than 20 degrees from 250 to 20,000 Hz. These results suggest the speakers should be easy, noncritical loads for any amplifier.

The sensitivity of the speaker was fairly low, producing a sound-pressure level (SPL) of 85 dB at 1 meter with an input of 2.83 volts of pink noise. Total harmonic distortion (THD) was measured with a constant input of 5 volts, equivalent to a 90-dB SPL. From 10 percent at 45 Hz, the distortion dropped smoothly to 3.6 percent at 100 Hz and remained between 0.3 and 1 percent from 200 to 1,000 Hz.

The averaged room response from the two speakers, mounted on 26-inch stands about 30 inches in front of the wall, was relatively
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Listen to the Technics Mica CX Speaker Series at one of these fine stores:

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- Phipps - Monroe's Sound Systems - Scottsfield
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- Nashville - Electronic Express
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- Collinsville - Bryant Radio Supply - Roanoke
- Lee Harrison & Sons, Inc. - Stafford - SRC Electronics - Virginia Beach - FX - Winchester Sound
WASHINGTON - Bellevue - Video Depot
WISCONSIN - Janesville - Team Electronics of Janesville - Madison - Philips - Wausau - Sound World of Wausau
WYOMING - Casper - Jet's Electronics

The quasi-anechoic IQS FFT response measurements confirmed the general character of the swept-frequency response measurements. Although there were minor directional effects at various frequencies, the response curves measured on-axis and 45 degrees off-axis coincided well until the frequency exceeded 10,000 Hz, where the divergence increased markedly. The group delay of the system was exceptionally uniform, varying about ±0.1 millisecond from 1,000 to beyond 20,000 Hz.

We tested pulse-power-handling ability only at 1,000 Hz, since at higher frequencies the relatively high impedance of the system resulted in amplifier clipping long before the speaker's limits were reached. At 1,000 Hz, a single-cycle tone burst produced a much better sound image with not a hint of mechanical noise. This produces an input of 56 dB (though without any obvious mechanical noise) with an input of 56 dB.

The Cambridge SoundWorks Ambiance speakers fully lived up to the manufacturer's claims. Not only did they not sound at all like small speakers, but they easily held their own in comparison with some substantially larger and more expensive speakers.

In sharp contrast, we never felt the need to move the Ambiance speakers any closer to the back wall than about 2 feet, and at no time did we resort to tone controls or equalizers. The speakers sounded beautifully balanced, delivering a full-size sound image with not a hint of its origin in two small boxes. Comparisons with other, larger speakers whose bass extended down to 50 Hz or lower showed, however, that while the Ambiance was distinguished by its overall spectral balance and demonstrated excellent bass for its size, Henry Kloss has not worked a miracle.

Even without miracles, we can say that very few small speakers we have heard can match the overall sound of the Ambiance, and, like its manufacturer, we know of none that surpass it. It provides a lot of good sound from a small, attractive box at a hard-to-beat price.

Circle 143 on reader service card

"... You know something, Richard, you're sick! Removing the spare tire so you can have a place to keep a spare subwoofer!"
One of the most advanced speakers on the face of the earth is made from the face of the earth. Presenting the Technics CX Speaker Series. A remarkable 3-way speaker system made from one of nature's most unique sound conductors: mica.

In fact, mica has just the right characteristics for a speaker. It's lightweight yet extremely rigid. 1.5 times more rigid than titanium. Which means no matter what type of music you listen to, our mica speakers can reproduce it with amazing clarity.

More specifically, the pure mica diaphragm tweeter and midrange driver cones provide incredible accuracy. And the composite mica/pulp woofer not only delivers a deep, rich bass but helps eliminate the distortion that can accompany it.

What's more, the CX series is available in a bookshelf and two floor-standing models. The latter uses a linear compliance Passive Radiator in the rear of the cabinet to further improve low frequency reproduction and total efficiency.

So, if you appreciate a brilliantly clean sound, listen to the Technics CX Series.

We don't think you've ever heard rock sound like this before.

Technics Mica CX Series

CIRCLE NO. 177 ON READER SERVICE CARD
At Altec Lansing, we think it's time you had a hand in what you hear. That's the idea behind the new Altec 511 Tower, the first loudspeaker that gives you total control of amplification, tonal balance and imaging for each midrange, tweeter, upper bass and woofer. The result is a sound system that lets you mold the music precisely to your taste, so everything from Mozart to Motown will sound exactly the way you want it.

Five years in the making, this towering achievement lets the discriminating audiophile choose between single, bi, tri or quad amplification and an impressive range of tonal balance levels, all through a simple control panel. So now, you can tell the philharmonic how to conduct itself.

The remarkable 511 Tower is one of twelve new Altec Lansing speakers, all designed to reproduce sound with unheard-of accuracy. If the new 511 sounds good, call 1-800-Altec 88 for the dealer nearest you. Then take a pair home and tell them what you want to hear.

ALTEC LANSING LOUDSPEAKERS FOR THE WELL TRAINED EAR.
**SNELL E/III SPEAKER SYSTEM**

*Julian Hirsch, Hirsch-Houck Laboratories*

The Snell E/III is a floor-standing, two-way vented speaker system. Its single 8-inch woofer is located just above the center of the speaker panel, with a 1-inch soft-dome tweeter above the woofer. The port is in the rear, near the bottom of the cabinet. The E/III also has a second, rear-firing tweeter, with a ¾-inch dome, near the top of the back panel. Operating over approximately the same frequency range as the front tweeter, its function is not to add brightness but to enhance the spaciousness of the sound by flattening the high-frequency end of the speaker’s total output through reflection from the rear wall.

The E/III, like other Snell speakers, uses a high-order crossover network with steep slopes, at least 18 dB per octave. The crossover frequency is 2,700 Hz. The tweeter level, adjustable over a limited range by a knob in the back of the cabinet, is factory balanced to give a system response within 0.5 dB of an original prototype speaker when the control knob is set to a reference mark. The inputs for the woofer and tweeters are brought out to separate pairs of binding-post terminals (which also accept dual banana plugs). The terminals are normally joined by jumper wires. If the jumpers are removed, the system can be biwired (driving the tweeter and woofer through separate wires from a single amplifier) or biamplified (using separate amplifiers for woofer and tweeters).

The specifications of the Snell E/III include a frequency response (in an anechoic environment) within ±1.75 dB from 39 to 20,000 Hz through a horizontal angle of ±25 degrees relative to the speaker’s axis. The nominal system impedance is 6 ohms, and its rated sensitivity is 91-dB sound-pressure level (SPL) at 1 meter (anechoic) with a 1-watt input. The E/III is said to be suitable for use with amplifiers rated between 15 and 150 watts per channel. The cabinet is available finished in matched, hand-sanded and oiled oak or walnut veneers or in black. A black grille cloth, held by a continuous strip of Velcro around the edge, covers the entire front of the speaker. It is removable, but not easily. Dimensions are 13 x 35 x 11 inches, weight less than 50 pounds. Price: $990 a pair. Snell Acoustics, Inc., Dept. SR, 143 Essex St., Haverhill, MA 01830.

**Lab Tests**

The close-miked bass response of the system, after combining measurements made at the woofer cone and the port, was perfectly flat between 70 and 230 Hz, falling off to −5 dB at 28 and 600 Hz. The averaged room response varied only ±2.5 dB from 600 to 20,000 Hz. There was some ambiguity in splicing the two curves to form a composite response, which could have been interpreted either as having a 5-dB shelf (level difference) between the very uniform low- and high-frequency responses or as a relatively flat overall response except for a depressed output in the 1,500- to 3,000-Hz range. Since the output at low and middle frequencies is nor-
It leaves an indelible impression on your senses even before you turn it on.


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mally highly dependent on room characteristics and speaker placement, this matter had to be settled by listening and by quasi-anechoic FFT response measurements, which indicated that the overall response was very flat except for a drop of 5 or 6 dB through the upper mid-range.

The tweeter-level adjustment either boosted the output by as much as 2 dB over most of the range from 5,000 to 20,000 Hz or reduced it by as much as 4 to 5 dB through the same range. We found the best balance to be with the control set either in its “flat” position or at its maximum boost.

The minimum system impedance was 4 ohms at 150 and 10,000 Hz, and the maximum was 18 to 19 ohms at 55 and 1,200 Hz. Impedance also dipped to 4.5 ohms at 30 Hz. Although the system’s average impedance was close to its 6-ohm rating, we would prefer to think of the E/III as a 4-ohm speaker. The measured sensitivity was a high 93-dB SPL at 1 meter with a 2.83-volt input of pink noise. With a 2-volt drive level, corresponding to a 90-dB SPL, the bass distortion was about 1.5 percent from 100 to 45 Hz, rising to 5.5 percent at 30 Hz.

The tweeter’s horizontal dispersion was good, with less than a 6-dB difference between the output measured on-axis and 45 degrees off-axis up to 10,000 Hz. The rear tweeter’s output was essentially flat from 6,000 to 20,000 Hz and sloped downward to -6 dB at 3,000 Hz. The system group delay was very uniform over most of the tweeter range, varying less than 0.2 millisecond overall in the range of 2,000 to 22,000 Hz.

The power-handling ability of the Snell E/III with single-cycle tone bursts was very good. The woofer cone began to rattle with a 100-Hz input of 1,200 watts into its 4.8-ohm impedance. At 1,000 and 10,000 Hz, the amplifier clipped (at respective outputs of 425 and 1,580 watts) before the speaker’s output was significantly distorted.

Comments

The Snell E/III had an exceptionally neutral sound quality, and the octave-to-octave balance of its output was superb. It never sounded tubby or shrill, nor could it be characterized by any of the other pejorative terms that can be applied to some degree to the sound of most speakers.

These properties are consistent with Snell’s stated goal in speaker design: to “deliver exactly what [the speaker] receives without distortion, coloration, or any other changes.” We have seen such statements from other speaker manufacturers, but few have been as successful as Snell in achieving such aims in practice.

Everyone has his own criteria for judging speaker sound, and there are probably as many opinions as there are listeners. It was no surprise that side-by-side comparisons between the Snell E/III and other fine speakers revealed distinct differences between their sounds—but that would be true of any two speakers one might compare. If we had to describe the sound of the E/III in one word, it would be “neutral.” Rarely have we heard a speaker with as little tonal coloration as this one. All the frequencies in our test recordings, from the fairly low bass (below 40 Hz) up beyond the limits of human hearing, were present in believable proportions, without any obvious emphasis or deficiency in any particular portion of the audible spectrum.

The most obvious illustration of this neutral quality is the way the E/III reproduced the sound of male voices. The upper-bass heaviness typical of the vast majority of speakers we have heard was totally absent from the sound of the Snell E/III. That particular coloration is perhaps the most common flaw we have encountered in otherwise good speakers, and it was refreshing to find an affordable speaker, with excellent credentials, measurements, and overall sound, that was free of it. All in all, the Snell E/III is a truly outstanding performer. And as a bonus, it looks as good as it sounds.

Circle 144 on reader service card

“Whaddya mean you can’t pick up a fingerprint on any of the compact discs? There’s no such thing as a compact disc without a fingerprint!”
IT EVEN SOUNDS PICTURE PERFECT.

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SYSTEMS FOR SMALL SPACES

Tight quarters? Consider some of today's sound solutions.

BY IAN G. MASTERS

Bose's Acoustimass SE-5 ($799) is a small three-piece satellite-subwoofer speaker system. The omnidirectional bass module (rear left) can be hidden almost anywhere in a room, even under a chair or behind a sofa.
HE white-on-white European room with the tasteful tapestries, sleek audio components, and speakers that would seem right at home in a science-fiction movie looks wonderful in the ad. So does the immense, overfurnished condo with the entertainment center that resembles Master Control at CNN. But most of us don’t have the luxury of that sort of space—or money—and must put together our hi-fi systems on a somewhat smaller scale.

In truth, audio manufacturers design most of their equipment to fit in an “average” living room, whatever that might be. Although there are no real standards, the great majority of electronic audio components are between 3 and 6 inches high and about 17 inches wide, a width adopted from professional usage, where a 1-inch flange is added on each side for mounting in a standard 19-inch equipment rack. Speakers come in all sorts of sizes and shapes, but most are “bookshelf” size: about 2 cubic feet or a little less.

Such dimensions are modest enough. Even so, there are times when even “normal”-size gear is difficult to accommodate. Many apartments offer little space for stereo equipment; college dorm rooms, mobile homes, and even the average bedroom in a suburban house have still less space. But the appreciation of good sound has little to do with the dimensions of our living spaces. Of course, you could simply switch on your Walkman, clap on the phones, and let it go at that. Fortunately, however, there is no need to give up and settle for inferior audio quality just because you have space limitations; true high-fidelity equipment is available in every sort of configuration. Some careful planning and shopping should enable you to fit the kind of components you want into even the most Lilliputian of living quarters.

**Fitting It In**

Sometimes it just takes creative arrangement of the system. Before you consider minicomponents—a fairly limited selection compared with the full range of audio equipment—it’s worth looking at the space you have with an eye to fitting conventional components into it. For one thing, it may not be necessary to have all of the equipment within arm’s length, or even visible.

Separate power amplifiers, for instance, can be tucked away in closets or behind furniture, as long as there is adequate ventilation. And these need not be the kind of huge power plants we usually associate with the notion of separate amplifiers; several companies offer modest separates suitable both for small-size systems and for concealment. Often these amplifiers are intended primarily for powering extra channels in surround-sound applications, but they work just as well as main amplifiers where high output levels are not required. The PT-50 from Audio Design Associates or the NHT VA-1 would be ideal for such use. The VA-1 is even designed to accept signals from a TV set’s speaker or headphone outputs—in fact, it can be driven by any component that has an output-level control, without need of a preamplifier, though you would be restricted to a single music source in that case.

Certain components—especially cassette decks, CD players, and turntables—are best situated within easy reach, but many other parts of a system could be operated entirely by remote control, enabling you to place them high up on a shelf, freeing more accessible space for the things you do have to get at. If you install components more than 2 or 3 feet apart, however, use good, low-capacitance cable to connect them or else various forms of interference, particularly hum, may creep in, and you may experience some loss of high frequencies.

An alternative is to keep the components together but to conceal the whole system—in a closet, perhaps, or under a bed, again making sure there’s sufficient ventilation—and run it by remote control. Normally this would require a clear line of sight between your usual listening position and the equipment, but there are a number of remote extenders on the market that can pick up infrared commands at a convenient place in the listening room and retransmit them to the equipment wherever it may be. You would still have to be able to get at some of the equipment from time to time, to change discs or tapes, say, and this might be a bit inconvenient, but most functions could be handled by the remote control.

An elegant, though pricey, solution to the problem of freeing up shelf space is offered by the Beosystem 4500 from Bang & Olufsen. While hardly a minisystem, it can be mounted on a wall like an elongated picture. The components themselves protrude only a couple of inches from the wall surface—except the turntable, of course, which sticks out about a foot.

**Combinations**

Another way to conserve space is to seek out components that combine as many functions as possible on a single chassis. The most common of these is the receiver, which combines an AM/FM tuner, a preamplifier section with control functions, and a power amplifier. Most receivers are relatively low-powered, but in small rooms the need for massive output levels is unlikely to arise, particularly if there are neighbors on the other side of that paper-thin wall, so the 30 to 50 watts per channel typical of receivers should be adequate. While many receivers have full-size chassis, there are slimmer ones on the market that might fit your space more easily. In some cases small receivers offer fewer functions than their larger brothers, but their limitations will probably be acceptable; a small system is unlikely to require inputs for more than one or two external signal sources.

**Others**

Sorts of combination exist as well. For instance, if you simply must have both tape and CD capabilities, you might look at Teac’s tape deck/CD player combination, for use along with a conventional receiver. Alternatively, if you plan to listen chiefly to cassettes, you might consider a “cassettever,” which combines a receiver and a cassette deck. These units often look like miniature rack systems but are actually single components, sometimes including a...
The remote-controlled Aiwa X-79M, a complete minicomponent system for $1,220, includes a 40-watt-per-channel integrated amplifier, an AM/FM tuner, a dual-well cassette deck, a six-disc CD changer, a turntable, three-way main speakers, and mini surround speakers.

Using a portable CD player or tape deck with the three-piece Pattern powered speaker system from Atlantic Technology can give you big sound from small components. The satellites and the subwoofer are separately amplified, and the system can be driven by virtually any line-level source as well as by conventional means with a receiver or an external amplifier. Price: $499.

compact disc player as well. Many provide dual-well cassette mechanisms, with high-speed dubbing in some cases, and matching turntables are often available.

The most elaborate combinations look like giant boomboxes with detachable speakers. These "portable" audio systems are usually anything but, unless you have been pumping iron for some years, but they do offer a lot of flexibility in a small volume. In addition to the radio functions, many include not only a CD player but also dual cassette decks for dubbing. The amplifiers tend to be fairly low-powered, but the wattage may be enough for your situation. If not, virtually all of these systems have line outputs that can be used to drive an external amplifier. Practically all of the full-line audio companies make equipment in this class. Casio has four new ones in its Profound Sound line, increasing step by step in price and size; Aiwa offers a choice of six models. The selection is pretty broad, so you should plan on doing a lot of shopping around if you decide to go this route.

