

# Audio

MAY 1985 • \$2.00

GETTING THE NOISE  
OUT OF YOUR CAR RADIO

## 11th ANNUAL CAR STEREO DIRECTORY



EX-95  
CC-1250



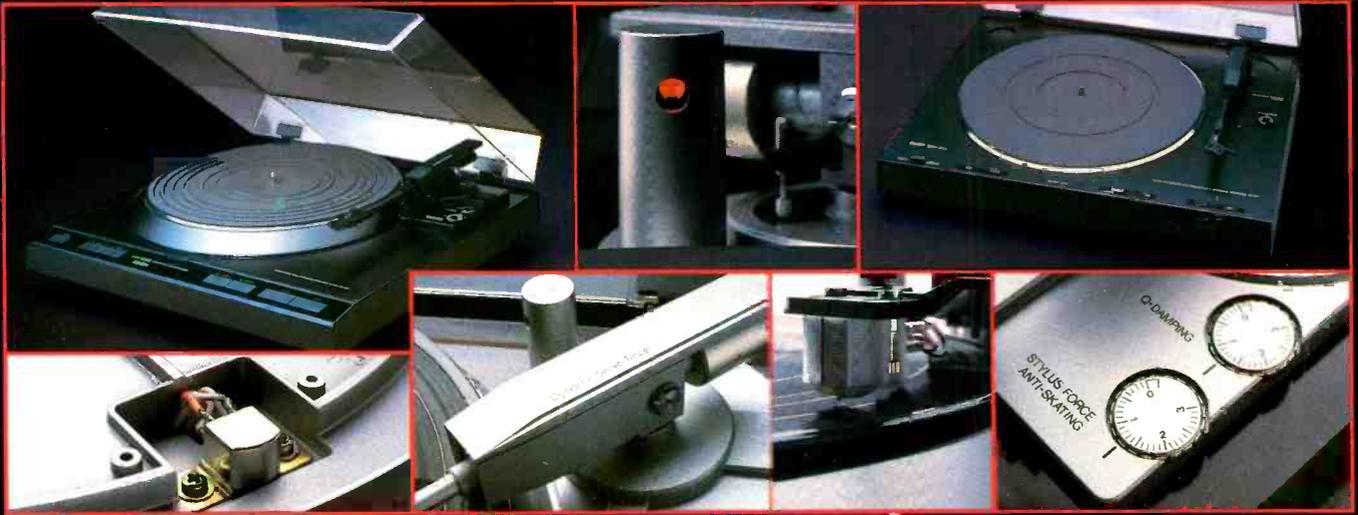
**"A GREAT TURNTABLE DOES NOT COMPROMISE  
ONE DESIGN PARAMETER FOR ANOTHER."**

There is no reason that a maximum performance turntable should not also be beautiful and simple to use. Denon can prove it.

From the DP-23F, a full-sized fully automatic turntable with Dynamic Servo Tracer microprocessor controlled tonearm, flat-twin direct drive motor with magnetic speed detection for \$225; to the DP-35FB with a Dynamic Servo Tracer tonearm and high density, anti-resonance base for \$275; to the

Audio Video International Hi-Fi Grand Prix award winning DP-37F (\$325) and DP-45F (\$375)—each model in the new Denon DP-Series offers the maximum combination of performance, construction quality, convenience and styling.

The new Denon DP Series Turntables. Honest designs that give you something extra for your money without taking something else away.



**DENON**

D E S I G N I N T E G R I T Y

Prices are for comparison purposes.

Enter No. 22 on Reader Service Card

Denon America, Inc., 27 Law Drive, Fairfield, N.J. 07006 (201) 575-7810

# ULTI-MATES.



If you haven't discovered the ultimate truth about audio cassettes, you're about to. No one makes finer normal or high-bias audio cassettes than TDK.

But don't just take our word for it. Take the sound of our AD-X and SA-X Pro Reference Series audio cassettes as proof. Each is designed to deliver unmatched performance for every type of music.

When you record in the normal-bias position with the Avilyn-based AD-X, you'll discover the higher MOL, broader frequency sensitivity, and greater headroom. All this enables AD-X to handle your most demanding program sources—without distortion.

SA-X, with its unique dual coating of Super Avilyn particles, actually goes beyond the former limits of high-bias. With increased sensitivity and higher MOL across the entire audible frequency range, SA-X delivers saturation-free brightness and clarity never before found in a conventional high-bias audio cassette.

To assure you of an ultimate performance play after play, our specially engineered Laboratory Standard mechanism provides smoother tape transport and better tape-to-head contact for total reliability and trouble-free performance.

You can also obtain the ultimate listening pleasure from two

more TDK Pro Reference Series cassettes: HX-S metal particle high-bias—the ideal cassette for digitally-sourced material—and the world renowned MA-R metal.

Each tape in the series is designed to deliver the purest listening pleasure, plus long-time performance reliability...thanks to the assurance of our Lifetime Warranty.

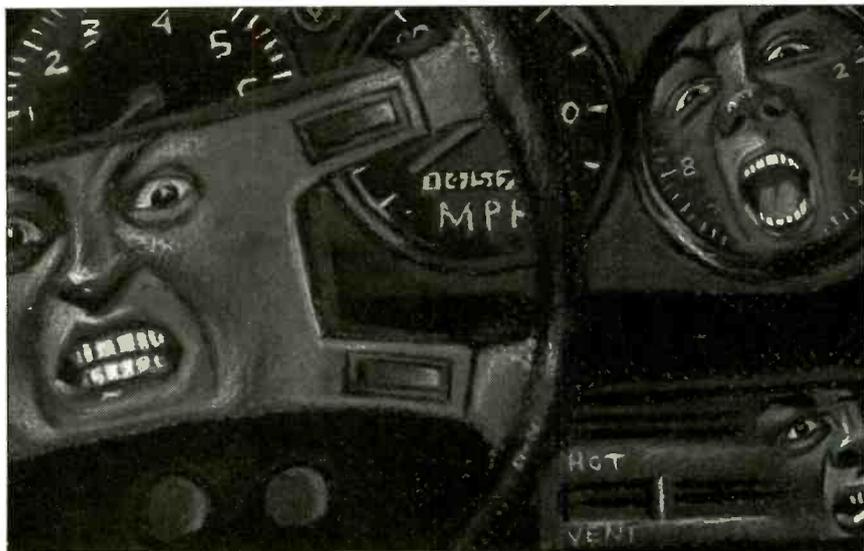
When you want the finest musical reproduction attainable in any audio cassette, keep this in mind: Ultimately, you'll select TDK.

 **TDK**  
THE MACHINE FOR YOUR MACHINE.®

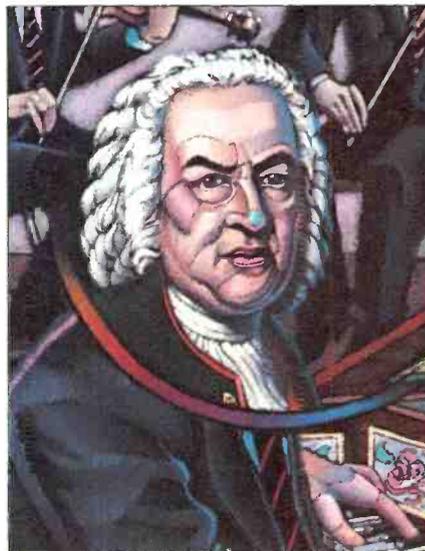
# Audio

MAY 1985

VOL. 69, NO. 5



See page 60



See page 25

## FEATURES

<b>THE AUDIO INTERVIEW:</b>		
JERRY WEXLER .....	Ted Fox .....	52
<b>CAR STEREO:</b>		
GETTING THE NOISE OUT .....	Daniel Sweeney .....	60
11th ANNUAL		
CAR STEREO DIRECTORY .....		89

## EQUIPMENT PROFILES

ONKYO T-9090 TUNER .....	Leonard Feldman .....	68
AUDIOVOX/HI-COMP		
HCC-1250 CAR STEREO .....	Leonard Feldman and Ivan Berger ..	74
PIONEER FEY-95 CAR STEREO .....	Leonard Feldman and Ivan Berger ..	80

## MUSIC REVIEWS

CLASSICAL RECORDINGS .....	Edward Tatnall Canby .....	132
COMPACT DISCS .....		134
ROCK/POP RECORDINGS .....	Michael Tearson, Jon & Sally Tiven ..	140

## DEPARTMENTS

WHAT'S NEW .....		6
SIGNALS & NOISE .....		10
TAPE GUIDE .....	Herman Burstein .....	17
AUDIOCLINIC .....	Joseph Giovanelli .....	19
AUDIO ETC .....	Edward Tatnall Canby .....	25
BEHIND THE SCENES .....	Bert Whyte .....	30
DIGITAL DOMAIN .....	Ken Pohlmann .....	39
SPECTRUM .....	Ivan Berger .....	42
LONDON LETTER .....		47
ROADSIGNS .....	Ivan Berger .....	50

The Cover Equipment: 1951 Studebaker Classic (courtesy of John Cohoe), Infinity CS1 component speaker system and MRA-150 amplifier, Nakamichi TD-700 tuner/cassette deck, and Soundstream Class A 40 amplifier. The Cover Photographer: © 1985 Bill Ashe.

Audio Publishing, Editorial and Advertising Offices,  
1515 Broadway, New York, N.Y. 10036.



Subscription Inquiries, (800) 525-0643; in Colorado, (303) 447-9330.



See page 39



See page 140

# Sony introduces the audio receiver made for videos.

Rock videos are the most exciting thing to hit television since the legends of rock 'n' roll first gyrated across the stage.

But you shouldn't have to listen to them or some rock opera on a speaker designed for a soap opera.

And thanks to Sony you don't have to. In fact, our new receivers are the only ones that allow you to enjoy MTV, HBO and other cable simulcast programming on something built for great music. Your stereo system.

These remarkable receivers enable the FM simulcast portion of your cable to be directly hooked into your system.\* In a sense, it serves as a kind of "nerve

center" for all your audio components and your video components, as well. Which is why you'll grow into it, rather than out of it.

As impressive as all this sounds, it's nowhere near as impressive as the quality of the receiver itself.

Our new Audio Signal Processor for instance, generates exceedingly low levels of noise and distortion. And our feather-touch pushbutton controls are also part of the most flexible tuning system ever built into a receiver. Direct Access™ Quartz Synthesis Tuning.

It eliminates the need for fine tuning. It also eliminates the need for something else: wasting time. (It can pick up preset stations faster than a radar detector picks up police cars.)

Our new receivers also have  
Enter No. 52 on Reader Service Card

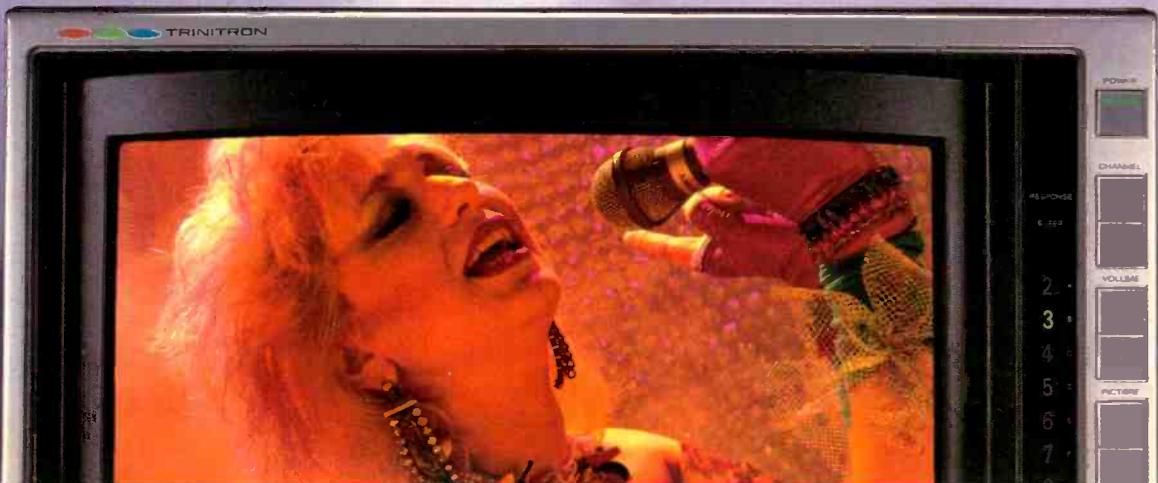
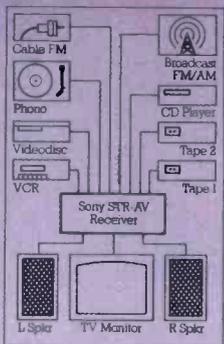
other virtues. Like the option of Sony's Remote Commander® unit which allows you to control all your Sony audio components without even a remote possibility of ever having to get out of your chair.

One of the features you'll find most impressive, however is the price. Which is extraordinary when you stop to consider there's nothing else like them at any price.

So go to your Sony dealer and listen to our new STR-AV receivers. Once you do, rock videos will start to sound as colorful as they look.

**THE ONE AND ONLY SOUND OF SONY.™**

\*Check your local cable company for service availability and any additional requirements. Model shown is STR-AV560, 60 watts per channel (continuous RMS, both channels driven, 8 ohms, 20 Hz-20kHz, 308% THD). © 1985 Sony Corporation of America. Sony and Remote Commander are registered trademarks of Sony Corporation. Direct Access and The One and Only Sound of Sony are trademarks of Sony Corporation of America. TV picture simulated.



# The KICKER Classic™

The new dimension in car audio

Now the famous KICKER™ sound is available for more vehicles than ever before!

The KICKER Classic™ is a self-contained stereo speaker system less than 3½ inches high ... perfect for rear deck mounting in cars ... and packed with an incredible high-performance kick.

Great for vans, pickups, fastbacks, and hatchbacks, too.

Hear The KICKER Classic™ at better car audio specialists nationwide. Suggested list price \$199.95



1212 South Main Stillwater, OK 74074 (405) 624-0451

stillwater designs

Enter No. 53 on Reader Service Card



## CLEAN, CRISP, POWER

The MODEL 2121 is the first car audio product to use a PHASE COHERENT ELECTRONIC CROSSOVER making it the most flexible and sophisticated bi-amplification, expandable to a tri-amp system.

Linear Power engineers developed a Phase and Amplitude Compliment Circuit, (PAC) that looks at and compares output signal to input and adds the inverse to make them identical which eliminates phase distortion. The MODEL 2121 contains a 60 watt RMS per channel stereo amplifier to power the main speaker system and, a 120 watt RMS mono subwoofer amplifier with a PHASE COHERENT CROSSOVER that is infinitely adjustable between 45Hz and 200Hz.

Designs for the demanding listener . . .

**LINEAR** POWER  
CAR AUDIO MADE IN USA

DeWitt Center 11545 D Avenue  
Auburn, CA 95603 (916) 823-7891  
In Canada call (416) 828-1210

Enter No. 34 on Reader Service Card

# Audio

Eugene Pitts III  
Editor

Art Director: Cathy Cacchione

Technical Editor: Ivan Berger  
Managing Editor: Kay Blumenthal  
Copy Chief: Elise J. Marton  
Assistant Art Director: Linda Zerella  
Assistant Editor: Andrea Lynne Hecker

Associate Editors:  
Edward Tatnall Canby, Bert Whyte, B. V. Pisha

Senior Editors:  
Leonard Feldman, Richard C. Heyser,  
Howard A. Roberson

Senior Editor/Music Features: Ted Fox  
Editor-At-Large: David Lander

Contributing Editors/Artist:  
Herman Burstein, David L. Clark,  
Anthony H. Cordesman, Ted Costa,  
John M. Eargle, Joseph Giovanelli,  
Laurence L. Greenhill, Bascom H. King,  
Edward M. Long, C. G. McProud,  
Peter W. Mitchell, Jon Sank, Donald Spoto,  
Michael Tearson, Jon & Sally Tiven, Paulette Weiss

General Manager: Mary Anne Holley  
Production Director: David Rose  
Production Manager: Patti Burns  
Special Projects Coordinator: Phyllis K. Brady  
Ad Coordinator: Ruth M. Linehan

Stephen Goldberg  
Associate Publisher

## ADVERTISING

Eastern Manager: Stephen W. Withoft  
(212) 719-6337  
Account Managers: Susan L. Newkirk  
(212) 719-6346  
Lesa Rader Giberson  
(212) 719-6291  
Western Manager: William J. Curtis  
Regional Manager: Randy Patton  
(213) 827-8655  
Classified Manager: Laura J. LoVecchio  
(212) 719-6338  
Classified Assistant: Mary Jane M. Adams  
(212) 719-6345

## CBS MAGAZINES EXECUTIVE STAFF

President: Peter G. Diamandis  
Exec. V.P.: Thomas M. Kenney  
Exec. V.P., Magazines: Albert S. Traina  
Exec. V.P., Operations: Paul H. Chook  
Sr. V.P., Advertising: Michael J. O'Neill  
V.P., Editorial Director: Carey Winfrey  
Sr. V.P.: Robert F. Spillane  
V.P., Finance & Admin.: Robert J. Granata  
V.P., Circulation: Bernard B. Lacy  
V.P., Mfg. & Distribution: Murray M. Romer  
Pres., CBS Magazine Mktg.: Robert E. Alexander

**AUDIO** (ISSN 0004-752X, Dewey Decimal Number 621.381 or 778.5) is published monthly by CBS Magazines, A Division of CBS Inc., at 1515 Broadway, New York, N.Y. 10036. Printed in U.S.A. at Nashville, Tenn. Distributed by CBS Magazine Marketing. Second class postage paid at New York, N.Y. 10001 and additional mailing offices. Subscriptions in the U.S., \$17.94 for one year, \$32.94 for two years, \$45.94 for three years; other countries, add \$6.00 per year. **AUDIO** is a registered trademark of CBS Inc. ©1985, CBS Magazines, A Division of CBS Inc. All rights reserved.

Editorial contributions are welcomed but should be accompanied by return postage. Submissions will be handled with reasonable care, but the Editor assumes no responsibility for safety or return of manuscripts, photographs, or artwork. The Publisher, in his sole discretion, reserves the right to reject any ad copy he deems inappropriate.

**AUDIO** Publishing, Editorial and Advertising Production offices, 1515 Broadway, New York, N.Y. 10036. Subscription offices, P.O. Box 5318, 1255 Portland Place, Boulder, Colo. 80322; (800) 525-0643, (303) 447-9330 in Colorado. Postmaster: Send change of address to P.O. Box 5316, 1255 Portland Place, Boulder, Colo. 80302.



The International Preview Society invites you to accept a  
No-Obligation Classical Music Membership  
and your choice of any...

**3 Digital  
Recordings \$1**  
for only **1**

plus shipping and handling

**DVORAK, SYMPHONY NO. 9 IN E MINOR (FROM THE NEW WORLD)**  
Chicago Symphony Orchestra/Solti. "The playing is superlatively good."—*Gramophone* London 115168

**MOZART, PIANO CONCERTOS NO. 15 IN B FLAT; NO. 21 IN C (ELVIRA MADI-GAN)** • Alfred Brendel, piano. Academy of St. Martin-in-the-Fields/Marriner. Philips 115421

**AISLE SEAT (GREAT FILM MUSIC)**  
The Boston Pops/Williams. E.T., Raiders Of The Lost Ark, The Wizard Of Oz, Gone With The Wind, more. Philips 115082

**MOZART, SYMPHONIES NO. 40 IN G MINOR, K. 550; NO. 41 IN C, K. 551 (JUPITER)** • James Levine leads the Chicago Symphony Orchestra in a superb recording. RCA 104810

**This remarkable \$1 offer is being made to introduce you to an outstanding classical music membership—with never any obligation to buy.** The International Preview Society features such artists as James Galway... Neville Marriner... Vladimir Ashkenazy... Vladimir Horowitz... Georg Solti... Luciano Pavarotti... James Levine... Plácido Domingo... Leonard Bernstein—and hundreds of other world-renowned classical performers.

**No obligation to buy—ever!**

You'll find hundreds of outstanding albums in each issue of Preview, the Society's bulletin, which will be sent to you every 4 weeks. You will also receive 2 special sale issues, giving you 15 opportunities a year to shop for fine music. Each issue highlights a Main Selection and scores of alternates. But there is no obligation to accept any offering at anytime.

**You choose only the music you want!**

If you'd like to accept the Main Selection, you need not do a thing; it will be sent automatically. If you'd prefer an alternate selection or none at all, just mail back the Notification Card by the specified date. You'll always have at least 10 days to decide.

**Substantial savings with our half-price bonus plan.**

For every regular purchase you do make, you may choose a Bonus album for only half of the members' club price! That can amount to savings of more than 55%! Shipping and handling, plus any applicable sales tax, are added to all shipments.

**Three records or cassettes for just \$1!**

Begin your membership now by choosing any 3 digital albums shown here for just \$1 plus shipping and handling. That's a savings of as much as \$31.94 off the suggested list prices! Send no money now. We want you to judge for yourself before you decide to buy. If not delighted, return your 3 albums at the end of 10 days without obligation.

**ATTENTION COMPACT DISC BUYERS!**

Now there's a Club just for you! The Compact Disc Club offers you hundreds of Compact Discs each year, featuring a full range of the latest CD albums from classical to popular/soft rock—with never an obligation to buy. And a Half-Price Bonus Plan gives you even greater savings on Compact Discs.

**Take a Compact Disc of your choice now for only \$1!**

Simply fill out the coupon. We'll send your Compact Disc and bill you later for only \$1 plus shipping & handling. All other Club details are similar to those of The International Preview Society noted above. Full details will follow, plus the same 10-day return privilege as noted above if not fully satisfied.

**VIVALDI, THE FOUR SEASONS** • Simon Standage, violin. The English Concert/Pinnock. "...the performance as a whole is breathtaking."—*Stereo Review* Archiv 115356

**SUNDAY IN THE PARK WITH GEORGE**  
Original cast album. "It's the most exciting thing to happen since stereo met *My Fair Lady*."—*High Fidelity* RCA 154014

**MUSSORGSKY-RAVEL, PICTURES AT AN EXHIBITION; RAVEL, LE TOMBEAU DE COUPERIN** • Dallas Symphony Orchestra/Mata. "...spirited readings."—*Ovation* RCA 114344

**PAVARETTI: MAMMA** • Title song, *Vieni sul mar, Non ti scordar di me, Musica proibita, Vivere*, 11 more. Henry Mancini, arranger & conductor. London 115310

**HOROWITZ AT THE MET** • Scarlatti, 6 Sonatas; Chopin, Ballade No. 4 & Waltz in A Flat, Op. 69, No. 1; Liszt, Ballade No. 2; Rachmaninoff, Prelude in G Minor. RCA 151876

**SHOSTAKOVICH, SYMPHONY NO. 5**  
Concertgebouw Orchestra, Amsterdam/Haitink. "...quite magnificent... altogether outstanding."—*Gramophone* London 115401

**ELGAR, VIOLIN CONCERTO** • Itzhak Perlman, violin. Chicago Symphony Orchestra/Barenboim. A grammy winner! "...dazzling."—*Gramophone* DG 105499

**ORFF, CARMINA BURANA** • Hendricks, Aler, Hagegård. London Symphony Orchestra & Chorus/Mata. A masterful recording of this modern favorite. RCA 144503

**OFFENBACH, GAITE PARISIENNE**  
Pittsburgh Symphony Orchestra/Previn. "...a revelation... a brilliantly fresh interpretation."—*Gramophone* Philips 115261

**HIGH, BRIGHT, LIGHT & CLEAR** • The Canadian Brass play Baroque music: Bach, Air On The G-String; Mouret, Fanfare (Masterpiece Theatre Theme); more. RCA 144529

**WAGNER, ORCHESTRAL HIGHLIGHTS FROM THE RING** • Vienna Philharmonic/Solti. Ride Of The Valkyries, Magic Fire Music, Forest Murmurs, Wotan's Farewell, more. London 115426

**BACH, ORGAN WORKS** • Toccata and Fugue in D Minor; Prelude and Fugue in E Flat; Prelude, Largo and Fugue in C. Daniel Chorzempa, organ. Philips 115193

**JAMES GALWAY & HENRY MANCINI: IN THE PINK** • The Pink Panther, Breakfast At Tiffany's, Pennywhistle Jig, Two For The Road, Cameo For Flute, more. RCA 151758

**FREE  
10-DAY EXAMINATION  
REQUEST**

Mail to: **The International Preview Society**  
P.O. Box 91406  
Indianapolis, IN 46291

YES! Please accept my membership in The International Preview Society and send me, for 10 days' free examination, the 3 albums I have indicated below. I may return them after 10 days and owe nothing... or keep them and pay only \$1 plus shipping/handling.

Please send all selections on  Record  Cassette

Write Selection Numbers here:

Name \_\_\_\_\_  
(please print)

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

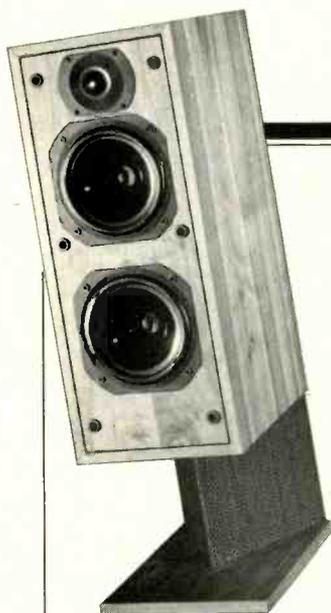
Phone (Area Code) \_\_\_\_\_ P-MC (P)

YES, please enroll me, instead, as a Charter Member in the Compact Disc Club and send my introductory selection for only \$1 plus shipping & handling. I reserve the right to return my CD if not satisfied, and owe nothing, with no further obligation. Full membership details will accompany my shipment.

Write Selection Number here:    UES30 (ZS)

Limited to new members, continental USA only; one membership per household. We reserve the right to request additional information. Local taxes, if any, will be added.

# WHAT'S NEW

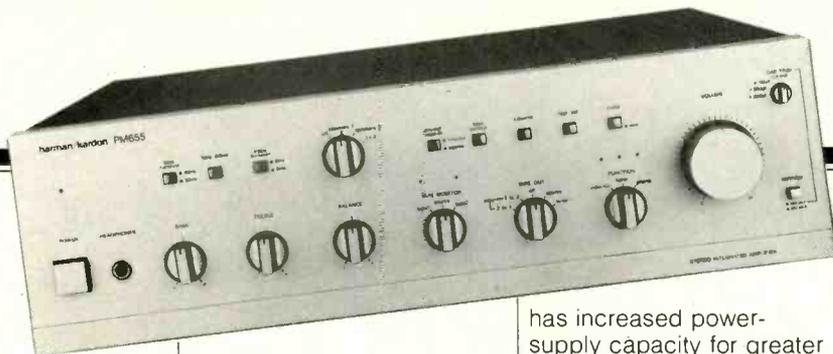


## John Bowers Active Speaker

The John Bowers Active 1 is a two-way speaker system with integral amplifiers and electronic crossovers. Bass and midrange are handled by a 6-inch woofer and a 6-inch bass/mid-frequency driver, with an amplifier delivering 200 watts at well below 0.01% distortion; high frequencies are handled by a 1-inch tweeter and a 100-watt amplifier. The amplifiers and crossovers switch on automatically within 1 S after sensing an audio input signal and

## Harman/Kardon Integrated Amplifier

High current capacity, to drive low-impedance or reactive loads, is one of the main circuit features of Harman/Kardon's new 600 series of amplifiers. The amplifiers also use low negative feedback,



ultrawide bandwidth, and discrete audio stages. In the Model PM655, shown here, the phono stage has dual RIAA circuits, one of which provides passive equalization while the other maintains the same low level of negative feedback from 20 Hz to 20 kHz. The MC pre-preamplifier section

has increased power-supply capacity for greater dynamic range, and the MM phono inputs have capacitance trim controls. Power is rated at 60 watts per channel, 20 Hz to 20 kHz, at 0.08% THD into 8 ohms, with an instantaneous current capacity of 45 amperes. Price: \$425. For literature, circle No. 101

## Ring King CD Box

Adapting their line of floppy-disk storage devices to the similar-sized CD, Ring King Visible's has produced a locking case for up to 12 audio discs. The CDT12 has a hinged lid, two built-in carrying handles, dividers for indexing disc titles, and a keyed lock. Price: \$29.95. For literature, circle No. 102



## Acoustic Research Turntable

An upgraded version of the current AR turntable, the ETL-1 has a sleek, black lacquer base and several new interior features. Its motor is a high-torque, 12-V model with electronic

mat. The turntable sits on adjustable isolation feet, with the platter and arm mounting resting on a subplatform with dual-spring, three-point suspension. Because the ETL-1 will only be sold without a tonearm, the



speed control. The platter is now a massive, zinc die-casting, riding on a sapphire main bearing and carrying an energy-absorbent rubber

T-Bar has adjustable weights to accommodate arms of different weights. Price: \$850. For literature, circle No. 103



switch off after 15 minutes without input. The amplifiers have MOS-FET output stages and are designed to work in Class A for the first 90 dB of acoustic output from the speaker. Price: About \$2,900 per pair, including integral stand. For literature, circle No. 100

The Sound Quality of the finest Custom Super Systems at a fraction of the cost.

# Polk's Remarkable New Mobile Monitor Loudspeakers

MMXIV-100 Watt  
6½" Subwoofer  
\$59.95 ea.

MMXII-100 Watt  
6x9 Two-Way System  
\$99.95 ea.



MMX-100 Watt  
6½" Two-Way System  
\$99.95 ea.

Digital Disc Ready

## Grand Prix Award Winning Polk Sound Quality For Your Car

### State-of-the-Art Performance and Value

Polk's remarkable new Mobile Monitors set new standards for sonic performance, attractive styling, rugged construction, mounting flexibility and value for pre-assembled automotive loudspeaker systems. All 3 new Polk Mobile Monitors incorporate the same state-of-the-art Polk tri-laminate polymer 6½" drivers used in Polk's Grand Prix Award winning home systems. The MMX and MMXII utilize high definition polymer tweeters and complex 2nd order isophase crossovers with huge air core coils, precision capacitors and resistors. The result is a new level of sonic performance previously unavailable except in the most elaborate and expensive custom installations.

### Hear for Yourself Why Polk is #1

The Audio Video® Grand Prix is a prestigious annual competition for products that best exemplify the state-of-the-art in audio, combined with benefits and value for you, the listener. Polk speakers have won the Grand Prix for four years in a row and Polk has been voted the #1 loudspeaker manufacturer overall for the last two years. What is the secret? Dedication to the quality approach makes the difference. Polk builds each and every loudspeaker with the same world-class standards of construction quality and uncompromised performance accuracy. Now you can get award winning Polk sound for your car. Hear for yourself why Polk is #1!

**"Our advice is not to buy speakers until you've heard the Polks."**

*Musician Magazine*

Polk's revolutionary True Stereo SDAs (\$395. to \$850.), Monitor Series (\$79.95 to \$260.), Mobile Monitors (\$39.95 to \$139.95), and VideoSound™ loudspeakers (\$99.95 to \$199.95), all offer state-of-the-art technology, performance and value. Contact us for full information.

*In Atlanta and New Orleans at Stereo Village.*

Polk Audio, Inc.  
1915 Annapolis Rd., Baltimore, Md. 21230.

**polkaudio**  
The Speaker Specialists®

For Dealer Nearest You Call TOLL-FREE 1-800-843-3800

Enter No. 42 on Reader Service Card

# Soundcraftsmen



AMERICA'S PERFORMANCE/VALUE LEADER  
IN ADVANCED AUDIO TECHNOLOGY...

## WORLD'S MOST VERSATILE PREAMPLIFIERS...

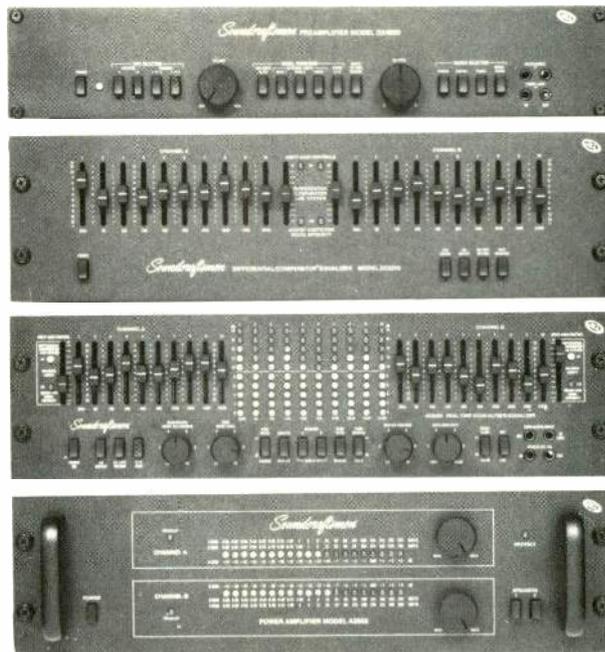
Featuring -97dB Phone S/N, Adjustable Phono Capacitance and Impedance, Moving Coil Inputs, Phono Input Level Controls, Exclusive AutoBridge® circuit for Mono Operation of Stereo Amplifiers @ TRIPLE POWER OUTPUT, Push-Button Patch Bay with Two External Processor Loops, Digital and Video/Audio Inputs, 10-octave EQ, Precision Passive Coil EQ Circuitry and Differential/Comparator® for Highest Gain, Lowest Distortion and No "Clipping" of Wide Dynamic-Range Material. 12" LP Analyzer Test Record and Charts with EQ's... from \$399.

## REAL-TIME SCAN-ALYZER/EQUALIZERS AND EQUALIZERS, ACCURACY TO 0.1dB...

REVOLUTIONARY Differential/Comparator® circuitry makes possible Accuracy to 0.1dB! Automatic or Manual Octave Scanning for Fast, Accurate Analyzing and Equalizing. Precision Passive Coil Filters for Highest Gain, Lowest Distortion, Scan-Alyzer Models. With and Without Built-in Equalizers. No Calibrated Microphone necessary. 12" LP Analyzer Test Record and Charts with EQ's... from \$189.

## REVOLUTIONARY CLASS "H" AND MOSFET AMPLIFIERS, 125 TO 555 WATTS P/C...

The most advanced Stereo and Professional Amplifier Models, featuring Class H Dual Signal-Tracking Power Supply, Auto-Buffer® for Continuous 2-Ohm Operation, No Current-Limiting, Power MOSFET circuitry for Highest Reliability, Calibrated LED meters, A, B, and AB Speaker Switching... from \$449.



## FOR A DEMONSTRATION, VISIT NEAREST DEALER LISTED BELOW

However, many additional Dealers—too numerous to list here—are located throughout the U.S. with many models on display. If no dealer is shown near you, or you encounter any difficulty, please phone us at 714-556-6191, ask for our "Dealer Locator Operator!"

### ALABAMA

Huntsville  
SOUND DISTRIBUTORS

### ARIZONA

Phoenix  
ABSOLUTE SOUND  
Yuma  
WAREHOUSE STEREO

### NO. CALIFORNIA

Berkeley  
HONKERS SOUND CO.  
Concord  
SOUND DISTINCTION  
Goleta  
HDUSE DF AUDIO  
Palo Alto  
WESTERN AUDIO  
Sacramento  
NEAL'S SPEAKERS  
San Francisco  
LISTENING POST  
Santa Barbara  
HOUSE OF AUDIO

### SO. CALIFORNIA

Phone 714-556-6191, ask for  
"Dealer Locator Operator!"  
(insufficient space to list  
all Dealers in this area)

### COLORADO

Englewood  
GOLD SOUND  
Colorado Springs  
THE SOUND SHOP

### CONNECTICUT

Danbury  
CARSTON STUDIOS  
Newington  
SOUNDS GREAT  
Stamford  
COUNTY AUDIO

### FLORIDA

Fort Walton Beach  
AUDIO INTERNATIONAL  
Meritt Island  
AUDIO MART ELECTRONICS  
Miami  
AUDIO PLUS  
LAS FABRICAS  
Orlando  
AUDIO MART ELECTRONICS

### GEORGIA

Atlanta  
AUDIO UNLIMITED  
STEREO DESIGNS  
Augusta  
THE STEREO SHOP  
Columbus  
WORLD-WIDE ELECTRONICS  
Dalton  
BROCK'S ENTERTAINMENT

### HAWAII

Hilo  
YAFUSD T.V. APPLIANCE  
Honolulu  
HARRY'S AUDIO  
VIDEO LIFE  
Lihue, Kauai  
JACK WADA ELECTRONICS  
Waikuku, Maui  
ADRIAN'S ELECTRONICS

### IDAHO

Idaho Falls  
PHASE 4 STEREO

### ILLINOIS

Chicago  
MUSICRAFT  
Dekalb  
AUDIO PLUS  
Gurnee  
OPUS EQUIPMENT  
Peoria  
ELECTRONICS DIVERSIFIED

### INDIANA

Anderson  
ANDERSON ELECTRONICS  
Indianapolis  
SOUND DECISION  
New Haven  
HJS SOUND  
West Lafayette  
VON'S ELECTRONICS

### KANSAS

Overland Park  
AUDIO ELECTRONICS  
Salina  
DELS TV  
Wichita  
AUDIO PLUS  
Tampa  
SENSUOUS SOUND

### KENTUCKY

Lexington  
THE STEREO SHOPPE  
Louisville  
HI-FIDELITY, INC

### LOUISIANA

Baton Rouge  
NEW GENERATION  
Lafayette  
NEW GENERATION  
Metairie  
SOUND TREK

### MARYLAND

Baltimore  
STANBURY STEREO  
Gaithersburg  
AUDIO BUYS

### MASSACHUSETTS

Brockton  
SCORPIO SOUND  
Rochester  
SCIENTIFIC STEREO

### MICHIGAN

Marquette  
AMERICAN TV  
Saginaw  
LISTENING ROOM

### MINNESOTA

Bloomington  
MINNESOTA SOUND VALUE

### MISSISSIPPI

Gulfport  
TIPPI'S MUSIC  
Jackson  
HOOPER SOUND  
Meridian  
HOOPER SOUND

### NEBRASKA

Lincoln  
LIGHT & SOUNDS FANTASTIC

### NEVADA

Las Vegas  
UNIVERSITY PRO AUDIO

### NEW HAMPSHIRE

New London  
NORTH STAR ELECTRONICS

### NEW JERSEY, SO.

Wildwood  
SEASHORE STEREO

### NEW YORK CITY,

### NORTHERN N.J.

Phone 201-947-9300 ask for  
"Dealer Locator Operator"  
(insufficient space to list  
all Dealers in this area)

### NEW YORK—UPSTATE

Albany  
SOUNDS GREAT  
Newpaltz  
NEWPALTZ AUDIO  
Poughkeepsie  
DUTCHESS AUDIO  
Rochester  
SOUNDS GREAT  
Syracuse  
SUPERIOR SOUND

### NORTH CAROLINA

Greensboro  
High Point  
Winston-Salem  
AUDIO-VIDEO CONCEPTS  
Hickory  
MC LAUGHLIN'S TV  
Raleigh  
CREATIVE ACOUSTICS

### NORTH DAKOTA

Fargo  
WATTS-MORE

### OHIO

Akron  
OHIO SOUND  
Canton  
OHIO SOUND  
Cleveland  
B&B APPLIANCE  
OHIO SOUND  
Lima  
HART AUDIO  
Middleburg Hts  
B&B APPLIANCE  
Warren  
CUSTOM SOUND CO.

Youngstown  
CUSTOM SOUND CO.

### OKLAHOMA

Oklahoma City  
JOHNSON TV & SOUND

### OREGON

Coos Bay  
PENNINGTON'S AUDIO  
Eugene  
BRADFORD'S HIGH FIDELITY  
Klamath Falls  
HIGH COUNTRY RECORDS  
Medford  
SOUNDTRACK ELECTRONIC  
Portland  
HAWTHORNE STEREO

### PENNSYLVANIA

Chambersburg  
SUNRISE ELECTRONICS  
Hermiage  
CUSTOM SOUND CO.  
McKeesport  
HI FI CENTER  
Philadelphia  
SOUND OF MARKET  
SOUND SERVICE  
Pittsburgh  
AUDIO JUNCTION  
Reading  
Shillington  
PHOENIX HI FI  
Willow Grove  
SOUNDX

### PUERTO RICO

Puerto Nuevo  
LASER SOUND

### SOUTH CAROLINA

Columbia  
NORTON STEREO  
Greenville  
DON JONES STEREO  
Newberry  
THE ELECTRONIC SHOP  
Spartanburg  
DON JONES CUSTOM STEREO

### TENNESSEE

Chattanooga  
COLLEGE HI FI  
Nashville  
AUDIO SYSTEMS

### TEXAS

Arlington  
SOUND IDEA  
Beaumont  
BROCK AUDIO  
Corpus Christi  
SOUND VIBRATIONS  
Fort Worth  
SOUND IDEA  
Houston  
HOME ENTERTAINMENT  
Hurst  
SOUND IDEA  
Midland  
FOLGER'S ENTERTAINMENT

### UTAH

Salt Lake City  
INKLEY'S  
St. George  
ARROW AUDIO

### VIRGIN ISLANDS

St. Thomas  
ELECTRONICS UNLIMITED

### VIRGINIA

Falls Church  
AUDIO BUYS  
Richmond  
GARY'S

### WASHINGTON

Bremerton  
EVERGREEN AUDIO  
Dlympha  
DESCO ELECTRONICS

### WEST VIRGINIA

Morgantown  
THE SOUND POST  
Princeton  
THE SOUND POST

### WISCONSIN

Appleton  
AMERICAN TV  
Glendale  
SOUNDSTAGE  
Madison  
SPECIALIZED SOUND  
AMERICAN TV  
Oshkosh  
AUDIO PLUS  
Sheboygan  
GENE'S CAMERA & SOUND

**SAVE 62% ON**

**Audio**

**YES**, send me a one-year subscription for **\$8.97** – that's 62% off the newsstand cost of \$24.00 and half the regular subscription rate.

I prefer a two-year subscription for **\$17.94**.

Payment Enclosed     Bill Me

Name \_\_\_\_\_  
(Please print)

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

Outside the U.S. add \$6.00 per year for additional postage. Payment must accompany order. Your first copy will be in the mail within 6 weeks.

**New subscribers only, please.**

4GAK6

**SAVE 62% ON**

**Audio**

**YES**, send me a one-year subscription for **\$8.97** – that's 62% off the newsstand cost of \$24.00 and half the regular subscription rate.

I prefer a two-year subscription for **\$17.94**.

Payment Enclosed     Bill Me

Name \_\_\_\_\_  
(Please print)

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

Outside the U.S. add \$6.00 per year for additional postage. Payment must accompany order. Your first copy will be in the mail within 6 weeks.

