

MAY 1989 ● \$2.50

# Stereo Review®

HI-FI HITS THE ROAD • TAPE DECK BUYING GUIDE

TESTED: NEC CD PLAYER, ADVENT SPEAKERS,  
GRUNDIG FINE ARTS INTEGRATED AMP, MORE



06276  
#2598\*\*\*\*\*S-DIGIT 40242  
#BC8900V091\*  
430492 BCH 8900Y091 741J JAN90  
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8900 YELLOW WOOD PL  
LOUISVILLE KY 40242  
05#L6

Accelerate to audiophile performance in the automotive environment. Introducing the first high-power, pull-out cassette/receivers good enough to be called Harman Kardon.

Harman Kardon autosound is backed by more than thirty-five years of leadership in advanced audio technology. Always innovative, Harman Kardon is responsible for such audio breakthroughs as ultrawidebandwidth, low negative feedback, High Instantaneous Current Capability, Phase Locked-Loop FM tuning and the world's first stereo and high fidelity receivers. Applying its technical expertise to autosound, Harman Kardon delivers quality performance that's designed for the home, built for the road.

The latest components from Harman Kardon's complete line of mobile electronics are designed to perform both together and in conjunction with existing systems. Sleekly styled, these units offer American-designed ergonomics for ease of operation: A calculated, precise front panel layout truly makes listening easy, even under the most demanding conditions.

The CR131 and CR151 powered\* cassette/receivers feature the same premium heads used in Harman Kardon's renowned high-end home systems. Teamed with Dolby B noise reduction and precise, bi-directional azimuth adjust, they provide true 20Hz to 18kHz bandwidth (+/- 3dB) while driving hiss and distortion to new lows. Both models include quartz-synthesized FM sections, 18 FM and 6 AM presets, and dual fader-controlled pre-amp outputs. The CR151 adds Dolby C, full-logic feather-touch transport, special Hi-Q interference rejection and external processor loop.

To double the output, add the CA212 half-DIN in-dash power amplifier for solid, clean, reliable power\* with advanced protection circuitry and 0.5% THD. Incorporate the CQ10 7-band equalizer and you can optimally contour the sound to the specific environmental conditions of any automotive system. Convenience features include a front panel mini-jack input for portable stereos or CD's. It offers a built-in electronic crossover to allow for additional subwoofer system expansion. The CQ10's extraordinary flexibility makes it an important addition to any sophisticated component system.

Classically designed, innovatively driven. Accelerate to audiophile performance with Harman Kardon.

\*Our ratings are as distortion-free as our amps. Unlike many manufacturers, Harman Kardon uses only the conservative FTC measurement standard. The CR131 and CR151 deliver 12 Watts per channel into 4 Ohms, 20Hz-20kHz with less than 0.9% THD. Beware of "peak power" ratings, measurements at 1k bandwidth only or those with as much as 10% harmonic distortion.

**CR151**  
Autoreverse Hi-Power Pull-Out  
Cassette/Receiver

- PLL quartz tuning
- Hi-Q interference rejection
- 18 FM / 6 AM presets with scan
- Dual azimuth heads
- Dolby B/C\*\* NR
- Music search
- Full logic transport
- Key-off release & tape end eject
- Separate bass/treble
- External processor loop
- 2 preamp outputs
- 12 + 12W RMS/ch.



**CQ10**  
1/2-DIN Equalizer/Electronic Crossover

- 10dB boost/cut
- 50, 200, 500, 1K, 3.2K, 8K & 16K bands
- Portable CD/tape player front & rear panel jacket
- 80/125/200Hz 2-way electronic crossover
- Fader

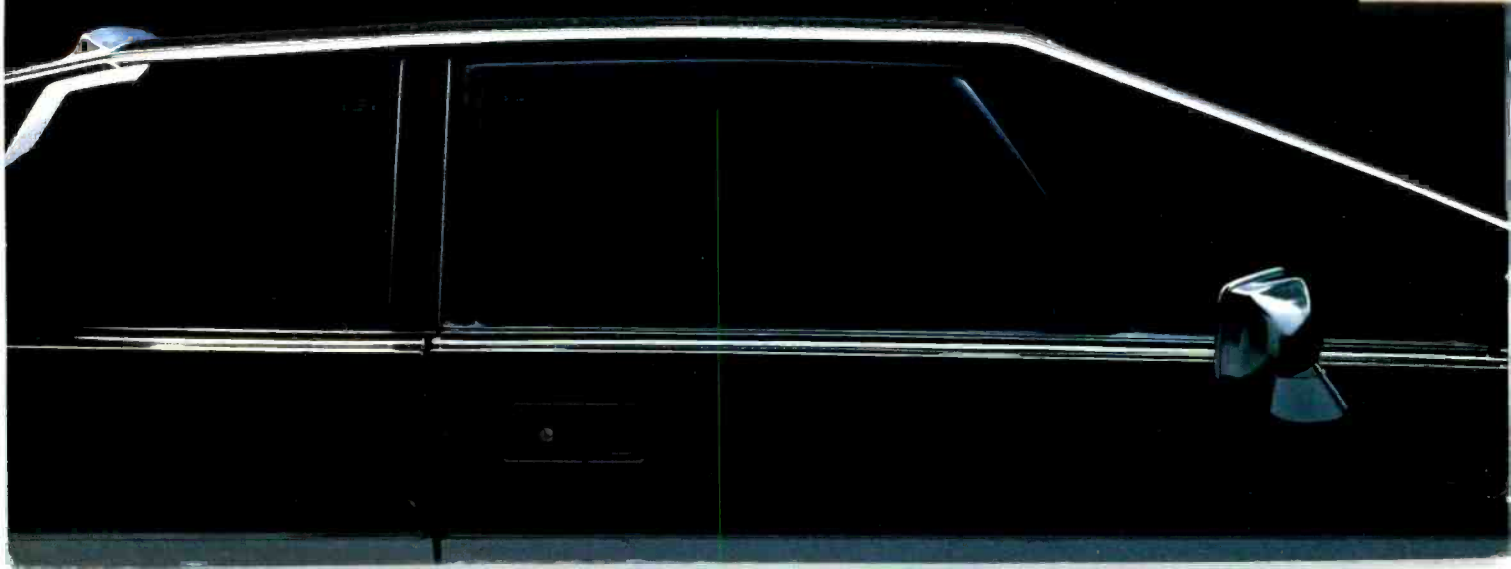


**CA212**  
1/2-DIN Power Amplifier

- 12 + 12 W RMS into 4 Ohms 20-20kHz w/less than 0.5% THD
- Low negative feedback design
- Advanced protection circuitry



For more information and your nearest dealer call toll free 1-800-525-7000 Ext. 101 or write 240 Crossways Park West, Box 9101, Woodbury, New York 11797





*In-Home Performance In-Dash.  
Inevitably Harman Kardon.*

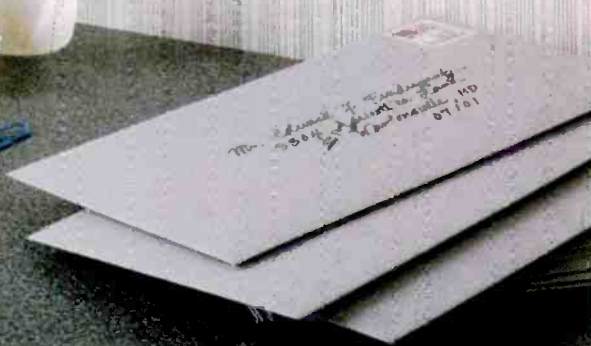
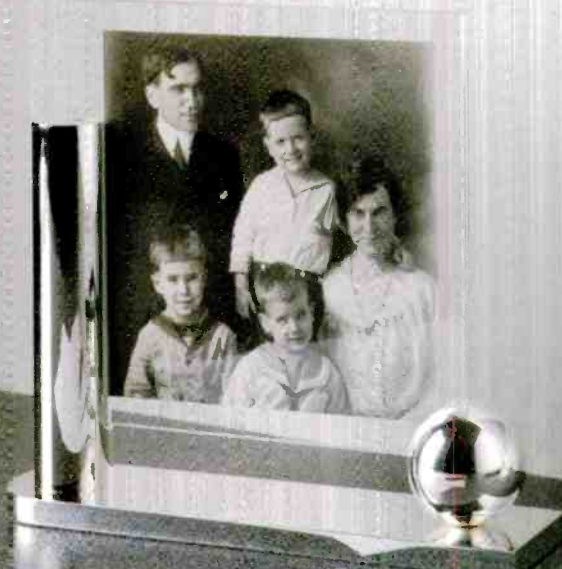
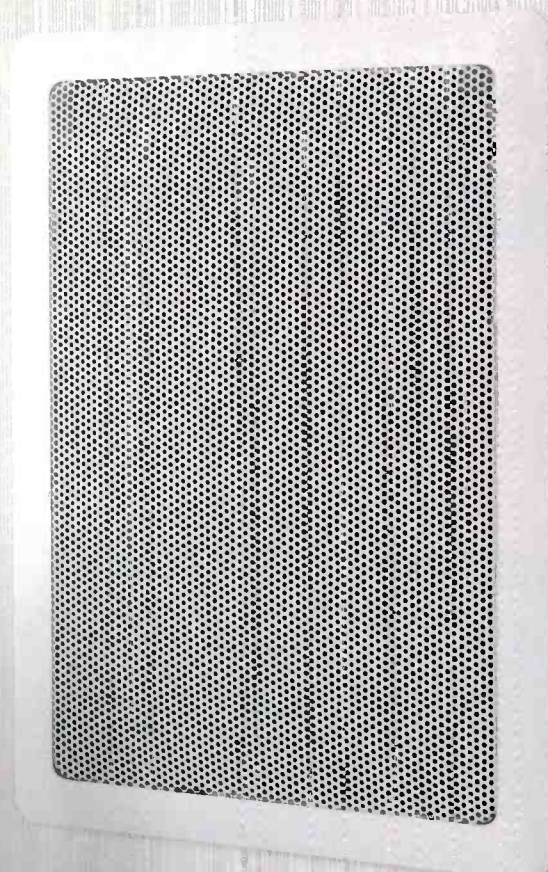


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## High fidelity in "impossible" places



With the new Boston Acoustics Designer Series speaker systems, you can enjoy high fidelity music everywhere in your home. They mount flush in walls or ceilings, blending unobtrusively into any room setting. And unlike conventional speakers, they take up absolutely no shelf or floor space.

As main, surround, or extension speaker systems, our Designer Series speakers give you the accurate, uncompromised sonic performance you've come to expect from Boston Acoustics. Frequency response is smooth and accurate, and stereo imaging is unusually lifelike.

There are two Designer Series models. Shown above is the model 360, with a 6½-inch woofer. The smaller model 350 has a 5¼-inch woofer. Both have our CFT-4 one-inch dome tweeter. The contoured grille and trim,

finished in matte white, can be painted to match or complement the surroundings.

The specially engineered woofers provide full bass performance without need for special enclosures. The tweeter is a new version of the one-inch domes used in our finest home systems. It is of a quality not normally found in built-in speakers. All drivers have waterproof diaphragms, allowing installation in moisture-laden places such as kitchens, baths, and boats.

For a Designer Series brochure, please write to us at 247 Lynnfield St., Peabody, MA 01960. Or call (508) 532-2111

**Boston**Acoustics



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*Cover: Sleek lines and sweet sounds fire up a 1985 Corvette. Details on page 84. Design by Sue Llewellyn, photo by Bruce Miller.*

STEREO REVIEW BUYER POLL, SEE PAGE 121  
Please fill in if you bought equipment in the past thirty days.  
READER SERVICE INFORMATION CARD, FACING PAGE 121  
Circle the items you want to know about.

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# Marlboro Lights

The spirit of Marlboro  
in a low tar cigarette.



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

10 mg "tar," 0.7 mg nicotine av. per cigarette, FTC Report Feb '85



# BULLETIN

by Christie Barter  
and Rebecca Day

## KLH RETURNS

The KLH brand name has reappeared on speakers in the U.S. market following Wald Sound's purchase of the name from Kyoocera in January. The new KLH line, designed by engineer Keith Johnson, includes two-way speakers with 6- and 8-inch woofers (\$258 and \$298 a pair), a three-way floor-standing system with a 12-inch woofer (\$498 a pair), and a three-way tower speaker (\$598 a pair).

## FREEBIES

TDK will throw in a free 60-minute Rykodisc CD sampler if you buy a six-pack of TDK SA-90 blank cassettes or a five-pack of SA-100 tapes. The bonus CD's will be available through the end of the summer or as long as supplies last. . . . Maxell has published a handbook for consumers that offers safety and usage tips for various types of batteries, including NiCad, alkaline, lithium, and silver-oxide. To get a complimentary copy of the handbook, send a stamped (25¢), self-addressed #10 envelope to Maxell Battery Brochure, P.O. Box CN4780, Trenton, NJ 07410. Maxell has also revised its consumer video handbook. The third edition, sixty pages long, covers such topics as differences between VCR formats, Super VHS, camcorders, tips for home video recording, and hi-fi video sound. To get a copy of the handbook, send a stamped (75¢), self-addressed envelope to Maxell Product Guide Offer, P.O. Box 4686, Reidsville, NC 27322-4686.

## TECH NOTES

Denon is marketing a tabletop stereo system with receiver and speakers designed for offices and other secondary listening environments. The 25-watt-per-channel system lists for \$399. . . . Blaupunkt has introduced a five-channel, 350-watt car power amplifier, the BMA 5350B (\$849.95), that has a fully integrated electronic crossover

network with individually variable frequency and level controls for the front, rear, and subwoofer outputs. . . . Terk Technologies, which has been granted a patent for the Gamma Loop design of its amplified Pi indoor FM antenna (\$85), has introduced a nonamplified version, called the FM+, which will list for \$20. . . . International Jensen (Advent, Phase Linear, and Jensen brands) has entered a technology agreement with England's Goodmans Loudspeakers Ltd. (Goodmans, Tannoy, Mordaunt-Short, and other brands) for the joint development of car speakers. . . . MB Quart has introduced what it says is the first speaker system that incorporates a true spherically radiating driver, the Quart Aera (\$25,000 a pair). It has a 4-inch pulsating-sphere tweeter, a 2-inch dome midrange, and a 10-inch woofer.

## HONORS

The Songwriters Hall of Fame celebrates its twentieth anniversary on May 11 with a gala induction ceremony and all-star concert at New York's Radio City Music Hall, to be taped by CBS for nationwide telecast later in the month. Elton John, Lee Adams (*Put On a Happy Face*), and the writing team of Anthony Newley and Leslie Bricuse (*What Kind of Fool Am I?*) are among the inductees, and Quincy Jones will receive a lifetime-achievement award.

On May 10 the Principality of Monaco is hosting the first World Music Awards show, which will be telecast worldwide from the Monte Carlo Sporting Club. The awards, covering "the whole spectrum of music," are based on record sales and special achievements in 1988.

## CD-I UPDATE

Philips and Sony have completed the development of specifications for Compact Disc-Interactive, or CD-I, which has the capability of combining high-quality video and sound with data storage. The new format is

designed for use with microcomputers and is expected to find applications in the areas of entertainment, education, and information.

## NAKAMICHI CONCERTS

The Nakamichi International Music Series, a program of weekly radio concerts, has just been launched by American Public Radio and WGBH in Boston. Beginning with three concerts taped at the Prague Spring Festival featuring the Czech Philharmonic and Prague Chamber Orchestras, the series will showcase vocal and instrumental artists, chamber groups, orchestras, and conductors in live performances from the major music centers of Europe, the Soviet Union, and Japan. Check with local schedules for dates and times of broadcasts.

## IMPROVED 8MM FORMAT

Sony and Canon are countering Super VHS with a new 8mm video recording format, called Hi8, that provides hi-fi sound along with a higher-resolution picture than standard 8mm recording. Sony's Hi8 line includes the CCD-V99 Handycam camcorder (\$2,200) and the EV-S900 videocassette recorder (\$2,000). Canon's Hi-Band A1 camcorder lists for \$2,299. The Sony VCR records stereo soundtracks with digital pulse-code modulation (PCM); the Canon machine uses audio frequency modulation (AFM).

## A VERY GOOD YEAR

The American record industry had its best year ever in 1988, according to the Recording Industry Association of America. A grand total of 762 million recordings were sold, in all formats. The previous high, 726 million, was set in 1978. Overall revenues were up too.

The leading format last year, as it has been for the past six years, was the tape cassette. It outpaced the CD by three to one—and the LP by about six to one. In dollar figures, cassettes were up 14 percent, CD's up 31 percent, LP's down 33 percent. □

*The RTA Series*



*"They provide smooth, fast and incredibly well detailed sound."*



# “Polk’s RTA Tower Loudspeakers Combine Legendary Polk Performance with Contemporary Style.”

*Big speaker performance with an efficient use of space.*

## RTA 11t

The RTA 11t is the finest conventional (non-SDA) speaker that Polk Audio manufacturers. Its extremely high power handling (250 watts) and high efficiency (90dB) provide remarkable dynamic range from both large and small amplifiers. The RTA 11t utilizes the same technologically advanced fluid-coupled subwoofer design found in Polk’s flagship model. Dual 8” sub-bass radiators are coupled to two 6½” mid-bass drivers, resulting in a fast, powerful, deep, and ultra-accurate bass response, without the boomy, undetailed sound of large woofer systems.

## RTA 8t

In a slightly smaller package, the RTA 8t offers the same driver complement as the larger, more expensive RTA 11t, and thus shares its benefits of superior imaging, musicality, and detail.

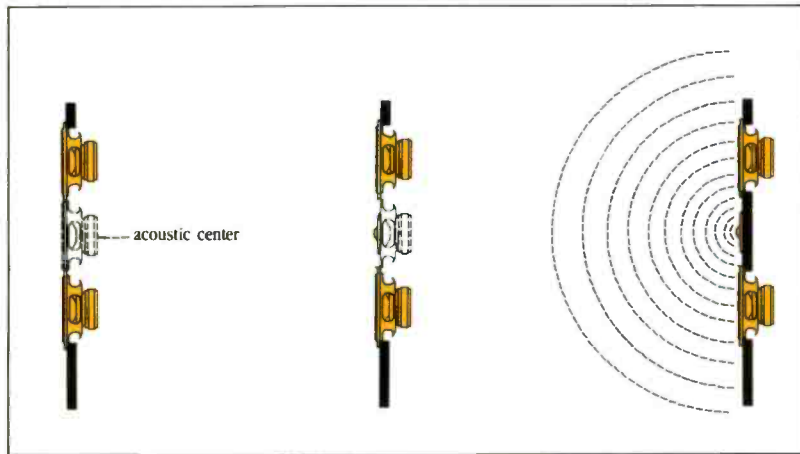
Both Polk RTA series loudspeakers achieve the extremely rare combination of good looks and state-of-the-art performance. The tall, elegantly slender, and deep “tower” design cabinets allow for substantial internal volume for high efficiency and powerful bass, while requiring less than one square foot of floor space. The small baffle surface area around each driver minimizes diffraction (sonic reflections), thereby insuring outstanding imaging and low coloration.

Positioning the 1” silver-coil dome tweeter between the two 6½” trilaminate polymer bass/midrange drivers achieves what is called “coincident radiation.” This means that both the mid- and high-frequencies appear to radiate from the same place on the baffle resulting in perfect blending at the critical crossover point. (See illustration, below).

Polk RTA speakers have an uncanny ability to perfectly reproduce the human voice, pianos, guitars, and every other instrument whose faithful reproduction demands superlative midrange and high-frequency performance. Bass and percussion instruments are accurately reproduced with full visceral power and realism, without the heaviness, boominess, or lack of detail that plague lesser designs.

The discriminating listener who seeks state-of-the-art performance and design will find the quintessential combination of both in Polk’s RTA series loudspeakers.

## THE PRINCIPLES OF COINCIDENT RADIATION



The perceived source of sound of two identical drivers is centered in the area between them.

The benefit of coincident waveform propagation resulting in precise imaging, uniform vertical dispersion and startling midrange accuracy.

In the Polk RTA loudspeaker, the tweeter is positioned at the acoustic center of the drivers.



Polk audio's RTA 8t and RTA 11t High Performance Tower Speakers

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Where to buy Polk Speakers? For your nearest dealer, see page 127.

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## LETTERS

### Tape Recording

Compliments on Craig Stark's article on using a tape recorder (March). He made some excellent, nontechnical points based on a healthy appreciation of the medium—and an admission of its limitations.

Mr. Stark's suggestions about riding gain were well taken, but it should be noted that various very sophisticated compressors are now available for consumer use—items that were once available, at heavy expense, only in professional settings. In particular, the dbx company makes an excellent CD player with a built-in compressor (the same compressor is also available as an out-board unit). It can be totally switched out of the circuit or, when switched in, be adjusted to work a slight compression or a considerable one. I find that just a bit of tailoring allows all but the most difficult CD's to be put down on cassette tape safely, without overload or noticeable tape hiss.

DAVID E. LICHT  
Jackson Heights, NY

### The New Jazz

According to the Marsalis brothers and Harry Connick, Jr., as their views were presented by Chris Albertson in "The New Jazz" (March), jazz, unlike any other type of music, must not evolve. Rather, it must remain static, frozen in a period and style of their choosing. Their efforts to pigeonhole jazz and give it some sort of unassailable definition serve no purpose. It's like asking if Mozart's symphonies are superior or inferior to Mahler's.

Yet the neoboppers have nothing to fear. The sounds of the great jazz icons are in no more danger of going silent than the sounds of a Bach fugue. Great music endures.

PAUL CERVANTES  
Canoga Park, CA

Wynton Marsalis, the leader of the young neoboppers, is a very talented and intelligent young man. But he has not earned the right—nor has anyone else—to criticize Miles Davis!

T. DUDA  
Portland, OR

### Sony Shuffle: The Last Word

I am disappointed that my Sony CDP-50 compact disc changer repeats selections in the multidisc shuffle-play mode. Originally, I thought something was wrong with the machine and sent it to the district service center for repair, which sent it back, stating that repeats were normal.

When I read the letter from Mr. John

H. Berry, Jr., in the March issue saying that Sony told him the repeats were abnormal and that a service bulletin had been issued for his model, the CDC-70, I hoped that one had also been issued for mine. I called the district service center and Sony headquarters, but no one knew of any service bulletin. The Sony representative did say that both models perform the same in the shuffle-play mode. Could you straighten this out?

MICHAEL MOORE  
Philadelphia, PA

We have received a number of inquiries regarding a letter from Mr. John H. Berry of Hastings, Michigan, published in the March issue of STEREO REVIEW.

The shuffle-play function in all current Sony CD players makes selections on a truly random basis. This means that during some listening sessions selections will be repeated before all selections are played, providing for true variety in play sequence.

We called Mr. Berry but were unable to speak with him. We did speak with the servicer he referred to in his letter and learned that the service bulletin he mentioned addressed another micro-processor function.

We at Sony truly apologize for any confusion regarding this issue.

TIM MARSHALL  
District Service Manager  
Sony Corp. of America  
Farmington Hills, MI

### The Optical Turntable

How disappointing to read in March's "The High End" column that laser-read LP's are not on the horizon. I keenly remember the excitement of reading about this emerging technology several years ago, and I have been telling friends to delay buying a CD player because the new laser component was just around the corner.

How foolish I was.

WENDY A. BIE  
Rolla, MO

Oh, optical turntable—where were you when we needed you? Devotees of the vinyl LP will wonder, and perhaps never know, if the O.T. could have saved the LP from oblivion. Could it yet bring it back?

BEN CALDERONE  
Levittown, NY

*Don't hold your breath.*

### Michelle Shocked Bonus

The review of Michelle Shocked's "Short, Sharp, Shocked" in March's "Best Recordings of the Month" states



# Car audio for drivers who sit on the left.



Most car audio components have their controls facing front and center. Which is great for drivers who like to sit on the transmission hump or the stick shift. But ridiculous for the rest of us.

So we designed ours with the controls angled towards the driver. Which seems to make a little more sense to us.

To see how it looks from your point of view, see your Toshiba car audio dealer.

If you sit on the left, it's the right thing to do.

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# The Brains.

*Carver's new CT-Seven Remote Control Preamplifier/Tuner with Asymmetrical Charge Coupled FM Detection and Sonic Holography.*



# The Brawn.

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Power and finesse. They've always been important factors in a serious listening system. Now there's a new way to achieve both without overpowering your budget.

Our new CT-Seven preamplifier/tuner combines a Sonic Holography® preamplifier and Asymmetrical Charge-Coupled FM Detection tuner into one convenient component.

It makes beautiful music with our whole line of Magnetic Field Power amplifiers. Including the new M-4.0t with the same transfer function and power output as Bob Carver's \$17,500-pr. ultra-esoteric Silver Seven monoblock amplifiers.

**The CT-Seven as an audiophile preamplifier:** Like Carver's fine separate preamplifiers, the CT-Seven is designed as a "straight wire with gain," capable of perfectly passing input signals without adding or subtracting any musical nuances.

It includes a meticulously engineered, ultra-low noise phono stage that flawlessly duplicates the theoretical RIAA equalization curve.

**The CT-Seven as a complete sound control center:** From the comfort of your listening chair you can choose from six sound sources including dual tape monitors, CD input and video/auxiliary inputs (suitable for video sound or DAT). Unlike most remote volume adjustments which use distortion-inducing electronics, the CT-Seven employs a motorized volume control for smooth control and smoother sound quality. Also included are useful 3-band tone controls, mono switch, loudness equalization and a studio-quality headphone amplifier.



**The CT-Seven as your passport to musical reality:** The CT's Sonic Holography® Generator is capable of redefining your perception of music by recreating the sound stage and 3-dimensional spatial characteristics of a live performance. According to some of America's top reviewers, Sonic Holography® "... seems to open a curtain and reveal a deployment of musical forces extending behind, between and beyond the speakers. The effect strains credibility."

And you can create it from any stereo record, tape CD or even FM broadcast. With your existing speakers. At the touch of a remote button.

**The CT-Seven as a high performance quartz synthesized FM tuner:** You've simply never heard FM until you've heard it through the Carver Asymmetrical Charge-Coupled FM Detector circuit. Multipath distortion, interference and distant station noise are dramatically reduced. Weak stations emerge into dramatic clarity. Yet stereo separation, space, depth, and ambience were not only retained, but seemingly enhanced by the lack of background noise.

Choose 8 FM and 8 AM presets by remote control. Scan the broadcast band automatically or manually. With the CT-Seven's ACCD circuit on, you'll discover "new" stations which were previously unlistenable!

**The CT-Seven's power partners:** Only Carver gives you four high power amplifier choices from 140 watts to 375 watts per channel. Each is perfectly matched to the CT-Seven. And each uses Carver's cool-running Magnetic Field Technology which dispenses with bulky power supplies and power-wasting external heat sinks... yet which is so rugged it's used in the world's largest touring professional sound systems.

Choose from the new "modestly-powered" M-0.5t (140 watts per channel RMS 20-20kHz both channels driven into 8 ohms with less than 0.1% THD), the M-1.0t (200 watts/ch. per channel RMS 20-20kHz both channels driven into 8 ohms with less than 0.15% THD), M-500t (250 watts per channel RMS 20-20kHz both channels driven into 8 ohms with less than 0.15% THD), or the new M-4.0t (375 watts per channel RMS 20-20kHz both channels driven into 8 ohms with less than 0.5% THD).

**Hear brains and brawn together at your Carver dealer.** Switch the CT-Seven and the most expensive tuner in the room to hear Asymmetrical Charge-Coupled FM Detection work its magic. Put on your favorite CD, press the CT-Seven's Sonic Holography® remote button and feel the sound room "disappear." Turn up the volume to live performance levels and discover the impact of true dynamic headroom.

And then get ready for another pleasant experience when you discover what a super value the CT-Seven and Carver power amplifiers are.

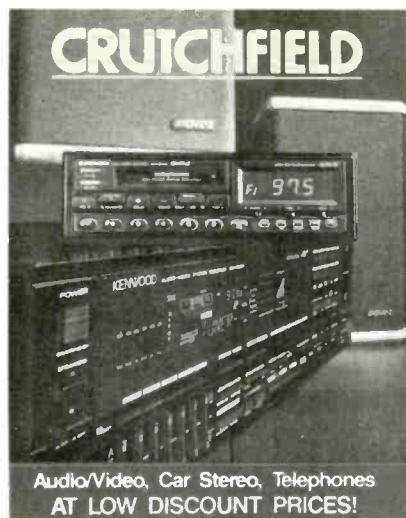
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## LETTERS

that the album's length is thirty-four minutes and it contains ten songs. The CD has a timing of thirty-six minutes, thirty-three seconds and contains an additional, eleventh track that is not mentioned in the credits. Do you happen to know why it's not listed?

ROBEY CALLAHAN  
Mobile, AL

*According to Mercury Records, the bonus track on the CD, Fogtown, is "just there," so no annotation was given. It's intended "to lift you out of your seat for the final two and a half minutes." An earlier, acoustic version of the song was included in Shocked's "The Texas Campfire Tapes" LP.*

### CD Player Listening Tests

Congratulations on Ken C. Pohlmann's article in the December 1988 issue on perceived differences between six good CD players. The audio world has needed this for some time. You cannot have been unaware of the published views of some British magazines, which have left the man in the street a trifle confused. Thanks for bringing the discussion back to earth.

TONY HAWKES  
Randburg, Republic of South Africa

It did not surprise me one little bit that you could find little audible difference between the mediocre players included in the December listening tests. Have you ever heard of McIntosh? Audibly superior in every way, the new Model 7007 is the most analog-sounding player I've ever heard.

THOMAS O. ELIASON  
San Jose, CA

I concurred with the conclusions of Ken C. Pohlmann's article on CD player listening tests and felt he supported his claims well even in follow-up responses in the "Letters" column, so I took my three-year-old Yamaha CD player to an audio dealer and compared it for hours with top-rated new players. I switched between my own discs and listened through headphones. Audible differences were subtle if present at all, so I thanked the very kind dealer and felt good about saving myself \$600 for a new player.

DENNIS FELA  
Cheswick, PA

### Strange Words

I have been receiving *STEREO REVIEW* for many years and have been mystified by the "Performance" and "Recording" ratings in the review section. Not long ago I purchased a CD on the basis of the reviewer's word that the performance

was "Fluent" and the recording "Resonant." The performance was only fair, and the recording was merely good. On a scale of 1 to 10, I would give the CD a 4 for performance and 5 for recording; I was looking for a 9 or better in both categories.

You need a table that would explain the meaning of all the strange words your reviewers use, such as "Animal crackers," "Energetic," "Dylan's garage sale," "Homespun," "Ear candy," etc. I found 109 of these terms in four issues of *STEREO REVIEW*. A study of a year's issues might reveal 200 or more adjectives. Compared with a 1-to-10 grading system, would the word "Spacious" mean a 9, 8, 7, or what? "Wow" could be either a 1 or a 10. And where does "Not like Mom" fit into the system?

DON SAMEX  
Ramona, CA

*The brief comments following the "Performance" and "Recording" tags in our reviews are not intended as ratings. They just indicate the general thrust of the reviews as an aid to browsing.*

### New Age Essentials

As the producer and host of commercial radio's first and most widely listened to syndicated New Age program, I offer this list of ten "essential" compact discs (in no particular order) to those who might be interested in exploring the best of New Age music.

1. Kitaro: *Silk Road* [Gramavision]
2. Ray Lynch: *Deep Breakfast* [Music West]
3. Andreas Vollenweider: *White Winds* [CBS]
4. George Winston: *Autumn* [Windham Hill]
5. Michael Stearns: *Planetary Unfolding* [Sonic Atmospheres]
6. Jonn Serrie: *And the Stars Go with You* [Miramar]
7. Patrick O'Hearn: *Between Two Worlds* [Private Music]
8. Jean-Michel Jarre: *Oxygène* [Polydor]
9. Brian Eno: *Ambient 1/Music for Airports* [Editions EG]
10. Deuter: *San* [Kuckuck/Celestial Harmonies]

FRANK FOREST  
Mill Valley, CA

### Correction

In the review of "Cedar Walton Plays" on page 113 in the March issue, the record label is correctly identified as Delos in the heading, but the album is misidentified as a Denon release in the body of the review. We regret this error. □



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## NEW PRODUCTS

### Phase Technology

Phase Technology's Model 435ES is a two-way bookshelf loudspeaker with an 8-inch bass/midrange and an asymmetrically mounted 1-inch ferrofluid-cooled soft-dome tweeter. Sensitivity is rated as 92 dB sound-pressure level, power handling as 80 watts, and frequency response as 45 to 20,000 Hz  $\pm$  3 dB. The enclosure measures 22½ x 12 x 10⅞ inches and is finished in walnut or dark-oak woodgrain vinyl. Price: \$300 a pair. Phase Technology, Dept. SR, 530 Rosselle St., Jacksonville, FL 32204.

**Circle 120 on reader service card**



### Yamaha

The Yamaha AVC-70 preamplifier has five video and ten audio inputs and incorporates digital circuitry for four surround-sound modes: Dolby, hall, live, and simulated-surround. It has two S-VHS inputs, and there are front-panel video and audio inputs for an auxiliary source such as a camcorder. Delay is adjustable in four steps between 15 and 30 milliseconds. Additional features include bass, midrange, and treble controls for the audio output, a bass-exten-

sion switch, and a ten-position record-out selector so that an input signal can be routed to an audio or video recorder while another signal is fed to the main system. The supplied ninety-one-key remote control can also operate a variety of other Yamaha components. The available finishes for the AVC-70 are titanium-color and black. Price: \$529. Yamaha, Dept. SR, 6722 Orangethorpe Ave., Buena Vista, CA 90620.

**Circle 121 on reader service card**



### Audio Control

Audio Control's 4XS car stereo electronic crossover can be used in either a four-channel two-way or a two-channel three-way configuration. It has a separate, independent subwoofer output and a bridging adaptor. Virtually any crossover frequencies between 10 and 20,000 Hz can be programmed using a plug-in module. The Programmable

Frequency Match circuit is an additional steep-slope, high-pass filter that can be used to exclude infrasonic frequencies or be set to cut off at a higher point to help tune speaker enclosures or protect drivers. Price: \$199. Audio Control, Dept. SR, 22313 70th Ave. W., Mountlake Terrace, WA 98043.

**Circle 122 on reader service card**

### JBL

The JBL LX55 is a three-way loudspeaker with a 1-inch titanium-dome tweeter, a 10-inch high-polymer-laminate woofer, and a 5-inch polymer-laminate midrange. Its frequency response is rated as 40 to 20,000 Hz, sensitivity as 92 dB sound-pressure level with a 1-watt input. Crossover frequencies are 800 and 4,000 Hz. Nominal impedance is 8 ohms. Dimensions are 26 x 14 x 12 inches. Grilles are charcoal gray, and cabinets are black. Price: \$798 a pair. JBL, Dept. SR, 240 Crossways Park West, Woodbury, NY 11797.

**Circle 123 on reader service card**



## NEW PRODUCTS



### Sony

Sony's MDR-IF5K cordless headphone system uses infrared technology. The headphones themselves weigh 4 ounces and have semi-open-air earpads and individual volume controls for each ear. The accompanying TMR-15F stereo transmitter uses high-output infrared diodes for high-speed response and wide directivity and has an automatic-level-control circuit to optimize the frequency-modulated signal to the headphones. It serves as a combination recharger and stand for the headphones when they're not in use. Price: \$200 complete, including headphones, transmitter, AC adaptor, and mini-plug adaptor. Sony Corp. of America, Dept. SR, Sony Dr., Park Ridge, NJ 07656. **Circle 124 on reader service card**



### One Step Ahead

The CD Organizer & Evaluation System from One Step Ahead includes color-coded labels for filing CD's by music genre, artist, or period. Each label can be filled in with a numerical preference rating and tempo code for each track on the disc. Packages contain either forty-two or eighty-four labels. Prices: \$2.95 and \$4.95. One Step Ahead, Dept. SR, 4320 196th St. SW, Box 239, Lynnwood, WA 98036. **Circle 127 on reader service card**



### Clarion

Clarion's Model 5630CD, a 20-watt-per-channel car CD receiver, is the company's first noncartridge-loading CD player. It has a three-beam laser tracking system and a low-vibration suspension system that is said to prevent mistacking. Users can sample each track of a disc for 10 seconds, and the repeat function allows repeat of a whole disc or

a single track. The tuner section features Clarion's Magi-Tune FM reception system, eighteen FM and six AM presets, auto-seek tuning, and preset scan. The 5630CD has Clarion's anti-theft security-code system. Price: \$829.95. Clarion Corp., Dept. SR, 5500 Rosecrans Ave., Lawndale, CA 90260.

**Circle 125 on reader service card**



### BASF

The Ferro Maxima I cassette, the third ferric cassette in BASF's audio line, uses dual-layer "micro-coating" technology and proprietary megadium iron oxide. The maximum output level is said to be almost 4 dB higher than that of BASF's Ferro Extra I cassette. Prices: C-60, \$2.59; C-90, \$2.89. BASF, Dept. SR, Crosby Dr., Bedford, MA 01730.

**Circle 128 on reader service card**

### Lebo

Lebo's CD storage racks are available in a two-shelf and a three-shelf model, which can be stacked as shown. The Model 54596 holds ninety-six regular CD's or forty-eight double discs on three shelves. The two-shelf Model 54564 holds up to sixty-four single CD's or thirty-two doubles. Both have a laminated oak-grain finish and measure 19 inches wide and 5½ inches deep. The Model 54596 is 18 inches high, the Model 54564 12½ inches. Prices: \$55.95 and \$41.95. Lebo, Dept. SR, 60 West St., Bloomfield, NJ 07003-4998.

**Circle 126 on reader service card**





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## NEW PRODUCTS



### Carver

The Carver TL-3300 compact disc player has an 18-bit, eight-times-over-sampling digital filter, dual digital-to-analog converters, and a three-beam laser system. It also features Carver's Digital Time Lens, which is said to restore ambience and balance that may have been lost as a result of the digital recording process. The player accepts CD-3's without an adaptor. A twenty-two-key remote control is included. Price: \$699.95. Carver Corp., P.O. Box 1237, Lynnwood, WA 98046.

### Onkyo

Onkyo's TA-RW400 dubbing deck has two separate computer-controlled transports. It features Dolby HX Pro, Dolby B and Dolby C noise reduction, automatic bias and equalization settings for tape Types I, II, and IV, and a switchable MPX filter. The deck's continuous-play design enables both sides of each tape to run sequentially for up to 3 hours of uninterrupted play. Price: \$350. Onkyo, Dept. SR, 200 Williams Dr., Ramsey, NJ 07446.



### Cerwin-Vega

A pair of CMW5 5 1/4-inch midrange/woofers, a pair of CD3 dome tweeters, crossovers, mounting hardware, and terminals make up Cerwin-Vega's new automotive speaker-system package. The overall frequency response is rated as 50 to 20,000 Hz. Sensitivity of the midrange/woofer is rated as 91 dB sound-pressure level at 1 meter with a 1-watt input, and that of the tweeter is rated as 94 dB. Recommended amplifier power is 45 watts. Price: \$199.95. Cerwin-Vega, Dept. SR, 555 E. Easy St., Simi Valley, CA 93065.

**Circle 129 on reader service card**

### Superphon

The Superphon C.D. Maxx preamplifier, designed for listeners who have chosen CD's as their primary recorded music source, has only line-level inputs. Its top-accessed controls are mounted on the circuit board, directly in the signal path, which eliminates long signal traces to improve "articulation, clarity, and punch." The pure Class A circuitry uses MOSFET's and FET's. There is a straight-wire bypass that switches the

line stage out of the signal path for passive operation. The C.D. Maxx has three line-level inputs, a tape loop, and two sets of output jacks. Total harmonic distortion is rated as less than 0.05 percent at 2 volts output, frequency response as 2 to 200,000 Hz, and signal-to-noise ratio as better than 95 dB. Price: \$329. Superphon, Dept SR, 1035 Conger, Unit 3, Eugene, OR 97402.

**Circle 130 on reader service card**





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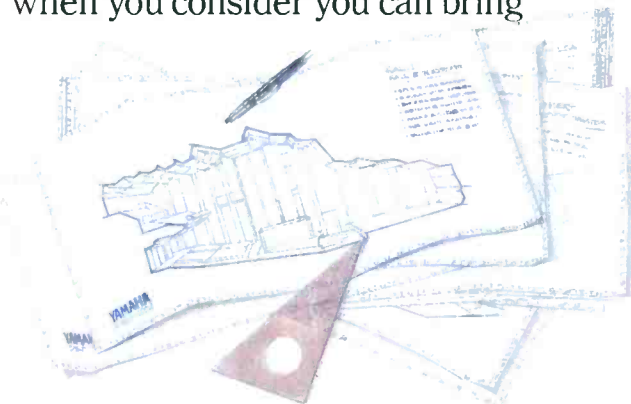
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## NEW PRODUCTS

### Teac

Teac's PD-700M six-disc CD changer has a front-loading magazine. It uses quadruple oversampling and has dual digital-to-analog converters. Up to thirty-two selections can be programmed, and there is a three-way repeat feature. The magazine is CD-3-compatible. A full-function remote control is included. Price: \$479.95. Teac Corporation of America, Dept. SR, 7733 Telegraph Rd., Montebello, CA 90640.