Also, you should be aware that these all-in-one systems seldom match the performance typical of separate components. The main shortcoming of most, but certainly not all, of these systems is the quality of their speakers. If the one you choose is weak in that respect, make sure that it has outputs for external speakers. The original speakers might still be used if you travel with the system (though only a few such systems actually provide for battery operation).

Replacing the speakers may not be necessary, if you find supplied ones you like. This applies equally to a conventional boombox with nondetachable speakers. Some sound pretty good, although they are in the minority. If you latch onto one of those, you will have solved your space problem and will probably save money into the bargain. One feature of many such units is a means of manipulating phase electronically to increase the apparent width of the sound stage. While these circuits vary widely in their effectiveness, the good ones might well add considerably to the listening experience in a small space. Also, some of the most ambitious portable systems incorporate circuitry to enhance bass performance, such as Panasonic's XBS, Hitachi's HPX, and others. Again, these might be beneficial in tight quarters, although many of them just add boom. With the possible exception of the Bose Acoustic Wave Music System, none of these one-piece systems is capable of reproducing low bass.

At the other end of the scale, several audio companies sell what are essentially conventional components housed in cabinets small enough to squeeze into very tight spaces. The 600 Series from Proton, for instance, is a group of separate
Acoustic Research's Powered Partners are two-way speakers with built-in amplification and shielded drivers so they can be placed on top of or near a TV set without degrading the picture. They can also be hung on a pole, mounted on a wall, or clamped to a shelf, and they accept any line-level source. Price: $400 a pair.

components, enabling you to select only those functions you will use. The lineup includes a 60-watt integrated amplifier, an AM/FM tuner with Schotz noise-reduction circuitry, a CD player, a cassette deck, and a unified remote control.

Feeding the Signal

Whatever you choose as the core of your system, your next concern will be what to use as signal sources. One very practical device to consider is a portable CD player; virtually all of these have line outputs and are capable of working on AC power. The best of them perform nearly as well as good full-sized players, and you will have the benefit of being able to use the player while you jog or ski as well as at home.

Similarly, it is possible to hook up a portable tape player to your home system, and many now offer such niceties as Dolby noise reduction and line outputs. Good as they are, however, few such portables are a match for their table-top equivalents, so it might be wise to devote some of your precious space to a home-style cassette deck. These come in a variety of sizes, some quite modest.

ANY stereo buyers these days are dispensing entirely with equipment to play vinyl LP's, but if you have a collection of them, you'll need a turntable (unless you can persuade a friend who has one to copy your favorites to cassette). Turntables come in many shapes and sizes, but some of the ones with linear-tracking arms are hardly wider than an LP and only 2 to 3 inches high, and these are ideal for cramped quarters. Make sure the cartridge you buy is the best you can afford, as this will have a profound effect on the overall sound quality.

Small Boxes, Big Sound

As with any audio system, the most important components are the speakers, but usually these also take up the most room. Fortunately, the idea that good sound is possible only from large speakers has been false for a long time, but you will have to shop carefully to find really good small ones. The best are compact bookshelf models, such as the Boston Acoustics A-40 or the NHT Model 1, which are comparable to much larger speakers except in deep-bass performance. Most truly miniature units are only barely adequate. Still, the sound of the smallest models from the major manufacturers usually resembles that of their larger relatives, and they are a good place to start looking (and listening).

Tiny speakers usually need a fair amount of power to develop reasonable output levels—sensitivity vs. size is a common tradeoff—but that may not matter in a small room. If it does, a pair of powered speakers, which contain their own amplifiers, may be what you need, and this approach can save you both money and space in the electronics part of
The first portable compact disc player to incorporate digital signal processing (DSP) technology and an eight-times-oversampling digital filter, Sony's D-555 Discman can also be used as a source component in the home when it is connected to a receiver, an integrated amplifier, or powered speakers. Price: $450.

For those who want to hear but not see their speakers, the a/d/s/ Model 300CC is a two-way in-wall system for $300 a pair. Colors available on special order include black, light and dark gray, beige, mocha, and white, all with matching grilles and brackets. Standard finish is black textured urethane with a steel grille.

Yamaha's Active Servo Technology keeps the speakers in its 90 Series to a 3-inch depth. The five-piece system shown includes a CD player, integrated amp, tuner, and cassette deck ($2,500).

The remote-controlled A-007 integrated amplifier and D-007 CD player below are half of Luxman's new mid-size L-7 Design Series, which also includes the T-007 AM/FM tuner and K-007 autoreverse cassette deck. All together, the four matching components list for $2,400.
your system. Small powered speakers have been available for some years, such as the RoomMates from Bose and the Powered Partners from Acoustic Research; both come in a variety of configurations. Sony offers a range of tiny powered speakers that have the advantage of working from either AC power or batteries, so you can take them with you for listening away from home.

ANY compact speakers, even ones that are well balanced over the range in which they operate, may be fairly weak at the low end. One fairly recent solution to this is the "architectural" loudspeaker, which is built into a wall and uses the wall cavity as part of its enclosure. This is obviously not a solution where you don't own the walls or where there is somebody on the other side who would object to your music. And built-in speakers are really practical only if the areas where they could be installed make sense in terms of speaker/listener positioning. If none of these constraints apply, however, in-wall speakers are a good way to get very good sound without taking up any space at all.

Among the first companies to offer in-wall speakers were a/d/s and Sonance, both of which now have a number of models available and have been joined in this category by a large number of other companies. The Canton InWall 9, for example, is a coaxial speaker featuring a 9-inch woofer for good low bass. Polk Audio's AB-7 offers economy, at $400 a pair, and MB Quart has adapted one of its existing speakers, the Model 280, for in-wall use. Wallspeaker Technologies produces speakers that are not, in fact, very small in terms of volume, but most of the system is hidden behind the wall, with only a small panel showing. Among the other companies that have entered this popular area of late are Boston Acoustics, Infinity, Niles Audio, Luxman, KEF, and Phase Technology. A number of manufacturers have taken other approaches to the problem of small speakers, and their solutions may be yours as well. Tiny satellites used with small, separate woofer modules are ideal for very small rooms, since you can tuck the bass unit behind a sofa or under a bed or use it as a coffee table. Some of the tiniest three-piece systems come from Bose, whose Acousti-

mass models have both extremely small satellite speakers and modest-size bass units. Just about as unobtrusive is the Model I/Octave Bass Module combination from NHT, and Advent offers a system that can also be used outdoors. The ADC Model 3010 satellites and 3015 subwoofer are available either separately or as a package (Model 3025). And for high sensitivity, Cerwin-Vega sells the SAT-6. The four-piece Ensemble from Cambridge SoundWorks includes two separate bass modules to cope with standing-wave problems.

A novel way to deal with space is represented by the Duetto system from Revox, which consists of a single triangular enclosure containing two speakers radiating in opposite directions. This approach to stereo allows the cabinet to be relatively large, for good bass response, but still to occupy a small floor space.

Another route has been taken by Yamaha, whose YST speaker/amplifier combinations are capable of producing remarkably wide-range sound from very small speakers without the use of external subwoofers. A dedicated amplifier with special equalization circuitry is required, but this may make more sense than an extra speaker cabinet in the room. Yamaha now offers several amp/speaker combinations using this technology.

The Auto Alternative

Another approach to investigate might be car stereo speakers, particularly the surface-mount models that come in their own enclosures. These can offer acceptable sound without taking up much space. Most of them are rated at 4 ohms nominal impedance, however, so you will have to make certain the amplifier or receiver you choose is happy with such a load.

In fact, for people with extreme space constraints, a whole system made up of autosound components might be a reasonable alternative. These days you sacrifice hardly anything in terms of sound quality with car stereo electronics, but the space that the equipment occupies is minimal. If you decide to do this, you'll need a regulated 12-volt power supply but these are fairly common. Be aware, however, that a car stereo amplifier is likely to draw quite a few amps of current—more than the basic Radio Shack power supply can provide. Car stereo source components combined with powered (AC-powered, that is) speakers could be the answer.

On the Table

Your needs may not be very complicated, on the other hand, in which case a "table-top" stereo system might suffice. The Proton RS-420, for instance, is basically an upscale clock radio that offers an optional extension speaker for stereo listening. Sony's ICF-CS970 is also basically a radio, but in this case it incorporates a pair of speakers in a single enclosure, along with a low-frequency-enhancement system that the company calls Mega Bass. Unlike the Proton, the Sony unit has an input for a signal from the headphone output of a portable tape or CD player. Denon's DT-400 two-piece table-top hi-fi system provides both line inputs and ones that will accept a headphone feed.

SOMEWHAT closer to conventional audio components is Yamaha's C10 Unity System, which features not only diminutive electronics but also speakers using the company's YST technology. Luxman, Nakamichi, Bose, and several other manufacturers also offer fine-sounding miniature systems. One of the most elaborate examples of this class of equipment is the Proton AT-3000, which includes not only a pair of small speakers and the amplifiers to drive them but a built-in cassette deck and a CD player as well. The whole thing can be operated from its own remote control.

However you choose to tackle your space problem, you can take heart that there is a lot of very good equipment out there that doesn't take up much room. You may have to look fairly hard to find it, but that's only because it's so small.
YEARS ago, back in 1973, a single, startlingly advanced tape recorder—the Nakamichi 1000—in one stroke made the cassette an integral part of the stereo world and established a reference standard against which the entire tape-recorder industry would thereafter be measured.

That same honored model designation now adorns another startlingly advanced tape recorder, a machine that bids fair to make digital audio tape (DAT) an integral part of this generation's stereo experience. Once again the Model 1000's technological innovations and sonic performance set a reference standard. And if its price puts it beyond the reach of all but the most fortunate audiophiles, it should be remembered that the original Nakamichi 100C cassette deck also cost three to four times as much as its competition—and was worth every penny.

Like its forebear, the new Nakamichi 1000 is the first recorder in its class to offer direct source-vs.-tape monitoring. Its four heads (two write, two read) allow instant comparison between the input signal and its recorded result. The Nakamichi 1000 is also the first DAT deck to permit digital-to-digital recording of CD's and other DAT's, insuring that their intrinsic sonic qualities will not be compromised by the previously required digital-to-analog (D/A) and analog-to-digital (A/D) conversions. (A recently concluded agreement between the Recording Industry Association of America and the Electronic Industries Association should soon permit this feature to be included in other future DAT recorders.) Of course, direct digital dubbing also requires that the user's CD player have digital as well as the usual analog outputs.

The Nakamichi 1000 Digital Audio Recording System comprises two main units and a full-function wireless remote control. Its internal construction is as battleship-solic as its outer styling is futuristic. Modular plug-in circuit boards are used throughout, which not only permits easy conversion to the higher signal levels of the professional version of the Model 1000 but also facilitates future updating to accommodate any changes in the DAT format as the technology evolves.

BY CRAIG STARK

PHOTO BY ROBERT BUTLER
Laboratory Measurements

Fast-forward/rewind times (C-120):
- High speed: 26 seconds
- Low speed: 60 seconds

Speed error:
- Not measurable

Wow and flutter:
- Not measurable

Line input for indicated 0 dB: 0.35 volt

Line output at indicated 0 dB: 2.2 volts

PLAYBACK PERFORMANCE

(Frequency response (dB), Signal-to-noise ratios (dB), Crosstalk (dB)

**Frequency response (dB)**
- **1,000 Hz**: +0.01, -0.01
- **20 Hz**: -0.15, -0.10
- **100 Hz**: +0.17, +0.04
- **10,000 Hz**: +0.15, +0.04
- **20,000 Hz**: -0.32, -0.43

**Signal-to-noise ratios (db)**
- **Unweighted**: 106.79
- **A-weighted**: 114.89
- **CCIR/ARM-weighted**: 113.92

**Crosstalk (dB)**
- **1,000 Hz**: -59.32, -59.97
- **10,000 Hz**: -59.97, -59.98
- **-60-dB level**: -59.97, -59.98

Digital Recording

Pressing the eject button on the recorder unit opens a vertically hinged door with a slot into which the tiny (2 7/8 x 2 1/6 x 3 1/2-inch) DAT cassette is inserted. Up to 2 hours of continuous recording are possible using C-120 cassettes. (The lower-fidelity half-speed option in the DAT standard is not supported.) The remaining tape in a cassette is visible through a clear window in the door. Also visible, through an adjacent window, is the deck’s remarkable helical-scan head assembly, which incorporates several Nakamichi innovations in transport design.

Most DAT transports are based on VCR designs, which position the tape against the rotating head drum by means of a single pair of movable loading pins. In contrast, the Nakamichi F.A.S.T. design (F.A.S.T. stands for Fast Access Stationary Tape Guide Transport) uses a pair of stationary, four-pin tape guides that not only position the tape more precisely, relieving some of the burden normally imposed on the error-correction circuitry, but also reduce the time needed to load the tape to less than 2 seconds.

The shallower tape-wrap angle of the F.A.S.T. mechanism (90 degrees rather than 180 degrees) also enables the deck to use a unique “half-load” tape position at times when audible high-speed cueing is not required. The half-load position permits faster winding speeds with less tape wear than is possible in conventional designs. The direct-drive reel and braking motors are operated by microprocessor-controlled servo circuits. The four heads are made of ferrite (with a sputtered-sendust film) and have a rated life of 10,000 hours.

The main pushbuttons on the recorder unit control the tape motion and will be familiar to any cassette user. Two fast-winding speeds are provided; the slower one permits audible cueing. A two-speed digital fader facilitates smooth transitions between recorded selections. Conventional memory programming for up to ninety-nine selections is provided through a calculator-style keypad, and there are additional switches for automatic rewind, play, and timer-activated record and play.
operations. The setting of the tape/source switch and all other important operating conditions are signaled with LED indicator lights. The deck records and plays back digital sources at sampling rates of 48, 44.1, or 32 kHz (automatically selected to match the source). Analog sources are recorded at the standard 48-kHz sampling frequency.

Less familiar to the cassette user are the full facilities provided in the Nakamichi 1000 recorder unit (and duplicated in the remote control) for locating, writing, and erasing the start, end, and skip codes that are part of the subcode field structure of the digital tape format. These inaudible DAT codes can be written during recording or added later, during editing. Tapes can be digitally marked to skip automatically past bad takes or accidentally recorded FM commercials. Start ID codes can be automatically inserted each time the deck is restarted, or they can be manually inserted at any point, and overall program sequencing can be renumbered at the touch of a button. With the manual editing facilities, the various digital codes can be shifted on the tape in increments as small as 0.15 second, making for very tight electronic "splices."

The recorder unit has two numeric LED readouts. One shows the current program and search numbers, and the other displays either counterclockwise, or time remaining on the tape, or time from the start of the tape, or time remaining on the tape. Both conventional coaxial (RCA-type) and fiber-optic inputs and outputs are provided, and a supplemental pair of rear-panel connectors permits connection and remote control of additional "daisy-chained" DAT machines.

**Digital Processing**

The Model 1000p processor is remarkably uncluttered and easy to work with. Three pushbuttons select among five switching states: transport (record, play, stop, fast forward, and reverse), source (analog or digital), and a monitor monitor function. The transport controls are placed at the top of the transport panel, and the source controls are placed at the upper right-hand corner. The source controls include a number of switches for selecting the source and a number of knobs for controlling the source. The transport controls include a number of buttons for controlling the transport. The transport controls include a number of buttons for controlling the transport.

The Nakamichi 1000p digital processor has pull-out drawers for its modular circuitry and connections to make it easy to update or upgrade the system.

The Nakamichi 1000p digital processor has pull-out drawers for its modular circuit that generates precisely timed equal and opposite noise pulses to null the glitches out.

At the A/D conversion end, the Model 1000p again employs a unique technique, a "charge comparison" system that avoids the need for conventional sample-and-hold circuits. Nakamichi contends that sample-and-hold circuits inevitably degrade low-level signal linearity, so they are not tolerated in its equipment. (An analogy might be made here to Nakamichi cassette decks, which carefully push the ordinary cassette pressure pad out of the way.) Finally, the A/D converter in the 1000p automatically calibrates each of its 16-bit quantization levels in the first 1.5 seconds after the deck is turned on.

While this description of its circuit innovations may give the impression of technological complexity, the front panel of the Model 1000p processor is remarkably uncluttered and easy to work with. Three pushbuttons select among DAT 1, DAT 2, or SOURCE, and a small SOURCE switch is set to analog or digital as appropriate. Additional switches control DAT-10-DAT dubbing and, for analog sources, provide a choice of using treble preemphasis or not. Indicator LED's show the sampling rate in use and whether preemphasis is being employed. No level controls are needed for...
digital recording, but left, right, and master record-level controls are provided for analog sources, and the analog outputs have both playback and headphone level controls. Signal levels are displayed on two thirty-two-segment peak-indicating LED arrays, which are calibrated from 0 dB (plus OVER) down to −60 dB. The level display can be switched to hold signal peaks up to 4 seconds or even be turned off.

The rear panel of the Model 1000p provides enormous flexibility in making connections to other components. As with the recorder unit, both coaxial and optical connectors are provided for digital signals. For analog equipment, the 1000p provides both professional, balanced-line Cannon connectors and conventional, unbalanced phono plugs. The fixed-level and variable-level analog outputs are switch selectable. As a final touch, the signal ground of the RCA-type connectors is separate from the chassis ground, making it easy to avoid ground loops in professional installations. Two AC convenience outlets and a chassis-ground screw connector are also provided.