**New subscribers only, please.**

4GAK6



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

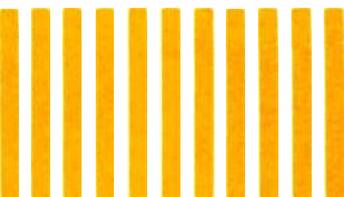
## BUSINESS REPLY CARD

First Class Permit No. 971 Boulder, CO

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 5318  
1255 Portland Place  
Boulder, CO 80321



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

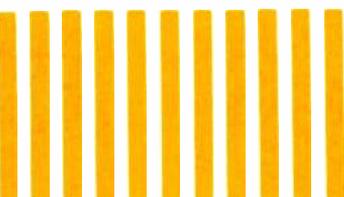
## BUSINESS REPLY CARD

First Class Permit No. 971 Boulder, CO

POSTAGE WILL BE PAID BY ADDRESSEE

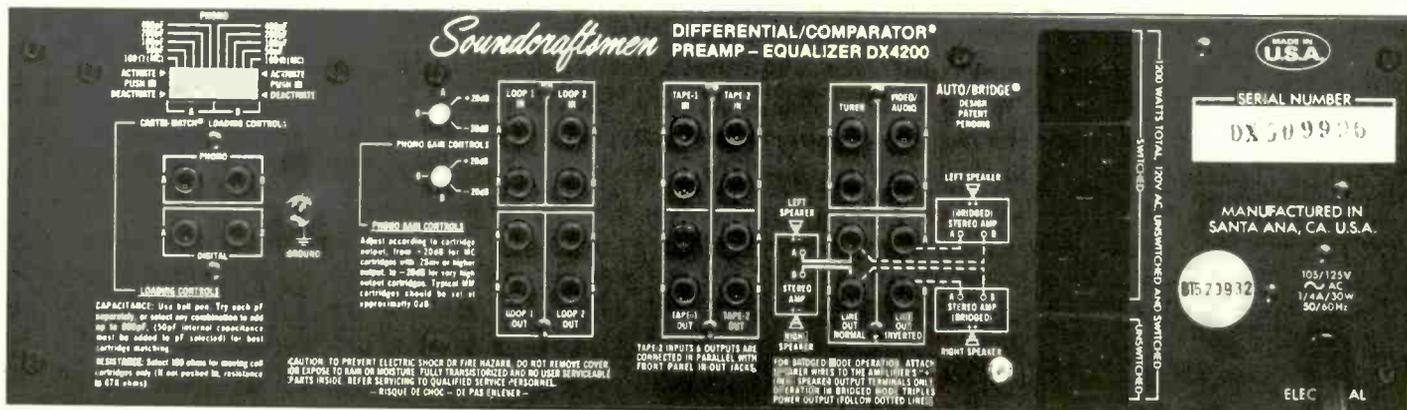
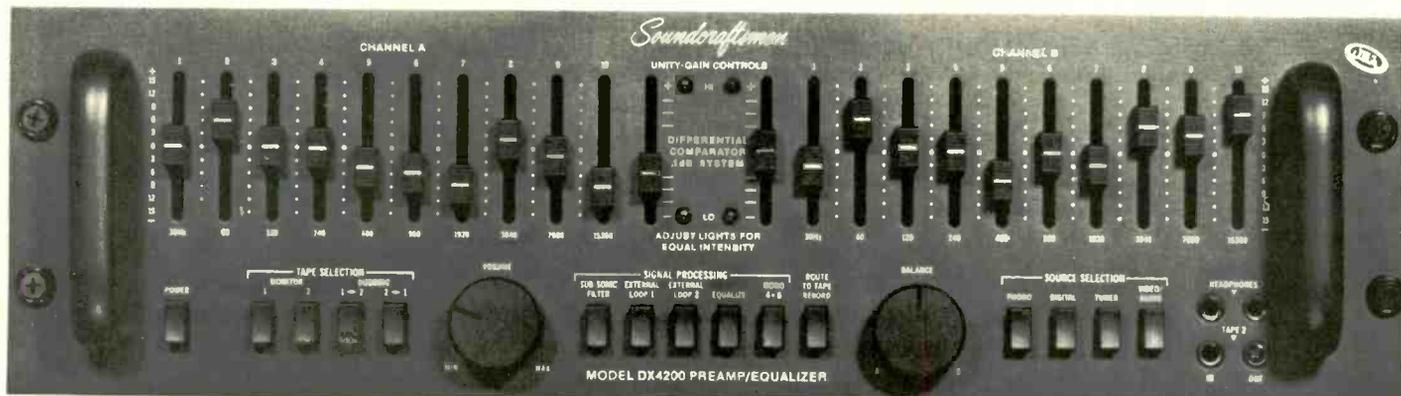


P.O. Box 5318  
1255 Portland Place  
Boulder, CO 80321



# Not just a Pretty Face... the Back is beautiful, too!

MADE IN U.S.A.



**“Set-to-Forget” controls on the Rear... “Set-to-Enjoy” controls on the Front**

## DX4200 DESCRIPTION

The new DX4200 Preamp/Equalizer is the most versatile preamplifier available. It was designed for the most demanding audiophile who takes a “hands-on” approach to his or her music system. The preamp section includes specially-designed “overload-proof” inputs for the latest CD players, with their potential for unsurpassed wide dynamic range. The phono preamp utilizes fully-discrete circuitry instead of the more common IC “chips,” eliminating coloration and making it exceptionally quiet. It accommodates most moving-coil cartridges and even permits adjustment in capacitance loading from 50 picofarads to 800 picofarads, in 50 picofarad steps, for exact matching of virtually any phono cartridge. Soundcraftsmen’s exclusive Auto-Bridge<sup>®</sup> circuitry permits the user to start with one stereo amplifier, and then to add a matching amplifier at a later date, operating both amplifiers in “bridged mono mode,” thereby TRIPPLING per-channel power output with no loss in performance. Ideal for meeting the power demands of digital audio. Only the finest available parts, such as the legendary Noble 31-position resistance-loaded volume control, are used in Soundcraftsmen preamps. Three-way tape dubbing and two external signal-processor loops add to the DX4200’s versatility.

## SIGNAL PROCESSING

Four useful and individually costly components are combined in each Soundcraftsmen Preamp/Equalizer: a Ten-Band Stereo Equalizer, a superb Phono Preamplifier, a versatile Patch-Bay Switching Box and a stereo amplifier Bridging Adaptor. With the growing number of excellent signal-processing devices available, it has become extremely difficult to connect these components to a stereo system and then be able to route any desired combination to loudspeakers and/or tape recorders. With Soundcraftsmen preamps it is as simple as pushing a button! No more cable-switching; add-on devices are permanently connected to the patch-bay section of the preamp. For the serious tape recordist, this one feature can eliminate hours of frustration associated with the interconnecting of add-on specialty components.

**FEATURES** • Sub-Sonic Filter: -3dB @ 15Hz, 12dB/octave rolloff • Auto/Bridge © to bridge 2 stereo amps • Phono Preamp utilizes all Discrete Components—No Integrated Circuits • CD Digital Audio Inputs • Noble 31-position volume control • Inputs for audio portion of video source • Three-way tape dubbing • Low-impedance headphone output jack w/amplifier • Dual 10-Band  $\pm 15$ dB equalization • Variable cartridge loading • Individual phono input level adjustments • Moving-coil cartridge inputs • Frequency Spectrum Analyzer Test Record • Computone Charts for Instant Re-setting • 19” rack-mount front panel • **SPECIFICATIONS** • FREQUENCY RESPONSE: Hi-level  $\pm 1/4$  dB, 5Hz to 100 KHz Phono  $\pm 1/2$  dB, 20Hz to 20 KHz • THD: Less than .01% at 1 Volt • IM DISTORTION: Less than .01% at 1 Volt • PHONO SIGNAL-TO-NOISE: 97 dB.

# FREE!

**16-PAGE FULL-COLOR BROCHURE, \$19.95 EQ-EVALUATION KIT,** includes 1-12” LP Frequency Spectrum Analysis Test Record; 2-sets of Computone Charts, 1-Connector Cable for comparison test, 1-instruction folder for use with your present stereo system, **JUST WRITE TO US OR CIRCLE READER SERVICE CARD # 30** for FREE SPECIAL OFFER DETAILS.

Soundcraftsmen Inc., 2200 So. Ritchey, Santa Ana CA 92705 PH: 714-556-6191 TELEX/TWX 910-595-2524 CANADA: E.S. Gould, Montreal, Quebec, H4T1E5

Enter No. 30 on Reader Service Card

## Do You Hear What I Hear?

Dear Editor:

By the tone of his letter (see "Signals & Noise," December 1984), Richard D. Kelly seems convinced there is negative bias (attitude, if you will) on the part of some *Audio* reviewers toward solid-state amplifiers as exemplified in the phrase, "transistory sound." He cites writing by Bert Whyte and Anthony H. Cordesman. To quote Mr. Cordesman, "this is reflected in a slight drying out of the sound and minor loss of life."

Well, now, one really must be able to do some serious listening for oneself in order to gain true insight (earsight) as regards the heart of the matter. I would suggest that among persons reading *Audio* magazine now, many have probably never had the chance to hear music through high-quality, vacuum-tube amplifiers and preamplifiers at all. Unfortunately for Mr. Kelly, this is the only way possible to form an educated opinion as to the relative merits of tubes versus solid-state. I would hazard a guess that he has not had the chance to listen over a period of time, via quality, vacuum-tube components, to a variety of recorded music. I believe that if Mr. Kelly would do so, his point of view as expressed in his letter may well change.

In a world where ultra-sophisticated, integrated circuits abound, it may seem incongruous that an amplifier employing thermionic emission devices with glowing heater elements should sound in any way better than a state-of-the-art, solid-state amplifier, but there you are.

Granted, there are plenty of audio gurus, wags, and hypsters as well as grand audio pooh-bahs out there, lurking in the world of audio ready to have you crowd around and absorb their particular point of view at any given moment, but so what? You will have to make your way as best you can.

Also, part of what makes audio interesting is the fact that different people do hear things differently, can hold other opinions, and so forth. That leaves experimentation open to the amateur. And, yes, components do sound radically better in certain combinations than others. In addition, all is *not* known about the best circuit designs for audio amplification.

I say bravo to Mr. Whyte and Mr. Cordesman for speaking their minds on the subject and to *Audio* for publishing it.

Mr. Kelly, get thee to some good tube equipment and listen for yourself.

Robert Rosenow  
Address unknown

## True Confession

Dear Editor:

'Fess up. Did Bert Whyte really write the column attributed to him on the Philips vs. Meridian CD players (see "Behind the Scenes," December 1984)? Or did Prof. Lirpa sneak in and play his usual tricks? Or, worse yet, did someone from an underground magazine sabotage you?

As I recall, the early reactions to CD from such above-ground magazines as *Audio* and *Gramophone* declared that CD represented perfection itself. Only fools and naysayers, of which one category includes reviewers in the undergrounds, could hear any flaws in music reproduced by the CD process.

Then in July 1984, the venerable *Gramophone's* John Borwick, John Gilbert and Geoffrey Horn, while conceding nothing of their earlier comments on CD, reported that engineers at Philips made improvements that overcame imperfections once heard only by fools and naysayers. Now Bert Whyte reports that not even Philips' improvements are enough; Meridian is able to make still more.

A purple haze (or perhaps a velvet fog) seems to be settling on the distinction between above-ground and underground magazines' perceptions of CD-reproduced sound. Next thing you know, someone will be claiming that the undergrounds were right all along. I shudder at the implications of that possibility.

Everett B. Young  
Santa Ana, Cal.

## Realistically Speaking

Dear Editor:

Regarding an item in December's "Spectrum" ("Timer, Timer, Glowing Bright . . ."), well, sir, there is an answer. You're just not looking "low" enough. That's often the trouble with some of you esoteric, high-end affectionados [sic]. However, I'd have a lot fancier system myself if I weren't the

mild-mannered, modestly compensated church worker that I am. But, by necessity, I'm forced to look for solutions I can afford. As a result, I have a finely developed "Volkswagen" taste—last year's models, no-frills equipment, and good used stuff. My system includes an older Dual turntable with a Shure 97HE cartridge, a nice little NAD receiver (now discontinued), a couple of JVC 03 speakers (that sound at least adequate to me), and a JVC DD-66 three-head deck that I picked up at a steal.

I regularly tape classical programs off the air, both for enjoyment and education. I finally added a Sony FX510R tape deck to accommodate programs over 45 minutes long. What to do when I'm not home to tape? A timer, of course. I chose a Radio Shack 24-hour programmable timer, and it's been working perfectly for about 9 months. I am now considering the purchase of the new seven-day programmable model. At \$50, it seems to do everything one would need.

I enjoy *Audio* very much and have received a valuable education from its pages. But, as I'm sure you know, price is often more a matter of prestige than a return (in terms of quality) on the investment made. I don't care for the Realistic name plates, but darn, it, I'm getting those recordings made!

Jon B. Oakleaf  
Moline, Ill.

## On the Case

Dear Editor:

Having read with great interest the article by David Lander, "The Untold Story Behind the Bose-CU Case" in the December 1984 issue, I would like to comment that, despite Mr. Lander's pro-Bose attitude throughout, the reader can only conclude Consumers Union is the wronged party. Dr. Bose's attitude seems to be that he will sue anyone who publishes something about his speakers of which he does not approve. His concession that reviewers may publish negative opinions under their own bylines is a canard: Unsigned editorials and reviews are, by long tradition, considered the opinions of the editorial board of the publication, and can be considered to be published under their bylines.

The absurdity of Dr. Bose's claims



## Our twelve millionth sound system just found a new home.

Audiovox made the very first custom in-dash radio for audiophiles nearly 20 years ago.

Since then, we've made over *twelve million* custom sound systems for automobiles. One at a time.

Today, our top-of-the-line Hi-Comp matched stereo components produce a response so remarkable they are wooing Mercedes owners away from the most famous European system.

For instance, the Audiovox Hi-Comp HCC-1250 receiver/cassette being installed here is only 5" deep. Yet its back-lit panel displays not only frequency and time, but all other functions just as though you had a small personal computer at your fingertips.

You get Dolby noise reduction from the deck, plus a music search system that permits scanning of cassette programs in both the forward and reverse modes. And a

further refinement is the solenoid soft-touch operating buttons usually found only on the most expensive home cassette decks.

With enormous power and the least cluttered control panel extant, this receiver/deck is designed for minimal eye movement combined with all the listening satisfactions of the home system.

But Audiovox hasn't stopped at sound systems in bringing motorists the comforts of home. Whether you're considering our new Audiotel™ mobile cellular phones or our electronic car security systems, Audiovox leads the way with a host of features the competition hasn't even considered yet. Audiovox. We've made cars more livable for a whole generation of drivers.

Audiovox Corporation, 150 Marcus Boulevard, Hauppauge, NY 11788. (516) 231-7750.

# A U D I O V O X

We make cars more livable.

Dolby is a registered trademark of Dolby Laboratories, Inc.  
© 1984 Audiovox Corp.

Enter No. 9 on Reader Service Card

# BRYSTON



## Bryston announces . . .

a substantial advancement to the technology of audio power amplification.

Bryston has been researching the science and the art of amplification for over ten years. Recently, a breakthrough of sorts at Bryston in the application of complementary Bipolar power-delivery systems has almost perfectly optimized the output transfer-function, resulting in an amplifier more linear, less sensitive to loading, with smaller amounts of upper-order harmonic content than previously possible without class-A biasing, or other special compensation techniques.

We feel that another veil has been lifted from the amplifier's contribution to the overall audio picture. We believe you will think so too. Write to Bryston at the appropriate address (below) for a technical paper on Bryston's *newest* advancement on the state of the art, and a list of dealers where you can listen to the optimal amplifier (and, of course, our matching preamplifier).



IN THE UNITED STATES

**BRYSTON VERMONT**  
RFD#4, Berlin, Montpelier, Vermont 05602

IN CANADA

**BRYSTON MARKETING LTD**  
57 Westmore Dr., Rexdale, Ontario, Canada M9V 3Y6

Enter No. 13 on Reader Service Card

against CU are brought into harsh focus by the nature of the lawsuit: Despite Bose's claims of wildly irresponsible reporting on the part of CU, the entire lawsuit hinged on one subjective opinion in the review (three words long!), having little or nothing to do with objective speaker-testing procedure. Bose Corporation's attitude toward testing, however, seems to be that the only fair tests are those which produce results favorable to Bose speakers. Threatening to sue a magazine (as Dr. Bose did with *Physician's Life Style*) for libel because their reviews did not agree with other, positive opinions, is absurd: Should a record manufacturer sue a reviewer who has published a negative opinion, claiming that, since nine out of ten reviewers liked the record, the one negative opinion must be due to defective musical taste? And this from a company which refuses to release *its* testing methods as proprietary!

I have not auditioned Bose speakers, and have no reason to believe that they are anything but superior. I do, however, have strong reason to believe that Bose Corporation has anything but superior scruples when the reputation of their products is involved.

Christopher Pettus  
Los Angeles, Cal.

### Designated Clearinghouse

Dear Editor:

I have a great suggestion: *Audio* could serve as a clearinghouse for oldies-but-goodies—those great analog master tapes, currently sitting somewhere in someone's vaults, that should be transferred to CD.

Readers could write in to suggest their requests for such reissues. You could then send the results to the respective manufacturers. (Incidentally, Polygram just did a *mono* CD reissue of an EmArcy jazz recording made during the '50s.)

My requests? Easy! My choices are the Mercury releases (engineered by C. R. Fine), Hi Fi Record classical and pop organ recordings (remember them?), RCA Reiner/CSO Orchestra Hall vintage discs, and Crystal Clear's Virgil Fox (not really an oldie) and Sonic Fireworks, with the Atlanta Brass.

James F. Kregg  
Evanston, Ill.

**PYLE DRIVER® SPEAKERS...**

**RECOMMENDED FOR CARS THAT ALREADY HAVE SUNROOFS**

...Or car owners who want maximum performance from their car stereo system.

We may not rip your roof off — but we can promise you superbly clean, clear, sound reproduction. Pyle Driver® speakers are handmade right here in the U.S.A. by craftsmen with over 30 years experience creating amazingly accurate sound.

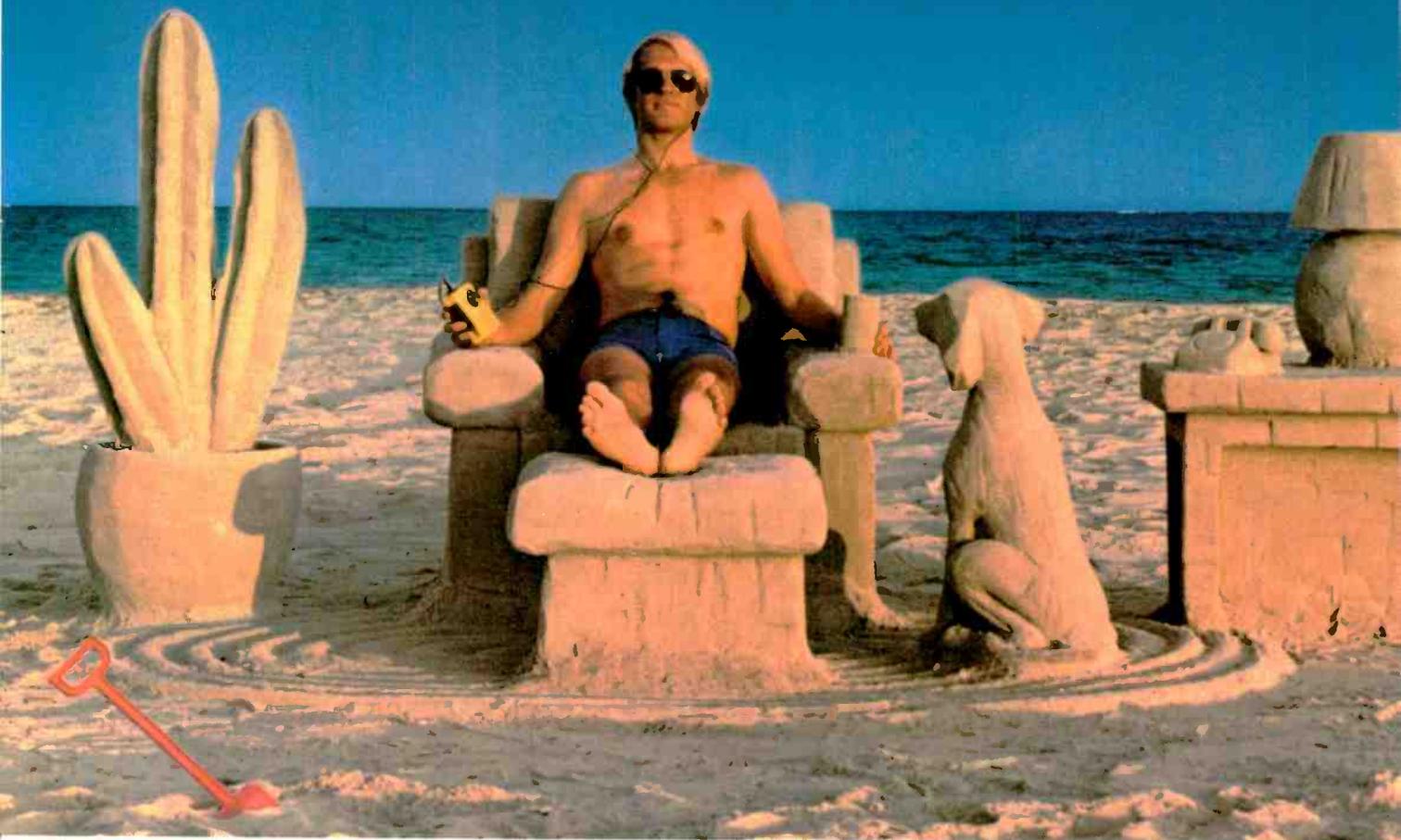
We know you want to hear it all — every high, every low and everything in between — without distortion and without paying a premium price! Pyle Drivers® . . . recommended for everyone who wants a great value and *the best sound*.

The source of great sound  
**PYLE DRIVERS®**

For the name of the Pyle Driver® dealer nearest you write:  
Pyle Industries, Inc., 501 Center St., Huntington, IN 46750

Enter No. 45 on Reader Service Card

# MAXELL TAKES COMPACT DISC QUALITY OUT OF THE LIVING ROOM.



Ah, the comforts of home. They're tough to leave behind. Especially when it comes to things like your compact disc player.

But even though you might not be able to take the player with you, you can take the brilliant sound quality. If you record your compact discs on Maxell XL-S cassettes.

By producing smaller, more uniform magnetic particles, we can pack more of those particles on the tape surface. Which makes it possible to record more information on a given area of tape.

As a result, AC bias noise is greatly reduced. And maximum output levels are significantly increased. In fact, the dynamic range of XL-S is expanded so much, it can capture everything from the subtle passages to the extreme bursts inherent to compact discs.

So record your compact discs on Maxell XL-S.

Then you can enjoy their sound quality wherever you feel at home.

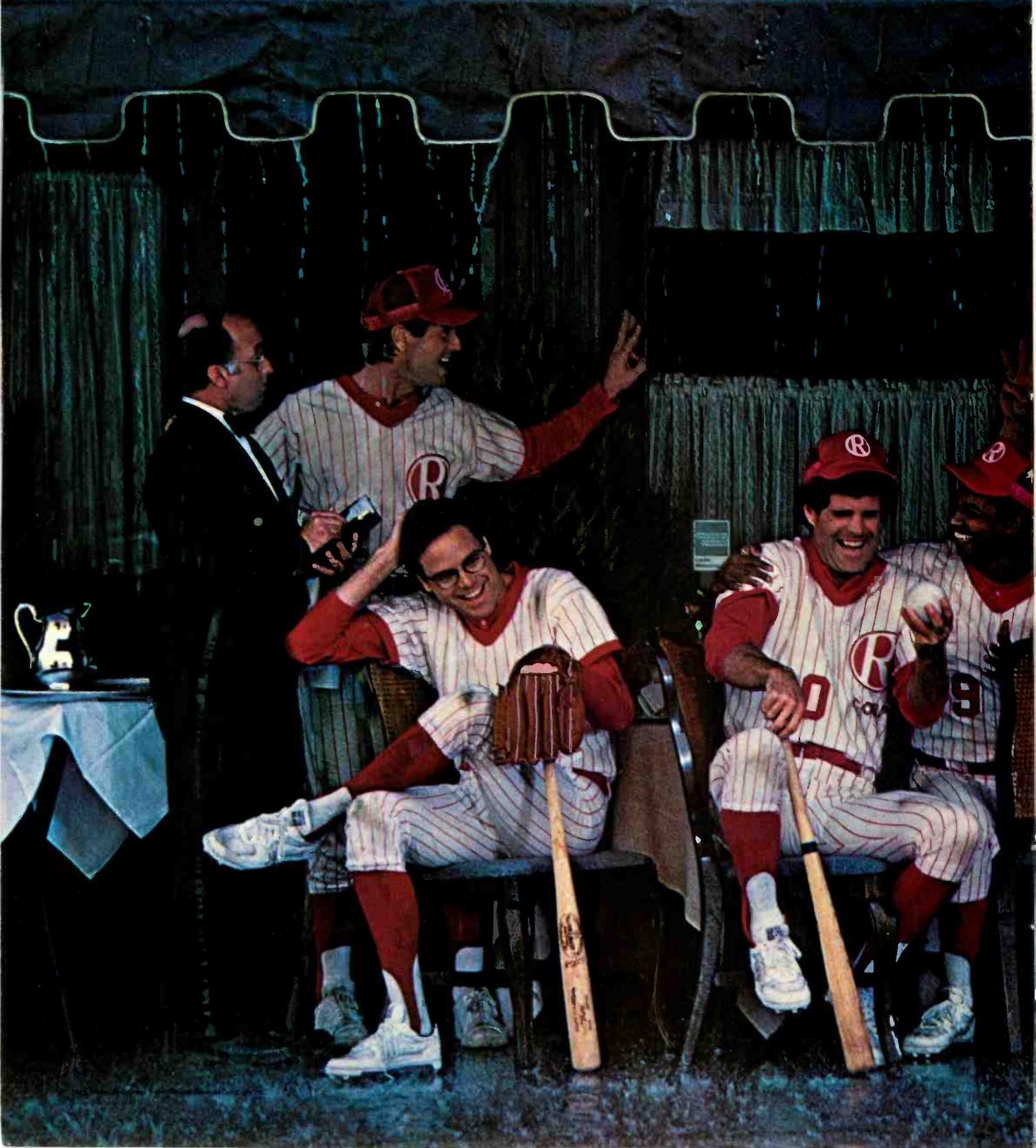


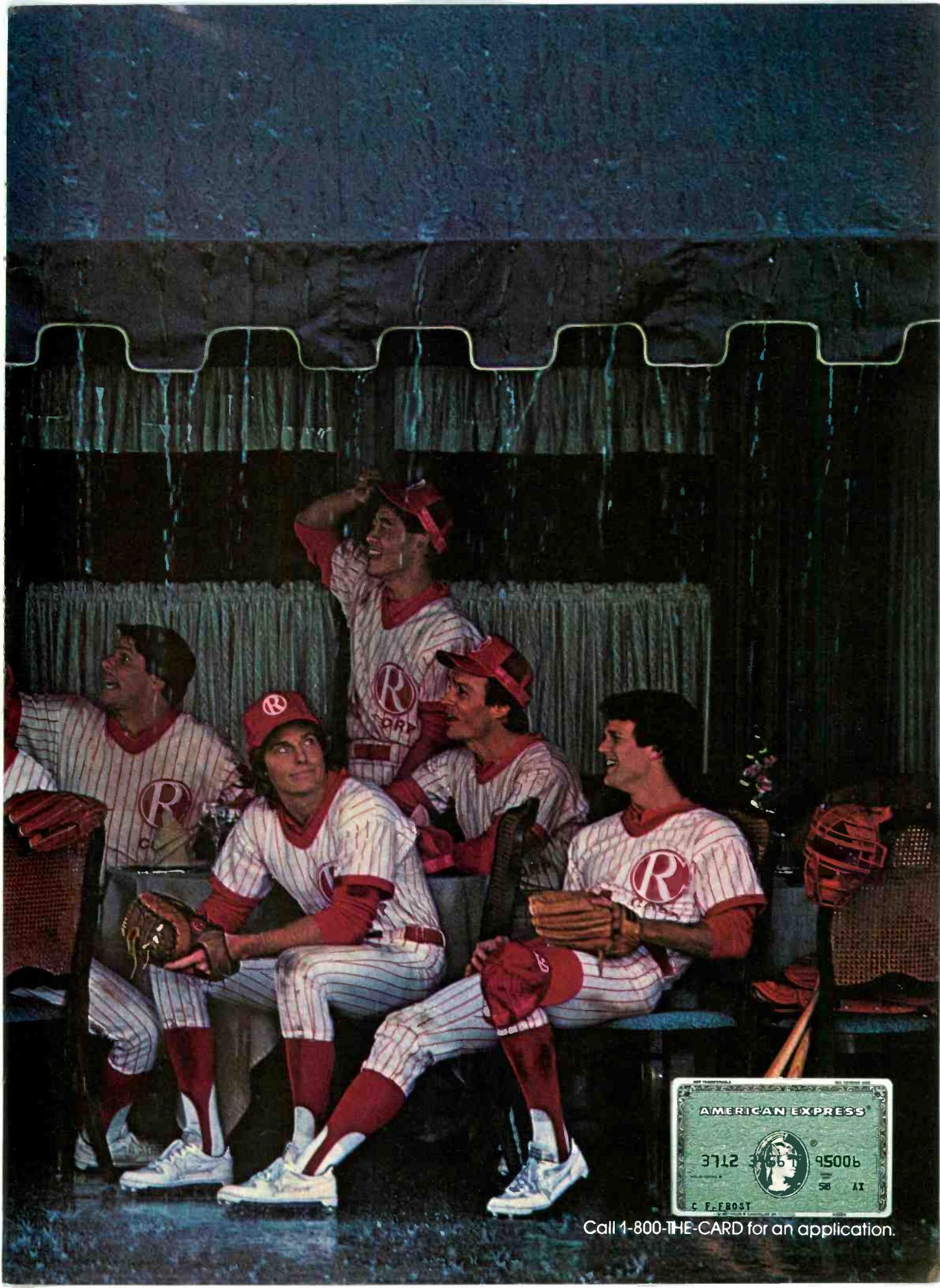
**IT'S WORTH IT.**

© 1985 Maxell Corporation of America, 60 Oxford Drive, Morristown, N.J. 07074.

Enter No. 35 on Reader Service Card

The American Express® Card. It's part of a lot of interesting lives.



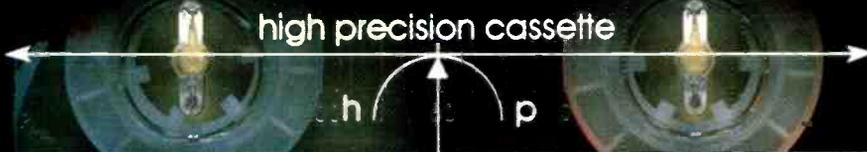


Call 1-800-THE-CARD for an application.

HIGH BIAS TAPE



# BASF 90



BASF CR-E II 90



## chromdioxid extra II

hifi stereo cassette · 2 x 45 min · 132 m

# BASF Chrome. The world's quietest tape.

When you buy most audio tapes, you get a little something extra whether you like it or not. It sounds like thisssssss.

Unless the tape is BASF Chrome. Because unlike ferric oxide tapes, BASF Pure Chrome is made of perfectly shaped chromium dioxide particles in an exclusive formulation that delivers the lowest background noise of any tape in the world. It also delivers outstanding sensitivity in the critical high-frequency range. In fact, it's designed especially for the Type II Chrome Bias position on your tape machine. And it's guaranteed for a lifetime.

So, if all you want to hear is the music you record, this little message should be music to your ears. BASF Chrome. The world's quietest tape.



# BASF

Chrome Audio & Video Tapes  
**The quality never fades.**

Enter No. 10 on Reader Service Card

**Dolby C and dbx**

*Q. Does dbx offer an improvement over Dolby C? Why would both circuits be present in one deck?—Freeman Matthews, Columbus, Ohio*

A. Dolby C, like Dolby B, works on the principle of variably boosting the treble range in recording and cutting it by a complementary amount in playback, which simultaneously cuts back upper-frequency noise. The amount of this treble boost or cut in recording and playback varies with signal level; the lower the level, the greater the change. This avoids applying excessive treble to the tape, which would cause distortion.

The dbx NR system compresses the entire audio range in recording and expands it back to normal in playback, with the downward expansion in playback reducing noise, just as it does in Dolby NR. By compressing the entire band, dbx NR effectively permits more signal to be recorded than would otherwise be the case.

Dolby C NR achieves about 20 dB of noise reduction, Dolby B about 10 dB, and dbx NR about 30 dB. Thus, Dolby C can attain a signal-to-noise ratio of more than 70 dB, Dolby B over 60 dB, and dbx more than 80 dB, all on a weighted basis referred to the 3% harmonic-distortion level at 315 Hz.

Dolby C requires matching the recording and playback levels for each tape formulation. This requires adjusting the deck's internal or external controls so that treble cut in playback will match (or "track") treble boost in recording to achieve flat response. (Remember that, in both Dolby systems, treble change varies with signal level.) The dbx NR system requires no such matching.

However, noise-reduction systems tend to have unwanted side effects, namely "pumping" or "breathing" (audible changes of the background noise level as the NR action begins and ends). The greater the degree of noise reduction, the greater these effects tend to be. Most people hear little or none of these effects; some claim that they do hear them and are bothered by them. Dolby C tends to have lower distortion than dbx at low and moderate signal levels, while dbx tends to have less distortion at high signal levels.

Having both Dolby and dbx in one deck enables the user to play tapes recorded on other decks with one NR system or the other. And it gives the user the choice of whichever system sounds better to his own ears with respect to tapes both recorded and played on his deck.

**Switch-Setting Confusion**

*Q. I own an old cassette deck which has a "Normal/CrO<sub>2</sub>" equalization switch. The service manual indicates that the CrO<sub>2</sub> setting rolls off the high frequencies during recording and does nothing during playback, which agrees with the audible effect of the switch. I note, however, that most current decks, including my car cassette deck and my Walkman-type player, include a normal/CrO<sub>2</sub> switch that seems to roll off the highs during playback. Assuming that it would be inappropriate to equalize during both recording and playback, which would be more advantageous—to record with the CrO<sub>2</sub> setting and play back with the normal setting, or to record with normal and play back with CrO<sub>2</sub>?—Gerald Zuckier, New Haven, Conn.*

A. Normal (Type I) and CrO<sub>2</sub> (Type II) tapes require different bias settings in recording and are normally used with different equalization settings in both recording and playback. Some decks have separate switches for bias and EQ, while others have a single switch handling both.

The "Normal/CrO<sub>2</sub>" switch (or the Type I/II switch on some decks) ordinarily does the following: In recording, it supplies more treble boost (and, if there's no separate bias switch, more bias) for Type II than Type I tapes. In playback, it supplies more treble cut for Type II than Type I tapes, a difference reaching about 1 dB at 1 kHz, about 3 dB at 2.7 kHz, and an eventual maximum of 4.4 dB at 20 kHz (using 400 Hz as the 0-dB reference). I realize that this contradicts your service manual, according to your letter. But unless your deck differs uniquely from most others, that is the case.

If your Type I/II switch controls both bias and EQ, then you must record CrO<sub>2</sub> tapes in the "CrO<sub>2</sub>" (or Type II) position to avoid excessive distortion and exaggerated treble, and you must record normal ferric tapes in the "Nor-

mal" (Type I) position to avoid excessive treble loss. That being the case, response should be flattest when you set the EQ switch to match the tape in playback, too. If you mismatch the tapes and EQ switch in playback, you will get a bit more highs when playing CrO<sub>2</sub> tapes in the "Normal" position and a bit softer highs when playing ferric tapes in the "CrO<sub>2</sub>" position; with some recordings, you might even prefer these deviations from flat response.

If your deck has separate bias and EQ switches, you still must match the bias to the tape in recording, but you are free to try using the "wrong" equalization in recording and playback; you will still get reasonably flat response, as long as you use the same EQ setting for both recording and playback. Using the "Normal" EQ setting will give you the best high-frequency response your tape is capable of, but not quite the lowest noise. Using the "CrO<sub>2</sub>" setting will give you the lowest noise, but not quite the most extended high-frequency response. The latter equalization was deemed better for CrO<sub>2</sub> tapes because those tapes have more high-frequency response to start with.

**Limiter Switch**

*Q. My tape deck is equipped with a limiter switch. Judging from the user's manual, this limits excessive peaks while recording, but the manual is far from clear. I have several questions: What exactly does the limiter do? Should it be used only in recording, or in playback as well? At what levels should I record with the limiter on and with the limiter off (the meters are peak-reading)?—Stuart Munro, Brighton, Mass.*

A. A limiter is a compressor which only goes into action when the signal being recorded approaches the tape-saturation level. It therefore reduces the likelihood of distortion due to over-recording, though at the expense of compressing the dynamic range of loud sounds. This is better than compressing the entire signal (as an ordinary compressor would), but still not as good in terms of fidelity as recording

**If you have a problem or question on tape recording, write to Mr. Herman Burstein at AUDIO, 1515 Broadway, New York, N.Y. 10036. All letters are answered. Please enclose a stamped, self-addressed envelope.**

Limiters work best with nonmusical material, where accurate dynamic range isn't critical.

without a limiter at levels just low enough to prevent overrecording. Limiters are most often used when recording live events, where signal levels are unpredictable. They work most satisfactorily for nonmusical material, where accurate dynamic range is usually less critical.

To record with the limiter off, without distortion, you should set the recording level so the meters do not exceed approximately 0 VU. However, you should experiment. Depending on the tape you use, and quite likely on the program material too, you may find that you can go a few dB above 0 VU

without noticeable deterioration in sound quality, thus improving the S/N ratio. With the limiter on, you may be able to aim a bit higher still.

#### Companing

*Q. I am a retired bass-guitar player. I tape my own arranged backgrounds and add a bass line plus other effects for guitar-chord jazz. I am interested in a compressor for recording and an expander for playback, and need information concerning this technique. There is no one near me to help, and San Diego is 40 miles away.—Jerome Geller, Lake San Marcos, Cal.*

A. I suggest that you review the listing of noise-reduction units (including companders, expanders, etc.) on page 240 of the October 1984 issue of *Audio*. Select those manufacturers who offer units of possible interest to you, and write to them for information.

Essentially, the combination of a compressor and expander will enable you to get more information on the tape and, with expansion in playback, reduce the noise of the tape recording system. (Plans for building such a unit were in our February '85 issue.)

It seems well worth your while to go into San Diego to hear for yourself what such units can do. If your tape system already has a high signal-to-noise ratio—say, up in the high 60-dB range, or into the 70s—they might do little or nothing for you.

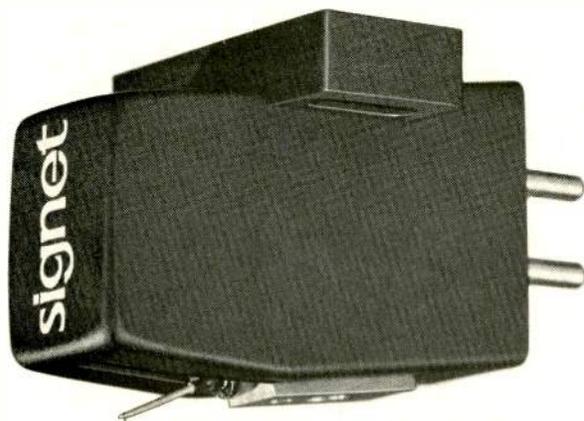
#### Tape Hiss

*Q. I have noticed that a new (unrecorded) tape produces less hiss than an erased tape. Is this normal?—J. Carl Shrader, New York, N.Y.*

A. If you are referring to a tape erased by the tape deck, yes, it is normal for such a tape to have somewhat greater hiss than a virgin (new) tape. The reason is that any distortion in the waveform from the deck's bias oscillator, which also drives the erase head, causes noise. There is almost always some distortion in the waveform, although usually less in decks of high quality than in others.

To minimize hiss, some people disable their deck's erase heads and use a bulk eraser prior to recording. A tape that has been carefully bulk-erased has about the same amount of hiss as one that is new. A

## Better sound from every record you own, with the new Signet TK10ML!

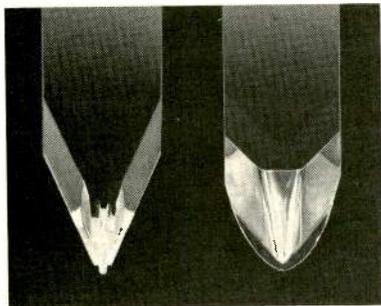


It's something you can't get with any other technology.

Until you hear the Signet TK10ML, you may not fully appreciate how superb today's analog recordings can be. And how much may be lost by going all-digital. So grooves sound new, long after other styli are threatening irreparable damage to your record collection.

The single most significant advance in the Signet TK10ML is its unique new *MicroLine™* stylus... with the longest, narrowest "footprint" ever achieved! Its scanning radius is a mere 2.5 microns, half that of the best ellipticals, while its vertical contact footprint is *three times longer* than the elliptical. The Signet *MicroLine* stylus tracks very high frequencies better—at lower groove pressure—than any other design.

Even with repeated playings, the *MicroLine* stylus maintains its shape, without "spreading" like all other tips.



Each Signet TK10ML *MicroLine* stylus is created from a whole, natural octahedral diamond, oriented for longest life, and with a square shank to precisely fit the laser-cut hole in our unique, ultra-rigid low-mass boron cantilever. You get perfect alignment. Period.

But the proof of quality is in the playing. With the new Signet TK10ML, older records literally come back to life. New records transcend the limits of ordinary technology. Your entire system gets a new lease on life.

Visit your Signet dealer. Peek into his microscope to see this fantastic stylus. Then get the *real* proof. Listen.