**Circle 131 on reader service card**



### Denon

The Denon DCD-1420 CD player features the company's Delta circuit, which incorporates an eight-times-oversampling, 20-bit digital filter and dual 20-bit digital-to-analog converters. There are optical and coaxial digital outputs for connection to digital amplifiers, fixed and variable analog outputs, separate power supplies for the digital

and analog sections, and linear-crystal oxygen-free-copper wiring in the analog filter. Other features include phrase repeat, twenty-selection programmability, auto space, auto edit, index search, and remote control. Price: \$550. Denon America, Dept. SR, 555 New Rd., Parsippany, NJ 07054.

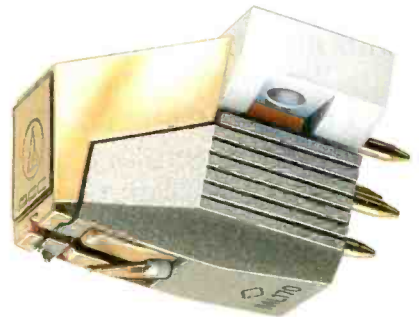
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### Audio-Technica

Audio-Technica's AT-ML170 is a dual-moving-magnet phono cartridge with the magnetic generators arranged in a "V" shape to match the geometry of the recording process. It uses a gold-plated boron cantilever and pure copper wiring in the proprietary Paratoroidal coils, which are said to offer low inductance for a flatter frequency response and reduced susceptibility to loading effects. The ML170 is rated to deliver 4 mv output at a lateral stylus velocity of 5 cm/s. Channel separation is given as 31 dB at 1,000 Hz, with the channels balanced within 0.5 dB. Frequency response is rated as 5 to 40,000 Hz. The recommended tracking force is 1.25 grams. Price: \$345. Audio-Technica, Dept. SR, 1221 Commerce Dr., Stow, OH 44224.

**Circle 134 on reader service card**



### Lazarus

The Lazarus M200 is a hybrid dual-mono power amplifier that uses vacuum tubes in the driver stages and MOSFET's in the final output stages. Designed with zero negative feedback, it is rated to deliver 200 watts rms per channel into 8 ohms, 375 watts into 4 ohms,

and 525 watts into 2 ohms. Controls include buttons for power and standby mode (power on, outputs muted). Price: \$1,750. Lazarus, Dept. SR, 8130 Coldwater Canyon, North Hollywood, CA 91605.

**Circle 133 on reader service card**



*All the information in the "New Products" section was provided by the manufacturers and does not represent the results of tests by STEREO REVIEW. Prices given are suggested retail ("list") prices as of press time. For more information, write the manufacturers or circle the corresponding numbers on the reader service card facing page 121.*



# More For My Money

I'd always thought you needed big speakers to get good sound. So every couple of years, some department store would have a sale and I would buy the biggest speakers I could find for the money. Then I moved across the country to take a new job. I left my old speakers behind. I was sure they wouldn't fit in my new apartment and I was ready for new ones anyway.

After the move, I went shopping for new speakers at a specialty hi-fi store near my apartment. I told the salesman to show me something under \$500. He took me into a room full of all kinds and sizes of speakers.

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CIRCLE NO. 2 ON READER SERVICE CARD

## CHIPS AHOY

by Ken C. Pohlmann

IT used to be easy to tell when a person was into computers. If you got close you could hear him talking about chips—8080, Z-80, 8085, 6800, or whatever, but it was always chips. In contrast, audio people felt secure in their ritual discussions of cartridge impedance, watts per channel, and subwoofer diameters.

Today, things have changed. Computer people still talk about chips, but now audio people are talking about chips too. Debates rage about the relative merits of four-times- and eight-times-oversampling CD players and whether 16, 18, or 20 bits are needed for good digital-to-analog conversion.

Digital signal processing (DSP) is purely a technology of chips, and audio will eventually become, to a large degree, an implementation of digital signal processing. It will be just like computers and data processing—only in this case the data may be Mozart or Guns n' Roses.

One existing example of DSP technology that links computers and audio is the NeXT computer, the electrical progeny of Apple Computer's co-founder and former chairman, Steve Jobs. The NeXT is a personal computer incorporating a number of technological breakthroughs, including a removable read/write/erasable optical disc that can hold 256 megabytes of data and a DSP chip, the Motorola 56001, that's used to process audio data. For the benefit of computer types, the 56001 is a fixed-point DSP chip using 24-bit architecture and two 56-bit accumulators. For us audio types, the 56001 is incredibly precise in its operation—for example, the accumulators provide 336 dB of dynamic range—and it is also blindingly fast.

The 56001 chip processes audio data with the same 16-bit word length and 44.1-kHz sampling rate as a compact disc player, performing both analysis and synthesis tasks. As a result, in addition to all of its computing assets, the NeXT

offers the most advanced audio technology ever designed into a basic computer. Thanks to chips.

Meanwhile, while almost nobody was looking, stereo systems also took a quantum leap forward, thanks to still more chips. Chips instigated the digital audio revolution, and they are about to lead us into the next phase of the digital era. Soon DSP chips will process all parameters affecting high-fidelity sound recording and reproduction. Rather than cut short digital audio's benefit at a CD player's output, a DSP-equipped system will maintain the audio signal in the digital domain throughout the audio system, up to the amplifier (and eventually to the loudspeaker itself).

Two examples of audio DSP chips have been introduced by Sony, not surprisingly a leader in computer technology as well as in audio. The CXD-1160 and CXD-1355 DSP chips permit precision control of parameters such as bass and treble tone-control settings, parametric equalization, infrasonic and ultrasonic filtering, reverberation, delay, surround sound, and dynamic-range compression and expansion. Throw in a little random-access memory (about 256 kilobytes), and the chips can perform automation and programming functions.

The CXD-1160 is tailored for dynamic-range, equalization, and time-delay processing, performing 32-bit calculations on 24-bit words. The CXD-1355 is primarily intended for time-delay and surround-sound processing. It has a digital attenuation circuit, an eight-times oversampling circuit, and 18-bit digital input/output (I/O). Together, the two chips form the heart of a digital component capable of performing preamplifier functions.

Sony's first consumer digital signal-processing component, the TA-V925E preamplifier, was introduced in Japan last November. It does everything you'd want a preamplifier to do, and it does it digitally. There is three-band parametric equalization with variable bandwidth and twenty-two adjustable frequency points. A digital dynamics processor permits three levels of compression: low-level (1:1.25 above -16 dB), mid-level (1:1.6

above -14 dB), and high-level (1:2 above -12 dB). A surround processor permits three modes of operation: movie surround (delay up to 80 milliseconds), music surround (delay up to 3 seconds), and simulated surround (delay up to 80 ms). There are a number of factory-set and user-programmable preset memories for all of the processing circuits. Fortunately, although its designers certainly needed Ph.D.'s in computer science, users of the TA-V925E do not.

While the TA-V925E will not be brought into the U.S., an export version of the preamplifier will be introduced here this summer. It is only a forerunner of many DSP products to come from Sony and its audio-manufacturing colleagues. In the same way that the CD player surmounted the stubborn limitations of analog music storage, DSP components will solve many of the problems of analog processing.

In addition, just as the CD format opened new markets, DSP will expand the horizons and functions of high-fidelity systems. Elements of DSP technology will appear in home, car, and portable digital audio products. Because DSP chips are programmable, custom software will provide new opportunities for audio designers. Even analog recordings will benefit, as DSP systems employ software for noise reduction and other processing.

On the other hand, DSP is not an easy technology. Whereas CD's appeared on the scene fully formed, DSP will not. Audio processing taxes present chip technology to the limit, demanding the fastest and most accurate chips we can make to insure a high-fidelity signal. With the coming of DSP, we will embark on a digital audio evolution every bit as interesting and diverse as that which made analog audio evolution so exciting—and challenging.

Still not convinced? Consider this: In 1982 the Audio Engineering Society met to consider digital audio. Among topics on the agenda was a novel technology called compact disc. This May the AES convenes in Toronto for its second meeting on digital audio. The item at the top of the agenda? You guessed it: DSP. □



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CIRCLE NO. 78 ON READER SERVICE CARD



by Ian G. Masters



## Equalizer Boost

**Q** The addition of a graphic equalizer to my stereo system seems to increase the overall power level when many frequency bands are boosted. Is this a normal occurrence? And is it possible that the increase will drive my amplifier into clipping?

MICHAEL STUMPF  
Montreal, Quebec

**A** It's certainly normal. Each control on an equalizer is the same as the volume control on your amplifier, except that it operates only in a fairly narrow frequency range. Increasing any of these controls will increase the overall level, although the effect may not be noticeable at high frequencies as relatively little energy is used in that part of the spectrum. Low frequencies, however, are very power-hungry, so boosting the bass with your equalizer will increase the overall level considerably. It is definitely possible to drive your amplifier into clipping doing this, particularly if you have little power reserve when the equalizer is set flat.

## 220-Volt Operation

**Q** My amplifier provides for operation at 220 volts, although the owner's manual only mentions overseas operation in this connection. I have a 220-volt line for my clothes dryer, and I'm considering using that to power the amplifier. Since power equals voltage times current, and this would double the volt-

age, shouldn't the output be doubled as well?

LARRY LUTMAN  
West Streamwood, IL

**A** Your plan is probably possible, but there would be little or no benefit in pursuing it. True, an amplifier is designed to work with a certain voltage, but that is always much higher than the AC house current (110 volts in this country, 220 to 240 volts in many overseas areas). The power-supply section simply steps the house current up to whatever the amplifier is designed for. Units like yours provide for different line voltages not only as a convenience for buyers who may wish to move the component from continent to continent, but also to reduce the necessity of manufacturing different versions for different countries.

While different voltages may go into the power supply, what comes out is the same: the voltage the amplification circuits were designed for. So there would be no point in using 220 volts unless only that were available. And even if you could double the output of your amplifier in this way, it would only yield a gain of 3 dB, which would hardly be worth all the trouble.

## Warped LP's

**Q** What can I do about warped record albums? Would putting an LP between two sheets of glass and placing it in my oven for 5 or 10 minutes at about 300 degrees flatten it?

R. LONG  
Pontiac, MI

**A** The technique you describe has been used with some success over the years, but you have to be very careful when you do it. First, the oven should be set for its lowest temperature; 300 degrees would ruin an LP in no time. Second, the top piece of glass should be weighted down. Third, you should watch closely during the process and remove the record from the oven as soon as it looks close to flat. Finally, the whole works—glass, weights, and all—should be removed from the oven as soon as possible, placed on a flat surface, and allowed to cool before you remove the glass.

Even if you take all this care, you may well find that the vinyl has been deformed in the process, rendering the record extremely noisy or even unplayable. Before you risk it, therefore, try one of the various accessory weights or clamps designed to stabilize LP's; you may find that does the trick. Or if all you want to do is get one last good play that you can record, try applying small bits of strapping tape to the edge of the

record and affixing it to the platter itself. Propping up the low spots with several layers of paper can also help to even out the record long enough to get one good copy.

## Biwiring Speakers

**Q** I recently purchased a pair of speakers set up for biwiring. What does that mean, and is it worth doing?

F. R. COSIN  
San Francisco, CA

**A** Several speaker manufacturers provide separate terminals for the high- and low-frequency drivers in a system, which allows you to run separate cables from a full-range amplifier to each driver while still using the speaker's internal crossover network. This practice is distinct from biamplification, which uses separate amplifiers for the different parts of the spectrum and an active crossover network in the circuit before the amplification stage.

Opinions vary as to whether biwiring results in any improvement in sound, and even its advocates seem reluctant to speculate on why it might work. I would hazard a guess, however, that whatever benefit there might be is caused by the doubling of the cable, which could be accomplished just as easily by using thicker wire.

## Biamplified Hum

**Q** My audio system is biamplified, employing two stereo amplifiers and a separate electronic crossover network. Whenever I attach the stereo output of my television monitor to the system, a low-frequency hum appears, no matter which input is selected. If I eliminate the crossover and run the speakers directly, however, the hum disappears. Are audio signals from a video source unable to be biamped for some reason?

MARK D. DAGOSTINO  
North Royalton, OH

**A** The line-level audio signals from a video monitor do not differ from other sources in any important way, and so there are no constraints on what you can do with them in terms of amplification or signal processing. In your case, it's not the signal that's causing problems—it affects all your sources—but the connection of the monitor to the rest of the system.

Hooking up your monitor is producing what is called a "ground loop," one of the major gremlins of audio. Theoretically, the chassis of every audio or video component is grounded; there is zero electrical potential between it and the earth. In reality, however, such grounding is often imperfect, resulting in a



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"chassis ground" that is slightly at variance with absolute ground. In addition, the chassis grounds of two components may be different if they are connected to the AC house current at different points. When two such components are connected together the slightly different grounds allow a current to flow at the AC frequency of 60 Hz, and this is audible as hum, particularly when the low-level parts of the system are involved. It seems that this sort of mismatch exists between your TV monitor and electronic crossover, so that hum occurs whenever both are connected to the system.

The easiest solution is to break the connection between the two chassis. To do so, carefully remove a short length of the braided outer conductor at *one* end of the cable joining the TV monitor and the rest of your system (do it for both channels, of course). This will prevent current from passing from one chassis to the other, but the cable will still be shielded by virtue of its connection to ground at the unaltered end.

### Crosstalk Clarification

In February's column I discussed crosstalk cancellation: the technique of phase manipulation used by a number of manufacturers to widen the sound stage by removing information intended only for the right ear from the left speaker, and vice versa. The best-known versions are Carver's Sonic Holography and Polk Audio's Stereo Dimension Array, but there are several others. A reader asked whether such a technique could be used in the recording stage, removing the need for a decoder at the time of playback. In my reply, I said it couldn't be done, because the technique must be tailored to individual listening rooms and listener positions, and a recording engineer can't predict how his product will be heard.

I should have added that there have nonetheless been efforts to do exactly what our reader suggested. Carver itself experimented with this some years ago, and Bedini has more recently developed a system to do much the same thing. Such an altered signal can, of course, be produced at any point in the process, either during or after recording, and the effect it produces is no worse than that created by a playback decoder that can't be tailored to a specific listening circumstance (and most home units fall into this category).

Still, the only *really* satisfactory way to provide for enhancing the stereo image by crosstalk cancellation—and then only for a single listening position—is to make the effect user-adjustable, so that it can be altered when recordings are played, not when they are made. □

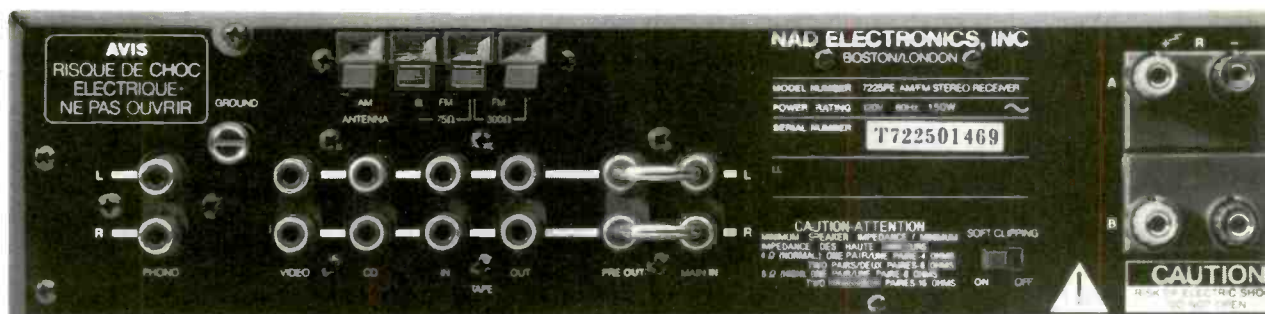


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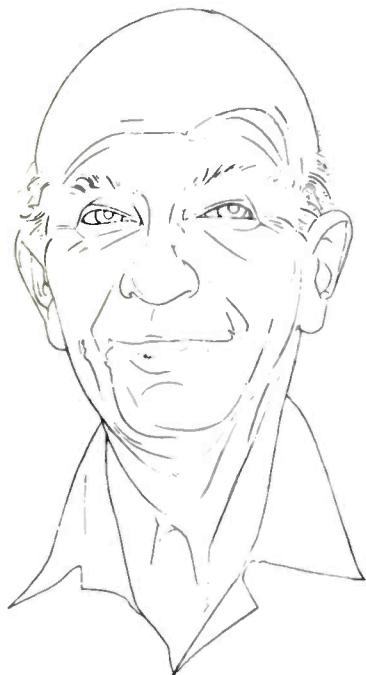
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by Julian Hirsch



## IS POLARITY AUDIBLE?

**I**N recent years, a belief has developed among some audiophiles that the "absolute polarity" of a program should be maintained in order to realize its most accurate reproduction. Although this idea has received the greatest attention from high-end audio users, we are seeing components at widely different price points that now incorporate polarity-reversal switches. Presumably, if the program sounds better in one of the switch positions than in the other, the polarity is correct for that specific recording.

Let us see what this is about. In simplest terms, the rationale for this idea begins with the belief that the sound from most, if not all, musical instruments begins with a compression of the air about them, which travels outward as a positive pressure wave. On the next half-cycle, as the diaphragm or air column that originally creates the sound reverses its direction of motion, the air is sucked in, and a negative pressure

wave is radiated. I suspect that this basic premise is flawed (by oversimplification), but I have no evidence for or against it.

Believers in the importance of polarity hold that the reproduction of such a sound should match its generation. In other words, the loudspeaker diaphragm should move outward and compress the air in front of it during the portion of the waveform that was originally created by a compression and move inward during the part corresponding to a rarefaction. This concept does have an appealing logic at first glance. It should be possible to verify its validity, one would think, by inverting the playback signal's polarity and listening for a change (for better or worse) in the sound.

As anyone who has tried this experiment knows, that is simply not the case. As a rule, nothing happens when polarity is inverted. Obviously, since there is no universal standardization with respect to microphone output polarity, phasing of multiple microphones, or microphone placement relative to the sound sources, it is quite difficult to establish a single-valued "polarity" for a recorded program. Only a monophonic recording of a single source (instrument or human voice) in an anechoic chamber would have any reasonable chance of capturing the original polarity of the sound being recorded.

The situation becomes impossibly complex when you are dealing

with the typical music recording made in a studio or concert hall and using a multitude of microphones. Even if all those dozens of microphones were phased identically (unlikely), *and* if no unexpected reversals took place in the mixdown, *and* if the resulting polarity (whatever that might be) was recorded correctly by a standard method (which does not exist), *and* if the playback system had a known polarity—either inverting or noninverting—from source to speakers, the result would almost certainly still not be a true replica of the initial sound waveform. And if, by some chance, it was essentially perfect, it still would not sound exactly like the original program would have sounded to *anyone* present at the recording session.

Although I am setting up an impossible set of conditions for a true "absolute polarity" to exist throughout the recording/reproduction process, the validity of that concept is easily tested experimentally. As I said, as a rule nothing happens in such experiments, though it is possible that someone with extraordinarily acute hearing *might* hear a difference in the sound—whether or not it represented an improvement—when the polarity is reversed.

I have never heard of a convincing test showing that polarity reversal has positive results. In my own case, I have had occasion to test a couple of products containing polarity-reversing switches. The first, a receiver, startled me when a difference was plainly audible. Further investigation, however, revealed that the gain of its amplifier section changed by about 0.2 dB when the reversal was made, wholly invalidating the test. Later, a CD player having a polarity switch (and with an unchanging gain) defied my most careful attempts to hear any difference between its two conditions.

It is easy for you to test this for yourself, without risk of an undesired gain change, by reversing *both* sets of your speaker leads simultaneously. This should be done with a suitable four-pole, double-throw switch (nonshorting, if you value your amplifier). I would appreciate hearing from anyone who either

### *Tested This Month*

**NEC CD-830DS**

*Compact Disc Player*

**JVC XP-A1000 Digital**

*Surround Processor*

**Advent Prodigy Tower**

*Speaker System*

**Hitachi DAC70**

*Compact Disc Changer*

**Grundig Fine Arts A-903**

*Integrated Amplifier*

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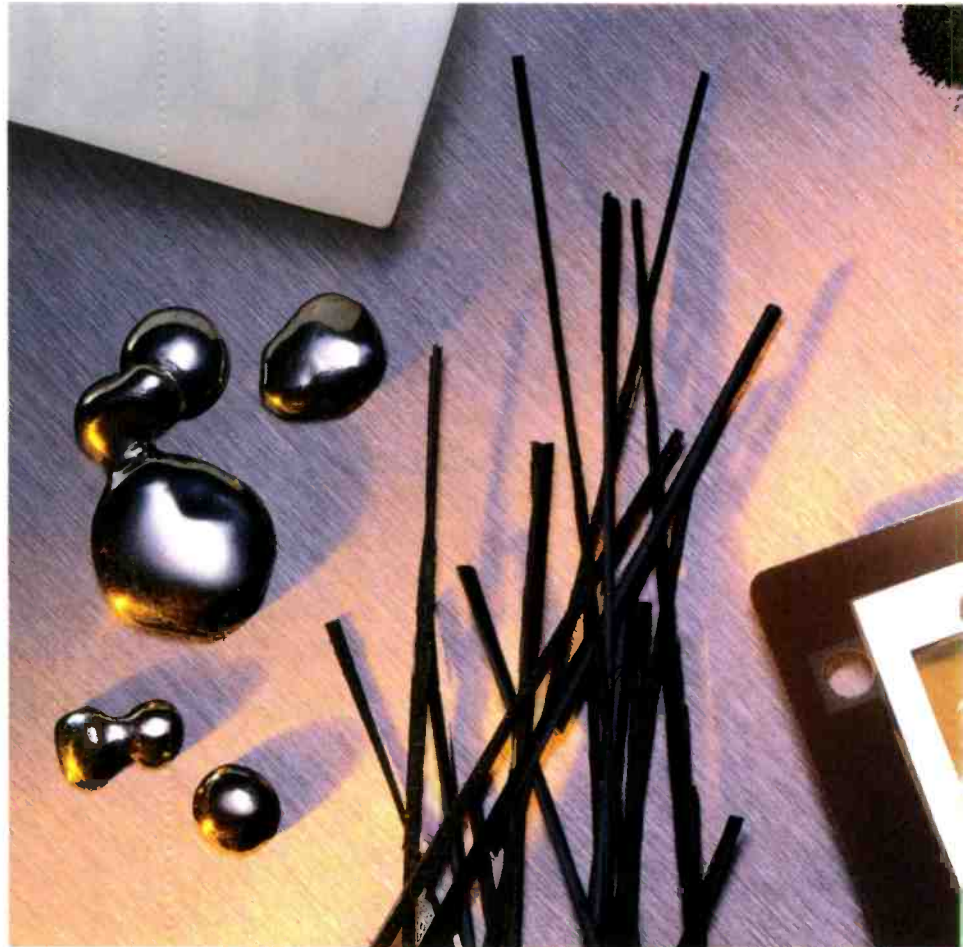
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## TECHNICAL TALK

concur or differs with my conclusions, but only after trying the experiment himself. No unsupported opinions, please.

It is true that there is a real, and often very large, difference between the positive and negative halves of most instrumental (or vocal) waveforms. This asymmetry can require peak amplifier powers many times higher for one polarity than for the other. The requirement is equally valid for either direction of cone

*Only a monophonic recording of a single instrument or human voice in an anechoic chamber would have any reasonable chance of capturing the original polarity of the sound being recorded.*

movement, however, and has nothing to do with the original polarity of the sound. Since an amplifier (and speaker, for that matter) must operate equally well with both output polarities, polarity asymmetry is a trivial matter in audio reproduction.

I recall my first-hand experience with this effect as a relatively new amateur radio operator some fifty years ago. For maximum communication effectiveness, it was desirable to modulate one's AM transmitter as fully as possible. Exceeding 100 percent modulation in the negative (downward) direction produced severe distortion and interference with other stations, but upward modulation could exceed 100 percent without harmful effects, and with improved communication effectiveness. I found that reversing my microphone polarity made a dramatic improvement in my signal reports, without any undesirable side effects. What I was doing, of course, was polarizing the microphone to modulate upward with the half of my voice waveform that had the largest peak amplitudes.

All this does not have too much to do with hi-fi, I suppose, except to show how easily a small grain of sense can be expanded into a volume of nonsense. □

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\*Vol. 9 No. 7 (Nov. 1986)

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JOCK LEUNG

## NEC CD-830DS COMPACT DISC PLAYER

*Julian Hirsch, Hirsch-Houck Laboratories*

**N**EC's top compact disc player, the Model CD-830DS in the Renaissance Series, is probably the most feature-laden product of its type that we have seen. In addition to an impressive array of operating capabilities, it embodies a highly sophisticated sixteen-times-over-sampling circuit design incorporating a variation on conventional digital oversampling technology that NEC calls "transversal filtering." For improved low-level linearity, it has four 16-bit digital-to-analog (D/A) converters.

To reduce playback errors resulting from noise pickup in the low-level signal path from the laser pickup to the circuits that follow it, NEC designed an integrated optical pickup with built-in impedance-conversion stages consisting of a photodiode and six current/voltage conversion amplifiers on a single chip. Other design features of the CD-830DS include a digital tracking servo for the pickup and a dual power supply with separate shielded power transformers for the analog and digital circuits. Mechanically, the

player is exceptionally rugged, with damping applied to critical metal panels and circuit boards in order to isolate the analog section from mechanical vibration. It is supported on large feet that can be installed at either three or four points and can be mounted for either flat or pointed contact with the supporting surface.

In addition to all the usual CD player controls and operating features, the NEC CD-830DS has two random-play modes (one places the system into pause between tracks, programming for playing up to twenty-four tracks in any sequence, and a delete mode that excludes any selected tracks from playback). The CD-830DS provides direct access by track number, index number, and even time point within a track. A button inverts the output polarity for use with discs or amplifiers that contain a polarity inversion.

Among the other notable features of the CD-830DS are Intro Scan (playing the first 10 seconds of each track), Auto Space (inserting 4 seconds of silence between tracks), and three editing modes that simplify

selecting the tracks on a disc that will fit into the recording time of a tape cassette (it can even be done for both sides of the cassette in a single operation). Auto Edit does the whole job at the touch of a button, Manual Edit accomplishes the same thing with the user selecting the tracks and the display indicating at which point the tape will be filled, and Disc Change Edit alerts the user when it is time to change discs.

The CD-830DS has a fade-out button that smoothly decreases the output level over a 10-second period and then places the player in pause mode. It can be controlled by an external timer for unattended playback. The output level at the front-panel headphone jack is controlled by an adjacent slider. On the rear of the player, in addition to the analog audio outputs, there are coaxial and optical digital outputs.

Most of the special control functions of the CD-830DS are operated by small pushbuttons on a hinged section that swings out from the bottom of the front panel at the touch of a finger. The supplied remote control duplicates all the controls on the player except headphone volume and power. The front-panel display window contains a music-calendar display of unplayed track numbers (up to twenty) and also shows track and index numbers, elapsed or remaining time on the current track or the

## TEST REPORTS

entire disc (selected by sequential operations of the time button), and the status of a number of other control functions.

The NEC CD-830DS measures 17 inches wide, 12 inches deep, and 4¾ inches high. It weighs about 25¼ pounds. Price: \$999. NEC, Dept. SR, 1255 Michael Dr., Wood Dale, IL 60191.

### Lab Tests

The frequency response of the NEC CD-830DS was flat within 0.02 dB or less from 15 to 3,000 Hz and rolled off slightly to -0.2 dB at 5 Hz and -0.5 dB at 20,000 Hz. The maximum interchannel phase shift was -0.5 degree at 20,000 Hz. Channel separation was also superb, 123 dB at 1,000 Hz and an impressive 102 dB at 20,000 Hz. The player's internal de-emphasis response was within 0.4 dB of the standard curve from 125 to 16,000 Hz. The noise spectrum of its output (playing an unmodulated track of the CBS CD-1 test disc) was typi-

cally between -120 and -130 dB; its largest component was the 120-Hz power-supply hum at -100 dB.

The total harmonic distortion (THD) plus noise at the 0-dB level was between -93 and -95 dB (0.0018 to 0.0022 percent) from 20 to 10,000 Hz and even less at higher frequencies (the minimum was 0.0014 percent at 15,000 Hz). At 1,000 Hz, distortion was less than -94 dB (0.002 percent) at levels between -90 and 0 dB. Low-level spectrum analysis showed no detectable linearity error down to a -80-dB level and a moderate +2-dB error at -90 dB.

The output from the player's analog jacks was 2.51 volts from a 0-dB input test signal. The dynamic range (EIAJ) was 99.5 dB, and quantization noise (with the D/A converters active) was -93.65 dB. The speed error of the player was -0.0019 percent. Playing the Philips TS5A test disc, the CD-830DS tracked the maximum calibrated errors (900 micrometers on the information

layer and 800 µm in the surface black-dot portion of the test). In the more severe error-correction and tracking tests of the new Pierre Verany test disc #2, the player began to mistrack at the 750-µm level, where it skipped back to the previous track.

The player's slewing time from Track 1 to Track 15 of the Philips TS4A test disc was 2.4 seconds, a typical but not particularly fast time. It cued perfectly to a track that was not separated from the previous one by a silent interval. The massive construction and damping of panel resonances in the CD-830DS aided it in withstanding all but the hardest blows to top or side with the palm or fist.

### Comments

The NEC CD-830DS offers a rare combination of innovative circuit design and enormous operating versatility. (Possibly its only omission, in the light of current CD design, is the ability to play 3-inch CD-3's without an adaptor.) When the control subpanel is hinged out of sight, the player presents a simpler external appearance than almost any other we have used. Even a neophyte will not be daunted by the transport controls and power switch, which normally are its only visible controls. Those who do not care to use the special features need never open the subpanel. Even the remote control separates the functions logically into two groups, with the basic transport buttons placed at the top on an off-white panel and the others on gray and blue panels below. The instruction manual explains the operation of all of the controls in clear, understandable language, and—unusual for a CD player manual—it also gives a "technical close-up" of the player's design features.

To us, the true distinction of the NEC CD-830DS is not in its sound per se, although it sounded just fine, but rather in its unusual—and ideal—combination of ultrasimple operation with remarkable versatility and overall performance that truly rates the "state of the art" sobriquet. These qualities easily justify a price that, while a little high as CD players go, is not excessive for what it buys.

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### FEATURES

- Sixteen-times-oversampling digital filter (705.6 kHz)
- Four D/A converters (two per channel)
- Digital servo circuitry
- Programmable to play up to twenty-four tracks in any order
- Delete function to exclude unwanted tracks from playback
- Random play in continuous or single mode (pauses between tracks)
- Auto Edit, Manual Edit, and Disc Change Edit for dubbing to cassettes
- Intro Scan
- Digital fade function
- Direct cueing by track, index, or time within track
- Repeat function for entire disc, programmed sequence, or user-defined segment
- Button to invert output polarity
- Hinged panel hides less-used controls
- Display of unplayed tracks (up to twenty), current track and index number, time (elapsed or remaining on track or disc), operating status
- Three-stage display dimmer
- Analog outputs and coaxial and optical digital outputs
- Wireless remote control (duplicates all front-panel controls except headphone volume and power switch)

### LABORATORY MEASUREMENTS

**Maximum output level:** 2.51 volts  
**Total harmonic distortion at 1,000 Hz:** 0.002% from 0 to -90 dB  
**Signal-to-noise ratio (A-weighted):** 99.5 dB  
**Channel separation:** 113 dB at 300 Hz, 122 dB at 1,000 Hz, 102 dB at 20,000 Hz  
**Maximum phase shift (from 5,000 to 20,000 Hz):** -0.5 degree at 20,000 Hz

**Frequency response:** +0, -0.5 dB from 20 to 20,000 Hz  
**Low-level linearity error:** 0 dB at -80 dB, +2 dB at -90 dB  
**Cueing time:** 2.4 seconds  
**Cueing accuracy:** A  
**Impact resistance:** top and sides, A  
**Defect tracking:** tracked maximum-level defects on Philips TS5A test disc; tracked 500-micrometer level on Pierre Verany #2 test disc





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JOCK LEUNG

## JVC XP-A1000 DIGITAL SURROUND PROCESSOR

*Julian Hirsch, Hirsch-Houck Laboratories*

ONE of the fundamental reasons that music reproduced in the home does not sound like the original performance is the difference between the recording and playback acoustic environments. Inevitably, the listening room imposes its own absorption and reflection properties on the recorded ambience of the concert hall or recording studio, destroying the illusion of "being there" that we all strive for in home hi-fi listening. No matter how good the playback equipment and speakers are, no one can believe that he is hearing a "live" performance.

Until the availability of digital large-scale integrated circuits (LSI's), little could be done to solve this problem—early time-delay accessories helped but left much to be desired. A few years ago the Yamaha DSP-1 demonstrated the poten-

tial of digital signal processing in a consumer product, and subsequent advances in technology have further improved the art. Basically, this type of digital signal processor contains analog-to-digital (A/D) conversion circuits along with LSI's that create a number of time-delayed signals from the original program to simulate the early reflections and the subsequent reverberation that create the sense of a surrounding space (ambience) in a concert hall or other performance locale. The frequency content of the delayed signals is then modified to correspond to real-world listening conditions (there is normally a considerable attenuation of high frequencies, for example), and the signals are returned to analog form by digital-to-analog (D/A) converters, amplified, and delivered to the speakers.

Additional speakers and ampli-

fiers are always required for this type of signal processing. As a minimum, you need speakers located toward the rear of the listening room to carry the delayed signals. Sometimes additional delay-channel speakers are placed along the sides of the room or in the front (in some systems, delayed signals are mixed with the main signal and heard through the front speakers).

Properly executed, with enough simulated first reflections and the proper reverberation characteristics, digital ambience enhancement can bring the home listener closer to the concert-hall experience than anything short of actually being there. You may not *really* believe that you are in the specific hall (or club, or arena) being simulated, but the total effect is much more realistic than any conventional hi-fi listening experience.

The JVC XP-A1000 is a new digital audio processor embodying a number of innovative designs and techniques. It processes the left and right channels separately. An A/D converter follows the analog input, and its digital output (or a signal coming directly from the coaxial or



# "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."

Julian Hirsch—Stereo Review, Sept. '88

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 far less than previous all-out designs.



Henry Kloss, creator of the dominant speaker models of the '50s (Acoustic Research), '60s (KLH), and '70s (Advent), brings you Ensemble, a genuinely new kind of speaker system for the '90s, available factory direct from Cambridge SoundWorks.

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No matter how well a speaker performs, at home the listening room takes over. If you put a conventional speaker where the room can help the low bass, it may hinder the upper ranges, or vice-versa.

## What Henry Kloss tells his friends:

Every time I came out with a new speaker at AR, KLH, or Advent, my friends would ask me, "Henry, is it worth the extra money for me to trade up?" And every time I would answer, "No, what you've already got is still good enough."

But today, with the introduction of Ensemble, I tell them, "Perhaps now is the time to give your old speakers to the children."

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 speakers dominate your living space, yet Ensemble reproduces the deep bass that *no* mini speakers can.

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*Unlike satellite systems which use a single large subwoofer, Ensemble features separate compact bass units for each stereo channel. They fit more gracefully into your living environment, and help minimize the effects of the listening room's standing waves.*

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...

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optical digital outputs of a CD or DAT player) goes to three LSI chips. Two of the chips generate the front and rear first-reflection signals, and the third generates the reverberation signals, which are combined with the other two. The combination of first reflections and reverberation is reconverted to analog form and supplied to external amplifiers and speakers. A single volume control simultaneously adjusts the levels of all the outputs.

The XP-A1000 can be used as part of a four- or six-channel system. In either mode, the rear speakers carry the rear-channel processed signals. In the four-channel mode, the main speakers carry a mixture of the original program and the front-channel processed signals. In a six-channel system, the main speakers receive only the unmodified input program, and a second pair of front speakers (with their own amplifiers) carries the front processed signals. The XP-A1000 can be connected between the preamplifier and the main power amplifier or in a tape-monitor loop of the preamplifier (it provides a loop to replace the one it occupies).

Much of the unique character of the JVC XP-A1000 comes from the way its specific operating parameters were derived. JVC engineers concluded that previous methods of measuring the reflections in a hall, usually with a four-microphone array, had insufficient resolution to differentiate between one reflection path (hence direction) and another with the same arrival time at the point of measurement. They determined that an array of six microphones, spaced about 6 inches from each other, could uniquely establish the source position (distance and direction) of each sound reaching the measurement point. A number of musical performance sites were analyzed with this system, at locations near the front and the rear of the listening area. An impulse from a starter's pistol fired on the stage was picked up by the measurement array and ultimately analyzed by a computer to plot the sources and relative levels of all significant reflections from hall boundaries.

The data from twenty different environments are stored on a ROM

(read-only memory) chip in the XP-A1000, and they can be recalled at the touch of a button. The available locations include six concert halls, a recital hall, an opera house, a Gothic cathedral, a church, jazz clubs, a disco, an open-air pavilion, a stadium, a gymnasium, and five different-size movie theaters.

For each of the simulated locations, the room size, liveness, high-frequency cutoff, reverberation level, and high-frequency reverberation level are separately adjustable. When a given location is first selected, each parameter is set to a standard value, but it can be adjusted to suit the listener's taste. Additional parameters include the rear delay time, the listening room's reverberation level, and the listening room's size. There is also a choice of the apparent source size ("spread" or "point") for more realistic reproduction of such diverse sources as a symphony orchestra or a vocal soloist. After modification, the parameters for all locations can be stored in a nonvolatile memory.

Except for the large, motor-driven volume knob, all of the XP-A1000's controls are pushbuttons, most of them concealed behind a hinged door extending across the front panel. Indicator lights show the sampling frequency of the input A/D converter, which is selected automatically by the input signal (48 kHz for analog inputs and DAT sources, 44 kHz for CD or DAT sources, and 32 kHz for DAT or 8mm sources using that frequency). A display window shows the name and a description of the selected acoustic environment, and when a control button is pressed, its corresponding setting appears in the window to aid adjustment.

The XP-A1000 comes with a wireless remote control that duplicates virtually every front-panel control, including volume, and has a few additional ones. It is essential for adjusting the unit, since the user should be located in the expected listening location.

The JVC XP-A1000 measures 18¾ inches wide, 14¼ inches deep, and 4 inches high, and it weighs 15 pounds. Price: \$1,200. JVC, Dept. SR, 41 Slater Dr., Elmwood Park, NJ 07407.

### *Lab Tests*

Most conventional electrical measurements on a signal-processing unit such as the XP-A1000 are of little value as indicators of its performance. The problem is exacerbated by the fact that the measurements are affected (often severely) by the parameters of the selected acoustic environment.

We can say, however, that the unprocessed (main) channels had unity gain and clipped at about 6.5 volts output. The front- and rear-channel processed outputs clipped at about 0.75 volt in one measurement, but that figure is strongly affected by the many possible adjustments of the XP-A1000. The main output's distortion was less than 0.003 percent at 1 volt, and the processed front- or rear-channel distortion was about 0.03 to 0.05 percent (at 0.5 volt). The A-weighted noise level in the front channels was an impressive -114 dB referred to 0.5 volt.

Obviously, the electronic circuits worked well. But how to judge—other than subjectively—its sound characteristics? The answer was at hand in the form of the IQS FFT analyzer we use for loudspeaker measurements. As part of its operation, this instrument emits brief electrical impulses similar to those JVC engineers generated with pistol shots during the calibration of the digital audio processor. The signal return from these impulses (acoustic in the case of a speaker test, electrical in the present instance) appears on the computer monitor as a series of pulses along a time scale that, depending on the control settings, may span a few milliseconds or many seconds.

Using the test with several of the XP-A1000's programmed environments revealed some of the sophistication behind this product. In their amplitude and timing, the synthesized reflections were basically what one would expect from a given simulated environment and had little resemblance to the output of some of the analog time-delay ambience synthesizers of a decade ago. For example, the simulation of a hard-floored gymnasium had its major reflection at 55 milliseconds,



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## TEST REPORTS

with several smaller ones between 30 and 120 ms (at the speed of sound, 1 ms equals about 1 foot). After the first reflections disappeared, the low-level reverberation remained, at a low but visible level, for a few seconds.