The Nakamichi Model 1000 recorder measures 17½ inches wide, 14½ inches deep, and 5½ inches high, and it weighs some 35 pounds. The 1000p processor has the same dimensions but weighs 38 pounds. Price: $11,000, including the remote control. Nakamichi America Corp., Dept. SR, 19701 S. Vermont Ave., Torrance, CA 90502.

High Performance

We tested the playback frequency response of the Nakamichi Model 1000 with our Sony TY-7551 digital test tape (recorded at a 44.1-kHz sampling rate) and found that neither channel deviated by as much as ±0.5 dB over the 20–20,000 Hz range. The overall record-playback response (recording at the 48-kHz sampling frequency used for an analog source, such as our Audio Precision test instrument) across the same spectrum showed a similar uniformity.

We checked total harmonic distortion (THD) both as a function of frequency and (at 1,000 Hz) as a function of level. At 0 dB the distortion hovered around 0.003 percent across most of the 20 to 20,000-hz band, rising to less than 0.01 percent at 20 kHz. More important than such minuscule figures, however, was the deck's distortion behavior as a function of level. As can be seen in the graph on page 83, the distortion declined up to the indicated 0-dB point but thereafter rose very sharply. This behavior is an inherent characteristic of digital recording, for once the maximum signal level (all binary 1's) has been reached, there are no more bits left to represent the signal. Recordists who are accustomed to "running into the red" (being saved from distortion by the deck manufacturer's having calibrated "0 dB" at a very low level) will have to change their approach when setting their recording levels on DAT decks. Fortunately, for digital-to-digital dubbing the "record level" is set by the signal.

Erring on the conservative side when setting record levels is not much of a sacrifice when using the Nakamichi 1000, however, because of its remarkably high signal-to-noise ratio (S/N). On an A-weighted basis we measured a 115-dB S/N for playback only and a 96-dB record-playback S/N. Few straight amplifiers, let alone tape recorders, can match that kind of performance.

Input/output levels were entirely normal for digital audio equipment, and, of course, there was no measurable speed error or wow and flutter. In high-speed rewind the Nakamichi 1000 zipped through a 2-hour (C-120) cartridge in 26 seconds.

Listening Satisfaction

'T's hard to convey to anyone but another audiophile the combination of awe and sensuous satisfaction that working with an instrument like the Nakamichi 1000 produces. Its operations were silent and smooth, swift but never rushed. Watching it load and handle a tape was almost hypnotic.

The acid test, of course, lay in source-vs.-tape comparisons of dubs from a wide variety of sources. We alternately hooked up the Model 1000 to the digital output of our CD player (a single cable carries both channels), to its normal (analog) outputs, and to the outputs of our open-reel mastering recorder.

To say the Nakamichi 1000 made audibly perfect dubs is, if anything, an understatement. Apart from hearing a slight click (which was not recorded on the tape) when the source/tape switch was pressed, not one of a whole cadre of audiophiles we brought in for the tests could detect any difference whatever between the original and the copy.

The record-playback performance of the Nakamichi 1000 was so eerily clean that we frequently found ourselves having to stop the deck with the monitor switch in the tape position (thereby killing the sound) just to assure ourselves that we hadn't been listening to the source signal the entire time. In all honesty, we could not be certain that we could consistently detect an audible difference even on CD's dubbed through the analog outputs of the player.

This kind of performance does not come cheap, of course. The Nakamichi 1000 costs more than most people's entire hi-fi systems. That was true also of the Nakamichi 1000 cassette deck. Equipment of this caliber is not intended for a large market, and Nakamichi will probably, as in the past, follow the Model 1000 with more popular-price models that do not significantly sacrifice performance. The key, however, is to start at the top, not to try to work your way up to it. That is what Nakamichi has done with the Model 1000 Digital Audio Recording System, and that is why it will long be the standard by which the entire industry's DAT introductions will be judged.
FIND THE SPEAKERS

A decorator's dream, the in-wall speaker is no longer an audiophile's nightmare.

THERE was a time, not long ago, when loudspeakers were flaunted like great paintings, worthy of prominent display in even the most stylish living rooms. Never mind that the big boxes clashed with the decor and devoured more floor space than a full-length sofa—that was seen as a fact of life, a small price to pay for having great music. And besides, those big speakers looked so impressive.

But today there's an entirely new parlor game being played in the trendiest of homes: It's called "find the hidden speakers." No ong-
Two to three years ago, there were only a few companies building in-wall speakers, and demand was limited primarily to commercial applications. But then several high-quality speaker companies, including Polk, KEF, Boston Acoustics, Sonance, and a/d/s, got behind in-wall technology and upgraded the sound. Their products quickly attracted the interest of a certain upscale, design-conscious demographic group that goes by an overused label I won't repeat here (I'll just say it starts with a "y"). By now, seemingly everybody in the speaker business has jumped into the category with both feet; shoppers can choose from among more than a dozen brands.

What's driving the in-wall boom? First and foremost, it's a matter of interior design. These chameleon-like speakers can blend into any setting and become part of the decor of a room without taking up valuable space. In most cases, the only part of the speaker that's visible is the faceplate, which usually measures no more than 8 x 12 or 6 x 10 inches and mounts flush with the wall. The grilles are clean and contoured, and they can be painted or covered with cloth to match the wall perfectly; sometimes colored or patterned grilles are used to accent a room's design. In short, in-wall speakers are a decorator's dream.

But even more important, they're no longer an audiophile's nightmare. Early in-wall models were little more than modified car stereo speakers; as such, they were out of place in spacious rooms, lacking the necessary imaging and bass capabilities. In the last two years, however, the category has taken several steps forward. The latest in-wall speakers feature sophisticated crossover networks and the kind of high-quality woofers and tweeters found in the better free-standing speakers.

Until recently, the big disadvantage of in-wall speakers was that they lacked bass. But companies such as Canton are now putting bigger woofers in their in-wall speakers to beef up the low end. And KEF, Polk, Triad, Sonance, and others have gone a step further, introducing a new wave of three-piece systems that include in-wall subwoofers. A subwoofer in the wall can produce startling results: While you can't see these in-wall systems, you can feel them. They rock the house.

With that added low-end muscle, speaker companies and retailers are seeing a fundamental change—some of the industry folks are actually quite surprised by it—in the way in-wall speakers are being used in homes. "In the beginning, the idea was to use in-wall speakers for background music in kitchens or dens," said Polk Audio's Rob Ain, "but now in-wall speakers are definitely moving into primary listening areas."

While Ain and others readily concede that in-wall speakers still cannot quite match the best self-contained speakers in sound quality, they say the technology is coming close enough to satisfy many listeners, who are now putting speakers into their living-room walls. And we're not just talking about two speakers in the room: In-wall speakers are becoming particularly popular for multispeaker, surround-sound entertainment centers.

The notion of using in-wall systems in the living room is somewhat radical and not necessarily endorsed by audiophiles. Some, such as Wayne Puntel, owner of Cleveland's Audio Craft stores, continue to hold the position that in-wall speakers are best in secondary applications. Puntel points out that while the speakers themselves have improved, the old obstacles to good sound remain the same: With in-wall designs, speaker placement is dictated by factors other than the ideal listening position, and the wall itself can become a part of the sound process as it vibrates. "There are too many variables that can't be controlled," Puntel noted.

Still, like others who don't recommend in-wall speakers for the living room, Puntel acknowledges that "built-in speakers are great for family rooms and dens," not to mention bathrooms, kitchens, and bed-rooms.
Triad's System 6 in-wall speakers use the same drivers and polypropylene capacitors as the company's three-piece stand-alone systems. The subwoofer (far right) is powered by its own 70-watt amplifier. Each speaker's fabric grille and aluminum grille frame can be painted. System price: $600.


Axiom recommends positioning its two-way AX 1.5 Wallmount speakers at ear level on one wall to achieve the best response. The tweeter was designed for maximum dispersion and linearity to provide a realistic stereo image and sound stage, and the woofer is said to handle a wide dynamic range without distortion. Suggested retail price is $339 a pair.

The a/d/s/ Model 200CC hideaway speaker is available in six colors including white so the case, grille, and mounting brackets can be painted to match the color of a room. The two-way acoustic-suspension system has a 4-inch long-exursion woofer and a 1-inch soft-dome tweeter. Impedance is 4 ohms. Price: $330 a pair.
rooms. Of course, there are different needs and requirements for different rooms. A system for a family room might need a subwoofer, whereas just a pair of high-quality speakers would do the job in a bedroom or kitchen. A bathroom might call for smaller, less powerful speakers—though they'd have to be moisture-resistant.

As in-wall applications expand, speaker companies are broadening the selection in their lines. Most now have two or three different models at prices ranging from $200 a pair for the most basic speakers to $400 or $500 a pair for high-quality systems. Throw in a subwoofer, and the cost climbs into the $700 to $800 range, or about $1,000 when installation fees are included.

While in-wall speakers all tend to look the same, they're clearly not all created equal. Manufacturers are using a variety of materials and design approaches for the speaker interiors and enclosures, and a lot has changed just in the last year.

Polk, for example, broadened its line for this winter with the AB-300 (2½-inch woofer, 3¼-inch tweeter), the AB-700 (6½-inch woofer, 1-inch tweeter), and the AB-800 (two 6½-inch woofers, 1-inch tweeter). The systems all feature trilaminate-polymer bass/midrange drivers and silver-coil, polymer soft-dome tweeters. Available as an option with any system is Polk's new AB-1W, an in-wall subwoofer with two 6½-inch drivers. Boston Acoustics has also added a new speaker to its in-wall selection: the Model 325 in the company's Designer Series. It's smaller than the company's other in-wall models, the 350 and 360, measuring just 3½ inches square, with a 5¼-inch, copolymer, moisture-resistant woofer.

Triad's Inwall Systems Six and Seven feature 3½- and 5-inch midranges, respectively, and both systems come with a woofer powered by a separate 70-watt bass amplifier. Sonance, which has one of the fullest lines of in-wall speakers, now has two subwoofers designed for in-wall installation, the VCA1 and the PSW2. The VCA1 is a powered system featuring a versatile outboard amplifier; the PSW2 is passive. The company has also updated its Sonance I speaker (now the Sonance 1A) with a 6½-inch polypropylene woofer, and it still carries the original Sonance IV and the miniature M-30 for space-tight bathrooms and kitchens.

KEF's new CR 160 is a two-way system that mounts in either a square or a round frame and features a design that places the tweeter at the apex of the woofer cone. KEF also now offers a flush-mounting 10-inch subwoofer, the CR250SW. Bose's rounded 102-S/F speaker, intended for use with the company's Acoustimass Music System, is designed to be recessed in the ceiling adjacent to a wall, from which the sound is reflected. The Architectural Series from a/d/s, which already included both a compact in-wall speaker, the 300/tr3, and the larger C400, has been expanded to include a passive subwoofer, the SW2, which can fit between floor and ceiling joists.

Among the newcomers to the in-wall scene is Niles Audio, whose Blueprint Series includes three speakers: the Models 100 and 200 have 6½-inch woofers, and the Model 300 has an 8-inch woofer and a soft-dome tweeter. Infinity has also come on board with its Environmental Reference Standard (ERS) series. Three models, the ERS 500, 600, and 800, feature woofer sizes of 5¼, 6½, and 8 inches, respectively; the two larger models include an independent tweeter-level control to allow high-frequency fine-tuning. JBL is offering the Signature Series S-3 and S-4 in-wall speakers, which feature the company's titanium drivers and high-polymer-laminate woofers that measure 5¼ and 6½ inches. Canton's new InWall 9 system boasts a big 9-inch woofer and an aluminum-manganese tweeter in a coaxial design. Lumin's S-505 has an 8-inch woofer with a graphite-impregnated polypropylene cone and a soft-dome tweeter. Axiom's AX 1.5 Wallmount has a 6½-inch woofer and a 3¼-inch dome tweeter; the grille measures 13½ inches high and 9½ inches wide. Ambria's C-200 and C-300 feature 5½- and 6-inch woofers, respectively, and soft-dome tweeters. Other newcomers include Fossate, Audio Concepts, and Gold Sound, which has a full line of 5-, 6-, and 8-inch two-way systems.

Choosing from among all of these brands and models isn't easy. Dealers advise that you request a demonstration: Most stores, if they're serious about in-wall speakers, now have a demo area with speakers actually built into a wall. It's important to keep your room and intended application in mind as you shop. And don't forget to inquire about ease of installation—you may decide you can do it yourself.

Most manufacturers have taken pains to simplify the installation process through clear instructions and well-designed hardware, including easy-to-install mounting brackets. But the job is still not recommended for beginners. If you buy from a specialty audio dealer, you can turn to its custom-installation department, whose staff will know exactly where to put the speakers for the best sound. Professionals also know how to do the job cleanly. The same cannot be said for the average guy with a drill in his hand, who's liable to crack plaster, rock through the back of the wall, cut insulation, or sever electrical wiring. A lot of things can happen inside a wall, most of them bad.

If you do decide to install your own in-wall speakers, as about 25 percent of today's buyers do, there are a few points to keep in mind. For wall-mounting a subwoofer, an exterior wall is recommended because it's more rigid than an interior one. Don't put in-wall speakers beside an air duct; the music will travel through the vents, and you'll end up with a "multi-room music system" you never bargained for. And if you are setting up a real multiroom system with in-wall satellites throughout the house, be aware of the impedance load; a secondary amplifier may be needed to feed all of those power-hungry speakers.

When the drilling stops and the dust settles, you should end up with a system that's physically and visually unobtrusive, which is what in-wall audio is all about. Then you can invite a few friends over, crank up the volume, and challenge them to find the speakers. Of course, it may not be as gratifying as showing off a pair of 6-foot-high boxes, but at least you'll have room for the sofa.
Three models make up Infinity's Environmental Reference Standard series of in-wall speakers. The ERS 800 shown here ($600 a pair) has a tweeter control that enables the user to fine-tune the system to fit any room. It has an Infinity IMG long-throw woofer and EMIT k tweeter.

The Canton InWall 9 speaker (left, $600 a pair) was designed so that its drivers and crossover can be removed easily if they require servicing. The coaxial system has a 9-inch woofer and a 1-inch tweeter. The white metal grille can be used as is or painted.

The Model 300 (right, $460 a pair) in Niles Audio's Blueprint line is sold with mounting brackets for new or existing walls or drop ceilings. Designed for outdoor use also, it is resistant to water and ultraviolet rays. The metal grille comes either in white or a weather-resistant paint.

Sonance developed the first high-fidelity in-wall speaker in 1981. Its top current speaker, the IV, has a rated frequency response of 35 to 22,000 Hz ± 2 db. The two-way system uses an 8½-inch polypropylene-cone woofer and a 1-inch polycarbonate-dome tweeter. Price: $650 a pair.
It is such a daily pleasure for me to be with the Royal Concertgebouw Orchestra."

by Roy Hemming

MORE than a few eyebrows were raised when the great Concertgebouw Orchestra of Amsterdam (now called the Royal Concertgebouw), for the first time in its hundred-year history, broke a proud national tradition and named a non-Dutchman as its new music director beginning with the 1988-1989 season. The choice to follow such world-renowned Dutch conductors and international recording stars as Willem Mengelberg, Eduard van Beinum, and Bernard Haitink turned out to be a young Italian, Riccardo Chailly (pronounced shy-yee).

For the preceding three years, the energetic but soft-spoken, mop-topped, and bearded Chailly, still in his early thirties, had been attracting attention as the conductor of the Berlin Radio Symphony, although he remained best known as an opera conductor in the major European and American houses. He was also well known for daringly zooming around on his motorcycle, until an accident in northern Italy put him in the hospital with painful arm injuries that not only prevented him from conducting for several months but also brought an ultimatum from his wife: Choose between the motorbike or her. She won.

No one was more surprised by the Amsterdamers' choice than Chailly himself. "I never expected it," he told me in New York soon after the news was announced. "That's the sort of appointment you don't dare dream about at my age. Naturally, I'm thrilled. It's such a fantastic orchestra. I also have to say it is very humbling to be the successor to Bernard Haitink, whom I have always admired so very much. I can't help but think, too, of the many deserving conductors who never arrive at such a position. It's a matter of luck, I guess—of the right moment in your career and so many things you can never predict in advance."

Last year, toward the end of his first sixteen-week Amsterdam season, I talked with Chailly again. How did he feel things had gone so far? "I know it sounds banal," he began somewhat apologetically, "but it is such a daily pleasure for me to be with this orchestra. I think we've established a very good relationship. The important thing is to maintain it from week to week, without getting too used to each
Any surprises? "I have found in the Netherlands a great love for Italian music," he said, "and many complaints that it isn't performed enough. That surprised me." The Royal Concertgebouw Orchestra, of course, has a great reputation for late-Romantic music, with German repertoire heading the list of its best-known recordings. So, as an Italian, Chailly admits he was cautious at first, since he did not want to appear to be "pushing" his native country's music. Actually, his own reputation in the concert hall has been built primarily in German and Russian repertoire, though when it comes to the opera house, his reputation so far is definitely based on Italian works.