**signet**

SIGNET, 4701 HUDSON DRIVE, STOW, OHIO 44224

Enter No. 51 on Reader Service Card

## Analog to CD Mastering

*Q. I have recently purchased a CD player and some fine CDs. Two interesting questions came to mind, based on my collection of these discs. Most CBS Masterworks CDs have, at the right of their covers: "Digitally Mastered" and "Analog Recording." Inside, the manufacturing process is described as being digital: "Mastered from the original recording at the CBS Recording Studios . . . on the CBS Disc-Computer system." Is this process digital throughout, or did they cut a master analog tape? Also, why do I hear "hiss" on these recordings?—Paul Spens, Indianapolis, Ind.*

*A. The phonograph record industry has been with us a long time. Tucked away in vaults are precious master recordings of great artists—and some not so great—made on various analog formats, tape or disc. If the CD is to succeed, there must be a source of music from which to build a library. Many of these analog tape recordings of fine performances have excellent sound. Therefore, these tapes are often transferred to CDs. In order for this transfer to take place, an intermediate step is necessary. The original recordings must first be transferred to a digital master tape. This is not done to improve the sound; it is, however, a necessary step in the process of converting the original product to the Compact Disc format. Any hiss on the original tape will be transferred onto the CD. The remastering process cannot, and should not, differentiate between desired program material and hiss.*

## FM and Dolby Noise Reduction

*Q. Why does the high-frequency response increase when an FM program is being broadcast with Dolby NR, but the NR is not being decoded at the receiver?*

*My receiver has a 25- $\mu$ S switch which is supposed to be used for Dolby reception. Is this the same as Dolby NR? If not, what is the difference? They both seem to increase the high frequencies.—Edwin Cruz, Chicago, Ill.*

*A. When a signal is Dolby encoded, whether for broadcasting or recording, highs are boosted during quiet passages or whenever else there isn't enough high-frequency content to*

*mask system noise. When it's decoded, in reception or playback, those boosted highs are cut back to normal, cutting high-frequency noise in the process. As a result, a Dolby-encoded signal always has emphasized high frequencies if heard without decoding.*

*To maintain compatibility with listeners not using Dolby NR, stations change their pre-emphasis curve from the usual 75  $\mu$ S to 25  $\mu$ S, cutting highs by just about as much as the Dolby system boosts them. For absolutely correct playback, you should therefore use both Dolby decoding and 25- $\mu$ S de-emphasis, counteracting the two changes made at the station and reducing noise. Using the 25- $\mu$ S de-emphasis when listening to Dolby-encoded broadcasts without Dolby decoding, or when listening to non-Dolby broadcasts, will boost the highs unnaturally. However, switching in a Dolby decoder when listening to non-Dolby broadcasts should decrease the highs, not increase them.*

*The best way to find Dolby broadcasts is to ask your local stations when they use the process. Failing that, try decoding broadcasts; if the sound is strange, with mysterious changes in "liveness," then the program is probably not broadcast with Dolby NR. (Incidentally, only the Dolby B NR system is used in broadcasting.)*

## Low Speaker Impedance

*Q. I would like to operate my 8- and 4-ohm speakers at the same time, but I am leery of the demands that the resulting low impedance of 2.6 ohms will place on my power amplifier. Would you envision any problems with using Y plugs to split the preamplifier's output for feeding it to two separate power amplifiers (one amplifier for each set of speakers)? How is this same task accomplished in professional installations?—Jim Fenwood, Hot Springs, Ark.*

*A. I see no problem with using Y connectors to send the signal from your preamplifier to two power amplifiers. These inputs usually have much higher impedances than the minimum the preamplifier should drive. Thus, even with the impedance seen by the preamplifier cut in half, no problems will result. If, however, the cable runs are long, the cable capacitance may*

*become large enough to cause some high-frequency loss.*

*In professional installations, such as recording studios, we do much the same as described above: We wire up some jacks on a patch bay and connect them all in parallel. (This arrangement is called a "mult.") The output of a tape player might be connected into one jack, with several recorders plugged into the other jacks. I have driven 10 or more recorder inputs in this manner without any audible degradation.*

## Defining Ambience

*Q. What is "ambience"?—Tom Wick, Huntington Station, N.Y.*

*A. "Ambience" refers to your surroundings, your environment. When related to sound, it has to do with the environment in which a given recording was made. Where there is no audible ambience because of "dry" acoustics, it is sometimes introduced artificially in the form of reverberation to simulate the ambience one might expect to encounter in a live performance. The producer often uses his imagination to create an ambience unlike anything we might find anywhere, but which nevertheless enhances the recording.*

*We can be our own recording engineers or producers, at least as far as ambience goes. There are many devices that can be attached to our sound systems to alter ambience by adding reverberation, delaying the sound before presenting it to loudspeakers, or feeding the left channel, out of phase, into the right (and vice versa).*

## Switched Outlets Again

*Regarding "Switched Outlets" in July's "Audioclinic": Additional electrical stress will be placed on the preamp's power-switch contacts at the time of turn-on because of contact bounce. During the 1 or 2 mS following the initial "make" of the contacts, each time the contacts close a small magnetic field will develop (in the load). When the contacts bounce open, the*

**If you have a problem or question about audio, write to Mr. Joseph Giovanelli at AUDIO Magazine, 1515 Broadway, New York, N.Y. 10036. All letters are answered. Please enclose a stamped, self-addressed envelope.**

If your area suffers from even brief power outages, you need to look for a VCR with a backup system for its clock.

magnetic field will collapse, adding back EMF (from the load) to the applied electrical potential. This, in turn, can cause more damage to the switch (contact erosion) than would be experienced with a resistive load.

Putting a three-prong plug into a two-prong socket is another matter. In

a quest to make everything "idiot-proof," our latest electrical code bans adaptors having green, pigtail grounding leads in favor of adaptors having fixed, metal tabs molded into them. This is to prevent the "idiot" from plugging the pigtail into a live slot on a standard, duplex wall outlet. I would

suggest that others who have such problems as described by Mr. Bower stock up on the discontinued adaptors with the pigtail leads, to facilitate grounding the third wire to the preamp chassis.—G. Carroll, Culver City, Cal.

#### Digital and Analog Tuner Sensitivity

*Q.* In terms of the ability to "pull in" and "hold" a signal, how much better are digital tuners than analog tuners?—Steve Mello, Lowell, Mass.

*A.* The difference between digital and analog tuners lies in how their tuning oscillators are adjusted, whether continuously (analog) or in discrete increments (digital). This has nothing whatever to do with the ability to "pull in" weak signals, which is governed by the gain and noise figure of the rest of the tuner's front-end.

#### VCR Timers and Power Outages

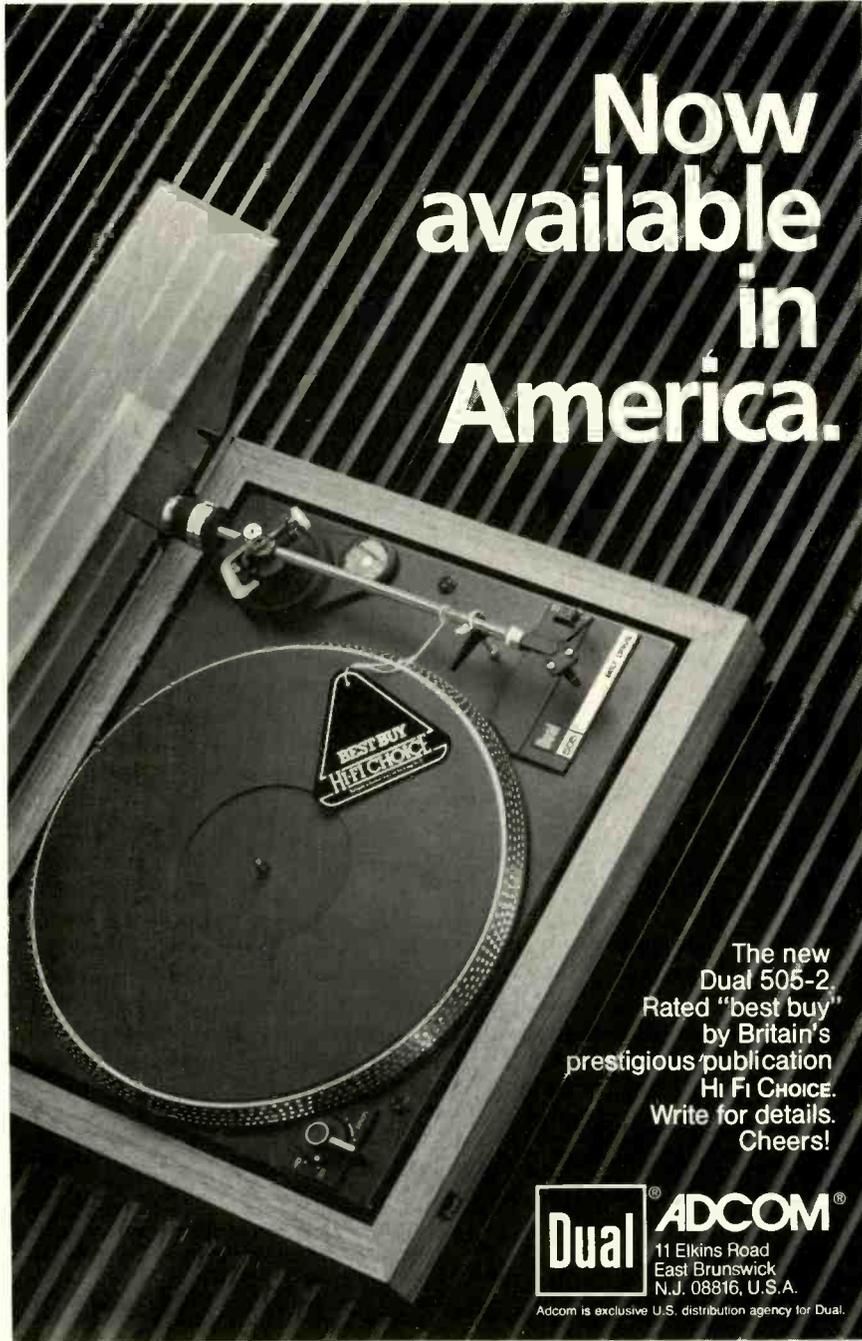
*Q.* I returned home one night, expecting to find a favorite TV program neatly recorded on our VCR. Obviously, while I was gone, there was a short power outage. Our digital-type alarm clock still had the correct time, but not the VCR.

*A.* When the timer in a \$700 VCR is outperformed by a \$20 digital alarm clock, something is definitely wrong.—Ken Knoles, Mason City, Ill.

*A.* A VCR is one of the most complex pieces of equipment that one can find in the home. It is amazing that such a device, with its built-in computer, servo systems, interrelated tape elevator, and loading and running motors can be priced so modestly.

You cannot compare a simple timer with a whole VCR. If you had told me that you had a \$700 timer which did not work as well as your inexpensive clock, I would heartily agree with you. As it is, I cannot.

Some VCRs have provisions for maintaining the clock's settings for a period of perhaps 8 hours. If your area suffers from even brief power outages, then one of the features you need to look for when buying a VCR is a backup system for its clock. Just as you checked to see if the picture was clean, or, perhaps, that the fast search was jitter-free, so, in your case, one feature you must consider is the backup for your timer.



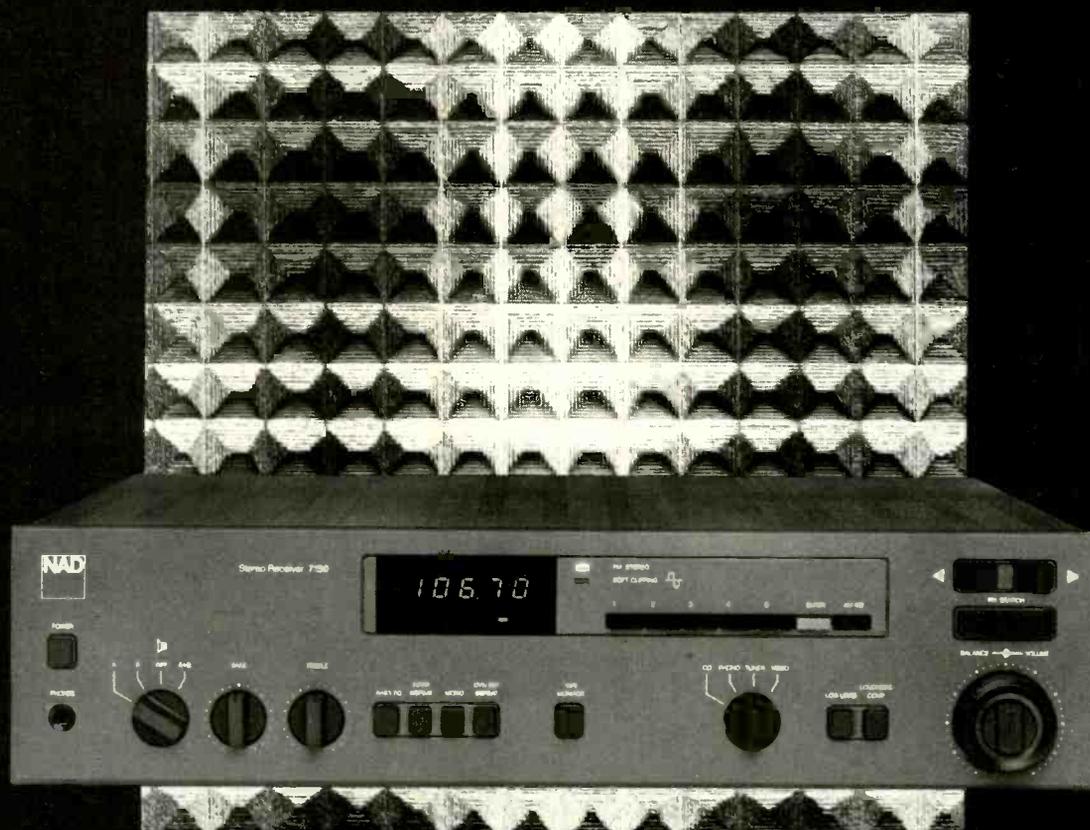
Now  
available  
in  
America.

The new  
Dual 505-2.  
Rated "best buy"  
by Britain's  
prestigious publication  
Hi Fi CHOICE.  
Write for details.  
Cheers!

**Dual** **ADCOM**<sup>®</sup>  
11 Elkins Road  
East Brunswick  
N.J. 08816, U.S.A.

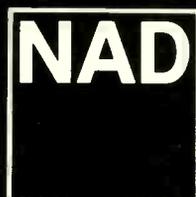
Adcom is exclusive U.S. distribution agency for Dual.

***How Do You Rate  
"CURRENT" Events?***



***By The Good News:***

**THE MODEL 7130 RECEIVER  
FROM**



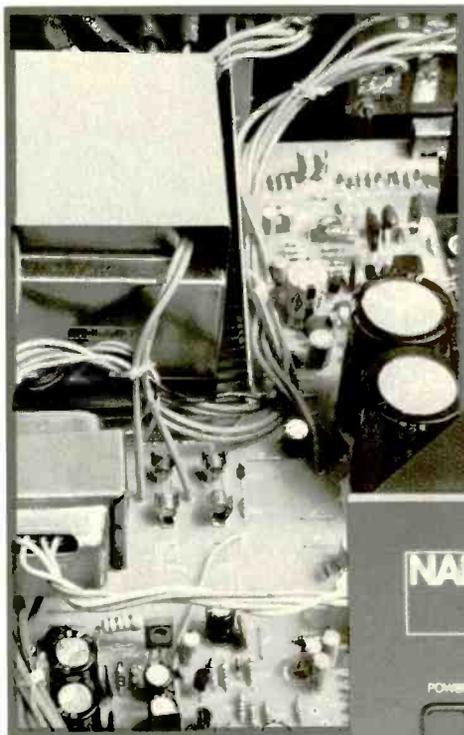
# The NAD 7130 Digital AM/FM Stereo Receiver

NAD's approach to audio product design can be characterized in one phrase—"high-value engineering,"—delivering audibly superior performance at modest cost. The NAD 7130 receiver exemplifies this approach perfectly.

The amplifier section is based on the classic NAD amplifier that has won worldwide praise for its accuracy, musicality and seemingly ef-

fortless power. The FM tuner section of the 7130 is based on the new generation of NAD tuners that are setting standards for clean, quiet FM sound at modest cost. Together they form a robust, easy-to-use stereo receiver whose modest price makes it an attractive choice for the first time stereo buyer, but with uncompromised performance that will satisfy experienced audiophiles as well.

**Designed for Real World Performance.** The clean, uncluttered exterior of the NAD receivers is both a complement and a contrast



**High Current Output Stage.** The typically low and complex impedance of a loudspeaker requires much more output current from the amplifier than an 8-ohm test resistor would. The ability of the NAD 7130 to deliver such current with ease is reflected in its remarkably high Dynamic Power specification at impedances of 4 and even 2 ohms.

**MOSFET FM Tuner.** The low-noise, dual-gate MOSFET FM tuning circuit provides an optimum combination of sensitivity to weak signals and freedom from strong-signal overload.



## Binding Post Speaker Terminals.

Instead of the usual spring clips, heavy duty binding posts are used to ensure secure, low resistance connections for high current delivery with any type of speaker cable.

**Impedance Selector.** NAD's unique impedance selector matches the power supply to the speakers. One setting provides increased voltages for loudspeakers of 8 ohms or higher impedance. The other setting provides the lower voltage and high current needed to drive low impedances, such as 4-ohm speakers or two pairs of speakers playing together.

**Dynamic Separation.** NAD's dynamic separation circuit cancels the out-of-phase portion of the high-frequency hiss that always accompanies weak FM stereo signals. It works by selectively blending the highs, but only in those stereo signals that are weak enough to need the extra quieting. The result is clean, quiet FM reception with subjectively wide separation at all times.

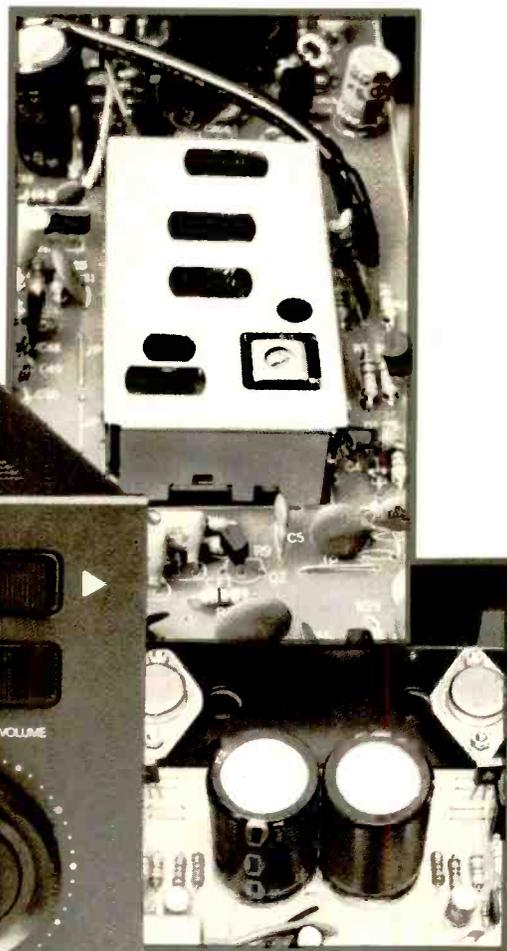
to the expensive circuit components, massive power supply transformers, high power transistors and highly selective tuning circuits of the interior.

Thus while the moderately priced 7130 receiver is rated at 30 watts per channel in standard lab tests using an 8-ohm resistor, in actual listening comparisons it produces noticeably more solid and transparent sound at high levels than other "30 watt" units. This is because the 7130 has a high voltage, high current output circuit that delivers short term bursts of more

than double the rated power into the impedance of a real loudspeaker. Furthermore, NAD's exclusive Soft Clipping™ circuit permits listening levels even beyond those limits, by minimizing audible distortion at high volume settings. The FM tuning section of the 7130 has a remarkable IHF sensitivity rating and in actual use it pulls in weak or difficult stations with audibly better freedom from noise and interference than other comparably rated receivers. This is due to its sophisticated three stage I.F. filtering and Dynamic Separation circuit.

**Linear Phase I.F.** The tuner contains a total of three ultralinear ceramic I.F. filters that provide superb selectivity for interference rejection while maintaining uniformly wide stereo separation. The balanced quadrature detector ensures consistently low distortion, even with overmodulated signals.

**Moving Coil Input.** A rear panel switch increases preamp sensitivity while maintaining extremely low noise. The 7130's MC input is audibly quieter than many others.



**CD Input.** The 7130 receiver has a separate CD input (not merely a re-named AUX input) for a Digital Compact Disc player. There is no input circuit that could be overloaded by high level peaks; the signal goes directly to the Volume control before it is amplified.

**Video Input.** Since this input won't be used up by your CD player, it remains available for other sources of stereo sound—such as a "HiFi" VCR, video disc player or stereo TV tuner.

**Wide Range Phono Preamp.** The phono preamp section of the 7130 is a high precision discrete-transistor circuit whose performance matches that of far more expensive separate preamps. Its signal/noise ratio is close to the theoretical limit under real use conditions, i.e.: with a phono cartridge plugged in. The total dynamic range of the phono/preamp is approximately 106 db.

## Specifications

### NAD 7130 Digital AM/FM Stereo Receiver

Note: Measurements referenced to 8 ohms are taken with the Speaker Impedance selector set to "8Ω (High)." Measurements for 4 and 2 ohms are taken with the impedance selector at "4Ω (Normal)." Specifications are measured in accordance with EIA Standard RS-490 (IHF A-202) for amplifiers and ANSI-IEEE Standard 185(1975) (IHF T-200) for tuners. Tuner sensitivity is measured via 75-ohm coaxial input and converted to equivalent 300-ohm values.

#### Power Amplifier Section, Stereo Mode

##### CONTINUOUS AVERAGE POWER OUTPUT INTO

8 OHMS (min. RMS power per channel into 8 ohms, 20 Hz–20 kHz, both channels driven, with no more than the rated distortion)

Rated distortion (THD), 20 Hz–20 kHz 30 W .03%

Clipping power 1 kHz (max. continuous power per channel) 8 ohms 45 W 4 ohms 48 W

IHF dynamic headroom at 8 ohms +3 dB

IHF dynamic power (max. short-term power per channel) 8 ohms 60 W 4 ohms 65 W 2 ohms 85 W

Slew factor >50

Slew rate 15 V/μSec

Damping factor (ref. 8 at 50 Hz) >50

Input impedance 22 kΩ

Input sensitivity for 1W/30W out .15/.84 V

Power amp gain 25 dB

THD (Total Harmonic Distortion, 20 Hz–20 kHz, from 250mW to rated output) <.03%

SMPTE I.M. (Intermodulation Distortion, 60 Hz + 7 kHz, 4:1, from 250mW to rated output) <.03%

IHF I.M. (CCIF IM Distortion, 19 + 20 kHz at rated output) <.03%

#### Controls

Treble ±7 dB at 10 kHz

Bass ±7 dB at 100 Hz

Bass EQ +3 dB at 60 Hz

+6 dB at 33 Hz

–3 dB at 15 Hz

12 dB/octave

–20 dB

#### FM Tuner Section

Input sensitivity 10.3 dBf

Mono, –30 dB THD+N (1.8μV/300 ohms)

Mono, 50 dB S/N 14.2 dBf (2.8 μV)

Stereo, 50 dB S/N 34.2 dBf (28 μV)

Stereo, 60 dB S/N 44.3 dBf (90 μV)

Capture ratio at 25, 45 and 65 dBf <1.5 dB

AM rejection >62 dB

Selectivity Alternate channel 70 dB

Image rejection 75 dB

R.F. intermodulation 65 dB

I.F. rejection 75 dB

SCA rejection 70 dB

Subcarrier suppression (19 + 38 kHz) 60 dB

THD at 100% modulation 1 kHz 100 Hz–6 kHz

Mono .09% .2%

Stereo .09% .3%

Signal-to-noise ratio Mono 82 dB

IHF weighted, 65 dBf Stereo 75 dB

(typ. 80 dB at 75 dBf) ±0.5 dB

Frequency response, 30–15 kHz 50 dB

Stereo separation 1 kHz 40 dB

(Dyn Sep Off) 30 Hz–10 kHz

#### AM Tuner Section

Usable sensitivity 300 μV/meter

Selectivity 35 dB

Image rejection 50 dB

I.F. rejection 50 dB

#### Physical Specifications

Dimensions (width × height × depth) 42 × 10.8 × 38 cm

16.5 × 4.25 × 15 in

8 kg/17 lb, 9 oz

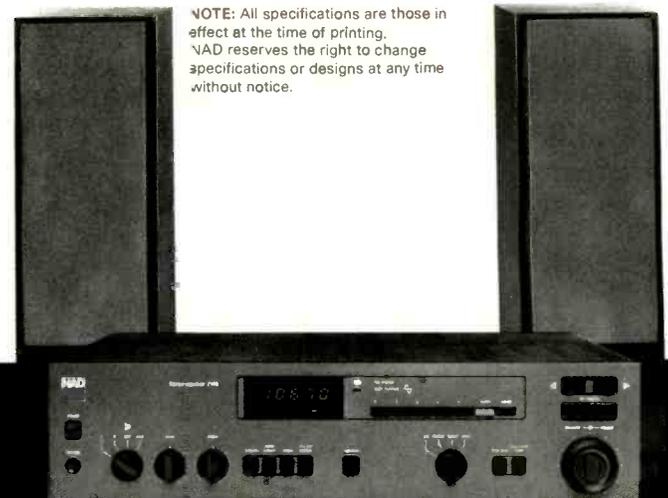
Net Weight 9.4 kg/20 lb, 13 oz

Shipping Weight 50/60 Hz at 110, 120,

Power Consumption 220, or 240 VAC

150 W

Cover Graphics Courtesy of Dora Hsiung, Boston.



NOTE: All specifications are those in effect at the time of printing. NAD reserves the right to change specifications or designs at any time without notice.

**NAD MAKES HIGH PERFORMANCE AFFORDABLE.**

Designed with a degree of thoughtfulness and care seldom found at this price level, the 7130 Stereo Receiver will drive the very best loudspeakers with ease and will do justice to the finest musical recordings.

NAD manufactures an entire line of home electronics, including stereo and video components, loudspeakers and accessories. Featured here is the 7130 receiver with the NAD 20 loudspeakers.

**NAD ELECTRONICS**  
BOSTON/LONDON/TOKYO

## TAKING A BACH SEAT

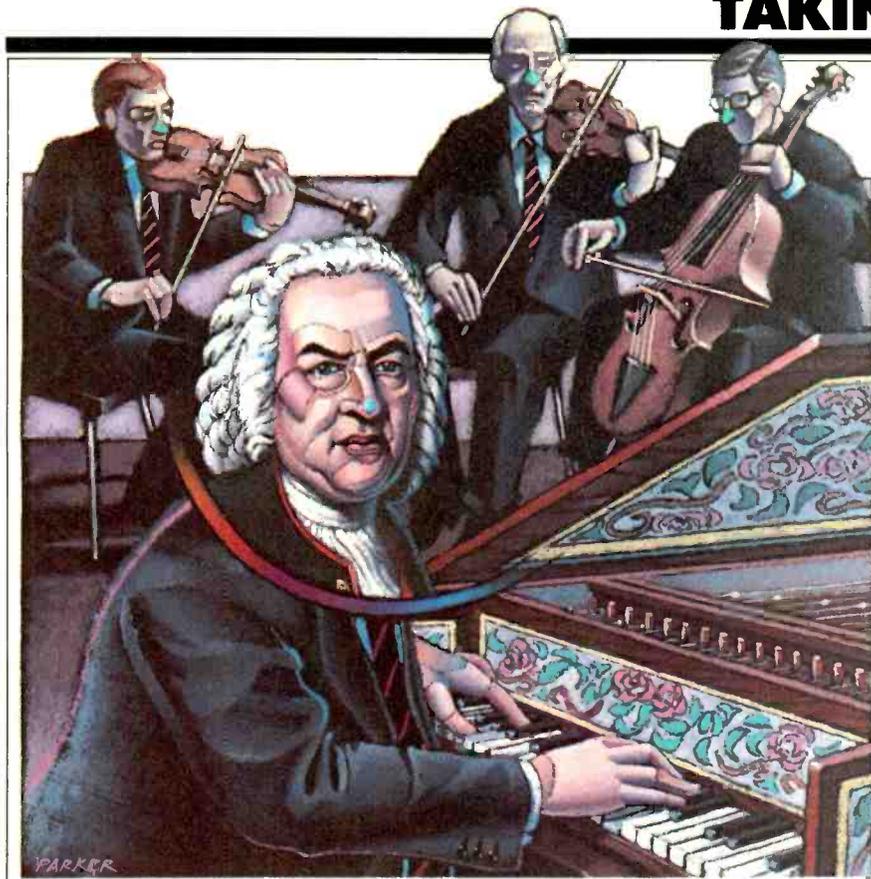


Illustration: Tim Parker

**T**here's nothing like a Bach Festival to produce usable sound, especially in this year of his 300th birthday. So I went to the Northwest Bach Festival, which, according to its management, was the very first 300th-year festival in the U.S. The festival began around January 9 in Spokane. (Pronounce that like aluminum can.) Ever optimistic, I thought I might pick up a few audio ideas.

However, this festival was very odd. There was no audio. Only one pair of visible mikes, merely for a reference recording that nobody is likely to hear. Do you think this discouraged me? Not in the least. My head was full of audio speculations, if by a sort of inverse implication. As soon as I hit the concerts I knew I was in the right place.

Now I had imagined, as an Easterner, that Spokane must be some kind of Western cow town, or mill town, or mining town, out among the Indian reservations in the deserts of Eastern Washington. Bach in such a place? And there was wintry Montana, just beyond the narrow neck of Idaho! I packed my heaviest Swiss boots and all the wool I

could find into an enormous suitcase and set off for Bach, below zero, or worse.

Surprise, surprise. First, I had forgotten about a small terrestrial barrier between Spokane and the Montana blizzards—the Rocky Mountains. Spokane has a Pacific climate, often cold but not boisterous. Each day I was there it was exactly 29° in the afternoon, and a snowfall sat like marshmallow, white and clean, on top of the front-yard evergreens. Switzerland in Washington! That set the scene. When I left Connecticut it was 8° below zero.

Second surprise: Spokane is no cow town, nor even a mining town as it once was. I found a handsome and sizable city that seems to have grown easily into the modern age. I quickly discovered that it was a very sophisticated town: Everyone I met read *Audio*. Engineers, hi-fi bugs, Bach audiences, professional musicians. What more can we ask?

There were big, quiet audiences for Bach. Spokane struck me as more at home with the old man than smaller Eugene, where the big Oregon Bach

Festival resides each spring. Eugene is still a booster town, precariously wealthy (from lumber) and avid for culture, surrounded by higher education, yet bravely overreaching itself in vast projects too big to fit. Silva Hall, for instance—an international-type concert hall and landmark in electronic acoustics as well as architecture (see "Audio ETC," October and November 1983). Spokane seems a more confident city even without a university (the nearest is 25 miles away). The Bach concerts, which might be called esoteric since they were performed entirely on old or "authentic" Bach instruments, attracted astonishingly large and attentive audiences, mostly well-turned-out young people who obviously knew what they were getting into. One could guess what this meant: *Hi-tech*. These must be the new wave of Americans come into Spokane. Not one of them looked remotely like a miner, or even a mine owner.

As we know in audio, people who are into chips and computers and software tend to be brainy and educated as well as youthful. Our own young audio engineers are in the middle of it—they, too, are getting a new and wider education, routinely taking music courses, for instance, along with their audio after the German *Tonmeister* model. Conversely, young musicians, on their side, now receive an equivalently widened training which often includes some of the elements of audio in relation to music performance and composition.

All this, you see, was embodied (literally speaking) right there around me in Spokane. This is clearly a transformed city though it hangs onto its legacy of gorgeous Victorian houses built by the wealthy miners in its past. A Spokane Bach audience, then, is very much *our* audience. Need I say more?

I horned right in on the Bach musicians, though they were, of course, extremely busy, particularly the two entrepreneurs who direct the Northwest Bach Festival (part of a year-round series of events put on by their Connoisseur Concerts). David Dutton is a professional musician who plays Baroque oboe and oboe d'amore in the Bach Festival. Beverly Biggs is one of three harpsichordists (one is also an organ-

Another amplifier from  
McIntosh that

## SOUNDS GREAT!

Although 'High Tech' is a new term in our language, 'High Tech' has always been the norm for McIntosh. McIntosh amplifiers have consistently forced new levels for quality performance, new levels for reliability, new demands on quality power that produce near perfect Spectral Fidelity and the greatest sound. McIntosh is the ONLY company that has achieved these superior levels of performance.

'High Tech' is the right description for the NEW McIntosh MC 2002, a powerfully perfect 200 watt per channel (300 watts into 4 ohms) power amplifier. The pleasure you enjoy from music is protected by McIntosh Power Guard (patent #4,048,573), an exclusive McIntosh circuit, McIntosh invented that insures Spectral Fidelity for greatest sound.

Today's electronic instruments and superior recordings push amplifiers for power performance beyond the amplifier's capabilities destroying Spectral Fidelity and quality listening. Only with McIntosh Power Guard can you be assured of total power performance without the distortion of clipping. Only McIntosh 'High Tech' protects your listening.

For more information on Spectral Fidelity amplifier measurement techniques and detailed information on McIntosh products write:  
MCINTOSH LABORATORY INC.  
P.O. BOX 96 EAST SIDE STATION, A35  
BINGHAMTON, NY 13904-0096



The Northwest Bach Festival was very odd. There was no audio, only one pair of visible mikes for a reference recording.

ist) who keep the Bach keyboards running. Not much rest for *them*. These two more or less operate the Bach show (with a lot of excellent help), doing the chores, feeding the musicians, ferrying them from pillar to post in a van, watching over every detail—and playing music. This was a musician's world, decidedly.

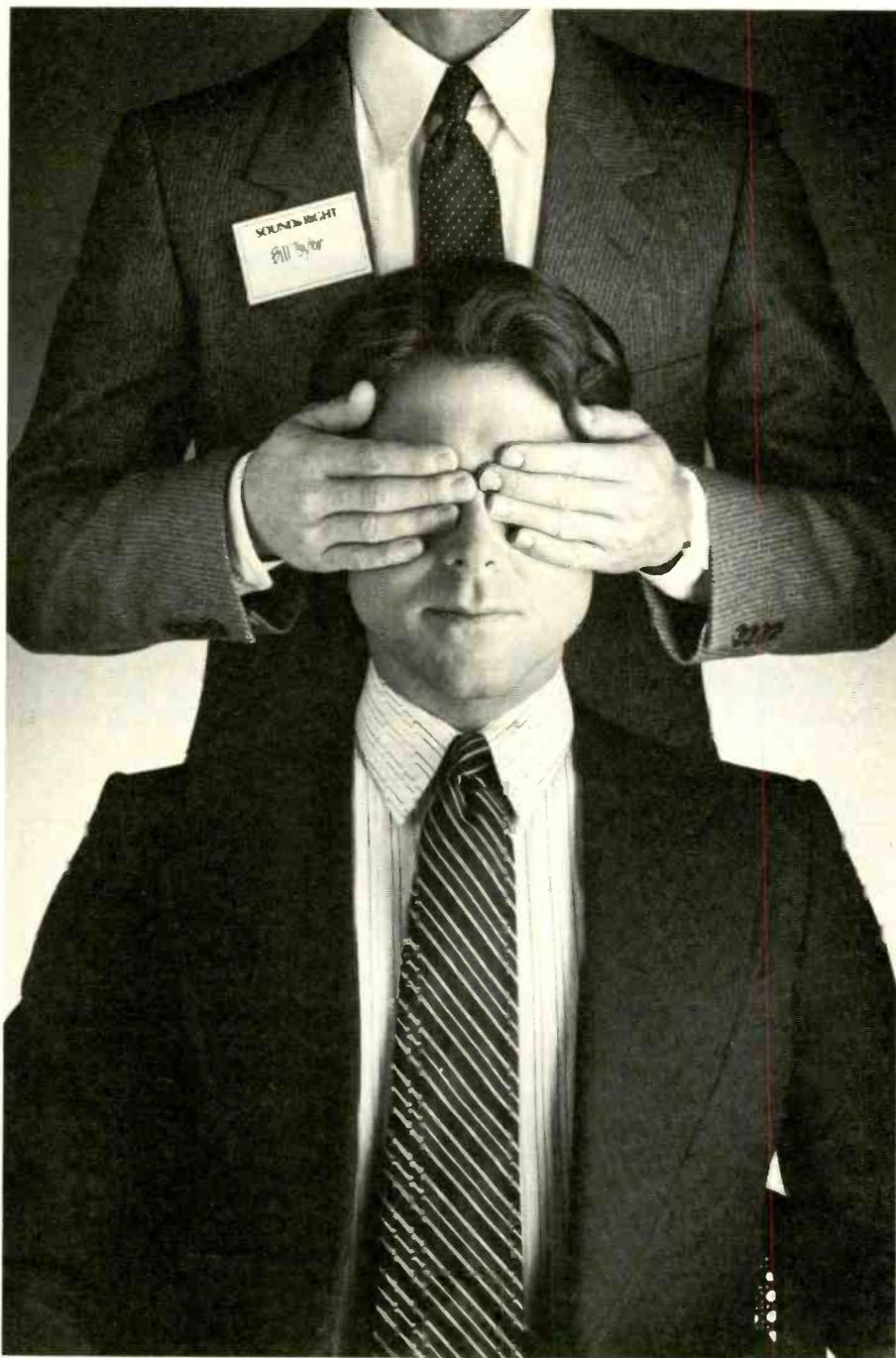
But, if I am right, that pair of microphones on the stage during each concert belongs to David Dutton. He sets up the equipment. At home, he and Beverly have a component hi-fi system, and there are tapes and discs lying around, right next to a lovely Broadwood piano of the mid-19th century. This, I remind you, is a professional musician's home. Interesting? You bet. It didn't used to be this way.

By a sheer coincidence, David Dutton turned out to have been a semi-student of mine as a teenager back in 1959, at a summer music school in Tennessee for young players. My subject there, of course, was music and hi-fi, or, as we now prefer to say, audio. That's always my subject. But in 1959 I had a rough time of it. I hauled a carload of equipment and records the length of the Great Smoky Mountains for musical illustration, but the management was, shall I say, so reluctant to allow me any time that after a while I just gave up and left. There was a jealousy of anything electronic—which was anything but pleasant. That was no time to teach audio to musicians.

But David Dutton was there and heard me. Now, though audio is not a special interest for him, he routinely sets up mikes, plays cassettes, and all the rest. You think that isn't something?

In 1959 (and before) there was a very deep suspicion among musicians in this country that audio, any form of electronically reproduced music, including recording, was a threat to live music performance. Part of it was a labor question—and we can remember the nationwide musicians' strikes that shut down most recording—but the fear was even more profound. It often took the form of a downgrading, as though recordings were beneath a musician's notice. Canned music! That's what I was trying to sell, it seemed, at my 1959 music school.

At about the same time I was invited to give a lecture/demonstration, the



## The only component of your system you should buy with your eyes closed.

When shopping for a speaker system, don't be misled by special shapes, sizes, or designs. Your proper concern is the sound coming out of the speaker, not the "magic" ingredients designed into it. We at Celestion are justifiably proud of our proprietary design and analysis technology, but we ask you to ignore our claims—along with those for competitive products—until your ears confirm the sonic truths of the matter.

When auditioning speakers, it's best to use familiar material, preferably good clean recordings of acoustic instruments. Close your eyes. Do the speakers provide a realistic, wide sound stage with front to back depth? Does the sound have an open, airy quality? Do voices come through cleanly without nasality or boxiness? Are individual instruments clearly delineated and precisely focused in the stereo space defined by the speakers?



If your answers are all "yes," open your eyes and check the model numbers of the Celestion speakers you've been listening to. Our Ditton Models 100, 110 and 250 all provide exceptional performance at prices to fit into any system.

Now that your ears have validated our design approach, we feel free to refer to our 60 years of innovation in speaker technology, our pioneering work in laser interferometry, and our old-world/high-technology craftsmanship that produces mechanically superior, distortion-free drivers. To hear the special sound of Celestion and—if you like—to learn more about Celestion technology, visit your Celestion dealer. He will open your eyes . . . and ears!

**Celestion**

The more you listen, the better we sound.

Kuniholm Drive • Box 521, Holliston, MA 01746 (617) 429-6705 • Telex 948817

In 1959 I had a rough time. There was an unpleasant jealousy of anything electronic, and it was no time to be teaching audio to musicians.

usual, at a large, Eastern state university, sponsored by the engineering and physics people in cooperation, supposedly, with the music department. The physics and engineering profs were helpful and much interested, even going to the trouble of providing and setting up equipment for me, and

they threw a small dinner party after the lecture. Not one member of the music department came to my show, nor did any attend the dinner. It was a science man who showed me through the lavish music building.

Today, large elements of professional music are still edgy in this fashion,

though naturally they take advantage of whatever audio may offer them, which is easy to understand. Why not? But we have come a long way. The change since 1959 has been steady and constructive. As we in audio have become more sophisticated and more knowledgeable in music, more and more musicians have come to realize that they can live with us, with our equipment and with our sound. Not always—but often. In 1985 it was the musicians who entertained me in Spokane, not the scientists.

I didn't meet an actual audio pro until I went to Seattle (which I'll tell you about in my column next month). His wife was a professional musician; she reads *Audio*.

There's space for one more idea out of Spokane from plenty that hit me during those five felicitous days of Bach et al. This was a paradox that struck me as I listened to a Bach concerto in a large, wide, modern Lutheran church jammed to the doors with that hi-tech audience. Excellent overall acoustics, a visually handsome and comfortable building—but so big. And so many listeners. How about authentic *sound*, as well as performance?

This was a Bach concerto for two harpsichords and small string orchestra. The instruments were out in front on the church "stage," interlocked like two grand pianos, with the players at opposite ends. The orchestra was spread around them. An interesting scene, and, as I knew from an earlier concert, the sound was good for those who could sit nearby, in spite of big spaces and masses of people further out. But at this concert, I found myself halfway back in the church. (I was, as they say, unavoidably detained; the restaurant had been crowded.) I could not even see the heads of the performers. But what I could not *hear* was more significant.

Now Bach himself had played this concerto, perhaps with one of his sons at the other keyboard, for a sort of music club that met in a tavern. The place could not have been large, and the audiences were tiny fractions of those in Spokane. The music was tailored to fit. At proper, close range, the harpsichord is not a weak instrument; it can be sturdy and forceful, if not really loud. We hear it rightly today on the

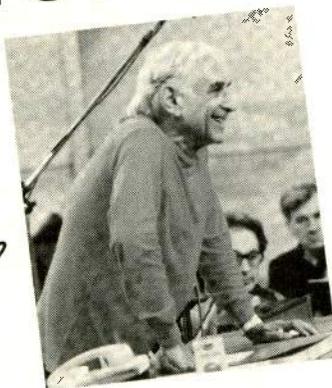
# Leonard Bernstein



conducts his  
**WEST SIDE STORY**

Now available on  
Compact Discs, Records  
and Chrome-Cassettes

2 CD 415-253-2 • 2 LP 415-253-1  
2 MC 415-253-4



© 1985 DB / PolyGram Records, Inc.

It's not enough to *play* authentic Bach, I say. We must also be able to *hear* it authentically, in the manner intended by the composer himself.

recordings we make, where balance and proportion can be built-in ahead of time. The two soloists playing alone, as they often do in this music, would have made an impressive effect. Even with the orchestra, their music would be *audible*, though in the background. That's the essence of a concerto of this sort. A good recording of the music will bring you exactly that sound.

So now I am listening to the music played live! Is it authentic in sound as it reaches my ears?