The Gothic cathedral was even more dramatic. The first, and largest, early reflection was at 100 ms, followed by a long series of gradually decaying reflections that came at ever-decreasing time intervals until about 1 second had passed. From that point, the reverberation remained at an almost constant (but rather low) level for a full 20 seconds, which was the limit of our measurement ability. These signals seemed consistent with the dimensions and acoustic properties of a large cathedral. In this case the front and rear outputs of the XP-A1000 were nearly the same, as might be expected for a cathedral, where the direct-arrival sound would probably be insignificant compared with the large number of reflections.

One of the concert-hall settings had its first, and largest, front reflection at 40 ms and about six weaker ones at intervals of 10 to 20 ms before fading into the reverberant background. Its rear reflections began at 80 ms, with several smaller ones at intervals from 10 to 40 ms. Obviously, although we did not make the same measurement with all the programmed environments, they differ substantially from each other, and are usually different from front to rear, as they would be expected to be in the real world.

### Comments

The JVC XP-A1000 is an incredibly complex instrument, and you cannot expect to get the most satisfactory results from it without substantial study and practice. The number of possible adjustments it offers (and sometimes requires) is enormous—a rough calculation shows the availability of some 14 billion different combinations of control settings! Fortunately, most of the adjustment steps are so small that the effects are not likely to be audible to ordinary mortals (they weren't to me, at any rate). The best approach is to start with the programmed values and make changes

one at a time only as necessary for the desired effect.

I found that it was usually desirable to increase the levels in the processed channels to produce a believable effect in my listening room. I did all my listening in the six-speaker mode, with the two front ambience speakers on the wall behind the main speakers and the rear speakers at the junctions of the ceiling and the side walls near the rear of the 15 x 20-foot room. All four ambience speakers were small, inexpensive units, but they proved completely adequate for their purpose.

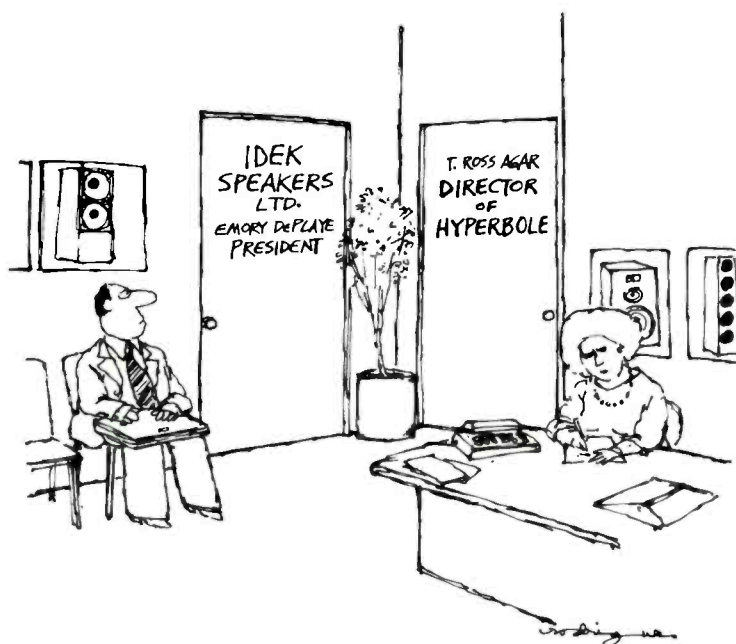
Once I had spent the required time studying the manual (which was not always as helpful as I would have wished, although it contains most of the necessary information), followed by a period of hands-on practice, the previously "impossible mission" of setting up the operating parameters became straightforward. The eventual result was thoroughly satisfying, although I found many of the sonic differences to be so subtle as to be insignificant. The problem of evaluating the effects was slightly compounded by the muting of the audio output whenever any of the control buttons was pressed; it later unmuted smoothly over a period of a second or two. Thus, the effect of a parameter change was not immedi-

ately audible but came in gradually.

Since a side-by-side comparison with another digital sound processor is impractical given the complexity of these devices, I cannot say for certain how the JVC XP-A1000 compares with any similar product, but it was undoubtedly among the best of its kind that we have used and evaluated. Incidentally, unlike some other digital processors, its movie modes are *not* designed to decode the directional properties of Dolby Surround soundtracks but merely to provide the ambience of a movie theater for any type of audio program.

While the JVC XP-A1000 still did not convince me that I was in a concert hall or a cathedral, when I closed my eyes and listened to music with appropriate parameter settings, it provided the closest approach to "the real thing" that I have yet experienced in my home. The ambience had the room-filling quality of live sound. Especially impressive was the way a speaking voice could be heard in any sort of environment with complete clarity and not a trace of the unnatural echo that plagued the early time-delay units. Warning: This component is addictive once you get the hang of using it.

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### ADVENT PRODIGY TOWER SPEAKER SYSTEM

*Julian Hirsch, Hirsch-Houck Laboratories*

**T**HE Advent Prodigy Tower, a compact, floor-standing two-way speaker system, measures 28½ inches tall, 10½ inches wide, and 8⅞ inches deep and weighs 25¼ pounds. Although its proportions probably justify the "Tower" name, it could be described more accurately as a minitower, for it will not dominate even the smallest room.

The cabinet, which appears to be made of ½-inch-thick fiberboard, is painted flat black on four sides. The top is covered by a solid piece of oiled pecan wood, and there's a matching trim plate on the bottom of the front panel. With the black grille cloth in place, the speaker presents an all-black exterior except

for the accents of light-colored wood. The spring-loaded input connectors, recessed into the rear of the speaker, accept the stripped ends of speaker wires.

The 8-inch, long-excursion woofer, which operates in a sealed enclosure, is located in the middle of the front panel, with the driver's center about 16 inches from the floor. At 3,000 Hz there is a crossover to a ¾-inch, soft-dome tweeter (cooled and damped by ferrofluid) located near the top of the panel. The nominal system impedance is 6 ohms, with a minimum of 4 ohms. The rated sensitivity is 89 dB sound-pressure level (SPL) at 1 meter with a 2.8-volt input, and the speaker is recommended for use with ampli-

fiers capable of delivering up to 75 watts continuous or 300 watts peak.

Advent gives the frequency response of the Prodigy Tower as 45 to 23,000 Hz ± 3 dB, with a useful lower limit of 37 Hz (where its output is -8 dB). The tweeter's output variation (dispersion) over a 30-degree angle, either vertical or horizontal, is rated as ± 1 dB. The system's harmonic distortion with a 1-watt input level is rated as less than 0.8 percent above 80 Hz. Price: \$350 a pair. Advent, Dept. SR, 4138 N. United Parkway, Schiller Park, IL 60176.

#### *Lab Tests*

Advent encourages experimentation in the placement of these speakers, although the Prodigy Towers are designed to be placed on the floor about 1 to 6 inches from the wall. According to the instruction sheet, this placement puts the system close to the ear level of a seated listener, for optimum mid-range and treble response, and also provides the flattest low-frequency response.

Since a tweeter only 24 inches from the floor would be at ear level only for listeners sitting on the floor (not our preferred location), we first installed the speakers on 7-inch stands a few inches from the wall. Later we placed them directly on the floor about 18 inches from the wall. The audible differences were quite minor, and we concluded that the speakers are relatively insensitive to placement.

The averaged room response of the left and right speakers was strikingly free from large peaks or dips. In fact, the raw (unsmoothed) room curve was flat within ± 5 dB from 50 to 20,000 Hz, which is quite unusual in our experience. The close-miked woofer response had a broad maximum at 80 Hz, falling at 12 dB per octave below 60 Hz and gradually sloping off by about 6 dB per octave from 80 to 2,000 Hz. The woofer response cut off sharply above 2,000 Hz, but the absence of a significant response hole in the crossover region suggests that the effective crossover frequency may be nearer to 2,000 than to 3,000 Hz.

When the woofer curve was

## TEST REPORTS

spliced to the room curve, the composite frequency response (relative to the 1,000-Hz level) was +4, -1 dB from 140 to 16,000 Hz. From 43 to 20,000 Hz the variation was +6, -1 dB. The minimum system impedance was 4.2 ohms in the 100- to 200-Hz range and at 20 Hz. The bass resonance was at the rated frequency of 60 Hz, where the impedance reached its maximum of 20 ohms, and there was a broad impedance peak to 17 ohms at 2,000 Hz (additional evidence that this was the true crossover frequency).

The measured sensitivity was 90 dB, slightly higher than the rated 89 dB. When we drove the speaker with 2.83 volts (equivalent to a 90-dB SPL), the woofer distortion was under 0.8 percent from 100 to 60 Hz, easily surpassing the manufacturer's bass-distortion rating. The distortion climbed gradually at lower frequencies, but only to 4.3 percent at 40 Hz, and below that the output was less than our measurement threshold. We also measured the distortion from 20 to 2,000 Hz using our highly sensitive Audio Precision test system. Up to 100 Hz the readings matched those of our point-by-point measurement, although we were also able to make a measurement at 20 Hz, where the distortion reading was only 5 percent. After reaching a maximum of 0.9 percent at 200 Hz, the distortion decreased steadily to 0.3 percent at 2,000 Hz.

Our quasi-anechoic FFT measurements of the Prodigy Tower generally confirmed the characteristics revealed in our other tests. A crossover dip appeared between 2,000 and 3,000 Hz, putting the actual crossover frequency somewhat in doubt again, although this figure is of little importance to a user. These tests revealed the excellent dispersion of the system's tweeter: The maximum level change between the on-axis and 45-degree off-axis responses was about 5 dB over the tweeter range up to about 13,000 Hz. Since we operate in a "live" room environment, more precise measurements are difficult to make. In any case, the dispersion of the Advent Prodigy Tower's tweeter was better than that of most other speakers we have tested.

The Advent system also had excellent phase linearity in its tweeter range, yielding a group-delay variation of about 0.1 millisecond overall from about 4,000 to 20,000 Hz. Pulse power tests indicated an excellent power-handling ability. The woofer began to rattle with a 100-Hz input of 1,150 watts into its 4.8-ohm impedance. At 1,000 and 10,000 Hz, our amplifier clipped before the speaker output distorted, with an input of about 675 watts into respective impedances of 9.8 and 5.8 ohms.

### Comments

Judging from their measured performance, the Advent Prodigy Tower speakers are among the better systems available in their modest price range. Happily, they sounded every bit as good as they measured. From the start, their sound was smooth and uncolored, with no noticeable emphasis or deficiency in any portion of the audible spectrum. Further listening revealed that their bass reproduction was more extended and cleaner than in many, if not most, speakers we have heard that are comparable in size or price.

It is difficult to describe or evaluate the sound of speakers heard in isolation; this is best done in careful comparisons with the sound of more familiar models. In this case, we were fortunate in having available a pair of speakers that are not

too different in size from the Advents but sell for several times their price. The comparison system sounded superb, with an exceptionally open sound stage. We could not have expected the Prodigy Tower to equal or surpass this "reference" system (not our regular reference, incidentally), but we were surprised to discover what a minute difference there was between the two. Above the mid-bass, the two sounded (and measured) almost identical in their octave-to-octave balance. The Advent was clearly superior in the low bass. The only respect in which the reference system clearly outperformed the Advent System (and only by a moderate amount) was in the breadth, height, and depth of its reproduced sound stage.

Considering the great price difference between these two speakers, and the subtlety of the sonic differences between them, the Advent Prodigy Tower is obviously an outstanding value. You won't find many \$350-a-pair speaker systems with its combination of compact size, smoothness, wide dispersion, extended bass and treble response, high efficiency, high power-handling ability, and low bass distortion. Although calling a speaker of its size and proportions a "tower" might be considered hyperbole, the "prodigy" part of its name is not hard to justify.

**Circle 142 on reader service card**



*"Gee, Tom, you do it manually, by ear? I thought speaker crossovers were all done electronically."*



# The Ford JBL Audio System for Taurus

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# ACCULINEAR 18-BIT TEC

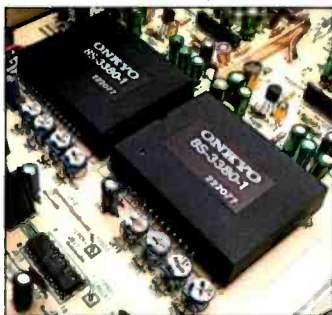


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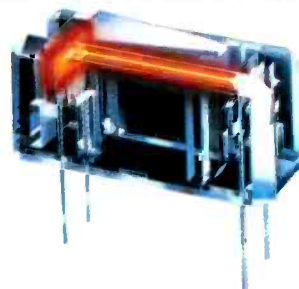
Onkyo's linear 18-bit technology, on the other hand, assures you that all the musical information gets processed. So you don't lose anything. Even the subtle clues that tell you about the space the music was recorded in. And how well the engineer chose the microphones.



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JOON LEUNG

## HITACHI DA-C70 COMPACT DISC CHANGER

*Julian Hirsch, Hirsch-Houck Laboratories*

**A**LTHOUGH a CD can contain over 70 minutes of music, there are times when that is not enough, and a changer is just the answer. Loading magazines that hold as few as five and as many as twelve CD's have been available for some time, yet those that hold six discs appear to be today's *de facto* standard. Hitachi has devised a logical extension of the six-disc system with its DA-C70, which holds two magazines and can play up to twelve discs in any sequence.

Most of the front-panel controls of the DA-C70 are perfectly conventional and will be familiar to anyone who has used another CD player. In addition to the large, flat transport controls, which include fast-search and track-skipping functions, there is a matrix of buttons that provides direct access to any numbered track (up to No. 99). The repeat function is usable in all the normal operating modes of the player, including programmed and random play, but no repeat of a user-defined segment is available. The slightly cryptic S&P

control identification, for "scan and play," refers to an intro-scan function that plays the first 10 seconds of every track.

The programming capabilities of the Hitachi DA-C70 are impressive. It can be set to play any tracks from any disc (or the entire disc) in either magazine in any desired sequence. The maximum program length is thirty-two steps, although playing a disc straight through involves only one step. The CHECK and CLEAR buttons verify a programmed sequence or clear it from the player's memory. The player can be programmed before the magazines are loaded, for ease in checking the contents of the discs.

The display window shows the playing mode, operating status (stop, pause, play), elapsed or remaining time, the current magazine, disc, and track number, and the number of unplayed discs remaining in both magazines (if both are loaded). The front panel contains a headphone jack with a small knob that adjusts its level independently of the main output level.

The DA-C70 also has a built-in clock display, like the one found on most VCR's, that normally appears only when the power is switched off. Unlike those CD players that can be controlled by an external timer, this one is designed to be switched on and off automatically at predetermined times by its own timer.

The furnished wireless remote control duplicates every front-panel control except the magazine-eject buttons. Optional wood side panels are supplied. The Hitachi DA-C70 is a compact machine, measuring 14½ inches wide (15¾ inches with the side panels installed), 12¾ inches deep, and 5 inches high. It weighs 12½ pounds (14¼ pounds with the side panels). Price: \$449. Hitachi, Dept. SR, 401 W. Artesia Blvd., Compton, CA 90220.

### *Lab Tests*

The Hitachi DA-C70 delivered a maximum output of 1.74 volts into a standard EIA load from a 0-dB test signal, slightly lower than the 2.0-volt standard. The channel levels were matched within 0.05 dB, and the output-level adjustment had the specified range of 50 dB.

No mention is made in the instruction manual or specifications of any circuit details, but the player's front panel contains the inscription Oversampling Digital Filter. The square-wave response,





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# TEST REPORTS

however, lacked the characteristic symmetry of a digital filter and was more consistent with the ringing of an analog low-pass filter used to remove the sampling frequency and other ultrasonic components from the output. The interchannel phase shift, which reached 40 degrees at 20,000 Hz, suggests the use of a double-oversampling digital-to-analog (D/A) converter multiplexed between channels.

The frequency response varied less than  $\pm 0.2$  dB from 8 to 10,000 Hz but rose to +1 dB at 20,000 Hz. Channel separation was 102 dB at 100 Hz and 98 dB at 1,000 Hz, narrowing to about 79 dB at 20,000 Hz. The total harmonic distortion (THD) plus noise at 1,000 Hz was 0.008 percent at levels from 0 to -70 dB. At a 0-dB (maximum) level, the THD plus noise was less than 0.01 percent from 20 to 12,000 Hz, rising to about 3 percent at 20,000 Hz (apparently because of image-frequency components falling in the upper end of the audio range).

The D/A converter's nonlinearity was undetectable at levels from 0 to -70 Hz. At -80 dB the error was

+1.8 dB, and at -90 dB it was +0.5 dB. Wide-band spectrum analysis of the noise in the player's output showed readings from -120 dB at 30 Hz to -100 dB at 20,000 Hz. Power-line hum and its harmonics were extremely low, barely detectable in the noise spectrum, and never exceeded a -110-dB level. The wide-band noise (A-weighted) was -92.5 dB referred to a 0-dB signal level, and the quantization noise (measured with the D/A converters operating on a 20-Hz signal) was -84 dB.

Dynamic range, measured according to the EIAJ standard, was 90 dB. The frequency error of the player's quartz-crystal clock was +0.0003 percent, and wow-and-flutter were 0.00027 percent (approximately the residual of our Audio Precision System One test equipment).

The various features of the DA-C70, including its programming modes, worked exactly as specified. In defect-tracking tests, its error-correction system successfully coped with the maximum-level errors on the Philips TS5A test disc.

The more demanding Pierre Verany #2 test disc revealed that the player mistracked with data interruptions 1,250 micrometers long and with two closely spaced 1,000- $\mu$ m interruptions. It played flawlessly through discrete interruptions of 770 and 500  $\mu$ m.

The slew time of the tracking system was about average, requiring 2.8 seconds to shift from Track 1 to Track 15 of the Philips TS4 test disc. Typical track-change times when a disc change was also involved were 10 to 11 seconds. The cueing to tracks with no silent interval between them was excellent. The player's impact resistance was fair, mistracking with side impacts from a fist or moderate finger tapping on the top of the cabinet.

## Comments

The Hitachi DA-C70 is obviously a lot of CD player for the money, but this result was not achieved by magic: Some design and performance features were sacrificed in order to include others. For example, the circuit design of the DA-C70 seems to be fairly basic, without such exotic touches as high-order oversampling or multiple D/A converters, separate power supplies for analog and digital circuits, and the like. If those features are important to you, look elsewhere.

But if you want a CD changer that measures and sounds good, and that will give more than 12 hours of uninterrupted music at a price just above that of the least expensive home players, you need look no further. Everything in the DA-C70 works straightforwardly (although you had better read the manual if you want to make most effective use of its capabilities), and it was surprisingly free of annoying idiosyncrasies for a player with such a host of features. The only mechanical sounds emerging from it were the inevitable "clunking" noises during disc changes. And if you want automatic, timer-controlled operation, its internal electronic timer beats any external timer we have seen. Overall, the DA-C70 is a well-designed and well-manufactured component that it would be hard not to like.

Circle 143 on reader service card

## FEATURES

- Can accept two standard six-disc magazines for uninterrupted playback of up to twelve discs
- Direct keypad access to any track (up to No. 99) on any disc
- Programmable by disc and track for playback in any sequence (up to thirty-two steps)
- Repeat by disc or magazine
- Random playback of disc or magazine
- Programmable with magazines removed
- Scan-and-play mode to audition first 10 seconds of each track
- Built-in electronic clock and timer for unattended playback start/stop
- Display of elapsed time or remaining time on track or disc
- Electronic adjustment of output level over 50-dB range
- Front-panel headphone jack with independent volume control
- Furnished with optional wood side panels
- Furnished wireless remote control has all front-panel functions except magazine eject

## LABORATORY MEASUREMENTS

**Maximum output level:** 1.74 volts  
**Total harmonic distortion at 1,000 Hz:** 0.008% from 0 to -70 dB  
**Signal-to-noise ratio (A-weighted):** 92.5 dB  
**Channel separation:** 102 dB at 100 Hz, 98 dB at 1,000 Hz, 79 dB at 20,000 Hz  
**Maximum phase shift (from 5,000 to 20,000 Hz):** 40 degrees at 20,000 Hz

**Frequency response:** +1, -0.1 dB, 8 to 20,000 Hz  
**Low-level linearity error:** +1.8 dB at -80 dB, +0.5 dB at -90 dB  
**Cueing time:** 2.8 seconds on same disc, 10 to 11 seconds with disc change  
**Cueing accuracy:** A  
**Impact resistance:** top, C; side, B  
**Defect tracking:** tracked 770-micrometer defects on Pierre Verany #2 test disc



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 Code Protection  Optional Shuttle.

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## GRUNDIG FINE ARTS A-903 INTEGRATED AMPLIFIER

*Julian Hirsch, Hirsch-Houck Laboratories*

**F**INE ARTS high-fidelity products manufactured by Grundig, a long-established West German manufacturer, have recently been introduced into this country. The Fine Arts A-903 is an integrated amplifier rated for 100 watts per channel into 8-ohm loads. It has a protection system that safeguards it against short-circuits, overloads, DC components in the outputs, and excessive heat.

The A-903 is a solidly built amplifier whose principal front-panel controls are a large volume knob and a number of flush-mounted, flat pushbuttons to select the program source. Other buttons connect one or both pairs of speaker outputs, bypass the tone controls, and activate the loudness-compensation circuit. Small amber lights above or next to the buttons indicate when they are active, and the volume knob carries a light that serves as an index marker. The power switch has a red pilot light above it. There is a headphone jack and four gold-plated phono jacks for the inputs and outputs of a tape deck (duplicated on the rear).

A section of the panel below the

input selectors hinges down to reveal four small knobs and a pushbutton. The knobs for the bass and treble tone controls and the balance control are center-detented. The remaining knob, marked LEVEL, operates a six-position switch to adjust the overall amplifier gain from +6 to -9 dB (relative to the normal "zero" setting) in 3-dB steps. Its principal function is to adjust the degree of loudness compensation at a preferred listening level. The pushbutton parallels the signal channels for mono inputs.

The rear apron of the A-903 contains two pairs of insulated speaker connectors, which accept stripped wire ends but not banana plugs or similar connectors, and phono, CD, tuner, video/TV, and tape-monitor input jacks. The monitor input is used with a three-head tape deck in order to monitor the recording from the tape. There are two sets of regular tape input/output jacks, one of them wired in parallel with the front-panel jacks. A small screwdriver adjustment varies the phono-input sensitivity.

The Fine Arts A-903 measures 18¾ inches wide, including its re-

movable decorative end plates, 13 inches deep, and 4½ inches high. It weighs 24 pounds. Price: \$899. Grundig, Dept. SR, 3520 Haven Ave., Unit L, Redwood City, CA 94063.

### *Lab Tests*

Although the top of the A-903 became quite warm during its hour of preconditioning at one-third rated power and subsequent high-power testing, it was never too hot to touch. The output power at clipping into 8-ohm loads was 122 watts per channel, increasing to 170 watts with 4-ohm loads. The protection circuit shut off the amplifier when it was driving 2 ohms at an output of 175 watts, although the waveform had not yet clipped visibly. During our slew-factor measurement, the amplifier shut down at 50 kHz, corresponding to a slew factor of 2.5. Dynamic power readings were respectively 150, 242, and 196 watts into 8, 4, and 2 ohms.

The total harmonic distortion (THD) plus noise at 1,000 Hz into 8 ohms decreased from 0.085 percent at 1 watt to a minimum of 0.01 percent at 100 watts. Into 4 ohms, the distortion ranged from 0.1 percent at 1 watt to a minimum of 0.021 percent at 40 watts and 0.035 percent at 140 watts. The 2-ohm distortion readings were roughly similar, reaching their minimum of 0.011 percent at 100 watts. Driving 8 ohms, the amplifier's distortion was

## TEST REPORTS

relatively constant with frequency and power, with typical readings of 0.01 percent or so, a minimum of 0.005 percent at 1,000 Hz and 50 watts, and a maximum of 0.0148 percent at 20,000 Hz and 10 watts.

The input sensitivity (through the CD input) for a 1-watt output was 108 millivolts (mV), with an A-weighted noise level of  $-89.5$  dB referred to 1 watt. Using the factory setting of the phono-input sensitivity control, 0.25 mV was required for a 1-watt output, and the noise level was  $-69$  dB. The phono input overloaded at 71 to 76 mV through the middle- and high-frequency range and at 110 mV at 20 Hz. The sensitivity adjustment had a considerable range, from 0.94 to 0.062 mV, with corresponding overload limits (at 1,000 Hz) of 500 and 19 mV. The phono-input termination measured 49,000 ohms in parallel with 100 picofarads.

The tone-control characteristics were conventional, with a maxi-

mum range of about  $\pm 15$  dB at the frequency extremes. The range from 500 to 1,500 Hz was unaffected by the controls. The frequency response (CD input) with the tone controls centered was slightly different between channels but varied only about 1 dB overall. With the defeat (bypass) switch engaged, the amplifier's response was an impressive  $\pm 0.03$  dB from 20 to 20,000 Hz.

The loudness compensation boosted both lows and highs, by as much as 15 and 5 dB, respectively, as the volume was lowered. The LEVEL switch, as rated, shifted the amplifier gain in 3-dB steps from  $+6$  to  $-9$  dB. The RIAA phono-equalization error was  $+0.2$ ,  $-0.7$  dB from 35 to 20,000 Hz and  $-3.5$  dB at 20 Hz.

### Comments

The Fine Arts A-903 had the look, feel, and sound of a fine audio product. For the most part, it appeared to be a perfectly conventional inte-

grated amplifier with obvious control functions that could be understood without reference to the instruction manual. The manual, incidentally, was both clear and comprehensive.

The input selectors operated quietly, positively, and with little pressure. They were free of audible switching transients. The phono-level adjustment in the rear, intended for matching the phono volume to that of other sources such as a CD player or tuner, also permits optimizing the amplifier's noise and overload margin for any moving-magnet cartridge, regardless of its output. The volume control, which operated with a silky smoothness, had a tapered characteristic that simplified precise, noncritical volume adjustment. The only change, though a minor one, that we would like to see would be in the speaker-output terminals. Binding posts on  $\frac{3}{4}$ -inch centers, able to accept single or dual banana plugs, would be a welcome convenience.

The A-903's protection system was exceptionally effective. Apparently with little or no conventional current limiting, it cuts off the outputs by a relay before the transistors can be damaged by an overload, and they recover automatically a second or two after the overload is removed. We must admit to a few worried minutes when the amplifier shut off entirely (including all front-panel lighting) during 2-ohm high-power testing. But about 45 minutes later, after the power transformer cooled down, it returned to life none the worse for its experience.

Removing the top cover of the A-903 should dispel any lingering doubts about its credentials. The mechanical assembly, the neatly cabled and dressed wiring, and the generally professional appearance were completely consistent with its image and performance. Noting the statement on the rear of the amplifier that it was built for Grundig in Portugal, we began to wonder how many other high-quality electronic products come from Portugal. Is this small country about to become the Korea of Europe? The Grundig Fine Arts A-903 is a fine piece of work in any case.

**Circle 144 on reader service card**

### FEATURES

- Protection against shorts and overloads by output relays
- Protection against overheating by thermal switch in power transformer
- Pushbutton input selection for phono, CD, tuner, video/TV, two tape decks
- Duplicate set of Tape 2 input and output jacks on front panel
- Monitor switch for three-head tape deck
- Bass and treble tone controls with defeat switch
- Switchable loudness compensation
- Two sets of speaker outputs, individually switched
- Six-position level switch for optimizing amplifier gain
- Rear-apron phono-gain adjustment
- Mono switch
- Front-panel headphone jack

### LABORATORY MEASUREMENTS

**Output power at clipping** (1,000 Hz): 122 watts into 8 ohms, 170 watts into 4 ohms, 175 watts into 2 ohms

**Clipping headroom** (relative to rated output): 0.86 dB at 8 ohms

**Dynamic power output:** 150 watts into 8 ohms, 242 watts into 4 ohms, 196 watts into 2 ohms

**Dynamic headroom:** 1.76 dB at 8 ohms

**Harmonic distortion** (THD + noise at 1,000 Hz into 8 ohms): 1 watt, 0.085%; 10 watts, 0.028%; 100 watts, 0.01%

**Maximum distortion** (20 to 20,000 Hz into 8 ohms): 0.0148% at 10 watts (20,000 Hz)

**Sensitivity** (for a 1-watt output into 8 ohms): CD, 108 mV; phono, 0.25 mV at center

setting (adjustable from 0.062 to 0.94 mV)

**Phono-input overload:** 71 to 110 mV at center setting (adjustable from 19 to 500 mV)

**A-weighted noise** (referred to a 1-watt output): CD,  $-89.5$  dB; phono,  $-69$  dB (at center gain setting)

**Phono-input impedance:** 49,000 ohms in parallel with 100 pF

**RIAA equalization error:**  $+0.2$ ,  $-0.7$  dB from 35 to 20,000 Hz

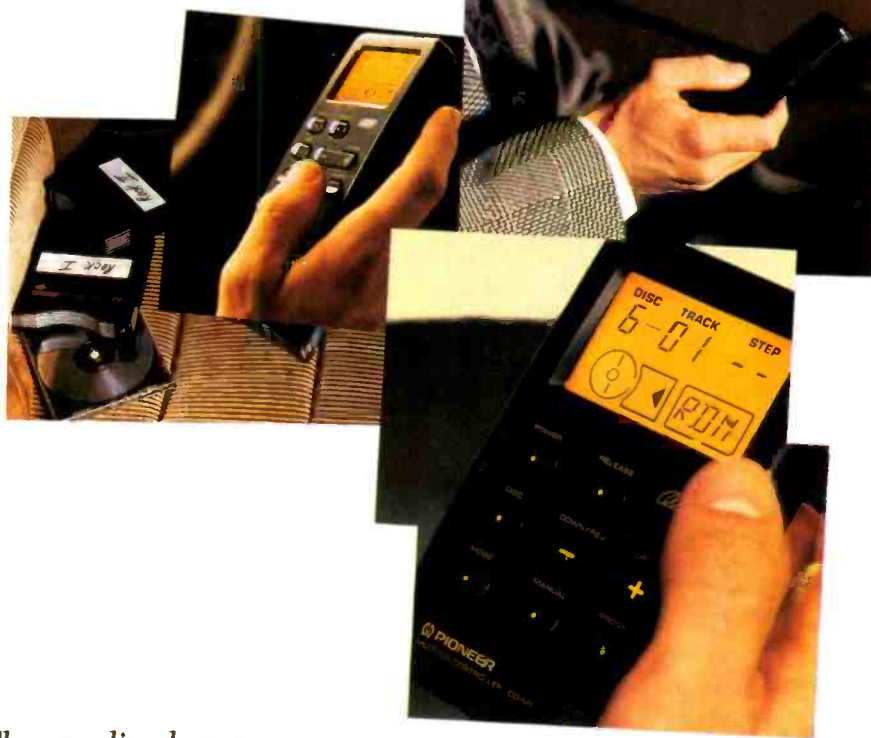
**Tone-control range:**  $\pm 11.5$  dB at 100 Hz,  $\pm 11.5$  dB at 10,000 Hz

**Frequency response:**  $\pm 0.5$  dB from 20 to 20,000 Hz with tone controls centered,  $\pm 0.03$  dB from 20 to 20,000 Hz with tone controls defeated



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### MORDAUNT-SHORT MS35Ti SPEAKER SYSTEM

*Julian Hirsch, Hirsch-Houck Laboratories*

**W**ELL known in its own country, the British loudspeaker manufacturer Mordaunt-Short is perhaps less of a household word among American audio enthusiasts. In its more than twenty years of existence, the company has earned a reputation for quality and value in the British audio market, but it has had only sporadic distribution in this country. Recently, however, Mordaunt-Short USA was formed, and a network of U.S. dealers has been chosen with the goal of

establishing the Mordaunt-Short brand name in the American audio world.

The MS35Ti Series 2, a compact two-way bookshelf system, is typical of the Mordaunt-Short design approach. Its 7½-inch woofer operates in a reflex enclosure constructed of braced fiberboard. The woofer cone, formed of paper, has a rubber surround, long-throw suspension, and high-temperature voice coil. The crossover to a ¾-inch titanium-dome tweeter is specified as 4,000 Hz, with 12-dB-per-octave

slopes. The tweeter's fundamental dome "break-up" resonance is said to be at 23,000 Hz.

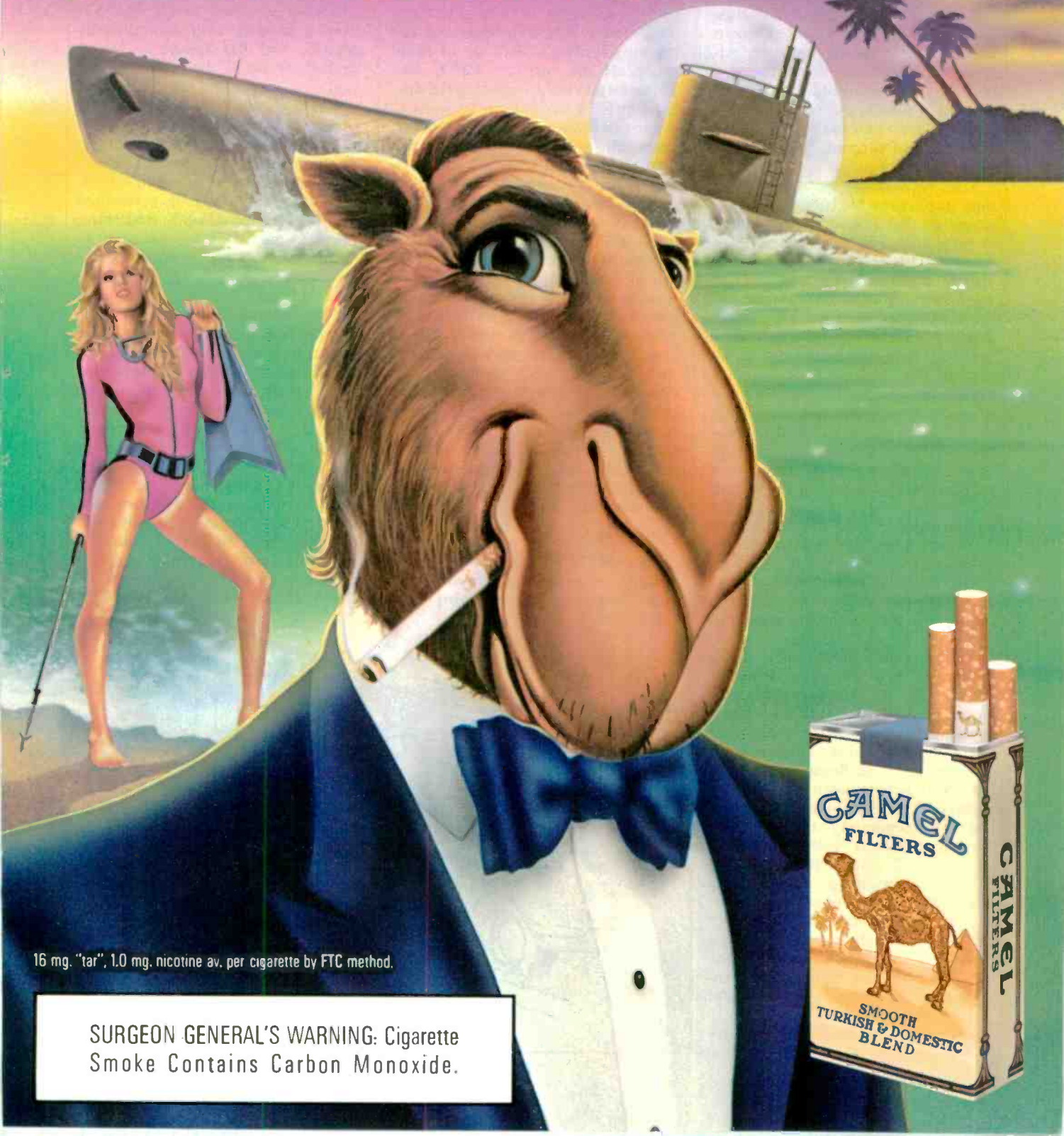
The drivers are individually protected against thermal overload by the Positec circuit, which consists of a bistable polymeric positive-temperature-coefficient resistor that is connected in series with the voice coil. The resistor's normally low resistance does not affect the speaker's performance. If excessive current passes through a driver for an appreciable time, the resistor heats up and its resistance suddenly increases to a high value, which cuts off most of the power to the speaker. When the overload is removed, the resistance returns to normal and the speaker's operation is automatically restored.

The cabinet, which measures 19½ inches high, 10¼ inches wide, and 10¾ inches deep, is veneered in a choice of black ash or walnut wood-grain vinyl on the top, sides, and bottom. Each speaker weighs 18¾ pounds. The speaker board, covered by a removable black cloth grille, is painted silver gray, and the back is sprayed black. The woofer and tweeter are located as close together as possible on the front of the cabinet, with the woofer port above them. Banana-jack terminals are recessed into the rear of the cabinet, and mating plugs are supplied with the speakers (standard ¾-inch-spaced dual banana plugs can also be used).

The performance specifications for the MS35Ti include a sensitivity of 88 dB sound-pressure level (SPL), an 8-ohm nominal impedance, a recommended amplifier power rating between 20 and 300 watts per channel, and an overall frequency response of 55 to 20,000 Hz at the -3-dB response points. Mordaunt-Short recommends that the speakers be located at least 14 inches above the floor and away from the rear wall, and well away from the side walls. Stand-mounting is suggested, and the company manufactures suitable stands for its entire speaker line. The bottom of the MS35Ti (like the other models in the line) is fitted with threaded inserts enabling it to be bolted firmly to the top of the matching stand, which is designed to be supported



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16 mg. "tar", 1.0 mg. nicotine av. per cigarette by FTC method.

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## TEST REPORTS

on spiked feet. Price: MS35Ti, \$389 a pair; IS2 stands, \$109 a pair. Mordaunt-Short, Dept. SR, 1225 17th St., Suite 1430, Denver, CO 80202.

### Lab Tests

Our test samples of the MS35Ti were supplied with the IS2 stands, which are shipped knocked down and must be bolted together. Although the necessary wrenches were included, the assembly process was clumsy in places, but once fastened together, the combination of speaker and stand formed an extremely solid and rigid unit.

The room-response curve had only moderate fluctuations superimposed on a gently downward-sloping output as the frequency increased. The close-miked woofer response decreased slightly from its maximum, at about 100 Hz, to -4 dB at 1,000 Hz and then fell sharply above 2,000 Hz. When the port output was combined with the cone output, the resulting bass response varied over a total range of 6 dB from 20 to 1,500 Hz. It spliced easily to the room curve to form a composite frequency response that sloped down from its maximum level, at 50 to 100 Hz, all the way to 20,000 Hz, with an overall level variation of  $\pm 5$  dB referred to the 1,000-Hz level. Although it is not important to the user, our tests suggested that the actual crossover between the woofer and the tweeter is closer to 2,500 Hz than to the rated 4,000 Hz.

The system's impedance minimum of 3.5 ohms was reached at 150 to 200 Hz. Its bass-resonance impedance of 14 ohms was measured at 70 Hz, and the maximum value in the audio range was 15 ohms at 1,500 Hz. Sensitivity was 89 dB SPL at 1 meter with a pink-noise input of 2.83 volts. Bass distortion, measured separately at the port and the woofer cone with a constant input of 3.2 volts (equivalent to a 90-dB SPL midrange output), was reasonably low, ranging from about 0.5 percent at 100 Hz to 2.6 percent at 70 Hz, which was the effective crossover frequency between the woofer and port radiation. It increased to 4.6 percent at 50 Hz and 9.5 percent at 35 Hz.

Our quasi-anechoic frequency-re-

sponse measurements with the IQS analysis system closely matched the downward-sloping curve we had obtained from swept sine-wave measurements. The frequency-response curves obtained on-axis and 45 degrees off-axis were closely parallel up to 10,000 Hz, diverging moderately above that frequency but remaining within 6 to 8 dB of each other all the way to 20,000 Hz. These results indicate very good dispersion for a tweeter with a  $\frac{3}{4}$ -inch dome radiator. The group-delay variation was  $\pm 0.2$  millisecond from 3,000 to 20,000 Hz and less than 1 ms down to 180 Hz.

Pulse power tests showed that the MS35Ti had a very high power-handling ability for a small, two-way speaker. As usual, our amplifier ran out of power before significant distortion could be induced at 1,000 and 10,000 Hz (at 575 watts into 12 ohms and 765 watts into 9 ohms, respectively). The woofer emitted the rattling sounds indicative of cone-bottoming with a very high input of 680 watts into its 5-ohm impedance at 100 Hz. We had no indication that the Positec circuit was affecting this measurement, which does not subject the speaker to thermal stresses.