A major test came a little over a year ago when, as the Amsterdam orchestra's new music director, Chailly had to lead its hundredth-anniversary concert. The management wanted a big, special, choral work. Chailly suggested the Verdi Requiem. "It was enthusiastically accepted—and it was a huge success," Chailly noted happily. Obviously, in the future he will be programming more works by Italian composers, with no guilt feelings.

Chailly is openly proud of his Italian roots, but like such compatriot conductors as Claudio Abbado, Giuseppe Sinopoli, Riccardo Muti, and Carlo Maria Giulini, he is no narrow nationalist. Although he traces some of his ancestors to France, he claims no relationship to the celebrated French musicologist Jacques Chailly. But music certainly runs in his family. His father, the composer Luciano Chailly, was for fifteen years artistic director of RAI, the Italian radio and television network, and for five years artistic director of La Scala.

"My father was against the idea of my becoming a conductor," Chailly confessed. "He had been inside the music business for many years, so he knew just how hard it is to have a career as a conductor. But I think I knew from the age of ten that that's what I wanted to be. My father took me to the RAI studios with him one Saturday morning and left me to watch the orchestra rehearse while he went to do some work. I can still feel the shock, the impact of the world of sound I discovered that day—and the way the conductor shaped the sound. I will never forget it. From that day I knew I would be a conductor."

Young Riccardo started going to all the concerts he could and began listening avidly to some of his father's phonograph records at home. "I would follow the opera recordings with the librettos, and I would even go through the motions of conducting." By the age of twelve, he was also a fanatic record collector on his own. He still is, with a collection of more than five thousand records and tapes.

As a teenager, Chailly studied piano and percussion—and got his first paying job in music as the drummer in a jazz and rock group in the lake region north of Milan for several summers. "We played a lot of Beatles songs and American music," he said, adding that he still likes jazz.

Meanwhile, he entered the Milan Conservatory to study conducting. He was only seventeen when the conductor Claudio Scimone, on the recommendation of one of Chailly's teachers, invited him to conduct the chamber group Solisti Veneti for a performance in Padua. From then on, there was no turning back. Eventually he spent three summers in Siena studying conducting with Franco Ferrari, who also taught Claudio Abbado, Daniel Barenboim, and Zubin Mehta. By nineteen, Chailly was an assistant to Abbado at La Scala, and he continues to look upon Abbado as a major mentor.

Opera would continue to dominate Chailly's career for most of his twenties—including stints in the U.S. with the Chicago Lyric Opera beginning in 1974, the San Francisco Opera in 1977, and New York's Metropolitan Opera in 1982. That same year he made such a successful debut with the Cleveland Orchestra that he was not only invited back for the next several seasons but also made several widely praised recordings with the Clevelanders for London/Decca. As his guest conducting expanded to include the Los Angeles and New York Philharmonics, he began dividing his time more evenly between opera and the concert hall.

After accepting the post of principal conductor of the Berlin Radio Symphony in 1983 and of the Bologna Opera in 1986, however, Chailly cut back drastically on all guest conducting. He felt it was more important to concentrate on Berlin and Bologna, and on building his repertoire, than to jet everywhere with a few showpiece works as some of his colleagues were doing. He even completely eliminated any American engagements. "It isn't because I haven't been asked or because I don't like America," he stressed. "Quite the contrary. I miss America very much and have wonderful feelings about my time in Cleveland and New York. My wife, in particular, keeps telling me it's been much too long since we've been to America." (That situation should be remedied this September when Chailly is scheduled to lead the Royal Concertgebouw Orchestra on a three-week tour here.)

Is there any conflict between opera and symphony as a personal priority? "Less than there used to be. I did so much opera during the Seventies and early Eighties that I soon felt it was time to concentrate more on symphonic repertoire—especially the Romantic and late-Romantic music that has always fascinated me. Now I have achieved more of a balance and consider opera and symphony parallel loves. At the moment, I do only two new opera productions a year and one opera recording. I am recording much more orchestral repertoire."

Chailly is especially proud of his recent recording, for London/Decca, of Bruckner's Fourth Symphony with the Concertgebouw. "It's an important record for me as my first Bruckner symphony with this great Bruckner orchestra," he said. As it is, his earlier recordings of Bruckner's Third and Seventh with the Berlin Radio Symphony are among his most acclaimed.

Chailly is clearly still in awe of the sonic qualities of the Amsterdam orchestra and the world-famous hall that has been its home since its founding in 1888 (the Dutch word
“concertgebouw” means concert hall. “They both have a unique sound,” he said, “although I discovered a problem with the hall itself. When it’s full, when the audience is there, the sound is marvelous. But for rehearsals, when the hall is empty, there is a big problem with balances. Not all the players can hear each other.”

Chailly learned that Mengelberg had been so bothered by the same problem four or five decades ago that he had huge sound-reflecting panels constructed to separate the stage from the rest of the hall during his rehearsals. Chailly arranged for similar panels to be installed, and he is happy with the results. “But I must admit that sometimes for avant-garde music or very fast rhythmical music—such as Stravinsky—the hall is not as congenial as a drier acoustic would be.” That’s not a problem for recording sessions, Chailly noted: “We do not record on the stage but on a platform that’s built over the parterre of the hall itself. The sound is then much more straightforward and easier to control.”

Chailly insists that when he made his first appearance as a guest conductor with the Concertgebouw, in January 1985, he did not know that Haitink had given notice he was leaving. “I was completely unaware of what was going on with regard to a search for a new conductor,” he said. “I conducted four different programs over a two-week period in 1985 and went on my way. About four months later, I began to hear rumors that I was being considered as one of the candidates for chief conductor. And then it became real.”

When Chailly accepted the Amsterdam post, he retained his position with the Bologna Opera, and he let it be known that he would continue with the Berlin Radio Symphony through the end of his contract in 1990. “But when they decided on Vladimir Ashkenazy as their new conductor,” Chailly explained, “I agreed to step down a year earlier so that he could start his active relationship with the orchestra sooner.”

And Chailly will all the sooner be able to consolidate his own active relationship with his new orchestra. “For the next four years I’ll be busy enough—and happily busy enough—with the Concertgebouw in Amsterdam.”

**CHAILLY ON COMPACT DISC: A SELECTIVE CHECKLIST**

- **Beethoven: Piano Concertos.** Alicia de Larrocha (piano); Berlin Radio Symphony. LONDON 414 391-2 three CD’s.
- **Brahms: Symphony No. 1, in C Minor; Academic Festival Overture.** Royal Concertgebouw Orchestra. LONDON 421 295-2.
- **Dvořák: Symphony No. 9, in E Minor (“From the New World”); Carnival Overture.** Royal Concertgebouw Orchestra. LONDON 421 016-2.
- **Franck: Symphonic Variations; Symphony in D Minor.** Jorge Bolet (piano); Royal Concertgebouw Orchestra. LONDON 417 487-2.
- **Gershwin: An American in Paris; Cuban Overture; Lullaby; Rhapsody in Blue.** Katia and Marielle Labèque (pianos); Cleveland Orchestra. LONDON 414 326-2.
- **Giordano: Andrea Chenier.** Montserrat Caballé, Luciano Pavarotti, Leo Nucci; National Philharmonic Orchestra. LONDON 410 117-2 two CD’s.
- **Prokofiev: Alexander Nevsky.** Irina Arkhipova (mezzo-soprano); Cleveland Orchestra and Chorus. LONDON 410 164-2.
- **Puccini: Manon Lescaut.** Kiri Te Kanawa, José Carreras; Orchestra del Teatro Comunale di Bologna. LONDON 421 426-2 two CD’s.
- **Rossini: II turco in Italia.** Samuel Ramey, Montserrat Caballé; National Philharmonic Orchestra. CBS M2K 37859 two CD’s.
- **Tchaikovsky: Manfred Symphony.** Concertgebouw Orchestra. LONDON 421 441-2.
- **Verdi: Macbeth.** Shirley Verrett, Veriano Luchetti; Orchestra del Teatro Comunale di Bologna. LONDON 417 525-2 two CD’s.
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TOKYO—If a visitor to the 1983 Japan Audio Fair were suddenly whisked forward in time six years to the 1989 fair, he would have a hard time recognizing it. It’s not that the fair has changed much, despite the move from the huge Harumi exposition grounds on Tokyo Bay to the smaller Sunshine City convention complex across town. It’s that the fair reflects the many changes the Japanese audio industry has gone through in this decade.

The advent of the CD has taken explanations for improvements in fidelity from the physical realm of motors and mechanisms to the mathematical realm of “encoding,” “bit density,” and “noise shaping.” (Shape noise? Why not just get rid of it?) And in place of stack after stack of standard-size components in clear-cut categories, there were components in a wide range of colors, sizes, and configurations. It was clear from the 1989 fair that if Japanese audio today is perhaps not as exciting as in years past, it is certainly more diverse than ever.

Sponsored by the Japan Audio Society, the Japan Audio Fair is billed as the world’s largest of its kind. The 1989 event drew nearly 220,000 visitors, including consumers as well as industry and media people from around the world, during its October 4 to 8 run.

More than ever, the fair was dominated by new developments in digital audio. Most interesting in this area was Sony’s prototype CD recorder/player, billed as “the ultimate recorder.” A magneto-optical device, it records special discs magnetically and plays them back optically with a laser in the same way it plays normal CD’s, discs recorded by the machine cannot be played back on an ordinary CD player, however. It looked more like a finished product than a prototype, though it may be well into the Nineties before Sony, or anyone else, puts a deck like this on the market.

Bit Wars and MASH

After 18-bit, 20-bit, and even “45-bit” operation, we’re on to 1-bit now. A high-profile example is Matsushita’s new MASH-PWM technology. MASH is the unlikely acronym for a new multistage noise-shaping technology for digital-to-analog (D/A) conversion. MASH
was present in the prototype SV-DA10 DAT deck and in a small variety of remote control (¥21,000, or about $145 at 144 yen to the dollar) to the Technics SL-Z1000 CD player and matching outboard SH-X1000 digital processor (¥400,000, or about $2,800, each) and even the Technics SV-MD33 DAT portable (¥334,000, or $2,320), which has balanced input terminals with Cannon connectors. The handsomely styled prototype Panasonic SL-PA10 CD player, however, didn't feature MASH as it has no D/A converter, being designed for connection to a “digital” amplifier such as the matching Panasonic SU-MA10 (¥107,000, or $745), an integrated amp with an internal “MASH 1-bit” D/A converter. It appears that Matsushita intends to put MASH in all its products in the coming years.

Sony also introduced 1-bit D/A conversion technology in the form of its High Density Linear Converter System, which contains what it calls a “pulse D/A converter.” Several high-end CD components using this system were displayed, among them the DAS-Rla D/A converter (¥400,000, or $2,800) and its companion CDP-R1a CD player (¥300,000, or $2,085), the CDP-R3 CD player (¥300,000), and the CDP-X77ES player (¥180,000, or $1,250).

Digital Audio Tape

Drawing strong interest in the DAT category was the new Aiwa HD-X1 portable deck (¥77,000, or $535), announced earlier in the year. To record analog signals, the HDA-1 analog-to-digital converter (¥22,000, or $153) is necessary. The HDV-1 video adaptor (¥53,000, or $368) can be connected to enable the recording of up to 3,600 video stills along with a digital audio soundtrack on a 120-minute DAT cassette. Slightly larger were Hitachi's new DAT-88 portable and JVC's DIN-size KS-D1 car DAT player (¥168,400, or $1,167), with a large display and direct keypad track selection.

Sony, however, showed the most strength in this area with its impressive collection of professional DAT equipment. The exhibit featured a large table of Sony DAT products, including the TCD-D10, PCM-2000, and PCM-2500 decks.

The JVC XD-Z909 was among several prototype DAT decks shown by various manufacturers with SCMS (Serial Copy Management System) circuitry. JVC also showed its XD-Z700 DAT deck (¥128,000, or $889), with remote control and a “high precision fine tracking mechanism” said to stabilize the signal during recording and playback. Onkyo displayed its prototype DT-1001 DAT deck, while Kenwood's DAT-LZ12 prototype featured four heads to enable monitoring while recording. Denon's GTR-CX prototype featured "ladder form multiple bias D/A lambda" circuitry.

CD Players

Starting with the small, Sony's new D-350 Discman has a ten-key pad on top of the unit, a large display, and eight-times oversampling. New Yamaha CD players were the CDX-1030 (¥89,800, or $624), and the CDX-930 (¥69,800, or $485), both with four-stage noise-shaping 1-bit D/A converters. Yamaha also displayed the CDX-100 player (¥49,800, or $346), with eight-times-oversampling digital filters and 18-bit D/A converters.

Teac's new CD-player separates, the D/A converter unit and the CD drive unit, are all half the width of standard components, so conceivably a pair could come together as "one" in an audio rack. Shown were the D-500 D/A converter (¥100,000, or $694) and the P-500 CD drive unit (¥80,000, or $556); also available on special order were the D-2 D/A converter and P-2 CD drive unit (¥400,000, or about $2,800, each). Along similar lines, JVC offered the XP-DA1000 D/A converter unit (¥450,000, or $3,125).

Kenwood showed CD players with its new DPAC (digital pulse axis control) circuitry, which is said to reduce jitter: the DP-8020 (¥80,000, or $556), the DP-7020 (¥55,000, or $382), the DP-6020 (¥45,000, or $313), and the DP-5020 (¥35,000, or $243). Its new DP-X9010 (¥73,200, or $508) is a CD playback drive unit designed for connection to the company's DA-9010 integrated amplifier (¥91,100, or $633), which has an internal D/A converter.

Pioneer introduced seven new CD players, among them the massive 331/2-pound PD-5000 (¥200,000, or $1,389), with a claimed track-access time of 0.5 second or less, and two
An ultra-compact speaker that proves high performance, small size and low cost need not be mutually exclusive.

Ambiance by Henry Kloss outperforms many, if not most, speakers of its compact dimensions, and is outperformed by none. We think you'll find it an ideal speaker for use in many circumstances, and it is perfect as an extension speaker, in surround-sound systems, and for situations where space is at a premium.

Proper engineering vs. over-engineering.

Ambiance provides a level of performance that makes it comparable to the costliest small systems, which can be costly indeed. So-called "mini" speakers have developed a kind of jewel-like cachet, whereby the higher the price per cubic inch, the higher the performance is assumed to be. That this is not so with the application of proper engineering, as opposed to over-engineering, is amply demonstrated by Ambiance. Ambiance is a two-way acoustic suspension system designed to the same high standards as our Ensemble system, with much the same seamless, well-balanced response. Unlike most speakers of its size, Ambiance's response in the 100 Hz region has not been exaggerated at the expense of bass lower down. It has more output in the 40 Hz region than any speaker of its size we've encountered. While no speaker of Ambiance's size can provide the same very low bass and total volume as our Ensemble system, it does provide ample weight on the vast majority of recordings. And its high-frequency dispersion permits placing it in a location that acoustically supports low bass (such as on the floor against a wall), without sacrificing treble response. Ambiance can accept more power than most systems its size, and can be used with just about any amplifier designed for home use. While efficiency is moderately low to maximize low frequency performance, Ambiance can be comfortably powered in many applications by low-cost receivers and amplifiers (a minimum of 15 watts/ch. is recommended). Ambiance is available in three finishes: gun-metal gray Nextel (a durable, suede-like finish), primed so that you can paint them, and in solid oak.

Try Ambiance in your home risk-free for 30 days.

Ambiance is available only directly from the Cambridge SoundWorks factory, a method of distribution reflected in its unusually low cost (we believe Ambiance competes directly with "mini" speakers retailing for hundreds of dollars more). Ambiance is only $109 per speaker in Nextel or primed for painting, $129 in solid oak (shipping extra), and comes with a 30-day money-back guarantee. For literature, expert advice, or to order call 1-800-AKA-HIFI Mon-Sat 9AM-10PM, Sun 9AM-6PM (ET). Canada 1-800-525-4434 Fax: 617-332-9229.
All Shapes and Sizes

Most noticeable at the fair was the diversity of audio system configurations. There were, for example, some very small "desktop systems," sort of like boomboxes without the box. An attractive execution of this idea was the Yamaha AST-7 Tiffany system ($49,000, or $340), which includes a book-size receiver (no output figures given), a twenty-one-mode remote controller the size of a playing card and only 4 millimeters thick, and two round-enclosure speakers with what Yamaha calls Active Servo Technology, which is said to produce stronger, deeper bass (in the U.S., "AST" becomes "YST" for legal reasons).

Moving up on the size scale, there's a new generation of rack systems measuring approximately the width of two cassette wells. The smallest may be the Sony Pixy Personal Component systems, just under 9 inches wide. Finished in matte gray, the Pixy MHC-P77 ($110,000, or $764) includes a CD player, a tuner/timer, an integrated amp, a double cassette deck, a remote controller, and a pair of two-way bookshelf speakers. The optional SDP-P77 digital surround processor ($44,800, or $311) has ten presets and Dolby Surround circuitry.

Aiwa's new 11 1/2-inch-wide NST-160 ($99,800, or $693), in a textured gray finish, features the company's new Super Turbosonic speaker system, which is said to extend and strengthen bass response by electronically including the speaker within the amplifier's feedback loop. The system also features processing circuitry developed by BBE Sound of the U.S., which is said to offer higher sound definition in the middle and high frequencies.