Without the orchestra, in solo passages, I could just barely hear the two harpsichords, enough to get the sense of the music if I strained. A distant, faint, silvery tingle—some newcomer might think of it as mystic emanations from another planet, and be entranced. Wrong! Worse, when the small orchestra came in, the so-called tutti (everybody), the harpsichords simply vanished. Not a trace. It was as though old Bach was sitting up there working away at all those notes on a dead keyboard. Is that what you could call authentic?

Always a practical composer, for a large hall or church Bach would have written quite different music or adapted the old—trumpets, drums, choirs of strings and woodwinds. That was his answer. What's ours? We can't very well recompose his music to fit the modern church, but should we not do something?

Throw out most of the audience? Move to a much smaller place? Heaven forbid. That's not the idea at all. We can hardly blame the Bach people at Spokane. They were happy to have so much interest shown and were probably not yet aware of what was happening to the sound. (I did tell one of the harpsichordists, as a challenge.) Nevertheless, it can be argued that this sort of unintended extinction—and indeed any shift of the proper musical effect—is just as much a "distortion" as a poor mike placement or a faulty recording balance. It's not enough to *play* authentic Bach, I say. We must also *hear* it authentically.

Musicians are just as aware of hall acoustics as we are and enjoy the right places for their music just as we do. But the thought that carefully controlled sound reinforcement is the proper solution to the problems of an-

cient sound in the modern age of big spaces just isn't easy to accept yet. Better no sound at all than "amplified" sound? Not in my book.

Ah, last spring! I heard Bach chamber music, a few instruments and a harpsichord, in the vast spaces of Eugene's Silva Hall. The electronic

acoustics were good, even for this close-up and intimate music. And from a distant balcony seat I could hear every note of the harpsichord continuo, exactly as it should be. The harpsichord was miked. So was the hall. That's the sort of thing we can do when we know what we're doing. **A**

## What should you expect from a Swiss receiver?

You should expect thoughtful design and quality construction. And you'll find it in the new B285 AM/FM receiver from Revox. The B285 is elegantly styled, meticulously crafted, and solidly built. As you'd expect from the Swiss.

What you might not expect is the most sophisticated microprocessor control system available in any receiver made anywhere in the world. Two microcomputers are built into the B285: one controls the quartz-locked digital tuner while the other governs an unprecedented array of programming and control functions. All input sensitivities are stored in digital memory, along with separate levels for each of the 29 AM or FM station pre-sets. A multi-mode LCD display gives a complete status check of all tuner and pre-amp functions. For your added convenience, the B285—along with all other Revox components—may be operated with a single infrared remote control unit (optional). Multi room remote control, as well as external computer control, is possible through the B285's serial data bus.

The B285's class AB power stage, with a rise time of 3  $\mu$ -seconds, delivers transparently detailed high frequency transient response. And the exceptional signal-to-noise performance provides a silent backdrop for optimum digital sound reproduction.

As with all Revox components, the B285 receiver is built in quiet defiance of planned obsolescence. Because, since you expect a Swiss receiver to cost more, you should also expect it to be the best of its kind—for a long, long time. Visit your Revox dealer for an audition. Bring high expectations.



**REVOX**

1425 Elm Hill Pike, Nashville, TN 37210/(615) 254-5651

BERT WHYTE

## SCENES STEALERS

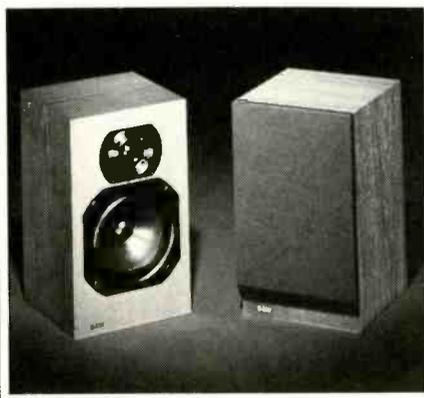
Last month I reported on the considerable activity in new CD-player technology at the Winter Consumer Electronics Show in Las Vegas. Herewith, a roundup of more conventional new audio equipment that I found interesting at the show.

As always, loudspeakers comprised the largest product category among the high-end audio exhibits. As I have noted in previous years, much of the sound I have heard at the Riviera Hotel is a sad indictment of most current speaker designs. With few ear-pleasing exceptions, this year's crop of loudspeakers were conspicuous by their lack of musicality. Even allowing for the admittedly poor acoustics of the Riviera demonstration rooms, too many of the loudspeakers I heard were woefully inadequate in the simple matter of conveying a pleasing sound.

What is more frustrating is that when you gently point out to manufacturers various shortcomings in their transducers, they take considerable umbrage and think you are either a wise guy or some cranky old curmudgeon with tin ears and an axe to grind!

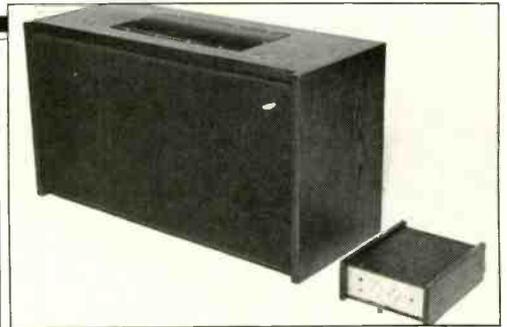
Among the noteworthy systems was an improved version of the Magneplanar MG-III panel loudspeaker. Driven by a Levinson ML-3 amplifier, the speakers were playing the wonderful Digital Music Products CD recording of "Trio." The transient attack of the piano was excellent, with a fine tonal verisimilitude. Bass response appeared to be more extended and better defined. Dynamic range was certainly not constricted, and imaging was quite nicely presented. All in all, one of the best sounds at the Riviera.

B & W DM100 loudspeaker



Speaking of screen-type loudspeakers, it was good to see Acoustat back in business. As you may know, Acoustat had fallen on hard times and had filed for Chapter Eleven bankruptcy protection. Happily, they have been resurrected and are now under the banner of the resourceful David Hafler organization. The Acoustat plant, most of the original employees, and chief engineer Jim Strickland are all on track again and back in full production of their various electrostatic loudspeakers. Jim has come up with a major improvement applicable to all Acoustat loudspeakers, an innovative transformer known as the Acoustat Medallion. The new transformer is said to increase dynamic range and give a warmer, smoother sound, while bass response is extended, with better control of bass transients. Better transient response and the extended, high-frequency output are additional pluses, as are enhanced imaging and better retrieval of depth. The new Medallion transformer can be retrofitted to earlier Acoustat loudspeakers; the modifications are performed at the Acoustat factory in Fort Lauderdale, Fla. Acoustat loudspeakers using the MK-121 full-range interface can be modified for \$300 per pair, and those using the MK-131 subwoofer interface will cost \$225 per pair to modify. Anyone interested in these modifications should contact Acoustat directly. The Medallion transformer is used in the new Acoustat Model One, a single-panel electrostatic speaker standing 6 feet high. The Model One operates down to 100 Hz, and then an 18-inch cube subwoofer with a 10-inch, dual voice-coil driver takes over. With the Medallion transformer, the Model One is said to have the output of the earlier two-panel design. SPL is rated at 108 dB measured at 15 feet in a 14 by 18-foot room. Price of the Model One, complete with subwoofer, is \$1,195 per pair.

Before leaving the realm of the electrostatic loudspeaker, you might be interested in an extensive and expensive (\$2,000) modification to the Quad ESL 63 performed by Crosby Audio Works (101 First St., Suite 163, Los Altos, Cal. 94022). This modification, originally developed by Richard Fryer and Demian Martin of Spectral Audio, and CBS engineer Richard Lees, reworks



Duntech Thor subwoofer

the entire frame to add additional mass and thereby reduce resonances present in the stock frame. The 60 feet of internal wiring is replaced by wire designed by Bruce Brisson of M.I.T. (and the designers suggest using the same wire for speaker cables). Proprietary Teflon and polystyrene capacitors and aerospace-quality resistors are used in the electronics section. A special grille cloth that is 40% more acoustically transparent than the OEM cloth is used. All of these modifications are said to provide better overall focus with reduced resonant colorations, increased depth of field, and larger image size.

Infinity introduced four loudspeakers especially designed for video applications involving stereo sound. The VM-1, the premier model, features a 6½-inch, long-throw woofer, a polydome midrange, and an EMIT tweeter. The unit is self-powered with a 60-watt amplifier for each channel. Volume, bass and treble controls are provided, as well as DNR noise reduction, and the speaker is magnetically shielded to prevent TV-picture distortion. Price of the VM-1 is \$699 per pair. The VM-2 is a two-way, self-powered model with 40 watts per channel; its price is \$479. The VM-3, the same as the VM-2 but without amplifiers, is priced at \$299 a pair, and the VM-4, a still smaller, non-powered unit, is \$199 per pair. Needless to say, the powered VM-1 will probably be used for straightforward audio applications as well as for TV.

With more and more people living in apartments, small loudspeakers are becoming increasingly popular, especially the diminutive loudspeakers designed with all the advantages of modern transducer technology and new materials. A case in point is the Wharfedale Diamond loudspeaker



## SANSUI CAR AUDIO High Octane Performance. Regular Price.

Sansui puts pleasure in the passing lane! With performance and value that could only come from a proven leader in car and home audio technology, our incredible RX-4000 is power-packed car audio that's not just along for the ride.

Even with all its outstanding features, plus 20 watts of pure sonic power, Sansui's RX-4000 doesn't require shock absorbers for your wallet.

At the heart of this pulsating 20 watt powerhouse is a precision digital synthesizer tuner with 12 presets (6AM/6FM). And to combine total operational pleasure with driving pleasure, our RX-4000 also features: auto scan; auto reverse; ASRC with interference blocker for clear reception in any environment; Dolby™ NR; built-in four-way fader controller; RCA preamp outputs; clock display—and much more.

And if the performance power of our RX-4000 seems too hot for you, most of the same great features will be found in our models RX-3000 and RX-2000. All deliver the same great Sansui sound and quality that have made us world famous.

For high octane performance, sound thinking and solid value, nothing on the road beats Sansui car audio. Get it now for an incredible moving experience.

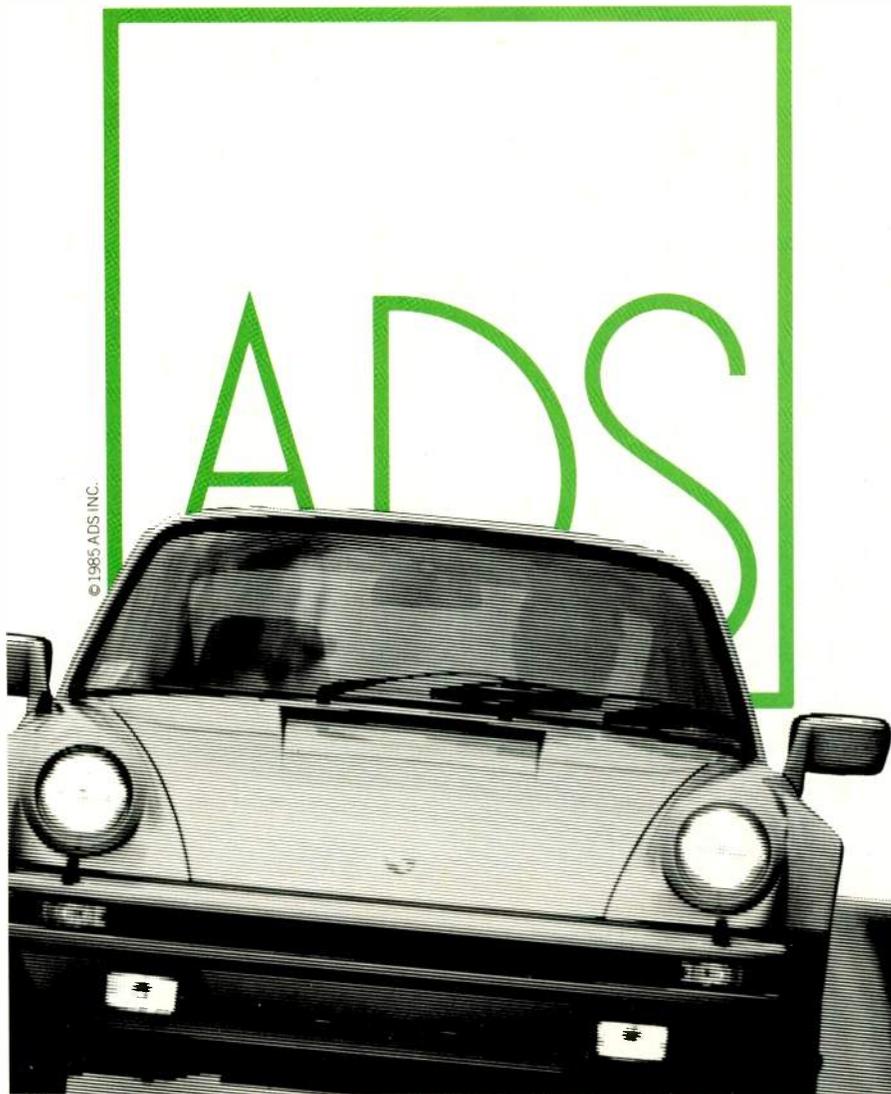
For the name of your nearest Sansui Car Audio dealer, call or write: Sansui Electronics Corp., Lyndhurst, New Jersey 07071 (201) 460-9710; Carson, California 90746 (213) 604-7300

**Sansui**

*Putting More Pleasure in Sound.*

Dolby is a registered trademark of Dolby Laboratories, Inc.

Enter No. 48 on Reader Service Card



***“Perhaps the only significant performance option you can add to a car like this comes from ADS.”***

It's already fast enough to get you in a heap of trouble. So why not look into an option that can make the double nickle bearable? A sound system from ADS.

Any car audio pro will tell you that ADS is first in the field. So instead of bragging, let us instead offer some options to consider.

The ADS 300i. A two-way speaker designed for flush-mounting in decks and doors. A pair of these will impress you.

The sensational ADS 320i. A six-piece system which includes a pair of 2" samarium cobalt tweeters that can be surface or in-dash mounted. A pair of 5¼" woofers to flush-mount in panels or doors. And a pair of crossovers to split the signal among them.

The new ADS 315i, which is philosophically the same as the 320i system but with slightly larger tweeters and a slightly lower price.

The CS 700 subwoofer system whose two 7½" drivers and electronic crossover make a truly exciting low-end contribution to any serious installation.

The ADS P80 and P120 Power Plate™ amplifiers which put out 80 and 120 watts per side.

If you don't know where to find ADS call 800-824-7888, Operator 483. In California, 800-852-7777, Operator 483. Or write Analog & Digital Systems, Inc., 555 Progress Way, Wilmington, MA 01887.

**ADS. Audio apart.**

Enter No. 2 on Reader Service Card

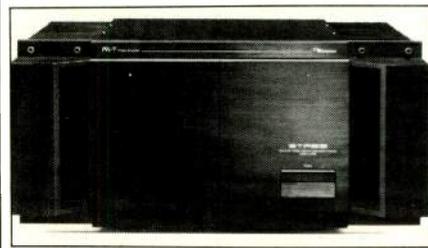
The new Duntech subwoofer is nicknamed "Thor," after the Nordic thunder god, and I can assure you the name is entirely apropos!

measuring 9½ in. H x 7½ in. W x 8 in. D. This tiny transducer employs a two-way reflex design with a reflex port firing rearwards. A ¾-inch dome tweeter is combined with a 4½-inch bass/midrange driver; crossover is at 5 kHz. The Diamond is designed to be played close to a wall, and this placement is said to provide bass response to 50 Hz. I thought the Diamond sounded very smooth, with good imaging, clean transients and a nice, open sound. Voices were particularly well reproduced, with good articulation. The Diamond is priced at \$195 per pair.

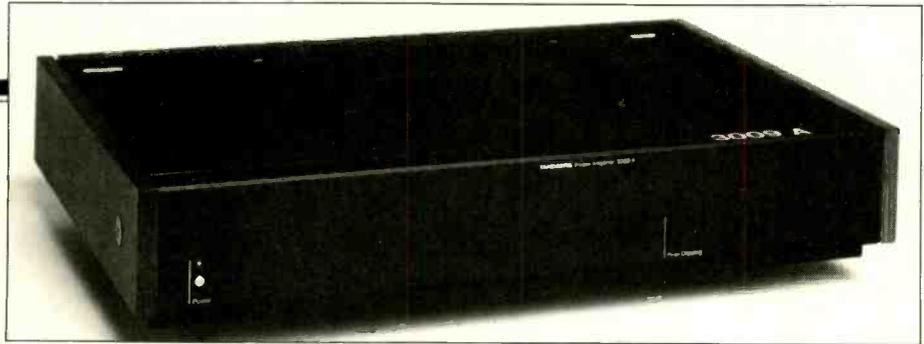
B & W has also entered the small-loudspeaker sweepstakes with their DM100. This unit is 14½ in. H x 8¾ in. W x 8¼ in. D. It employs a 150-mm, laser-optimized, bass/midrange driver with a 26-mm, high-temperature voice-coil and a critically impregnated, composite, short-fiber cone. The 26-mm tweeter uses the same polyamide cone material as the B & W 801F. A fourth-order Butterworth crossover is at 3 kHz. Sensitivity is quite high, at 89 dB SPL (1 watt/meter). Frequency response is claimed to be ±3 dB from 80 Hz to 20 kHz. The DM100, priced at \$218 per pair, can handle amplifiers with 75-watt outputs.

I've had the opportunity to audition the DM100s in my own listening room. Because I didn't have a small amplifier handy to drive them, I hooked them up to my monster, \$7,500-per-pair Krell KMA-200 (200-watt) Class-A amplifiers. I exercised caution, and these small DM100 speakers delivered sound of amazing fidelity. Clarity was outstanding, as was smoothness of response and ultra-sharp transients. Bass fell off below 60 Hz, but down to that point it was very full and clean. Imaging, always a strong point with speakers from B & W, was excellent, with good stability. The DM100 repro-

*Nakamichi PA7 amplifier*



Tandberg's new mono amp can handle difficult loads, with peak output of 1,512 watts into 0.5-ohm loads.



Tandberg 3009A amplifier

duced the Mozart "Coronation Mass," a large-scale choral work, with clean and very convincing musicality.

I've come to expect something special at the Duntech/W & W Audio room and was delighted to find them demonstrating John Dunlavy's long-promised subwoofer. The Duntech 1B-20 active subwoofer is nicknamed "Thor," after the old Nordic god of thunder, and I can assure you the name is entirely apropos! As subwoofers go, the Thor is fairly modest in size, measuring 17 in. H x 31 in. W x 13 in. D. Nevertheless, due to extremely high-density particleboard construction and the integral amplifier, the subwoofer weighs nearly 80 pounds. The dedicated amplifier is a 180-watt unit with a current output of 50 amperes! This works into the 2.7-ohm load of the special 12-inch driver, which employs a heavy, cast-aluminum basket having a high-temperature, brass, voice-coil former and a symmetrical flux gap. Unlike many designers, John Dunlavy isn't too keen on polypropylene cones. He believes that his proprietary plasticized, felt-fiber cone has the proper strength-to-weight ratio and optimum stiffness to operate most efficiently in his acoustic suspension system, with minimum nonlinearities and ultra-low coloration of bass frequencies. The frequency response of the Thor is flat within  $\pm 0.5$  dB from its 120-Hz crossover down to 30 Hz! Distortion at a very loud 100 dB SPL at 30 Hz is less than 2.5%. As usual with Dunlavy designs, his proprietary critical damping assures low distortion with extremely accurate transient response.

What really makes the Thor different from virtually every other subwoofer on the market is its linear-phase, 6-dB/octave, first-order crossover, which is both phase and pulse coherent. Placed close to a wall, underneath a Duntech PCL-3 or PCL-5 wall loudspeaker, the system is time-aligned: All drivers have very nearly equal path lengths to a listener seated 10 to 15 feet in front of the loudspeakers. The Thor has a control/crossover unit which can be remotely operated via a connecting cable. The control has an a.c. on/off switch with LED, a bass level control, a balance control, and a defeat switch to disable the subwoofer and feed signal directly to the main

loudspeaker. The Thor can be operated very successfully in a single "common-mode" configuration, but, as with any subwoofer, a stereo pair provides optimum results.

What did the Thor sound like? First, it must be noted that Warren Weingrad, the importer of Duntech equipment based in Charlotte, N.C., was operating a PCL-5 wall speaker in conjunction with the Thor. He said this combination is the first full-audio-range, pulse-coherent system—with time alignment from 25 Hz to 20 kHz!

The first impression of the Thor is its astonishing low-frequency power and the cleanness of the reproduction. There is not the slightest trace of overhang or boominess. Great bass drums don't merely make a large thud or "thwack" but exhibit timbre and tonality as well. On the "Dafos" recording, I heard the infamous, monster, bass-drum transient for the first time reproduced with room-shaking power without doubling or bottoming. It is positively frightening! The huge bass drums on Telarc's *Time Warp* recording explode with gut-wrenching, visceral impact. Organ pedal fundamentals are simply awesome. On the Telarc CD of Jongen's "Symphonie Concertante for Organ and Orchestra," the entrance of the full organ with its huge pedal notes is heart-stopping! Contrabass sound is ultra-sonorous, conveying all the darkly rich resonance, but is always completely articulate. The other piece on that disc, Franck's "Fantaisie in A," has huge, shuddery pedal notes in the 20-Hz range, and they are cleanly reproduced in all their majesty.

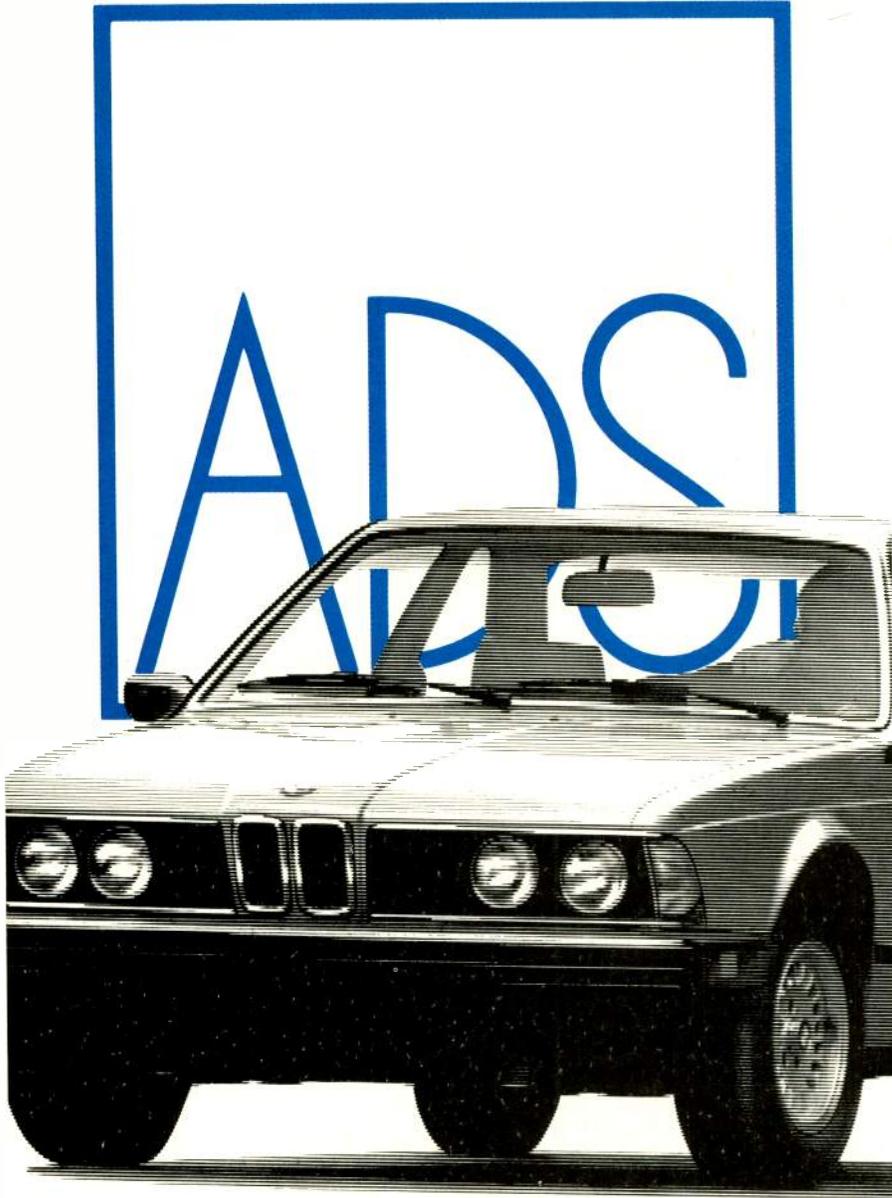
The Thor is certainly impressive with classical music, and with pop/rock recordings that have subterranean synthesizer sounds. It is a revelation to hear them with such tremendous power and clarity. The Thor is the first subwoofer I have heard that smoothly inte-

grates with the main loudspeaker and enhances its sound. It would likely satisfy many people who want the power and bass response of a subwoofer but who have been deterred from adding one to their system because they feel it degrades the tonal balance of the main loudspeaker. One really great feature of the Thor subwoofer is that it can be time-aligned with such speakers as the Quad ESL 63 and Magneplanars, as well as dynamic types.

The Thor subwoofer will retail for \$1,145 each, complete with control/crossover unit. John Dunlavy deserves congratulations for a unique design that will enable users to enjoy lifelike reproduction of the low-frequency underpinnings of the musical spectrum.

There was some amplifier activity worth noting at the WCES. Nakamichi surprised a lot of people by introducing a "purist" line of amplifiers and preamplifiers. Their CA-5 preamplifier, priced at \$595, is a minimum-control unit which features a built-in moving-coil phono input. The 100-watt/channel PA-5 and the 200-watt/channel PA-7 power amplifiers are interesting in that they use the Stasis technology developed by Threshold and now also licensed to Nakamichi. Both amplifiers feature toroidal power transformers. Slew rate is claimed to be 50 V/ $\mu$ S, and a high-current output is another feature. The PA-5 is \$850, and the PA-7 costs \$1,495.

Tandberg showed an updated preamplifier, the TCA 3008A. This unit features lower noise, better transient response, and reduced phase shift; its price is \$795. The Tandberg TPA 3009A is a mono amplifier with a unique capacity to deal with difficult speaker loads. The unit puts out 200 watts into 8 ohms, 330 watts into 4 ohms, 456 watts into 2 ohms, and 1,512 watts (peak) into 0.5 ohm! Slew rate is a fast 250 V/ $\mu$ S, and peak out-



**“What a shame to install anything but ADS in a car of this caliber.”**

One of the options you don't want to install in an "original" is imitation anything.

Therefore, the following information may be useful.

ADS invented high-performance car audio. Today the concept (especially ADS styling) has been cloned to a fare-thee-well. But the imitators still sound like just that.

So, if you're a fanatic about owning the best, ADS has:

*Amplifiers:* Two Power Plates—P80 or P120. Forty or 60 watts per channel, respectively.

*Subwoofer:* Ask for the CS700 (a pair of Linear Drive woofers with Stiffliite cones) and stand back.

*Speakers:* The 300i is the speaker that started it all. 315i and 320i separate woofers, tweeters, and crossovers for installation flexibility, and pin-point imaging.

For specs and/or the name of your nearest dealer call 800-824-7888 (in CA 800-852-7777), operator 483. Or write to Larry Daywitt (who drives a Bimmer himself) at ADS, 555 Progress Way, Wilmington, MA 01887.

**ADS. Audio Apart.**

Enter No. 3 on Reader Service Card

New video technology is closely allied with audio. A case in point are the units designed to provide the equivalent of Dolby Cinema "surround sound."

put current is a hefty 55 amperes. The TPA 3009A is \$995.

It is rather well known that many doctors are avid audiophiles. Some of them get into audio very deeply. Dr. Bob Odell, a friend of mine, has become an expert on amplifier design and has some very brilliant and original ideas. Recently, Bob bought 25% of PS Audio, and now the firm is going to produce an interesting power amplifier designed by him. A prototype of the Model 200C was demonstrated at CES. It puts out 200 watts/channel into 8 ohms and 400 watts into 4 ohms. This is a d.c.-coupled amplifier, with an FET front-end. The Model 200C has no current limiting; it features a high slew rate and low feedback. Uniquely, there is no internal wiring, but component sections are connected with copper bus bars 1/8 inch in diameter! At a projected price of \$1,265 this could be a real winner.

As you know, audio and video have cross-pollinated, to put it mildly. There is a great deal of new video technology, but a close look reveals it is very closely allied with audio. A case in point is the emergence of control/decode units designed to furnish the home-video viewer with the equivalent of Dolby Cinema "surround sound." Units are available from Fosgate, Aphex, SSI/Surround and Audionics of Oregon, and prices range from \$395 to \$695. All of them use speakers to the left and right of the TV set (large-projection TV systems are preferred), another speaker for a central dialog channel, a subwoofer channel, and delay systems for rear side-wall and back-wall speakers for the "surround" information. All of these systems have, or will shortly incorporate, what is known as the standard Dolby Cinema Matrix. Used with stereo videotape or videodiscs, the many Dolby stereo-encoded productions can furnish a home audio/video experience very close to what you get with a Dolby stereo presentation in a movie theater. This is a very active technology, and more companies will probably get into the competition. The systems I heard all worked fairly well, with some units having an edge in their presentation of surround-sound special effects. More on this fascinating new technology as it becomes available. 

# Digital Precision

The precision of digital electronics has revolutionized the art of music reproduction. A signal-to-noise ratio of 90 dB. Perfectly flat frequency response throughout the audible spectrum. Wow and flutter so low it defies measurement. And over 90dB of dynamic range to widen your music horizons. Akai has made the dream of musical purity a reality with Compact Disc players that everyone will enjoy.



**AKAI**

Enter No. 4 on Reader Service Card

# The Sound of M



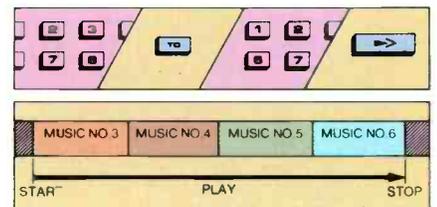
The tracks on a Compact Disc are only 1.6 microns apart, and are scanned at 1.2 to 1.4 meters every second—tolerances a hundred times greater than conventional records that require a perfectly accurate tracking system. Akai's 3-beam tracking system uses three lasers for incredibly precise tracking. In addition to the laser pickup, two other lasers instantly sense and compensate for any deviations before they have a chance to affect tracking. Signal dropouts caused by mistracking are eliminated for stable, reliable playback.

### Akai's Unique Program Order System

The Unique Program Order System takes the guesswork out of operation. Along with 10-key input, the track

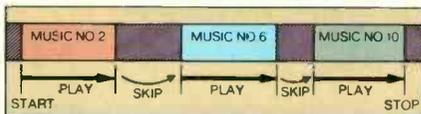
selection controls—[TO] [AND] [WITHOUT]—are marked for easier understanding. The playback of any or all selections in the recorded order is as easy as using your fingertips to "talk" to the player.

For example, to play selections 3, 4, 5, and 6, just press [3]—[TO]—[6]—[START] . . . it's that easy.

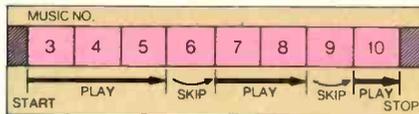


# Musical Purity

Playing certain selections is no problem either. To listen to selections 2, 6, and 10, just press [2]—[AND]—[6]—[AND]—[10]—[START] . . . anyone can do it.



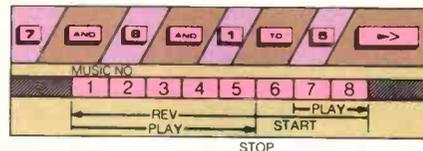
How about skipping certain selections, say 6 and 9? Pressing [3]—[TO]—[10]—[WITHOUT]—[6]—[AND]—[9]—[START] is all you have to do.



## Random Programmed Playback

Since Akai's Unique Program Order System responds to simple commands, playing up to 16 selections in any order you like is no more complicated than normal playback. Let's say you'd like to hear selections 7, 8, 1, 2, 3, 4, and 5 in that order. Programming is straightforward—press [7]—[AND]—[8]—[AND]—[1]—[TO]—[5]—[START] for

a total of eight key inputs. Enjoy your favorite songs—in your favorite order!



Since up to 16 key inputs can be programmed, a virtually unlimited number of selections can be ordered for playback in an endless number of ways for total playback versatility from any Compact Disc. Repeat, selected repeat, index search, and auto play functions are all available by pushbutton control. The wireless remote control unit allows operation of nearly all functions.



## Quick Access System

Regardless of the number or order of selections, playback is begun almost immediately. Access time, which is the amount of time required to cue and play a selection, is 2.6 seconds or less. With Quick Access, there are no annoying gaps between songs.

## Full Feature Convenience

The brilliant Centralized FL display shows selection number, elapsed time, and other operating information at a single glance. The front-panel output level control allows you to match the volume with other components in your system. Headphone output for private listening.

The CD-A7 is available in black or silver finish. 440mm wide to match standard-size components



COMPACT  
disc  
DIGITAL AUDIO

# AKAI

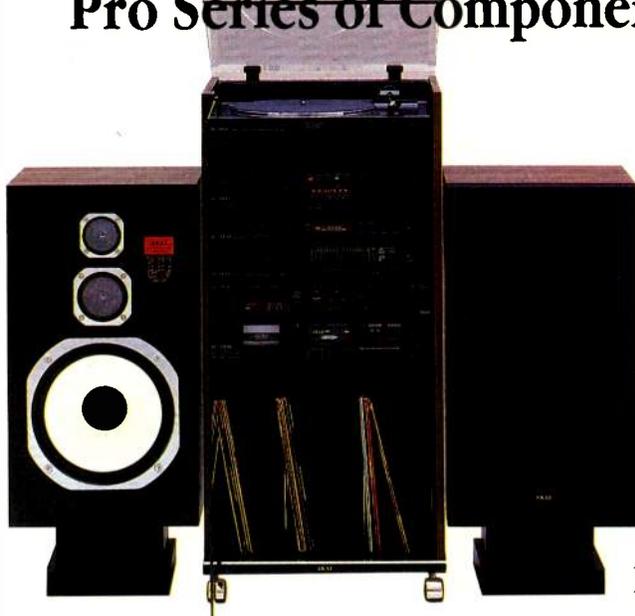
## Specifications for Akai CD-A7TB Compact Disc Player

Specifications	CD-A7
Sensor type.....	Optical
Quantum bit.....	16
Channel.....	2
Sampling frequency.....	44.1kHz
Frequency response.....	5 to 20,000Hz $\pm$ 0.5dB
T.H.D. ....	0.005%
Channel separation.....	85dB
Dynamic range.....	90dB
S/N ratio.....	90dB
Wow & flutter.....	Below measurable limits
Line output level.....	2V
Access time.....	2.6 sec.
Power requirements.....	120V, 60Hz for USA & Canada
Dimensions.....	17.3(W) $\times$ 3.0(H) $\times$ 10.0(D) inches (440 $\times$ 76 $\times$ 255mm)
Weight.....	12.8 lbs. (5.8kg)

Remote control unit	RC-M80
Type.....	Infrared pulse position modulation
Carrier frequency.....	38kHz $\pm$ 0.2kHz
Range.....	8m
Directivity.....	$\pm$ 30
Power supply.....	R6 (AA or UM-3) $\times$ 2 (3V) batteries
Dimensions.....	3.0(W) $\times$ 0.7(H) $\times$ 6.4(D) inches (75 $\times$ 18 $\times$ 162mm)
Weight.....	150g (including batteries)

•For improvement purposes, specifications and design are subject to change without notice.

## Designed to complement Akai's sophisticated Pro Series of Component Music Systems



Look how easily a CD player integrates into your system. The CD-A7 is shown with the Pro Series components which feature an integrated design for full compatibility.

Pro Series

For further information contact:

Akai America, Ltd.  
800 W. Artesia Blvd.  
P.O. Box 6010  
Compton, CA 90220-6010

East Coast office at  
6 Kilmer Rd.  
Edison, NJ 08817

# AKAI



## FISHING THE UPSTREAM BIT

In today's digital world, everything ultimately boils down to bits. That is a comforting eventuality; all the complexity and shock of technology's advance is a little less formidable if we are able to quantize it down to something as graspable as the innocent bit. However, that simplicity and confidence is perhaps a little deceptive. Anyone who has ever purchased "compatible" software only to have their computer stop dead in its data tracks has learned the first lesson of digital information: A bit is a bit, but data, and informed data, is a completely different story.

Specifically, the format in which data is configured is critically important in the recovery of encoded information. Furthermore, there are many ways of formatting data, some more efficient than others. Digital storage is *not* a question of ones and zeros. Rather, it is a question of formatting, interleaving, modulation, and bit rate. Lately in this column we've examined the hardware designed to read data from the Compact Disc. Now let's jump into the bit stream with a look at how data is encoded on the disc itself, that is, the upstream part of the coding. Next month we'll cast a line downstream and look at decoding.

The CD is by now a familiar method of storage. Its physical characteristics are obvious to anyone with a ruler: Disc diameter is 120 mm, hole diameter is 15 mm, thickness is 1.2 mm. A little less obvious are the physical details of data storage: Track pitch is 1.6  $\mu\text{m}$ , pit width is 0.5  $\mu\text{m}$ , pit (and reflective land) length varies incrementally from 0.833 to 3.054  $\mu\text{m}$ , with nine different pit and land lengths. It is combi-



Illustration: Robert Scott

nations of those varying dimensions which physically encode the data.

Not obvious at all is the origin of the bit stream, in other words, the format by which data is ordered on the disc. For example, the pits and intervening reflective land on the CD surface do not directly designate ones and zeros. Rather, each pit edge, whether leading or trailing, is a one; everything in between, whether inside or outside a pit, is a zero. This is a much more efficient storage technique than coding the binary bits directly with pits. The technique is illustrated in Fig. 1; as you can see, rather than encode each binary bit with a pit, only four pits are needed to code many bits of information, thus saving valuable disc space and permitting longer playing time.

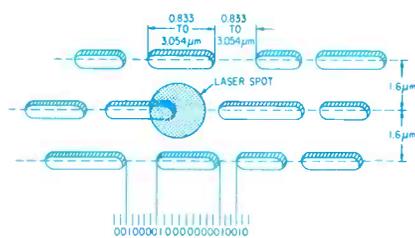
But even those channel bits coded by the pits are not directly commensurable to audio data. The pits on a Compact Disc are merely the end result of an elaborate data transformation which takes place during master encoding and which undergoes decoding each time the disc is played. A block diagram for encoding is shown in Fig. 2; the data begins, of course, as music. Analog recordings must be converted to digital form with low-pass filtering, sample-and-hold, and A/D conversion circuits. Music already recorded with

PCM (pulse code modulation) is directly time-multiplexed to merge the two stereo channels into one bit stream, with 44.1-kHz sampling and 16-bit quantization, recorded on a VCR via the Sony PCM-1610 digital audio processor. Once the audio data adheres to these basic specifications, it must undergo error-correction encoding and a process called eight-to-fourteen modulation (EFM), which I'll describe shortly; subcode and synchronization words must be added as well. Clearly, a data format is needed.

All data on a CD is delineated by frames; by definition a frame is the smallest complete section of recognizable data on a disc. The frame provides a means to distinguish between audio data and its parity, the synchronization word, and the subcode; frame construction prior to EFM modulation is shown in Fig. 3. During the encoding process of CD mastering, all of the above data is placed into the frame format. The end result of encoding and modulation is a bit stream of frames, each frame consisting of 588 channel bits. It is the channel bits themselves that are physically cut into the disc such that each pit edge represents a binary one and flat areas are binary zeros.

Compact Disc frames are assembled when the master disc is cut by a

Fig. 1—CD surface pits and intervening lands. Pit and land lengths vary incrementally; pit edges always represent binary "1" and intervening spaces, binary "0."



Audio symbols are interleaved so errors are scattered in time. Thus isolated, these errors are much easier to correct.

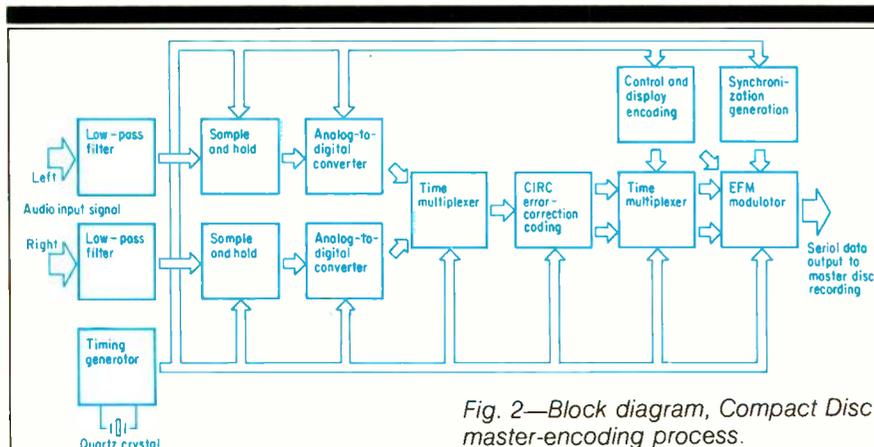


Fig. 2—Block diagram, Compact Disc master-encoding process.

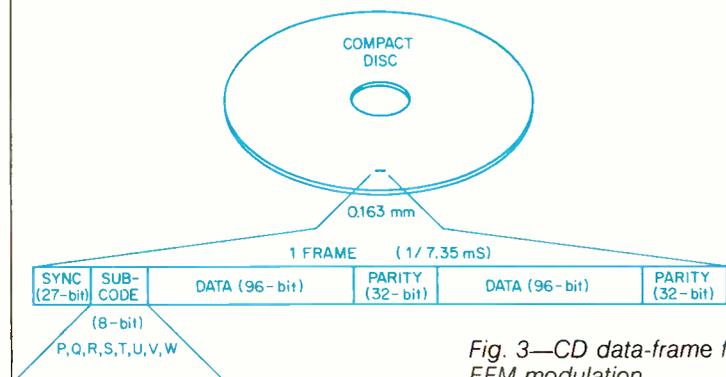


Fig. 3—CD data-frame format prior to EFM modulation.

laser cutter, a piece of hardware costing a cool \$1.5 million. Using data from the VCR master tape, six 32-bit PCM audio sampling periods (alternately from left and right channels) are grouped in a frame. The 32-bit sampling periods are divided to yield four, eight-bit audio symbols. To scatter possible errors, the symbols from different frames are interleaved so that the audio signals in one frame originate from different frames. Interleaving might be thought of as shuffling a deck of cards; data symbols are redistributed in the bit stream. An error occurring in the medium (such as a dust particle on the disc) might prevent the successful reading of a number of symbols. However, upon de-interleaving, the shuffled symbols are placed back in their original and rightful positions in the stream. The errors are scattered in time and thus isolated, making them much easier to correct. As an additional error-control measure, eight parity symbols are generated per frame; parity is essentially redundant data used to check for errors. The interleaving

and generation of parity bits constitute the error-correction encoding based on the Cross Interleave Reed-Solomon Code (CIRC). With this encoding algorithm, bits from the audio signal are delayed and interleaved in the bit stream, and two encoding stages generate parity symbols.