### Comments

The MS35Ti delivered a very smooth, relatively uncolored sound that compared very favorably with

that of some much more expensive speakers in A/B tests or extended listening. Somewhat surprisingly in view of its downward-sloping response, it did not sound in the least soft or bass-heavy. In fact, a slight forwardness was audible at times when we switched to the MS35Ti from a speaker with an unusually smooth and flat response, but it would not usually be noticeable except in such a direct comparison.

Although the close-miked bass response made it appear that the lower limit of this speaker was 20 Hz, this is an artifact of measurement. Its effective lower limit is in the 45- to 50-Hz range, and it performed very well indeed down to that point. Overall, the MS35Ti managed to perform like a much more expensive speaker and totally belied its modest price.

The Mordaunt-Short MS35Ti speaker is as attractive as one could expect from a simple box. Even the stands are attractive, besides being very stable and forming a true union with the speakers. Nonetheless, it is plain that the primary design effort went into achieving the speaker's fine acoustic qualities, and that is as it should be. If you want a handsome piece of furniture, you will have to pay for it, but a surprisingly high caliber of sound is available from this speaker at a very modest price.

**Circle 145 on reader service card**





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audio is easy.

Humanizing it  
takes some  
really impressive  
technology.

# Welcome to the human side of



*\*Continuous average power output, both channels driven into 8 OHMs from 20Hz to 20KHz at no more than 0.007% THD.*



# e to the f the high end.

In the rush to digitize everything in audio—seeking ever higher levels of sound quality—it seems that one thing has been almost completely forgotten.

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The audience for music isn't made up of oscilloscopes and signal processors. It's made up of human beings.

That's the simple premise behind a new line of precision audio components—Fisher's Professional Digital Reference Series. The flagship of which is our RS-Z1 Receiver. Which



comes with a full-function remote control capable of accessing other PDRS components as well.

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mizes all the benefits of digital processing: greater accuracy, range, resolution and speed.

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Other specifications of the RS-Z1 are just as uncompromising. It delivers 150 watts of power per channel.\* Along with a total harmonic distortion rating of 0.007%.

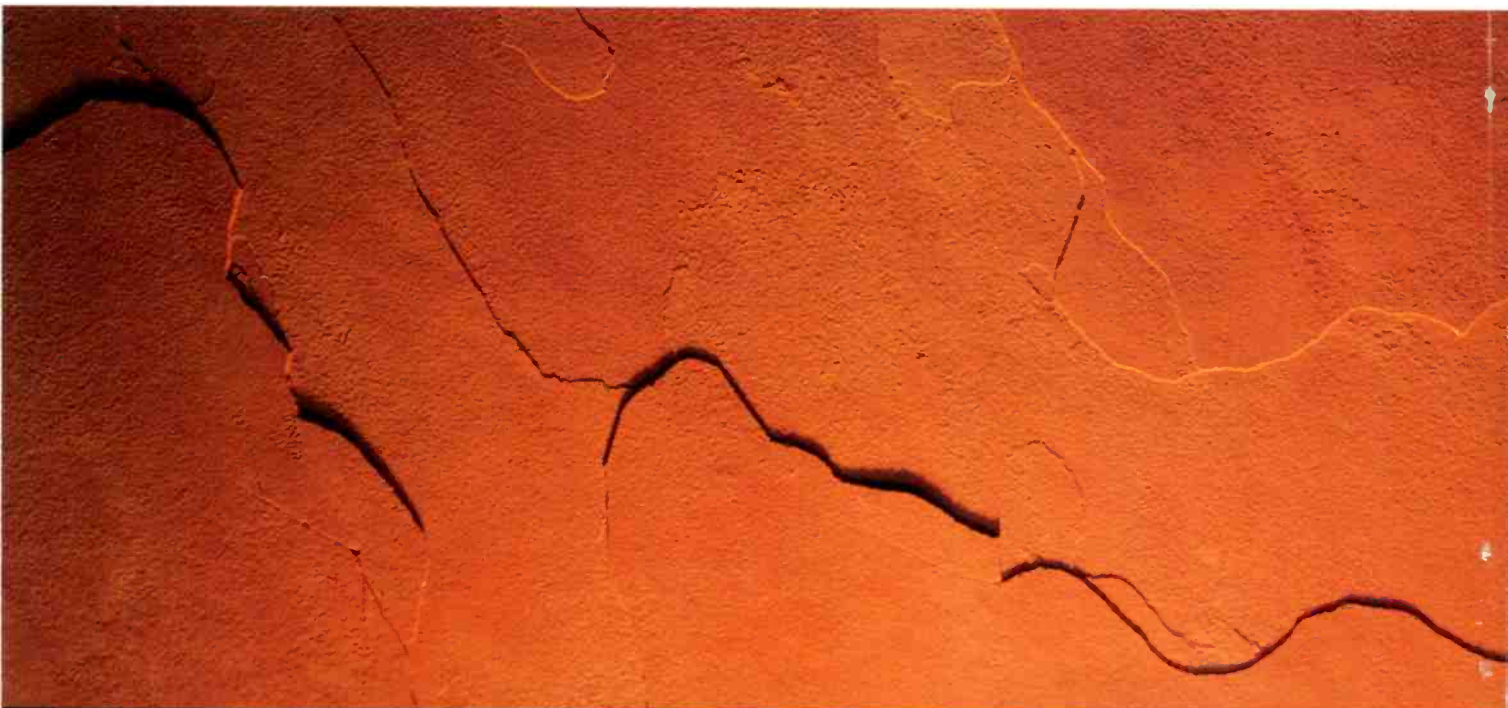
But while you're sure to appreciate the technology that went into the RS-Z1, we suspect there's something about it you'll like even better.

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MCA 4353 LEONARD BERNSTEIN'S MASS

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EI 00718 10,000 MARCHES IN NY TRIBE

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There are some audiophiles who still refuse to believe compact disc technology can match the sound quality of a fine turntable.

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Proof that a CD changer can distinguish itself in fidelity, without calling for a sacrifice in convenience.

By using fiber optic coupling, eight-times oversampling and dual 18-bit linear digital/analog converters, the DAC-Z1 delivers pure, natural sound reproduction. Superior frequency response. And unbelievably low harmonic distortion.

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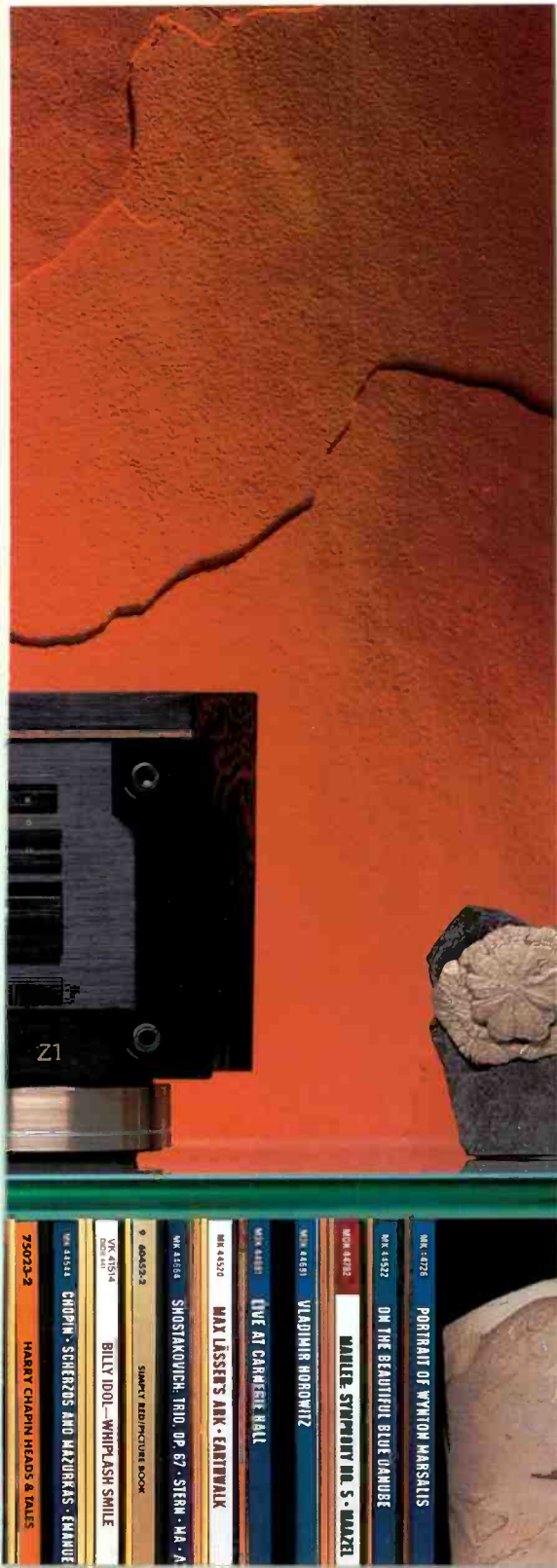
And with our optional EQ-Z1 14-band graphic equalizer (see inset), you can tailor the sound to the exact acoustics of your room.

But enough talk. See the DAC-Z1 for yourself.

Then hear why some rather avid turntable enthusiasts will be giving CD technology a second listen.



PROFESSIONAL DIGITAL REFERENCE SERIES



# A violin str vibrate just o

REFERENCE  
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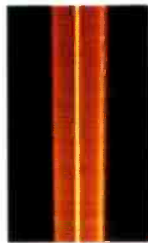
Z1  
DIGITAL PURE RESPONSE





# ing doesn't ne way either.

No matter how much we might like to change the laws of physics, it makes more sense to respect them.



With that in mind, the Professional Digital Reference Series approach to speaker technology is starkly realistic. Yet wonderfully sophisticated.

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PROFESSIONAL DIGITAL REFERENCE SERIES

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Our goal in creating the Professional Digital Reference Series can be summarized in a few words:

To reproduce music as much like the original performance as is humanly possible.

And we stress the word "humanly."

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Since you demand a sophis-

ticated sense of reality, that's exactly what we strive to deliver. And that's precisely what you'll find in the Professional Digital Reference Series' receiver, CD player, CD changer, dual cassette deck, graphic equalizer and speakers. Each of which is designed with every other PDRS component in mind.

In fact, our devotion to reality can be seen as well as heard—in the video components that complete the series.

These include the PC-Z1 TV, with a 27-inch screen that boasts up to 700 lines of horizontal resolution. And the FVH-Z1—one of the first VCRs to combine Super VHS, digital noise reduction and an array of digital effects.

Experience the fully integrated Professional Digital Reference Series for yourself.

And find out how beautiful reality can be.

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For the Fisher Professional Digital Reference Series dealer nearest you, please call 1-800-462-PDRS.



Super VHS is a trademark of Victor Corporation of Japan, Limited.





# TRAVELLING

*Car makers and hi-fi companies are teaming up to build in sophisticated stereo systems that let you drive right out of the showroom with great sound.*

BY KEN C. POEHLMANN



PHOTO BY BARNABY HALL. LOGO BY BILL RUSSELL

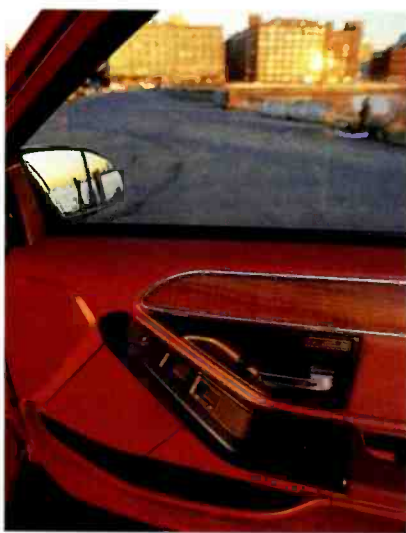
**N**O one really knows for sure, but apparently the first car audio system was a uniquely American phenomenon. It probably appeared at the Louisiana Purchase Exposition, a World's Fair held in St. Louis in 1904. The American DeForest Wireless Telegraph Co. displayed an automobile radio called the Auto Wireless No. 1 that received Morse code from a radio transmitter located on the fairgrounds. The car, a rather forward-looking bit of technology itself, was electric.

*With a CD player, the Ford/JBL system is a \$1,350 option in the 1989 Thunderbird. With a cassette player only it costs \$850. The system contains nine speaker drivers powered by two amplifiers.*

In 1926 William Heina filed for a patent on his car radio, the Heinaphone, the true forerunner of modern autosound. The Heinaphone used a four-stage tuner and a two-stage audio amplifier run off batteries mounted in a box under the

floorboards. The radio was installed behind the dashboard, with holes cut for the control knobs. A speaker was mounted in the headliner above the windshield. On good days the received signal was able to overcome the interference.

From these humble origins, car audio has become a giant in today's consumer electronics industry. Receivers, cassette players, compact disc and digital tape players, equalizers, signal processors, crossovers, power amplifiers, and loudspeakers (not to mention security systems)



*Two of the four JBL speaker enclosures in the 1989 Thunderbird are located in the front door panels just below the electric-window controls; two more are in the rear. Each contains a 4-inch midrange, a 1-inch tweeter, and a dedicated four-band parametric equalizer. A four-channel, 60-watt amplifier powers the four satellites, and an 85-watt amp drives a 7-inch subwoofer located in the rear.*

are all part of sophisticated mobile sound systems. More and more people are doing much of their listening not in the home but in the car, and the profit potential of the car audio market has stimulated tremendous competition in both the automobile and electronics industries, leading to considerable product diversity across a wide spectrum of prices. In short, now there is a car sound system available for every car and to fit every budget.

At the heart of the boom is the competition between car companies and audio companies. Car makers sell sound systems pre-installed in the cars, as standard equipment or as pricier options; this is called the original - equipment - manufacturer market, or the OEM market for short. On the other hand, audio companies sell autosound equipment separately, for consumers to install in cars they already own; this is called the aftermarket.

Over the years the balance has shifted from one side to the other. For a period in the Seventies, for example, an aftermarket stereo system was *de rigueur*—mainly because everyone wanted the hot new cassette players while Detroit was still installing eight-track cartridge players.

Today, the situation has changed dramatically. The OEM side has fought back with stunning success, ironically tapping the expertise of the aftermarket companies to design competitive systems.

Automakers now regularly enlist the aid of audio manufacturers to

supply their cars with high-quality, factory-specified components. Such an association may be used as a selling point, but often it is kept rather quiet. You can buy a Thunderbird with a well-advertised Ford/JBL sound system in it, for example, or you can get a BMW 300 series without ever knowing that the sound system in it is made by Pioneer. In addition, the car makers have improved the quality of their own audio designs. The result of both these trends is a real renaissance in mobile sound.

Bose is perhaps the one audio company most identified with factory-installed car sound—and one of the few audio companies collaborating with automakers that is not thereby directly competing with its own aftermarket equipment. Beginning with its legendary Cadillac and Corvette systems, Bose loudspeakers and electronics have appeared across the General Motors line as well as in cars from Acura, Audi, Honda, and Nissan.

# T

HE new Cadillac/Bose system, available in the 1989 Cadillac Seville, Eldorado, DeVille, and Fleetwood, is representative of the state of the art. This Gold Series system uses a Delco-GM receiver with a cassette deck or CD player (featuring selectable 2:1 compression) in the dash; an atypically floor-mounted DAT player may be installed along with the cassette receiver as a dealer option. The Bose front speakers, 4½-inch bass-reflex models, are mounted in the front door panels in tuned, ported enclosures. Two Bose 6 x 9-inch rear speakers are placed in the package shelf, and high-efficiency Bose amplifiers are mounted on the speakers themselves. Total power available is 200 watts in the DeVille and Fleetwood systems, 170 watts in the Seville and Eldorado versions.

The Acura/Bose system (standard in the Legend Coupe, an option in four-door models) uses an Alpine cassette receiver and four individually amplified and equalized Bose





*Seven different Chrysler/Infinity sound systems are currently available in more than twenty car models. The Dodge Caravan system features a CD tuner and four coaxial speakers. One pair of coaxes is mounted on either side of the rear cargo-hatch door (bottom left), and the other pair is mounted in the front doors (bottom right). In addition to the speakers, Infinity supplies the amplifiers and customized equalization.*



PHOTOS BY BARNABY HALL



loudspeakers: two 4½-inch speakers in tuned, ported enclosures in the front doors and two 6 x 9-inch drivers in the rear package shelf. The Audi/Bose system is standard in the Audi 200 series, optional in the 100 series. A Blaupunkt cassette receiver drives four independently amplified and equalized speakers, two 4½-inch ones in front and two 6 x 9-inch speakers in the rear. Audi/Bose systems are installed at Audi's assembly plant in Neckarsulm, West Germany.

In an unusual twist, the Bose systems for Hondas are installed in the U.S. before the cars are exported to Japan. The system, now standard in the 1989 Accord SEi four-door sedan, includes two 3-inch Bose "twiddlers" in tuned, ported enclosures in the front doors, two 6 x 9-inch speakers in the rear deck, a multichannel amplifier/equalizer module, and an Alpine cassette receiver in the dash.

The results of the Nissan/Bose collaboration are available in the 1989 Maxima. The Clarion-made cassette receiver drives three 4½-inch front speakers and two 6 x 9-inch rear speakers, each individually amplified and equalized. A Clarion CD player is available as a dealer-installed option.

# F

ORD has blazed new paths in car audio through its highly successful collaboration with JBL, introduced in 1985 for the Lincoln. The latest Ford/JBL system is now also available as an option for the 1989 Ford Thunderbird and Taurus and the Mercury Cougar and Sable. The T-Bird and Cougar systems use a Ford Audio cassette receiver with a CD option. Nine JBL drivers are mounted in five locations: four 5½ x 7½-inch enclosed two-way speakers with 4-inch midranges and 1-inch tweeters and one 7-inch subwoofer in a 10-liter sealed enclosure. The satellite speakers and the subwoofer are separately amplified. The satellite speakers are driven by four 15-watt amplifiers, and the subwoofer has its own 85-watt amp.

There is a four-band parametric equalizer for each satellite and a two-band parametric equalizer for the mono subwoofer.

The Taurus and Sable systems use no fewer than ten drivers mounted in four locations: six drivers in two 6 x 9-inch three-ways and four drivers in two 5¼-inch coaxials. Up to 140 watts of power are distributed to four channels. Other Ford cars have not been neglected. A CD option is available for the Lincoln Town Car, the Continental (along with a DAT player), and the Probe, and Ford plans to introduce a trunk-mounted CD changer with remote control.

Chrysler has teamed up with Infinity to produce the Chrysler/Infinity sound systems. Unlike some premium systems, this one is available in a wide range of Chrysler vehicles at a relatively low price. Since its introduction in January 1987 in the New Yorker, LeBaron GTS, and Lancer, the Chrysler/Infinity line has expanded to include seven different systems available in more than twenty current models. Ultimately, the goal is to offer a premium system for every Chrysler vehicle. Chrysler's own head units are employed, and Infinity supplies all the speakers, amplifiers, and equalization. The front speaker complement includes separate tweeters and woofers. Two ¾-inch polycell-dome tweeters with 2.8-ounce ceramic magnets are mounted in the instrument panel, and two 5¼-inch polypropylene woofers with barium-ferrite magnets are mounted in the front door panels. (Minivans use two coaxial speakers mounted in the instrument panel.) The rear speakers are 5½ x 7½-inch or 6 x 9-inch oval coaxes (depending on the car line), with polypropylene woofers and polycell tweeters mounted on a pad ring and bracket. Chrysler's TC by Maserati has two 6 x 9-inch oval speakers mounted under the storage area behind the seats.

Chrysler/Infinity systems are biamplified and tuned to each car. All the woofers are individually amplified, with circuitry attached to the back of the speaker baskets. Individual low-pass filters allow better crossover control and greater

frequency separation, and hence a higher power level to each speaker, than would be possible with a single multichannel crossover. The tweeters are individually driven by four amplifiers in the head unit. Optional CD players are also available for the systems (one is standard in the Maserati). A nice touch in some models is rear-seat headphone jacks that defeat the rear speakers.

# W

HILE General Motors, Ford, Chrysler, Acura, Honda, Audi, and Nissan have formed highly conspicuous alliances with major audio electronics companies, some car makers prefer to provide their customers with high-quality sound on a more anonymous note, often collecting components from several audio companies to assemble the sound system. For example, both Pioneer and Alpine quietly supply components to BMW.

With many imported cars, OEM electronics are installed at the port of entry into the U.S. This is commonly done because it helps avoid the confusion created by the different radio standards around the world; after the car is shipped to a given country, the appropriate radio for that area is installed. On the other hand, OEM speakers are often installed at the factory. Another twist: Sometimes dealers order empty cars and install their own sound systems—to help *their* bottom lines.

Speakers for BMW's are factory-installed, but the electronics may come later, at the port of entry. Often it is Pioneer electronic components that make an appearance in BMW cars. (Alpine handles the 3-Series nonconvertibles.) The anti-theft cassette receiver has rear-panel CD jacks, and every 7-Series car is prewired for a Pioneer CD changer. The trunk-mounted changer is standard equipment (port-installed) in the 1989 BMW 750iL and is available as a dealer option for the 3-, 5-, 6-, and 7-Series. Using the wiring harness that's standard in the 7-Series and optional in the 3-, 5-, and





*A Bose sound system is standard equipment in the 1987 Audi 200 Turbo. A Blaupunkt-made cassette tuner with Dolby B supplies audio signals to four independently amplified and equalized speakers—two 4½-inch drivers in the front doors and a pair of 6 x 9-inch speakers in the rear deck. The Bose system is optional in the Audi 100 series.*



6-Series, the dealer simply screws in a bracket and attaches the leads. The changer uses the same six-disc magazine as Pioneer's home changers and features a double-oversampling filter.

Although Alpine's work for BMW (and Acura) is unheralded, one Alpine OEM venture that is well documented is its sound system for Lamborghini. Lamborghini's twenty-fifth-anniversary Countach (with a mild-mannered 420-horsepower, 5.2-liter, V-12 engine) has an all-Alpine sound system. This limited-edition car (only two hundred were made) comes complete with an Alpine Model 7390 cassette tuner or Model 7903 CD tuner, a Model 3528 four-channel amplifier, and pairs of both the Model 6255 and Model 6256 speakers.



HE newest player on the high-end OEM sound-system field is Toyota, which has embarked on a program of providing sophisticated systems using equipment from a variety of audio companies. The first system is for the Lexus models, from Toyota's luxury division. The flagship Lexus LS 400, a V-8-powered sedan scheduled for a fall 1989 debut, will be the first car to offer a factory-installed Nakamichi system as an original-equipment option. Pioneer will supply the standard audio system for the LS 400 as well as for the ES 250, a V-6-powered sedan. Both systems include a cassette receiver with a CD option, individually placed tweeters, midrange drivers, and full-range drivers. The LS 400 features a bi-amplified subwoofer, and the CD option is a multidisc changer. Toyota has entered the fray at the head of the pack, and we can expect high-end audio upgrades in future generations of Toyota cars, from such Japanese audio giants as Nakamichi and Pioneer, to join the systems now available from Fujitsu Ten and Panasonic.

Blaupunkt, one of the early developers of car audio, is the exclusive supplier for Porsche, and Porsche's standard factory-installed radios



*The 200-watt Delco/Bose Gold Series system (left) is available in 1989 Cadillacs. Featuring two 4 1/2-inch speakers in the front and two 6 x 9's in the rear deck, the system costs \$560 with a cassette tuner and \$860 with a CD tuner. A DAT player is a \$2,000 dealer option.*

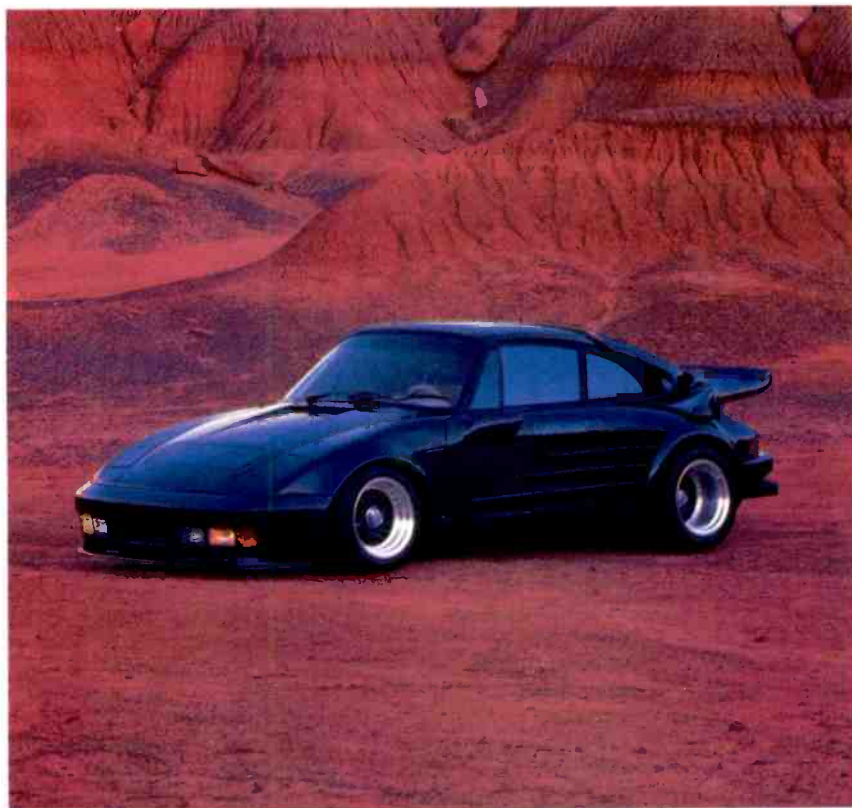


*A Nissan/Bose system is standard equipment in the 1989 Maxima SE (above). A Clarion-made cassette tuner feeds a pair of door-mounted 4 1/2-inch speakers and two 6 x 9-inch drivers in the rear.*



*The cassette receiver in Chrysler's TC by Maserati (left) features a five-band equalizer. Two 6 x 9-inch Infinity speakers are mounted under the storage area behind the TC's seats; each is powered by an individual amplifier.*





bear the Blaupunkt name. As any Porsche owner knows, these cars present high ambient noise levels and limited space for audio systems. Nevertheless, Blaupunkt has managed to squeeze a high-power, ten-speaker system into the Model 928 and highly respectable systems into the 911 and 944. Blaupunkt also supplies audio components to other car makers, including Audi, and is aggressively pursuing several concept cars with German automakers, including one containing a mobile office of the future complete with two-way communications, fax machine, touch-screen controls, and, of course, an executive sound system.

**A**T the other end of the automotive spectrum, Jeep has established a collaboration with Jensen. The factory-option Jensen Accusound system, available in high-end Jeep models such as the Wagoneer, features the legendary Jensen coaxial speakers, 6 x 9-inch or 5-inch depending on the car model. When a car as utilitarian as the Jeep is available with high-fidelity sound, car audio has clearly come of age.

Soon only the imagination of the designers will limit the performance of automotive sound systems. Increasingly, car manufacturers are talking to their audio partners at earlier stages in the design of new models, and sound systems are being better integrated into cars, so that they are better looking as well as better sounding. As cars themselves are becoming more sophisticated, so is autosound. Just down the road, for example, is digital signal processing. Collaboration was the best possible move for both the car makers and the audio manufacturers, and the audio systems you can buy with your car have never been better.

Lee De Forest died in 1961 with nearly three hundred patents under his name. Imagine what he would think if he could hear the descendants of that car radio he showed in St. Louis in 1904. □

*Pioneer's Gemballa Avalanche is a heavily customized 1988 Porsche 911 that sports a cassette tuner, a six-disc CD changer, a video cassette player, and a 6-inch TV set—all Pioneer equipment, of course. Maximum system power is said to be a hefty 2,440 watts.*



# HI-FI HITS THE ROAD

BY WILLIAM WOLFE AND MICHAEL SMOLEN

## 1988 Acura Integra LS: A Sony/Pioneer system that satisfies

There are a lot of different kinds of car stereo systems out there, from the basic bass-banger to the heavy-weight wattage champ to the one-speaker tinhorn. And then there are high-fidelity car stereo systems, the ones that will satisfy drivers who have good stereo systems in their homes. Hi-fi car systems can be expensive or not so expensive, complex or straightforward, but they should all have one thing in common: They should be designed by the installer for good sound as judged by the same standards that apply to home systems.

The system in Richard Citrin's 1988 Acura Integra LS—installed by DSL Professional Automotive Services of Paramus, New Jersey—is a good example. It offers three program sources, fully adequate power, and great sound—and it doesn't devour the generous cargo

space offered by the Integra's rear hatch area.

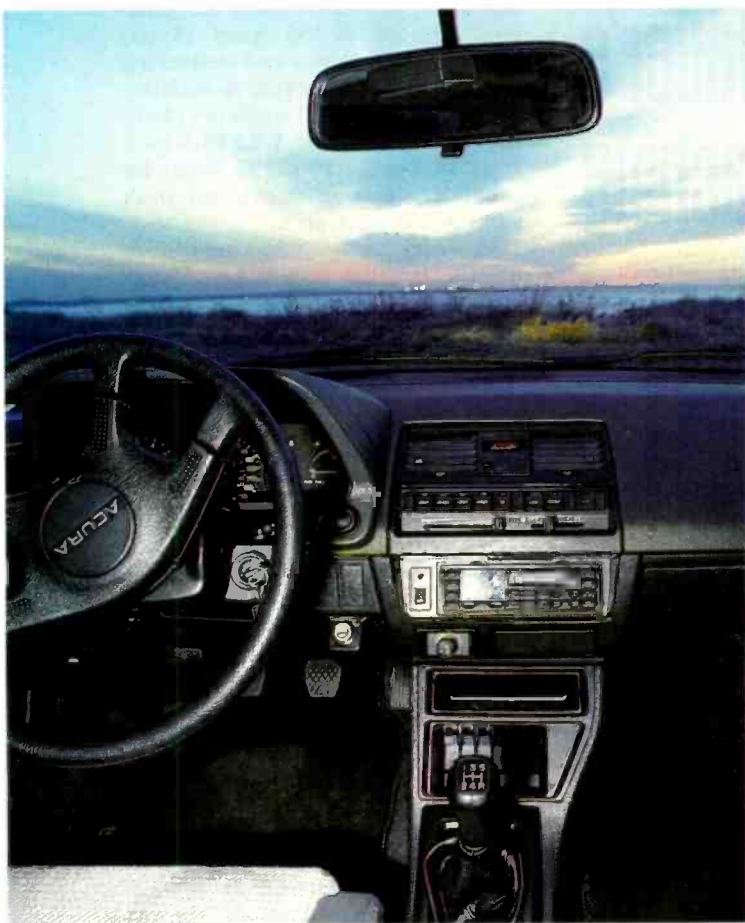
The system's heart is a Sony XR-7200 DIN-size cassette tuner (\$650), a flexible head unit that not only offers tape playback with Dolby B and Dolby C and AM/FM tuner reception, but also serves as a remote control for the Sony CDX-A20 ten-disc CD changer (\$750) that DSL installed in the trunk. And for upgrade-minded car audiophiles, the XR-7200 has a built-in active crossover that can be set at 80 or 120 Hz for use with component subwoofers.

Power is provided by a pair of 120-watt Sony XM-701 amplifiers (\$270 apiece) mounted behind the spare tire. The amps drive a set of Sony's XS-HL55 component speakers (\$300) mounted in the front doors and a pair of Pioneer's TS-6966 6 x 9-inch triaxials (\$160) mounted in the removable rear parcel shelf. The amps and CD changer are far enough out of the way to leave plenty of room for luggage.

The complete system has a list price of \$2,400 (Citrin paid \$1,965), and DSL's installation took only 8½ hours, which cost an additional \$340. Other nonstereo extras for the car were tinted windows and a Maxi-Guard security system. The total effect is flashy but functional—just like the sixteen-valve, 1.6-liter, four-door Integra LS. □







PHOTOS BY BARNABY HALL



*The Acura's dash holds a Sony XR-7200 cassette tuner, the trunk (top) a side-mounted Sony CDX-A20 ten-disc CD changer. The rear deck sports 6 x 9-inch Pioneer TS-6966 triaxials, and two Sony XM-701 amplifiers are mounted forward of the spare tire. At left, a look at the removable rear deck.*

## 1988 BMW M3: An installer's personal road machine

The BMW M3 is a rare automobile on American roads, and the owner of this one is a rare bird himself. Jim Nagy is in his thirteenth year as owner of Safecar Autosound Engineering in Downer's Grove, Illinois, and the M3 is not only his personal car, but as a result of his classy installation it's the car stereo show car for Pyle Industries.

The Bimmer's head unit is Alpine's Model 7390 cassette receiver and CD controller (\$600), which operates an Alpine 5952 six-disc changer (\$650) mounted under the passenger seat. An Alpine 4390 wireless remote control (\$60) eases life for both the driver and backseat DJ's. Source signals are routed to two Audio Control EQT's—mono thirty-band, one-third-octave equalizers (\$300) used to smooth out the inevitable peaks and dips of an automotive interior. The signal is then sent to an Alpine 3656 six-channel electronic crossover (\$350), where it is divided and parceled out to the amplifiers.

All of the speakers and amplifiers are made by Pyle. Two WL1580/4 15-inch Pro subwoofers (\$260 each)

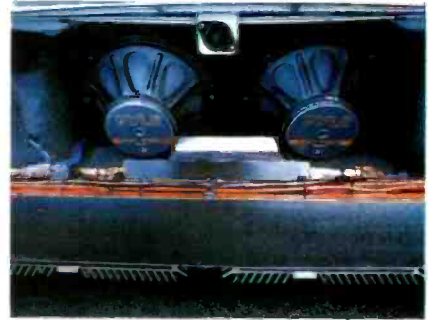
fire through the modified back seat, which has had much of the inner foam removed, new support put in, and a new perforated-leather cover installed. The subwoofers are powered by an A-400 amp (\$665) strapped into mono and delivering up to 400 watts. Another A-400 running in stereo at 200 watts per channel powers the four WL870 8-inch Pro "midwoofers" (\$138 each) located in the side panels on both sides of the back seat.

In order to keep the rear deck in its original condition, Nagy mounted the rear satellite system—two WP5216 5¼-inch midranges (\$39 each) and two D3580 1-inch dome tweeters (\$60 a pair)—in the factory enclosures. The eight-speaker front-imaging system consists of two custom Z-Box 325 MP2 enclosures (\$580 a pair), each loaded with a K-499W 4-inch dual-cone midrange (\$79 a pair) and a D3580 tweeter, that replace the BMW's door map pockets; two WP5216 midranges in the factory kick-panel locations; and two D210 ¾-inch dome tweeters (\$33 a pair) in the car's factory tweeter locations. The front and rear satellite systems and the Z-Box enclosures are each powered by 200-watt A-200 amplifiers (\$465 each). All of the wiring and connectors are by Nakamichi or Phoenix Gold (\$1,255 total).

Total retail cost of the sound system is \$8,280, plus \$6,950 for the installation, which includes a stock power-window switch for raising and lowering the amp rack. There's also a shock-mount system crafted from the scrapped differential mount of a Lotus Elan. □







PHOTOS BY BEN ALTMAN



The Alpine 7390 cassette receiver and CD controller unit looks natural in the BMW's dash. Two 15-inch Pyle subwoofers are hidden inside the back seat (top), and each front door has a midrange and tweeter in a custom Z-Box enclosure (middle). There's even room for a Mitsubishi Mesa 95 cellular phone. The trunk holds the Pyle power amplifiers that make this system scream.

# 1985 Corvette Coupe: Cost no object, no holds barred

When Joe Lotito took his '85 Vette to Rich Malanga, Jeff Hoover, and Tom Mangs at Audio Advisors in Lake Worth, Florida, he told them he wanted the best of everything. Little did he know that the system they put in his car would bring him seven first-place finishes in 1988 car audio competitions.

The dash sports a complete array of Eclipse source units: an EQZ-200 cassette tuner (\$1,350), an ESD-230 CD player (\$750), and an EST-240 DAT player (\$1,600), all of which feed into an Alpine Model 3401 parametric equalizer (\$500). The signal then travels to a pair of Rockford Fosgate XV-1 active crossovers (\$135 each) and from there to five Rockford Fosgate 45-watt Punch 45 power amplifiers (\$220 each).

The front-half speaker system runs through a Nakamichi PC-100

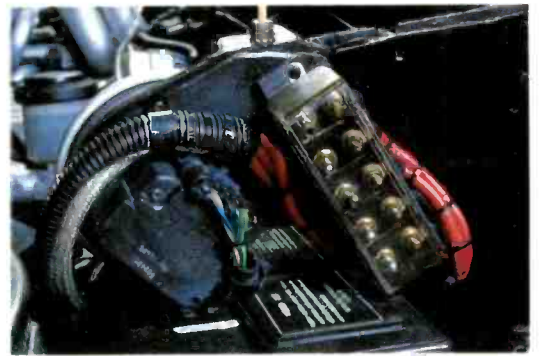
passive crossover (\$90) and consists of two MB Quart 25 HC 1-inch titanium-dome tweeters (\$300 a pair) in the dash and two Nakamichi SP-40 4-inch midranges (\$129 a pair) mounted on full-direction servomotors in the tops of the doors. Each door contains three Nakamichi drivers, an SP-65C 6½-inch coaxial (\$325 a pair), an SP-50 5-inch midrange (\$150 a pair), and an SP-10 1-inch soft-dome tweeter (\$195 a pair). The rear speakers, mounted in the trunk, include four M&M Electronics 62015PR4 mid-bass drivers (\$60 each) and two Nakamichi SP-1010 10-inch subwoofers (\$190 each).

The total retail cost of the audio components was \$7,400, but that's just the beginning. Special installation work included motorized rosewood panel covers for the equalizer and amplifiers, a special cooling system, a five-stage alarm system, a TV set, a cellular phone, radar detectors, and plenty of custom carpeting, woodwork, and leatherwork—plus a 170-ampere tri-phase fire-engine alternator to run the whole thing. Audio Advisors labored for 145 hours on the Vette, at \$35 an hour (total: \$5,075), and by the time the *entire* job was finished the audio and communications system was worth a whopping \$21,862.75.

We want one. □







PHOTOS: TOP, BRUCE MILLER; OTHERS, PAT RACEY



The Corvette's imposing dash has a "rack" of Eclipse gear. Custom door work (top) accommodates Nakamichi speakers, and part of the car's electrical system was modified (middle). Five Rockford Fosgate amps restle in the trunk along with a custom fusebox and the rear speakers. At left, the finished trunk layout, with the M&M mid-bass drivers, Nakamichi subwoofers, and Alpine 3401 parametric equalizer.

# JEFFREY TATE

BY HERBERT KUPFERBERG



**T**HE conducting career of Jeffrey Tate substantiates the theory that the best way to learn something is by doing it. In ten short years, the forty-six-year-old British musician has become one of the busiest conductors on the international scene. In the United States his engagements have included the Metropolitan Opera, the Boston Symphony, the Philadelphia Orchestra, and the Los Angeles Philharmonic. In his own country he has been appointed principal conductor of the Royal Opera at Covent Garden and of the English Chamber Or-

*"It's a terrible thing to tell people, especially young people, but there is an element of luck in making a success."*



chestra. On the continent he has established regular bases in Paris, Geneva, and Salzburg. His compact disc releases now exceed thirty, and the list is expanding.

Yet as recently as 1980 Tate was earning his living mainly as a vocal coach, rehearsal pianist, and operatic assistant, and his education at

Cambridge had been medical rather than musical, culminating in an M.D. degree and two years of practice at St. Thomas's Hospital in London.

"Musically, I was a gifted amateur," Tate told me when we spoke in Boston

CHRISTINA BURTON/FMI



recently. "I was a great sight-reader, but I stopped taking piano lessons at the age of ten because my parents wanted me to concentrate on school work. But I kept right on playing, mainly operatic scores. Even today, I can't play the Liszt sonata to save my life, but I can sight-read my way through *Götterdämmerung* without trouble."

Complicating Tate's childhood—and his life ever since—were a series of disabling physical afflictions, principally spina bifida and kypho-scoliosis, which left his torso twisted and his left leg shorter than his right. A handsome man nevertheless, he navigates his way to the podium surprisingly briskly with the aid of a cane, and he conducts with vigor perched on a high stool with an elevated back.

"The seated position actually has its points," Tate remarked philosophically. "Christoph von Dohnányi once told me, 'When you start conducting you'll find that sitting in a chair is very good. You'll have a lot of control that way.' And I've found that to be true."