On the high-end side, Marantz displayed a series of very simply designed, crisply finished 9 3/4-inch-wide components, including the prototype PH-1 phono-equalizer amp and the DMA-1 mono power amp ($125,000, or $868, each), the DAC-1 control amp ($146,000, or $1,014), and the DPS-1 digital power supply ($68,000, or $472), which has been designed to shut out AC line noise.

Luxman showed a new series of midi components (14 inches wide) with an interesting warm gray-brown finish. The series is called AL Compo and includes the A-007a integrated amp ($69,000, or $479), D-007a CD player ($43,000, or $299), K-007a double cassette deck ($59,000, or $410) with autoreverse, the T-007a AM/FM/TV-sound tuner ($37,000, or $257), G-007 digital delay unit ($59,300, or $412) with surround sound and seven-band graphic equalizer, P-007 turntable ($26,500, or $184), V-007 combi-player ($110,900, or $770), and TS-007 satellite broadcast tuner ($56,300, or $391).

In full-size system components, Onkyo's new Liverpool series, to be introduced this spring, was one of the most attractive shown at the fair. All the components featured sparsely designed front panels attractively finished in titanium color with gold trim. They included the R-200 receiver ($68,800, or $478), the C-200 compact disc player ($55,000, or $382), the ML-500 combi-player ($139,000, or $965), and the K-200R cassette deck ($69,000, or $479).

Electronics

The recent trend toward including video equipment in high-fidelity audio systems has triggered an avalanche of sound-processing systems, typically for surround sound. Drawing the most attention in this area was the avalanche of sound-processing systems, typically for surround sound. Drawing the most attention in this area was the avalanche of sound-processing systems, typically for surround sound. Drawing the most attention in this area was the avalanche of sound-processing systems, typically for surround sound. Drawing the most attention in this area was the avalanche of sound-processing systems, typically for surround sound. Drawing the most attention in this area was the avalanche of sound-processing systems, typically for surround sound. Drawing the most attention in this area was the avalanche of sound-processing systems, typically for surround sound.
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was the release of the Panasonic Home THX sound system, based on Dolby Pro Logic and the Lucasfilm THX system used in theaters. Sold as a package for ¥1.6 million ($11,111), the system includes a THX Control Center component with remote control, three 100-watt-channel stereo power amplifiers, three front speakers, a subwoofer, and two special rear-mount surround speakers. The system was demonstrated with some "gee-whiz" film clips from Lucasfilm.

Dolby Pro Logic alone was the choice of several other manufacturers. Kenwood introduced the new KA-V6000 ($85,000, or $590), and KA-V4000 ($65,000, or $451) audio/video integrated amplifiers with Dolby Pro Logic Surround and full function "learning" remote controllers. The prototype Denon AVC-3000C audio/video integrated amplifier also featured Dolby Pro Logic Surround, as did the Pioneer SP-7000 digital sound-field processor ($89,800, or $624). Pioneer also showed another model, the SP-91D ($120,000, or $833), with a high-performance 50-bit "DSP" (digital signal processing) circuit, along with three new audio/video amplifiers, the VSA-930 ($108,000, or $750), the VSA-730 ($79,800, or $554), and the VSA-530 ($53,800, or $374), all of which have multifunction "learning" remote controllers.

One of the Dolby Pro Logic camp was Yamaha, which displayed its new DSP-107AST digital sound-field processor ($139,800, or $971), whose remote controller has more buttons than can be easily counted (some thirty-five of them are said to be "learning keys"). The same DSP technology is incorporated into the new AVX-100AST audio/video integrated amplifier ($84,800, or $589), which is rated at 100 watts per main channel and 20 watts for each of three effects channels, all into 6 ohms (EIAJ).

In the basic electronics category, Denon showed the prototype PRA-2000X preamp and its companion POA-3000X power amp with the company's new "MOS-Super Optical A" circuit and BTL balanced inputs. Also on display was Denon's new PMA-8900 integrated amp with built-in "Super Linear" D/A converters, priced at ¥84,800 ($589); a cosmetically tweaked gold version (PMA-8905G) is also available (¥93,800 or $651).

The Accuphase exhibit highlighted the new P-11 power amplifier ($230,000, or $1,597) and matching C-11 preamp ($220,000, or $1,528), the DP-11 CD player ($270,000, or $1,875), and the T-11 FM tuner ($120,000, or $833), all controlled by the immense RC-6 Remote Commander.

The eye-catcher in the Onkyo booth was the new M-510 Grand Integra power amplifier ($760,000, or $5,278), with what may be the most massive power meters in the business. Also in the "big is beautiful" category were the Sony TA-NR1 mono power amplifier ($500,000, or $3,472), with internal D/A converter and 240 watts per channel, and the DA-P9500 control amplifier, with a rather formidable "intelligent communicator" remote-control panel replete with buttons, a dial, and a large display.

Speakers

Loudspeakers have traditionally been the area of least strength for the Japanese, though some manufacturers are working to improve their success through the development of new diaphragm materials, outboard processing systems, and port configurations. Or just plain good looks, as many new models are far more attractive than their predecessors. Examples include Onkyo's beautifully finished Scepter 3001 ($280,000, or $1,944, a pair) and Q1 ($35,000, or $243, a pair), both of which featured round tweeter enclosures mounted on top of the speaker cabinets. There was a gorgeous, deep-lacquer finish on the prototype Technics RX-100 speaker with a "super graphite" flat diaphragm, and Mitsubishi, a favorite of high-end enthusiasts in Japan, showed off its Diatone DS-V5000, a four-way acoustic-suspension system ($550,000, or $3,819), and the 2S-3003, a two-way bass-reflex speaker (no price given). Both models feature 12½-inch woofers and are available only by special order.

Perhaps the most interesting-looking Japanese speakers are offered by Sasaki, whose "Clearball" speakers have spherical crystal enclosures. Prices ranged up to ¥460,000 ($3,194) a pair.

In the realm of outboard speaker processing, Yamaha demonstrated a strong presence. The latest in its Active Servo Technology speakers included the new two-way AST-S10 ($65,000, or $451), the three-way, five-driver AST-F100 ($650), and the three-way, four-driver AST-T100 ($160,000, or $1,111). All require an add-on processing unit such as the new AST-A5 Active Servo Processing Amplifier ($300, or $208), which is rated at 80 watts per channel into 6 ohms (EIAJ). Also shown was the AST-SW100 Active Servo Processing Super Woofer ($59,000, or $410), which has a built-in 80-watt amplifier.

Analog Cassette Decks

Almost all manufacturers seemed half-hearted in the category of analog tape decks, with practically no new models priced over ¥90,000 ($625). In Japan, DAT deck sales have yet to register more than a blip, so it seems that the anticipation of DAT's popularity has kept interest away from analog machines. Kenwood showed a line of cassette decks led by the three-head KX-9010 ($69,400, or $482), with automatic tape-calibration system and remote control. The new Yamaha KX-R100 ($69,800, or $485), a two-head deck with Dolby HX Pro, boasted a twelve-layer laminated amorphpus head said to offer superior high-frequency response. JVC offered two new "independent three-head" decks, the TD-V931 ($87,000, or $604) and the TD-V731 ($69,800, or $485). Denon showed its new DRR-60 auto-reverse deck ($49,800, or $346) and the gold-colored DR-70G, a three-head deck with remote control ($69,800). Mitsubishi displayed several of its new A & D brand decks, including the three-head GX-9100EX ($110,000, or $764) and GX-Z6100 ($69,800), while Technics offered the RS-B755 ($49,800, or $346), a three-head deck with remote control.

More than anything else I saw, the biggest testimony to the diversity of the 1989 Japan Audio Fair was the new Micro-Seiki APM-2 turntable ($220,000, or $1,528) and MA-125 static-balanced tonearm, demonstrated to a room full of hushed audio enthusiasts. Even "old" technology, it seemed to say, can be captivating when it's beautifully executed.
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CIRCLE NO. 31 ON READER SERVICE CARD
BEST RECORDINGS OF THE MONTH

Stereo Review’s critics choose the outstanding current releases

JANET JACKSON’S “RHYTHM NATION 1814”

THREE years ago, with the release of her album “Control,” Janet Jackson gave notice that she was far more than simply Michael Jackson’s cute little sister. The propulsive dance tunes and sensual ballads of “Control” established Jackson as a mature and assertive artist who was willing to bend conventional forms to suit her personality. Her new album, “Janet Jackson’s Rhythm Nation 1814,” represents an even bolder move in that direction.

Working again with producers Jimmy Jam Harris and Terry Lewis, Jackson has fashioned a concept album that addresses such social concerns as racial prejudice, crime, and homelessness through the medium of popular dance music. The effort succeeds because the songs avoid self-conscious, heavyhanded preaching and leave room for Jackson’s excursions into playfulness and intimacy. Concept aside, the record succeeds because it offers modern techno-pop music of high quality.

Harris and Lewis are wizards at creating electronic drummers that come across as many-handed monsters of energy, and the set blasts off with an overwhelming burst of rhythmic power. But the technology is employed with extraordinary imagination, consistently serving the music. The songs Jackson sings are immediately captivating and would stand up well even without the gimmickry, but the special effects heighten their drama. The music is still effective when the approach is more subdued, as in the poignant Livin’ in a World (They Didn’t Make), which addresses the plight of children who are born into a society where adults break all the rules but expect the young to know the difference between right and wrong.

Though Harris and Lewis exert a strong influence, the magic is supplied by Jackson herself, whose voice and personality dominate the proceedings. She also played a prominent role behind the scenes, participating in the production and writing or co-writing half the material, including two of the very best songs, the bounding, sassy Escapade and the rakish, strutting Black Cat, which is underscored by biting blues licks and a driving beat. Her sensuality shimmers in the lovely, engaging Back to Me, a ballad that segues into the equally romantic Someday Is Tonight, both by Jackson and her co-producers.

While the reference to 1814 in the title is unexplained, “Rhythm Nation” is a tour de force that should insure Janet Jackson a leading position among today’s popular artists. She comes across as a musical dynamo who not only knows what she wants to say but delivers her messages with a mighty wallop.

Phyl Garland

JANET JACKSON: Janet Jackson’s Rhythm Nation 1814. Janet Jackson (vocals); vocal and instrumental accompaniment. Interlude—Pledge; Rhythm Nation; State of the World; The Knowledge; Miss You Much; Love Will Never Do (Without You); Livin’ in a World (They Didn’t Make); Alright; Escapade; Black Cat; Livin’ In Complete Darkness. A&M SP-3920, © CS-3920. © CD-3920 (61 min).

KARAJAN’S DRAMATIC BRUCKNER

THE monumental Eighth Symphony was the first Bruckner work recorded by the late Herbert von Karajan, in 1958 with the Berlin Philharmonic for EMI. The Bruckner Eighth was also one of the conductor’s last recordings, made in November 1988 with the Vienna Philharmonic and now released by Deutsche Grammophon. In between came a memorable complete series of the Bruckner symphonies that Karajan recorded in Berlin for DG: the Ninth in 1968, the Eighth in 1976, and the rest between 1976 and 1982. All of these later Berlin recordings have been acclaimed as masterfully, displaying an unerring command of musical architecture and dramatic tension, and all are available on CD.

The Vienna performance of the
Eighth was recorded as part of a Karajan series slated for European television. His reading differs little from the craggy and awesome 1976 version. There is more intensity in the climactic episodes than before, but this may be a factor of the recording itself, which makes an even more powerful impact than the earlier one at the bass end of the spectrum. In either version (both of which use the Haas edition, by the way), Karajan’s interpretation of the symphony has unsurpassed drama and scope, essential requirements in this work. My only reservation has to do with a desire for more of a windswept quality in the scherzo, where I find both of these readings a shade stolid.

Among digitally recorded Bruckner Eighths, the major rivals to the new Karajan version are those by Bernard Haitink with the Royal Concertgebouw Orchestra on Philips and Carlo Maria Giulini with the Vienna Philharmonic, also on Deutsche Grammophon. Both are less highly charged but certainly convincing on their own terms. For this work, I prefer the Vienna sound, especially as captured in this powerful new recording. David Hall

BRUCKNER: Symphony No. 8, in C Minor. Vienna Philharmonic Orchestra, Herbert von Karajan cond. Deutsche Grammophon © 427 611-2 two CD’s (83 min).

ALL-OUT COUNTRY FROM RODNEY CROWELL

WITH his 1988 breakthrough album, “Diamonds and Dirt,” the multitalented Rodney Crowell became the first entertainer in the history of country music to score four consecutive No. 1 Billboard singles written, produced, and performed by the same person, all drawn from the same album. Such mainstream-performing success was a long time coming for Crowell (“Diamonds and Dirt” was his fifth album release), even though he had been one of the most respected songwriters and producers in the business for at least a decade. This past October, he garnered four nominations in the 1989 Country Music Association awards.

In the follow-up album “Keys to the Highway,” again co-produced with Tony Brown, Crowell wisely repeats the all-out country approach that propelled “Diamonds and Dirt” while still demonstrating his ability to write intelligently, effectively, and evocatively in a number of country subgenres and offshoots. As usual, he excels in two particular areas, original rockabilly and heartwrenching ballads.

Both styles suit the album’s conceit—the events that collide and provide keys to the highway of life—as they each leave room for bold, expressive statements of Crowell’s reflections on new beginnings, relationships, death, and the healing power of love and self-acceptance. Crowell, whose recent records indicate a maturing and more sharply focused self-image, has never been stronger than in Things I Wish I’d Said, one of two songs that address the recent death of his father and the bond that holds them still. As comforting a song about death as has ever been written, it is in essence a love song. The album is dedicated to the memory of the elder Crowell.

Crowell’s long suits have always been the descriptive narrative and the ability to capture complex emotion in simple language. But he also reveals a new facility with sexual urgency in the steamy roadhouse blues We Gotta Go On Meeting Like This, an almost comical ode to lust written with his cousin, Larry Willoughby: “They call me dirty, they call you trash/T’ween you and me, that’s what brings me back,” he offers, in uncommonly honest country writing.

Backed by the Dixie Pearls, a hand-picked group of rock-oriented studio musicians he has favored for years, Crowell continues to insist on eloquent, no-nonsense playing and on stretching his limits as an expressive, emotive vocalist. He is reminiscent here, in the best sense, of the young Don Everly.

“Keys to the Highway” may demand more of the listener than “Diamonds and Dirt,” since few of the songs are as immediately accessible. It’s worth the effort, though. If anyone else is writing mainstream country music with half the heart, head, and soul as Rodney Crowell, he has yet to come forward.

Alanna Nash

RODNEY CROWELL: Keys to the Highway. Rodney Crowell (vocals, acoustic guitar); the Dixie Pearls (instruments); Rosanne Cash, Vince Gill (background vocals); vocal and instrumental accompaniment. My Past Is Present; If Looks Could Kill; Soul Searchin; Many a Long & Lonesome Highway. We Gotta Go On Meeting Like This; The Faith Is Mine; Tell Me If Looks Could Kill; Soul Searchin; Many a Long & Lonesome Highway: We Gotta Go On Meeting Like This; The Faith Is Mine; Tell Me
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the Truth; Don’t Let Your Feet Slow You Down; Now That We’re Alone; Things I Wish I’d Said; I Guess We’ve Been Together for Too Long; You Been on My Mind. COLUMBIA FC 45242, © FCT 45242, © CK 45242 (41 min).

PINNock LEADS PURCELL’S “DIDO AND AENEAS”

In the summer of 1988 Trevor Pinnock conducted his original-instruments ensemble, the English Concert, with its choir and soloists, in a number of works by Henry Purcell, which they then began recording for Archiv. The first to be issued is the remarkable little opera Dido and Aeneas (“little” only in the sense of its being so concise). The performance makes vividly apparent why the première of this work, which occurred three hundred years ago last spring, is regarded as having inaugurated the “golden age” of English music. It is by no means the first successful recording of the opera. Charles Mackerras conducted a fine one on the same label more than twenty years ago, and Raymond Leppard has conducted two very appealing ones since then. But Pinnock’s is surely the most effective of the several recordings involving period instruments.

Pinnock’s cast is headed by the young Swedish mezzo Anne Sofie von Otter, whose voice is ideally suited to the role of Dido and who makes her characterization particularly effective through her sensitive balance of total emotional commitment and a patrician restraint lying for a queen. All of her associates make similarly distinguished contributions in realizing both the musical and dramatic qualities of their respective roles—of making those qualities, in fact, inseparable. And Pinnock has the measure of the work without question; he keeps it moving with a wonderful sense of flow, and in the charming instrumental dances his players do not rely on the sheer sounds of their instruments to win us over but show the most vivid imaginativeness and spirit.

Simon Standage, who has twice been the violin soloist in recordings of Vivaldi’s Four Seasons with Pinnock, richly earns solo billing here, if only for his incredible playing in the last of those tiny dances, the Witches’ Dance in Act III. This is what we might call total-immersion musical drama: Every number, vocal and instrumental, is a part of a continuous and utterly convincing theatrical flow. Dido’s great lament, set forth in truly regal modesty, and the chorus that follows it do not merely conclude the work but resolve its various elements with the impact of a Mahler adagio in microcosm.

The recording itself balances warmth and crispness as appealingly as von Otter balances the emotional elements of her characterization, and the package includes an especially comprehensive background piece by Curtis Price as well as the full text. (And, by the way, this is the first Deutsche Grammophon CD I’ve seen with indexing.)