An eight-bit, user-subcode symbol is added to each frame; two of these subcode bits (P and Q) contain information such as total number of selections on the disc, their beginning and ending points and playing time, index points within a selection, and program lead-in and lead-out points. The other six bits (R, S, T, U, V, and W) are available for other applications such as encoding video information on audio CDs. One still video picture could be drawn from every 20,000 to 30,000 frames; a CD holding an hour of audio data could additionally hold up to 700 still video images, drawing a new picture from the disc about every 5 S. Obviously, the single bits in each frame cannot convey this information; instead, the player stores the bits from

individual frames until it has accumulated enough data.

After the audio, parity and subcode data is assembled, the bit stream is modulated using the aforementioned EFM. Blocks of eight bits are translated into blocks of 14 bits using a dictionary which assigns an arbitrary and unambiguous word of 14 bits to each eight-bit word. Blocks of 14 bits are linked by three merging bits (to prevent the possibility of successive ones); thus, the ratio of bits before and after modulation is 8:17. The resultant channel stream produces pits and lands which are at least three channel bits, and no more than 11 channel bits long. We have thus defined the physical relationship of the pit dimensions. With EFM there are more bits to accommodate, but EFM also decreases the number of signal transitions (pit-to-land and land-to-pit). This lowers the laser-optical system's frequency response requirements, permitting lower track velocities and hence longer playing times.

The resulting EFM bit stream must be delineated. Therefore, a synchronization pattern is added prior to each frame. The synchronization word is uniquely identifiable from any other possible data configuration (specifically, the 24-bit synchronization word is 10000000001000000000010, plus three merging bits). When the data manipulation is completed, the original audio bit rate of 1.41 million bits per second has been augmented to 4.32 million bits per second; such is the price of overhead. That resulting bit stream is encoded onto the disc as channel bits in the form of pits and lands. To reproduce the data stored on a disc, a player must read the channel bits, decode them, and deliver an analog signal to its output jacks.

The Compact Disc bit stream is thus more complex than one might suspect. In the interests of data density and robustness, the audio signal must undergo some sophisticated processing. EFM and CIRC, as well as the entire frame structure used to delineate data, require that the data be uniquely packaged before it is encoded onto the Compact Disc. And, of course, the player is left with the job of deciphering it all. But we'll hook our line into that topic next month. A

# Winston. America's Best.

Excellence.  
The best live up to it.



17 mg. "tar", 1.3 mg. nicotine av. per cigarette by FTC method.

Warning: The Surgeon General Has Determined  
That Cigarette Smoking Is Dangerous to Your Health.

## DO THE KARAOKE

**S**tand up to sing in an American bar, and you'll be hushed up and urged to take a taxi home. Do it in a Japanese bar, and you'll be handed a microphone, asked what you want to sing, and given an orchestral accompaniment.

That's *karaoke*, an electronic institution in Japanese bars, homes and (so I'm told) bathhouses. It takes many forms, but all involve amateur singing through a microphone with heavy reverb and (usually) an instrumental backup. Hence the name, which is Japanese for "empty orchestra."

I got my first three tastes of it last year while on a trip to Japan. My introduction came at a quiet, neighborhood bar in Tokyo's Nakano section, where about half a dozen patrons took turns at the mike. The accompaniment came from a special eight-track player equipped with program-location systems, reverb, and a mike-mixing input. Books of lyrics were placed beneath the tables—you picked a song, and the proprietors plugged in the proper tape for you. I sang "Lili Marlene" in German with the tape accompaniment, and a Russian hymn without. Mine was far from the best voice in the place; as the friend who brought me had promised, this bar's patrons were fine singers, indeed.

## Entex Electronic Singing System



Illustration: Michael A. Donato

More common, I was told, are bigger, more expensive bars, whose *karaoke* machines have pitch control and whose patrons—mostly out for a typical evening of heavy-drinking business entertainment—are not such good performers.

My sampling of expense-account *karaoke* came in Tokyo's Roppongi section, at a small bar whose music system consists of a live guitarist and a rhythm machine. Pitch control was therefore no problem for the accompaniment, but some of the singers had pitch problems of their own; as predicted, the singing was not up to that of the regulars at the Nakano bar. Still other bars, I hear, put their customer-performers on small stages, with curtains, spotlights and even video playback. I didn't investigate; two bars in one week is well past my norm.

*Karaoke* bars also exist here, in cities with large Japanese communities. My friend Sheila tells me her Japanese husband constantly practices at home so that he'll sound good at the bars. That's one reason for the sale of home *karaoke* units (and for the mike-mixing inputs found on so many Japanese stereo amplifiers and receivers); the other is the growing popularity of *karaoke* as family entertainment.

The *karaoke* influence shows up in other types of sound equipment. The week before I investigated the bars, on a visit to Sony, I saw a 120-disc CD changer with digital pitch control (no tempo change). It looked less like

a record player than an automated warehouse, with discs stacked 60 high on each side of a central shaft in which the player mechanism rose and sank. *Karaoke* is also a reason for the auto-pause feature, found on some home players, which pauses play at the end of each track. And *karaoke* Compact Discs are, I hear, among the hottest-selling CDs in Japan.

Dual-well cassette decks apparently were first developed so that users could save their sing-alongs for posterity, dubbing both their voices and *karaoke* cassettes onto a blank tape. In Japan, Onkyo sells a deck which plays *karaoke* eight-track cartridges in one well and records and plays cassettes in the other well.

The biggest and fanciest home *karaoke* system I've seen here is Pioneer's SC-55 rack system, which includes a four-input mixer amp with panpots and reverb, a dual-well cassette deck with pitch control, as well as the usual tuner, turntable (also with pitch control) and equalizer, plus a rhythm box. More conventional *karaoke*s are available from Magnavox, Entex, Panasonic, TTC, JVC, Clarion, Hal Roach Studios (whose Singing Machine is also available as a plug-in deck), and others. Tapes are available in cassette form (with Dolby B NR) from Songtrax (Studio City, Cal. 91604) and in eight-track format from the Singing Machine division of Hal Roach Studios (8605 Kewen Ave., Sun Valley, Cal. 91352).

# CAR STEREO FEATURE GUIDE

**CRD-90**    **CRD-180**  
**CRD-95**    **CRD-101**  
**CRD-150**    **CRD-301**



**Sherwood**  
Quality and Innovation You Can Afford

# Cassette Receivers



## CRD-90 AM/FM Cassette Receiver

A no-compromise electronic package with all the essentials for high performance sound in your car.

**Power:** 6 Watts X 2 (10% THD); 3.5 Watts X 2 (0.5% THD 40-20kHz).

**Preamp output:** 450mv

**Additional features:** Tuner plays in fast forward and rewind.



## CRD-95 Auto Reverse AM/FM Cassette Receiver

All the advanced performance of the CRD-90 plus the added convenience of auto reverse.

**Power:** 6 Watts X 2 (10% THD); 3.5 Watts X 2 (0.5% THD 40-20kHz).

**Preamp output:** 1000mv

**Additional features:** Program switch with LED direction indicators, LED dial pointer, enhanced night illumination.



## CRD-150 Electronically Tuned AM Stereo/FM Stereo Cassette Receiver

Fully electronic PLL quartz lock tuning system plus the added pleasure of AM stereo.

**Power:** 6 Watts X 2 (10% THD); 3.5 Watts X 2 (0.5% THD 40-20kHz).

**Preamp output:** 450mv

**Additional features:** 10 station pre-sets (5 AM/5 FM), tuner plays in fast forward and rewind, mute switch. *Available without AM Stereo, Model CRD-130.*





**CRD-180 Electronically Tuned AM Stereo/FM Stereo Auto Reverse Cassette Receiver with Digital Clock**

An impressive array of fully computerized features and high performance in an advanced yet compact automotive sound center.

**Power:** 6 Watts X 2 (10% THD); 3.5 Watts X 2 (0.5% THD 40-20kHz).

**Preamp output:** 1000mv

**Additional features:** 12 station pre-sets (6 AM/6 FM), unique preset scan feature, enhanced night illumination, program switch with LCD direction indicators.



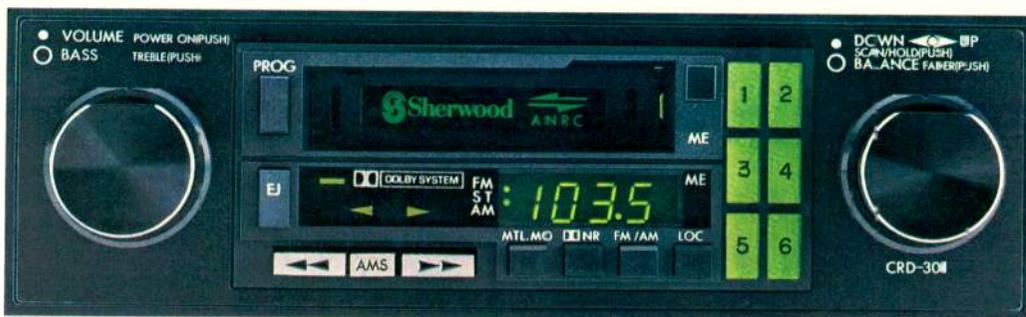
**CRD-101 AM/FM Auto Reverse Cassette Receiver**

Great features, built-in high power, super performance with both tuner and tape and true affordability.

**Power:** 20 Watts X 2 (10% THD); 12 Watts X 2 (0.5% THD 40-20kHz).

**Preamp output:** 1000mv

**Additional features:** Program switch with LED direction indicators, key-off eject, motorized cassette loading, enhanced night illumination.



**CRD-301 AM/FM Electronically Tuned Auto Reverse Cassette Receiver**

A feature and performance package that rivals competitive models selling for hundreds of dollars more, the CRD-301 is a perfect example of quality and innovation you can afford.

**Power:** 20 Watts X 2 (10% THD); 12 Watts X 2 (0.5% THD 40-20kHz).

**Preamp output:** 1000mv

**Additional features:** 12 station pre-sets (6 AM/6 FM), program switch with LED direction indicators, key-off eject, motorized cassette loading, enhanced night illumination.



# Glossary



**Mini Chassis.** Use where internal dash space is restricted; small enough to fit virtually any car made in western Europe, North America or Japan. 6 7/8" W x 2"H x 4 7/8" D



**Preamp Output.** Conveniently connects to any Sherwood or other brand amplifier. Retains all control functions through separate amp.



**Preamp Output with Fader.** With separate amplifier, apportions signal between front and rear speakers.



**Power Fader.** Apportions internal amplifier power between front and rear speakers.



**Local/Distant Switch.** Increases/decreases FM sensitivity for clear reception under crowded channel or weak signal conditions.



**MOS-FET Front End.** Advanced technology found in our top-rated home receivers has been adapted to the special conditions found in a moving car for wider dynamic range and extended overload capacity. You get the cleanest FM possible in a car.



**Metal Tape Switch.** Adjusts tape playback equalization to 70us when playing metal, chrome or ferrichrome tape.



**Stereo/Mono Switch.** Increases usable range of weak stereo signals by switching to lower noise mono mode.



**Line Filter.** An in-line circuit that reduces noise from your car's electrical system.



**Balance Control.** Permits full adjustment of left/right signal balance.



**Automatic Noise Reduction Circuit.** Automatically blends upper frequencies of left and right channels to improve listenability of marginal FM signals without eliminating stereo effect. Also reduces "picket fence" distortion by discriminating between multipath signals.



**Separate Bass and Treble.** Independently adjusts low and high frequency for highest quality tone control.



**Dolby Noise Reduction.** Improves signal-to-noise ratio when playing back Dolby encoded tapes.



**Locking Fast Forward and Rewind.** Provides hands-free fast winding of tapes.



**Power Antenna and Booster Lead.** Permits remote turn-on/turn-off of powered antenna, amplifier or other accessory from receiver.



**Super Hard Permalloy Head.** Delivers long life with any tape formulation, including metal, and provides shielding from interference generated by automotive electrical system.



**Auto Reverse.** Changes direction at end of tape play, or whenever you command with the program switch.



**PLL Synthesizer Tuner.** A computer in a car receiver. The phase-locked-loop synthesizer locks onto the exact center of your desired tuning frequency while a precision quartz oscillator rechecks it millions of times each second for the finest reception available in a car. This quality, all-electronic design also has the convenience of digital frequency display and instant, electronic pre-set tuning. And no moving parts means superb reliability.



**LED Digital Readout.** Clearly shows the exact station frequency with light-emitting diode number display. No more guessing.



**Signal-Seeking Tuning.** Automatically finds next station.



**Scan Tuning.** Moves from station to station, sampling the signal for a few seconds on each.



**C-QUAM Format AM Stereo.** Automatically decodes AM broadcasts in C-QUAM format; has much longer range than FM and is free of multipath distortion.



**Digital Clock.** Shows time of day when tape is playing or when tuning controls are not in use.



**LCD Multifunction Display.** Uses advanced liquid crystal technology to indicate many conditions, such as tuning frequency, time, tape direction, and status of special features.



**Automatic Music Search (AMS).** Automatically finds the next selection on a tape. No more guessing with fast wind controls.

Dolby and the "Dolby D" are registered trademark of Dolby Laboratories.

C-Quam is a registered trademark of Motorola.



**Sherwood**  
Quality and Innovation You Can Afford.

13845 Artesia Blvd., Cerritos, CA 90701 In Canada: The Pringle Group, Don Mills, Ontario

## EDISON UPDATED, AWARDS REINSTATED

### Pengelly Cylinder Player

*Editor's Note:* This item, which makes for an interesting postscript to our May 1984 feature, "Old-Tyme High-Tech Electronic Cylinder System," was recently sent to us by Donald Aldous. A consulting editor for Britain's *Hi-Fi News*, Aldous was recently honored for his achievements in audio (see following announcement).

In 1977, the Royal Scottish Museum in Edinburgh staged a major exhibition and symposium to celebrate the centenary of the invention of recorded sound and playback by Thomas Alva Edison. Among the contributors to the symposium from the U.S. and Europe was Joe Pengelly, an Englishman renowned as a specialist in the electrical reproduction of the earliest mode of sound recording on cylinder. Pengelly, an Oxford University graduate and an Hon. Research Fellow in Oral History at Exeter University, was a BBC man for some 20 years. In 1977, he compiled and presented the BBC's Centenary program on the invention of recorded sound. Examples of his archive work can be found in the Library of Congress, the White House Special Collection, the Royal Archives at Windsor, and the BBC Archive section.

As the result of the sound quality he was able to reproduce from cylinders made at the turn of the century, Pengelly was invited to the Edison National

Historic site at West Orange, N.J., to transcribe certain important cylinders in the Edison archive.

Until recently, Pengelly worked with original (but modified), spring-driven Edison cylinder machines. In 1983, however, he was awarded a Leverhulme Research Grant to construct a completely new, electrical, cylinder-replay mechanism. This design was built by the Department of Mechanical Engineering at Plymouth Polytechnic in England's Westcountry. The actual work was carried out under the supervision of Engineer-in-Charge Terry Bouncer; Mike Springer was responsible for the actual construction.

The basic mandrel on the machine can accommodate the more common-size cylinders, while a number of additional slip-on mandrels can provide replay for every type and size of cylinder, with the exception of the two smallest "cotton reel" cylinders produced by the French Lioret company.

The basic difference between this and other electrical replay mechanisms produced so far is that in the Pengelly system the reproducer remains still and the mandrel travels laterally beneath a stationary pickup—in this version, an SME arm and suitable cartridge/stylus. Any freestanding pickup arm can, however, be used. The principle of a laterally moving mandrel was employed by Edison as far back as his first experimental tinfoil

cylinder machine in 1877, and again on his most sophisticated machines some 30 years later. The servo-controlled motor drive can accommodate variable speeds between 40 and 200 rpm.

Donald Aldous

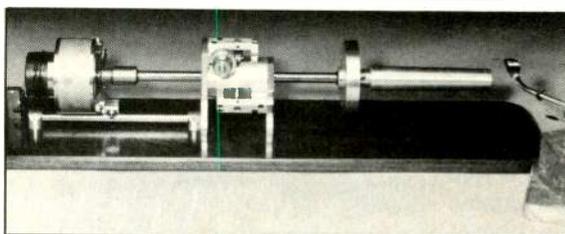
### Hi-Fi News Awards

Not long ago, England's *Hi-Fi News & Record Review* reinstated a long-standing tradition—its annual presentation of awards to those who have made significant contributions to recorded music. However, the awards (which had been suspended for 2½ years) have returned with a new twist: Unlike the old Audio Awards, which originally honored individual recordings, the new *Hi-Fi News Awards* celebrate the general achievements of high-fidelity engineers and journalists. Also unlike the earlier award, recipients of the new honor will not be restricted to Britons, but will include audio professionals from around the world.

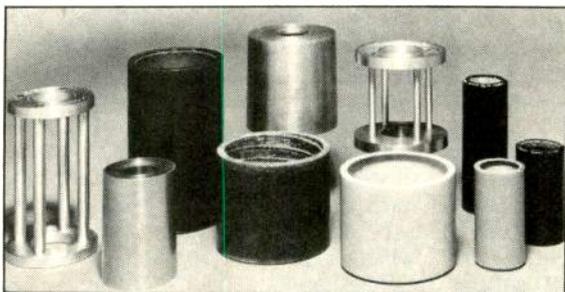
Accordingly, the 1985 awards have gone to three Americans—David Hafler, J. Gordon Holt, and Edgar Villchur—as well as three of England's native sons—Donald Aldous, Stanley Kelly, and Peter Walker.

A technical journalist for many decades, Donald Aldous published his first piece in *Popular Radio*, in 1933. In the same year, he was a founder-member of the British Sound Recording Association, forerunner of the AES. In 1935 he began writing for *Gramophone Record Review*, later serving as technical editor after *GRR* became *Audio Record Review*. Between 1945 and 1955, Aldous was director of Walden Films, where he was particularly involved with audio-visual aids and direct to disc recording. During this time, he continued writing for a variety of journals; he also published technical manuals and helped produce a usable magnetic recorder before any commercial machines of the type were available. Today, Aldous is consulting editor of *Hi-Fi News*, program organizer of Plymouth Film Theatre, and vice president of the Torbay Gramophone Society. He recently published *Sound Systems*, a book for audio beginners.

An engineer who learned while on the job during his World War II military service, David Hafler is best known for



The cylinder player invented by Joe Pengelly in 1983 features a mandrel that travels laterally beneath a stationary pickup.



Pengelly's modern player can accommodate a wide variety of cylinder sizes, including all of these, and more.

# HIFIDELIVISION®

Naiad Hifidivision is a self contained video stereo system that provides the best possible way to obtain state of the art video sound. Start with a TV and converter or VCR, and Hifidivision will turn ordinary TV sound into a spectacular event.

Add whatever you wish; TV monitor/tuner, beta/VHS hifi, laserdisc, satellite TV, FM simulcast.

Hifidivision is future ready™. See it and hear it at your nearest Naiad Hifidivision dealer.

**naiad**  
 Box 1840      Box 1250 Falls Sta  
 Brantford, Ontario      Niagara Falls, N.Y.  
 N3T 5W4      14303 0260



Enter No. 27 on Reader Service Card

# Audio

SUBSCRIBER SERVICE

Place label here

## MOVING?

Please give us 8 weeks advance notice. Attach label with your old address, and write in new address below.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

**AUDIO**  
 1255 Portland Place  
 P.O. Box 5318  
 Boulder, CO 80322

## Donald Aldous' career in journalism stretches back to 1933, when his first article was published in *Popular Radio*.

the design and manufacture of amplifiers offering high-end performance at affordable prices. This he began doing through Dynaco, the manufacturing company he founded in 1956, after obtaining a patent for an ultralinear circuit design. Notable among Dynaco's early offerings was a 50-watt amplifier, considered by many at the time to be far more powerful than necessary. Planning to retire, Hafler sold Dynaco in the late '60s. But by the mid-'70s he was back in business with the David Hafler Co., producing a new generation of high-performance amplifiers.

The founder, editor and chief tester for *The Stereophile*, J. Gordon Holt began his journalistic career at *High Fidelity*, where he was technical editor from 1955 to 1960. He left to publish a newsletter for Weathers, a manufacturer of cartridges and turntables; it was this newsletter that eventually became *The Stereophile*. Though Holt has written for other magazines, his name remains most closely associated with *The Stereophile*, which is considered by many to be a seminal "underground" audio publication and a model for others of its kind.

An electronics designer for five decades, Stanley Kelly spent the years before World War II as an engineer for Standard Telephones & Cables and for Philco. After the war he was chief engineer at Cosmocord, where he helped design microphones and pickups, including the first commercial pickup using a cantilever stylus. In 1954 Kelly left Cosmocord to start his own firm, Kelly Acoustics, which manufactured tape-recorder microphones, specialized test equipment, sapphire styli, and one of his best-known products, the Ribbon Loudspeaker. In 1964, Kelly sold the Ribbon's manufacturing rights to Decca, for whom he continued designing audio products; he has also designed speakers, transducers and filters for the OEM market. Today he is a technical adviser to *Hi-Fi News*.

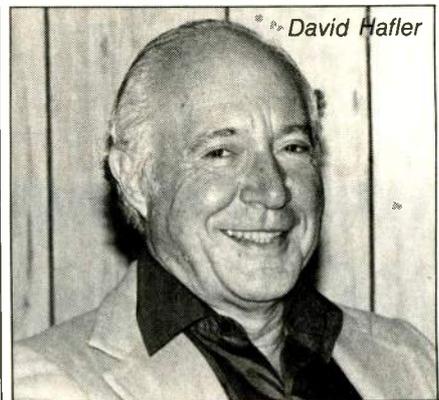
Edgar Villchur cofounded Acoustic Research and served as its president and director from 1954 to 1967. Among his introductions during this time were the acoustic-suspension speaker and the dome tweeter. But it was the AR turntable, launched in 1961, that is considered Villchur's most noteworthy achievement. A simple,

Donald Aldous



belt-drive design, it pioneered the use of a three-point suspended subchassis and is regarded by many as the forerunner of almost all high-end turntables on the market today. Villchur is currently president and director of research for the Foundation for Hearing Aid Research; he is also affiliated with the Massachusetts Institute of Technology and the Albert Einstein College of Medicine.

Though he is best known for his loudspeakers, Peter Walker's firm, the Acoustic Manufacturing Company, was in business for 14 years before its



David Hafler

first commercial loudspeaker design, the Corner Ribbon, debuted in 1950. The following year the company was renamed Quad, after its first domestic amplifier: The Quality Unit Amplifier, Domestic. In the ensuing years Quad pioneered the design of amps, preamps, tuners and loudspeakers, including the now legendary Quad ESL, introduced in 1956 and still in production, and its successor, the ESL-63, which was in development for 18 years before its introduction in 1981. **A**

# CAN YOU SEE THE MUSIC?

B&W's newest star is in the spotlight.

To celebrate the marriage of Audio and Video, B&W of England commissioned its world renowned research team to design a loudspeaker dedicated to the audio/video environment. A new star was born!

Until recently, TV was meant to capture the eye rather than the ear, a one-experience medium. But now, with the availability of Beta and VHS Hi Fi and the advent of Stereo TV, it has become a two-experience medium. Yes, you can expect theatre quality sound in your own living room. B&W video acoustic monitors reproduce the whole eight octaves of sound, an astounding improvement over the four to five octaves reproduced by ordinary TV speakers.

The television picture tube and associated components are seriously affected by stray magnetic fields. The magnets employed in TV loudspeakers are shielded to prevent magnetic interference but if large magnets required to produce true high fidelity are used, then shielding is only partially effective.

B&W goes one step beyond. B&W has totally redesigned the magnet circuits and motor system by producing nickel-cobalt centre pole magnets. B&W has produced ZMF speakers, giving virtually a Zero Magnetic Field. This revolutionary new approach actually enhances the performance of the loudspeaker system beyond anything achievable with simple screening; B&W ZMF speakers can be placed immediately adjacent to the television monitor without creating any adverse effect.

Behind the successful development of these video acoustic monitors lies B&W's world leadership in loudspeaker technology and design. B&W's Model 801 has been selected by famous recording companies, orchestras and conductors worldwide as their classical music monitor. For both the professional recording artists and the critical music lover, B&W has dedicated itself to the pursuit of perfection in the recreation of live sound.

More than a contribution to viewing pleasure, B&W ZMF loudspeakers provide all that has been missing from the complete audio video experience. LISTEN AND YOU'LL SEE!



## B&W

dealer listing is on page 148.

Enter No. 14 on Reader Service Card

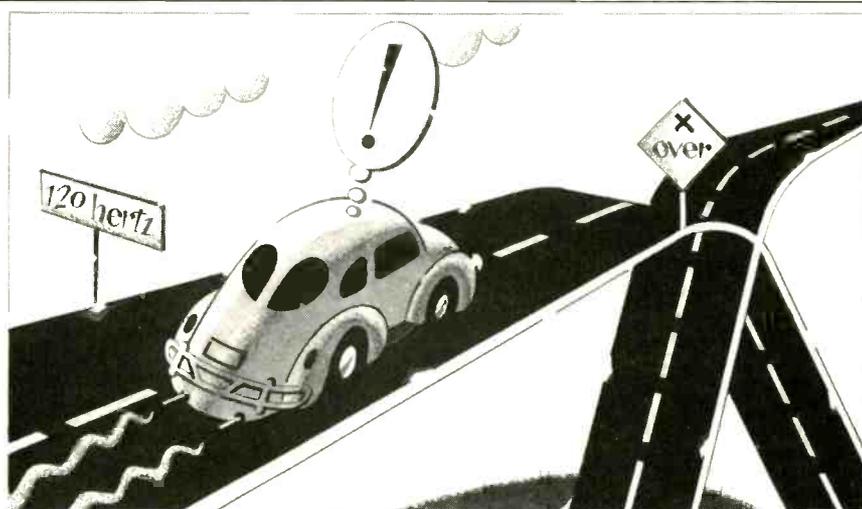
VIDEO ACOUSTIC MONITORS

### SUPERB SOUND WITHOUT PICTURE DISTORTION OR MOVEMENT

Anglo American Audio P.O. Box 653, Buffalo, NY 14240 (416) 297-0595

## ALL THINGS BEING EQUALIZED

Illustration: Philip Anderson



**A** while back, I said the ideal equalizer for the car would not be visible to the driver or passengers but would be hidden away, its controls preset by the installer. Well, at the Winter CES I saw just that. Folks, meet the Audio Control EQ-X.

The EQ-X is a 12-band-equalizer with unusual spacing: Half-octave bands from 45 to 180 Hz, then octave-centered bands from 250 Hz to 16 kHz. Left and right stereo channels are independently adjustable, and all settings are made with screwdriver-adjustable pots. Input gain is sufficiently variable to handle any signal, from the output of a small amp down to preamp level; as an aid in setting the unit correctly, a light blinks when the level gets to within 3 dB of the clipping point.

The EQ-X also includes a two-way, electronic crossover with stereo outputs for the main speakers and with stereo, summed-mono and inverted-mono outputs for the lower frequencies. The summed-mono output allows both channels to share one subwoofer;

Audio Control EQ-X



the inverted-mono output can be used with the summed output to allow bridged mono operation from a stereo amplifier. Output impedance is kept low to avoid noise pickup from long cable runs, and the power supply is a bipolar type for higher headroom. The EQ-X (Audio Control's first car stereo unit) is in production now, for \$299.

The *in-dash* equalizer that most interested me was Denon's DCE-2200, which also has staggered spacing for its seven bands. In the bass, where equalization is usually most needed in cars, the bands are spaced an octave or so apart; that spacing is maintained into the midrange (1 kHz). But the two uppermost bands are spread out: They're at 3.5 and 10 kHz. The DCE-2200 also has a built-in subwoofer crossover, switchable for 80 or 120 Hz, at 18 dB/octave.

Yamaha, too, introduced equalizers with crossovers, the nicely styled, seven-band YGE-400 and the five-band, powered (two channels at 18 watts apiece) YGA-618. Both cross over at 80 or 200 Hz.

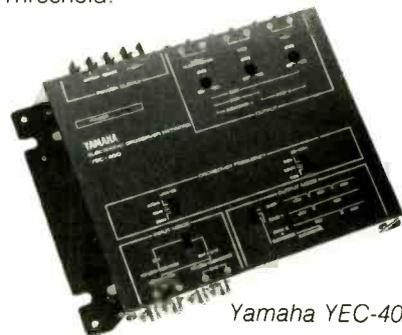
Kenwood's KGC-9400, a seven-band unit, is only 1 inch high, which should solve many installation problems, yet it seems fairly easy to adjust precisely—in a stationary car, at least. The 9400 has memories for four user curves plus four that are built-in (counting flat as one; the other three are for loudness, vocal boost, and high-cut). Its electronic display is switchable to serve as a spectrum analyzer (though without a mike input)—okay by me,

since you can stop its dancing lights so they won't distract you when driving at night.

There was a welcome emphasis on night illumination in Blaupunkt's sleek, stalk-mounting BEQ-65, Parasound's 500EQB, and Pioneer's seven-band, amplified BP-780. The latter has not only Pioneer's usual DIN jacks but RCA jacks as well—bravo for that.

Crossovers without equalizers continue to proliferate. I take this, and the presence of crossovers in equalizers and amps, as a sign that systems are growing more complex, and subwoofers more common.

The crossover that most intrigued me was the Soundstream DX-1. This is not the same Soundstream that used to make digital recordings (that's now Digital Recording Corp.), but an outfit that has purchased the name. They also have a top-name audio designer working with them: Nelson Pass of Threshold.



Yamaha YEC-400

Like all of Pass' designs, the DX-1 has many clever circuit features. For example, the crossover frequencies are separately adjustable, not just for the high- and low-pass sections but for the front and rear high-pass sections as well, the assumption being that front and rear speakers (and their environments) will differ, but both speaker pairs will probably share the same subwoofers. You can set the subwoofer level to vary with the level in the front or the rear speakers, or to stay constant (so bass won't vary as you work your front/rear fader). The high-pass sections have 6-dB/octave slopes with switch-selectable frequencies of 75, 100, 150, and 200 Hz. The summed-bass subwoofer section has a 24-dB/octave slope, continuously variable in turnover frequency from 50 to 250 Hz.

Yamaha's YEC-400, for three-way systems, has two equalization curves built in; one rolls off the lows a bit, the other rolls off the mids and lows. A third position gives flat response. The YEC-400 has both stereo and summed, monophonic subwoofer outputs. Audia, Philips, Proton and SFI also showed new crossovers.



Soundstream DX-1

The number of familiar brands of car amps continues to increase. Some of those names—such as Carver, Hafler, Crown and Denon—are known for home audio but are just now making their autosound debuts. Others are familiar from their speakers for home and car, such as EPI, Infinity and Pyle. (Pyle, incidentally, has just been bought by Harman Industries.)

The Carver Car Amplifier is, naturally, a magnetic-field type, rated at 120 watts per channel, bridgeable to 240 watts in mono. It costs \$350. It, too, has a built-in crossover, at 115 Hz, plus soft-start circuits to keep turn-on thumps and such from reaching the speakers. (The soft-start feature is also found on Concord's HPA-54 amp, which has four channels of 35 watts each and costs \$280, and on three amplifiers from Orion Industries.)

The Hafler entry is, just as naturally, a MOS-FET amp that will come in kit as well as factory-wired form when it be-

Concord HPA-54



comes available this fall. It will deliver 100 watts per channel. Also, David Hafler is the first car-amplifier maker I've caught calling his product "CD-ready."

If power is what CD-readiness requires, Linear Power can make that claim even more emphatically. To celebrate their 10th anniversary, they've introduced a limited-production, 500-watt model (250 watts per channel, naturally), the \$1,000 Model 5000.

At the other end of the power spectrum, Harman/Kardon introduced the Model CA205, at 3.5 watts per channel. Presumably, it's designed to power tweeters and the like, where more powerful amps would be less cost-effective than this \$50 unit. I may have gotten that idea from Soundstream, whose Class-A-40 (a \$350, pure Class-A amp delivering 18 watts per channel into 4 ohms, 30 watts/channel into 2) is specifically recommended for such use. For the bass they (and H/K, for that matter) make more powerful, more conventional amps.



Harman/Kardon CA205

Denon showed a hybrid Class-A, the DCA-3250. This nonswitching, non-negative-feedback amp delivers 40 watts per channel over the audio band. Both it and the 12-watt/channel DCA-3100 have pilot lights to show when they're turned on—a welcome aid in system troubleshooting.

Infinity's MRA-150 uses a slightly less exotic, quasi-complementary output stage to deliver its 75 watts per channel. Crown's CMA-1 has several power options: You can divide its 300 watts among three channels at 100 watts apiece, or use two 100-watt and two 50-watt channels, or one 100-watt and four 50-watt channels.

That reminds me of Yamaha's YPA-800 amp, which I had failed to mention previously as a result of having seen it between shows. It delivers either two channels at 100 watts apiece, four full-

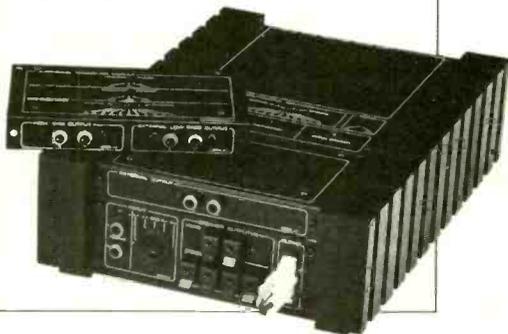
Blaupunkt BEQ-65

range channels at 40 watts each, or two stereo bass and two stereo upper-frequency channels of 40 watts each, crossing over at Yamaha's usual 200 Hz. The YPA-800 also claims super-efficient circuit design, worth noting if you're worried about your car's electrical capacity. Yamaha's new YPA-600 amp (\$250) delivers either 50 watts per channel in stereo or 150 watts when bridged to mono, and has a subwoofer crossover with summed and stereo output.

As the Carver and Yamaha entries show, amplifiers too now reflect the subwoofer trend by incorporating crossovers. Mansoor, a Canadian outfit new to me, has taken a different approach to this, with a "modular" amp, the Model MEI PA750H, delivering 50 watts per channel and priced at \$300. Modular, here, means that an optional crossover (Model EX800V, priced at \$70) can dock in place of the original input module.

There was not a phenomenal amount of news out of the WCES relating to cassette/radio units for the dash, but I haven't a phenomenal amount of time and space this month, either. So we'll wrap up the CES review in the next installment. I will say now, though, that only three or four companies expect to have CD players for the car this spring, but there will probably be a flood of announcements, at the June CES, of models that should be available (if somewhat scarce) before the year is out.

Mansoor MEI PA750H amp and EX800V crossover module



# Jerry Wexler: Navigator of the Atlantic Sound

Ted Fox

JESSE STONE



**I**n rhythm and blues and soul music, one record company set the pace and dominated the scene throughout the '50s and '60s: Atlantic. Jerry Wexler, record collector, jazz buff, former *Billboard* magazine writer, was brought into the company by founder Ahmet Ertegun in the early '50s. At that time, Wexler had practically no experience making records, and Ertegun was still wet behind the ears. But oh, did they learn fast! Wexler and Ertegun produced some of the greatest stars of the '50s, including The Drifters, The Coasters, LaVern Baker and a host of others. As Ertegun moved more to the business side, Wexler emerged as the premier producer of black talent in the '60s, especially with the classic sessions he produced for Ray Charles and Aretha Franklin. He put the obscure hamlet of Muscle Shoals, Alabama, on the map, and developed the Memphis-Stax sound through his work with artists such as Wilson Pickett, Sam and Dave, Solomon Burke and Otis Redding. He was responsible for The Allman Brothers, signed Willie Nelson when nobody else wanted him, brought Bob Dylan to record in Muscle Shoals, and, after he moved to Warner Bros. Records in the mid-'70s, signed such seminal New Wave bands as The B-52's and The Gang of Four. He is an old-style Jewish hipster who owes his fabulously successful career to his virtually unflinching sense of taste, dedication to quality, and openness to new sounds. Jerry Wexler respects the artists he works with, and most important, he *listens* to them—not just what they sing or play, but what they think. Perhaps that is the key to soul.—T.F.

*As a person who's been involved in making records most of your life, how do you deal with your personal taste versus what you're making?*

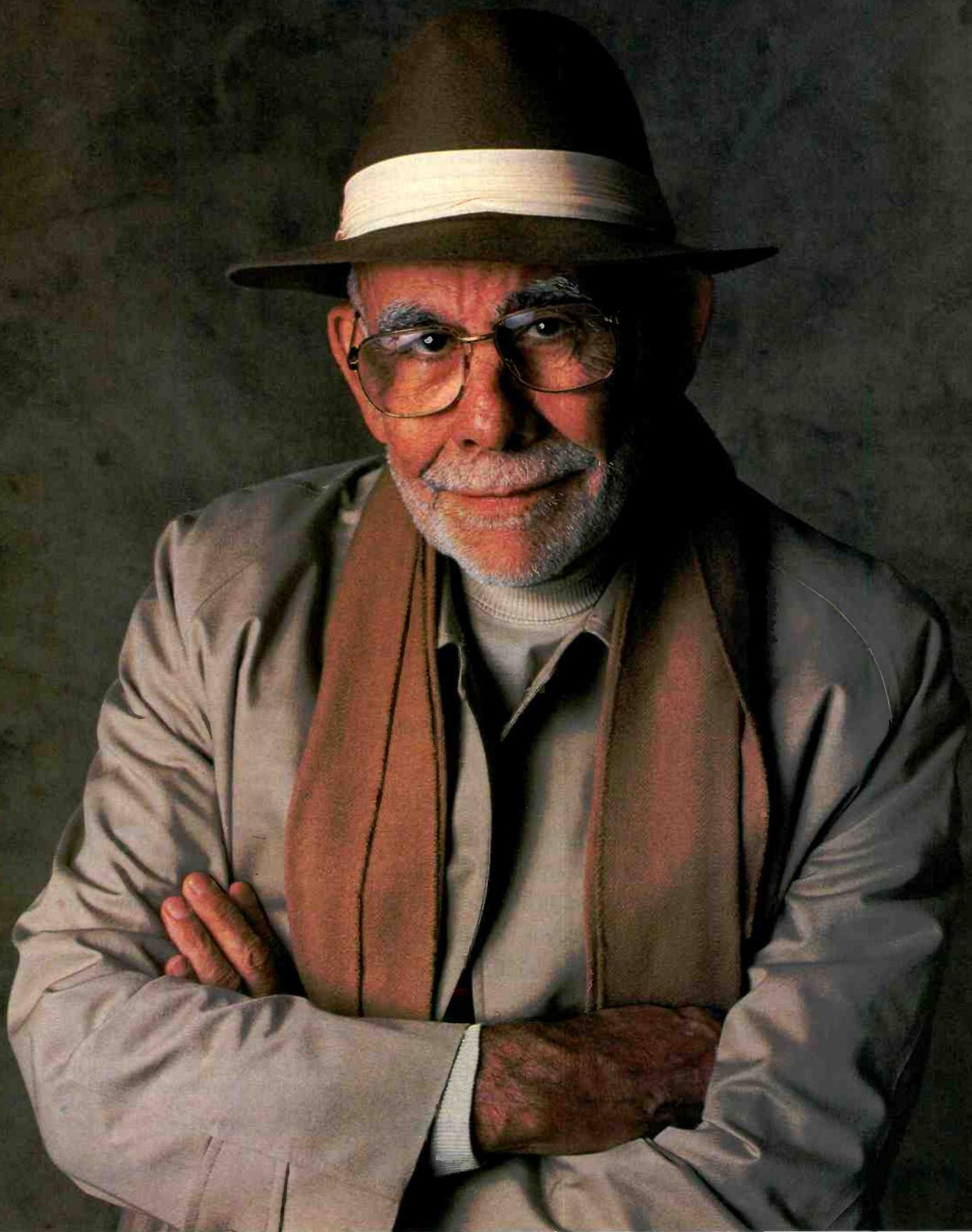
That's an interesting question. As a fan, you know, when I was a record collector in the '30s, we all ran together. We all knew each other. Of course, John Hammond was the *doyen*, the guy we all looked up to, and he already was making records, and Milt Gabler was making records at Commodore, and Alfred Lion and Frank Wolf at Blue Note, and then a wonderful guy named Dan Qualey who had a label called Solo Art. We all wound up in the record business, and we now had to deal with this question of what I call Column A and Column B. We always imagined that what we recorded would all be from Column A. We'd find something we liked, we would bring it in, we'd record it, then we would promulgate it and offer it to the public, and they would buy it. That was true, up until a certain point. It was true until rock 'n' roll. In the beginning, we loved what we did in the studio. I must say, to this day I've never personally produced anything that I didn't personally like. Never. I've *signed* a lot of acts to Atlantic, and some of them were hugely successful, but not only could I not see myself going into the studio with them, I would never even play their music at home. There came a point, around 1960, '61 or '62, when the crossover happened, when Ahmet Ertegun and I had to stop staying with Column A; we had then to deal with Column A and Column B. And then Column A became an indulgence.

*Who was in Column A after those years?*

After those years? My God. You're talking about all my flops [laughter].

Photo: © 1985 Frank Driggs Collection

Photo: © 1985 Carol Friedman



*You don't have to say who was in Column B, just some of the people who were in Column A . . .*

Well, Ray Charles and Aretha Franklin, there was no problem about empathizing with them, and loving to work with them, and loving their music. There was no problem with my working with Muscle Shoals or Memphis musicians on anything I ever did in the South. It was always a joy, Muscle Shoals or anything I did in Memphis with Stax or Chips Moman and the "American" band. Whatever we did with King Curtis, or The Sweet Inspirations, or taking Wilson Pickett down to Memphis, or Ronnie Hawkins to Muscle Shoals. Because it was all unadulterated music. The commercial compromise was never programmed into those records. That may sound mealy-mouthed for a producer to say. But I never did it, with Dusty Springfield or whomever I worked with. That doesn't mean I just went careening down the road doing what I wanted. My job was to serve the project.

*Was soul music something you consciously sought to develop? Or did it just happen after artists like Ray Charles, Aretha Franklin, Otis Redding, Wilson Pickett, Sam and Dave, and so forth came under the Atlantic umbrella? Certainly the Atlantic artists appeared to be a movement.*

This is, like, evolution. It works day to day, and it's not apparent as you're

doing it. The categories only emerge in retrospect; you just go along. It's survival from day to day, and survival means growth. Grow or die. Small record companies either grow or they die. You're going with a pulse, a feeling. There are very deep socioeconomic roots and conditioners that have to do with this music, and you don't apprehend them consciously. You react to them. You go into the studio with someone and say, "Play me a song," and say, "Yeah, that feels like something we should do next week." You can't articulate it.