Jeffrey Tate first came to the notice of American music lovers in 1980, when he conducted Alban Berg's *Lulu* at the Metropolitan Opera. James Levine, whom he had met in Salzburg, had invited him to work at the Met as a vocal coach and as a "cover" or standby conductor; in the latter capacity he was asked to take over Berg's difficult score—without benefit of a stage rehearsal.

"I'd never actually conducted it before, but I had prepared it for Pierre Boulez's performances of the complete score, so I really knew it. Jimmy Levine said, 'Of course you can do it,' and he turned out to be right."

**T**ATE went on to conduct other operas at the Met over the next few years, with the reviews ranging from highly favorable for Mozart's *Idomeneo* to decidedly tepid for Johann Strauss's *Die Fledermaus*. He acknowledged that *Fledermaus* had been "problematical," adding, "I tried to be untraditional, and it didn't turn out the way I'd hoped. I also did a couple of *Bohèmes* at the Met, but that's really not my part of the musical world. I don't feel too emotionally comfortable in most Italian

opera, and since I don't have an affinity for it, I try to steer clear of anything south of the Alps.

"I do have a feel for the Germanic tradition: Mozart, Richard Strauss. That's the world I live in. If I had to name my style, I'd say I was of the Karl Böhm school, the German classical school. French repertoire also is very much up my street, and there are some Verdi works I'd love to do, like *Don Carlos*."

Far from being strictly a Haydn-Mozart-Schubert conductor, however, Tate displays an extraordinary musical range and adaptability. His latest CD releases from EMI/Angel encompass Schoenberg's *Verklärte Nacht* and Chamber Symphony No. 2 and Richard Strauss's *Le Bourgeois Gentilhomme* suite and *Metamorphosen*, all with the English Chamber Orchestra, as well as Beethoven's Seventh Symphony with the Dresden Staatskapelle. This spring he's recording the *Missa Solemnis* in London for release early next year. On his most recent visit to the U.S., in January, he conducted the Boston Symphony in a program consisting of Franz Schreker's Chamber Symphony for Twenty-three Solo Instruments, Benjamin Britten's Nocturne for Tenor Solo, Seven Obligato Instruments, and String Orchestra, and Schubert's Symphony No. 2.

"When I suggested that program to the Boston people, I thought they'd scream for fear it would empty the hall," Tate said. "But they didn't. They're wonderful. Boston is always interested in new works and rare programming."

Tate thinks that his scientific training may have contributed to the sense of discipline with which he approaches his work, whether performing or recording. "I don't like wasting time," he said, "either mine or the musicians'. I learned that working as a *répétiteur* [vocal coach] for Georg Solti at Covent Garden. I think I know how to plan a three-hour session. Seventy-five percent of a conductor's function is organization, twenty-five percent inspiration."

It was at the urging of his parents that Tate studied medicine. His father, a postal worker, figured the boy had more of a chance of making a decent living as a physician than as a musician. "If I had stayed in medicine, I would have become an

ophthalmologist," Tate said. "It's fascinating. Surgery, neurology, and general medicine all come together in the eye."

But even as he interned at St. Thomas's Hospital, Tate was pursuing his musical interests. At the age of twenty-seven he began serious work at the London Opera Centre, a training institution, and after a year he won a job as rehearsal pianist at Covent Garden. There he worked for Solti—indeed, Tate played the harpsichord part for several of Solti's operatic recordings. In 1976, his medical career now well behind him, Tate assisted Pierre Boulez at Bayreuth, musically preparing the modern-dress production of Wagner's *Ring of the Nibelung*, staged by Patrice Chéreau, that created such a sensation on television (it's now on videodisc from Philips).

**E**VEN then, Tate said, he never thought he'd become a conductor, but an offer came in 1978 to direct Bizet's *Carmen* in Sweden. It was followed by an invitation to conduct opera in Cologne, and he was on his way. "I hadn't gone to a conservatory," he said, "but all the strands just seemed to come together for me. It's a terrible thing to tell people, especially young people, but there is an element of luck in making a success."

Although Tate believes that opera is "the most difficult thing for a conductor to pull off," he expects to go right on conducting his share of it, with his immediate schedule including Beethoven's *Fidelio* in Geneva in May followed by Strauss's *Der Rosenkavalier* at Covent Garden in June and Mozart's *Le nozze di Figaro* in Vienna in September. But his chief priority at the moment is to concentrate on the symphonic repertoire, largely through the English Chamber Orchestra. He was recently also named principal guest conductor of Loren Maazel's French National Radio Orchestra. He'll be doing some work with the Rotterdam Philharmonic, which he regards as a vastly underrated orchestra. And he expects to continue conducting orchestras in North America at least one month a year; next January he will appear in Cleveland, Pittsburgh, and Toronto.

Tate particularly likes working with American musicians. "There are a lot of misconceptions about

*"It has been like a musical love affair between Uchida and myself from the moment we first worked together in London."*



PHILIPS CLASSICS

musical nationalities," he said. "German orchestras, for instance, are not necessarily the most disciplined. American and English orchestras are the most disciplined. There's a special quality of warmth and enthusiasm about American musicians once they know and trust you. I feel a conductor shouldn't get in the way of the musical inspiration of his players. I always want the personality of the players to come through. You have to encourage people to be themselves. You have to trust your players or you're finished."

Tate enjoys recording and is partial to compact discs. "I've always been interested in clarity of sound," he said. "That's part of the Boulez influence. Compact discs provide both clarity and detail. But that can also be a bit frightening because everything has to be so exactly right."

He has an exclusive contract "for everything except opera" with EMI, for which he's scheduled to record the Mozart Symphonies Nos. 25 through 41 and the Haydn *London* Symphonies (Nos. 93 to 104). He also plans to record the Elgar symphonies and other English music, some French pieces, possibly a Bruckner Ninth, and "some small-

scale music." His EMI contract allows him to do some work for Philips, for which he is recording an admirable sequence of Mozart concertos with the Japanese pianist Mitsuko Uchida and the English Chamber Orchestra. Three discs, containing Nos. 20, 21, 22, 23, 26, and 27, have been issued so far, with at least ten more concertos to follow.

"It has been like a musical love affair between Uchida and myself from the moment we first worked together in London," he said. "We understand each other instinctively and have developed a close personal as well as musical relationship." In 1991 Uchida, Tate, and the ECO plan a tour of Japan.

**H**AVING skipped music school, so to speak, Tate naturally is a believer in the educational value of practical experience. "Some people are good in competitions," he said, "and some aren't. I think I would have fallen apart if I'd entered one. My advice is to go out and do, rather than compete. The idea of a working apprenticeship appeals to me. That's the European method, though I hear that assistant conductorships work well in America.

"Conducting opera is the basis of all conducting; all the great German conductors started out as *Kapellmeisters* in opera before moving into symphonic repertoire. It really helps to have blooded yourself in Germany conducting those endless Saturday matinees of *Zigeunerbaron*. So I'd say a good way to start a career is to go get a job as a *répétiteur* or an odd-job man in a small German opera house."

Inevitably, one asks Jeffrey Tate what suggestions he has to offer those who, like himself, suffer from a serious disability. Although less militant than violinist Itzhak Perlman, whom he has never met, Tate does interest himself in the cause of the disabled in England. "The way I treat my own disability," he concluded, "is by ignoring it. In this business, the music business, no one makes allowances for you. All that matters is if you can deliver the goods. So my advice to anyone facing the problem would be to minimize your disability—ignore it as much as you can. My answer to being disabled is to be normal." □

*Herbert Kupferberg, a senior editor of Parade magazine, is the author of The Book of Classical Music Lists, published in paperback by Penguin.*



# TAPE DECKS A BUYING GUIDE

## ACOUSTIC RESEARCH

### RD-06 Cassette Deck

Features Dolby B, C, and HX Pro; brushless direct-drive DC motor; record/playback sendust-core head; ferrite-core erase head. S/N with Dolby C 73 dB; W&F 0.035% wrms . . . . \$499

## A/D/S

### Atelier C4 Cassette Deck

Features Dolby B and C NR; microprocessor control of recording levels and balance; status displays; remote controlled through a/d/s/ R4 receiver or CC4 tuner/preamp; auto bias/EQ for all types of tape; memorizes bias and level settings for each tape formulation; displays elapsed or remaining time; quartz-controlled-PLL capstan motor drive in die-cast metal chassis; record/playback timer; auto repeat; music search; mic/line mixing; adjustable headphone output; LED recording-level meters; recording-level range 80 dB in 1-dB steps. Speed deviation <0.5%; W&F <0.04% wrms; FR (all types of tape) 20-20,000 Hz  $\pm$  2 dB; S/N >74 dB A-wtd with Dolby C (optional outboard NR system extends S/N to >93 dB A-wtd). 2 $\frac{3}{4}$  x 17 $\frac{1}{2}$  x 14 $\frac{7}{8}$  in; 20 lb. . . . . \$1,250

### Atelier C3 2-Speed Cassette Deck

Records and plays at 1.88 ips (standard speed) and 3.75 ips (double speed); remote controlled through a/d/s/ R4 receiver or CC4 tuner/preamp; quartz-PLL direct-drive-capstan, multiple-pole, outer-rotor motor; repeat; mic/line mixing; 3 heads; 2 motors; Dolby B and C NR; music search; memory stop/play; LED meters; headphone jack. W&F standard speed 0.04% wrms, high speed 0.035%; FR (all types of tape) standard speed 20-20,000 Hz, high speed 25-22,000 Hz  $\pm$  2 dB; S/N (A-wtd, all types of tape) standard speed: >74 dBA with Dolby C, high speed: >76 dBA with Dolby C. 2 $\frac{3}{4}$  x 17 $\frac{1}{2}$  x 14 $\frac{7}{8}$  in; 19.6 lb . . . . . \$850



Aiwa AD-WX909

## AIWA

### AD-WX909 Autoreverse Double Cassette Deck

Features 3 heads with micro-grain-surface capstan; auto tape/source monitor selector; automatic demagnetizing system; Dolby HX Pro (deck 2); Dolby B and C (both decks); gold-plated CD inputs and line/CD front-panel selector; high-speed dubbing; soft-touch IC logic controls; digital tape counter; fine bias adjustment for chrome and normal tape ( $\pm$  20%); music sensor (both decks); continuous playback. W&F 0.0055% wrms (deck 1), 0.028% wrms (deck 2);



**D**ESPITE the mushrooming sales of compact disc players, the cassette deck remains one of the most popular hi-fi components. Late 1988 and early 1989 brought many new models into the stores offering more features for less money than ever before. Inexpensive dual-well decks and superior three-head machines are now common purchases.

Our listings here are necessarily selective because of space limitations. All of the information about features and performance specifications was supplied by the manufacturers and does not reflect independent testing or evaluation by STEREO REVIEW. Prices given are suggested retail; actual selling prices may vary. The manufacturers' addresses appear on page 100.

S/N 80 dB with Dolby C; FR 10-19,000 Hz (high-bias); 4 $\frac{3}{8}$  x 17 x 11 $\frac{3}{4}$  in; 14.5 lb . . . . . \$750

### AD-F780 Cassette Deck

Features 3 heads; recording and playback heads enclosed in a heavy-duty die-cast alloy head block; Anti-Modulation Tape Stabilizer (AMTS); Dolby HX Pro, B, and C; manual recording calibration system; feather-touch IC logic controls with cue and review; FL display; electronic tape counter with memory rewind and repeat; switchable MPX filter; auto tape and record-mute selectors; record/play timer standby. FR 20,000 Hz (metal); W&F 0.035% wrms; S/N 78 dB with Dolby C . . . . . \$450

### AD-WX808 Double Cassette Deck

Features autoreverse; Dolby HX Pro, B, and C; amorphous head; blank skip continuous playback; double-speed playback; IC logic control; digital tape counter; auto record mute; rec/timer standby. W&F 0.055% wrms; S/N (metal): 78 dB with Dolby C; FR 20-19,000 Hz (high bias). 5 x 17 x 12 $\frac{3}{8}$  in; 11 lb . . . . . \$400

### AD-R40 Autoreverse Cassette Deck

Features 2 heads; autoreverse; bi-directional, auto rewind in playback; Dolby HX Pro, B, and C; 0.3 sec autoreverse changing time. FR 20-18,000 Hz (metal); W&F 0.065% wrms; S/N 78 dB with Dolby C . . . . . \$200

## BANG & OLUFSEN

### Beocord 5500 Autoreverse Cassette Deck

Automated recording system with auto azimuth adjustments and auto Dolby B and C selection. Features auto and manual record level; 23-track programming; HX Pro headroom extension; motorized tape-loading drawer; black and silver finish; remote control by Master Control Panel. W&F <0.09% wrms; speed deviation  $\pm$  1.5%; S/N with chrome tape >64 dB Dolby B, >74 dB Dolby C; 16 $\frac{1}{2}$  x 3 x 12 $\frac{3}{8}$  in; 18.7 lb . . . . \$1,100

### Beocord 4500 Autoreverse Cassette Deck

Integrates with Beosystem 4500 for remote control from many rooms. Features black glass and mirrored aluminum; optional wall brackets; sensi-touch controls; remote control from Beolink 1000 remote; compatibility with 4500 turntable and CD player for coordinated recording; auto search; auto meter adjustment according to type of tape; sendust heads; auto demagnetization; HX Pro. W&F <0.09% wrms; speed deviation <1.5%; S/N with chrome tape >66 dB Dolby B; 16 $\frac{1}{2}$  x 2 $\frac{3}{4}$  x 9 $\frac{7}{8}$  in; 9.9 lb . . . . \$800

## DENON

### DRM-44HX Cassette Deck

Features Dolby HX Pro; Dolby B and C NR; dual-capstan transport; logic controls; computer controlled silent mechanism; direct-drive FG servo motor; non-slip reel drive; computer controlled bias fine-tuning; full auto-stop; SF combination head; dual power supply; MPX filter; 4-

# TAPE DECKS

digit tape counter with memory stop; FL peak-level meter; real-time counter; wired remote control; record pause/mute; one-touch record/standby; output level control; headphone jack. Includes wood side panels. FR 25-20,000 Hz  $\pm$  3 dB with metal tape; W&F 0.035% wrms; S/N >75 dB with Dolby C ..... \$650

### DRM-700 Cassette Deck

Two-head, three-motor, silent-mechanism cassette deck. Features Integral System (IS) remote compatibility; non-slip reel drive; Dolby B, C, HX Pro ..... \$550



*Denon DRM-700*

### DRM-34HR Cassette Deck

Three-head, three-motor cassette deck. Features wireless remote control; Dolby B, C, HX Pro; dual-capstan transport; full-logic control transport; computer controlled silent mechanism; non-slip reel drive; manual bias fine-tuning; full auto-stop; SF combination head; dual power supply; MPX filter switch; 4-digit tape counter with memory stop; FL peak level meter; balance control; record pause/mute; auto-space; one-touch record/standby; output level control; headphone jack. FR 25-20,000 Hz  $\pm$  3 dB with metal tape; W&F 0.045% wrms; S/N >73 dB with Dolby C ..... \$500

### DRM-24HX Cassette Deck

Three-head cassette deck with Dolby HX Pro, B, C and auto tape select. W&F .045% wrms; FR with metal tape 20-20,000 Hz  $\pm$  3 dB; S/N >73 dB with Dolby C NR at 3% THD; 4 1/2 x 17 1/8 x 11 1/4 in; 12.3 lb ..... \$450

### DRM-12HR Cassette Deck

Two-head tape deck compatible with Denon remote-control receivers. Features dual-channel recording amplifiers; Dolby HX Pro, B, C; music search FL display; auto tape selector; W&F .045% wrms; FR with metal 25-18,000 Hz  $\pm$  3 dB; S/N 72 dB with Dolby C at 3% THD; 4 1/2 x 17 1/8 x 11 1/4; 9.9 lb ..... \$350

### DRM-07 Cassette Deck

Features Dolby B and C NR; full-logic transport; manual bias fine-tuning; full auto-stop; SF record/play head; 3-digit tape counter; 6-segment peak-level LED display; balance control; one-touch record/standby; headphone jack. FR 40-16,000 Hz  $\pm$  3 dB with metal tape; W&F 0.057% wrms; S/N >73 dB with Dolby C ..... \$250

## DUAL BY ORTOFON

### CC5850 Cassette Deck

Two-head, 2-motor tape deck with Dolby B, C, and HX Pro; bias adjustment; defeatable MPX filter; FR 31-19,000 Hz  $\pm$  2 dB; black ..... \$350

## FISHER

### CRW980B Double Cassette Deck

Dual-well cassette deck with autoreverse and 6-function wireless remote control. Features full-logic autoreverse cassette mechanisms (1 re-

cord/play, 1 play only); metal tape capability; auto search; Dolby B and C NR; sequential play; one-touch, high-speed synchronized dubbing; FL record meters; auto tape selector; timer standby; MPX filter; headphone jack ..... \$400

### CRW880B Double Cassette Deck

Dual-well cassette deck with autoreverse. Features full-logic autoreverse cassette mechanisms (1 record/play, 1 play only); metal tape capability; auto search; Dolby B NR; sequential play; synchronized dubbing; 5-LED record meters; auto tape selector; timer standby; MPX filter; headphone jack ..... \$300

### CRW780B Double Cassette Deck

Dual-well cassette deck with autoreverse. Features autoreverse cassette mechanisms (1 record/play, 1 play only); metal tape capability; Dolby B NR; synchronized dubbing; 5-LED record meters; auto tape selector on deck 1; timer standby; MPX filter; headphone jack ..... \$250

## FOSTEX

### Model 460 4-Track Cassette Deck/Mixer

Features 2 tape speeds (1 7/8 and 3 3/4 ips); 8-input mixer; balanced XLR mic inputs; phantom power; parametric EQ; Dolby B or C NR; dedicated stereo mixer for 4-channel bus with individual gain and pan plus overall master level; 2 position autolocator; search to zero; auto repeat; trim control for mic and line levels; aux 1 level control; aux 2 with stereo gain and pan; monitor selector for aux 1, aux 2, two channel in, stereo master of tape/bus 1-4; independent level controls for monitor, phones, and solo; pitch control. W&F  $\pm$  0.1% wrms; FR 20-20,000 Hz (mixer), 40-18,000 Hz (recorder); THD 0.05% at 1kHz (mixer), 1.5% at 1 kHz (recorder); S/N 82 dB A-wtd with line, 66 dB A-wtd with mic (mixer), 70 dB A-wtd to 3% THD (recorder). 4% x 21 1/8 x 15 3/8 in; 24 lb ..... \$2,495

### Model 160 4-Track Cassette Deck/Mixer

Features 3 3/4 ips tape speed; Dolby C NR; 2 mic inputs; 4 line inputs; stereo bus; overdubbing and punch-in capability; aux bus with source/tape button for each track; dedicated sync input to track 4 for MIDI interface; straight line fader; selector switch (input/tape); high/low tone controls; assign button to mix bus or direct; pan control; aux send control with source/tape button; dedicated stereo bus with meters; pitch control; zero stop. Optional foot switch for remote punch-in/out. W&F  $\pm$  0.1% wrms; FR 20-20,000 Hz (mixer), 40-14,000 Hz (recorder); THD 0.05% at 1kHz (mixer), 1.5% at 1kHz (recorder); S/N 75 dB A-wtd with mic, 82 dB A-wtd with line (mixer), 70 dB A-wtd to 3% THD. 3 1/8 x 11 1/8 x 15 3/8 in; 7.7 lb ..... \$840

### X-30 4-Track Cassette Deck/Mixer

Features Dolby B & C NR; 4 independent tape outputs and stereo effects return; 1 7/8 ips; pitch control. Optional foot switch for remote punch-in/out. W&F  $\pm$  0.1% wrms; FR 20-20,000 Hz  $\pm$  2 dB (mixer), 40-12,500 Hz  $\pm$  3 dB (recorder); S/N 70 dB A-wtd. 12 7/8 x 2 1/2 x 9 in; 5.07 lb .. \$495

## HARMAN KARDON

### CD491 Cassette Deck

Features direct-drive, dual-capstan transport; 3 heads and 2 motors; Dolby B, C, HX Pro; bias fine trim with record and bias calibration test-tone oscillators; music search; output level control; memory stop/play; logic control; weighted

peak-hold LED meters; mic inputs; mic/line mixing; headphone jack; record mute; timer controllable. W&F 0.025% wrms; FR with all types of tape 20-24,000 Hz  $\pm$  3 dB; S/N (A-wtd with high-bias tape) 75 dB with Dolby C noise reduction ..... \$1,099

### TD392 Cassette Deck

Features 3 heads for monitoring during recording; sendust record head, narrow-gap high-density ferrite play head; 1 motor; Dolby B, C, HX Pro; solenoid logic transport; bias fine trim with test-tone oscillator; output level control; weighted LED meters; headphone jack; record mute. W&F 0.05% wrms; FR with all types of tape 20-22,000 Hz  $\pm$  3 dB; S/N (A-wtd with high-bias tape) 75 dB with Dolby C ..... \$779

### TD302 Cassette Deck

Features sendust record/play head and logic-controlled solenoid transport; Dolby B, C, HX Pro; bias fine tuning; output level control; record mute; headphone jack; defeatable MPX filter. W&F 0.05% wrms; record-play FR, ferric 20-21,000 Hz  $\pm$  3 dB, high-bias 20-21,000 Hz  $\pm$  3 dB, metal 20-21,000 Hz  $\pm$  3 dB; S/N (A-wtd with high-bias tape) 65 dB with Dolby B, 73 dB with Dolby C ..... \$549

### TD262 Cassette Deck

Features solenoid transport; Dolby HX Pro; Dolby B; Dolby C; amorphous record/playback head; bias fine trim; 7-LED peak metering system; record mute; memory; MPX filter; metal-tape capability; metal chassis ..... \$439



*Harman Kardon TD212*

### TD212 Cassette Deck

Features solenoid transport; Dolby B; Dolby C; hard-permalloy record/playback head; bias fine trim; 6-LED peak-metering system; record mute; memory; MPX filter; metal tape compatibility; metal chassis ..... \$329

## JVC

### TDV711BK Cassette Deck

Discrete 3-head cassette deck with computer controlled, dual-motor, full-logic transport mechanism. Features monitor-capability; SA head for record; amorphous head for play; closed-loop, dual-capstan drive with direct-drive motor; fine bias adjustment; 2 direct inputs; OFC plating on circuit boards; separate circuit construction; DC-configured amps on separate PC boards; low impedance voltage-tracking regulated power supply; high-rigidity chassis; Dolby HX Pro; Dolby B & C NR; MPX filter; FL digital peak display; level meters and digital counter; auto record mute; music scan; timer start; auto tape selector; headphone jack with adjustable level; gold-plated terminals; FR 15-20,000 Hz  $\pm$  3 dB (metal tape) ..... \$620

### TDR611BK Cassette Deck

Cassette Deck with Dolby HX Pro and Dolby B and C NR. Features MPX filter; autoreverse; 2-motor full-logic transport mechanism; SA head; direct input; LC-OFC coil in heads; separate circuit construction; low imp voltage-tracking;



# TAPE DECKS

high-rigidity chassis; FL digital peak display; level meters; digital counter; auto record mute; music scan; blank skip; A/B repeat; timer start; auto tape selector; headphone jack with adjustable level; FR 20-17,000 Hz  $\pm$  3 dB (metal tape) ..... \$480

### TDW999BK Double Cassette Deck

Features twin autoreverse transports with flip reverse heads; sequential or simultaneous recording of 2 tapes; computer controlled, full-logic mechanisms; high-speed editing with synchro dubbing; continuous play; Dolby B and C NR; LED level meters; dual electronic digital counters; auto/synchro record mute; music scan on both decks; timer start; auto tape selector; headphone jack ..... \$440

### TDW777BK Double Cassette Deck

Features twin autoreverse transports with flip reverse heads; computer controlled, full-logic mechanisms; high-speed editing with synchro dubbing; continuous play; Dolby B and C NR; LED level meters; dual electronic digital counters; auto/synchro rec mute; music scan on both decks; auto tape selector; headphone jack ..... \$380

### TDR411BK Cassette Deck

Cassette Deck with Dolby B and C NR. Features autoreverse with flip reverse head; computer controlled, 2-motor, full-logic mechanism; LED multi-peak level indicator for each channel; auto record mute; auto tape selector; headphone jack; tape running indicator ..... \$270

## KENWOOD

### KX-1100HX Cassette Deck

Features 3 motors; super Twin Loop Linear Exciter; Dolby B, C, and HX Pro; separate recording and bias level calibration controls; built-in signal generator; FR 20-19,000 Hz  $\pm$  3 dB (chrome); S/N 75 dB with Dolby C (metal); <0.6% THD at 1000 Hz (metal/normal); w&F 0.025% wrms; 7 $\frac{3}{8}$  x 4 $\frac{3}{8}$  x 12 $\frac{1}{2}$  in ..... \$650

### KX-97CW Double Cassette Deck

Features dual, autoreverse wells; bi-directional recording/playback; Dolby B and C NR; high-speed dubbing; full-logic computer controlled tape transport; program search; music search; auto recording mute; index scan; FR 20-16,000 Hz (chrome); S/N 72 dB with Dolby C; <0.6% THD at 1000 Hz (normal); w&F 0.08% wrms; 4 $\frac{3}{4}$  x 16 $\frac{1}{2}$  x 10 $\frac{1}{2}$  in; 11.9 lb. .... \$389



Kenwood KX-87CR

### KX-660HX Cassette Deck

Features Dolby B, C, and HX Pro; auto/manual bias adjustments; 12 point FL peak-level display; full-logic controls; program search blank search; index scan; front loading; FR 20-17,000 Hz  $\pm$  3 dB (chrome); S/N 74 dB with Dolby C (metal); <0.9% THD at 1000 Hz (metal); w&F 0.06% wrms; 17 $\frac{3}{8}$  x 4 $\frac{1}{2}$  x 12 $\frac{7}{8}$  in; 11 lb. . . \$300

### KX-87CR Autoreverse Cassette Deck

Features autoreverse: Dolby B and C NR; pro-

gram search; full-logic controls; 9-program music search; auto tape select; recording mute; index scan; FR 20-16,000 Hz (chrome); S/N 73 dB with Dolby C; <0.5% THD at 1,000 Hz (normal); w&F 0.06% wrms; 4 $\frac{1}{2}$  x 16 $\frac{1}{2}$  x 10 $\frac{3}{8}$  in; 8.4 lb ..... \$259

## LUXMAN

### K105 Autoreverse Cassette Deck

Features 3-motor, dual-capstan autoreverse transport system; rotating head assembly; patented Duo-Beta dual feedback-loop audio amplifier circuitry; LED diodes; Dolby B and C NR; dbx NR; music search; intro scan; blank search; blank skip; auto recording pause; FR 20-16,000 Hz  $\pm$  3 dB (CrO<sub>2</sub>); S/N 71 dB with Dolby C, 90 dB with dbx (metal); 0.7% THD at 1000 Hz (normal); w&F >0.05% wrms; 17 $\frac{1}{4}$  x 4 $\frac{1}{2}$  x 12 in; 9.9 lb ..... \$600

### K-112 Cassette Deck

Features full-logic controlled, single capstan transport system; dual-motor drive system; Hexalam 3-head assembly; OFC wire windings; tape monitoring; Dolby B, C, and HX Pro; patented Duo-Beta dual feedback-loop audio amplifier circuitry; LED diodes; electronic tape counter; bias adjustment; record mute/auto space; system remote jack; FR 20-20,000 Hz  $\pm$  3 dB (CrO<sub>2</sub>); S/N with Dolby C 72 dB (CrO<sub>2</sub>); 0.7% THD at 1000 Hz (normal); w&F 0.05% wrms; 17 $\frac{1}{4}$  x 4 $\frac{3}{8}$  x 12 $\frac{3}{8}$  in; 9.5 lb ..... \$550

### K-111 Cassette Deck

Features soft-touch, full-logic controlled, single capstan transport system; Hexalam record/play head; dual-motor drive system; Dolby B, C, and HX Pro; OFC inductors; motor driven head engagement; patented Duo-Beta dual feedback-loop audio amplifier circuitry; remote control capability; FR 30-17,000 Hz  $\pm$  3 dB (CrO<sub>2</sub>); S/N with Dolby C 70 dB (CrO<sub>2</sub>); 1.0% THD at 400 Hz (normal); w&F 0.06% wrms; 17 $\frac{1}{4}$  x 4 $\frac{3}{8}$  x 10 $\frac{1}{2}$  in; 7.7 lb ..... \$350

## MARANTZ

### PMD 430 Portable Cassette Deck

Features 3 heads; AC/DC stereo recording; Dolby B and dbx NR; bias fine tuning control; speaker and headphone jack with adjustable volume; 2 mic inputs; switchable limiter and mic attenuation; pitch control; illuminated VU meters. w&F 0.1% wrms; FR 35-14,000 Hz; S/N 60 dB; 2 x 9 x 6 $\frac{1}{2}$  in; 3.5 lb ..... \$600

### PMD 420 Portable Cassette Deck

Similar to PMD 430 except with 2 heads and only Dolby B NR ..... \$470

### SD565 Autoreverse Double Cassette Deck

Features autoreverse, record, and playback for both transports; 15-song quick music search; auto tape selector; high-speed dubbing; mixing; auto record mute; Dolby B and C NR; 2 heads; 2 motors; memory stop/play; LED meters; soft-touch controls; mic inputs; headphone jack. w&F 0.12% wrms; FR 35-15,500 Hz; S/N 65 dB. 4 x 16 $\frac{1}{2}$  x 10 $\frac{1}{4}$  in; 11.9 lb. .... \$430

### SD385 Autoreverse Double Cassette Deck

Features autoreverse for both transports; quick music search; auto tape selector; high-speed dubbing; Dolby B and C NR; 2 heads; 2 motors; memory stop/play; LED meters; soft-touch controls; headphone jack. w&F 0.3% wrms; FR 35-14,000 Hz; S/N 60 dB. 4 $\frac{1}{2}$  x 16 $\frac{1}{2}$  x 10 $\frac{1}{4}$  in; 8.8 lb ..... \$300

## MITSUBISHI

### M-T5100 Double Cassette Deck

Full-logic, dual-well cassette deck with autoreverse. Features high-speed synchronous one-touch dubbing; continuous playback of 2 cassettes; music search; repeat functions; blank skip; automatic muting; Dolby B and C; automatic bias calibration; remote control ... \$450

### M-T4100 Double Cassette Deck

Dual-well cassette deck featuring autoreverse; one-touch, high-speed dubbing from tape 1 to tape 2. 7-cassette programmable auto-changer; direct-access selection of tracks on any cassette; music search; blank-skip; repeat playback; synchronized recording; Dolby B NR; automatic tape selection switching; record mute. ... \$349

## NAD

### 6300 Cassette Deck

Features Dolby B, C, and HX Pro NR; play trim to adjust playback EQ; 3 heads; fine bias tuning; elapsed time counter; nonsymmetric dispersed-resonance dual-capstan transport; wireless remote; circuit to boost soft passages 20 dB. Speed accuracy  $\pm$  1%; w&F 0.03% wrms; FR 30-19,000 Hz  $\pm$  3 dB; S/N 78 dB with Dolby C ..... \$898

### 6100 Cassette Deck

Features play trim; circuit to boost soft passages 20 dB; Dolby HX Pro and Dyneq headroom extension; rack mountable ..... \$498

### 6240 Cassette Deck

Features play trim; Dyneq headroom extension; chrome and metal tape compatibility; bias fine tuning peak-reading LED meters. Speed accuracy  $\pm$  1%; w&F 0.06% wrms; FR 30-19,000 Hz  $\pm$  3 dB; S/N 77 dB with Dolby C ..... \$298



Nakamichi Dragon

## NAKAMICHI

### Dragon Cassette Deck

Microprocessor-controlled 3-head cassette deck with Dolby B and C NR. Features auto azimuth correction system; asymmetrical diffused-resonance transport; Super Linear Torque direct-drive motors; auto-retracting slot guides; tape-pad lifter; auto tape slack take-up; 2-speed cueing; 2-speed master fader; auto record pause; record-level and bias-calibration controls with 2-tone oscillator; dual-gap ferrite/sendust erase head; separate tape and EQ switches for ZX, SX, and EX cassettes; direct-coupled recording and playback amplifiers; left, right, master input levels; output level control; record mute; high-output headphone jack; defeatable infrasonic filter; 4-digit LED electronic counter with memory stop and repeat. w&F 0.019% wrms; FR 20-22,000 Hz  $\pm$  3 dB with ZX tape; S/N Dolby B and C 66/72 dB at 400 Hz with 3% THD (A-wid with ZX tape at 400 Hz, 0 dB); sep/crosstalk 37/60 dB at 1,000 Hz, 0 dB; input sens/imp 50 mV/50 kilohms line; output level/imp 1 V/2.2 kilohms line, 45 mW/8 ohm headphone jack. 17 $\frac{3}{8}$  x 5 $\frac{3}{8}$  x 11 $\frac{7}{8}$  in; 21 lb ..... \$2,195

## TAPE DECKS

### CR 7A Cassette Deck

Discrete cassette deck with asymmetrical diffused-resonance dual-capstan transport. Features 3 heads; 3 motors; auto bias/EQ; Dolby B and C NR; manual azimuth adjust; elapsed-time counter; remaining-time counter; output level control; memory stop/play; LED meters; soft-touch controls; headphone jack; rec mute; wireless remote; auto and manual tape/EQ selection; auto fade; auto repeat. W&F 0.027% wrms; FR, ferric 18-21,000 Hz  $\pm 3$  dB; S/N (A-wtd), metal 66 dB, Dolby B 72 dB; line-input sens for 0-dB reading 50 mV; line-output level with 0-dB indication 1,000 mV. 17 $\frac{1}{4}$  x 5 $\frac{3}{8}$  x 12 in. . . . \$1,595

### RX-505 Cassette Deck

Discrete cassette deck with unidirectional autoreverse to eliminate bidirectional azimuth error. Mechanism turns cassette over at end of side during record or playback. Features 3 heads; asymmetrical dual-capstan closed-loop transport; auto fade (20 secs before end of tape); Dolby B and C NR; DC servo motors; auto record pause; LED peak-level meters reading from -40 to +10 dB; dual-speed master fader; punch-in recording; memory stop/play; soft-touch controls. W&F <0.04% wrms; FR 20-20,000 Hz  $\pm 3$  dB all tape types; S/N >70 dB with Dolby C and metal tape; THD <0.9% with ZX tape; line-input sens for 0-dB reading 50 mV; line-output level with 0-dB indication 1,000 mV; 17 $\frac{3}{4}$  x 5 $\frac{3}{8}$  x 11 $\frac{1}{2}$  in; 22 lb. . . \$1,395

### CR 5A Cassette Deck

Discrete cassette deck with asymmetrical diffused-resonance dual-capstan transport. Features 3 heads; 3 motors; Dolby B and C NR; bias fine tuning control; output level control; memory stop/play; LED meters; soft-touch controls; headphone jack; record mute; auto repeat; dual speed-master fader control; independent L/R. W&F 0.027% wrms; FR, ferric 18-21,000 Hz  $\pm 3$  dB; S/N 72 dB A-wtd with Dolby C; line-input sens for 0-dB reading 50 mV; line-output level with 0-dB indication 1,000 mV. 17 $\frac{1}{8}$  x 5 $\frac{3}{8}$  x 12 in; 18 lb, 2 oz. . . . \$1,095

### CR-4A Cassette Deck

Discrete 3-head system. Features asymmetrical dual-capstan direct-drive transport with FG-servo capstan motor; manual bias and level calibration; built-in test signals; Dolby B and C NR; independent tape and EQ selection; 13-segment 50 dB peak-level meters; one-touch rec/pause; 4-digit LED counter with memory stop and auto repeat; calibration; concentric record level and balance control; output level; gold-plated input, output, and headphone jacks; OFC wiring and copper-plated chassis; optional remote control; FG servo, brushless, slotless, coreless motor; DC motor mechanism. W&F <  $\pm 0.048\%$  wrms; FR 20-20,000 Hz  $\pm 3$  dB; with Dolby C >72 dB; THD <0.8%; sep > 37 dB; 17 x 4 x 10 $\frac{1}{2}$  in; 13 lb. . . . \$995

### CR-3A Cassette Deck

Discrete 3-head system. Features asymmetrical dual-capstan transport; bias fine tuning control; Dolby B and C NR; independent tape and EQ selection; 13-segment 50 dB peak-level meters; 4-digit LED counter with memory stop and auto repeat; record mute; source/tape, stop, play, pause and record indicators; concentric record level and balance controls; output level control; gold-plated input/output jacks; headphone jack; extra-heavy chassis; optional remote control; DC servomotor; DC motor mechanism. W&F  $\pm 0.06\%$  wrms; FR 20-20,000 Hz  $\pm 3$  dB; S/N Dolby C >72 dB; THD <0.9%; sep > 37 dB; 17 x 4 x 10 $\frac{1}{2}$  in; 12 lb, 13 oz. . . . \$795

### CR-2A Cassette Deck

Microprocessor-controlled silent-mechanism transport; Dolby B and C NR with defeatable MPX filter; bias fine tuning control; independent tape and EQ selection; 37 dB peak-level meters; 4-digit LED counter; memory stop; auto repeat; record/playback timer; record mute; concentric record level and balance controls; output level control; headphone jack; optional remote control; DC servo motor; DC motor mechanism. W&F <  $\pm 0.11\%$  wrms; FR 20-20,000 Hz; S/N with Dolby C >70 dB; THD < 1.0%; sep > 36 dB; 17 x 4 x 10 $\frac{1}{2}$  in; 11 lb, 14 oz. . . . \$475

### CR-1A Cassette Deck

Microprocessor-controlled silent-mechanism transport; Dolby B and C NR with defeatable MPX filter; independent tape and EQ selection; 37 dB peak-level meters; 3-digit mechanical counter; memory stop; auto repeat; record/playback timer; concentric record level and balance controls; headphone jack; DC servo motor; DC motor mechanism; W&F <  $\pm 0.11\%$  wrms; FR 20-20,000 Hz; with Dolby C >70 dB; THD <1.0%; sep > 36 dB; 17 x 4 x 10 $\frac{1}{2}$  in; 11 lb, 14 oz. . . . \$349

## NIKKO

### D-600 Cassette Deck

Features bi-polar power supply and direct-coupled circuitry; twin-motor IC-logic transport control system; Dolby B, C, and HX Pro; hard permalloy record/playback head; electronic tape counter with index and tape-run-time modes; 2-color left and right peak program level meters; bias fine tuning control; record mute with auto spacer; master recording level control with left and right channel preset controls; auto tape type selection; MPX filter; headphone jack. W&F 0.006% wrms; FR 20-20,000 Hz (chrome); S/N with Dolby C, over 1 kHz 80 dB A-wtd; 3% THD. 17 $\frac{1}{8}$  x 4 $\frac{7}{8}$  x 10 $\frac{3}{4}$  in; 11.02 lb. . . . \$600

### D-400 Cassette Deck

Features bi-polar power supply and direct-coupled circuitry; twin-motor IC-logic transport control system; Dolby B, C, and HX Pro; hard permalloy record/playback head; electronic tape counter with index and tape-run-time modes; 2-color left and right peak program level meters; bias fine tuning control; record mute with auto spacer; master recording level control with left and right channel preset controls; auto tape type selection; MPX filter; headphone jack. W&F 0.006% wrms; FR 20-18,000 Hz (chrome); S/N with Dolby C, over 1 kHz 74 dB A-wtd; 3% THD. 17 $\frac{1}{8}$  x 4 $\frac{7}{8}$  x 10 $\frac{3}{4}$  in; 11.02 lb. . . . \$500



*Onkyo TA-RW470*

## ONKYO

### Integra TA-2090 Cassette Deck

Computer-controlled cassette deck with Dolby B, C, and dbx NR, Dolby HX Pro. Features 3 heads; 3 motors; auto bias/EQ; dual capstans; bias fine-tuning control; direct drive; elapsed-time counter; remaining-time counter; music search; output-level control; memory stop/play; mic input; headphone jack; record mute; record

calibration controls; sendust heads; MPX filter; fluorescent meters; 2-color peak-hold indicators. Optional remote control and side panels. W&F 0.02% wrms; FR 25-17,000 Hz  $\pm 3$  dB (Type I tape), 25-19,000 Hz  $\pm 3$  dB (Type II tape), 25-21,000 Hz  $\pm 3$  dB (Type IV tape); S/N (Type IV tape) 60 dB no NR, 70 dB Dolby B, 80 dB Dolby C, 87 dB dbx. 17 $\frac{3}{4}$  x 3 $\frac{3}{8}$  x 15 $\frac{1}{2}$  in. . . . \$950