Richard Freed

PURCELL: Dido and Aeneas. Anne Sofie von Otter (mezzo-soprano), Dido; Stephen Varcoe (baritone), Aeneas; Lynne Dawson (soprano), Belinda; Nigel Rogers (tenor), Sorceress, First Sailor; others. Simon Standage (first violin); Trevor Pinnock (harpsichord); Choir of the English Concert; Trevor Pinnock cond. DEUTSCHE GRAMMOPHON/ARCHIV © 427 624-2 (54 min).

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ANYTHING GOES (Cole Porter). Kim Criswell, Frederica von Stade, Cris Groenendaal, Jack Gilford, Bruce Hubbard, others (vocals); Ambrosian Choir; London Symphony Orchestra, John McGlinn cond. EMI/ANGEL © 4DS-49848, © CDC-49848 (74 min).

Performance: Something special
Recording: Bright and vivid

From the opening measures of the overture here, it's spine-tinglingly clear how exciting any number of vintage albums of Broadway shows would have sounded if technology had come along a few decades earlier than it did. But thanks to such dedicated conductors as John McGlinn, we can have vivid, authentic, superbly recorded reconstructions—as with his recent Show Boat and now Cole Porter's hit musical of 1934, Anything Goes. Unlike the recent Lincoln Center revival in New York (and several others in the last decades, plus two movie versions), this Anything Goes sticks strictly to the original score, with no interpolations of songs from other Porter shows. McGlinn does, however, reinstate (in their proper positions) two topnotch numbers that were dropped during the 1934 pre-Broadway tryouts: Buddy Beware and What a Joy to Be Young. He also includes, at the end of the recording, three other songs that were cut during rehearsals, including Kate the Great, which Ethel Merman refused to sing because its "dirty" lyrics (they seem mild today) would offend her mother—Porter got even by giving her Katie Went to Haiti for 1939's DuBarry Was a Lady. The details about all of this, as well as a guide to the arrangements used for each song (some are Robert Russell Bennett's surviving originals, others are conscientiously researched reconstructions), are provided in the superbly thorough liner notes.

Frederica von Stade, in the secondary role of the ingenue, Hope, sings gorgeously and unaffectedly. Her All Through the Night duet with Cris Groenendaal and her solo What a Joy

EXPLANATION OF SYMBOLS:

 далее содержится описание символов.

STEREO REVIEW JANUARY 1990
SEX, drugs, and rock-and-roll, pop culture’s unholy trinity, are often lumped together, but giving up the second of them has intensified Aerosmith’s desire to excel at the other two. The band’s powerful, drug-free performances in 1987’s “Permanent Vacation” and their new album, “Pump,” give the lie to the myth that cocaine and fast drugs have anything to do with inspiring fiery rock-and-roll. Just compare these latest records with those Aerosmith cut during nearly a decade of life in the fast lane—from “Draw the Line” to “Done with Mirrors,” a fairly dreadful run of albums. For all intents and purposes, “Permanent Vacation” picked up where “Rocks,” their last great album of the Seventies, left off, and “Pump” moves them another step forward.

Perhaps egged on by younger competition such as Guns n’ Roses, with whom they toured, Aerosmith rocks harder than ever in “Pump.” The cover of the album, a suggestive picture of one truck mounted on top of another—dare I call it auto-eroticism?—is an apt metaphor for the raunchy rocking within. It’s a very lean and sinewy band of survivors that the rafters with songs such as Young Lust, F.I.N.E., My Girl, and the kooky hit Love in an Elevator, with the added voices of tour manager Bob Dowd and horn player Bruce Fairbairn. At the same time, Aerosmith manages to work in a lot of baroque, left-field touches—everything from horns and strings to sitars and exotic African instruments—without detracting from the band’s guitar-driven, adrenalin-fueled whomp. You can tell these guys are bouncing off the walls with energy and ideas—sort of a rediscovered lust for life not uncommon in those who have conquered their addictions—and “Pump” does just that, for nearly fifty minutes.

Along the way, Aerosmith slips a few public-service announcements into the program. Monkey on My Back is a plain-spoken account of addiction (“You best believe I had it all and I blew it,” screams Steven Tyler) that beats back the monkey with a solid shot of slide-guitar-driven blues-rock. Janie’s Got a Gun is an unflinching account of child abuse and the worst-case scenario that unfolds when such abominations go unnoticed or unpunished. Finally, in Voodoo Medicine Man, Aerosmith interpolates a Zulu tribal chant into a raging number about the widening gap between man and nature—and nature’s indignant response to one too many environmental affronts.

The audacity of the arrangement is reminiscent of Continental Drift, from the Rolling Stones’ “Steel Wheels” album, which also works the music of a far-flung culture (the Joujoukan pipe players of Morocco) into a rock song. Isn’t Aerosmith, when you get down to it, America’s answer to the Stones? And isn’t it somehow fitting that both bands are delivering knockout punches after years of foundering? Parke Puterbaugh

AEROSMITH: Pump. Steven Tyler (vocals, keyboards, harmonica); Joe Perry, Brad Whitford (guitars); Tom Hamilton (bass); Joey Kramer (drums); vocal and instrumental accompaniment. Young Lust; F.I.N.E.; Love in an Elevator: Monkey on My Back; Janie’s Got a Gun; The Other Side; My Girl; Don’t Get Mad, Get Even; Voodoo Medicine Man; What It Takes. GEFFEN GHS 24254, © MSG 24254, © 24254-2 (48 min).

To Be Young are the album’s unequivocal highlights. Groenendaal is splendid as Billy, the leading man, but Jack Gilford just doesn’t have enough voice left to do justice to Meredith Martin’s numbers. In the keystone role of Reno Sweeney, the one that was once Mer- man’s, Kim Criswell sings with verve and clarity, but also with tones that too often become strident and whiny.

McGill is the clear star of this production, holding everything together with a winning blend of lighthanded snap, dash, and genuine lift. Despite the somewhat uneven casting, his Anything Goes again sets a high standard for new recordings of American musical-theater classics.

RODNEY CROWELL: Keys to the Highway (see Best of the Month, page 104)

MELISSA ETHERIDGE: Brave and Crazy. Melissa Etheridge (vocals, guitar); other musicians. No Souvenirs: Brave and Crazy: You Used to Love to Dance; You Can Sleep While I Drive; and five others. ISLAND 91285-1, © 91285-4, © 91285-2 (48 min).

Performance: Gritty
Recording: Good

Melissa Etheridge makes folk-rock, with the emphasis on the rock. She may strum an acoustic guitar, and she may write songs filled with literate references, but she’s a rocker at heart. She belts out her words from deep in the diaphragm, with her jaw thrust out, growling and moaning in a husky voice that portrays a swaggering, macha way of looking at life.

Unfortunately, Etheridge’s attitude gets in the way of her music. She moves back and forth between soft and hard, between innocence and headlong consummation without ever stepping in between. She singing is bipolar, too, which explains the basic structure of nearly all her songs: soft expectancy in the verses and hard pounding in the choruses. These are power ballads of a sort, but she doesn’t always successfully empower them.

Taken in small doses, Etheridge is quite effective. Over the course of an entire album, however, the repetitiveness and narrowness of her music get a little tiresome. She’ll sound great in the car, but will you want to take her home?

Eurythmics: We Too Are One. Eurythmics (vocals and instruments); other musicians. We Two Are One: The King & Queen of America; (My My) Baby’s Gonna Cry; Don’t Ask Me Why, Angel; and five others. ARISTA AL-8606, © AC-8606, © ARCD-8606 (48 min).

Performance: Typical
Recording: Quite good

Annie Lennox and Dave Stewart have settled into a comfortable groove some-
Stereo Review wants to know more about our readers. How much equipment you buy (and how often), how much you spend on it, what sort of product features you like. That will help us create a better, more informative magazine, specially geared to your tastes and preferences.

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Mary Chapin Carpenter

O

to frighten the horses. Too much education was somehow considered "inauthentic."

Today, however, Mary Chapin Carpenter is being received with open arms. And with very good reason. Her second CBS album, "State of the Heart," like her first, "Hometown Girl," reveals a songwriter of uncommon wisdom, clarity, and craft. Unlike millions before her, she has figured out how to write music that is both commercial and intelligent, universal yet intensely personal.

Carpenter's forte is a style that mixes folk, country, blues, and jazz—with heavy emphasis on folk—and at times her husky, sturdy voice brings to mind the vocal and melodic fashions of such diverse artists as Rosanne Cash. Emmylou Harris, Nanci Griffith, and Suzanne Vega. But her real drawing card, like Griffith's and Vega's, is the poetic nature of her lyrics. In a voice that bespeaks a trace of genteel Southerness, she sings poignantly of the loneliness and anger of a middle-aged woman abandoned by a married lover (Goodbye Again) and, in a most difficult concept to pull off, of the years and loves and events marked by the fading and fraying of a favorite old rock (This Shirt). She manages to duplicate the narrative craftsmanship of Harry Chapin (no relation) without his cloying, overwrought emotionalism.

All of the songs here are, in fact, songs of the heart, songs that speak of love and loss with, as Carpenter says, as much humor as melancholy. But Carpenter, the solo romantic of old, is now accompanied by a band that rocks out plenty when needed, employing a chicken-pickin' electric guitar for the country-rock of Too Tired, a racy song about giving in to wrong-headed romance.

"Randiness," of course, or at least a woman's sexuality, was something the "girl singer" of years past couldn't touch with a ten-foot or even an eleven-foot pole. Tammy got a lot closer, as did K.T. But chances are it's Mary Chapin Carpenter who will acquaint country audiences with a full range of a woman's emotion—or just a human's, for that matter. Girl singers never sounded as articulate as she does in "State of the Heart." Or, come to think of it, as good. Alanna Nash

Mary Chapin Carpenter: State of the Heart

Mary Chapin Carpenter (vocals, acoustic guitar); vocal and instrumental accompaniment. How Do: Something of a Dreamer; Never Had It So Good; Read My Lips; This Shirt; Quittin' Time; Down in Mary's Land; Goodbye Again; Too Tired; Slow Country Dance; I Don't Bring You. Columbia FC 44228, © FCT 44228, © CK 44228 (38 min).

where between rock and soul. It's the dominant mode in "We Too Are One," their eighth album as Eurythmics, and it's the hybrid that's brought their recent commercial success. Stewart provides the rock, and Lennox delivers the soul.

Sometimes that soul comes on ice. Lennox always treads the fine line between passionate and disdain. In the title cut, she's warm and embracing, in (My My) Baby's Gonna Cry she's cool and distancing. And she's just plain cold and cruel. Lennox's voice soothes at the bottom of her range, but at the top it cuts like a whip. "We Too Are One" takes an occasional side trip from romance. The King & Queen of America is a stiff jab at the most American attitudes, and Sylvia tells the melodramatic story of a young woman whose life is a downward spiral. But the most powerful track in the album is Angel, a quiet dirge about the death of a dear one. It doesn't seek to explain so much as describe grief and loss. The song is all the more powerful for its lack of answers. "We Too Are One" doesn't represent any bold new developments. Instead, it reaffirms the talent and ability of one of rock's most captivating duos.

Janet Jackson: Janet Jackson's Rhythm Nation 1814 (see Best of the Month, p. 103)

Ziggy Marley and the Melody Makers: One Bright Day. Ziggy Marley and the Melody Makers (vocals and instrumental) accompanied by Black Japanese Story (Past History); One Bright Day; Who Will Be There; When the Lights Look Out; All Love; and five others. Virgin 91256-1, © 91256-3, © 91256-2 (41 min).


There is something eerily familiar about the music of Ziggy Marley and the Melody Makers, which probably stems from the fact that these four kids are children of the late Bob Marley, who was so responsible for bringing international recognition to Jamaican reggae. Their music is just as compelling as his, but they have taken a bold step into the mainstream by employing the sort of modern production that will make their politically informed lyrics more palatable to a broad audience. The bottom is heavier, the sound crisper and cleaner than in Bob Marley's records. "One Bright Day" is an amazingly rich and rewarding album that conveys the essential charm of authentic reggae without sacrificing its integrity. P.G.

Maze Featuring Frankie Beverly: Silky Soul. Frankie Beverly (lead vocals, keyboards, drum programming); Maze (vocals and instrumental) accompanied by Silky Soul; Can't Get Over You; Just Us; Somebody Else's Arms; Love's...
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Performance: Smooth balladeer
Recording: Very good

The West Coast-based vocal-instrumental group called Maze has been on a sabbatical from recording for the past three years, so this release should come as good news to fans of Frankie Beverly, who not only sings all the lead vocals, and plays keyboards but also writes just about all of their music. He's a smooth balladeer who can spice his music with tasteful percussive effects when he chooses. He likes to get into a mellow groove and ride it out, which is what he does here. No song is quite as compelling as the group's all-time hit, Southern Girls, with its laid-back, folksy charm, but two songs stand out for rhythmic enticement as well as for the sermons tucked into their lyrics—Change Our Ways and Mandele, both of which address current concerns yet have a catchy beat. Best of all, though, this set once again "features" Beverly singing, and playing, his firm conviction and solid musicianship.

REBA McENTIRE: Reba Live
McEntire (vocals); vocal and instrumental accompaniment. So. So. So Long. One Promise Too Late. Let the Music Lift You Up. Little Rock. New Fool at an Old Game. Somebody Up There Likes Me. San Antonio Rose; and twelve others. MCA ©MCAC2-8034, © MCAAD2-8034 (72 min).

Performance: Gone for it
Recording: Excellent remote

Several years ago, Reba McEntire, arguably the finest female country singer since Patsy Cline, traded in her country sound for a middle-of-the-road mashing (Sunday Kind of Love, Respect, Who's in New England) in a quest to reach the widest possible audience. Here, in an album compiled from concerts recorded before California audiences, McEntire, ably supported by a vigorous and muscular road band, skillfully blends the cowgirl material of old with the new, uptown Reba. Fiddler Glen Duncan and saxophonist Joe McGlohon add backbone to several songs that turned fazed in the studio renditions, and while the program gets overlong with the addition of a medley of country's most stalwart tunes, the vocal and emotional results are largely satisfying.

McEntire rattle the rafters to show off her formidable technical skills. Occasionally, however, she goes way overboard. She has an annoying tendency to overdo the trills and embellishments, and there's a wretchedly excessive a cappella version of Cline's signature tune, Sweet Dreams. If the latter indiscretion sends you lurching for the fast-forward button, you might also skip the singer's between-song prattle, which is predictable, bland, and incessantly self-promoting. As a singer, McEntire generally has the timing—and the instincts—of a choral director of her concerts (and lately of her career), she obviously needs new advisors.

WILLIE NELSON: A Horse Called Music
Willie Nelson (vocals, guitar); vocal and instrumental accompaniment. Nothing I Can Do About It Now; The Highway; I Never Cared for You; If I Were a Painting; Spirit; There You Are; Mr. Record Man; and three others. COLUMBIA FC 45046, © FTC 45046; © CK 45046 (35 min).

Performance: Coastin' Recording: Muddy

After thirty albums, any artist is bound to let down occasionally, but Willie Nelson has been doing too much of that in the last decade. Recording double albums in a weekend and taking too little care with song selection and pacing. In "A Horse Called Music," Nelson team with his producer of twenty-five years ago, Fred Foster, who dug out a terrific, lyrical title tune and a couple of offbeat, engaging supporting songs that Nelson sings with more feeling than usual. But too much of the material seems like leftovers, including a reprise of one of Nel-
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THE WORLD ACCORDING TO YOUNG

We already know that Neil Young is a genius. He's proved that over and over again during the course of more than twenty years and more than twenty albums. It shouldn't surprise us that his new "Freedom" is a great album. And it is a great album, even for Neil Young.

In a sense, "Freedom" is Young's State of the Union address, and it's part rant and part dirge. He's unhappy about injustice, poverty, crime, drugs, pollution, hypocritical politicians, and mindless citizens. He takes aim at President Bush in the blistering Rockin' in the Free World. An acoustic, folky treatment of the song opens the album; a no-holds-barred reprise closes it. "We got a thousand points of light/For the homeless man," Young sings at the end. "We got a kinder, gentler machine-gun hand." Life in these United States is getting worse, says Young, and nothing is being done. He hasn't been this angry since Ohio.

On the personal level, things seem nearly as bad. Young adds two bleak entries to his romantic oeuvre, Hangin' on a Limb and The Ways of Love. He seems to be saying in the latter that love is hard, if not impossible. You don't get it as much as steal it from someone else. Enjoy it while you can, because it doesn't last. Hangin' on a Limb offers a glimmer of hope: "And though their love was hangin' on a limb/She taught him how to dance." The sweetness of the track, to which guest artist Linda Ronstadt contributes warm backing vocals, is undercut by Young, whose singing is so enervated that you begin to question his will to see the song through.

No one has portrayed the horror of drugs with as much feeling and depressing intelligence as Young. But he has never before taken us this far into the terror of addiction. In No More he piles desperation upon desperation in a string of simple junkieplaints: "Where did the magic go?/I searched high and low/I can't find it no more... No more, no more, no more." There is a puzzled quality to the song, a mournful, relentless stupidity.