When soul music was at its absolute height, we had this absolutely incredible roster. We had all the Stax people and all the people from the South—Joe Tex and Percy Sledge, and on and on and on—and then the Capricorn operation. It was just like a pantheon of soul artists. And I said to Ahmet one day, "It's going to be over in about a year, all at once, with this whole roster." And you look back and, suddenly, they were obliterated. It all went. Otis Redding died. The other people stopped selling. It just all changed overnight. The Stax operation ground to a shuddering halt, and Rick Hall's Fame Records . . . suddenly it went away, just like that.

*How did you get together with Ahmet and Herb Abramson at Atlantic?*

Ahmet and Herb started the company in about 1949. Max Silverman, of Waxy

Maxy's in Washington, D.C., was in on the formation of the company, and so was a man named Jerry Blaine, a record distributor who owned Jubilee Records. But as it turned out only Ahmet and Herb were really involved in the original formulation of the company. Most of the money was put up by a Turkish dentist in Washington whom Ahmet knew. The father of Ahmet and his brother Nesuhi was the Turkish Ambassador to the United States. They lived in the embassy and had a good time. Herb Abramson was sending jazz groups down, people like Ben Webster and I don't know who all. They had jam sessions at the embassy. So, in 1952, we were friends, we all knew each other, all people who collected. I was working for a music publisher at the time and they asked me to come over and go to work.

*As a producer?*

Not as a producer, as an anything. Run the music-publishing company, do administrative work in the office. It wasn't specified as to whether I'd be producing records or not. I said, "No, I've got a job." I said, "If you want me to come over, I want to be a partner." I had the effrontery, and they thought that was hilarious, but a year later, after they'd picked themselves up from rolling on the floor, they said, "Come over and you can buy a piece of the pie." I said, "That's fine." So I came in and I became a stockholder in Atlantic Records. I became a partner.

*What was the state of the company at that point?*

Herb Abramson was leaving. He owed the Army Reserve some time. He had gotten some education on Army time and so on, and he had to go to Europe for 18 months or something. They thought I'd be a good stabilizing, balancing influence there. I started making records immediately, with Ahmet; Nesuhi wasn't there yet.

*Had you ever made a record before?*

Yeah, I'd made one or two records. I'd made some demos, working for a publisher. I'd produced a session with Woody Herman, oddly enough. A friend of mine named Howie Richmond was a music publisher. At that time bands like Woody Herman's were not getting contracts with record labels. So Howie financed a date with Woody Herman to plug a couple of his tunes. I

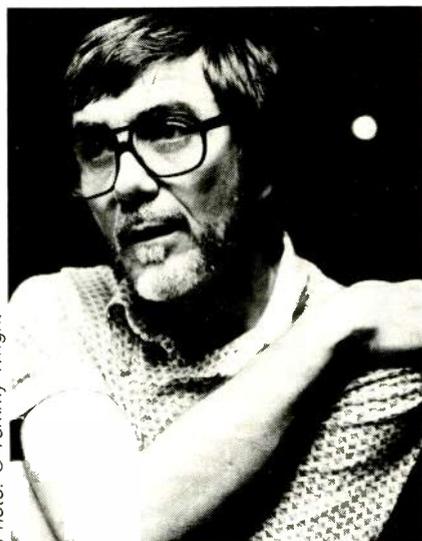


Photo: © Tommy Wright

**W**e had Tom Dowd as our engineer, and he was so outstanding that I'm a technological cripple to this day. I never had to bother about the board or the microphones.

TOM DOWD, c. 1975.



Photo: © Tommy Wright

don't even have a copy of that record today. I wish I knew how it sounds. That was my first actual recording session of a commercial record, although it was not a very commercial venture.

**Was Ahmet, by this point, a pretty seasoned producer?**

There were no seasoned producers at this time. Nobody really knew how to make records. What you'd do is you'd express your taste, and it worked pretty well. We kept making records until we learned how. I don't know exactly how many years it took, but it took a long time.

**How did you and Ahmet divide the responsibilities and duties and so forth?**

We didn't. We each did everything. If there was a point of difference, we'd proceed sort of Socratically. We'd always reach some conclusion. We weren't always 100% in agreement, but we were amazingly accommodating to each other, and it worked. And we had a very good team. We had Tom Dowd as our engineer, and Tom was so outstanding that I'm a technological cripple to this day. I never had to bother to learn anything about the board or microphones.

**What would you tell Dowd?**

Everything that needed to be elucidated about a record. Such as: "Watch it, in three bars we've got a sax solo com-

ing up, so watch the pot and be ready to bring it up." Such as: "Brighten the cymbals, because we're losing them in the bridge." Everything that had to do with sound and feeling. That was working with Tom on the board. Then there was what needed doing out in the studio, when it came to microphone placements and things like that. I'd know what I wanted to hear, I just didn't know how to get it. I just said, "Tom, do that," and he did it. I didn't always say, "Tommy, do that." I'd say, "Tommy, what's good here?" Tom was also a producer masquerading as an engineer for many years. Then there was the matter of directing the music, aside from the sound. Remember, there are people playing music out in the room, and it's coming over wires and onto a piece of tape.

**Who picked the songs?**

Ahmet and I did, of course with the approval, input and cooperation of the artist. Now, some artists picked more songs than others, some artists didn't pick any. Aretha Franklin picked most of her songs, maybe as much as 60% to 75%. Ray Charles wound up picking 100% of his songs, and wrote them all after a certain period. Later on, when rock 'n' roll became very crystallized, a great deal was attached to the idea of people who could write their own songs. I don't think that is as important

as it was made out to be, as it came to be in the rock 'n' roll era. Of course, it's great when you get a superb artist like Ray Charles who wrote all of his own songs while he was at Atlantic. The minute he left us, I don't think he ever wrote another song again, but his career went on and up, without him writing his own songs. If you think of the really high points in American music, you want to talk about Bing Crosby, Al Jolson and Sophie Tucker, and on the stage, Ethel Merman. There were songwriters like Johnny Mercer and Harold Arlen writing songs for singers like Bing Crosby and Al Jolson and Lena Horne. What's wrong with that? I see nothing wrong with that, providing you're using great entertainers.

**You also had a house arranger working at Atlantic.**

We had Jesse Stone, who is an incredible man. He also wrote great songs. He wrote "Shake, Rattle and Roll" and "Smack Dab in the Middle." He wrote under two names: Charles Calhoun and Jesse Stone. He had a BMI name and an ASCAP name.

**Is that why they did that?**

Sure. Jesse was one of the great figures of American music. He came out of the Kansas City area, the Southwest, Oklahoma or Kansas. He was very close to the era of Jelly Roll Morton. Jelly Roll was one of the first people to

Photo: © 1985 Frank Driggs Collection



CLYDE McPHATTER WITH BILLY WARD'S DOMINOES IN FRONT OF THE APOLLO THEATRE, AUGUST 1952.

McPHATTER AND THE DOMINOES ON THE APOLLO STAGE WITH ARNETT COBB'S BAND, AUGUST 1952.

Photo: © 1985 Frank Driggs Collection



CASHBOX AWARD PRESENTATION DURING THE ALAN FREED SHOW (c. 1956 or 7); KNEELING ARE WEXLER, FREED, AND AHMET ERTEGUN IN FRONT OF BUDDY JOHNSON, CASHBOX'S NORMAN ORLECK, ELLA JOHNSON, JOE TURNER, LOU WILLIE TURNER, AND JACKIE FREED.

Photo: Courtesy of Jerry Wexler



begin arranging music, and Jesse was right there, very close in time to Jelly Roll. Jesse was one of the people who developed the arranging of the jazz orchestra. He brought that over into rhythm and blues; it was just a natural. **There was also Arif Mardin.**

Well, Arif came later. That was in the '60s. He was a "hey, you" in the studio. He started doing little horn sketches and one thing led to another. He's developed into one of the greats in the industry.

*I want to get a little deeper into this working relationship between you and Ahmet and Tom Dowd and Jesse and, later, Arif. Can you explain how a session would come together?*

Let's take a Drifters date, for example. The Drifters' first date is a good example because it was very early. When Clyde McPhatter came in, he assembled a group around him. "Money Honey" was one of the songs on that first date, and it was written by Jesse Stone. Some of the other songs on that date came in from other people, and maybe Clyde McPhatter brought in a song or two. We rehearsed. That was unheard of; nobody else was doing that. We would rehearse for weeks. We would line out the arrangements with Clyde and Jesse Stone there. We'd work out the routine, and actually pick the key, get the layout. We'd rehearse the song with the group and the piano player, maybe it'd be Jesse or somebody in the group. We'd all sit around chipping in with ideas and notions for songs, arrangements, tempos, the whole thing. Then we'd bring the group back again and drill it and drill it. Then we'd go into the studio to record it. That's why Atlantic Records sound so good today. They're in tune and they're in time. I know it sounds like braggadocio, but you check them out. Compare them with some of the records from the golden age of a cappella that were being made at the same time.

*And they sounded so good because you rehearsed?*

Yeah. Either it's because we rehearsed or because once we got in the studio, we wouldn't let anything get by, because we *heard* it when it was wrong. A lot of records were being made at that time, but though the people sitting in the booth didn't hear what the hell was going on, they were hits anyhow.

**Is that still happening?**

Not so much anymore. Today the state of the art is such, both technically and production-wise, that a lot of people now know what goes into a phonograph record.

**I've also heard you say your philosophy of making records is "miss 'em quick."**

Oh yeah. That means you don't spend endless time agonizing, and hundreds of thousands of dollars, taking a year to make a record. Like The Rolling Stones said, "It's only rock 'n' roll."

**Let's expand on your philosophy. How could you, in the '50s and '60s, make those classic records in a day or two, when now you've got people spending a year on a record?**

I can't understand people spending a year on a record. I take three to four days, that's it, to do the tracks for an album. A lot of agony can start after the basic tracks if you have problems with the singer, if you don't know what sweetening you want, if there's a lot of "Hamlet" over the backing and filling of these horns. Within this simplistic restriction, there's room for fine-tuning a lot of individual variations. Some artists have to work slowly and more molecularly. Some, at times, have to go through the whole exercise, and you have to respect that.

**Who worked that way?**

Well, I'll tell you who didn't work that way. Aretha Franklin, Ray Charles, Bob Dylan, Wilson Pickett. I did a nice record with a group called The Sanford-Townsend Band, *Smoke from a Distant Fire*. I put a lot of time in. It took a month to make that record, and that's a lot for me. But I don't think there was a lot of wasted time, any indulgence. See, when you're dealing with a rock 'n' roll group, it's a different story. Think about it. When you're dealing with a singer like an Aretha Franklin, with a backup band of the best studio musicians, you get right down to it pretty quick. You grab it while the bloom is on. It's not a question of people who are rudimentary players hoping to play into a groove, and hoping to learn their instruments while they're taping. In a lot of rock 'n' roll groups, people are still trying to master their instruments. And I'm no good with groups like that because I'm not a musician. I can't tell a guitarist what he's doing wrong. I

can't put my fingers on the frets and say, "Do this." But if I've got Cornell Dupree or Hugh McCracken or, God bless him, Duane Allman, I just say what I want to hear and that's it. So it's much quicker when you work with studio musicians and a singer.

**You don't have to deal with four or five different egos, either.**

You don't have to deal with four or five different egos, and you don't have to deal with people who always feel, you know, "Learn while you earn." That's not to say that there aren't many rock

the drummer. And I told the artist a story to create the attitude. Then I would sing the song to the artist and say, "Phrase it like this, the accent goes here." I've read a lot of interviews with a lot of producers, and there's a lot of talk about who programs the Linn drum machine, and a lot about the proper use of synthesizers, but I haven't seen a whole lot about singing in many of these pieces. And finally what this is all about is a person and a song. A singer and a song, that never changes. In my opinion, not enough



**C**lyde McPhatter and The Drifters' first date is a good example of how we would rehearse for weeks, drill it and drill it. That was unheard of, and that's why Atlantic records sound so good today.

CLYDE MCPHATTER

'n' roll groups composed of master musicians. It took a long time for rock 'n' roll to evolve into a situation like that.

**What are the limitations of a record producer?**

Ahmet Ertegun has a great expression about that, about record producers. He's very blasé about record producers, and I think it's really fantastic. He said, "Show me a great artist in the studio, and I'll show you a great record producer in the booth." There's a whole lot to that.

**Thinking about the great sessions you've been involved with, what was your input as a producer? What did you do for these people?**

I got excited. I went out there and I did The Jerk and The Monkey and The Boogaloo, and I danced the groove for

attention is paid in a lot of records to what the singer is doing out there. To help the singer to find . . . to take her best shot. I say "her" because I love to work with females.

I would talk the lyrics, because good music phrasing is conversational. Just by talking and singing to them I could say, "This is the way you should go." Attitude—singing has to do with who maintains their attitudes and phrasing. And attitude can be any one of a million things; it depends what the song calls for. It depends what the music is saying at the time. For instance, if I was working with The Staple Singers I might go to Mavis Staples and put one hand on my hip and twitch my butt and say, "Get sassy now, sweetie, like this." Or, "This is dejection." Or, "This

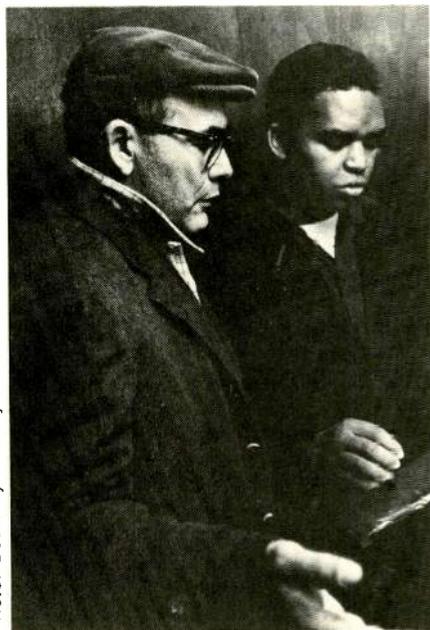
Photo: © 1985 Frank Driggs Collection



MAVIS STAPLES

**S**inging has to do with who maintains their attitudes and phrasing. I might go to Mavis Staples and put one hand on my hip and say, "Get sassy now, sweetie, like this."

WEXLER AND SOLOMON BURKE  
IN THE ATLANTIC STUDIOS, c. 1960.



is triumph. This is misery: You just cooked a dinner and now it's four o'clock in the morning and the beans and ham hocks are cold on the stove. Your man hasn't come home. And you've called seven bars, and he ain't there. And now you're ready to go out to an after-hours joint, and fuck him. That's what I want to hear in this song." You have to run librettos and stories. The singer may have an idea that's good, but you may have an idea that better amplifies and expands on what the singer says.

*So in addition to being the central reference point, you have to be the artists' inspiration.*

Yeah. The players have to feel good, they have to be fired up, and you have to grab it at the earliest possible take.

Sometimes maybe the 67th take becomes a hit, but it's much better if it's the fourth take—for all concerned, including the finances. It's better for the singer. It's better for the record if you get it early.

*What you say is so simple, so basic. Sure, there ought to be somebody there inspiring the artists, but that's not what most people think about, and I'll bet you that's not even what most record producers think about when they think of their role.*

The producers that I respect the most are producers who think about that, like Jerry Leiber and Mike Stoller, Bob Crewe, Phil Ramone. Of course, Ahmet Ertegun thinks the same way. Tom Dowd thinks that way, and so does Richard Perry. They know there's a

breathing body in the booth, and they know how to communicate to get the best out of the singer. And you also have to have the brass balls and the effrontery to go up to the singer and sing the song and say, "Sing it like this, the line starts with this accent, the 'and' beat after 'one.'"

*I suppose that could be abused and has been abused. I think about that scene in the Buddy Holly movie where Buddy's in Nashville, and he's trying to do his thing, and there's some asshole in the booth who's telling him, "No, man, that's not the way to do it, this is the way to do it." I suppose that's the bad side of that philosophy of producing. No?*

Well, the Buddy Holly thing is very complicated. Norman Petty was left out of that movie. Norman Petty had so much more to do with Buddy Holly than people imagine. In the long run, it's like the question of who does what to whom in bed. Nobody knows. You've got to be under the bed with a tape machine. Nobody knows what goes on at a record session unless you're sitting there. And the fact is that most record producers don't have any idea how other record producers work because they're not there when it happens. In the long run, what emerges is that the credit accrues to the whole team. The question is always going on among the people who have nothing else to do, because basically they're not employed or they don't have any projects; they sit around and say, "Now over at this company, who's the man? Who really is making this record?" All this speculation, "Well, shit, man, the engineer, he's the one who gets it done. Those schmucks, those ones with the vests and the briefcases don't . . ." Nobody knows.

*Certainly, I would assume, you decry the tendency to elevate star record producers?*

I do. The final litmus test is durability. How long have they run with their thing? Five years is a long time, 10 years is incredible, and beyond that is unbelievable.

*Another aspect of the producer's function is to decide where to record. What went into your decision to do it in New York or Muscle Shoals or Miami or Los Angeles?*

It's a combination of . . . You comput-

WILSON PICKETT

erize it, you put all the factors together and ask, "What's the best place?" It depends on the singer, the background musicians, the songs, what sound you're trying to get. It usually runs in cycles. People get addicted; they get comfortable recording in certain places and then move on to other places. People criticized me for staying at Muscle Shoals for too long. Maybe they're right, maybe they're wrong. I don't know. But I got very comfortable there. It's what's coming through to you in the control room. Where you start feeling it the best is where you want to go. In the case of Muscle Shoals, it was not the studio, it was the players. They did many, many different things for me and for themselves and for other people that were exceptional. We did Willie Nelson there. Aretha Franklin, Bob Dylan, Wilson Pickett. And the same four people played all that music with different lead guitarists, sometimes somebody from Muscle Shoals, or maybe I'd bring a guitarist.

Also, there's the fact that I like to be away. I don't like to be home when I'm recording. The funny thing is, I heard Manfred Eicher say the same thing about ECM, which is a whole different thing. He recorded in Norway, in Sweden, someplace very close to the Arctic Circle, where it's very cold. He does all his recording far from his home in Munich. I don't like to come back to my home environment when I'm making a record. I want to be, like, in retreat—in the Catholic sense, in the James Joyce sense. I want to be away from everything that I know. Because you're concentrated and relaxed at the same time. I don't want any interference, whether social or domestic, I just want to be making a record. And I'd rather be away from any regular place, and Muscle Shoals had all of these charms for me. After you make the record, you go to wherever you're staying—I stayed with Barry Beckett, one of the musicians—and you play the tapes that you'd made all day, and you analyze them, and you get ready for the next day, and that's really fine. I don't need to boogie down, you know, to get rid of my tensions when I'm making a record. I don't want to go out. I don't want to go to a movie afterwards.

**How long would you usually stay in Muscle Shoals?**

Two to three weeks. Then, maybe I'd come back one or two times to sweeten it and mix it.

**Did you mix all the Muscle Shoals stuff in Muscle Shoals?**

No. It's very interesting. I lost interest in mixing records way, way back. I used to let Arif Mardin and Tommy Dowd mix the records that I made. They would present them to me for comments, and I would comment, and they would make some small change that I asked for. I pretty much knew what sound I wanted. I knew what was right. But when computerized mixing came in, I got very excited, and now I mix records again. I love it. Mixing used to bore me.

**What's the difference?**

The way I work, and the way a lot of producers do, I imagine, is when it's time to mix the record, you let the engineer make the basic setup. That takes anywhere from 3 to 5 hours. Then you get a phone call: "I've got something for you to listen to." From there you take it, and adjust it, and fine-tune it to what you want. The basic setup is always something good enough to begin on. It's never horrendously off the mark. Maybe sometimes you say, "I can't deal with this." But 99 out of 100 times, it's your starting point, and it's a good one. But then it becomes a matter of your discretion, and your taste, where you want to take it from there. Now, you've always got it, because it's computerized, and there it is. It's in the tape, and you can go back to it, and back to it. If you want to redo background vocals or a guitar lead or a synthesizer part, the keyboard, anything, you've got it without disturbing the whole record. In retrospect, there are some records I'd like to remix.

**Which ones would you like to go back to and improve?**

Some Aretha Franklin records. I would love to have more voice and less strings.

**On some of the later ones?**

I don't even talk about some of the later ones [laughter]. I think that I was a little lax with Aretha Franklin.

**You think her recordings could have been better?**

Better mixed, with more voice and less background.

**You're talking about the classic Aretha Franklin sides?**

Photo: © 1985 Frank Driggs Collection



Photo: Joe Alpor. © 1985 Frank Driggs Collection



RAY CHARLES

Well, no, not the classic Aretha Franklin sides [laughter]. But there are a lot of good ones that aren't classics, a lot of great ones.

**You know, some people say she peaked too early.**

Oh, that's wonderful! Saying that is like saying . . .

**They say that she couldn't live up to those early ones. That those early ones were so great . . .**

That's almost like a computerized prizefight between Jack Johnson and Marciano. You're playing with immutable facts—there it is, that's what it is. Peaking too early . . . It's never too soon to get great [laughter].

*This is the first section of a two-part interview.*

# CAR STEREO: GETTING THE

DANIEL SWEENEY

**A** favorite theme in advertisements for autosound components is the "hostile environment" of the automobile, and how the particular components advertised manage to sound wonderful amidst all the hostility. The effects of the elements are frequently alluded to—the parching sun, the chill of a northern winter, the ravages of air pollution—but seldom is any mention made of that greatest of autosound cripplers, the noise that infests an automobile's electrical system.

That topic—so the industry appears to believe—is best left unexplored. For the problems of noise are so widespread (and so little under the control of the manufacturers themselves) that to touch on the matter at all could only confuse the consumer.

In fact, most aftermarket autosound equipment, and many OEM factory-option systems, suffer from at least some extraneous noise during operation. By noise I mean electrical noise—technically, crosstalk between the audio circuits and the various other electrical

circuits in the car. To be sure, automotive audio systems are also plagued with extremely high ambient noise levels, microphonic tape heads, resonating speaker enclosures and mountings, and all manner of purely acoustical problems, but most of these are inseparable from the automotive environment. The purely electrical noises are much more amenable to solutions, and are more interesting to investigate as well. Indeed, unless the audio components are themselves defective, virtually any autosound system can be



*buschman*

# NOISE OUT

purged of electrical noise. And you as a consumer need not and should not tolerate any extraneous noise in a custom installation you have purchased.

An automobile fosters electrical noise problems in an audio system because it houses a great many electrical circuits and because it is difficult to properly ground all of these circuits and isolate them from one another. Audio signals in an autosound system, as in any electronic audio system, take the form of alternating currents which fluctuate over time with waveforms en-

coded in the recording medium at the sound source. Noise is created by any extraneous alternating current having no relation to the program signal, and it is always AM—amplitude-modulated.

Such extraneous currents may have their point of origin in the car's electrical system—most frequently in the alternator or ignition. Or they may come from separate audio transceiver systems such as CB radios or cellular telephones, from one of the car's mechanical systems (due to a buildup of static electricity), or, occasionally, from

sources outside the car. In all cases they represent leakages into the audio circuits; they are not to be confused with distortion, where components fail to pass an input waveform accurately and spurious waveforms are generated within the audio circuit.

Noise in an autosound system may take the form of a steady whine; clicks and pops; high-pitched, twittering sounds known as "birdies," or a continuous ticking. The noise may be level-dependent (that is, it may rise and fall with the strength of the audio signal

*Illustration: Lynne E. Buschman*



# NOISE IS MORE LIKELY TO BE FOUND IN SYSTEMS CONTAINING MANY COMPONENTS, SIMPLY BECAUSE THERE ARE MORE POINTS AT WHICH THE NOISE MAY ENTER.

at speaker level), or it may be at constant volume and largely masked when the program signal is strong. Noise may be continuously present or mad-deningly intermittent. It may occur only when the tape or tuner section is in use, or may be present in both modes.

Noise is more likely to intrude in systems containing a multitude of components, simply because there are more points at which the noise may enter the audio system. But all autosound systems are vulnerable to noise, even those that are factory-installed.

Noise may enter the signal path at any point, from the antenna right up to the speaker cables. The earlier in the signal path the noise enters, the more severe it will be at speaker level because the noise will be amplified along with the signal at each gain stage in the signal path.

Noise may enter the system directly through the positive power leads from

the battery; it may be induced by powerful magnetic fields from electrical cables running adjacent to audio cables or components; it may be radiated through the air in the form of radio-frequency interference; it may enter through ground loops formed by false grounds, hovering above true ground potential, or it may take the form of crosstalk between or among audio components in the system.

For every noise problem in a car, there exists a specific remedy based upon generally held engineering principles. The trick is to identify the source of the noise. Identification tends to be the major task in noise suppression simply because of the wide variety of electrical systems to be found among different models of cars, and because of the varying immunity to noise even among cars of the same make and model.

Techniques of suppressing noise in

automobile systems evolved by trial and error. Theory could explain both the nature of electrical noise and the circumstances in which it could occur, but the actual, physical sources of noise within a car had to be discovered by a painstaking isolation of components within a system while evaluating the effects on noise level, by shielding potential noise generators, and by instrument testing of the car's electrical circuits.



A number of manufacturers and installers, many of whom did groundbreaking work in noise suppression, provided me with considerable assistance in writing this article, among them Charles Apcar, of Apcar Engineering in Los Angeles, Cal.; Roger Holdaway, founder of Speakerworks, an autosound retail chain in Orange County, Cal.; Larry Frederick, recently of Proton; Steve Mantz, president of Zed Audio, a manufacturer of high-end automotive electronics, and finally, the technical-services staff at Alpine-Luxman. I might add that Holdaway and Apcar, among the most respected installers in California, pioneered techniques of high-end installation during the late '70s. Holdaway is also a manufacturer of automotive loudspeakers and enclosures.

All of the above indicated reservations concerning current texts on noise suppression, and suggested that a wider understanding of the noise problem among consumers might help to raise the level of installation among autosound specialists.

The basic techniques for noise suppression in a car are simple. For noise induced by magnetic fields, one employs magnetic shielding, physically separating the inductor from the vulnerable audio component. For noise entering through the power leads, one uses simple filters, consisting of chokes and capacitors, to block alternating current. And for noise entering

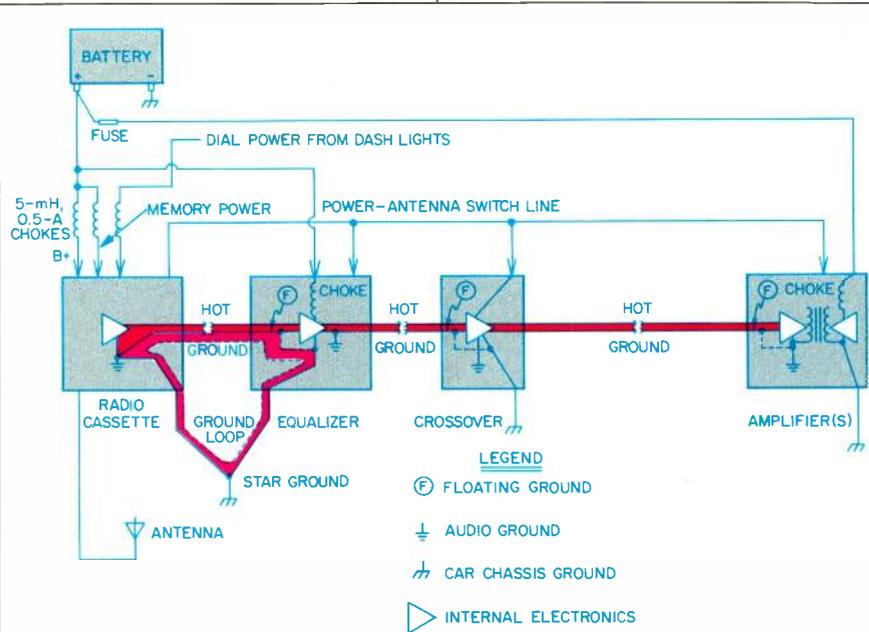


Fig. 1—Signal, power, and ground paths in a complex car-audio installation. Note the use of external suppressor chokes on components with insufficient internal suppression, and the use of the power-antenna switch line to power the crossover and provide turn-on signals for the equalizer and amplifier (a measure not all components require). The

equipment's floating-ground configuration eliminates ground loops which would occur if the input grounds ran as per the dotted lines in the crossover and amplifier. Note how the transformer in the amplifier's switching power supply allows isolation of the signal from the chassis ground. (Courtesy of Zed Audio.)

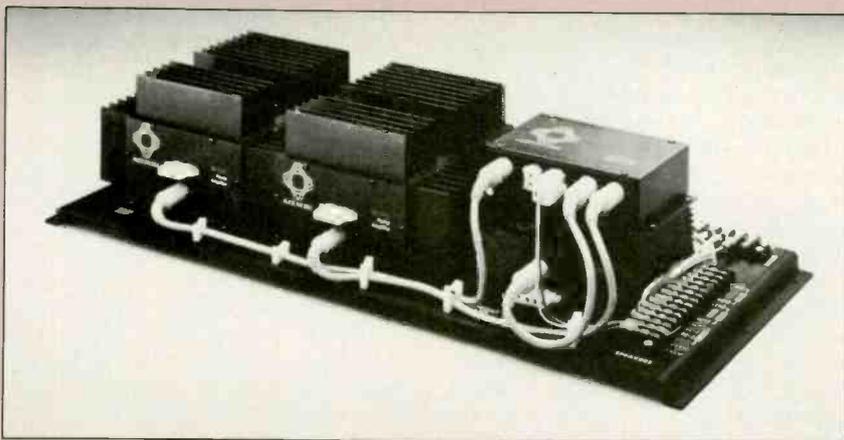
## CASE STUDY: MERCEDES

Any high-end component auto-sound system has a large potential for serious noise problems, and the one installed in this Mercedes 500SEC sedan is no exception. The system is biamplified and utilizes a total of five stereo amplifiers—four 20-watt-per-channel AudioMobile SA-452 amps to power the four tweeters and midranges, and one 50-watt-per-channel AudioMobile CXE-2 amp to drive two Isophon subwoofers. It is also equipped with an AudioMobile SP-300 preamp/equalizer. The multi-amp configuration and the custom-built speaker enclosures make this an esoteric system by autosound (or even home) standards.

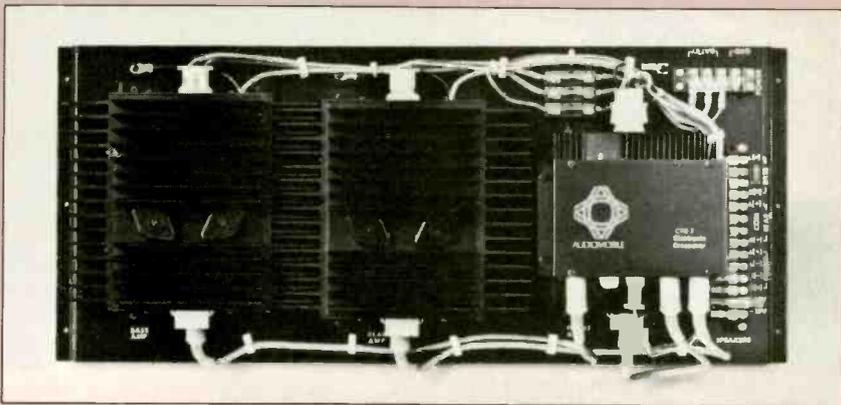
Biamplified systems are especially vulnerable to noise because of the multiplicity of ground points and the wide physical separation between the grounds of the cassette deck/tuner and preamp/equalizer in the front of the vehicle, and the grounds of the amplifiers and electronic crossovers in the trunk. Several feet separate the ground points in the front of the car from those in the back, and at that distance some voltage drop is inevitable. However, if the series resistance in the chassis between front and rear grounding points is under 0.1 ohm, a significant ground-loop problem should not exist.

An audible ground loop did not exist in this installation. The installer, Charles Apcar of Apcar Engineering, had checked ground potentials during the installation. When the car manifested noise problems after the components were in place, he checked grounds one by one, from the tuner to the power amp, until he was satisfied that a ground loop was not the point of entry for the noise.

Generally, the actual sound of noise while a system is in operation will provide a good deal of evidence of its cause. In this case, the noise, a faint whirring sound of variable pitch, was easily identifiable as alternator-generated. The noise level was not particularly high and was frequently masked by program material. None-



*Fig. B1—Two views of a typical amp rack, from AudioMobile, dismantled; note connector cables and power leads. Despite shielding, such cables can pick up noise by induction from adjacent power cables.*



theless, it was entirely unacceptable in a quality installation, and Apcar was determined to eliminate it.

Alternator noise almost always enters a system through a ground loop or through the positive power lead. It is very seldom induced, and never radiated. Apcar had already ruled out ground loops, and he deduced that the power leads from the battery were the likeliest source of the noise.

The next task was to identify the precise power lead transmitting the noise; Apcar surmised that the lead to the cassette tuner was the most probable offender. The power supplies in the other electronics constitute a fairly effective barrier to a.c. on the power line, so the head unit was

virtually the only component capable of passing interference from the positive side.

Apcar installed a passive filter across the power lead near the power input of the tuner/cassette deck, replaced the wiring, and took the car on the road for a field test. The noise problem was entirely eliminated.

Apcar specializes in exotic cars and expensive European sedans, and he finds many such vehicles to be plagued with stubborn noise problems. He emphasizes that two cars of the same make and model will not necessarily have the same immunity to noise, and he emphasizes that the business of installation involves ceaseless experimentation.

## CASE STUDY: CHRYSLER

Roger Holdaway, founder of the Speakerworks chain in Orange County, Cal., specializes in esoteric audio installations, and he has consistently sought to advance the art of mobile audio systems. A speaker manufacturer as well as an installer, he subjects his more ambitious systems to a battery of instrument tests to achieve optimal phase and frequency response, and all systems are guaranteed to be free of electrical noise.

Holdaway stresses that immunity to noise is gained by preventive installation. Big installations such as the one



*Fig. C1—To check on whether noise is being induced into the receiver, pull it from its mountings while it remains connected, and listen for a drop in noise level.*

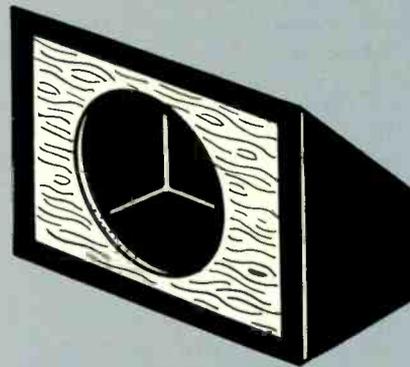
described here are very labor-intensive, and noise suppression applied after the components are in place is simply not cost-effective.

The car is a 1984 Chrysler owned by David Black, director of marketing for Alpine-Luxman, and the system is, naturally, all Alpine. It includes a 7347 cassette deck/tuner, three 3502 power amps delivering 80 watts per channel, one 80-watt 3518 power amp, and three 3650 electronic crossovers. Speakers are custom-made from Alpine components. An Alpine 8120 security system and an Alpine cellular telephone complete the ensemble.

Late-model Chryslers are considered especially noise-prone vehicles, but installer Pat Holdaway (Roger Holdaway's son) simply took his usual precautions and installation of the system was effected with no undue difficulties.

During the installation, audio wiring was run near the doors, and away from the central wiring loom, to prevent induced noise. All grounding points were tested with an ohmmeter.

Another noise-detection tactic did not prove necessary in this vehicle. When induced noise is suspected in the cassette tuner, the installer simply



*Fig. C2—Rendering of a custom-made Alpine woofer enclosure used in Speakerworks' Chrysler installation.*

pulls the unit out of its mountings with connectors still in place, and listens for a drop in the noise level. If such a drop occurs, induced noise is obviously present, and appropriate shielding can be placed over the cassette tuner.

This installation, by no means the most elaborate to come out of Holdaway's shop, required about 120 man-hours of labor. Preventive installation kept noise problems from ever surfacing.

through grounds, one determines a true ground of very nearly zero voltage potential for each ground lead, and then secures the ground lead at that point—or avoids the problem altogether by using audio components whose signal grounds "float" above the power grounds.

But before we examine individual noise problems, a word is in order on automotive electrical systems—which are problematic in themselves—and on how audio systems relate to them.

The fundamental reason a car has an electrical system is to power the ignition system and the running lights. Air conditioners, cigarette lighters, idiot lights, warning bells, and audio sys-

tems are secondary. In the design of an automobile, little consideration is usually given to whether an audio system will perform optimally.

The car's electrical system contains an alternator which produces alternating current (of widely varying frequency and thus unsuitable for powering audio systems), and a large-current, low-voltage battery for storing an electrical charge. The battery provides the power source for the automotive audio system. In general, the direct current provided by the battery is poorly filtered and contains a considerable a.c. component. The car battery is a far cry from the theoretically perfect, ripple-free power supply.

The battery itself may be used as a power supply for the active stages of components in a low-powered audio system. But in most of the more sophisticated systems, the amplifiers, and sometimes the preamp-equalizer, will contain separate, switching power supplies. These power supplies chop the direct current from the battery into a high-frequency alternating current which is stepped up to a high voltage via a transformer, then rectified again into direct current.

As Figure 1 illustrates, electronic audio components draw their power from the positive battery terminal in virtually all cars manufactured today. In most cases the positive power lead is at-

# MOST COMMONLY, A CAR'S STEEL CHASSIS IS USED AS A GROUND FOR AUDIO COMPONENTS; IT IS SO MASSIVE THAT ITS ELECTRICAL RESISTANCE IS VERY LOW.

tached directly to the battery; such a connection is far preferable to tapping into power leads of other electrical equipment. Power grounding is referenced to the negative terminal of the battery (obviously, a true earth ground is impossible in a car). All power grounds, without exception, ultimately lead back to the battery.

Running each component's grounding wires directly back to the battery is not a practical proposition. The installer, therefore, is forced to find an electrical ground that is physically remote from the battery yet part of the battery circuit and at nearly the same voltage potential as the negative terminal. Most commonly, the steel chassis of the car is used as a ground for audio components. The chassis is so massive that its electrical resistance is generally very low, and when a heavy-gauge wire is run from the negative terminal of the battery to the chassis, the circuit is closed.

Still, not all points on the chassis will be at absolute zero potential, and as little as a 0.1-ohm difference between two ground locations on the chassis will be enough to create an audible ground loop.

An alternative method of grounding audio components is to use a grounding strip, generally a very heavy-gauge copper wire to which all ground leads are attached, and which itself is affixed to the negative terminal. The scheme is rarely successful, however. Perhaps something on the order of welding cable would do the job, but the internal resistance of any standard audio cable far exceeds that of a typical car chassis and usually leads to serious ground-loop problems.

This brief description of the automotive electrical system should indicate that the car's audio system does not enjoy a clean circuit. Noise has very easy access to the audio system, and noise, as we shall see, is present in abundance.

The worst noise-makers in an automobile are the ignition system and the alternator. Alternator noise is the more widespread, and is present to a greater or lesser degree in most vehicles; I will return to this problem in a moment.

Ignition noise, generally radiated in the form of radio-frequency interference, emanates from the spark plugs.

It is manifested in a rapid, continuous ticking sound which increases with engine speed but does not change pitch. Ignition noise enters a system principally at two points—the antenna and the tape head. (In some cases, low-capacitance antenna cables may also pick up interference from the ignition system, but this is rare.) The ignition system generates interference in the AM frequency range, so if the antenna is the point of entry, the noise will be manifested only during AM reception. A simple but effective way of checking for radiated noise is to listen to a cheap, portable AM radio placed near the engine. Any r.f. problems should be readily apparent.



Generally, the car's hood effectively prevents radiated noise from a typical ignition system from reaching the antenna; however, cars with nonmetallic bodies such as Corvettes and Fieros are extremely transparent to ignition noise, as are cars whose hoods are ungrounded. In the case of cars with nonmetallic hoods, external shields may have to be placed over the engine cylinder head.

Tape heads, the second principal portal for ignition noise, are especially vulnerable because they are specifically designed to generate electrical currents by induction and to transmit low-level signals. In some cases, noise will be radiated into the tape heads; in other cases, noise will be induced by magnetic fields from electrical cables passing very near the heads. The car's electrical devices are, of course, powered by direct current, but as we have seen, the direct current from the battery may carry a considerable a.c. component, sometimes enough to induce audible interference.

All tape decks on the market contain magnetic chassis shielding, but occasionally it is inadequate. If that is so, the installer must encase the chassis, except for the faceplate, in mu-metal or some other nonpermeable substance. The shield itself must be properly

grounded or it will be entirely ineffective. Tin foil is utilized in many "quick and dirty" or trial installations, but it is not recommended.

The other main type of noise in auto-sound systems, alternator noise, may enter through the positive power leads, through ground loops, or occasionally through the chassis of a component. In the last instance, induction through adjacent power cables is generally involved. Of the three, ground loops are the most common points of entry. In all cases, alternator noise is manifested as a whining sound which rises in frequency with engine speed.

If alternator noise is passing through the battery, it may be fairly easily filtered out of the system by inserting chokes between the positive terminal and the power inputs of the audio components (see Fig. 1). The battery itself is a giant capacitor, and a choke placed in series with it makes a very effective filter.

Alternator noise on the positive side of the electrical system is commonly caused by improper output filtration of the alternator itself, by such alternator defects as damaged rectifier diodes or a malfunctioning voltage regulator, or by the battery providing less than optimum filtering action.

The last point requires some explanation. As a battery ages, its internal resistance rises and its effectiveness as a filter component diminishes accordingly. Increasingly, the battery passes alternating current into the car's electrical system, and an increasing amount of supplementary filtering is required at both input and output.

It should be noted that many audio components manufactured today have filters at the power input just to keep alternator noise from entering through the positive side, and some automobiles have factory-installed power-lead filters to serve the same purpose. But the installer cannot always depend upon either to be entirely effective. Finally, we should note that the switching power supplies in many audio components are generally effective in keeping noise out of the circuit on the positive side, though if poorly designed, such power supplies may themselves send appreciable amounts of switching noise back into the battery.

Ground-loop problems are a little

# NOISE CAN COME FROM THE ALTERNATOR, THE IGNITION SYSTEM, POWER CABLES AND ELECTRIC MOTORS IN THE CAR, OTHER AUDIO COMPONENTS, OR OUTSIDE SOURCES.

more intractable because they hinge on the design of the audio components themselves. Ground loops can occur only when a.c. grounds and d.c. grounds impinge on each other at some point. In an automobile, the d.c. ground is the power ground leading back to the negative terminal at the battery; the a.c. ground is the audio signal ground. In many cases, and perhaps most, the ground potential for the signal ground of a given component will be referenced to the preceding component in the signal chain. That is, the negative ground return will be to the output of the preceding component in the signal chain, and not directly to the battery. In such cases the signal ground is called a floating ground because the ground potential "floats" above the ground potential of the d.c. electrical circuit. Ground return for a floating ground will usually be effected via the outer shield of a coaxial interconnect cable.



The advantages of a floating audio ground are obvious. The signal is effectively isolated from noise and interference—so long as the ground really floats. At the point where it ceases to float, the door is open for unwanted noise intrusions.