### TA-2800 Cassette Deck

Three-head tape deck. Features computer-controlled, 3-motor silent-mechanism transport; Dolby B and C NR; Dolby HX Pro; automatic Accu-Bias system; record calibration; real-time counter; switchable MPX filter; forward and reverse AMCS remote compatible. . . . \$650

### TA-RW490 Double Cassette Deck

Features autoreverse; high-speed and real-time dubbing; continuous recording; Dolby B and C NR; Dolby HX Pro; 2 real-time tape counters; program music search for both decks; headphone jack; mic input. . . . \$630

### TA-RW470 Double Cassette Deck

Features computer-controlled transports with autoreverse and 2 motors; Dolby B and C NR; real-time counter; standard and high-speed dubbing; continuous play; AMCS; remote compatible. . . . \$500

### TA-2600 Cassette Deck

Three-head tape deck. Features computer-controlled 3-motor silent-mechanism transport; Dolby B and C NR; Dolby HX Pro; Accu-Bias system; real-time counter; switchable MPX filter; forward AMCS; remote compatible. . . . \$480

### TA-R200 Autoreverse Cassette Deck

Autoreverse cassette deck with 2 heads; full-logic controls; Dolby B, C, HX Pro; Accu-Bias system; auto tape selector; 2-mode repeat; remote compatible. . . . \$260

## PARASOUND

### D/HX-600 Cassette Deck

Features Dolby B, C, and HX Pro; sendust-alloy head; LED peak and peak storage meters; polystyrene capacitors and other hand-selected parts; single DC servo motor; soft-touch controls. S/N 75 dB with metal tape and Dolby C. 17 $\frac{1}{4}$  x 4 $\frac{1}{2}$  x 11 in; 12 lb. . . . \$360

### D/HX-550r Autoreverse Cassette Deck

Features LED peak metering; slider controls for recording level; polystyrene capacitors; soft-touch controls; Dolby B, C, and HX Pro; FR 20-20,000 Hz; S/N 77 dB (metal); <0.1% THD; 17 $\frac{1}{4}$  x 4 $\frac{1}{2}$  x 11 in; 11.5 lb. . . . \$330

## PHILIPS

### FC 567 Dual Cassette Deck

Features dual cassette wells; autoreverse; logic controls; playback EQ with digital filtering; high-speed dubbing; 4 motors; continuous playback and recording for up to 3 hours; dual azimuth settings; double-gap erase heads. FR 30-18,000 Hz (chrome); S/N 60 dB (chrome); W&F <0.04% wrms; 16 $\frac{3}{4}$  x 4 x 10 $\frac{1}{2}$  in; 11.75 lb. . . . \$479

### FC 566 Cassette Deck

Same as above except 2 motors; 10 lb. . . . \$379

## PIONEER

### Elite CT-91 Cassette Deck

Features Dolby B, C, and HX Pro; logic controls; 3 heads; 2 motors; 3 power supplies; bias



# Nothing comes remotely close.



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## TAPE DECKS

fine tuning; anti-vibration design; dual-capstan; amorphous head; FL display; remote-control compatibility; electronic real-time tape counter; power eject; auto monitor; FR 20-22,000 Hz; S/N 80 dB; W&F 0.024% wrms. 5¼ x 16½ x 14½ in; 21 lb, 3 oz. .... \$950

### CT-S800 Cassette Deck

Features 3 heads; 2 motors; remote control; logic controls; Dolby B, C, and HX Pro; automatic tape selector; closed-loop dual-capstan mechanism; cassette stabilizer; copper-plated honeycomb chassis; 3 power supplies; 15-segment level display; electronic real-time tape counter; auto record muting between tracks; 15-track music search; one-touch tape return; auto monitor and power eject ..... \$750

### CT-W900R Double Cassette Deck

Features Dolby HX Pro; two autoreverse transports; two-sided continuous recording of each tape; relay play; cassette stabilizer; separate keys for operating each deck; remote-control compatibility; blank search; blank skip; skip search; automatic recording mute ..... \$650

### CT-W700R Double Cassette Deck

Features Dolby HX Pro; playback on transport 1 and recording or playback on transport 2; relay play; cassette stabilizer; separate keys for operating each deck; remote control compatibility; blank search; blank skip; automatic recording mute ..... \$435

### CT-S600 Cassette Deck

Features 2 heads; logic controls; Dolby B, C, and HX Pro; cassette stabilizer; copper-plated honeycomb chassis; 15-segment level display; electronic real-time tape counter; 15-track music search; one-touch tape return; auto monitor and power eject ..... \$375

### CT-1280WR Double Cassette Deck

Features autoreverse playback and recording on deck 2; autoreverse playback on deck 1; Dolby B and C; relay play; high-speed dubbing; logic controls; music search; skip search; auto tape selector; record mute. Compatible with Pioneer's SR unified remote control. W&F <0.09% wrms; S/N 57 dB no NR. 16½ x 4¾ x 10½ in ... \$360

## PROTON

### 740 Autoreverse Cassette Deck

Autoreverse cassette deck with logic controls and Dolby B, C, and dbx NR. Features 2 heads; 1 motor; auto bias/EQ; elapsed-time counter; music search; output level control; memory stop/play; LED meters; soft-touch controls; mic inputs; headphone jack; rec mute; sleep timer; 9-program memory selection; W&F 0.05% wrms; FR 25-18,000 Hz ± 3 dB (chrome); S/N (A-wtd) with Dolby C 71.5 dB (chrome); <1.8% THD (chrome); mic input sens 0.35 mV; 16½ x 4¾ x 10½ in; 11.22 lb. .... \$349

### AD-300 Autoreverse Cassette Deck

Autoreverse cassette deck with Dolby B and C NR. Features logic controls; tape counter; peak-reading level indicators; memory stop/off/play; W&F 0.05% wrms; MPX filter; auto bias selector; FR 40-16,000 Hz ± 3 dB (chrome); S/N with Dolby C 70 dB (chrome); <1.8% THD (chrome); optional remote control. .... \$319

### AD-200 Cassette Deck

Features one-button recording; Dolby B and C NR; defeatable MPX filter; LED peak-level indicators for record and playback; tape counter; headphone jack; locking rewind and fast forward;

ward; tape selector. W&F; 0.08%; line-input sens 80 mV; FR 40-15,000 Hz ± 3 dB (chrome); 16½ x 4 x 10 in; 8.8 lb. .... \$229

## RCA

### MTR225 Double Autoreverse Cassette Deck

Dimensia dual-well deck with remote-control. Features on-screen status when used with Dimensia monitor; Dolby B and C NR; high-speed dubbing; soft-touch electronic controls; microprocessor control; peak meters; random-access programming; scan-and-play system; automatic tape cueing; auto tape selection; status display; tape mode display; record-level control. S/N 70 dB with Dolby C; W&F <0.07%. 14½ x 5 x 10½ in ..... \$399



Realistic SCT-84

## REALISTIC BY RADIO SHACK

### SCT-84 Double Cassette Deck

Features single or multiple repeat; auto tape selector; synchro-start dubbing; auto stop; record mute button; permalloy record/play head; ferrite erase head; Dolby B and C NR; high-speed dubbing; metal tape compatibility; mic and headphone jacks; 2-color 8-LED peak-level meters; sequential play; soft-touch controls. W&F 0.06% wrms; FR 20-15,000 Hz ± 3 dB (chrome); S/N 70 dB with Dolby C; 1.0% THD; 5 x 17 x 12½ in. .... \$260

### SCT-83 Autoreverse Cassette Deck

Features music search; Dolby B and C NR; solenoid operation; plays 1 side, both sides, or repeats continuously; metal tape compatibility; mic and headphone jacks; intro scan; W&F 0.06% wrms; FR (± 3 dB) high bias 40-15,000 Hz; S/N 70 dB with Dolby C. .... \$220



Revox B215-S

## REVOX

### B215-S Cassette Deck

Employs 3 microprocessors to control bias, recording level, EQ, and tape transport. Features a real-time counter that computes elapsed time on partially wound tapes; 3 heads; 4 motors, Dolby B, C, and HX Pro; digital memory to store bias and recording levels; EQ settings for 6 tape formulations; manual or auto record-level setting; die-cast transport chassis; azimuth-stable pivoting headblock; 2 programmable buttons for track location; loop mode. W&F 0.1% wrms; FR ferric 30-18,000 Hz ± 3 dB; S/N (A-

wtd) high bias: 72 dB with Dolby C; line-input sens for 0-dB reading 50 mV; line output level with 0-dB indication 775 mV; 18½ x 6½ x 13½ in ..... \$2,800

## ROTEL

### RD870 Cassette Deck

Features Dolby B, C, HX Pro; sendust record/playback head; 2 motors; bias fine tuning; direct drive; LED meters; soft-touch controls; mic and headphone jacks; W&F 0.05% wrms; FR metal 30-20,000 Hz ± 3 dB ..... \$499

### RD835 Cassette Deck

Features Dolby B and C; sendust record/playback head; ferrite-core erase head; soft-touch controls; LED meters; mic inputs; DC servo motors; headphone jack; W&F 0.08% wrms; FR high bias 30-17,000 Hz ± 3 dB; S/N high bias: 72 dB Dolby C. 17 x 4½ x 10½ in; 9 lb ..... \$249

### RD855 Cassette Deck

Features logic controls. 2 motors. Dolby B and C; and remote control ..... \$379

## SAE

### C102 Cassette Deck

Features tape transport encased in electronic sliding drawer; logic controls; 2 heads; 2 motors; Dolby B and C NR; manual azimuth adjustment; elapsed-time counter; remaining-time counter; music search; blank skip; memory stop/play; LED meters; record mute; sendust heads. W&F 0.06% wrms; FR 20-20,000 Hz for all types of tape; S/N (high bias): 74 dB with Dolby C; line-input sens for 0-dB reading 70 mV; line output level with 0-dB indication 650 mV; 19 x 3½ x 14 in; 18 lb ..... \$499



Sansui D-X301i

## SANSUI

### D-X701 Cassette Deck

Features 3 heads; 2 motors; dual-capstan transport mechanism; logic controls; Dolby B and C NR; separate record and playback DC amplifiers; fine bias adjustment; headphone jack with adjustable level; record/pause; auto-monitor; memory stop; 15-track automatic music program search; FL display. FR 30-20,000 Hz; W&F 0.035% wrms; S/N 60 dB ..... \$650

### D-X501 Cassette Deck

Features Dolby B and C NR; 2 heads; 2 motors; logic controls; record cancel; headphone jack with adjustable level; record/pause; auto-monitor; memory stop; 15-track automatic music program search; FL display. FR 30-18,000 Hz; W&F 0.045% wrms; S/N 58 dB ..... \$450

### D-X301iR Autoreverse Cassette Deck

Features autoreverse; 20-track automatic music search; logic controls; Dolby B, C, and HX Pro; automatic bias adjustment; record/play timer; remote control compatibility; record cancel; music scan; headphone jack with adjustable level; memory stop. FR 20-19,000 Hz; W&F 0.5% wrms; S/N 72 dB with Dolby C. .... \$390





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Now you can hear the traditionally natural Advent<sup>®</sup> sound in a totally different environment. Outside.

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## TAPE DECKS

### D-3000WR Double Cassette Deck

High-speed dubbing autoreverse deck. Features LED meters for each channel; logic, soft-touch controls; Dolby B and C NR; automatic program search; record mute. W&F 0.09% wrms; FR metal 20-17,000 Hz; S/N metal 72 dB with Dolby C; 17 x 5 x 9 in.; 9.9 lb. .... \$375

### D-X301i Cassette Deck

Features bidirectional music scan; 20-song music search; 2 repeat modes; Dolby B, C, and HX Pro; logic controls; fine bias adjustment; MPX filter; tape lead-in; auto record mute; memory stop; RZ universal remote compatibility; record/playback timer; peak meters; electronic tape counter; black finish. FR 30-20,000 Hz  $\pm$  3 dB; S/N 75 dB with Dolby C; W&F 0.05% wrms; 17 x 5 x 11 $\frac{3}{4}$  in.; 10 lb. .... \$350

### D-1000W Double Cassette Deck

High-speed dubbing deck with automatic music program search. Features 2 logic, computer-controlled transports; Dolby B and C NR; manual level controls; level meters. W&F 0.09% wrms; FR metal 20-17,000 Hz; S/N metal 74 dB. \$300

## SCOTT

### DD696 Double Autoreverse Cassette Deck

Dual-well deck with wireless remote control and Dolby B, C, and dbx NR. Features autoreverse; logic controls; 9-selection auto program search; relay play function; high-speed dubbing; bias fine tuning. 17 $\frac{1}{8}$  x 5 $\frac{1}{4}$  x 10 in. .... \$430

### D4002 Double Autoreverse Cassette Deck

Autoreverse, dual-well deck with Dolby B, C and dbx NR. Features logic transport mechanisms; 9-selection music search; high-speed dubbing; dual record level controls; fine bias adjustment; relay play. Compatible with STA-4000 remote control. 17 $\frac{1}{8}$  x 5 $\frac{1}{4}$  x 10 in. .... \$350

### DD900 Double Autoreverse Cassette Deck

Features Dolby B NR; autoreverse record/playback (deck 1); autoreverse play (deck 2); high-speed dubbing; synchro dubbing; continuous play; 9-selection music search; soft-touch controls; normal, metal, and chrome tape selector; dual record-level controls; headphone jack. 17 $\frac{1}{8}$  x 5 x 7 $\frac{1}{2}$  in. .... \$250



*Scott DD900*

## SHARP

### RT-W800 Double Cassette Deck

Dual-well deck with autoreverse, high-speed-dubbing, and Dolby B NR. Features soft-touch controls; auto program search; LED peak-level meters; metal-tape compatibility; 2 heads; 1 motor; music search; output-level control; mic and headphone jacks. W&F 0.08% wrms; FR high bias 40-14,000 Hz  $\pm$  3 dB. 17 x 4 $\frac{7}{8}$  x 9 $\frac{1}{2}$  in. .... \$250

## SHERWOOD

### DS-7000R Cassette Deck

Features microprocessor supervised, soft-touch logic control; 3 heads; 2 motors; Dolby B, C, and HX Pro; fine bias control; digital readout; auto tape selector; separate left/right rec level

adjustment; output-level control; microphone and headphone jacks; 13-segment rec level indicators; record mute button; timer switch; 2-line input jacks with record cross fader; air-damped soft-eject cassette door. Optional Digi-Link remote control. FR 30-18,000 Hz; S/N 75 dB with Dolby C; 40 dB channel sep at 1 kHz; W&F 0.05% wrms. 5 x 17 $\frac{3}{8}$  x 11 in. .... \$470



*Sherwood DS-7000R*

### DD-1230R Double Autoreverse Cassette Deck

Features microprocessor supervised, soft-touch, logic control; autoreverse recording; Dolby B and C NR; digital tape counter; normal and high-speed dubbing; bidirectional auto music search; auto tape selector; uninterrupted dubbing; synchronized, one-touch dubbing; relay play with alternate playback deck; continuous play; record-mute button; separate record-level and balance control; 13-segment record-level indicators; timer-record and start; illuminated tape-direction indicators; air-dampened soft-eject cassette doors; 3 playback modes. Optional Digi-Link remote control. FR 30-16,500 Hz; S/N 75 dB with Dolby C; 40 dB channel sep at 1 kHz; W&F 0.12% wrms. 4 $\frac{3}{4}$  x 17 $\frac{3}{8}$  x 8 $\frac{7}{8}$  in. .... \$300

### DS-1630R Autoreverse Cassette Deck

Features microprocessor supervised, soft-touch, logic control; autoreverse; Dolby B, C, and HX Pro; digital readout; auto tape selector; 2-line input jacks with record cross fader; auto music search system; 3 playback modes; mic and headphone jacks; record-level and balance controls; output-level control; 12-segment record-level indicators; record mute button; relay play; continuous play; air-damped soft-eject cassette door; timer switch. Optional Digi-Link remote control. FR 30-18,000 Hz; S/N 75 dB with Dolby C; 40 dB channel sep at 1 kHz; W&F 0.09% wrms. 5 x 17 $\frac{3}{8}$  x 11 in. .... \$290

## SONY

### TC-WR11ES Double Cassette Deck

Dual-well deck with twin/sequential recording. Features 4 motors (2 per transport); soft-touch controls; autoreverse; high-speed dubbing; Dolby B and C NR on both decks; relay play; auto pause; linear real-time counter; automatic music sensor; blank skip; automatic tape type selection; remote control; 210 kHz super bias. FR 20-20,000 Hz  $\pm$  3 dB .... \$800

### TC-K700ES Cassette Deck

3-head deck with drive system that separates control circuitry from audio circuitry. Features dual-mono DC amp design; LC-OFC laser amorphous heads; Dolby B and C NR; memory stop/play; auto playback-EQ selector; MPX filter switch; auto play; auto space; record mute; timer record and playback; linear counter; counter subtract function for remaining time indication; headphone jack with adjustable level. W&F 0.025% wrms; FR 20-20,000 Hz  $\pm$  3 dB (no NR, Type IV tape); S/N 60 dB (no NR, Type IV tape). 17 x 5 x 13 $\frac{3}{4}$  in. .... \$700

### TC-WR900 Double Cassette Deck

Dual-well deck with autoreverse and recording on both decks. Features 4 motors (2 per deck); Dolby B and C NR; laser-amorphous heads; relay play; dubbing-level control; automatic music sensor; blank skip; electronic linear counter; direct-coupled electronics; remote capability. FR 30-18,000 Hz; W&F 0.05% wrms. 4 $\frac{3}{8}$  x 17 x 12 $\frac{1}{8}$  in.; 12.5 lb. .... \$700

### TC-RX80ES Cassette Deck

Features 2-motor transport with DC-servo motor for capstan and separate motor for reel hubs; laser-amorphous head; autoreverse; Dolby B, C, and HX Pro; 5-band spectrum analyzer; real-time counter; record-level calibration with 10-second test tone; variable bias; auto tape selection; auto music sensor; blank skip; music scan; auto space; record mute; timer rec/play; 160-kHz Super Bias circuitry; remote-control capability. FR 20-20,000 Hz  $\pm$  3 dB. .... \$600

### TC-RX60ES Cassette Deck

Features 2-motor transport with DC-servo motor for capstan and separate motor for reel hubs; laser-amorphous head; autoreverse; Dolby B, C, and HX Pro; linear real-time counter; automatic tape selection; automatic music sensor; blank skip; music scan; auto space record mute; timer rec/play; 160 kHz Super Bias circuitry; remote control capability. FR 20-20,000 Hz  $\pm$  3 dB. .... \$450



*Sony TC-K700ES*

### TC-WR800 Double Cassette Deck

Dual-well deck with recording on one deck. Features 2 motors (1 per deck); autoreverse on both decks; Dolby B and C NR on both decks; high-density heads on both decks; relay play; automatic music sensor; blank skip; direct-coupled electronics; remote control capability. FR 30-15,000 Hz; W&F 0.09% wrms. 4 $\frac{3}{8}$  x 17 x 10 in.; 10 lb. .... \$350

### TC-RX50ES Cassette Deck

Features laser-amorphous head; soft-touch transport; autoreverse; Dolby B and C NR; electronic digital tape counter; 3-position tape selector; high-speed cue; auto space record mute; timer rec/play; mic inputs; 160 kHz Super Bias circuitry; remote control capability. FR 20-20,000 Hz  $\pm$  3 dB. .... \$300

### TC-RX400 Cassette Deck

Autoreverse deck with Dolby B and C NR. Features remote control capability; soft-touch logic controls; direct-coupled electronics; high-density heads; mic inputs. FR 30-15,000 Hz; W&F 0.09% wrms. 4 $\frac{3}{8}$  x 17 x 10 in.; 8 $\frac{3}{4}$  lb. .... \$240

## TANDBERG

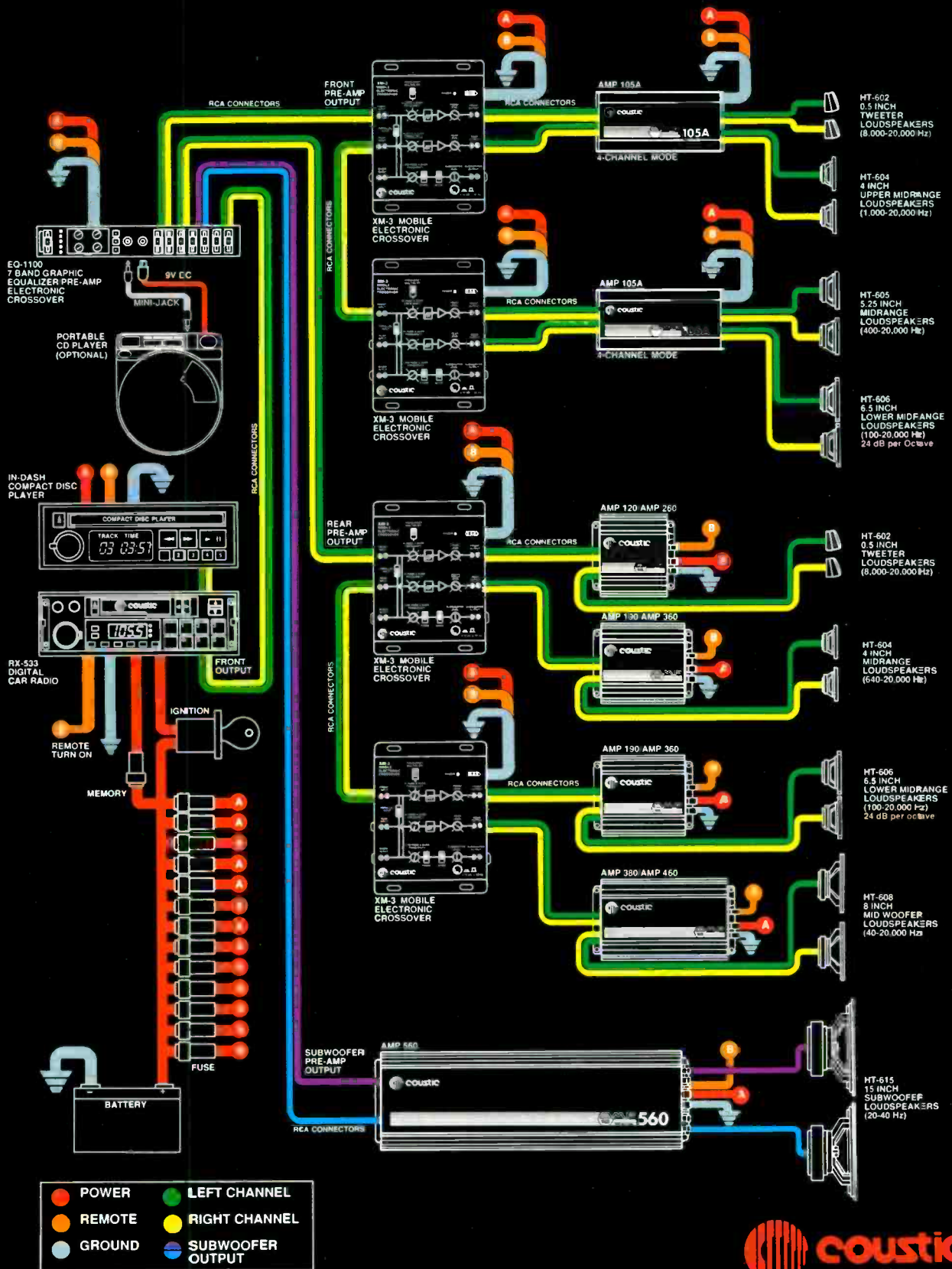
### TCD 3014A Cassette Deck

Three-head deck controlled by 8-bit, 32-K. E-PROM microprocessor. Features 4 servo-controlled tape-transport motors; scan to play; scan to stop; auto rewind; auto replay; record/playback timer; Dolby B and C NR; azimuth alignment; bias adjustment; built-in test system; lin-



# Double Scoop

When one is plainly not enough ...indulge!



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# TAPE DECKS

ear motor to position heads and pinch-rollers to tape; instant record/playback; Dyneq headroom extension; Actilinear II headroom-extension system; peak-reading meters; cue and review at half-speed; real time/real revolution counter; LED indication of all transport functions. Wireless remote control, rosewood side panels, and rack mounts available ..... \$2,500



Teac R-616X

## TEAC

**Esoteric R-919X Autoreverse Cassette Deck**  
Three-head cassette deck with Dolby B, C, HX Pro, and dbx. Features bidirectional rec/playback and autoreverse/repeat; 3-motor IC-logic transport control silent mechanism; double Acculign rotating-head system; hysteresis-tension servo-control system; wireless remote control; separate bias and level controls for left and right; block repeat; intro check; blank scan. FR 20-25,000 Hz  $\pm 3$  dB (metal); w&F 0.03% wrms; S/N 92 dB with dbx. 17 $\frac{1}{8}$  x 4 $\frac{7}{8}$  x 11 in; 13 lb. .... \$830

### Esoteric V-970X Cassette Deck

Three-head cassette deck with Dolby B, C, HX Pro, and dbx. Features 3-motor IC-logic transport control silent mechanism; closed-loop dual capstan drive; discrete separately adjustable record and play heads with LC-OFC winding; hysteresis-tension servo-control system; wireless remote control; separate bias and level controls for left and right. FR 25-20,000 Hz  $\pm 3$  dB (metal); w&F 0.025% wrms; S/N 92 dB with dbx. 17 $\frac{1}{8}$  x 4 $\frac{7}{8}$  x 11 in. .... \$800

### W-990RX Double Cassette Deck

Bidirectional continuous rec/playback double deck. Features bidirectional double deck parallel recording; dual three-motor IC-logic control mechanisms; wireless remote control; sync reverse capability; one-touch high/normal-speed dubbing; intro check memory dubbing; random memory program dubbing; reverse edit function; cobalt amorphous LC-OFC rec/play head; Dolby B, C, dbx NR; blank scan; automatic tape selector. FR 30-19,000 Hz  $\pm 3$  dB (metal); w&F 0.05% wrms; S/N 91 dB with dbx. 17 $\frac{1}{8}$  x 4 $\frac{7}{8}$  x 11 $\frac{1}{2}$  in; 12 $\frac{3}{4}$  lb. .... \$800

### R-616X Autoreverse Cassette Deck

Bidirectional rec/playback deck. Features auto repeat; two-motor IC-logic control transport; double Acculign rotating-head system; cobalt amorphous LC-OFC rec/play head; Dolby B, C, and HX Pro; block repeat; 15-selection random memory programming; bias fine tuning; blank scan; headphone jack with level control; L & R recording level controls. FR 20-19,000 Hz (metal); w&F 0.05% wrms; S/N 90 dB with dbx. 17 $\frac{1}{8}$  x 4 $\frac{3}{8}$  x 11 $\frac{3}{8}$  in; 11 lb. .... \$500

### V-670 Cassette Deck

Two-motor, three-head cassette deck with auto monitor. Features IC-logic control transport; double Dolby B, C, and HX Pro; bias fine tuning; bi-polar power supply/direct-coupled circuitry; rec mute with auto spacer; hard permalloy rec/playback head; multi-function FL display; electronic tape counter with index and tape-run time modes; L & R peak-level meter;

master recording-level control with L & R presets; auto tape selector; MPX filter; timer rec/play function. FR 20-21,000 Hz (metal); w&F 0.06% wrms; S/N 80 dB with Dolby C. 17 $\frac{1}{8}$  x 4 $\frac{7}{8}$  x 10 $\frac{3}{4}$  in; 11 lb. .... \$450

### V-570 Cassette Deck

Features two motors; Dolby B, C, and HX Pro; IC-logic control transport; bias fine tuning; bi-power supply/direct-coupled circuitry; rec mute with auto spacer; hard permalloy rec/playback head; multi-function FL display; electronic tape counter with index and tape-run time modes; L & R peak-level meter; master recording-level control with L & R presets; auto tape selector; MPX filter; timer rec/play function. FR 20-19,000 Hz (metal); w&F 0.06% wrms; S/N 74 dB with Dolby C. 17 $\frac{1}{8}$  x 4 $\frac{7}{8}$  x 10 $\frac{3}{4}$  in. .... \$350

### W-450R Double Cassette Deck

Bidirectional continuous-playback deck. Features bidirectional recording on deck II; Dolby HX Pro on deck II; Dolby B & C NR; rotating-head reverse system; sync reverse; sync dubbing; normal/high-speed dubbing; one program skip function in deck II; L & R microphone inputs on deck II; auto tape selector; peak-level meter; headphone jack; timer rec/play. FR 30-17,000 Hz (metal); w&F 0.06% wrms; S/N 70 dB with Dolby C. 17 $\frac{1}{8}$  x 4 $\frac{7}{8}$  x 10 $\frac{3}{4}$  in. .... \$290

### R-455CHX Autoreverse Cassette Deck

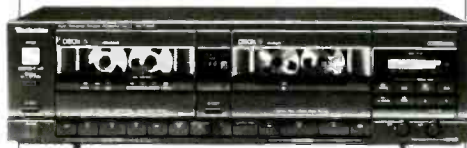
Bidirectional rec/playback deck. Features autoreverse/repeat; accurate rotating-head reverse system; Dolby B, C, and HX Pro; one-program skip function; 2-color peak-level meter; rec mute function; output-level control for line and headphone outputs; headphone jack; timer rec/play function. FR 30-17,000 Hz (chrome); S/N 70 dB with Dolby C. 17 $\frac{1}{8}$  x 4 $\frac{7}{8}$  x 8 $\frac{1}{2}$  in; 6.61 lb. .... \$220

**R-445.** Same as above except no HX Pro or output-level control. .... \$210

## TECHNICS

### RS-T80R Double Cassette Deck

Four-head, two-motor deck with autoreverse, record, and playback for both transports. Features 4 reverse modes; parallel and 3-hour series recording on both transports; series playback; synchro start; FL display; auto bias/EQ; soft-touch controls; remote-control compatibility with some Technics receivers; high-speed editing; Dolby B, C, and dbx NR; elapsed-time counter; music select; headphone jack. w&F 0.08% wrms; S/N high bias 75 dBA with Dolby C. 17 x 4 $\frac{3}{8}$  x 11 in; 11.7 lb. .... \$680



Technics RS-T330R

### RS-B905 Cassette Deck

Three-head deck with NR circuitry for decoded monitoring while in record mode. Features closed-loop dual-capstan transport; Dolby B, C, HX Pro, and dbx; 2-motor transport; FL display; bias control; record calibration tone generator; MPX filter; auto rec-mute; headphone jack with adjustable level. .... \$660

### RS-T55R Double Cassette Deck

Features autoreverse for both transports; Dolby

B, C, and dbx NR; high-speed dubbing; auto bias/EQ; synchro start, stop; rec mute; auto space; anti-resonant metallic feet; edit search on transport A; soft-touch controls; 28-part digital peak readout. .... \$460

### RS-B605 Cassette Deck

Features 3 heads with NR circuitry for decoded monitoring while in recording mode; Dolby B, C, HX Pro, and dbx NR; 2-motor transport; FL display; bias control; auto record mute. .... \$390

### RS-T330R Double Cassette Deck

Dual-well cassette deck with autoreverse record and playback in transport A. Features high-speed editing; Dolby B and C NR; FL display; series play; synchro-start; synchro-rec-mute; synchro-stop; electronic switching; LED indicators; cue and review; headphone jack; automatic tape selection; timer capability. .... \$330

## TOSHIBA

### PC-5858 Double Cassette Deck

Features IC-logic design; high-speed dubbing; Dolby B and C NR; continuous play between decks; continuous record between decks; quick search selection; repeat function. .... \$399



Uher CR 160AV

## UHER

### CR 1601 Portable Cassette Deck

Compact front-loading portable cassette recorder with monitor facility, 8 hours recording time, and voice activation recording. Features 3 heads; 2 motors; dual capstans; bias fine tuning; manual azimuth adjust; direct drive; elapsed-time counter; output-level control; memory stop/play; LED meters; soft-touch controls; mic and headphone jacks; record mute; 3 tape speeds: 1.88 ips, .94 ips and .16 ips with ALC. w&F <2% wrms; FR ferric 20-19,000 Hz  $\pm 3$  dB. 9 $\frac{3}{8}$  x 2 $\frac{3}{8}$  x 7 $\frac{3}{8}$  in; 5 lb. .... \$1,799

### CR 1600 Portable Cassette Deck

Compact front-loading, cassette recorder with autoreverse and remote control. Features 8 hours recording time; voice activation; Dolby B NR; switchable ALC with two time constants; separate channel record level meters; 4 tracks; 1 $\frac{7}{8}$  and 1 $\frac{3}{32}$  IPS; 3 heads; 2 motors; soft-touch controls; built-in speaker. Operates on dry cell, 12-V car battery, or 110/220 V AC. w&F 1% wrms; FR 30-16,000 Hz; A/V input capability. 9 x 2 $\frac{3}{8}$  x 7 $\frac{3}{8}$  in; 5 $\frac{3}{4}$  lb. .... \$1,799

### CR 160AV Portable Cassette Deck

Portable 2-head deck with Dolby B and C NR. Features 1 motor; manual azimuth adjustment; microphone inputs; headphone jack; ALC with two time constants; separate channel recording level control; 3 built-in speakers. Operates on dry cells, 12-V car battery or 120 V AC. w&F 0.2% wrms; FR high bias 30-16,000 Hz  $\pm 3$  dB; S/N high bias: 57 dB Dolby B; line-input sens for 0-dB reading 588 mV; line output level with 0-dB indication 775 mV; microphone input sens 0.35 mV; microphone input overload 20 mV. 9 $\frac{3}{8}$  x 2 $\frac{3}{8}$  x 7 $\frac{3}{8}$  in. .... \$999



# Deceptive Engineering

Obvious but **very** deceptive...

You'll probably notice our 50-watt RX-533 offers obvious features such as Digital AM/FM cassette/radio with Dolby® B & C noise reduction, 24-preset stations, preset scan, tape program search, separate bass & treble tone controls, etc., and of course, it's **removable!**

But you'll probably overlook the not-so-visible but specially engineered features such as FM optimizer II circuitry designed for superior FM reception and built-in Automatic Radio Monitor for filling the void with music while you are fidgeting with your tape. Special cassette features such as "Auto Azimuth Correction System" rotates the tape head 180 degrees whenever tape direction changes to keep perfect azimuth alignment, Keyoff Pinch Roller Release minimizes wear and tear of tape pinch roller and DC servo motor accurately controls tape movement thus minimizing wow and flutter.

Plus pre-amp outputs and CD/AUX input capability designed for flexible system expansion, two-tone illuminated control panel guarantees easy viewing and identification and replaceable Lithium back-up battery helps protect and store information in the microprocessor.

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## TAPE DECKS

### VECTOR RESEARCH

#### VCX-470R Autoreverse Cassette Deck

Features autoreverse, 2-motor transport; soft-touch logic controls; Dolby B, C, and HX Pro; high-frequency trim; fine bias adjustment; wireless remote control; music search; microphone inputs; switchable MPX filter; headphone jack with volume control; variable line output; auto tape selector ..... \$500

#### VCX-450 Autoreverse Cassette Deck

Features autoreverse; 9-song programmable music search; sendust head; solenoid control; switchable MPX filter; record balance; Dolby B and C NR ..... \$400

#### VCX-325 Double Cassette Deck

Dual-well deck with Dolby B NR. Features 2-speed and synchro-start dubbing; continuous play; power-assist transport controls; mic inputs; metal tape compatibility. FR 40-15,000 Hz metal tape; S/N 63 dB with Dolby B; W&F 0.08% wrms. 17 1/4 x 4 1/2 x 10 in ..... \$150



Vector Research VCX-325

### YAMAHA

#### KX-1200U Cassette Deck

Features 3 heads; 28-key wireless remote control; dbx dynamic expansion; Dolby B, C, and HX Pro; optical balance tuning system; closed-loop, dual-capstan tape transport; amorphous head; logic controls; recording-level indicator; integrated-system remote compatibility. Black. 22 lb ..... \$749

#### KX-W900U Double Cassette Deck

Features autoreverse; amorphous recording and playback heads; play, record, and autoreverse on both decks; relay play and rec; Dolby B, C and HX Pro; high-speed dubbing; auto dubbing; skip dubbing; random program dubbing; manual dubbing; cross-Dolby dubbing; simultaneous independent recording; remote control; random play and music search on both decks; intro scan; rec return; auto rec mute; blank skip; auto tape selection; 4-digit electronic tape counter; 13-segment peak-level meters on both decks; remaining-time indicator ..... \$699

#### KX-R700U Cassette Deck

Features autoreverse record and playback; full-logic, 3-motor tape transport; amorphous record/playback head; Dolby B, C, HX Pro, and dbx; electronic record-level control; recording-level indicator; power eject and close; remaining tape/time display; auto fade in/out; auto tape selector; record return; bidirectional intro scan; 9-selection random program play; music search; programmable timer-clock; 39-key wireless remote control; MPX filter; linear real-time counter; blank skip; zero memory; auto record mute; memory stop; integrated-system remote compatibility ..... \$579

#### KX-800U Cassette Deck

Features dbx dynamic-range expansion; Dolby B, C, and HX Pro; optical balance tuning system; 3 motors; 3 amorphous heads; master fader; MPX filter; linear time counter; 12-seg-

ment peak-level meter; 28-key wireless remote control; integrated-system remote compatibility; recording-level indicator; random program play; intro scan; music search; repeat; record return; auto record mute; auto tape selector; memory stop; headphone jack with adjustable level. S/N with Dolby C 77 dB; FR 20-22,000 Hz  $\pm 3$  dB ..... \$569

#### KX-W302U Double Cassette Deck

Features autoreverse play in both decks, recording in one deck; logic controls; amorphous head; Dolby B, C, and HX Pro; one-touch dubbing at normal and high speed; relay play; auto tape selector; auto record mute; music search; MPX filter; optional remote control ..... \$449

#### K-640B Autoreverse Cassette Deck

Features RS integrated-system remote compatibility; autoreverse; amorphous head; auto fade; remaining time; intro scan; car EQ; Dolby B, C, HX Pro, and dbx. Black. 16 lb ..... \$449

#### KX-500U Cassette Deck

Features 3 motors; Dolby B, C, and HX Pro; manual bias adjustment  $\pm 20\%$ ; master fader; MPX filter; 12-segment peak-level meter; 27-key wireless remote control; integrated-system remote compatibility; play trim; random program play; bidirectional intro scan; music search; repeat; record return; auto record mute; auto tape selector ..... \$399

#### KX-R430 Autoreverse Cassette Deck

Features Dolby B, C, and HX Pro; autoreverse; amorphous head; bidirectional intro scan; 2 heads; 2 motors; music search; full, single, and

phrase repeat; record return; auto record mute; auto tape selector; record and playback timer; front-panel headphone jack; 7-segment LED peak-level meters; MPX filter; blank skip; manual bias adjustment;  $\pm 20\%$ ; RS integrated-system remote-control compatibility. 11-key wireless remote control included. FR 20-19,000 Hz  $\pm 3$  dB; S/N 74 dB with Dolby C; 1% THD; W&F 0.05% wrms ..... \$349



Yamaha KX-1200U

#### KX-W202U Double Cassette Deck

Features one-way operation of both tape mechanisms; hard-permalloy record/playback head; Dolby B and C NR; one-touch dubbing at normal and high speed; relay play; music search; record return; auto record mute; MPX filter; auto tape selector; integrated system remote compatibility. Optional remote control ..... \$349

#### KX-300U Cassette Deck

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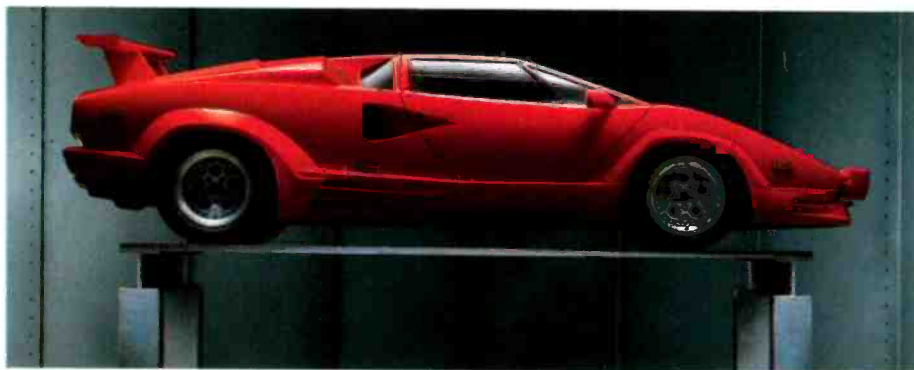
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## BEST RECORDINGS OF THE MONTH

*Stereo Review's*  
critics choose the outstanding  
current releases

### ELVIS COSTELLO DEALS WITH THE REAL WORLD

**E**LVIS COSTELLO has worn a lot of hats in a career that (hard to believe) is now over a decade old—angry young man, post-punk Cole Porter, garage-band rocker, and country singer, to name just a few. But unlike some other pop figures who've made a fetish out of constantly reinventing themselves (David Bowie and Neil Young come to mind), Costello rarely seems to be attempting to prove how cool he is. Rather, he gives the impression of a restless intelligence for whom, like Oscar Wilde, boredom is the ultimate perversion.