The music in "Freedom" has a familiar quality. The energized acoustic-guitar playing—with sweet, country-folk accents—harks back to "After the Gold Rush," and the blend of Young's warbly voice and pedal-steel guitar was first captured on disc during his days with Buffalo Springfield. His electric-guitar work has always been muscular, as well as lyrical, and often risky. Here, at times, he makes it deliberately ugly. In Don't Cry, for instance, his guitar sounds like a gunshot and industrial noise. And his nasty version of the classic On Broadway, with new verses on the current sleaziness of the Great White Way, ends with a stinging solo—guitar notes like tracer bullets.

"Freedom" isn't simply a journey into the musical past. Young has recast his varied musical talents to say something about the way we are now. He is full to bursting with life, as bleak and depressing as some of it may be, and he must raise his voice. He must be heard.

Ron Givens

NEIL YOUNG: Freedom. Neil Young (vocals, guitar); Linda Ronstadt (backing vocals); other musicians. Rockin' in the Free World; Crime in the City (Sixty to Zero Part I); Don't Cry; Hangin' on a Limb; Eldorado; The Ways of Love; Someday; On Broadway; Wrecking Ball; No More; Too Far Gone; Rockin' in the Free World. REPRISE 25899-1, © 25899-4, © 25899-2 (61 min).
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Being, five -inch package, science, art, and commerce have come together in a transcendent collision of the ridiculous and the sublime. It proves, whether by accident or design, that even in the latter half of the twentieth century (once described by Isaac Bashevis Singer as "a complete flop"), the ideal of the Renaissance man is alive and well.

Yes, Renaissance men (and women, to be sure) are the very raison d'être of "Golden Throats." For you can find—when, as Alan Funt would say, you least expect it—great thespian talents, artists who've enriched our lives with their portrayals of Gomer Pyle, Sgt. Joc Fri

ding, by offering our condolences to the side of I-95 on hearing Golden Throat Shatner contemplating Lucy in the Sky with Diamonds, and by thanking whatever gods we recognize that such a digital experience is available at better record stores at popular prices. And let us contemplate the myriad wonders awaiting us when the visionaries at Rhino offer us an even greater celebrity anthology, one sure to include excerpts from "The Robert Mitchum Calypso Album," the Brady Bunch kids' American Pie, and (oh joy!) Ted Knight's Hi Guys.

And people say that life is not worth living. Steve Simels


Performance: Gotta have songs Recorded: Very nice

Apart from his sonorous baritone and his flawless reading of emotional conflict, what distinguished Randy Travis's first three albums was a plethora of remarkable songs—"On the Other Hand," "Diggin' Up Bones," "Too Gone Too Long," "Forever and Ever, Amen," and "Deeper Than the Holler," to name a few. For Travis's fourth album, however, producer Kyle Lehning stalled off on his song-finding duties. The opener, Mining for Coal, has a nice melodic twist, but the sentiment is hardly new. He Walked on Water, a touching tribute to a memorable great-grandfather, never takes the idea far enough. It's Just a Matter of Time, a gaudy remake of the old Brook Benton hit (guest-produced by Richard Perry), is all wrong for this Carolina country boy. And Have a Nice Rest of Your Life, with its mock-angry spoken recitation, is beneath Travis's dignity. There are several high spots, namely the jaunty "Card Carvin' Fool" and the perfect, believable innocence of Somewhere in My Broken Heart. But two songs do not an album make, no matter how well Travis infuses them with earnest, genuine emotion. On the whole, you can't help but feel that the way they did in an interesting string of albums on the Decca label way back when. "About Time" is an album of static grooves, conservative playing, and stale songwriting, all floating around a few misbegotten attempts to target the contemporary Top 40. Ten Years After should have reviewed their incendiary performance at Woodstock before embarking on this cautious, enervated, and ultimately pointless reunion.

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MILES DAVIS: Aura. Miles Davis (trumpet); orchestra. Aura—Intro: White; Yellow; Orange; Red; Green; Blue; Electric Red; Indigo; Violet. Columbia DJX 45332 one LP, © CTX 45332 one cassette, © CK 45332 one CD (66 min).

Performance: Shining
Recording: Excellent
I have not liked much of Miles Davis’s output in recent years, but my quarrel is less with the way he plays and more with the environment he chooses. The souped-up, mediocre bands to which he lends an occasional tool. When the sound of his horn surfaces from these electronic brews, it often reflects the brilliance he still possesses, but we get only occasional flashes of it. If you share my disappointment, and long to hear the Davis of old, the Davis who blossomed with Gil Evans in the pre-"Bitches Brew" days, listen to "Aura," which turns the congenial trumpeter in top form backed by a large orchestra of mostly European musicians.

Aura is an extended composition written as a tribute to Davis by Danish trumpeter Palle Mikkelborg. It was recorded in Copenhagen in 1984, when Davis visited Denmark to receive that year’s Sonning Music Prize, an honor previously awarded Igor Stravinsky, Leonard Bernstein, and Isaac Stern. Mikkelborg has been a devoted Davis fan since he first heard the trumpeter’s 1953 quintet recording of When Lights Are Low, and he harbors equal enthusiasm for arranger Gil Evans. Not surprisingly, Aura is quite Evansesque, but its colorful, ethereal weave is also the fabric from which Davis’s recordings were made in his early electronic period. It is a broad, stunningly beautiful tapestry that should not have had to wait five years for release. (One must wonder why a work of this scope and significance is so poorly packaged on LP. In that format, both discs are stuffed into a jacket meant for one.)

SCOTT HAMILTON: Scott Hamilton Plays Ballads. Scott Hamilton (tenor saxophone), John Bunch (trumpet), Billy Pierce (piano), Chris Flory (guitar), Phil Flanigan (bass), Chuck Rigs (drums). I’ll Only Miss Her When I Think of Her; Dream Dancing; Round Midnight; Two Eighteen; Laura: Maybe September; In a Sentimental Mood; and two others (four others on CD). Concord CJ-386. © CJ-386-C, © CCLD-4386 (56 min).

Performance: Mellow
Recording: Very good
Scott Hamilton made his entrance in the Seventies, a kid, stuck in time, breathing into our ears the polished sounds of Ben Webster, Chu Berry, and Coleman Hawkins. Now he’s a firmly established keeper of the flame whose music might bring a nostalgic tear to the eyes of some and open the eyes of others. It is one thing to hear a Hawkins or Webster recording, quite another to have this music flow your way from a bandstand. I’m sure Hamilton has opened the ears of many young listeners to great jazz of the past, demonstrating in his most eloquent way how it continues to be relevant.

From first oozing note to last, the music in this album is as mellow as jazz can get. Accompanied by only a four-piece rhythm section led by pianist John Bunch, Hamilton gently caresses nine ballads, including Monk’s Round Midnight and his own Two Eighteen, and the CD includes two additional tracks, including a superb rendition of Body and Soul. It takes courage—not to mention artistic self-confidence—for any tenor saxophonist to approach the latter since Coleman Hawkins staked an undisputed claim to it fifty years ago, but Hamilton does it his own way, far better than he did in one of his earliest albums. In fact, he has grown impressively as an artist, and this album is pleasant proof of that.

ANDRÉ PREVIN: After Hours. André Previn (piano); Joe Pass (guitar); Ray Brown (bass). There’ll Never Be Another You; I Only Have Eyes for You; What Am I Here For; Limehouse Blues; All the Things You Are; Honeysuckle Rose; and five others. Telarc © CD-83302 (66 min).

Performance: Swing
Recording: Excellent
André Previn came to the U.S. at the age of ten, with a classical-music background, but he first made his mark in jazz. His Fifties albums on the Contemporary label are still sought-after items, and so they should be. But now he is better known in this country as the former music director of the Houston, London, and Pittsburgh Symphony Orchestras and the Los Angeles Philharmonic. He also enjoys an international reputation as a piano soloist in the classical field, but his love for jazz has never faded, as he amply demonstrates in this album, which marks his return to jazz after some twenty-five years.

Here he is joined by guitarist Joe Pass and bassist Ray Brown, two outstanding players who make “After Hours” as much theirs as it is Previn’s. The result is an extraordinarily unified effort that clearly proves the pianist’s ongoing ability to contribute meaningfully to jazz. The entire album is a treat, a swinging study in elegant improvisational interplay—and the playing time is an hour and six minutes, which makes it a real bargain.

RUDY SMITH TRIO/ANESE HADEED QUARTET: Jazz ‘n’ Steel from Trinidad and Tobago. Rudy Smith (double tenor pans); Anese Hadeed (tenor pan); Raf Robertson (piano); Niels Prastholm (bass); Ole Steenberg (drums); other musicians. There Will Never Be Another You; Blues for Rasta Prasta; Israel; Now Is the Time; and four others. DeLlos © DE 4013 (57 min).

Performance: Interesting
Recording: Good
The first conversion of a steel drum into a musical instrument took place some fifty years ago, and Trinidadians have been pounding the pans ever since. This album, though, presents the steel drum in an altogether different musical environment, that is, as a jazz instrument. All but one of the eight selections are played by the Rudy Smith Trio, which blends the leader’s double tenor pans with bass and drums played by Niels Prastholm and Ole Steenberg, both of whom I presume are Scandinavian. The resulting sound is interesting and, at times, quite engaging, but the limited octave range of Smith’s instrument is an all too obvious barrier. Anese Hadeed, a protege of Smith’s, spans close to three octaves with his “oversized” tenor pan, and the difference is striking, if you’ll pardon the pun. The presence of a pianist gives Hadeed an added advantage, but his main asset is his elaborate pan. Hadeed’s single contribution to the album, a twelve-minute live performance of Carnival ’72, is its highlight, but there’s a certain charm in all this music. It wouldn’t be a bad idea to have the two leaders combine their talents in a jazz setting.
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Performance: High-gloss
Recording: Very good

If Roger Norrington or Carlos Kleiber are too strong for your taste in the Beethoven Fifth, André Previn’s well-groomed performance here may be more to your liking. His reading is solid and unfussy, somewhat in the Felix Weingartner mold. The same holds for the two overtures, though I miss the kind of kinetic power that made Toscanini’s Leonore No. 3 linger in the memory. What is most excellent in these performances is the keen response of the Royal Philharmonic Orchestra players, especially with regard to niceties of balance. The horns acquit themselves most impressively in the final movement of the symphony and in the Leonore Overture’s last pages. The recorded sound is suitably powerful and full-bodied throughout.

BIZET: Carmen. Jessye Norman (soprano), Carmen; Mirella Freni (soprano), Micaela; Neil Shicoff (tenor), Don José; Simon Estes (bass), Escamillo; Jean-Phillippe Courtis (bass), Zuniga; Ghylaine Raphanel (soprano), Frasquita; Jean Rigby (mezzo-soprano), Mercedes; others. Choeurs et Maîtrise de Radio France; Orchestre National de France, Seiji Ozawa cond. PHILIPS 422 366-2 three CD’S (180 min).

Performance: Disappointing
Recording: Satisfactory

This is an accurately achieved if often mannered Carmen without the pulse of life that makes a first-rate production unforgettable. The difficulty is that it is a closely studied performance—so studied, indeed, that you become conscious of the effects that are strived for but not realized.

Perhaps, as with Hamlet, there can

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A SATIE CHAMPION

Erik Satie’s piano music has been well served in recordings. Aldo Ciccolini has rerecorded all of it on six Angel compact discs (with Gabriel Tacchino joining in for the four-hand works), and France Clidat’s three-disc survey in a very low-priced Pantheon box was a lovely surprise a few years ago. Anne Queffelec, however, on a generously filled new CD from Virgin Classics, strikes me as Satie’s most persuasive keyboard champion so far. More clearly than any other pianist I’ve heard in this material, she makes the case for Satie as a great continuator of the French keyboard tradition rather than the mischievous eccentric that he made himself out to be.

In large part, of course, the impression Queffelec conveys comes in terms of reminders of Satie’s influence on his contemporaries, his pupils, and still other French composers who were simply aware of his music. There is Poulenc in the Gnossiennes and Je te veux, there is Debussy in several pieces, and there are near-echoes of Rameau and Couperin here and there as well as Chabrier and even our own Gottschalk. Most of all, there is a great deal of music that is provocative in the best sense—not as puns and pranks alone but frequently touching on a surprising level, a wit that shows warmth of heart, tenderness that does not feel obliged to lampoon itself, and always the most elegant sense of proportion.

Queffelec, whatever her other repertoire specialties, was surely born to play Satie. The sonic focus is a little more insistently close up and reverberant than would be ideal, but it conveys the coloring and the remarkably live quality of her playing quite effectively. And—imagine!—the Gymnopédies are not placed first on the disc but turn up more effectively in the middle of the program, whose imaginative layout adds significantly to the pleasure of taking it all in at a single sitting. Virgin has also provided thorough indexing for all the multisection works.

Richard Freed

Satie: Six Gnossiennes; Véritables préludes flasques (pour un chien); Vieux séquias et vieilles cuirasses; Chapitres tournés en tous sens; Trois Gymnopédies; Embryons desséchés; Je te veux; Somatique bureaucratique; Heures séculaires et instantanées; Le Piccadilly—Marche; Avant-dernières pensées; Sports et divertissements. Anne Queffelec (piano). VIRGIN © VC7 90754-2 (75 min)
never be a perfect Carmen, but I do not feel that the title role is the right one for Jesse Norman. While her rich, opulent voice encompasses the music easily and very often beautifully, I remain unconvinced of what her Carmen is about dramatically. A case in point is the Habanera, sung so softly and so slowly and with such artificial inflection that its effect is diffused; what should be the archness is evident, too, in Norman’s reading of the spoken lines (the original opéra comique version is used). Again, in Act II, her Gypsy role assigned her and has the style to create character with straightforward simplicity. There is the same quality of honesty in Neil Shicoff’s Don José, a delineation that has much to recommend it. But why does this lyric tenor of medium vocal weight, who can cope effectively with the Flower Song, assume that the big aria is the entire role? In moments of jealous passion and anger he sounds merely petulant, his voice strained and unattractive. I suspect that his shortcomings here are the product not only of his voice size but also, and perhaps mostly, of his temperament.

Simon Estes, as Escamillo, sings with a rich, full tone, but he has considerable problems with French pronunciation and, like Norman and Shicoff, lacks an element essential to the success of this opera—a dynamic thrust that calls for a certain lightness of touch, even in the fourth act; without it the music and onstage doings become earthbound. which is the case here. The remaining members of the cast are more than adequate, however, and the quintet in Act II is a highlight of the album.

Seiji Ozawa conducts with the care and polish typical of his work, but without the involvement that made his recent recording of Strauss’s Elektra so exciting. His dynamics are frequently exaggerated, at least to my ear: now barely audible, then suddenly full forte. Both the choruses and the orchestra, however, respond with precision and enthusiasm, which makes for moments of real musical beauty. Unhappily they are not sufficient to redeem this recording as a whole.

R.A.

**BRUCKNER: Symphony No. 8, in C Minor (see Best of the Month, page 103)**


Performance: Spirited
Recording: Excellent

Seventeen-year-old Japanese violinist Midori has heretofore been represented only by a couple of Philips studio recordings, one of Bach and Vivaldi, the other of the Paganini D Major Concerto and Tchaikovsky’s Serenade for String Chorale and Valse-Scherzo. With her switch to CBS, we get a chance to hear her in a live recording playing some big-scale nineteenth-century works. Compared with Kyung-Wha Chung’s recent Angel recording of the Dvořák concerto and romance, Midori takes a decidedly more extraverted view of both works. Her playing of the concerto’s first movement is volatile and brilliant. The slow movement is executed with great purity of tone but a certain lack of emotional depth, and the finale is taken at a fast clip, with virtuosity to burn. As for the romance, I find her approach to the music cooler, and her pacing somewhat faster than Chung’s. Zubin Mehta, like Riccardo Muti for Chung, provides orchestral support that’s tailor-made for the performance style of the soloist.

The familiar Carnival Overture, which gets no more than a smart run-through at the end of the program, seems tucked on simply to give the buyer more music for the money. The sound is good and well balanced in all three works. D.H.

**GERSHWIN: Rhapsody in Blue (see STRAVINSKY)**

**GUBAIDULINA: Offertorium (Violin Concerto). Gidon Kremer (violin); Boston Symphony Orchestra, Charles Dutoit cond. Hommage à T. S. Eliot. Christine Whittlesey (soprano); Gidon Kremer, Isabelle van Keulen (violin); Tabea Zimmermann (viola); David Geringas (cello), Alois Posch (double-bass); Eduard Brunner (clarinet); Klaus Thunemann (bassoon); Radovan Vlahović (horn). DEUTSCHE GRAMMOPHON © 427 336-2 (69 min).**

Performance: Committed, eloquent
Recording: Superb

Soňa Gubačulina (born 1931) was one of the most interesting Soviet composers discovered by the audiences at the “Making Music Together” festival put together by Sarah Caldwell in Boston two years ago. This is the first recording of any of her music to come my way, and it presents her in the very strongest light. The Offertorium is a violin concerto composed for Gidon Kremer ten years ago. The significance—or, at least, partial significance—of the title becomes apparent at once in the opening of the work, a reference to the theme by Frederick the Great that became the basis for Bach’s Musical Offering. The orchestral setting in the style of Webern (who orchestrated the Ricercare a 6 from that Bach work) serves, according to Gubačulina as quoted in Steven Ledbetter’s brief but comprehensive note, “to unite the two personalities who have produced . . . the greatest impression on me.” The format is a long single movement whose three continuous sections comprise variations in which the theme is reduced, eventually to a single note, and then reconstituted in a thoroughly different manner, suggesting in its stillness and spirituality a different—religious—connotation for the work’s title.