In an automotive audio system, that door usually opens between the first two components in the signal chain. But the problem can occur whenever the signal input of one component is grounded to the chassis (the d.c. ground) and also draws a d.c. ground potential from the preceding component. A closed loop is formed between the two interconnected components, with current running (as illustrated in Fig. 1) through the a.c. ground return, down through the chassis ground of the first component, and back to the second component's input. Small but significant voltage potentials may be present in both the a.c. and the d.c. ground returns. These potentials are sufficient to cause appreciable current flow and audible noise. Any alternator

noise leaking through to ground will modulate the voltage in the ground loop and will be amplified in the power amplifier.

Ground loops cannot occur if the signal ground floats. Where signal and power grounds are common, a ground loop can be stopped if the power ground of the amplifier and the power ground of the preceding stage are effectively at the same voltage potential, with essentially zero impedance between them; hence the importance of checking the voltage potentials of all power grounds.

Ground loops are less likely to occur if the same physical location on the chassis is used for multiple ground leads, though electrical potentials can sometimes vary at physically proximate points on the chassis. Soldering the ground leads to the chassis is the most effective means of making a connection, though heat dissipation through the chassis renders soldering extremely difficult. Whatever technique is used for grounding, contacts must be scrupulously cleaned before they are connected, because high-resistance contacts would obviously defeat the purpose of the grounds.

Considerable investigation may be required to find the best grounding points on the chassis. Body panels or the engine block should never be used for ground points.

In addition to the ignition system and alternator, three other significant sources of noise exist in a car. The first of these is induced noise entering through the audio cables. According to both Holdaway and Apcar, cables powering appliances in the car may induce noise in adjacent audio cables—even speaker cables—and thus audio cables should be routed away from the primary "wiring loom" running down the center of most cars.

Another source of noise is the so-called secondary radiator. Certain metal parts in the car may have impedance characteristics and physical dimensions such that they function as antennas for radiated noise both from within and from without the car. Noise from such sources is quite rare, however, and when it occurs it may easily be eliminated by grounding the secondary radiator to the chassis.

Components themselves may gener-

ate noise internally. For example, the switching power supplies in amplifiers often share a common ground with speaker leads, noise from the power supply may contaminate the audio signal, and motors in tape decks may induce noise into the tape heads. But such problems are purely a result of poor component design and, as such, are beyond the capacity of the installer to correct.

The electrical motors that drive windshield wipers, power windows, and the like are another occasional source of noise in automobiles. When these motors' wire brushes become worn, they spark, and the sparks radiate noise like spark plugs. Here again, the antenna and the tape heads will be the primary points of entry.

Finally, noise may be radiated from sources outside the vehicle, such as other automobiles with noise problems of their own. However, such noise makers are outside the scope of this article and are very difficult to deal with in any event. The installer may reasonably be expected to suppress noise generated by the vehicle itself. He should not be held responsible for fending off every interference coming through our vastly overcrowded airwaves.

The above discussion has been intended as a commentary on the techniques employed by competent installers, not as a guide to those who wish to install their own systems (though the basic principles would serve the self-installer in good stead). My own view is that installation of high-performance autosound systems should be left to professionals unless the car is thoroughly expendable. Reputable installers carry insurance covering accidental damage to a vehicle. You, on the other hand, are on your own should you inflict structural damage on your car—a not-infrequent occurrence in installations by inexperienced persons.

Should you desire to undertake autosound installation as a hobby, one practical text on the subject of noise is available from Metra, a manufacturer of autosound accessories. However, no text is entirely comprehensive, simply because vehicles themselves change and evolve, and carry ever more abundant sources of electrical interference with each succeeding model year.



10 mg. "tar", 0.8 mg. nicotine  
av. per cigarette by FTC method.

© 1985 R. J. REYNOLDS TOBACCO CO.



*You've got what it takes.*  
**Salem Spirit**

*Share the spirit.  
Share the refreshment.*

Warning: The Surgeon General Has Determined  
That Cigarette Smoking Is Dangerous to Your Health.



# EQUIPMENT PROFILE

# 1

## ONYKO T-9090 TUNER

### Manufacturer's Specifications

**Usable Sensitivity:** Mono, 12.8 dBf; stereo, 17.2 dBf.

**50-dB Quieting Sensitivity:** Mono, 15.8 dBf; stereo, 37.2 dBf.

**S/N:** Mono, 95 dBf; stereo, 85 dBf.

**THD:** Mono, 0.009% (wide i.f.); stereo, 0.02% (wide i.f.).

**Frequency Response:** 30 Hz to 15 kHz, +0.5, -1.0 dB.

**Capture Ratio:** 1.0 dB.

**AM Suppression:** 60 dB.

**I.f. Rejection:** 100 dB.

**Image Rejection:** 100 dB.

**Selectivity:** 80 dB (super-narrow i.f.).

**Separation:** 55 dB at 1 kHz (wide i.f.); 33 dB, 70 Hz to 10 kHz.

**Output Level:** 0 to 1.5 V.

**Antenna Input Impedance:** 75 ohms, unbalanced.

**Dimensions:** 17 $\frac{3}{4}$  in. (45.1 cm) W x 4 in. (9.9 cm) H x 15 $\frac{5}{8}$  in. (38.8 cm) D.

**Weight:** 14.5 lbs. (6.6 kg).

**Price:** \$599.95.

**Company Address:** 200 Williams Dr., Ramsey, N.J. 07446.  
For literature, circle No. 90



For a tuner manufacturer to affix a \$600 price tag to an FM tuner these days, that manufacturer had better have something out of the ordinary by way of a product. FM tuner technology has advanced very rapidly in recent years, and along with ever more sophisticated and effective circuitry have come lower costs, thanks to the increased use of multi-function, large-scale integrated circuits. Let me state right at the outset of this review that Onkyo's suggested price for their T-9090 tuner is fully justified—and then some. The T-9090 is the kind of tuner that many FM listeners would have gladly paid twice as much for just a few years ago—if it had been available at the time. Think of this tuner as a reception problem-solver.

The tuner's most outstanding feature is its ability to set up operating modes and thus extract the best possible signal available under a wide variety of circumstances. As usual, Onkyo has come up with an acronym for this feature: APR. (Only when I got to the last page of the brief operating manual did I learn that these initials stand for Automatic Precision Reception.) APR is a system that automatically sets the r.f. stage gain (local or distant), i.f. bandwidth (wide, narrow, or super-narrow for extremely high selectivity), stereo/mono mode, and high-blend. Settings are based upon the quality of the incoming signal, including such parameters as field strength, distortion and noise.

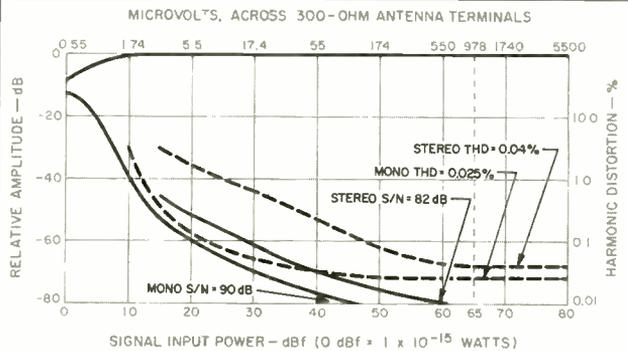
Normally, I would object to having a tuner make all these decisions for me (sometimes I want to hear just how noisy a weak-signal stereo station sounds in my location), but not in the case of this one. That's because Onkyo wisely provided a means for overriding the APR system—just for FM masochists like me!

### Control Layout

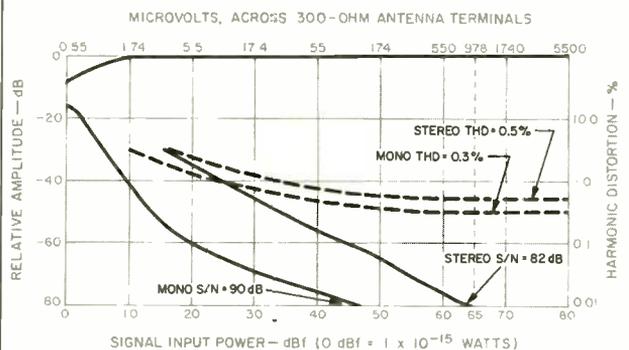
At first glance, the front panel of the T-9090 seemed very "busy," with its profusion of buttons and alphanumeric displays. Upon closer examination, however, I realized that each item on the crowded front panel served a useful purpose, and that the control buttons were quite logically arranged after all. At the extreme left of the panel are a power on/off button, two buttons associated with timer turn-on (an external timer would be required), and a toggle button that turns a built-in "beep" tone on and off. This tone, if left on, will beep every time almost *anything* on the tuner is changed or activated. The owner's manual suggests: "Use this switch to turn off the tone when not needed," and that's just what I did as soon as I was satisfied that it worked as advertised!

The main numeric display is multi-functional. It shows the tuned frequency, signal strength (actually calibrated in dBf), muting- or tuning-level setting (there are three muting levels possible: 17, 27, and 37 dBf), and the number of the preset station currently being listened to. Normally, this display shows tuned-to frequency; the other displays are activated when appropriate pushbuttons are touched. They then appear for 2 S, after which the display returns to the frequency-indicating mode.

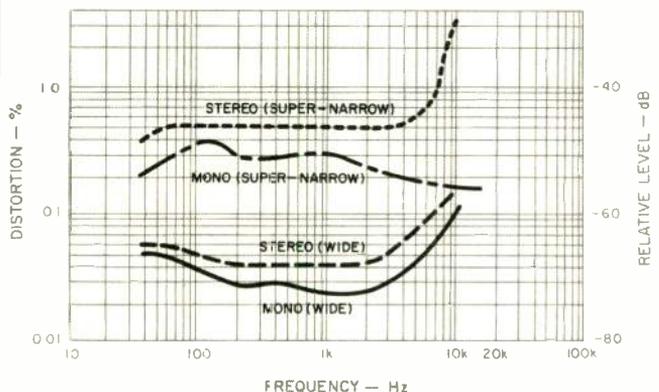
To the right of this major display area are indicators which tell you the status of the various operating modes selected manually or by the special APR circuitry. Below these are 20 numbered indicators to tell you which of the 20 preset stations has been selected and is being received. The



**Fig. 1—Mono and stereo quieting and distortion characteristics, FM section, in wide-band i.f. mode.**

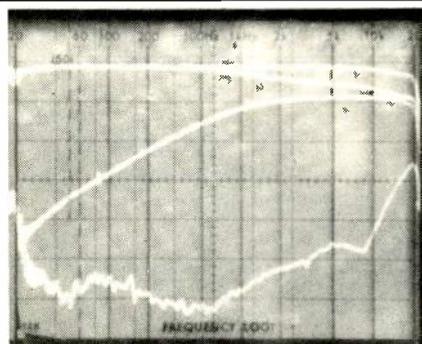


**Fig. 2—Mono and stereo quieting and distortion characteristics, FM section, in super-narrow i.f. mode.**

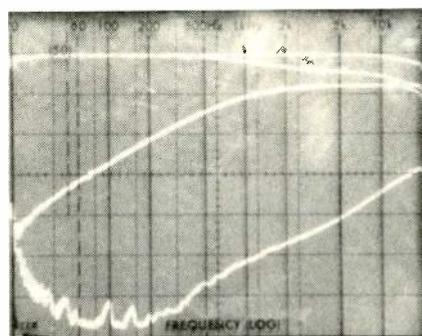


**Fig. 3—Harmonic distortion vs. frequency, in super-narrow and wide i.f. modes.**

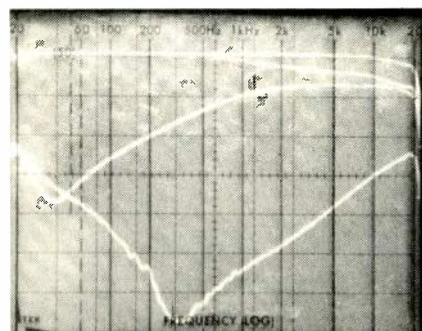
I was never able to honestly disagree with the operation-mode decisions made by this uncannily clever tuner.



A



B



C

**Fig. 4—Frequency response and separation vs. frequency, in wide (A), narrow (B), and super-narrow (C) i.f. modes. Top two traces in each photo**

**show response first without and then with blend; the bottom pair of traces show separation first with and then without blend.**

function keys that both assign and select the preset stations are arranged to operate much like keys of a typewriter. There are only 10 of them, but they can select 20 different preset frequencies using an additional shift key (button number 1 becomes 11, 2 becomes 12, etc.). At the upper right of the panel are touch buttons which can be used to override the APR decisions, as well as buttons for selecting "Tuning Mode" (automatic or manual), a button which sets in motion the preset scanning function (the tuner moves sequentially to all of your preset stations, letting you listen to

each for about 5 S), a key for entering preferred stations into the preset memory circuitry, the muting-level key for setting any of the three available muting thresholds, and a key for switching the frequency display over to its signal-strength display function. "Up" and "Down" tuning keys are at the lower right corner of the front panel.

The rear panel of the T-9090 is equipped with only a 75-ohm, coaxial, antenna transmission-line connector. However, Onkyo supplies a small, accessory, 300 to 75-ohm transformer for those who wish to use 300-ohm transmission lines from their antennas to this tuner. Fixed and variable output jacks as well as horizontal and vertical oscilloscope jacks are located near the center of the rear panel (the 'scope jacks are for observation of multipath problems). An output-level control nearby completes the simple rear-panel layout of the T-9090.

#### Measurements

Most of the measurements I made in the lab had to be done twice, once in the wide-band i.f. mode and then again in the super-narrow mode. I made a few measurements using the intermediate, narrow mode but discovered that distortion and separation figures fell just about midway between those obtained for the two extreme settings.

Figure 1 shows how quieting and harmonic distortion (for a 1-kHz modulating signal) vary with increasing signal strength in the wide-band i.f. mode. Mono usable sensitivity was an impressively low 10 dBf, considerably better than the 12.8 dBf claimed by Onkyo. Even in stereo, usable sensitivity measured only 15 dBf, considerably better than the 17.2 dBf claimed by the manufacturer. In mono, 50-dB quieting was obtained for signal strengths of 12 to 14 dBf (depending upon the i.f. bandwidth setting); for stereo, the signal strength needed to achieve 50 dB of quieting ranged from 19 dBf in the wide i.f. mode to 35 dBf in the super-narrow mode. Figure 2 shows quieting and THD for mono and stereo operation in the super-narrow i.f. mode.

The best signal-to-noise ratio I was able to measure with strong signals was 90 dB for mono and 82 dB for stereo. I won't quibble with Onkyo's claim of 95-dB S/N in mono since, frankly, I don't know for sure whether my test equipment is even capable of measuring signal-to-noise ratios in excess of 90 dB. Suffice it to say that the mono S/N I measured for the T-9090 beats anything I have ever measured for a tuner before.

Test equipment may have been the limiting factor in my measurements of harmonic distortion too. In the wide i.f. mode, I measured a distortion level of only 0.025% for mono and 0.04% for stereo. Admittedly, that's not as low as the 0.009% (mono) and 0.02% (stereo) figures claimed by Onkyo, but when you get down to such low levels of THD, it's hard to say whether the residual distortion is a function of test equipment, minute changes in tuner alignment, or other causes. In any case, these THD levels are obviously not going to be audible. As you might expect, switching to the super-narrow mode for higher selectivity always involves a trade-off against distortion and stereo separation. In the case of the T-9090, THD rose to 0.35% for both mono and stereo operation.

Figure 3 shows how harmonic distortion varies with fre-

# REDEFINITION.

## THE CARVER RECEIVER

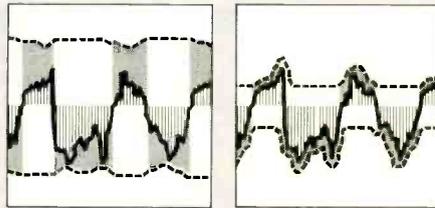
Redefines your expectations of receiver performance with the power you need for Digital Audio Discs plus virtually noise-free stereo FM reception. A receiver with astonishing performance incorporating two highly significant technological breakthroughs: Bob Carver's Magnetic Field Power Amplifier and his Asymmetrical Charge Coupled FM Detector.

**ESSENTIAL POWER:** Your system needs an abundance of power to reproduce, without distortion, the dynamic range of music on Digital Audio Discs and fine analog recordings.

The Magnetic Field Amplifier in the CARVER Receiver gives you 130 watts per channel\* of pure, clean power with superbly defined, high fidelity reproduction.

The Magnetic Field Amplifier produces large amounts of power (absolutely necessary for the accurate reproduction of music at realistic listening levels) without the need for heavy heat sinks, massive transformers, and enormous power capacitors required by conventional amplifier design.

Unlike conventional amplifiers which produce a constant, high voltage level at all times, irrespective of the demands of the ever-changing audio signal (Even when there is no audio signal in the circuit at all!), the Magnetic Field Amplifier's power supply is signal responsive. Highly efficient, it produces *exactly and only* the power needed to carry the signal with complete accuracy and fidelity.



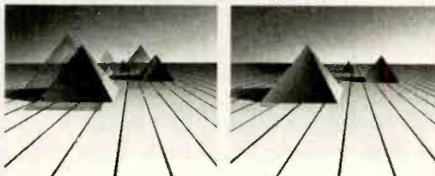
Solid line: audio output signal. Broken line: power supply voltage. Shaded area: wasted power. Vertical lines: power to speakers.

The 130 watts-per-channel\* CARVER Receiver is about the same size and weight of conventional receivers having merely 30 watts per channel!

**NOISE-FREE RECEPTION:** The AM-FM CARVER Receiver gives you FM stereo performance unmatched by that of any other receiver.

As it is transmitted from the station, the stereo FM signal is extremely vulnerable to distortion, noise, hiss and multipath interference.

However, when you engage CARVER's Asymmetrical Charge Coupled FM Detector circuit, the stereo signal arrives at your ears virtually noise-free. You hear fully separated stereo with space, depth and ambience!



Reflected multi-path signals cause audible distortion.

Asymmetrical Charge Coupled FM Detector gives your ears a true sonic image.

The Asymmetrical Charge Coupled FM Detector was first introduced in CARVER's TX-11 Stereo Tuner, receiving unparalleled critical acclaim:

*"A major advance... its noise reduction for stereo reception ranged from appreciable to tremendous. It makes the majority of stereo signals sound virtually as quiet as mono signals, yet it does not dilute the stereo effect."*

Julian D. Hirsch, STEREO REVIEW (December, 1982)

*"Separation was still there; only the background noise had been diminished, and with it, much of the sibilance and hissy edginess so characteristic of multipath interference."*

Leonard Feldman, AUDIO (December, 1982)

*"What distinguishes the TX-11 is its ability to pull clean, noise-free sound out of weak or multipath ridden signals that would have you lunging for the mono switch on any other tuner we know of!"*

HIGH FIDELITY (January, 1983)

*"The Carver Receiver is, without question, one of the finest products of its kind I have ever tested and used."*

Leonard Feldman, AUDIO (June, 1984)

The CARVER Receiver has been designed for fidelity, accuracy and musicality. You will want to visit your CARVER dealer for a personal audition of this remarkable instrument.

\*130 watts per channel RMS into 8 ohms, 20 Hz to 20 kHz with no more than 0.05% total harmonic distortion.



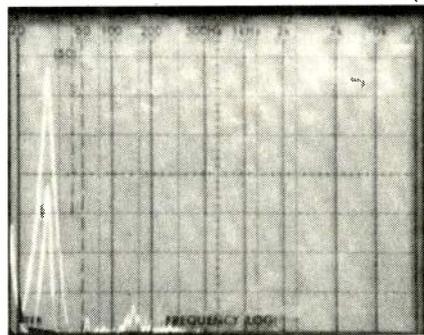
## CARVER Powerful Musical Accurate

Carver Corporation P.O. Box 1237 Lynnwood, WA 98036

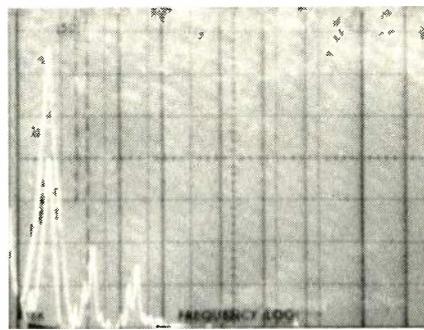
Distributed in Canada by Evolution Audio, Ltd.

Enter No. 16 on Reader Service Card

This is the kind of tuner that makes you wish for more really conscientious FM broadcasters providing the kind of sound quality the T-9090 can deliver.



A



B

**Fig. 5—Crosstalk and distortion products in wide (A) and super-narrow (B) i.f. modes, with a 5-kHz, 100% modulating signal. Sweep is linear from 0 Hz to 50 kHz.**

quency for both wide and super-narrow i.f. settings in mono and stereo. The three 'scope photos of Fig. 4 show how frequency response and separation vary with different i.f. settings. In each of these photos, the top two traces represent frequency response (from 20 Hz to 20 kHz) of the modulated channel, first without, then with the blend circuit. The bottom pair of traces in each case shows separation as a function of frequency (the scale is 10 dB per vertical division), with the least separation occurring when the blend circuit is manually activated. Figure 4A was plotted with the tuner set to the wide i.f. mode, in Fig. 4B the narrow mode was used, and in Fig. 4C the super-narrow setting was employed. An unusual, slight attenuation of high frequencies in each upper curve occurred when the high-blend circuit was introduced. In other words, for some reason, when the high-blend circuit is used, not only does separation at high frequencies decrease markedly, but the otherwise flat frequency response of the tuner is somewhat altered at the high end. Without the use of the blend circuit, separation in the wide i.f. position measured 57 dB at 1 kHz, 30 dB at 10 kHz, and 44 dB at 100 Hz. In the super-narrow i.f. setting, separation decreased to a still very satisfactory 42 dB at 1 kHz, 28 dB at 10 kHz, and 41 dB at 100 Hz.

Figures 5A and 5B also dramatically illustrate how i.f.

bandwidth affects distortion of a received audio signal. In these 'scope photos, the spectrum analyzer has been used to display a 5-kHz modulating signal as seen from the desired output (the tall spike at the left of each photo), followed by a second, stored sweep which shows the output of the unmodulated channel under the same conditions. Here the sweeps are linear from 0 Hz to 50 kHz in 5-kHz steps. Notice that in the wide i.f. position (Fig. 5A) there is very little evidence of crosstalk or distortion components at the output of the unmodulated channel (to the right of the main 5-kHz output spike). By contrast, in the super-narrow position (Fig. 5B), though separation is approximately the same (the shorter spike inside the taller one is about 26 dB lower in amplitude than the 5-kHz signal at the desired channel output), there are now several distortion and crosstalk components visible to the right of the 5-kHz signal.

Image and i.f. rejection for this tuner measured more than 100 dB (the limit of my test equipment), while AM suppression was an outstanding 75 dB. Capture ratio measured 1.2 dB, and subcarrier and SCA rejection were both in excess of 71 dB. Alternate-channel selectivity in the narrow position measured approximately 80 dB, increasing to better than 90 dB in the super-narrow i.f. setting.

#### Use and Listening Tests

I must confess that when it comes to FM, I am always turned on by a top-performing tuner or receiver. The T-9090 is just such a component. It's the kind of tuner that makes you wish there were more really conscientious FM broadcasters out there who were willing to devote the time and effort necessary to provide the kind of sound quality that this model can deliver. Fortunately, I have a couple of stations in my area that do care about good sound, and when you tune them in on a tuner such as this one, you realize just how good a sound—and how quiet a background—FM radio can provide. The T-9090's judgment with respect to modes of operation using the APR circuitry were better than my own. The tuner correctly analyzed a variety of incoming signals and made the right decisions about i.f. bandwidth and local/distant modes (or r.f. gain). In the case of a few really noisy stereo FM signals, it even turned on the blend control to reduce high-frequency hiss. Much as I would like to think that I could make better judgments than the built-in circuits, I have to confess that I was never able to honestly disagree with the decisions made automatically by this uncannily clever tuner.

In my listening area, having as many as 20 presets doesn't seem like overkill, though I know that in some areas there aren't even 20 signals available, let alone that many preferred stations. Using my outdoor antenna and a rotator, I was able to pick up 73 usable signals, some 49 of them in acceptably quiet stereo—including those for which the tuner decided to turn on the blend control. I haven't looked back over the last few years worth of tuner reports, but I suspect that this may be a new record. I have always admired Onkyo's r.f. products, and with the T-9090 they have really outdone themselves. Now, if more FM broadcasters would take their cue from Onkyo and start catching up, the true promise of high-fidelity FM radio would really be fulfilled.

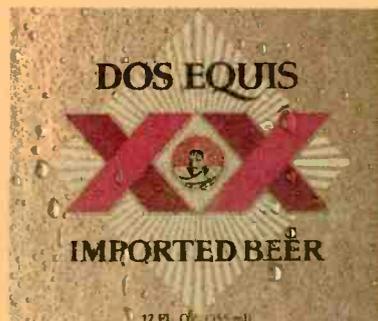
*Leonard Feldman*

# ENTER THE DOS EQUIS UNCOMMON IMPORT SWEEPSTAKES



You Have Two Chances to Win a New BMW 318i. In a world of imports, few are truly uncommon. And only one can be judged as the clear leader in its class. It takes quality. Consistency. Heritage. And taste that separates it from the crowd.

If you're driven by uncommon taste, try your hand at The Dos Equis Uncommon Import Sweepstakes. We just doubled your chances to win one of two new BMW 318i sedans. And when

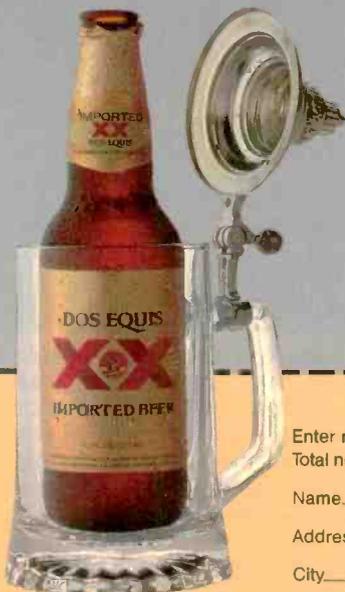


#### OFFICIAL RULES / NO PURCHASE NECESSARY

1. On an Official Entry Form or plain piece of paper no larger than 5" x 8" (one side only), hand print your complete name and address and the answer to this Sweepstakes question: How many red X's appear on the labels of a Dos Equis bottle? The correct answer to this question can be found only on bottles of Dos Equis or on the Dos Equis Sweepstakes Display available at your participating Dos Equis retailer or see Rule 4 below.
2. Mail your completed entry in a hand addressed envelope no larger than 4 1/4" x 9 1/2" (#10 envelope) to: Dos Equis Uncommon Import Sweepstakes, P.O. Box 4373, Blair, NE 68009. Limit one entry per envelope. All entries must be received by September 9, 1985. Not responsible for lost, misdirected or delayed mail.
3. Winners will be determined in a random drawing from amongst all correctly answered entries received under the supervision of the D.L. Blair Corporation, an independent judging organization, whose decisions are final on all matters relating to this offer. The odds of winning depend upon the number of correct entries received.
4. You may receive the correct answer to the Sweepstakes question by sending a self-addressed, stamped envelope to: Dos Equis Uncommon Import Answer, P.O. Box 4394, Blair, NE 68009. Residents of the State of Washington only need not affix postage to self-addressed envelopes. ALL requests must be received by August 18, 1985.
5. This sweepstakes is open to residents of the United States who are of legal drinking age in their states of residence at the time of entry. All-Brand Importers, Inc., Mochtezuma Imports, Inc., Pearl Brewing Co., and Terramar Importers, Inc. their affiliates, subsidiaries, distributors, advertising and promotion agencies, retail alcoholic beverage licensees and the families of each are not eligible. This sweepstakes is void in the states of OH, TX, KS, MO, UT, PA, OK, and wherever prohibited by law.
6. Taxes on prizes are the sole responsibility of the prize winner. All Federal, State and local laws and regulations apply. For the name of the prize winner, send a SEPARATE self-addressed stamped envelope to: Dos Equis Uncommon Import Winner, P.O. Box 4235, Blair, NE 68009. No substitution of prize is permitted. Prize winner will be obligated to sign and return an Affidavit of Eligibility within 10 days of notification. In the event of non-compliance within this time period, an alternate winner will be selected. A prize returned to the D.L. Blair Corporation or to the sponsor as undeliverable will be awarded to an alternate winner.

you thirst for uncommon taste in an imported beer, try light tasting Dos Equis. Clearly, number one in its class.

**Here's How to Enter.** Just fill in and mail the entry coupon below. Write in the total number of red X's appearing on all the labels on a bottle of Dos Equis and your name and address. With two BMW's to be won, it's a clearly better sweepstakes — from the beer that's clearly, number one in its class.



#### I Have Two Chances to Win a BMW 318i Sedan.

Enter me in The Uncommon Import Sweepstakes.

Total number of red X's appearing on the labels of a bottle of Dos Equis: \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Mail to: Dos Equis Uncommon Import Sweepstakes, P.O. Box 4373, Blair, NE 68009

2

## AUDIOVOX/ HI-COMP HCC-1250 CAR STEREO

**Manufacturer's Specifications****FM Tuner Section**

**Usable Sensitivity:** Mono, 11 dBf.  
**50-dB Quieting Sensitivity:** Mono,  
18 dBf.

**Frequency Response:** 30 Hz to 15  
kHz,  $\pm 3$  dB.

**Capture Ratio:** 2.5 dB.

**Alternate-Channel Selectivity:**  
74 dB.

**I.f. Rejection:** 80 dB.

**Image Rejection:** 62 dB.

**Stereo Separation:** Greater than 30  
dB.

**Maximum Output:** 0.5 V.

**Audio Section**

**Power Output:** 13 watts per channel  
continuous, 4 ohms, 50 Hz to 20  
kHz.

**Rated THD:** 1.0%.

**Frequency Response:** 20 Hz to 22  
kHz,  $\pm 3$  dB.

**Signal-to-Noise Ratio:** 70 dB.

**Bass and Treble Control Range:**  
 $\pm 10$  dB at 100 Hz and 10 kHz.

**Tape Section**

**Frequency Response:** 40 Hz to 14  
kHz,  $\pm 3$  dB.

**Wow & Flutter:** 0.10% wtd. rms.

**Stereo Separation:** 40 dB.

**Signal-to-Noise Ratio:** 120- $\mu$ S EQ,  
49 dB without Dolby, 59 dB with  
Dolby; 70- $\mu$ S EQ, 52 dB without  
Dolby, 61 dB with Dolby.

**Maximum Output:** 0.5 V.

**General Specifications**

**Chassis Dimensions:** 6 $\frac{1}{4}$  in. (16  
cm) W  $\times$  2 in. (5 cm) H  $\times$  5 in. (12  
cm) D.

**Price:** \$389.95.

**Company Address:** 150 Marcus  
Blvd., Hauppauge, N.Y. 11788.

For literature, circle No. 91



The nice thing about Audiovox's Hi-Comp series of car stereo components, and this model in particular, is the elimination of some of my pet peeves concerning FM and tape playback in cars. For example, the unit has an FM mute switch, just like the ones found on home tuners and receivers, so you don't have to listen to all of that interstation noise on FM as you search for the signals you want. Manual tuning is easy, even though there are preset tuning capabilities for 12 stations (six AM and six FM). Tone adjustment is made by "honest to goodness, boost and cut" bass and treble

controls, as opposed to a single, treble-cut/bass-boost arrangement. And if you want a bit of loudness compensation at low listening levels, you can get it with a loudness circuit that *you* control. (Too many car stereo amps have permanent loudness compensation whether you want it or not.)

Audiovox has also gotten around what is perhaps my chief objection to some of the displays now found on electronically tuned car radios. I become very upset when, after tuning to a station, the frequency display switches over to a clock-time display—whether I've asked it to or not. In the

# T A N D B E R G



... is the choice of those who consider music to be an important part of their life. From digital-ready amplifiers and world's finest: FM tuner, to the most sophisticated cassette & ræ recorders, only Tandberg offers a complete family of the most respected music reproduction equipment. European-made... acclaimed world-wide. For a color poster (without advertising copy) and the name of your nearest dealer, send \$2 for postage & handling to: Tandberg of America, 1 Labriola Ct., Armonk, NY 10504. Enter No. 55 on Reader Service Card

Tone adjustment is made by honest-to-goodness, boost-and-cut bass and treble controls, a feature uncommon in a car stereo.

HCC-1250 you have the option of an 8-S display of either time of day or frequency, followed by an automatic switch-over to the alternate display which remains active until you decide you want to change it. I like that a lot!

### Control Layout

Configured to fit in a standard, DIN-sized dashboard opening, the HCC-1250 has the usual pair of dual-concentric knobs at the left and right extremes of the front panel. Each of these knobs performs several functions. The volume control (in the usual, left-hand position) switches power off when turned full counterclockwise; it also doubles as the balance control when pulled and as the display-priority selector mentioned earlier when it's pushed at the same time as the adjacent memory-enable button. The ring surrounding this knob works as a bass control (or, when pushed, as a treble control. The tuning knob (as usual, at the right) tunes manually (shifting up or down by 200 kHz for each twist, and tuning continuously if held for a while) when turned, and automatically seeks the next clear station up the dial when pushed; during tape play, pushing the knob reverses tape direction. The surrounding ring is a front/rear fader control.

Pushbuttons on the left control tape ejection, loudness compensation, "FM/AM" band selection, and memory enable (a smaller button, colored yellow to distinguish it from all the others). Buttons at the right control fast-forward, rewind, music search, local/distant reception selection (or metal-tape EQ in the tape mode), and FM muting (doubling as the Dolby on/off switch when in tape mode).

In conjunction with the memory button, six smaller touch buttons are used to select and store favorite AM and FM station frequencies. An eject button is adjacent to the cassette slot; below the slot is the liquid-crystal time/frequency display area. In addition to showing frequency and/or time, the display tells you whether the loudness circuit is turned on, whether you are in the local or distant reception mode, if a stereo FM signal is being received, and which (if any) of the preset channels has been selected.

### Tuner Measurements

Mono usable sensitivity of the HCC-1250's FM tuner section fell short of the 11 dBf claimed, measuring more like 15 dBf; it was 22 dBf in stereo. In mono, 50-dB quieting required a signal input of 22 dBf (as opposed to 18 dBf claimed), while 50-dB quieting in stereo was attained with an input level of 36 dBf. Audiovox offers no distortion figures for the tuner section. I measured a THD of 0.75% in mono for a 1-kHz modulating signal and 0.85% in stereo for the same test signal. The signal-to-noise ratio for 65 dBf of mono signal measured 71 dB; for stereo, the best S/N measured 66 dB. Quietening and distortion characteristics as a function of signal strength are plotted in Fig. 1, and Fig. 2 shows how THD varies with modulating frequencies for mono and stereo signals.

Frequency response was down 2.5 dB at 50 Hz and -1.0 dB at 15 kHz. The upper trace of Fig. 3 shows response versus frequency for a left-only modulating signal appearing at the left output. The two lower curves show stereo separation (output of the unmodulated channel) at relatively weak signal levels (where a built-in blend reduces separation to lessen out-of-phase noise) and at strong signal levels (where maximum separation is maintained). I measured stereo separation of 30.5 dB at 1 kHz, 30 dB at 100 Hz, and 28 dB at 10 kHz under the strong-signal conditions.

Figure 4 shows the crosstalk products appearing in the unmodulated channel's output when a 5-kHz, 100%-modulated signal is applied to the opposite channel. Spikes to the right of the desired, 5-kHz indications represent harmonic distortion components, as well as residual 19- and 38-kHz subcarrier components which (as in most car stereo FM tuners) are not filtered out. It can be argued that since you are not going to record FM from a car FM tuner, and since you "can't hear" the 19- and 38-kHz subcarrier output signals, there's no harm in letting them come through if they are attenuated sufficiently so as not to cause any damage to tweeters in car speaker systems.

Capture ratio was 2.5 dB, as claimed, and image rejection exceeded published claims, measuring 65 dB. Selectivity was 75 dB, while i.f. rejection was 83 dB.

AM performance was anything but impressive, as is evident from the frequency response curve of the AM tuner section reproduced in Fig. 5. The mediocre performance of

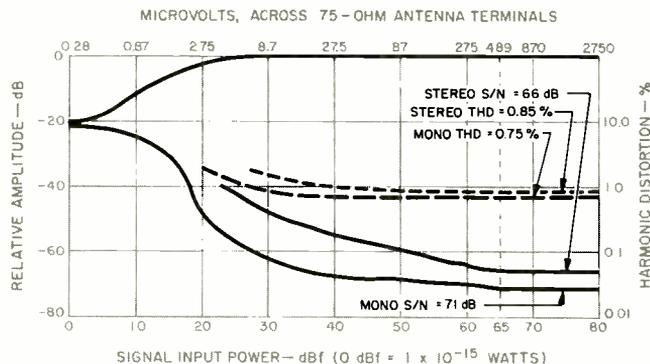


Fig. 1—Mono and stereo quieting and distortion characteristics, FM section.

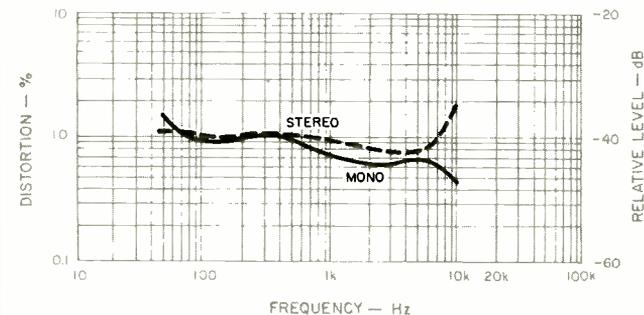


Fig. 2—THD vs. modulating frequency, FM tuner section.

Poor high-end tape response is likely due to azimuth misalignment, not to an inability to reproduce frequencies to the 14 kHz claimed.

the AM section may account for the fact that Audiovox provides absolutely no specifications concerning this portion of the receiver.

Action of the bass and treble tone controls was just what I would expect from a well-designed Baxandall tone-control circuit. Maximum boost and cut range is plotted in the 'scope photo of Fig. 6.

#### Amplifier and Tape Measurements

The power-amplifier section of the Hi-Comp HCC-1250 delivered 13.7 watts per channel before clipping, at 1 kHz, measured with 4-ohm loads. At 50 Hz, maximum power output before clipping was 12.2 watts; at 20 kHz, it was 12.5 watts. Damping factor measured 55.

Using a calibrated frequency test tape that required 120- $\mu$ S equalization, I measured the playback frequency response of the cassette-deck portion of the receiver. The rather poor results are plotted in Fig. 7. Response was down 3.2 dB at 9.4 kHz and was down nearly 3 dB at 78 Hz. Later tests of azimuth alignment (see Fig. 9) suggested that this poor high-end response was more a function of misalignment of the playback head's azimuth relative to my test tape than of any inability of the system to reproduce frequencies up to the manufacturer's claimed 14 kHz. Signal-to-noise ratio without Dolby, using normal-bias (120- $\mu$ S EQ) tape, measured 55.5 dB, increasing to 62.0 dB when Dolby circuitry was activated.

Figure 8 is a graphic analysis of wow and flutter characteristics of the tape-transport section of the deck. Overall wow and flutter, measured without a weighting curve, was 0.2% but decreased to just below the specified 0.1% when weighting was applied and the wtd. rms reading was taken. I deliberately plotted the wow and flutter results without weighting to illustrate some of the high-frequency components which seem to dominate in this case. In other words, there was considerably more audible flutter present than there was wow.

#### Technical Summary

My own reaction to the performance of this car stereo unit, from a technical point of view, can be summed up in a few words. I liked the external features and front-panel layout of this unit, but I wish that the more fundamental performance levels of the tuner and tape sections had been as good as the operating features and convenient panel layout had implied they might be. As for how the receiver performs in an automobile environment, I leave that up to Technical Editor Ivan Berger, who conducted practical road tests in his own car. In the last analysis, his reaction may count for more than all of the measurements I made on the test bench, but I would hope that he will agree with me that FM and tape performance could have been somewhat better, considering the price—and the promise—of this attractive-looking unit.

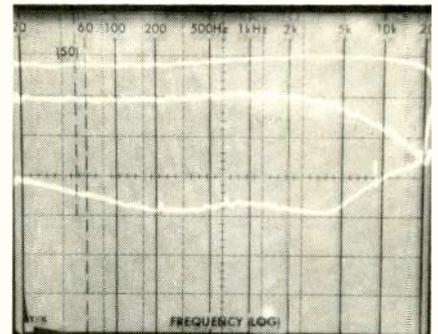
*Leonard Feldman*

#### Behind the Wheel

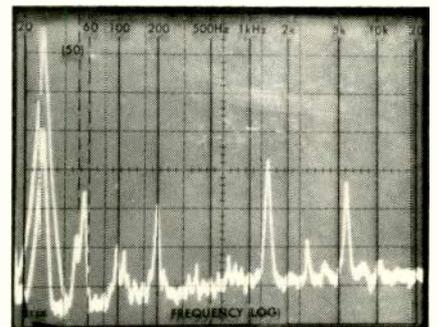
As Len says, the proof of the stereo is on the road. And the HCC-1250 did rather better there than the measurements would lead one to expect.

On FM in a variety of city, country and suburban spots, it

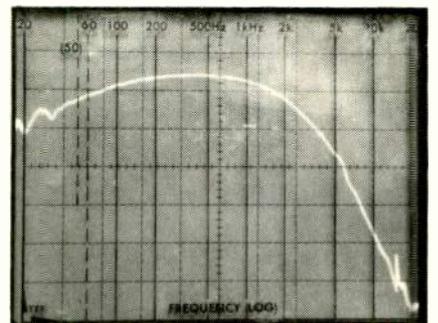
**Fig. 3—** FM frequency response (upper curve) and separation at weak signal levels (center curve) and strong signal levels (lower curve).



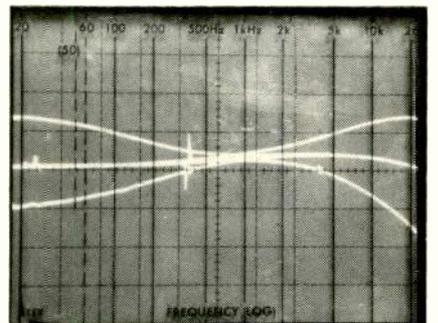
**Fig. 4—** FM stereo crosstalk, subcarrier, and distortion components for a 5-kHz test signal.