In his debut album for Warner Bros., "Spike," Costello fends off ennui by appearing in what may be his oddest guise yet—a middle-aged, comfortably married professional songwriter attempting to deal with the Real World. Backed by an impressively varied cast of pop luminaries (the only member of the Attractions appearing here, briefly, is drummer Pete Thomas), Costello casts an eye at such subjects as Thatcherism (*Tramp the Dirt Down*), capital punishment (*Let Him Dangle*), the media's all-seeing eye (*Satellite*), and what the Irish refer to as "the troubles" (*Coal-Train Robberies*), with an occasional foray into more personal topics like infidelity (*Pads, Paws and Claws*).

The results are mostly fascinating. Some of the credit goes to Costello's performing partners, including Chrissie Hynde, who helps turn the otherwise diffuse *Satellite* into an exquisitely poignant piece of neo-soul balladry; Paul McCartney, who has finally found a songwriting partner who can challenge him the way John Lennon did; and the ex-Byrd Roger McGuinn, whose chiming

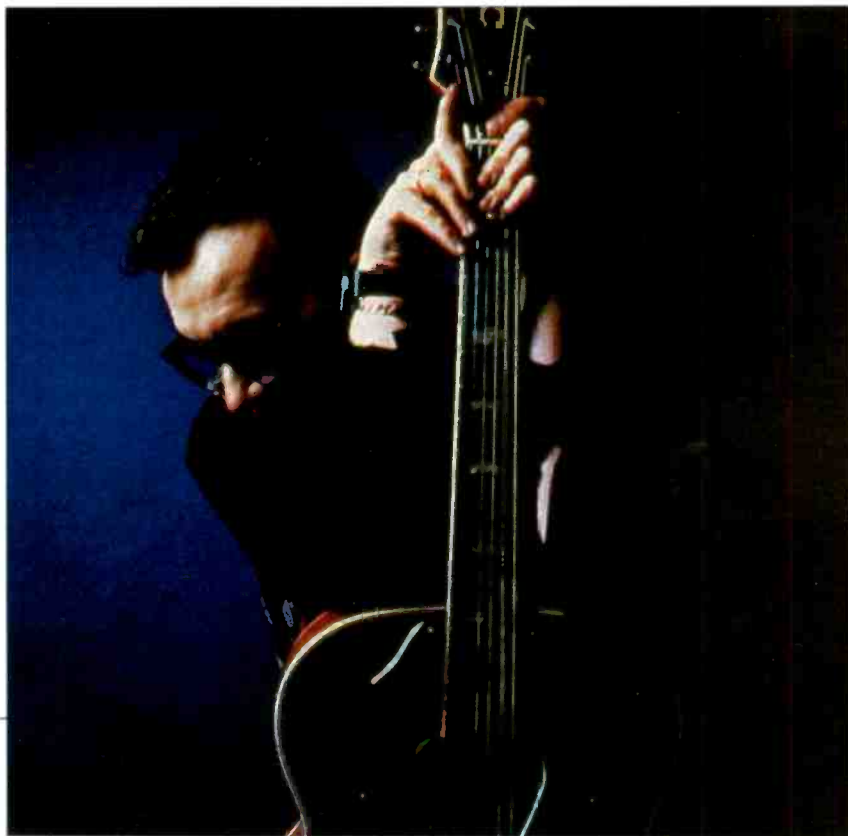
twelve-string guitar in *This Town*, the album's bang-up opener, is integrated into the song with an amazing combination of authority and self-effacement. But Costello himself hasn't been in such consistently interesting form in years. The word-play is only rarely forced, and when a subject engages him—as in the folkish and passionately felt *Tramp the Dirt Down*, or in the hilarious, anticlerical *God's Comic*, in which the Big G finds Andrew Lloyd Webber's *Requiem* somewhat wanting—his new songs seem utterly, unerringly right. Moreover, his singing has never been more accomplished and convincing (the exquisitely torchy performance in *Baby Plays Around*, for example, renders any future Mel Tormé version quite unnecessary). And the arrangements, which range from demented funk, courtesy of Tom Waits's guitarist Marc Ribot and the Dirty Dozen Brass Band (*Chewing Gum*), to gutsy middle Beatles (*Veronica*) and elegiac Hibernianisms (*Any King's Shilling*), are both apt and unpredictable.

A few years ago, after the perhaps too slickly produced "Blood and Chocolate," Costello was quoted to the effect that he didn't want to make any more albums whose

sound would clue the listener in to what year they were recorded. By that admittedly quixotic standard, "Spike" is a total success. But whether you view it as the latest stylistic chameleon job from one of pop music's most accomplished quick-change artists or just an unusually challenging set from an aging *enfant terrible*, one thing is certain: The Elvis Costello who once announced that he didn't plan to be around to witness his artistic decline has got nothing to worry about here. In fact, if Oscar Wilde was right and boredom equals perversion, "Spike" is one bracingly normal album.

Steve Simels

**ELVIS COSTELLO: Spike.** Elvis Costello (vocals and instrumentals); Chrissie Hynde (vocals); Marc Ribot, Paul McCartney, Roger McGuinn (guitars); Benmont Tench, Allen Toussaint, Mitchell Froom (keyboards); Jim Keltner (drums); Dirty Dozen Brass Band; other musicians. *This Town*; *Let Him Dangle*; *Deep Dark Truthful Mirror*; *Veronica*; *God's Comic*; *Chewing Gum*; *Tramp the Dirt Down*; *Stalin Malone*; *Satellite*; *Pads, Paws and Claws*; *Baby Plays Around*; *Miss Macbeth*; *Any King's Shilling*; *Coal-Train Robberies* (cassette and CD only); *Last Boat Leaving*. WARNER BROS. 25848-1, © 25848-4, © 25848-2 (65 min).



## BEST RECORDINGS OF THE MONTH



### ORPHEUS CHAMBER ORCHESTRA

**T**HE conductorless Orpheus Chamber Orchestra has done it again with a beautifully conceived program, impeccably played and recorded, of Prokofiev's *Classical Symphony*, Britten's *Simple Symphony*, and Bizet's *Symphony in C Major*. Elegance, precision, and vitality characterize the performances from start to finish. It is a pleasure to listen to the Prokofiev *Classical Symphony* with all the inner details of wind scoring clearly audible, not overwhelmed by a full symphonic string body. It is also good to hear the slow movement done at a pace that lets the music flow rather than bog down. Judiciously applied rubato makes the famous gavotte more than usually fascinating, and the finale is sizzling and zesty.

The performance of the Britten symphony for strings is characterized by razor-sharp attacks and rhythmic alertness. There's terrific zing in the "Playful Pizzicato" movement, great tonal richness in the "Sentimental Saraband," and virility to spare in the "Frolicsome Finale." The symphony by the seventeen-year-old Bizet goes with all the charm and spirit one could wish for, with the solo oboist shown to particularly lovely advantage in the

slow movement. The scherzo has real lift and verve, and the finale is swiftly played and virtuosic to the last degree.

The recording locale, the concert hall at the State University of New York at Purchase, is ideal for the Orpheus ensemble, enhancing the astonishingly powerful sonorities they generate. Unhesitatingly recommended. *David Hall*

**PROKOFIEV: *Symphony No. 1, in D Major, Op. 25* ("Classical"). BRITTEN: *Simple Symphony, Op. 4*. BIZET: *Symphony in C Major*. Orpheus Chamber Orchestra. DEUTSCHE GRAMMOPHON © 423 624-2 (64 min).**

### LYLE LOVETT'S LARGE BAND

**L**YLE LOVETT'S music has always made people a little uncomfortable. Like his trademark Brillo-pad hair ("It looks like it has emotional problems," he cracks), his songs lie just outside the usual frame of reference, presenting themselves as both a little freaky and a little threatening in their defiance of conventional thought and form. *God Will*, for example, sent half the Bible Belt to its knees to pray for the young singer's soul, and *She's No Lady* had hard-core feminists shrieking and running for arms. There was just no

telling what the boy would come up with next.

Musically, Lovett's songs are just as schizophrenic as his lyrics, the tunes in his first two albums alternately wearing scuffed-up cowboy boots and fancy black-patent dance slippers, hanging around jazz clubs one moment, rodeos the next. The bebop sensibility of several of his songs, especially the finger-popping *An Acceptable Level of Ecstasy* (*The Wedding Song*), made it clear that Lovett had big-band leanings far outside the Nashville way of doing things.

In his third album, "Lyle Lovett and His Large Band," he draws the line sharper and more emphatically than ever before. Side one, which kicks off with Clifford Brown's instrumental *The Blues Walk*, lays the foundation for the next five tunes—all dinner-jacket blues, cocktail jazz, and, well, *large-band* selections. Side two, on the other hand, hauls out the fiddles and the weepy steel guitars for songs about horses and saddles and guns.

Of course, little is really as it seems in Lyle Lovett's world—songs about horses and saddles and guns are really about emotional conflict and longing, and Lovett's decision to record *Stand by Your Man* probably says as much about his refusal to accept musical limitations as it does about his cockeyed and sardonic (and occasionally cartoon-like) view of women. And though his jazz meanderings in the earlier albums worked—in part because they were in such stark contrast to his other material—their



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## BEST RECORDINGS OF THE MONTH

critical acceptance has spawned several noodlings here that run thin, evoking not so much a mood as an aspiration toward one. In *What Do You Do/The Glory of Love*, a clever dialogue depicting marital discord using two songs written fifty-two years apart, Lovett sounds like a rank amateur—no, a poseur—up against the black r-&-b singer Francine Reed, who performs with an entire life experience, not just an attitude, behind her. And in *Here I Am* Lovett, the beat-poetry kid, alternates a spoken, bebop stream of consciousness with cool, knowing jazz, stretching the hip factor to the breaking point. As in *Good Intentions*, parody eats its young in a tedious, nonsensical examination of superficial life and love.

On the cowpoke side of the fence, however, Lovett starts out with a smart-aleck, hipster view of country, *I Married Her Just Because She Looks Like You*. But the joke only goes so far before he stops himself and reconsiders—he really does love country music, and he might as well admit it. By the time he gets to *Which Way Does That Old Pony Run* and *Nobody Knows Me*, he has let down his musical and romantic guard. Still, he takes his real chances in *If You Were to Wake Up*, as naked a portrait of intimate love as ever there was. Here, in a shattering confession of pain, Lovett the misogynist is finally understood, and forgiven. The next selection, *Once Is Enough*, finishes up the album with a return to what at first appears to be jazzy poses. But now it is Lovett's heart speaking, not his head. And no large band, or big one, for that matter, can drown such an eloquent voice. *Alanna Nash*

**LYLE LOVETT: *And His Large Band*.** Lyle Lovett (vocals, acoustic guitar); Richard Bennett (six-string bass); Francine Reed, Harry Stinson, Rodney Crowell (background vocals); other musicians. *The Blues Walk; Here I Am; Cryin' Shame; Good Intentions; I Know You Know; What Do You Do/The Glory of Love; I Married Her Just Because She Looks Like You; Stand by Your Man; Which Way Does That Old Pony Run; Nobody Knows Me; If You Were to Wake Up; Once Is Enough.* CURB/MCA MCA-42263, © MCAC-42263, © MCAD-42263 (41 min).

## CLAUDIO ABBADO'S MAHLER NINTH

CLAUDIO ABBADO'S new Mahler Ninth with the Vienna Philharmonic on Deutsche Grammophon is simply one of the three or four best, and best-sounding, recorded performances the work has had. It was taped live at a concert in May 1987, but you'd never know an audience was present—most remarkable considering the chamber-music-like textures and the suspenseful pauses in the first and last movements.

The Ninth is coupled with the Adagio from Mahler's unfinished Tenth Symphony, recorded live in June 1985. Even though Abbado chose to record only this fragment rather than the full version of the Tenth completed by Deryck Cooke, it is hard not to believe that an awareness of the completed version has affected his interpretation of the Ninth. He gives us a Mahler who bids farewell to the world with passionate regret but without bitterness. Somehow, and not to the music's detriment, Abbado manages to dispel the element of morbid angst that generally clings to this symphony.

The first movement is still a tremendous drama of the life and death of the spirit, performed here with the highest musical artistry. Abbado shows an unerring sense of line and pulse from start to finish, and the orchestra achieves a stunning climax in the martial-funereal episode.

The *Ländler* second movement has a less rural feel than we get from Bruno Walter, say, but it has a fine lift of its own thanks to the superb woodwind articulation. The *Rondo-Burleske* has had more savagery in the hands of Bernstein and Karajan. Abbado treats it the way I fancy Toscanini in his prime would have done, had he ever chosen to conduct the music of his rival of the baton. Every linear strand and rhythmic figure is crystal clear; mockery and wit overrule the nihilistic aspect. The final pages of the movement,



SILVIA LELLI MASOTTI/DC

taken at a hair-raising pace, amount to a veritable miracle of orchestral execution. The performance of the great adagio finale is truly an act of love and caring. Seldom have the last, barely audible pages been more movingly set forth.

Abbado lavishes similar loving care upon the fragment of the Tenth, with special attention to linear detail and balance. In keeping with his approach to the Ninth Symphony, Abbado lets the startlingly dissonant chord at the movement's climax make its full effect, but more as a cry of protest than of desperate agony. Throughout both performances, Abbado exhibits a fine command of subtle rubato and a tasteful and effective use of Mahlerian portamento in the strings.

A very large measure of credit for the overall artistic success of this production belongs to Deutsche Grammophon's production team, which has come up with one of the label's very best recordings. There's fine lateral imaging, a superb sense of depth, especially in the contrasts between muted and open brass, and a breathtaking range of dynamics (the Mahler Ninth is made to order for digital recording technology). For anybody immersed in the Middle-European aesthetic, Abbado's Mahler Ninth may seem a bit off-base. But for me this performance makes a convincing case for freeing Mahler from the limits imposed by his cultural milieu. *David Hall*

**MAHLER: *Symphony No. 9, in D Major; Symphony No. 10, Adagio.*** Vienna Philharmonic Orchestra, Claudio Abbado cond. DEUTSCHE GRAMMOPHON © 423 564-4 two cassettes, © 423 564-2 two CD's (105 min).



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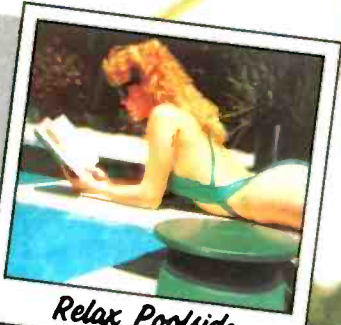
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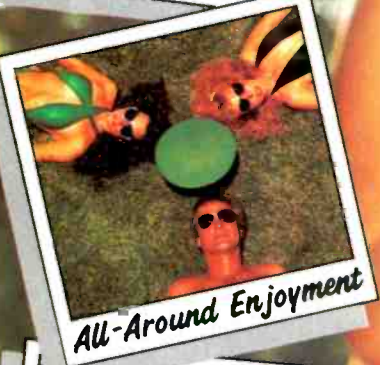
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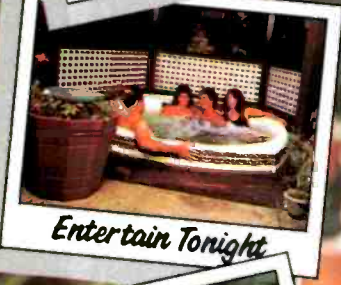
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**ALABAMA:** *Southern Star*. Alabama (vocals and instrumentals); vocal and instrumental accompaniment. *Song of the South*; *Down on the River*; *High Cotton*; "Ole" *Baugh Road*; *The Borderline*; and four others. RCA 8587-1-R, © 8587-4-R, © 8587-2-R (31 min).

Performance: *Whistling Dixie*  
Recording: *Fine and dandy*

With titles like *Song of the South* and *Southern Star*, you don't have to be a genius to figure out which side of the Mason-Dixon line these country boys like to do their fishing on. Alabama's roots in the Deep South manifest themselves in albums that are jingoistic in their Dixie pride. Though the affection is genuine, the homilies tend to become two-dimensional after a while, with honest regionalism reduced to self-caricature. Witness these lines from *Down on the River*: "We'll go fishin' by the light of the moon/And bait them hooks by hand/Early in the morning take 'em off of the line/And fry 'em all up in a pan."

In addition to catfish, there's plenty of cornpone to be found in "Southern Star." *High Cotton*, for example, is a pickin'-and-grinnin' song about the good old days, with a Jew's harp to complete the picture of rustic backwoods authenticity. And so it goes throughout the album: "Ole" *Baugh Road* reminisces about the old neighborhood ("a great place for kids to grow up"), and *Southern Star* tells the story of a working-class Everyman who's been "blue-collar branded and stuck in a mill." Alabama knows its audience like a miner knows coal and sings directly to them.

Built upon a well-manicured base of blues, gospel, and roadhouse rock-and-roll, "Southern Star" is rootsier than much of Alabama's slick early work, and that's good news. On the down side, the album clocks in at barely half an hour of playing time. *P.P.*

**RICK ASTLEY:** *Hold Me in Your Arms*. Rick Astley (vocals); vocal and

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## THROWING MUSES



Kristin Hersh (front) with David Narcizo, Tanya Donnelly, and Leslie Langston

**W**ITH "Hunkpapa," Throwing Muses has vaulted into the absolute front rank of American new-music bands. Their songs are tuneful enough to be immediately engaging yet sufficiently challenging to reward repeated exposure. When they threaten to fly out of control, they'll unexpectedly resolve into colorfully melodious moments or get collared by a bright, bold guitar hook.

The songs in "Hunkpapa," most of them written by band member Kristin Hersh, have the taste of life lived with eyes wide open. Hersh's cool, crisp voice is a joy to hear, and her dual guitar work with Tanya Donnelly creates geometric textures you can visualize. The third woman in the group, Leslie Langston, sends an avalanche of bass notes thumping into the fracas like boulders rolling down a mountain. All of this high-flying energy is anchored by David Narcizo's inventive drum patterns.

"Shocking is therapy/Electrify your head," Hersh sings in *Mania*, and those lines could pass for Throwing Muses'

credo as they shake loose of linear form and sense to redefine a reality based on raw feeling. By actively engaging the world, they have become infatuated with its possibilities. In *Dizzy*, for instance, a succession of travelogue-type images induces a heady vertigo, and *I'm Alive* cuts close to the bone, courting danger while reveling in the sensuality of risk taking.

Throwing Muses aspires to a larger-than-life sound in "Hunkpapa," and you can tell from the confident, sure-handed performances that they got what they were after. Rarely will you find an album as driven and purposeful as this one, which succeeds on its own terms without compromise or caution.

*Parke Puterbaugh*

**THROWING MUSES:** *Hunkpapa*. Throwing Muses (vocals and instrumentals); instrumental accompaniment. *Devil's Roof*; *Bea*; *Dizzy*; *No Parachutes*; *Dragonhead*; *Say Goodbye* (CD only); *Fall Down*; *I'm Alive*; *Angel*; *Mania*; *The Burrow*; *Take*; *Santa Claus* (CD only). SIRE 25855-1, © 25855-4, © 25855-2 (43 min).

instrumental accompaniment. *Take Me to Your Heart*; *She Wants to Dance with Me*; *I Don't Want to Lose Her*; *Giving Up on Love*; *Ain't Too Proud to Beg*; *Hold Me in Your Arms*; and four others. RCA 8589-1-R, © 8589-4-R, © 8589-2-R (38 min).

Performance: *Mechanical*  
Recording: *Thin*

British singer Rick Astley's first album launched a couple of enormous hits,

including the chart-topper *Never Gonna Give You Up*. His second, "Hold Me in Your Arms," was produced from an identical template of keyboard and drum programs, with Astley singing lyrics that are little more than romantic catch phrases fleshed out with the aid of a rhyming dictionary. It comes with the obligatory Motown cover (a comatose version of *Ain't Too Proud to Beg*) and a succession of contradictory, skin-deep sentiments (*I'll Never Let You Down*

one minute, *I Don't Want to Be Your Lover* the next).

At the push of a button, the music rises to an instant boil as Astley enters the synthetic fray. His pleasantly husky voice falls somewhere between Paul Young and Michael McDonald. Despite the mechanical sparkle, however, this is soul that's been removed from its flesh-and-blood sources and tooled into product. P.P.

**CHET ATKINS: *C.G.P.*** Chet Atkins (guitar, vocals); Darryl Dybka (keyboards); Mark Knopfler (guitar); Johnny Gimble (fiddle); other musicians. *Chinook Winds; Imagine; Knucklebusters; Jethreaux; Daydream; I Still Can't Say Goodbye*; and four others. COLUMBIA FC 44323, © FCT 44323, © CK 44323 (46 min).

Performance: *Masterly*  
Recording: *Very good*

Since signing with Columbia in 1982, Chet Atkins, the former head of RCA's country division, has turned his attention to jazz fusion; his records are now played on New Age, progressive, and adult-contemporary stations. This, his fourth such album, sets particularly well on the turntable. Atkins and his co-producer, keyboardist Darryl Dybka, deftly move through arresting and airy originals and recast such classics as *Daydream* and *Imagine* (in which Dire Straits' Mark Knopfler contributes a melancholy guitar accompaniment) in welcome new shapes. Atkins, who humbly calls himself a Certified Guitar Player (hence the title of this album), picks in a style so clean and elegant as to be deceptively simple, but he also paints complex musical images in startlingly vivid colors—bright red for Latin and country sounds, muted blue for the coolest of jazz. The one odd resonance is in the closer, a shaky and sentimental vocal performance of *I Still Can't Say Goodbye*. Atkins, who says he sees his father every time he looks in the mirror, conjures up the old man's spirit, still trying after all these years to be just like him. It is a poignant finish to an album that otherwise avoids overt emotion, aiming more for the head than the heart, but finally reaching both. A.N.

**EDIE BRICKELL AND NEW BOHEMIANS: *Shooting Rubberbands at the Stars.*** Edie Brickell (vocals); New Bohemians (vocals and instrumentals); other musicians. *What I Am; Air of December; The Wheel; Circle; She; Nothing*; and six others. GEFEN GHS 24192, © MSG 24192, © 24192-2 (49 min).

Performance: *Smart*  
Recording: *Good*

We remember the Sixties, and yet we seem doomed to repeat them. At least we can listen to Edie Brickell and New Bohemians while it happens, and that's not too bad. Considering that this Texas

band has ridden surprisingly high on the charts, we may not have any choice but to pay attention. Singer-songwriter Edie Brickell, of course, is the focus of attention. Her off-center perceptions often hit the mark, but she's a maturing rather than mature writer and usually picks easy targets. The band's big hit, *What I Am*, works best, including these two epigrammatic lines: "Philosophy is the talk on a cereal box/Religion is the smile on a dog." The band sounds loose-jointed yet springy, and that encourages Brickell's mild eccentricities without exaggerating them. R.G.

**RAY CHARLES: *Just Between Us.*** Ray Charles (vocals, keyboards); vocal and instrumental accompaniment. *Nothing Like a Hundred Miles; I Wish I'd Never Loved You at All; Too Hard to Love You; Now I Don't Believe That Anymore; Let's Call the Whole Thing Off*; and five others. Columbia FC 40703, © FCT 40703. © CK 40703 (35 min).

Performance: *Still the greatest*  
Recording: *Very good*

The consistent excellence that has marked the work of Ray Charles over the years is nothing short of remarkable. Somehow he has managed to sustain the profound expressiveness and blues-based authenticity that inform every note of his music. Whether he is performing pop, country, r-&-b, or jazz, it all comes out as genuine soul music, a genre he all but created. What's more, he's sounding just as good today as he did thirty years ago.

The bonus in "Just Between Us" is a series of guest appearances by some superb artists. The venerable B. B. King lets his guitar Lucille do the singing for him as he joins Charles in the effective opener, *Nothing Like a Hundred Miles*, and the wonderful Gladys Knight lends

*Chet Atkins: Certified Guitar Player*



her shimmering vocals to *I Wish I'd Never Loved You at All*. Most of the time, though, Charles wends his way through a set of classy, easy-listening numbers ideally suited to his style, with *Now I Don't Believe That Anymore* and *Stranger in My Own Hometown* being particular standouts. He rounds it all out with the perennially amusing *Save the Bones for Henry Jones*, in which he's joined by Chicago soul brother Lou Rawls and Milt Jackson on vibes. This album affirms that soul music will always be alive and well as long as Ray Charles is around. P.G.

**ELVIS COSTELLO: *Spike*** (see Best of the Month, page 103)

**BOB DYLAN AND THE GRATEFUL DEAD: *Dylan & the Dead.*** Bob Dylan (vocals, guitar); the Grateful Dead (vocals and instrumentals). *Slow Train; I Want You; Gotta Serve Somebody; Queen Jane Approximately*; and three others. COLUMBIA OC 45056, © OCT 45056, © CK 45056 (44 min).

Performance: *Not their best*  
Recording: *Okay*

On paper, this would seem a marriage made in hell: Bob Dylan, the most, er, spontaneous of major rock figures, and the Grateful Dead, a band of hippie stumblebums not often celebrated for their precision. Sad to say, the resultant album is about as awful as you'd expect, a stunning example of artists bringing out the worst in each other. Dylan's singing here is all nasal buzz, like some folk-rock version of Jeff Goldblum in *The Fly*, and the Dead, seemingly frustrated by having to play genuine songs with structured arrangements, sound limp even by their own stoned standards. Of course, all that begs the larger questions, such as, do we really need another version of Dylan's ode to mad-dog gangster Joey Gallo? And why doesn't Columbia just release Dylan's justifiably legendary (and often bootlegged) 1966 Albert Hall concert with the Band and be done with it? Dispensable stuff for anyone but Deadheads and Dylan completists. S.S.

**LYLE LOVETT: *And His Large Band*** (see Best of the Month, page 104)

**NEW ORDER: *Technique.*** New Order (vocals and instrumentals). *Fine Time; All the Way; Love Less; Round & Round; Guilty Partner*; and four others. QWEST 25845-1, © 25845-4, © 25845-2 (40 min).

Performance: *Moods for moderns*  
Recording: *Good*

There's something schizophrenic about New Order. It has roots in the moody, expressionistic new wave of Joy Division (the group New Order used to be) yet seems disposed to churning out percolating, urban-contemporary dance-floor grooves, with all the submerging



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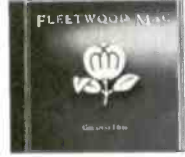
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of identity that implies. On the one hand, you get the feeling the band is really baring their souls, but at the same time the distance they put between themselves and the listener when the sequencers go on automatic pilot makes New Order no more knowable or interesting than, say, Exposé. It doesn't help that despite the dozen or so years they've been at it, the band members haven't developed a great deal of proficiency on their instruments. The synths all sound as if they were played using the one-finger method, and the guitars are similarly elementary. That's what comes from relying on machines and not performing in front of an audience often enough.

Cut by cut, "Technique" vacillates between roistering, heavily synthesized tracks and more pensive, guitar-laden ones. The slower cuts provide the most interesting moments, being marinated in a tuneful melancholy that recalls the Velvet Underground of *Sunday Morning* and *Femme Fatale*. Such songs as *All the Way*, *Love Less*, and *Run* all zero in on that warm, reflective, introspective feeling, as shimmering twelve-string guitars are shadowed by meandering bass lines and the singer employs an affectingly poppish delivery.

Most of the rest of "Technique" is an extroverted romp, with honking synths and busy drum programs hurrying the songs along like an ambulance in traffic. Some of it can be pretty infectious—*Fine Time* and *Dream Attack*, especially—but overall the album lacks the killer hooks to set it apart from the pack, and after a while the programmatic mode becomes a dead end. P.P.

**GRAHAM PARKER: *Live! Alone in America*.** Graham Parker (vocals, guitar). *White Honey*; *Watch the Moon Come Down*; *Black Honey*; *Soul Corruption*; *Durban Poison*; *Hotel Chambermaid*; *A Change Is Gonna Come*; and seven others. RCA 9673-1-R, © 9673-4-R, © 9673-2-R (48 min).

Performance: *Folky*  
Recording: *Okay*

Who'd have thought there was a folk singer at the heart of Graham Parker's music all this time? Until last year's "The Mona Lisa's Sister," Parker cloaked himself in various musical arrangements. Now, with "Live! Alone in America," he's walked into the spotlight by himself. In this album he reworks songs from the entire span of his career, including *Hotel Chambermaid* from "Heat Treatment" and *Don't Let It Bring You Down* from "Mona Lisa." Of the three new numbers, two are acidic socio-political condemnations (*Soul Corruption* and *Durban Poison*), and one is a light socio-political condemnation (*The 3 Martini Lunch*). He also does a cover of the Sam Cooke hit *A Change Is Gonna Come*. The guitar work is simple and effective but unremarkable (it's too bad Parker's guitarist-

buddy Brinsley Schwarz couldn't have come along). I'll stick with his classic studio albums. R.G.

**THE REPLACEMENTS: *Don't Tell a Soul*.** The Replacements (vocals and instrumentals). *Talent Show*; *Back to Back*; *I'll Be You*; *I Won't*; *Rock 'n' Roll Ghost*; and six others. SIRE 25831-1, © 25831-4, © 25831-2 (39 min).

Performance: *Restrained*  
Recording: *Okay*

What are we to think of Paul Westerberg, the primary songwriter and lead vocalist for the Replacements? "Don't Tell a Soul" could be evidence that he's maturing, or it could indicate that he's dissipating. Westerberg has shown intelligence and cleverness before, but it's always been tempered by adolescent bile. Coping with adulthood has never been as much fun as goofing off and acting snotty. Now, after dragging himself to the brink of maturity in "Don't Tell a Soul," he shows impatience with grown-up responsibilities, resentment at the state of the world that he and his generation have inherited, and nostalgia for the simpler time when he could goof off without consequences.

For all of us, this is the natural order of things: We get older. Yet now that Westerberg sits on the cusp of manhood, he can't seem to budge. At times he takes a sophisticated look at his past: *Talent Show* wistfully recalls his getting started in a rock band, and the tenderness of the music, predominantly acoustic guitars, sets the mood perfectly. But elsewhere he mismatches a low-key sound with high-key adolescent attitudes, as in *Achin' to Be* and *They're Blind*. As a result, the former sounds flaccid, and the latter oozes self-pity.

The harder-rocking songs are more consistent, with Westerberg's scorn and frustration matching guitarist Slim

Dunlap's variable-speed drilling. A big beat and heavy guitar make a fine backdrop for Westerberg's sneering "We'll inherit the earth, but we don't want it," or his deadpan "The rebel without a clue/I'm searching for something to do." If only he could have more successfully synchronized his vision with his band's sound, the Replacements would have made a killer album. Even so, "Don't Tell a Soul" has a wealth of intelligence and insight, and it shows great promise for a band that has already come a long way. R.G.

**JESSE WINCHESTER: *Humour Me*.** Jesse Winchester (vocals, guitar, keyboards); instrumental accompaniment. *If I Were Free*; *Thanks to You*; *Let's Make a Baby King*; *Well-A-Wiggy*; and six others. SUGAR HILL SH-1023, © SHC-1023, © SHCD-1023 (40 min).

Performance: *Congenial*  
Recording: *Nice*

Jesse Winchester, most memorable as the writer of *My Songbird*, *Rhumba Man*, *Yankee Lady*, and *The Brand New Tennessee Waltz*, has broken his seven-year hiatus from recording with "Humour Me," a lively collection of original r-&-b, Memphis funk, gospel, reggae, and folk. Winchester, who fled his native South for Canada when Uncle Sam came calling twenty years ago, here virtually abandons his former country-rock leanings to write, as he puts it, "the kinds of songs the Drifters used to sing." Don't look for the California Raisins to run out and cover any of these, but there's not a homely tune in the bunch. The lyrics never get esoteric (although they're never as emotionally searing as *My Songbird*, either), and Winchester's soft baritone sails them home with good-humored warmth and grace. All in all, a delight from start to finish. A.N.

*The Replacements: Chris Mars, Paul Westerberg, Slim Dunlap, Tommy Stinson*



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## LIVING IN DREAMS



Roy Orbison (1936-1988)

**I**N his heyday, Roy Orbison's great rock music reverberated from the tiny speakers of teens' car radios, the impassioned growl of *Oh, Pretty Woman* fueling lustful gropings in the back seats of Chevys everywhere. But his ballads... ah, his ballads! This was music of a different kind, a music of nighttime mystery, a music that hung its hat on Lonely Street, lingered beneath dingy streetcorner lights, and frequented the back parlors of David Lynch's *Blue Velvet*.

Yet, aside from his sad, soaring tenor—an instrument that appeared to have its origins in the netherworld, not the unlikely flat hamlet of Wink, Texas—in real life Orbison, one of rock's true shining originals, dispelled any notion of mystery with a kind of startling insouciance. Years ago, when the late Don Gant went to pick him up for his first BMI award ceremony, the publisher looked down to see the nerdiest of white socks reaching for the cuffs of Orbison's rented tuxedo.

In 1983, when Orbison was between record deals and his glory days were seemingly behind him, I traveled to one of his dates to talk with him about a magazine interview. Four years after his open-heart surgery, he was jowly and out of shape, and when he walked on stage in his costume, his physique sagged into something resembling a black-leather pear. None of that mattered when he started to sing, of course. The years had diminished none of his majestic range and power, and he still

sang for "lonelies" everywhere, his glorious voice throbbing with emotional pain and abandonment, his shuddering crescendo weeping for anyone who ever sought solitude and self-pity in the dark.

Afterward, in his hotel room, his eyes still hidden behind sunglasses, his pasty skin framed by crow-black, fright-wig hair, he talked about exercising, getting in shape for a comeback. He was sweet and gentle, polite to a fault, eternally self-effacing, and, in a way, almost beatific. He struck me as someone who spent too much time in dreams.

But dreams were, of course, the stuff of Roy Orbison's art. He often said that certain songs came to him in dreams, although songs such as *Running Scared* and *It's Over* sounded more like dreams themselves, dreams that teetered on the edge of nightmare. The irony is that after years of tragedy and career disappointments, dreams were starting to come true again for Orbison at the time of his death last December at the age of fifty-two. George Harrison, Bob Dylan, Jeff Lynne, and Tom Petty were thrilled when he agreed to climb aboard the Traveling Wilburys caravan. Cable TV gave him his own stylish special. And Virgin Records asked for his first album of all-new material in a decade.

"Mystery Girl," as the album was eventually titled, is as dignified a send-off as anyone could want. Written and produced by Orbison, his wife Barbara, and an all-star group of acolytes—including fellow Traveling Wilbury Jeff

Lynne, T Bone Burnett, and U2's Bono—the album weds the dramatic immediacy and grand flourishes of the old Monument hits with the good-natured simplicity of the Wilburys.

Although "Mystery Girl" is destined to become a classic, it's fair to say that the album also has its share of filler, most notably *California Blue* and *Windsurfer*, both of which Orbison had a hand in writing. But this is not a showcase for Orbison the writer, but for Orbison "The Voice." The most affecting material comes from the supporting cast, which grew up playing his music over and over in the safety of their bedrooms at midnight—Bono, Lynne, Elvis Costello, Billy Burnette, and Will Jennings. Not surprisingly, they too found the passageway to Lonely Street, and most of their offerings here are dignified expressions of pain and longing, shrouded in ethereal dreams, shaped around the Orbison aura.

At times, however, the dreamer finds himself in dangerous company. In Burnette's (*All I Can Do Is*) *Dream You*, he drifts away on growly, romantic fantasy. But Costello's bizarre *The Comedians*, about a man left stranded at the top of a Ferris wheel by his lover, tops even Orbison's bleakest songs for paranoia. And Bono's *She's a Mystery to Me* presents the dream lover as murdering seductress—and the pop song as both complex psychological study and dark concerto.

There are beguiling pop anthems here—the bouncy *You Got It* and *A Love So Beautiful*, a rhapsodic ballad that characterizes what Sun Records founder Sam Phillips saw as Orbison's baroque, classical contribution to the genre. (Sun was Orbison's first label.) But it is the murky fantasy underworld to which Orbison always returns, sometimes with eerie results. In the album's most plaintive cry, *In the Real World*, he asks with weary anguish why we can't always live in dreams, where everything will always be all right. "In the real world," he laments, "We must say real goodbyes/... And endings come to us/In ways that we can't rearrange."

Sweet dreams to you, Roy.

Alanna Nash

**ROY ORBISON: *Mystery Girl*.** Roy Orbison (vocals, acoustic guitar); George Harrison, T Bone Burnett, Bono (guitar); Benmont Tench (piano, organ); Jeff Lynne, Tom Petty, Billy Burnette (background vocals and instrumentals); other musicians. *You Got It; In the Real World; (All I Can Do Is) Dream You; A Love So Beautiful; California Blue; She's a Mystery to Me; The Comedians; The Only One; Windsurfer; Careless Heart.* VIRGIN 91058-1, © 91058-4, © 91058-2 (38 min).



## JAZZ

**GARRY DIAL AND DICK OATTS:** *Dial and Oatts.* Garry Dial (piano); Dick Oatts (flute, soprano, alto and tenor saxophones); string orchestra, Carlos Franzetti cond. *Between Us; Kept Woman; The Perfect Pill; Harmonic; I Can't Forget; Anita; I Dig Your Do; No Option;* and seven others. DMP © CD-465 (62 min).

Performance: *Ambitious*  
Recording: *Excellent*

Just when you thought the sight of jazz musicians surrounded by an army of string players was a scene out of the past, here come a couple of upstarts who arrange just that. In an age when one player can call on electronic gear to emulate just about any sound—including that of a full symphony orchestra—it is refreshing to find someone doing it the old-fashioned, expensive way.

Fortunately, "Dial and Oatts" is not just an album noteworthy for the way in which it was recorded; it also contains a wealth of worthwhile music. Both leaders have a solid background in acoustic jazz: Saxophonist Dick Oatts has been heard regularly with the Mel Lewis Jazz Orchestra, and pianist Garry Dial has played with groups led by James Moody and Gerry Mulligan. They have also worked together in the Red Rodney Quintet and in various other contexts for the past eleven years. This is their first venture as co-leaders, though.

The fifteen selections are meant to be listened to as a whole, according to Dial, but I find them quite pleasant taken separately. (DMP's press release calls the album "a classically structured jazz suite.") Aside from the unfortunate echo the engineers have placed on the soloists, the music often seems to be a throwback to the pretty ballads that Charlie Parker, Coleman Hawkins, and Stan Getz used to lay down ever so gently on a bed of strings. Fifties purists felt that anything so pretty and accessible couldn't possibly be jazz. How wrong they were. The Dial and Oatts material (just who wrote what is not made clear in the notes) is new and fairly original; it runs the gamut of moods and is a pleasant combination of the beautiful and the biting. Recommended. C.A.

**JACKIE AND ROY:** *Full Circle.* Jackie Cain and Roy Kral (vocals and instrumentals); instrumental accompaniment. *Cherokee; In the Dark; Line for Lyons; Sleigh Ride in July; Our Love Rolls On;* and three others. CONTEMPORARY C-14046.