Hommage à T. S. Eliot was also composed for Kremer, or at his suggestion, under a commission from the Philharmonic in Cologne in 1987. Gubačulina had read Eliot’s Four Quartets the previous summer and found that work “shattering.” Her Hommage, for soprano and instrumental octet, is about the same length as the violin concerto but is in seven clearly defined movements. With Eliot’s words actually sung (in English) in three of them. Strings alone play the first movement, winds alone the second, and the soprano unaccompanied in the third. Only in the fifth movement do all nine performers take part. As in the concerto, there are rich, sober sonorities evocative of Russian church music side by side with unmistakably contemporary devices. More striking than any of the specific devices is the originality with which all the materials are used, indicating a highly developed personal style. The little cadenza for the horn just before the soprano’s first (unaccompanied) number is one of the numerous simple but imaginative touches that make an immediate
and lasting impression. According to Ledbetter's note, Gubaidulina is thinking of making this work the core of a larger one whose outer sections would involve four string quartets and possibly a chorus.

Both works receive the most committed, eloquent, altogether impressive performances a composer could wish, and they have been superbly recorded—the concerto in Boston's Symphony Hall in April 1988, the Hommage in Bavaria during a tour by Kremer and his Lockenhaus Festival associates a year earlier.

**LISZT: Transcendental Etudes. Vladimir Ovchinikov (piano). EMI/ANGEL © CDC 49821 (64 min).**

Performance: Very good  
Recording: Sometimes plummy

The Soviet pianist Vladimir Ovchinikov began placing high in various competitions as far back as 1980. He landed his EMI contract, and a number of prime engagements, in consequence of taking first prize in the Leeds Competition of 1987, and in this recording of the Transcendental Etudes (his debut release, I believe), he clearly edges out such formidable Lisztians as Jorge Bolet and Claudio Arrau. Ovchinikov simply shows more flair, more brio, than either of his revered senior colleagues; he has inexhaustible technique, but also the good sense not to use this music merely to make us aware of that. There is, in fact, in such pieces as Mazepa and Ricordanza, a sense of holding back, of reluctance to pull out all the stops (pyrotechnical or emotional)—but far better a little understatement than the sort of excess to which so many interpreters are drawn. I would have welcomed more lightness and sense of fantasy in Feux follets, too, but in Erosce, Wilde Jagd, and most of the rest Ovchinikov is quite in his element. Chasse-neige brings the cycle not only to its conclusion but to its climax in terms of cumulative brilliance.

I can imagine still more satisfying accounts of this cycle. Lazar Berman’s Melodiya recording, once available here on CBS LP’s, would be worth reissuing, and Minoru Nojima’s incomparable performances of two of the etudes on a Reference Recordings CD strongly suggest that he is the pianist to give us the all-surpassing account of the entire set of twelve. But among those recordings available now, Ovchinikov’s surely takes top honors, and it gives promise of interesting things to come from him. (I hope his subsequent recordings are more judiciously focused sonically than this one, which, while generally good, tends to be a little plummy here and there, and distressingly so in Feux follets.)

**PUCCINI: Songs (see Collections—Placido Domingo)**

**PURCELL: Dido and Aeneas (see Best of the Month, page 106)**

**RAVEL: La Valse (see STRAVINSKY)**


Performance: Blazing  
Recording: Slightly mushy

Louis Lortie seems born to play these piano transcriptions, mainly by the composers of works originally for orchestra. With a precise understanding of the musical thought behind each piece at hand, he treats the transcriptions as blueprints for re-creating the color and drama of the orchestral versions in his own, distinctively pianistic sound world. In some cases, as in La Valse, he actually makes improvements—largely of the kind of thing brash young music students do among themselves to see who can get through the score the fastest. Lortie’s breakneck speed never allows the music to breathe or charm, and his rhythmic aggressiveness becomes unbearably mannered. Otherwise this has to be one of the most thrilling piano recordings of the year.

**D.P.S.**

**TCHAIKOVSKY: Piano Trio in A Minor, Op. 50. Beaux Arts Trio. PHILIPS © 422 400-2 (47 min).**

Performance: Intimate  
Recording: Good

This is the first Beaux Arts Trio recording with its new cellist, Peter Wiley, who joined pianist Menahem Pressler and violinist Isidore Cohen after the 1988 retirement of Bernard Greenhouse. Where the trio’s 1971 recording of the Tchaikovsky A Minor observed the composer-sanctioned cuts, the new one is complete.

While a plangently elegiac tone dominates the opening and closing pages—the work memorializes a contemporary
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vade the performance as a whole. which seems to place most emphasis on the
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of Tchaikovsky's, the Russian pianist
Nicholas Rubinstein—it does not per-
venable set of twelve
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of Tchaikovsky's, the Russian pianist
Nicholas Rubinstein—it does not per-

VIVALDI: Cello Concertos: in B Minor (RV 424); in G Minor (RV 416); in A Minor (RV 418); in F Major (RV 412); in C Minor (RV 401); in G Major (RV 413). Christophe Coin (cello). Academy of Ancient Music. Christopher Hogwood cond. L'OISEAU-LYRE © 421 732-2 (58 min).

Performance: Volatile
Recording: Excellent

This collection could be called "The Darker Side of Vivaldi." Some music lovers may be surprised to discover that Vivaldi even had a dark side, or that his music could be substantial enough to be
menacing. But Christopher Hogwood and Christophe Coin successfully chal-
lege the conventional wisdom about the Baroque master, not simply by pro-
gramming four minor-key concertos out of six issued but by choosing works that
seem deeply felt—at least by Vivaldi's standards. In fact, the rhapsodic cello
lines in the A Minor Concerto, RV 418, set against the contrapuntal orchestral
writing, suggest programmatic significance, as do the sudden pauses in the slow
movement.

Hogwood's performances are among his most committed in years. In addi-
tion to his usual feeling for the style of the music, he is unusually attuned to its
minute emotional twists, eliciting its volatility. As for Coin, sometimes the
cello lines can be downright craggy, but he never tries to smooth them out into
something suave and bland. On the oth-
er hand, his articulation on the authen-
tic instruments (a cello and a cello pic-
colo) is so much more fluid than what
we're used to hearing on a modern cello
that the virtuosic aspects of the music
don't call attention to themselves, but

PLACIDO DOMINGO: The Unknown Puccini. A te: Vexilla. Salve regina. Ad una morta; Mentia l'avviso. Storiella d'amore. Sole e amore; Avanti Urantia! Inno a Diana; E l'uccellino; Terra e mare (two versions); Canto d'amone: Casa mia, casa mia; Morire? Inna a Roma. Placido Domingo (tenor), Julius Rudel (piano, organ). CBS © MT 44981. © MK 44981 (45 min).

Performance: Very satisfying
Recording: Good

The especially full program notes sug-
gest that these songs will afford the lis-
tener keen insight into the work of
Puccini, and the point is well taken. In
these fifteen selections we hear strains
and tonalities of music yet to come from the master. Ad una morta fore-
shadows melodies in Manon Lescaut, and
Sole e amore appears quite undisguised in La Bohème. Act III. But in
addition to pleasures derived from mus-
cial sleuthing, there is the unusual sat-
sisfaction of hearing these songs about
aspects of everyday life—Puccini once
said he could write music only about
"little things"—performed by Placido
Domingo with the simplicity, sincerity,
and lack of "manner" that they require.
Some of Puccini's vignettes are very
small indeed, like the lullaby E l'uccel-
nino and the brief apostrophe to Casa
mia, and some, such as the religious
selections, are more expansive. All,
however, receive appropriate, honest
performances by an artist in fine
voice (ably assisted in Vexilla by bass-bar-
tone Justino Diaz) with sensitive ac-
companiments by Julius Rudel. The rec-
ording itself is sonically well balanced
throughout.

R.A.
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As Kate Bush has proceeded through her recording career, each of her six albums has taken longer to make than its predecessor. Her latest, The Sensual World," took four years. "I know it's a long time," she admits, "but each record gets harder to make. This is my most personal and female album so far."

As before, Bush has written lush, sophisticated music with distinct literary overtones. The title track, for example, was inspired by James Joyce's Ulysses. Bush also produced the album, and she used musicians who would give some of her sensuous arrangements an international flair. Bulgaria's Trio Bulgarka, a women's singing group, performs haunting harmonies on three tracks, and the piercing, ancient sounds of Irish uilleann pipes are heard on a few others.

Terence Trent D'Arby's second Columbia album, "Neither Fish nor Flesh: A Soundtrack of Love, Faith, Hope & Destruction," opens with this declaration: "I will not be defined. I'm neither fish nor flesh." Fair warning to fans of his debut album, "Introducing the Hardline According to Terence Trent D'Arby," that he's taken his basic funk sound in many other directions, from gospel-rich soul to swirling pop surrealism. Of the song To Know Somebody Deeply Is to Know Somebody Deeply, D'Arby said to The New Musical Express, "I dreamt that Marvin Gaye sang [it] to me, and that's how I got it."

D'Arby produced the new album himself, wrote all the arrangements, and plays nearly all the instruments. He'll go out on tour early this year.

The Tokyo String Quartet has established itself as one of the world's leading chamber-music ensembles, and it is celebrating its twentieth anniversary in 1990. During this milestone season the New York-based quartet has scheduled over a hundred concert appearances, ranging from Pasadena and Phoenix in the West to the Kennedy Center in Washington and New York's Alice Tully Hall in the East, and including the Netherlands, West Germany, and Switzerland in March.

The Tokyo Quartet is also vigorously pursuing its contractual commitment to BMG Classics to record all the quartets of Beethoven and Schubert. It began the Beethoven cycle in December with two of the middle quartets, Op. 59, Nos. 1 and 2, and at the same time put finishing touches on its recording of Schubert's Death and the Maiden, which is scheduled to be released in April or May. The Tokyo's recording of Schubert's last quartet, No. 15 in G Major, was released by BMG Classics just before Christmas.

The benefit album produced by the New York Philharmonic last year was "Solisten from the Orchestra. Volume II," featuring its first-desk men in works by Haydn, Mozart, Schumann, Hindemith, and the American composer Gordon Jacob, who died in 1984. To order, send $25 for the double-LP album or $45 for the two-CD set, plus $1 postage and handling, to Radiothon Office, Avery Fisher Hall, Broadway at 65th St., New York, NY 10023.

The Grateful Dead has just released a new album on Arista called "Built to Last," and as always, the band is supporting it by taking to the road. After playing their annual New Year's Eve show on home turf in the Bay Area, the Dead will prepare to tour Europe this spring. Following last fall's disaster, the band recorded a Rodney Crowell tune, "California
Earthquake,” that went out only to radio stations. It was the group’s way of wishing its neighbors well.

Phil Collins has returned to the vinyl wars. Although he’s written some songs in the last few years, notably for Buster, the movie he starred in last year, his new Atlantic album, “... But Seriously,” is his first solo long player since 1985’s “No Jacket Required.” There are ten cuts on the LP and twelve on the cassette and CD, most of which he wrote on his own. Co-produced by Collins and Hugh Padgham, “... But Seriously” calls on the services of such big-name musicians as guitarist Eric Clapton, keyboardist Steve Winwood, and David Crosby and Stephen Bishop, who contribute background vocals. Early reports that the album would not be released on vinyl were denied by Atlantic. The first single from the album is Another Day in Paradise, which at press time was climbing into Billboard’s Top 20.

One thing will lead to another. Saxophonist Grover Washington, Jr., serving as a spokesperson for Gore-Tex Outerwear, was particularly impressed with that company’s $2 billion commitment to the 1990 International Trans-Antarctica Expedition, a 4,000-mile crossing of the polar continent by six men and forty-two sled dogs—all of them protected from frostbite by Gore-Tex clothing. Accordingly, Washington composed Protect the Dream as a bonus track, on cassette and CD only, for his new Columbia album, “Time Out of Mind.” He also named his current swing through the U.S. the Protect the Dream Tour.

Winner of the Silver Medal in the Van Cliburn International Competition in 1981, the Cuban-born pianist Santiago Rodriguez has devoted a good deal of his studio time to recording music of established contemporaries, with an emphasis on composers of Latin or Spanish origins. His latest, released by Elan in December, features the premiere recordings of the Concertino for Piano and Strings (1956) by Carlos Surinach and the First Piano Concerto (1937) by the Italian-American composer Mario Castelnuovo-Tedesco as well as a performance of Alberto Ginastera’s Variaciones concertantes (1953). In the concerto works, Rodriguez is accompanied by the Richmond (Virginia) Sinfonía under George Manahan. Rodriguez’s discography also includes music from the standard repertoire, including Brahms’s Paganini Variations and Debussy’s second book of preludes. Upcoming are the third piano concertos of Rachmaninoff and Prokofiev and solo albums devoted, respectively, to works by Bach and Rachmaninoff.

Graeenotes. GRP has released an album called “Happy Anniversary, Charlie Brown!” in honor of the fortieth anniversary of the Peanuts comic strip. Musicians include Patti Austin, David Benoit, Dave Brubeck, Chick Corea, Kenny G., B.B. King, Gerry Mulligan, Lee Ritenour, Joe Williams, and Dave Grusin. ... David Bromberg has issued his first album of
by Ralph Hodges

OLD NEWS

BURROWING through dusty files of aging research material the other day, hoping to find something that wasn’t totally digital or so computer-intensive it was nothing but lists of numbers, I unearthed a brief but worthwhile little report based on work done at Nippon Columbia some two years ago. I don’t know why it had gone unnoticed heretofore, but when I turned it up this time my attention was drawn to the bottom of the list of credits, to the name of Almon Clegg, a member of Denon America’s engineering team and a man of high intelligence and good science. It was that, I suppose, that made me turn the page.

The kernel of the paper is the audible effects of “comb filtering,” and particularly what happens in multimiking situations when two or more microphones, at different distances from an instrument, all pick it up and then have their outputs mixed into a common channel. Depending on the wavelength the instrument is playing, the electrical outputs of the mikes will interfere simply or complexly. In the worst cases, the response curve that results can be plotted as a comb shape, teeth pointed toward the bottom of the graph, and it actually represents a form of (usually) short-duration ringing. The paper describes what is heard as “muddy,” “dirty,” or “raspy” when it is heard at all.

A fair amount of literature precedes this work, but Nippon Columbia has come up with some numbers for the threshold of audibility of the phenomenon that are considerably lower than I have seen before—that is, much smaller amounts of the effect can be detected than was suspected. Worst cases of audibility seem to correspond to a delay of about 1 millisecond, which puts the distant microphone about a foot farther away from the instrument than the close one—a not-atypical situation in a multimike session. Under those conditions, experienced listeners were able to hear combing by the distant mike’s output when it was 20 db and more down from the near mike’s contribution. Note, however, that a microphone only 1 foot farther away is likely to contribute much more than a -20-db level to the mix, no matter how directional it is. (It should also be mentioned that actual microphones were not used in these tests, but rather high-quality digital delay lines set to simulate various mike spacings. The results are still valid in my opinion.)

All this put me in mind of those raspy CD’s from the early days of the format, and somewhat reluctantly I went back to listen to my collection of those bummers to learn what I could hear in this context. I heard all the old horrors, and I think everything you’ve read about them is true: “presence boosts” in studio microphones, primitive analog-to-digital converters (they still are, in the view of many professionals), ignorance of dither techniques, gross misunderstandings between the engineers for the recording/mixing and mastering operations, etc. (It’s also true that many CD mastering people were and remain physics technicians rather than sound engineers.) Any combination of these factors can transform a basically good recording into something you’d rather not listen to. But I also believe I heard, with certain recordings and certain types of material, artifacts that could be attributed to combing. Great. Another alligator to worry about.

Today, however, we are told that there is a mass migration of producers and engineers away from multimiking and toward far less complex schemes, even to the point of simple microphone pairs. This is good news in many audiophiles’ opinion, but it has been pointed out regularly that even a mere two microphones, when spaced apart to left and right, can give rise to combing. Simply put, the mechanism is this: An instrument playing on the left will be picked up by both microphones, unless they are spaced impossibly far apart. But the acoustic path to the right microphone will be longer, hence there will be a phase difference between the two channels for that instrument. This shouldn’t matter, because the two channels will never meet electrically, but they will meet acoustically, at the listener’s ears—and there at the ears, says the theory, is where combing caused by phase interference may take place.

The above is the view of the coincident-microphone advocates, a not-too-numerous but vociferous group that generally favors putting two directional microphones as close together as possible (no path length differences for any instrument), with one aimed left and the other right. The coincident crew finds much other fault with spaced mikes, and their arguments are cogent, but probably many audiophiles would rather listen to microphones than argue about them.

Why have these matters become so urgent with the advent of the CD? I suspect it’s because anomalies intrinsic in earlier formats may simply have masked typically fleeting distortions such as comb distortion. Indeed, when shown comparison graphs of an LP test record and a CD test disc, even a hard-core phonophile may wonder how he put up with the phonograph system’s phase and amplitude instabilities and its waveform deformations for so long.

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