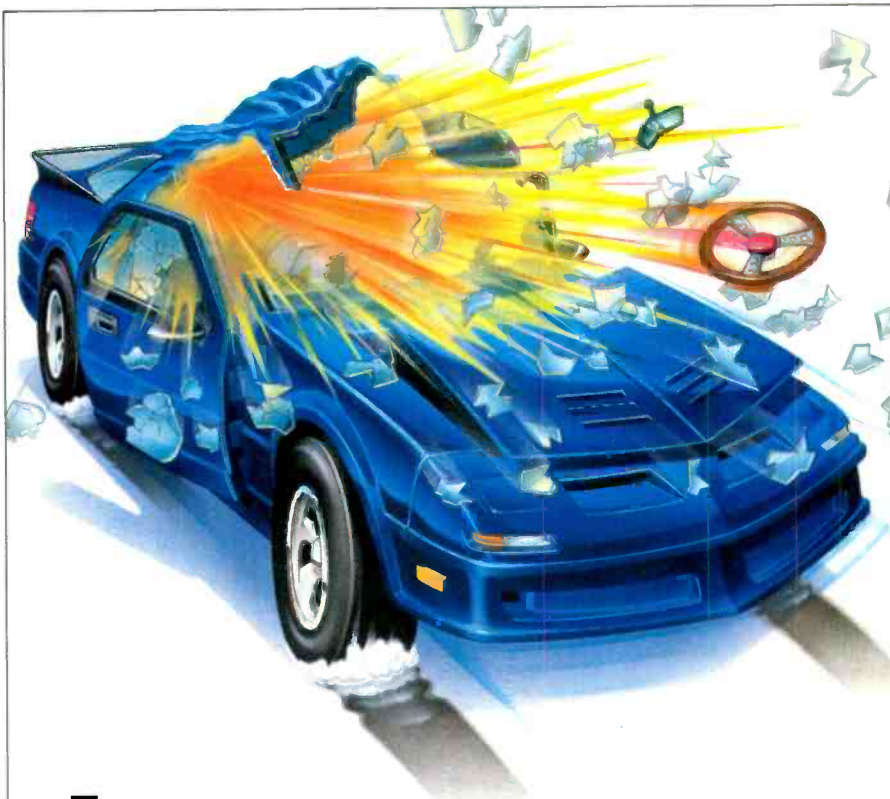
Performance: *Enduring*  
Recording: *Very good*

I was just getting my first taste of jazz forty years ago when Jackie Cain and

Roy Kral, aided and abetted by Charlie Ventura's band, gave jazz vocals some new boppish twists and turns. Their latest album, "Full Circle," recorded last year, belies the fact that they have been around almost as long as bop itself; there is no sign of age in their voices, and the style holds up remarkably well. Their influence can be heard in the work of such current groups as Manhattan Transfer and the Ritz, and it clearly helped shape Lambert, Hendricks, and Ross. The Jackie and Roy

approach to jazz vocals is somewhat meatless, but it borrowed much of its form from the cool instrumental sounds of the late Forties, and it has a certain enduring charm.

In the new album, the vocal duo receives wonderful instrumental support from some of the West Coast's finest, including trumpeter Conte Candoli, saxophonists Bob Cooper and Bill Perkins, and bassist Monty Budwig. As in the past, Kral is the session pianist and arranger. C.A.



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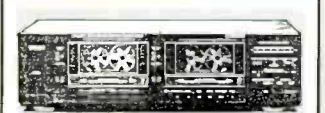


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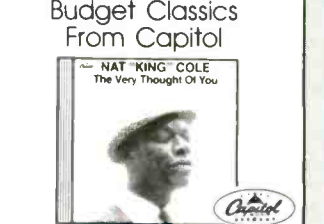
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**Compact Disc Players**



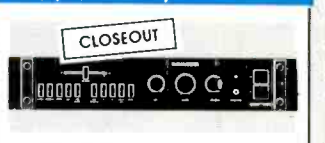
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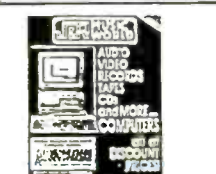


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*Discs and tapes reviewed by Robert Ackart, Richard Freed, David Hall, Stoddard Lincoln, Eric Salzman, and David Patrick Stearns*

**J. S. BACH** (trans. Guillou): *Goldberg Variations (BWV 988)*. Jean Guillou (organ). DORIAN/ALLEGRO IMPORTS © DOR-90110 (54 min).

Performance: *Convincing*  
Recording: *Fine*

Although Bach's *Goldberg Variations* are, perhaps, more idiomatically written for a double-manual harpsichord than any of his other keyboard music, they work beautifully on the organ. But this should come as no surprise—Bach's music is indestructible no matter what it is transcribed for, as Bach himself well knew. The canonic variations, in fact, are more clearly heard on the organ, as each of the two canonic voices is performed on a different stop, with a third stop for the accompanying voice. The same is true of the cross-keyboard variations and those for a single manual. Ironically, it is the theme itself that sounds weakest on the organ.

Jean Guillou brings clarity, rhythmic vitality, and imaginative registrations to the music in his splendid transcription for this recording. He plays the Kleuker organ of Notre-Dame des Neiges, Alpe d'Huez, France (at an altitude of some 6,000 feet), and its sonorities have been beautifully caught by the Dorian engineers. *S.L.*

**BARTÓK: Concerto for Orchestra.** **JANÁČEK: Sinfonietta.** Los Angeles Philharmonic Orchestra, André Previn cond. TELARC © CD-80174 (62 min).

Performance: *Very good*  
Recording: *Splendid*

André Previn's performance here of the Bartók Concerto for Orchestra may not have quite the hard-edged brilliance of those by Dutoit and Boulez. What it does have going for it, however, is warmth without sentimentality. The "couples" in the second movement parade across the sonic stage with great elegance and color. And whatever the "Interrupted Intermezzo" lacks in satire and sass is made up for by Previn's fine handling of contrasts in color and

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A MEMORABLE "FIGARO"



Hagegård, Bonney, Salomaa, and Augér in *The Marriage of Figaro*

**T**HE new recording of Mozart's *Le nozze di Figaro* on L'Oiseau-Lyre is perhaps the most beautifully cast performance of *Figaro* that I have ever encountered. Each singer, no matter how important or modest the role, has been chosen for having a vocal timbre that suits the part and reinforces Mozart and Da Ponte's social commentary on nobles versus commoners.

As the Countess, Arleen Augér offers a velvety sound with a superb legato that contrasts beautifully with the sharp edge of Barbara Bonney's pert Susanna. There is a similar contrast between the suave, flowing baritone of Håkan Hagegård, as the Count, and the biting bass of Petteri Salomaa, as Figaro. Mezzo-soprano Alicia Nafé brings a rich, throaty sound to her portrayal of Cherubino that is perfect for the role. All are splendid Mozart singers: They deliver their arias exquisitely and fall into razor-sharp ensembles with a precise rhythm and unerring sense of balance. Most important, they all sing lightly and simply, scaling their vocal production to the orchestra of authentic instruments.

The sonority of the early instruments is quite distinctive from the very outset, when one is struck by the quiet rustling of the strings and the mellow-sounding but sharply differentiated period woodwinds. Mozart had an incredible under-

standing of these instruments, and you have only to hear their subtle interweaving in the introduction of the Countess's "*Porgi amor*" to realize that no modern orchestra can produce such ravishing sounds. Conductor Arnold Östman's tempos are brisk but by no means skittish. At all times the recitative is crisp and intelligible.

One fascinating feature of this recording is the inclusion of material not usually heard in performances of *Figaro*, such as Marcellina's striking "*Tutto ancor non ho perso*" and Susanna's charming "*Uno moto di gioia*," as well as variants of the Countess's "*Dove sono*" and Almaviva's "*Hai già vinta la causa*." The first recording of Mozart's comic masterpiece on period instruments, this is also one of the finest of the half-dozen or so available today on compact discs. *Stoddard Lincoln*

**MOZART: *Le nozze di Figaro*.** Håkan Hagegård (baritone), Count Almaviva; Arleen Augér (soprano), Countess; Barbara Bonney (soprano), Susanna; Petteri Salomaa (bass), Figaro; Alicia Nafé (mezzo-soprano), Cherubino; Della Jones (mezzo-soprano), Marcellina; Carlos Feller (bass), Bartolo; others. Drottningholm Court Theatre Chorus and Orchestra, Arnold Östman cond. L'OISEAU-LYRE © 421 333-2 three CD's (186 min).

RO L/JUNGLION/LONDON:DECCA

dynamics. The finale is superbly controlled in execution, and the "Angel of Death" episode leading up to the defiant, life-asserting conclusion comes off to most telling effect.

Charles Mackerras's London recording of Janáček's *Sinfonietta* still sweeps the field for its vitality and brazen brilliance, but except for a slight staidness in the second movement and a touch of overlushness in the third, Previn's holds its own very well. Those who choose this disc for its pairing of two of the most colorful scores of the twentieth century can hardly go wrong, especially in view of the beautifully balanced and full-bodied Telarc sound. *D.H.*

**BIZET: *Symphony in C Major* (see Best of the Month, page 104)**

**BRAHMS: *A German Requiem, Op. 45*.** Barbara Bonney (soprano); Andreas Schmidt (baritone); Vienna State Opera Concert Chorus; Vienna Philharmonic Orchestra. Carlo Maria Giulini cond. DEUTSCHE GRAMMOPHON © 423 574-2 (74 min).

Performance: *Touching*  
Recording: *Good live take*

Otto Klemperer, the most persuasive conductor of Brahms's *German Requiem* on records (his Angel recording with Schwarzkopf and Fischer-Dieskau is on CD now), steered clear of the temptations to make the work either a grandiose public ceremony or a theater

piece, probed down to muscle and bone, and allowed a natural momentum to carry it forward. Carlo Maria Giulini doesn't share Klemperer's craggy view of the work, but he too avoids the big ceremonial gesture, in this case in favor of an expansive yet intimate approach. The result is consolatory rather than dramatic, but not without fervor, and sometimes touched by radiance.

The radiance is most engagingly apparent in the singing of the two soloists, both of them young and fresh sounding, free of self-consciousness or affectation. On its own terms, the performance is unflinchingly cogent, and the grand moments come through with exceptional conviction because the scale is maintained. This is a live performance, and the recording does have the feel of an occasion: I don't think it is overstatement to suggest that you can sense the difference between artists who are singing to people seated before them and those who are singing only to microphones. Both chorus and orchestra, in any event, are in splendid shape. The sound tends toward tubbiness at times but is generally quite good. *R.F.*

**BRITTEN: *Simple Symphony* (see Best of the Month, page 104)**

**COPLAND: *Connotations for Orchestra* (see SCHUMANN)**

**DVOŘÁK: *Piano Concerto in G Minor, Op. 33*. SCHUMANN: *Introduction***

*Philip Glass: variations on a sci-fi theme*



PAULA COURT/VIRGIN

**and *Allegro Appassionato in G Major, Op. 92*.** András Schiff (piano); Vienna Philharmonic Orchestra, Christoph von Dohnányi cond. LONDON © 417 802-4, © 417 802-2 (53 min).

Performance: *Poetic*  
Recording: *Mixed*

Dvořák's *Piano Concerto* has never enjoyed the popularity of his other big works. It has been criticized for the "clumsiness" of the piano writing, and most of the infrequent performances heard in our century have used the revised version of the solo part prepared by Vilém Kurz. Kurz's pupil, Rudolf Firkušný, who virtually alone kept the work in the international repertoire for decades, added emendations of his own, but lately he and several other pianists have taken up the original version, regarding it, in Firkušný's words, as "far purer than any subsequent revision, and more truly characteristic of the young Dvořák."

András Schiff apparently sees it that way, too. His performance here of the original version has everything one could ask in the way of both power and poetry, and he has a very sympathetic collaborator in Christoph von Dohnányi. The recording itself is a bit of a letdown, first for its flawed balance, in which the orchestral sound is conspicuously less well defined than the piano's, and also for the obtrusive reminders that it was made live.

The Schumann work, also beautifully played, was taped under studio conditions; it is more agreeably balanced than the Dvořák and free of audience noise, but still a bit below London/Decca's current standard. The piece itself is agreeable, too, but little more. The record might have been more of an enticement had it included Schumann's similarly titled later work (Op. 134), and there certainly would have been room for it. *R.F.*

**GLASS: *1000 Airplanes on the Roof*.** Miles Green (synthesizer sound design, sound effects); Martin Goldray (keyboards); Jack Kripl, Jon Gibson (saxophone, flute, wind synthesizer); Richard Peck (saxophones); Linda Ronstadt (vocals); other musicians, Michael Riesman cond. VIRGIN © 91065-1, © 91065-4, © 91065-2 (54 min).

Performance: *Vigorous*  
Recording: *Excellent*

Though somewhat less impressive on record than in the theater, *1000 Airplanes on the Roof* is one of the better scores that Philip Glass has written in the past few years. It was created to accompany a monodrama by David Henry Hwang that concerns a man's terror of being kidnapped by space aliens, which prompted Glass to return to a style that has much in common with his early opera *Einstein on the Beach*. The function of the music is to color the theatrical environment and to



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suggest the changing emotions of the protagonist. A sense of unity is given by the music's dominant leitmotifs, which are never very far away in any passage. In fact, *1000 Airplanes* occasionally sounds like a series of variations on a theme. Too often, though, Glass is content to restate a given theme in a different sonic context rather than truly transform it, which can at times make the writing sound musically thin and redundant. While one of Glass's strengths is that he never allows an idea to outstay its welcome, the drawback is that the music has a stunted quality. Just when you think it could begin to soar, it stops.

*1000 Airplanes* is scored more or less for Glass's regular ensemble (though no particular group is credited on the jacket), which means a lot of electric instruments and synthetic sounds. The composer uses them with considerable imagination, though the wordless songs performed by Linda Ronstadt become a bit monotonous. Overall, the music isn't quite as catchy as some of the things that Glass has written, but it seems, on the other hand, to repay repeated listening more generously than some of them too.

D.P.S.

JANÁČEK: *Sinfonietta* (see BAR-TOK)

MAHLER: *Das Lied von der Erde*. Jard van Nes (mezzo-soprano); Peter Schreier (tenor); Frankfurt Radio Symphony Orchestra, Eliahu Inbal cond. DENON @ CO-72605 (62 min).

Performance: *Two-thirds terrific*  
Recording: *Excellent*

With this recording of the work Mahler designated a "symphony for tenor and alto (or baritone) and orchestra," Eliahu Inbal completes his survey of the Mahler symphonies for Denon. It has been a stimulating and distinguished cycle, with some remarkable high points and superb sound quality throughout. In respect to the conducting and orchestral playing, *Das Lied* may be reckoned another high point, and it should surprise no one that Peter Schreier's performance in the three songs for tenor is the most effective on record since Fritz Wunderlich's with Otto Klemperer (on Angel), if not all the way back to the wonderful Julius Patzak recording with Bruno Walter (London). The highly touted Dutch mezzo Jard van Nes, however, seems curiously untouched by either the work's emotional power or the response it elicited from her colleagues in this undertaking. Perhaps no other singer has matched the poignancy achieved by Kathleen Ferrier in the Walter recording, but several have come a great deal closer than Van Nes, who does nothing more with her handsome-enough voice than sing the right notes. It is not a matter of subtlety or understatement, but of no feeling at all, no awareness of the words in the work's

most critical sections. It's especially frustrating when everything else about this release is so splendid.

R.F.

MAHLER: *Symphony No. 9; Symphony No. 10, Adagio* (see Best of the Month, page 106)

MOZART: *Horn Concertos Nos. 1-4; Rondo in E-flat Major (K. 371); Rondo in D Major (K. 514)*. Lowell Greer (natural horn); Philharmonia Baroque Orchestra, Nicholas McGegan cond. HARMONIA MUNDI @ HMU 907012 (61 min).

Performance: *Lusty*  
Recording: *Splendid*

Of all the conductors on the early-music scene today, Nicholas McGegan seems to bring the most joy and vitality to his performances. Horn player Lowell Greer has the same qualities, making him the perfect collaborator. The natural horn, too, is a lusty, joyous instrument with its throaty sonorities and remarkable changes in timbre when hand-stopping is employed for chromatics. These fine performances of Mozart's four horn concertos are full of the sounds of the forest—its rustling leaves and mysterious shadows serve as a background for the composer's spirited hunts.

The Rondo in E-flat Major is a reconstruction by Greer, and the D Major Rondo was completed by Herman Jeurissen. Both are extremely effective and make welcome additions to the repertoire.

S.L.

PROKOFIEV: *Symphony No. 1* (see Best of the Month, page 104)

D. SCARLATTI: *Sonatas: K. 18, 9, 21, 302, 84, 314, 315, 337, 277, 278, 87, 2, 12, 30, 334, 418, 86, 159, and 175*. Colin Tilney (harpsichord). DORIAN/ALLEGRO IMPORTS @ DOR-90103 (70 min).

Performance: *Suave*  
Recording: *Very good*

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S.L.

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*Der Musensohn; An die Musik; Auf dem Wasser zu singen; Sei mir gegrüsst; Litanei; Die junge Nonne; Ave Maria; Im Frühling; Gretchen am Spinnrade; Nacht und Träume; Ganymed; Lied der Mignon; Seligkeit.* Felicity Lott (soprano); Graham Johnson (piano). MCA CLASSICS © MCAD-25235 (64 min).

Performance: *Lovely*  
Recording: *Clear*

What a pleasure it is to hear a well-balanced program of selections by a single composer! You come away from this one with a feeling of genuine musical satisfaction. None of these Schubert songs are what you would call unfamiliar. The majority of them, in fact, are very well known; even the *Ave Maria* is included. Soprano Felicity Lott approaches each of them, however, with a winning freshness and sincerity. She uses her lovely and expressive voice to communicate the full emotional power of both words and music, while pianist Graham Johnson provides ever-appropriate accompaniment—now lyrical, now dramatic as the individual songs require. Like Lott's singing, his sensitive playing is always intelligent and tasteful. Highly recommended. *R.A.*

**SCHUMAN: *In Praise of Shahn.* COPLAND: *Connotations for Orchestra.* SESSIONS: *The Black Maskers, Suite.* Juilliard Orchestra, Otto-Werner Mueller, Sixten Ehrling, Paul Zukofsky cond. NEW WORLD ● NW 368-1, © 368-2 (60 min).**

Performance: *First-rate*  
Recording: *Very good*

This record is one of the first fruits of the Juilliard American Music Recording Institute, an entity created in November 1987 to work something like the long-running program of recording American music at the University of Rochester's Eastman School of Music. All the Juilliard recordings are to be made by that school's superb student orchestra, under several conductors, and will be devoted entirely to "twentieth-century concert music by American composers." The initial release is an impressive sampler, not only for the quality of the performances but for the seriousness it indicates with respect to repertoire.

The Copland and Schuman works were recorded by Leonard Bernstein and the New York Philharmonic shortly after their respective premières in 1962 and 1970, but neither recording has been available for some time now. Sessions's *Black Maskers* suite, which goes back to 1930, has been recorded by Howard Hanson on Mercury and a bit earlier by Walter Hendl and the Vienna Symphony. Few conductors have matched Hendl's authority in the American works he recorded in those hastily prepared Viennese sessions of the early Fifties, and few have ventured to challenge Bernstein in the works he



Felicity Lott: winning Schubert

introduced. There is no hyperbole, though, in suggesting that all three of the performances on this New World disc stand up to the earlier ones in terms of interpretation and execution, and they benefit pointedly from the smooth, up-to-date digital recording. The labeling could have been tidier: The Copland title is not simply *Connotations*, as given in all the labeling with the disc, but, as Eric Salzman tells us in his fine notes, *Connotations for Orchestra*; and surely it would have been appropriate to mention somewhere that Schuman designated his memorial to the American artist Ben Shahn a "Canticle for Orchestra." But this appealing package is musically first-rate, exciting the highest expectations for the new series. *R.F.*

**SCHUMANN: *Introduction and Allegro Appassionato in G Major* (see DVORAK)**

**SESSIONS: *The Black Maskers, Suite* (see SCHUMAN)**

**R. STRAUSS: *Josephs Legende, Ballet, Op. 63.* Tokyo Metropolitan Symphony Orchestra, Hiroshi Wakasugi cond. DENON © 33CO-2050 (67 min).**

Performance: *Good*  
Recording: *A shade brittle*

Those who consider Strauss's *Alpine Symphony* one of the summits of his orchestral output will find the *Josephs Legende* ballet score very much to their taste. Composed for Diaghilev's Ballet Russe and first performed under the composer's direction at the Paris Opéra on May 14, 1914, the music represents Strauss at his most decadently extravagant. The orchestra calls for not two but three full violin sections, a hecklephone, a piano, four celestas, an organ, and a vast array of percussion. The story line is essentially that of Joseph and

Potiphar's wife as told in *Genesis*, but with a few psychological overtones added that suggest the Jokanaan-Salome confrontation in Strauss's early and celebrated opera. Indeed, you might sum up the music as a blend of *Salome* and the *Alpine Symphony*. It has the sensuality of the former and the inflated grandiosity of the latter.

It's surprising to find a Japanese conductor and orchestra tackling this ultra-Straussian work—but then it's not so surprising when we read that Hiroshi Wakasugi spent most of the early Eighties conducting in Germany and Switzerland. The performance he conducts here is thoroughly creditable in terms of both interpretation and orchestral execution, but the acoustic surround is not quite right for the work's all-out scoring. The details of line and color emerge with ample clarity, but the huge climaxes seem confined and lack richness at the lower end of the spectrum. Nevertheless, the likelihood that this new recording of *Josephs Legende* will have a successor in the immediately foreseeable future is rather slim, so dedicated Strauss lovers will do well to add it to their collections. *D.H.*

**WAGNER: *Tannhäuser: Overture. Siegfried-Idyll. Tristan und Isolde: Prelude to Act I; Liebestod.* Jessye Norman (soprano); Vienna Philharmonic, Herbert von Karajan cond. DEUTSCHE GRAMMOPHON © 423 613-2 (54 min).**

Performance: *Satisfying*  
Recording: *Superior*

**WAGNER: *Tristan und Isolde: Prelude to Act I; Liebestod. Tannhäuser: Dich, teure Halle; Elisabeth's Prayer. Der fliegende Holländer: Senta's Ballad. Götterdämmerung: Brünnhilde's Immolation.* Jessye Norman (soprano); London Philharmonic Orchestra, Klaus Tennstedt cond. EMI/ANGEL © CDC-49759 (60 min).**

Performance: *Opulent*  
Recording: *Rich*

Recorded live during the filming of the recent television documentary *Karajan in Salzburg*, the Deutsche Grammophon program of Wagner is sonically radiant but presents an odd, rather meaningless combination of instrumental and vocal excerpts. The brightest moment is Jessye Norman's tenderly expressive *Liebestod*, which, under Herbert von Karajan, becomes an intensely personal and meaningful utterance.

Norman sings the *Liebestod* beautifully on the Angel disc as well, though without the same intimacy of feeling. The glorious, full richness of her voice is heard to exceptional advantage, however, in the other selections on Angel, making it an altogether more interesting Wagner concert than the one on Deutsche Grammophon, and Angel's Klaus Tennstedt conducts the finely honed London Philharmonic with exemplary style. *R.A.*

## THE "AUTHENTIC" BEETHOVEN

THE old-music business sometimes reminds me of the medieval traffic in saints' relics. Every era has its holy men, and we all need some of their powerful spirituality to rub off on us. Most of the stories about saints' relics and lives weren't true, but they *ought* to have been.

The Romantics replaced saints with artists like Leonardo and Beethoven and embellished a few tales on their behalf. This eventually led to psychobiography, pop media, and *People* magazine.

Getting close to the great masters today means authenticity: old instruments, original sources, the one true score. Beethoven as he would have heard it (if he hadn't been deaf). Beethoven as he would have wanted it (as he wrote it).

The early-instrument movement has gotten to Beethoven. With a bang and a tootle. There are "authentic" Beethoven symphonies on compact discs from Roger Norrington, Christopher Hogwood, and Frans Brüggen. And now there's a complete set from the Hanover Band (on a very reasonable five CD's) that claims to represent these works as they would have sounded in Beethoven's day. The Hanover Band was founded in 1980 as an original-instrument ensemble devoted to reconstituting the Classical orchestra. Its path led, inexorably, to *The Nine*.

This amazing set—not without its problems, as we will see—was very carefully prepared over seven or eight years. The Hanover Band plays from editions—score and parts—that have been newly revised and edited with the proverbial fine-tooth comb. Everything is played according to Beethoven's own manuscripts, copyists' scores corrected by the composer, original sets of parts used at the first performances, and so forth. The metronome marks are, we are told, Beethoven's own. The pitch,

which has crept steadily upward over the years, has been lowered. The wind-band sound as well as the articulation, dynamics, and phrasing are pre-Romantic.

Does it make a difference? You bet it does. The result is a distinctive orchestral sound that flavors and colors the music everywhere. Although most of the editorial revisions and restorations are not noticeable, some things, particularly the brass writing, jump right out.

But other significant decisions were made that have a great impact on the results and yet are hardly mentioned in the annotation. One is the size of the orchestra—that is, the number of strings employed in each work. Other choices have to do with the seating arrangements of the orchestra and the recording locales. One other important issue is how the pieces are led. Three of the symphonies were directed by Monica Huggett from the concertmaster's chair, the others by Roy Goodman from either the concertmaster's chair or the podium.

The conducting issue is serious. Rigid observance of Beethoven's metronome marks—if, in fact, that is what we have here—is not enough. The impression of fast, featureless pacing is particularly strong in the slow movements. Slow or fast, steady, unyielding tempos are the rule; the starting gun is fired, and away we go. There are traditions—in folk, jazz, Baroque, and early Classical music—in which performers embellish a rock-steady tempo through syncopations, by playing in front of or in back of the beat, by expanding or contracting the measures, and so forth. But none of that happens here, and the effect of the steady, relentless tempos is simply numbing.

It has been argued that Classical music and Beethoven were intended to be performed this way. Maybe. Contemporary accounts describing Beethoven

leading his own music make him sound like Leonard Bernstein at his most agile—jumping up and down, waving his arms, and leaping like a madman. But then Beethoven was already deaf and reportedly out of sync with the musicians most of the time anyway.

The Hanover Band claims to use a chamber-music approach to the symphonies, but these performances sound anything but chamber-like, partly because of the power of the brass section, partly because of the recording locales. Of all the instruments in the orchestra, the brass have changed the most—and so has brass writing. Beethoven knew only the natural instruments before they got wrapped up in elaborate valve-and-key mechanisms. They were primitive, but he knew how to write for them. And what a sound! Early critics complained that Beethoven had brought the outdoor marching band indoors, and often enough in these recordings you hear the logic of that complaint. As amplified by the reverberations of London Gothic churches, it is a spectacular sound, certainly not a chamber sound.

The strings, on the other hand, make a sound that is equally different but in another direction. The string section here has a beautiful and vivid color—listen to the opening of the famous Seventh Symphony *andante*—but its sound is considerably less brilliant than that of a modern string section. The Hanover Band also appears to use fewer strings than usual, and, in this acoustic, the wind and brass sections tend to overwhelm the strings in the big *tutti*s and important themes played in the lower strings tend to be lost.

My assumption was that the First and all the even-numbered symphonies would benefit most from the "authentic" treatment, but, quite the contrary, it is Nos. 3, 5, and 7 that work best. The Ninth, above all, eludes the Hanover Band. The pacing of the scherzo—for once, too slow—with all the repeats, makes it seem endless; similar problems plague the big instrumental fugue in the finale. Even so, there are moments that come to life in an amazing way. In the slow movement the tempo, the lower pitch, and the orchestral sound can combine to make an extraordinarily vivid impression, and the last "*Alle Menschen*" in the finale, just before the dash to the finish line, which you usually hear with a strained and exhausted chorus, is absolutely breathtaking.

*Eric Salzman*

*Concertmaster Monica Huggett leading the Hanover Band*



**BEETHOVEN: Symphonies Nos. 1-9.** Eiddwen Harrhy (soprano); Jean Bailey (contralto); Andrew Murgatroyd (tenor); Michael George (bass); Oslo Cathedral Choir; Hanover Band, Monica Huggett and Roy Goodman dir. NIMBUS © NI 5144-48 five CD's (348 min).



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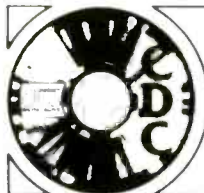
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by *Christie Barter*  
& *Ron Givens*

**O**NE of the Soviet Union's leading rockers, **Boris Grebenshikov**, will be releasing an American album this spring. His "Radio Silence" was produced for Columbia Records by **Dave Stewart** of Eurythmics and features guest appearances by **Annie Lennox** (also of Eurythmics), **Chrissie Hynde** (of the Pretenders), and **Siobhan Stewart** (formerly of Bananarama). Grebenshikov sings in English for most of the album, although some of the songs are in Russian. Recording sessions took place in



DAVID GAHR, COLUMBIA

*Grebenshikov: in America*

London, Montreal, New York, and Los Angeles.

Grebenshikov made several trips to the U.S. over the past year, marking the first time that an "unofficial" artist has been given such latitude. While he's basically unknown here, in the Soviet Union he's known to his fans as "the Bob Dylan of Russian rock." Three albums with his group **Aquarium** have sold a total of more than three million copies. □

**F**OR most of her career, **Tammy Wynette's** personal and professional life has been in turmoil. Through two unhappy marriages—one to former singing partner **George Jones**—and health problems that included sev-

eral abdominal operations and a dependence on painkillers, Wynette has managed to turn out records that have sold more than thirty million copies altogether. Now, with her fifty-first album, "Next to You" on Epic Records, she seems to have put her problems behind her. She's happily married, she says, and her health "is wonderful now." □

**T**HE latest American-born Broadway musical hit (as opposed to British imports, that is) is **Jerome Robbins' Broadway**, which opened at the Imperial Theater on Sunday evening, February 26. It's a sort of "Best of" compilation of memorable dance sequences staged by the veteran choreographer for musicals spanning a twenty-year period, from 1944's *On the Town* to 1964's *Fiddler on the Roof*. The show had been in rehearsal for several months and, unlike any other in living memory, was deemed ready to record on a Sunday two weeks before its opening. The result of those sessions, a two-record original-cast album containing familiar songs and dance music by **Leonard Bernstein**, **Morton Gould**, **Jule Styne**, and **Stephen Sondheim**, was set for release by RCA in April. □

**B**RAZILIAN music is making a remarkable comeback. Not since the days of the bossa-nova craze and **Astrud Gilberto's** record of *The Girl from Ipanema* has there been such a wealth of this

*Wynette: in the pink*



*On the town in Broadway's new hit*

music available. Now a major Brazilian label, **Som Da Gente** (Sound of Our People), is getting U.S. distribution. Started in 1982, it was the first label in Brazil devoted strictly to instrumentalists.

The best-known artist on the Som Da Gente roster is multi-instrumentalist **Hermeto Pascoal**, who's played with **Miles Davis**, **Chick Corea**, **Airto**, and **Flora Purim**. The groups on the label feature members who've played with such varied American musicians as **Pat Metheny** and **Chet Baker** and such well-known Brazilians as **Gilberto Gil** and **Egberto Gismonti**. Most Som Da Gente artists are generally unknown outside their country, but that may not be true for long. □

**A**MERICAN soprano **Barbara Hendricks**, who's recorded for every other major classical label, has recently been strengthening her ties with EMI—and has signed exclusively with the company for recital albums. Her first recording under that contract is a collection of songs by **Ravel** and **Duparc**, with the **Orchestre de l'Opéra de Lyon** under **John Eliot Gardiner**. It was released by Angel in April. Coming up are recitals of songs by **Fauré**, with piano accompaniment by **Michel Dalberto**, and **Mozart**, with pianist **Maria-João Pires**.

Hendricks is also featured in several large-scale works scheduled for EMI/Angel release in the months ahead. They include **Orff's Carmina burana**, the **Poulenc Gloria**, an album of **Haydn masses**,



ISSERMAN/EMI

*Hendricks: in recital*

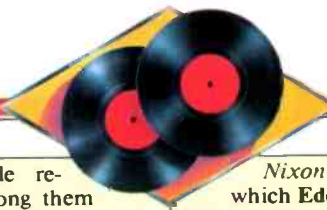
and **Richard Strauss's Der Rosenkavalier** with **Lorin Maazel** conducting. □

**T**HE forthcoming album by **John Cougar Mellencamp**, "Big Daddy," may surprise his fans. His seventh Riva/PolyGram release, it apparently takes an intense, almost spooky turn from the lighter, folk-based musical textures of his last one, "The Lonesome Jubilee." Mellencamp wrote all eleven songs in the album and produced it as well. Although "Big Daddy" uses the same band as "Lonesome Jubilee," Mellencamp has written edgier, more personal tunes and given them somewhat rough-sounding interpretations. Re-

POLYGRAM

COLUMBIA





portedly there are *no* upbeat songs in the album.

Mellencamp has also been working on a screenplay with Larry McMurtry, author of the novels *Lonesome Dove* and *Terms of Endearment*, among others, but no arrangements have been made for shooting it yet. □

**T**HE St. Louis Symphony Orchestra and its music director, Leonard Slatkin, have each signed exclusive five-year, multidisc recording contracts with BMG Classics, the international company that includes RCA Victor Red Seal. According to BMG, these are the longest exclusive recording agreements signed in the last decade.

Slatkin and the orchestra will make some thirty recordings together over the next five years, including all of the Tchaikovsky symphonies; Shostakovich's Nos. 1, 6, 8, 9, and 11; Mahler's Nos. 3, 4, and 5; Orff's *Carmina burana*; and Samuel Barber's Piano Concerto, with John Browning as soloist. The agreements call for a number of recordings of other works by American composers as well, including Aaron Copland, Elliott Carter, and John Corigliano.

Slatkin's new contract with BMG also calls for several

*Mellencamp: getting personal*

European-made recordings. Among them will be Strauss's *Salome* and *Der Rosenkavalier*, with the Bavarian Radio Symphony, and some works by British composers with the London Philharmonic. □

**F**OR his first major-label album in more than ten years, Dr. John has taken a stroll through the world of classic pop tunes. "In a Sentimental Mood," produced by Tommy LiPuma, surrounds



Slatkin: on a roll

Dr. John's saucy piano with straightforward pop arrangements, including lots of strings. Among the immortal songs in the album are *Makin' Whoopee!*, *Accentuate the Positive*, *My Buddy*, *More Than You Know*, and *Love for Sale*. Rickie Lee Jones joins Dr. John for a duet in one number. □

**F**ORMED ten summers ago by its artistic director, Michael Feldman, for performances at the Caramoor Festival in Katonah, New York, the Orchestra of St. Luke's is today one of the busiest orchestras in New York City's concert halls and recording studios. It has just concluded its fourth consecutive season of concerts at Carnegie Hall; in the last concert, Roger Norrington, making his New York debut, conducted "authentic" performances of Beethoven's Eighth and Ninth Symphonies. The orchestra also shared in the glory of John Adams's recent Grammy award for the Nonesuch recording of his opera

*Nixon in China*, in which Edo de Waart conducted. The recording was made at RCA's New York studios during the seven-performance run at the Brooklyn Academy of Music.

Musicmasters has signed the Orchestra of St. Luke's to a three-year contract, which will yield over twenty recordings of music from Bach to Copland. The latest is an album containing Kurt Weill's Violin Concerto, with Naoko Tanaka (a member of the orchestra) as soloist, and the suite from Weill's *Three-penny Opera*; Julius Rudel conducts. Forthcoming recordings on other labels include an all-Bach program, with soprano Kathleen Battle and violinist Itzhak Perlman, for Deutsche Grammophon; a collection of middle Haydn symphonies conducted by Charles Mackerras for Telarc; all of the Bach keyboard concertos, with Vladimir Feltsman as soloist, for CBS; and Adams's *Fearful Symmetries* (a St. Luke's commission) and *Shaker Loops*, conducted by the composer for Nonesuch. □

**T**HE singer, songwriter, and pianist Ray Charles, along with his Original Ray Charles Orchestra and the Raeletts, will join dancers of the New York City Ballet on the New York State Theater stage for a PBS telecast May 12 in the Live from Lincoln Center series. The program will feature a performance of Peter Martins's ballet *A Fool*

Feldman and Orchestra of St. Luke's: in demand



STEFAN ADLER



Dr. John: back to pop

for *You*, which is set to ten of Charles's classics, including the title song.

On the preceding Sunday, May 7, PBS will carry the twentieth-anniversary concert of the Chamber Music Society of Lincoln Center. Violinist Pinchas Zukerman and the organization's retiring artistic director, pianist Charles Wadsworth, will be featured in works by Ravel, Poulenc, and Schubert. □

**G**RACENOTES. Chrysalis is releasing "Once More into the Bleach," a collection of Blondie dance tracks, including some twelve-inch remixes. . . . Delbert McClinton's new Alligator album was recorded live on the TV show *Austin City Limits*. . . . Mavis Staples has a new album, produced by Prince for his Paisley Park label. . . . CBS Music Video has just released a two-hour highlight video of the Nelson Mandela 70th Birthday Tribute staged at London's Wembley Stadium last June. □

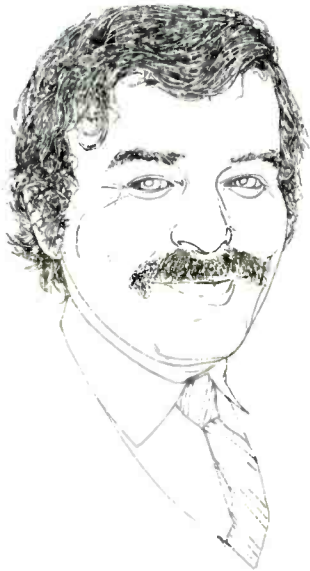
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by *Ralph Hodges*



## THE BLACK HOLE OF BASS

**Y**EARS ago, when I set up my first surround-sound array—it was then known as the Hafler System and achieved entirely by loudspeaker matrixing and passive circuit elements—I encountered something entirely unanticipated: a whole new bass response. “Gol-lee, Mr. Wizard,” I asked myself rhetorically, “what’s this all about?”

Mr. Wizard obligingly explained that I was experiencing the effects of subtractive acoustical interference, compliments of my newly installed rear speakers. Since these were essentially in opposite phase relative to the front pair, they were combatting some of the long-wavelength room modes I had suffered, and noticeably smoothing out the extreme low-end response. Undoubtedly they were also adding some response irregularities at shorter wavelengths, but the overall effect was pleasing, and it became more so with further adjustment.

Powerful stuff, Mr. Wizard, and very useful. I have since employed the same technique, in one way or another, in many sound systems I’ve designed for domestic listening rooms.

Now there has appeared a commercial product for this bass-purification function: the Phantom Acoustics Shadow, \$1,790 the pair, which buys two 7-foot columns with 8-inch woofers in top and bottom, 25-watt amplifiers for each woofer, and microphones and servo circuitry to tell the woofers what to do. They are not surround-sound speakers in any sense, being band-limited to about 200 Hz and below, and originator Nelson Pass, of Threshold amplifier fame, is not especially keen to have them become surround-sound speakers. “As amplifier manufacturers, we have made many good friends among speaker manufacturers,” Pass told me. “We don’t want to compete with them.”

So why has he come so close to it? “The whole idea for this product was outlined comprehensively by Harry Olson [famed RCA audio engineer] in 1953,” he remarked, “and even turned up in a science-fiction story by Arthur C. Clarke. Decades later, nothing had appeared. We decided to climb the concept because it *wasn’t* there.”

In essence, the Phantom system doesn’t make sound—it *un*makes it, by acoustically canceling the sound-pressure conditions that lead to the creation of standing waves and other listening-room resonances. It is an active acoustical diffuser rather than a passive one, and for the frequencies it addresses, it attempts to act like a black hole that unwanted bass can enter, but from which it will never escape.

According to Pass, “The structure of these tubes attempts to put a canceling transducer within 6 inches of all four rear corners—that is, wall and floor junctions and wall and ceiling junctions—of the room. The corners are where you’ll find the greatest pressure buildup, typically around +10 dB, that leads to troublesome room resonances. In effect, the system eliminates these corners, as if they were hacked off by a chain saw. The microphone senses the incoming pressure and informs the servo circuitry, then the amplifier gets the message to drive the speaker for 10 dB of cancellation. We believe this is the right figure. Too much more with a feedback system

like this and you risk instability and oscillation.”

Naturally, the cancellation takes place only for problem frequencies. The rest of the sound is left intact. Pass describes the overall effect as a tightening of the deep bass and a pleasant clarification of the middle and upper bass, both of which are reasonable expectations given the theory of operation.

Pass admits that the benefits of the Phantom are not easy to demonstrate. For a true A/B comparison, the tall towers have to be removed from the room completely, since even when the electronics are turned off the foam-filled structures exhibit considerable acoustic absorption. “I would not say the product has gotten to the point of taking the consumer by storm,” Pass said. “Probably our most enthusiastic customers to date are dealers, who are using the system to clean up their demo rooms. They know these rooms and their problems.”

By Pass’s estimate, the cancellation effect of the system is operative within a sphere whose radius extends about a quarter wavelength out from each driver. At greater distances, the influence on the sound is negligible. By inference, this would mean that the longest wavelengths get the most processing, which is appropriate. It would also mean that the system does much less in very large rooms, which is fine, because very large rooms with reasonable acoustics develop far fewer modes within the audio range.

While the intended function of the Phantom is subtractive, taking away bass where it exists in excess, Pass has discovered an application in which it can be profitably additive. When the towers are placed a bit behind and to the sides of true dipole radiators (full-range electrostatics and the like), they will eliminate some of the rear radiation that would otherwise result in back-to-front bass cancellation. Pass says he has gotten as much as 3 dB of low-frequency gain from the Martin-Logan CLS by this stratagem.

So, here is an audio product that truly breaks new ground. To experience it you’ll have to find a Threshold or Forté dealer, but that shouldn’t hold you back. □





# MAGNA

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