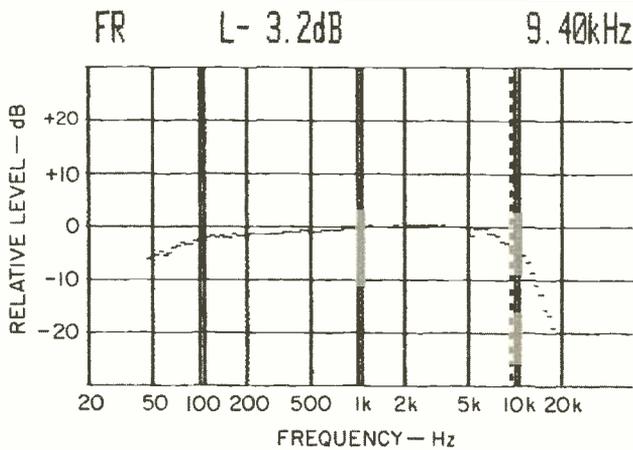
**Fig. 5—** AM frequency response.



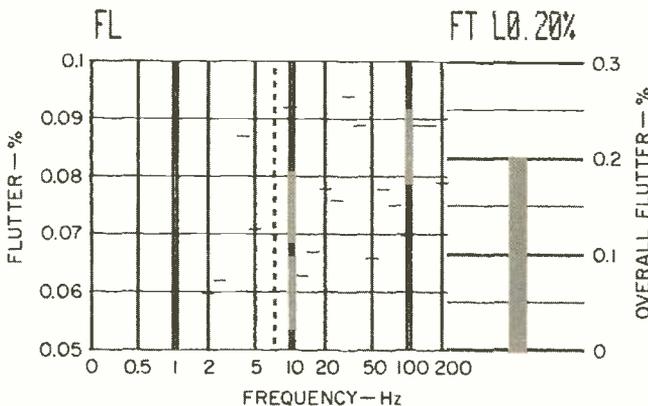
**Fig. 6—** Tone control characteristics.



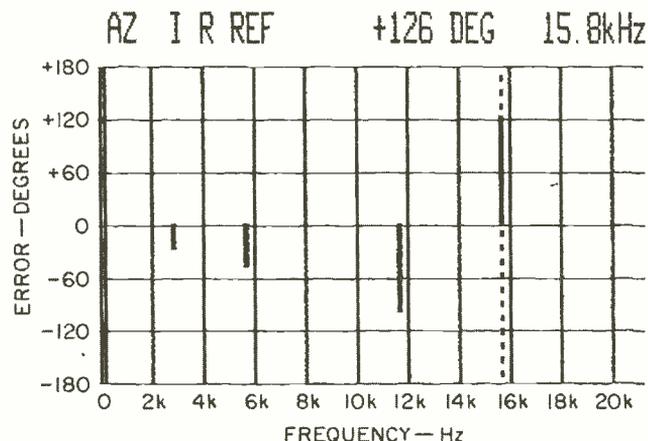
On the road, the HCC-1250 is a pretty good performer, and it strikes us as a good buy for the money.



**Fig. 7—Tape-playback frequency response; cursor on -3 dB point at high end (9.4 kHz, -3.2 dB); roll-off for bass is -2.9 dB at 78 Hz.**



**Fig. 8—Analysis of wow and flutter.**



**Fig. 9—Azimuth error.**

brought in just about as many stations as my reference Alpine, and just about as clearly. The sound seemed a bit sharper than my reference (an improvement on some, but not all, stations), but the treble tone control may have been boosted a bit—its detent is impossible to find.

However, AM radio sounded much duller on the HCC-1250, a function of its absurdly limited frequency response. Its treble cut did reduce static on many stations, however, and if it had been an extra feature that I could switch on and off, I might even have liked it.

In the New York City area, six preset buttons are definitely better than my reference system's five, and I liked having the memory-set button out of the way, where it wouldn't be touched accidentally. The "FM/AM" button was a hair smaller than I'd have liked, but therefore not so prominent that it's easy to press inadvertently.

I had mixed feelings about the liquid-crystal display. At night, or as long as the dash was shaded, it was not as easy to read as the higher contrast, self-illuminated numbers of an LED or plasma display. But when strong daylight hit the dash, the LCD grew easier to read, whereas the other type would have become unreadable. Subsidiary indicators for loudness, local/distance, muting, etc. were small and hard to read while driving; if they matter to you, you'll soon learn to read them by their location.

Tape performance was okay. The azimuth problem Len measured did cut high-frequency response, but the resulting sound was not very different from my reference system's, a sign that the latter probably now needs realignment, too. There was a bit more wow and flutter than on my reference system, especially on bumpy roads, but you had to listen for it in order to notice. The mechanical eject button required a fairly firm push. Stacking the light-touch, fast-forward and rewind buttons vertically instead of laying them out horizontally was a good idea, since they are referenced to the current direction of play rather than to the absolute direction of tape travel; pressing "FF," for instance, moves the tape toward the next selection on the side that's playing, whether it winds to the right or left to get there.

Loudness compensation is a useful and pleasant feature whose effectiveness depends on the power and sensitivity of your amplifiers and the sensitivity and placement of your speakers. In my system, these were just about right for the amount of compensation provided by the HCC-1250's "Loud" switch. Subtle indicators molded into the knobs let me judge volume settings by eye. And while the detent on the treble control was impossible to find, that on the bass control was fairly easy.

The HCC-1250 has both preamp- and amp-level outputs. My current reference system does not provide direct access to the main speakers, so I bypassed the amp and made my tests through the preamp-level outputs. Oddly, neither the instructions nor the otherwise comprehensive installation manual mentioned this possibility.

To summarize, I found the HCC-1250 a pretty good performer which held its own surprisingly well against my more expensive reference system. For the money (and it is widely discounted below list), it strikes me as a good buy. To do appreciably better, you'd have to spend appreciably more; not everyone can—or wants to.

*Ivan Berger*

# Sherwood car stereo: Quality, innovation, and money left over for the good times.

At Sherwood, we think you shouldn't sacrifice your lifestyle for your car stereo. So we make great car stereos that don't cost like great car stereos.

Built into every one is the quality and innovative design that has been Sherwood's benchmark for more than 30 years. The result is performance that sets standards for the more expensive brands.

## New CRD-180.

Take, for example, our new CRD-180. It not only performs with the finest car stereos, it has features you usually find only on far more expensive units. It has auto reverse, Dolby,\* metal tape capability, pre-amp output with fader, separate bass and treble controls, locking fast forward and rewind, and terrific night illumination.

**Great FM, and AM stereo.** And the CRD-180 not only has electronic synthesizer tuning with MOS-FET front end for super FM, it also has **AM stereo**, opening a whole new world of exciting

long-range on-the-road listening. (Sherwood was the first to introduce AM stereo in separately available car receivers.)

**Computerized features.** Advanced digital tuning lets you enjoy two scan-

because this display lets you know what's happening, including time of day, since it even has a **digital clock**.

**Fits your budget.** All of this innovation and performance comes in a mini chassis, so this great car stereo will fit just about any car. And just about any budget.

How much you pay for a great car stereo may not be the only thing on your mind, but it's not the only place you have to put your money, either. So have a little money left for the good times,

but get all the car stereo you want. Buy Sherwood.



## Sherwood®

**Quality and Innovation You Can Afford**

13845 Artesia Boulevard, Cerritos, California 90701.

In Canada, The Pringle Group, Don Mills, Ontario.

\*Dolby is a trademark of Dolby Laboratories.



ning modes: Scanning all stations, or just the ones in memory. This unique preset scan feature works with the ability of the CRD-180 to remember up to 12 of your favorite stations.

**LCD display and digital clock.** The latest in convenience, a multifunction liquid crystal display (LCD) indicates frequency, preset channel, local/distant, stereo, AM/FM, Dolby, tape direction and more. The CRD-180 is easy to use

© 1985, Inkel Corporation.

Enter No. 60 on Reader Service Card



3

## PIONEER FEX-95 CAR STEREO

### Manufacturer's Specifications

#### FM Tuner Section

**Usable Sensitivity:** Mono, 12 dBf.  
**50-dB Quieting Sensitivity:** Mono, 17 dBf.

**S/N Ratio:** Mono, 70 dB.

**THD:** Stereo, 0.5% at 1 kHz.

**Alternate-Channel Selectivity:** 70 dB.

**Frequency Response:** 30 Hz to 15 kHz,  $\pm 3$  dB.

**Stereo Separation:** 40 dB at 1 kHz.

#### AM Tuner Section

**Usable Sensitivity:** 18  $\mu$ V.

**Selectivity:** 70 dB.

#### Cassette Player

**Frequency Response:** Normal tape, 30 Hz to 16 kHz,  $\pm 3$  dB; metal tape, 30 Hz to 20 kHz,  $\pm 3$  dB.

**S/N Ratio:** 55 dB; 63 dB with Dolby B NR and 70 dB with Dolby C NR.

**Wow and Flutter:** 0.07% wtd. rms.

**Stereo Separation:** 45 dB.

**Fast-Forward and Rewind Time:** 100 S with C-60 cassette.

#### General Specifications

**Treble Control Range:**  $\pm 10$  dB at 10 kHz.

**Bass Control Range:**  $\pm 10$  dB at 100 Hz.

**Maximum Output Level:** 200 mV.

**Output Impedance:** 1 kilohm.

**Dimensions:** Tuner unit, 5 $\frac{3}{8}$  in. (15 cm) W  $\times$  1 in. (2.5 cm) H  $\times$  5 $\frac{7}{8}$  in. (15 cm) D; controller unit, 7 $\frac{1}{8}$  in. (18 cm) W  $\times$  2 in. (5 cm) H  $\times$  6 $\frac{1}{2}$  in. (16.5 cm) D.

**Weight:** Tuner unit, 1.3 lbs. (0.6 kg); controller unit, 5.2 lbs. (2.3 kg).

**Price:** \$699.95.

**Company Address:** P.O. Box 1720, Long Beach, Cal. 90801.

For literature, circle No. 92



The Pioneer FEX-95 car stereo tuner cassette player is, without a doubt, one of the very most sophisticated car-stereo control centers I have ever tested. That having been said, it is *not* the best that I have measured or tested in terms of FM-tuner sensitivity, low distortion, or signal-to-noise capability. This is not to say that the tuner is inferior to the competition, but simply that its absolute FM performance is not as good as the first "Supertuners" from Pioneer which I measured a few years ago. However, in terms of user features and ease of operation, I know of no other car tuner/tape player that can come close to this one.

The FEX-95, part of the Centrate series of autosound components from Pioneer, consists of two chassis: The tuner-circuit section, contained in a small chassis that has no operating controls and can therefore be installed out-of-sight, and the controller section, which houses the cassette player, the audio circuitry and all of the front-panel controls and pushbuttons.

The tape transport can find the start of the current or next selection (music search), go back or forward through up to five selections (skip search) or play the first 5 S of every selection (music scan). The current selection can be repeat-

ed up to five times, and the blank-skip feature fast-forwards automatically past any silent or blank sections lasting more than 12 S. The FEX-95 senses whether a tape requires 120- or 70- $\mu$ S equalization and sets itself accordingly.

Nudge a cassette partway into the tape slot, and power-drive automatically sets the cassette in place; ejection is also motor-driven. Tape play is automatically stopped if there is any problem with tape running, power-supply voltage, or excessive heat (whether from weather, the FEX-95 itself, or peripheral equipment). Both Dolby B and C NR are provided.

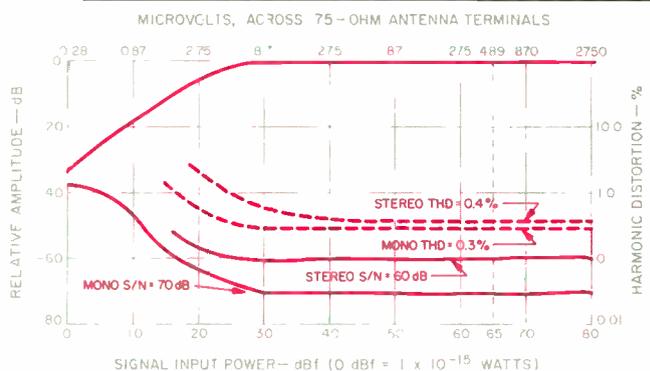
As for the tuner section, it uses a phase-locked loop (PLL) synthesizer circuit and all-electronic tuning. In AM listening, i.f. bandwidth is automatically switched to wide or narrow modes depending upon reception conditions. There are memory presets for up to 18 different stations (six AM and 12 FM). There's even a timer function which can be preset so that your favorite program comes on automatically at a predetermined time if you forget to turn on the radio while you are driving.

When switching between tuner and cassette, the illuminated legends for the main controls change to show their new functions. In both modes, an electronic beep confirms all pushbutton operations as they're entered.

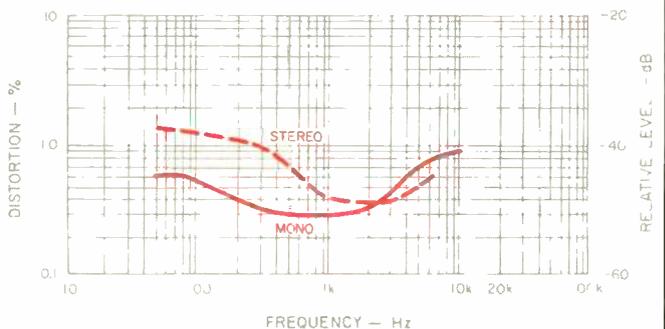
Six numbered "Commander" buttons at the upper left of the control panel set the number of recorded selections to be skipped or the number of times a selection is to be repeated. Below these are two volume-adjustment pushbuttons, marked "+" and "-", and an audio attenuator button which switches a 20-dB mute alternately on and off. Across the lower midsection of the front panel are a program-selection button (side A or B of the cassette), a fast-forward/fast-rewind rocker switch which doubles as a time-setting switch (hours and minutes), a music-scan rocker, and a music-repeat switch. Controls at the right end of the front panel include a tape-power switch, a tuner-power switch, a clock-display button and a button whose first push flips the center panel down to expose the tape slot and more controls, and whose second push ejects the tape. The controls hidden behind the panel include the "Balance," "Bass" and "Treble" controls, plus buttons to activate Dolby B or C NR and the blank-skip function.

The display area of the FEX-95, which occupies the upper midsection of the panel, provides different information depending on whether the tape player or tuner is being used. In the tape-play mode, it displays such useful information as the number of times you've set it to skip or repeat selections; operation of the search, skip, scan, and repeat features; tape play; fast-forward; fast-rewind; time; volume level; 70- $\mu$ S EQ selection, and Dolby B or C NR selection.

Most of the FEX-95's controls change function when you shift from tape to tuner mode. The numbered buttons which controlled the tape repeat and scan functions become station-preset buttons. The button that reversed tape direction now selects FM or AM. The tape-repeat button now enters station frequencies into the preset memories. The music-scan and fast-wind rockers become, respectively, controls for station scanning (pausing 5 S at each station) and tuning (up or down). Of the four buttons on the back of the flip-down panel, one changes from activating the tape blank-



**Fig. 1—Mono and stereo quieting and distortion characteristics, FM section.**



**Fig. 2—THD vs. modulating frequency, FM section.**

skip feature to activating automatic bandwidth selection in AM reception (when it's off, only narrow bandwidth is used); another becomes the local/distant switch.

In the tuner mode, the display shows selection of such functions as preset tuning, automatic wide/narrow AM-bandwidth switching, scanning, the program timer, and the tuner's "Local" mode. It also shows the volume setting and the currently selected band: "FM<sub>1</sub>," "FM<sub>2</sub>" (differing only in which set of memory presets they access) and "AM," all selected by successive presses on the band-switch button. Frequency is displayed too, of course.

Reviewing all of these control functions and the many

# EIN STRAUSSFEST

TELARC  
DIGITAL

BLUE DANUBE WALTZ · CHAMPAGNE POLKA  
TALES FROM THE VIENNA WOODS  
AND OTHER FAVORITES

CINCINNATI POPS ORCHESTRA  
ERICH KUNZEL



Th. J. S. 1858. Die Kapelle Johann Strauss beim Hofballe.

DC-10098

CD-80098

COMPACT  
disc  
DIGITAL AUDIO

TELARC  
DIGITAL

I marvel at the ingenuity of the FEX-95's designers in managing to cram so many controls and displays onto a front panel so small.

display indications, I could not help but marvel at the ingenuity of the FEX-95's designers in managing to cram all of this control capability onto a front panel which contains barely 6 square inches of usable area.

### Tuner Measurements

Mono usable sensitivity of the FM tuner section of the FEX-95 equalled or exceeded published specifications, measuring 12 dBf in mono and 20 dBf in stereo. For 50-dB quieting in mono, a signal input of only 16 dBf (as opposed to 17 dBf claimed) was required; 50-dB quieting in stereo was attained with an input level of 20 dBf. I measured a THD of 0.3% in mono for a 1-kHz modulating signal and 0.4% in stereo for the same test signal. Signal-to-noise ratio for a 65-dBf mono signal measured 70 dB, while for stereo, the best S/N measured only 60 dB. In all fairness, it must be said that the rather low strong-signal S/N reading in stereo was caused not so much by random noise as by the presence of a high level of residual, 19- and 38-kHz subcarrier products in the output. Even with the required 15-kHz, low-pass filter in place during the measurements, the contribution of these inaudible components was still considerable. Pioneer's engineers didn't deem it necessary to suppress these components since the FEX-95's tape deck is a play-back-only device, and there is no danger of these subcarrier components affecting either recordings or listening quality. Quieting and distortion as a function of signal strength are plotted in Fig. 1, and Fig. 2 shows how total harmonic distortion varies with modulating frequencies for mono and stereo signals.

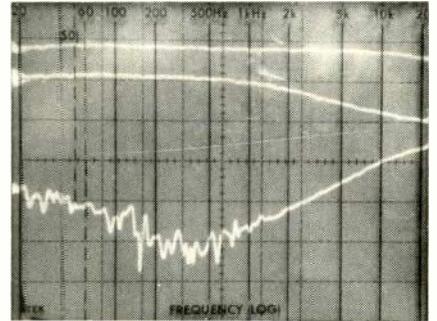
Frequency response was down only 1.0 dB at 50 Hz and 1.0 dB at 15 kHz. The upper trace of Fig. 3 shows response versus frequency for a left-only modulating signal appearing at the left output. The middle trace shows separation (output of the unmodulated channel) at relatively weak signal levels, where a built-in blend reduces separation to reduce out-of-phase noise. The bottom trace shows separation at strong signal levels, where maximum separation is maintained. I measured stereo separations of exactly 40 dB at 1 kHz, 32 dB at 100 Hz, and 25 dB at 10 kHz under the strong-signal conditions.

Figure 4 shows the crosstalk products appearing in the unmodulated channel's output when a 5-kHz, 100%-modulated signal is applied to the opposite channel. Spikes to the right of the desired 5-kHz indications represent harmonic-distortion components as well as the residual, 19- and 38-kHz subcarrier components which, as the 'scope photo shows, are substantially greater in amplitude than on most car stereo tuners I have measured recently.

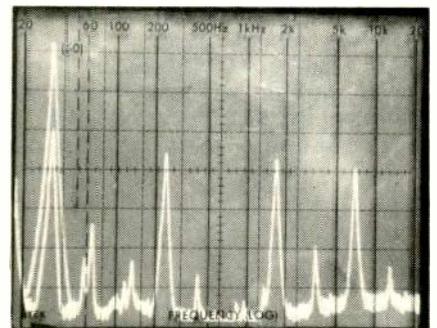
Capture ratio for the FM tuner section was 2.0 dB, image rejection measured 85 dB, selectivity was 75 dB, and i.f. rejection measured 85 dB.

AM performance was excellent, as is evident from the frequency-response curve of the AM tuner section reproduced in Fig. 5. Response in the wide i.f. mode extended all the way out to 10 kHz, and, as is evident from the 'scope photo, a 10-kHz "whistle" filter is incorporated in the AM circuitry. There also seems to be an additional notch at around 17 or 18 kHz which I cannot account for. It may, in fact, simply have been a quirk of the test equipment (which

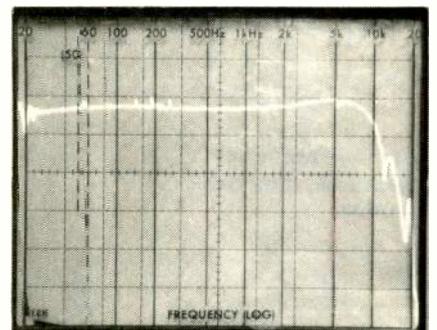
**Fig. 3—** FM frequency response (top trace) and separation for weak (middle) and strong (bottom) signals.



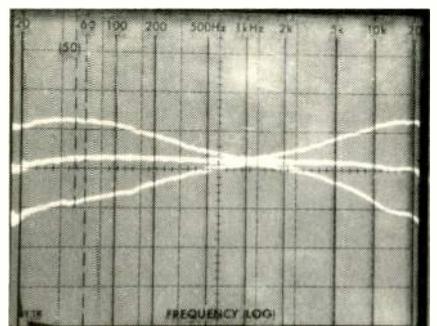
**Fig. 4—** FM stereo crosstalk and distortion components for a 5-kHz signal applied to the opposite channel.



**Fig. 5—** AM frequency response.



**Fig. 6—** Tone control characteristics.



I was more impressed by the tape deck and the AM tuner than by the FM tuner. Maybe I've been spoiled by earlier Pioneer car units.

is unaccustomed to finding *any* audio output from AM tuner sections at such high frequencies). Action of the bass and treble tone controls is plotted in Fig. 6.

#### Tape Deck Measurements

I measured the playback frequency response of the cassette deck portion of the FEX-95 using a calibrated-frequency test tape that required 120- $\mu$ S equalization (see Fig. 7). Response was down 3.0 dB at 13 kHz and 27 Hz. Later tests of azimuth alignment (Fig. 8) suggested that this drop in treble response below Pioneer's 16-kHz specification was due to head misalignment, rather than to any intrinsic inability to reproduce frequencies up to 16 kHz.

Buyers of car stereo components in the Centrate Series would probably use Type II or Type IV tapes, with 70- $\mu$ S equalization when making recordings for use in the car. But since there are no standard playback test tapes of these types, I had to use normal-bias, Type I, 120- $\mu$ S tapes. For Type I, S/N ratio without Dolby NR, measured 53.5 dB, increasing to 62.0 dB when Dolby B NR was activated. Figures 9A and 9B show noise distribution on a third-octave

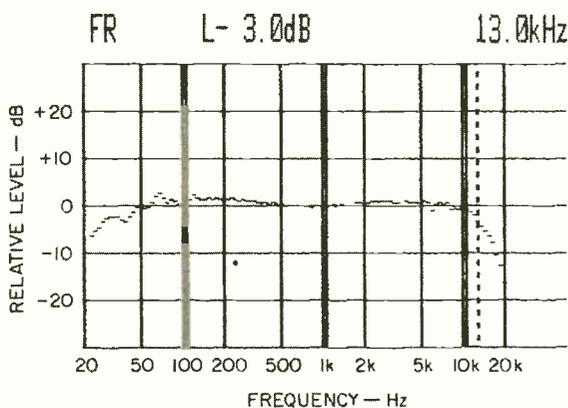


Fig. 7—Frequency response, tape deck section.

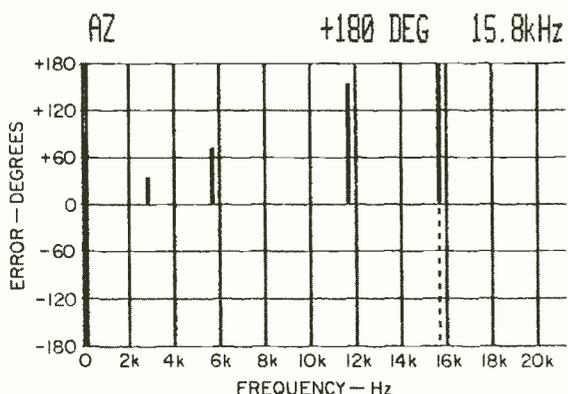


Fig. 8—Azimuth error of playback head.

basis: In Fig. 9A, S/N without Dolby NR (upper curve and results called out as "L") are compared with S/N obtained when Dolby B NR was used (lower curve and results called out as "R"). Figure 9B is similar in layout to Fig. 9A except that here the comparison is between performance with no noise reduction and with Dolby C NR; the deck achieved S/N of 68.4 dB with the latter on my tape sample.

Figure 10 is a graphic analysis of tape-transport wow and flutter, which measured a very low 0.064% overall. Speed error for the FEX-95's tape transport measured 0.78%. This relatively slight error was fairly constant over several minutes of tape-speed checking.

#### Use and Listening Tests

As in the case of other tests of car stereo equipment that I have conducted recently, I will confine my summary and reactions to the bench-test results and listening tests. Technical Editor Ivan Berger road-tested the unit and has more to say (below) about how it performs in a moving vehicle.

As for myself, I was more impressed by the performance and features of the tape deck, and the performance of the AM tuner, than I was by the FM tuner's performance. The three-motor drive system of the tape deck yielded impressively low wow and flutter for a car stereo deck, and the presence not only of Dolby B but of Dolby C NR (not too common in car players yet) was most welcome. The automated features (music search, skip, and all the rest) also worked as they were supposed to.

Perhaps I was a bit spoiled by the FM performance of earlier Pioneer car stereo tuners, which behaved very much like the best home FM tuners I have ever measured. The FM tuner section in the FEX-95 is a good one—it's just not quite as good as I would have hoped for in a third-generation series. I wish, too, that I hadn't had to test the FEX-95 out of its automotive context. Conceivably, its characteristics are more impressive on the road than on the bench, and I might have gained a better opinion of it from behind the wheel. But I leave that part of the fun to Ivan.

The FEX-95 is part of a system of Centrate components that includes equalizers, amplifiers, a subwoofer, and even an infrared remote control (for back-seat drivers, I suppose). You can spend between \$1,300 and \$1,900, depending upon which components are selected in addition to the FEX-95, which is the main (and costliest) component of the system. Had I been surrounded by most or all of its related components, I might not have noticed that the FEX-95's FM tuner section seems to be a bit behind the times in sensitivity, quieting, and distortion compared to earlier tuners from the same manufacturer. All of which suggests that once you come up with a winner such as Pioneer's first Supertuners, it's a hard act to follow. Still, I have no doubt that car stereo aficionados will love the FEX-95 for its overall performance and features.

Leonard Feldman

#### Behind the Wheel

The FEX-95 will have you listening to AM again. It may not have AM stereo, but its sensitivity, bandwidth (especially in the wide-band mode) and freedom from interference make AM listening a pleasure, as it was with the classic, AM-only car radios of the '50s.

# Your Eyes Have Ears

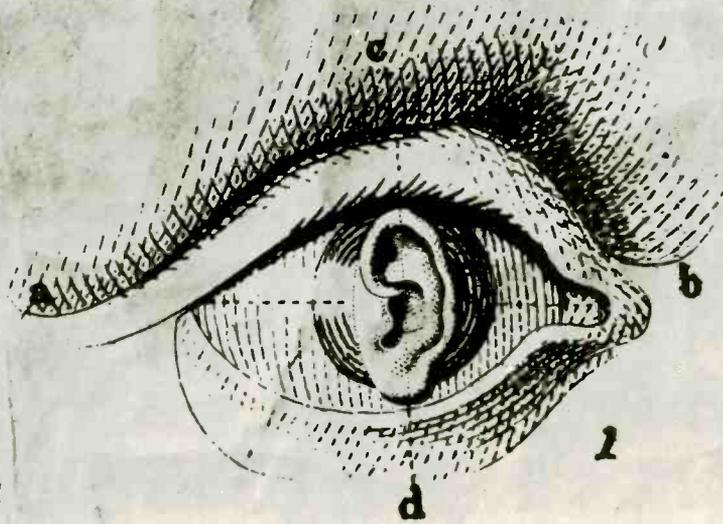


Figure 1

If Philo Farnsworth\* only knew. Most people think that audio and video are like oil and water. They don't mix. We would like to change all that.

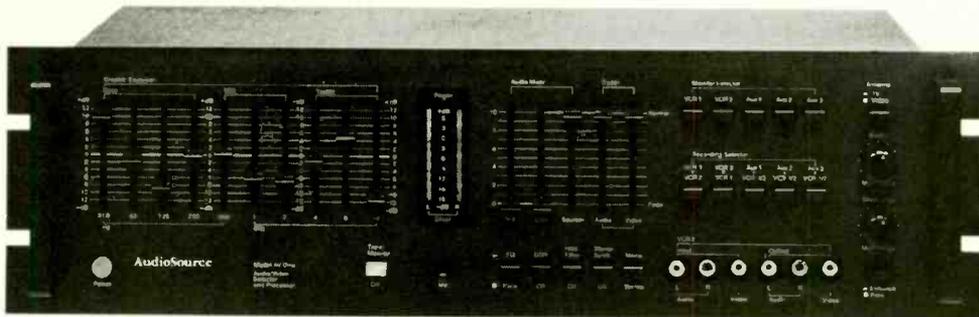
AudioSource introduces the AV-One. The most sophisticated audio/video selector and processor ever made. Operating the AV-One is simple. What it does to your entire audio and video system is nothing short of incredible.

**The Production Assistant.** Connect up to five video sources to the AV-One. It's flexible. Dub between any of them. And during dubbing, recording or playback, you have total creative control. Add detail, sharpen images, increase depth, fade in and out . . . even dub in a new audio track.

**Mixing Your Media.** All of your audio can be mixed through the AV-One too. Including your hi-fi. Reduce noise and hiss, synthesize mono to stereo, fade in and out, and equalize every word or note with a ten-band graphic equalizer.

The AV-One represents a new concept in home entertainment by integrating audio and video into one unified component. Audition it at the dealer nearest you and experience the thrill of giving your eyes a new treat . . . ears.

\*Inventor of the television



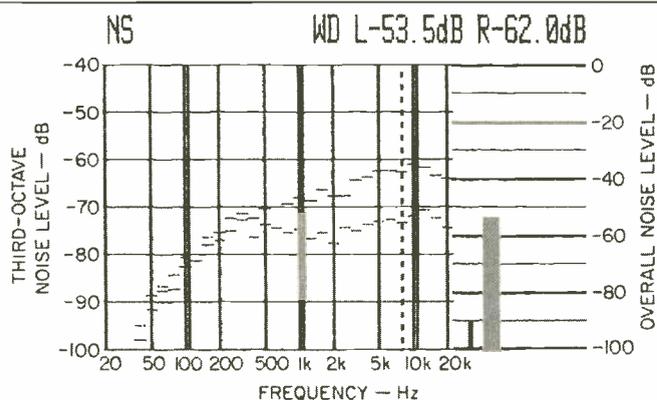
## AudioSource®

1185 Chess Drive, Foster City,  
CA 94404 415 574-7585

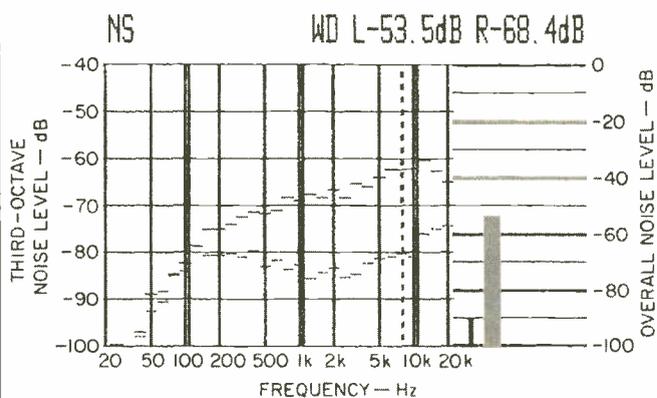
©1984 AudioSource, Inc.

Enter No. 7 on Reader Service Card

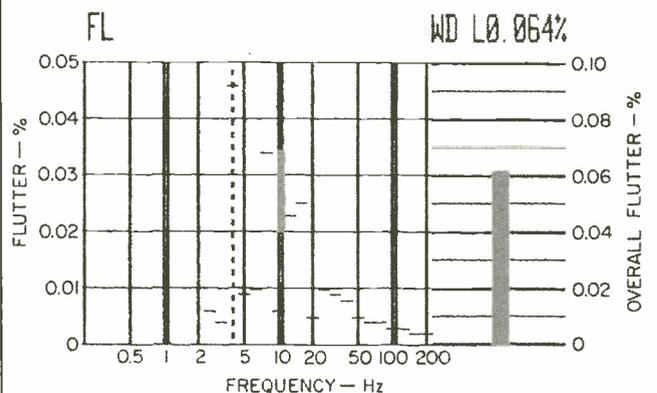
The FEX-95 will change your listening habits: You'll find yourself listening to AM radio once again.



**Fig. 9A—Tape signal-to-noise analysis without noise reduction (top curve) and with Dolby B NR (lower curve).**



**Fig. 9B—Tape signal-to-noise analysis without noise reduction (top curve) and with Dolby C NR (lower curve).**



**Fig. 10—Wow-and-flutter analysis.**

AM performance was significantly better than that of my reference: The FEX-95 picked up 10 stations as clearly as my reference and 11 stations more clearly. And that probably understates its performance, since the Pioneer was able to use its wide-band mode for nine of the 10 "equally good" stations. New York's high-fidelity WQXR-AM really sounded like hi-fi, and I even picked up WTOP-AM from Washington, D.C.—pretty good for a listener in Manhattan! In "distant" mode, the FEX-95's AM scan circuits stopped at 13 stations, all but two of them good signals. (For comparison, my reference tends to stop at every AM frequency in "distant" mode, and at only one or two in "local.")

In casual listening, I noticed no superiority on FM, but a careful tabulation told a different story. Of 49 receivable stations, the FEX-95 received 18 signals better than my reference set, 19 signals equally well, and only 12 not as well. Relative performance seemed to depend on station frequency; the FEX-95 did better above 95 MHz, while the reference set did better below this point. Sound quality in FM was about equal for both sets. The Pioneer's auto-scan pulled in 45 of the 49 stations I found manually; that included all the good signals but one, and only six that I really found unlistenable.

With tape, the Pioneer and my reference sounded pretty similar, too, with the Pioneer having a slight edge in clarity. There was, however, more of a jump in level when switching from tape to FM on the Pioneer than on my reference. Driving down a stone-paved New York City street caused no audible flutter.

Even the digital clock worked well, keeping slightly better time than my watch. The clock is more than a mere frill here: A built-in timer can be set to turn the system on to preselected stations up to twice a day, even if the radio is turned off or is set to another mode or station. (Don't worry about the program timer running your car battery down; it won't turn anything on if the ignition is off.)

The control setup is unusual, but seems to have been thought-out with the driver's needs in mind. For example, controls I set once and forget (balance, bass, and treble) are behind the flip-down dial; those who do use their tone controls more frequently will find them still accessible, but less so than when they're in the open.

The back of the flip-down dial holds four other controls which won't be used too often. In tape mode, two of these buttons turn the Dolby B and C NR on and off (presumably, they're located here so you'll remember to reset them when you switch to tapes requiring different NR settings). A third button, for blank skip, activates fast-forward automatically when more than 12 S of blank tape go by. In radio, the latter button switches AM stereo reception between narrow-band and automatic wide/narrow-band selection, while the fourth button selects local or distant tuning modes.

Hiding these controls makes for some minor awkwardness but allows the main controls, out front, to be larger and easier to use. The buttons on the satin-chrome panels flanking the flip-down display have backlit identification symbols that are easy to read at night. The buttons on the display panel have two sets of legends, one that glows just above the buttons when in tape mode and another that glows just below them when the tuner is on.

The control setup is unusual, but seems to have been designed with the driver's needs in mind. For example, rarely used controls are hidden away.

Four control functions especially pleased me. One was the attenuator, which drops the volume by 10 dB when you press it—a very handy feature when you have to ask directions, hear what a passenger is saying, or just concentrate on momentary traffic hazards. Another pleasing function was the automatic 70/120- $\mu$ S tape equalization selector. (Who really needs to have a manual one in this day and age, especially while driving?)

The other two features I appreciated were the separate tuner and tape-mode switches, and the logic behind them. When you press the tuner button, the tuner goes on; if a tape was playing when you did so, it stays in standby position, but the capstan and pinch roller are released. Press the tuner button again, and the FEX-95 returns to its prior status, either shutting off or resuming tape play where it left off. Pressing the tape button turns the tape on (if one is loaded) and the tuner off (if it was playing), while a second press restores the prior status. This gives you the option of hearing or not hearing radio when you stop or fast-wind the tape. When you turn the tape transport off, or when the car's ignition is shut off, the pinch roller, capstan and heads retract but the tape does not eject, so tape play can resume as soon as you turn the transport on again.

The display was extremely clear by day and night; it was difficult only to read the AM symbol, which is "FM" with a hard-to-spot line running down the right side of the tiny "F," but without the superscript "1" or the subscript "2" of the FM bands. On the whole, it's easier to tell FM from AM by reading the station frequencies (and, happily, harder to tell the two apart by ear than on most other units).

Len has already described many of the display features of the FEX-95; however, there are a few others worth mentioning. In tape mode, the display is mainly taken up by two symbolic tape hubs indicating which way the tape is moving and how fast; they even show when the automatic tape-slack canceller is working (each time you load a new tape). Arrow symbols also indicate the current tape-play direction; they are stacked and of slightly different colors to make them easier to tell apart. Other symbols show which NR system is at work, whether the FEX-95 has selected 70- $\mu$ S EQ or not, and when the music-search, blank-skip and scan functions are working.

My only complaint concerns installing this (or any) component of Pioneer's Centrate Series. Pioneer has gone to extraordinary lengths to discourage the mixing of Centrate and non-Centrate units. It's not just the usual ploy of using connector pin-outs used by no one else; the Centrate receivers just won't operate with "foreign" components (unless you get advice from Pioneer on how to adapt them), since all dial and button illumination power has to go from the receiver to the amp and back again!

You might want to buy other Centrate components in any case. There are two amplifiers, two seven-band equalizers (one of which adjusts volume automatically according to ambient noise), and a CD player (which takes priority when played through the FEX-95's AUX input). But I prefer having a free choice.

Once installed, though (with other Centrate components or without them), the FEX-95 is a good performer—and, on AM, the greatest one I've found yet. *Ivan Berger*

Revox B225

For those who waited.  
And those who wish they had.



All Compact Disc players are *not* created equal. This much, at least, has emerged from all the hype and hoopla.

Some CD players are built better than others. Some have more sophisticated programming features. Some are easier to use. And, yes, some *do* sound significantly better than others.

The new B225, from Revox of Switzerland, excels on all counts. For those who have postponed their purchase, patience has been rewarded. For those who didn't wait, the B225 is the logical upgrading route.

First, the B225 is designed for unexcelled CD reproduction. By using oversampling (176.4 kHz) in conjunction with digital filtering, the B225 guarantees optimum sound resolution and true phase response.

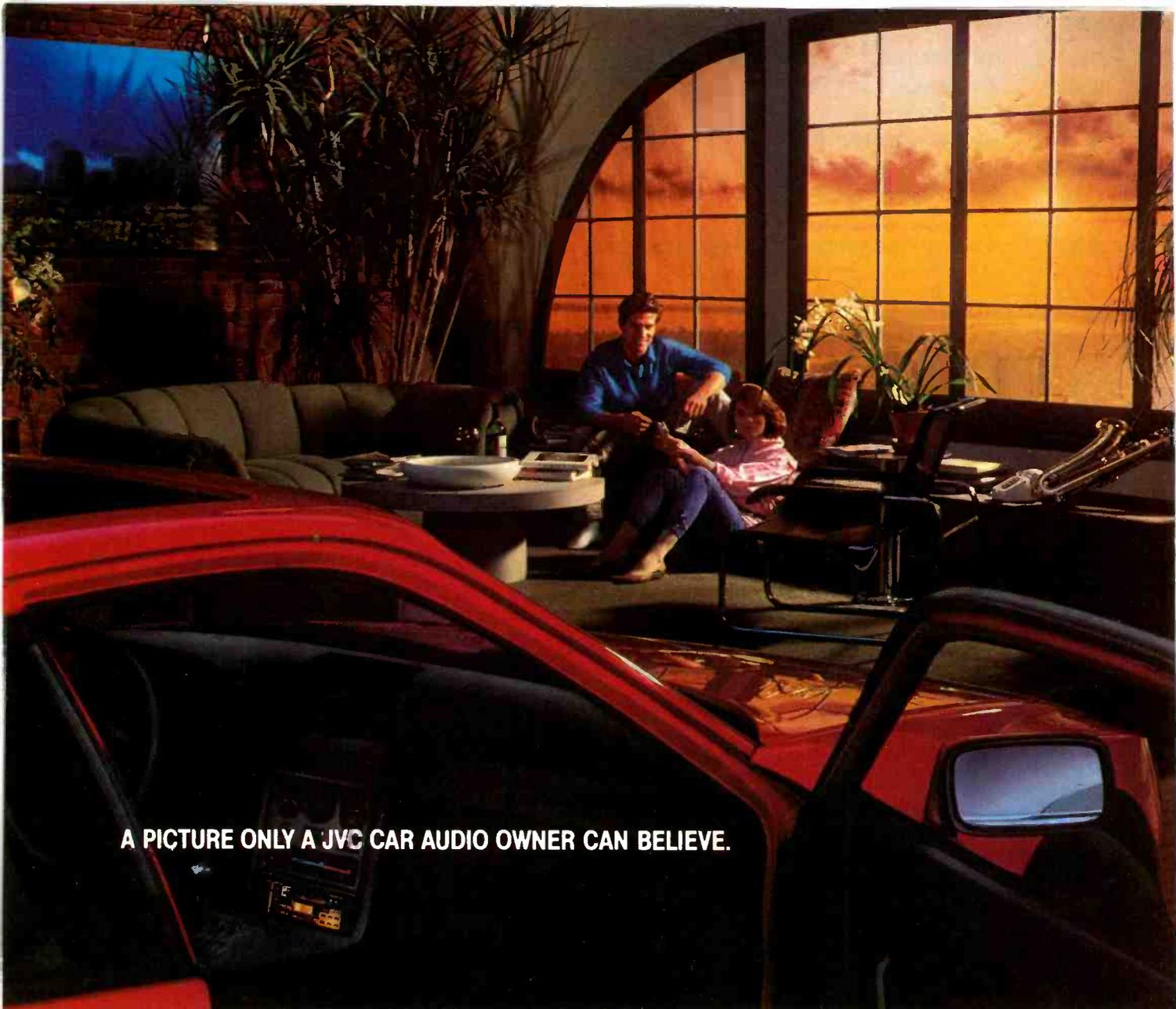
For your convenience, the B225 offers programming of nearly every conceivable combination of start, stop, pause, and loop functions, in any sequence, and using mixed combinations of track numbers and times. Cueing time is always less than 3 seconds, and a single infrared remote transmitter (optional) operates the B225 as well as all other components in the Revox 200 audio system.

Finally, the B225 is a product of refined Swiss design and meticulous craftsmanship. Behind its faceplate of functional elegance, you'll find the B225 is an audio component built in quiet defiance of planned obsolescence.

Without question, the definitive CD player has now arrived. For those who waited (and those who didn't), now is the time to see an authorized Revox dealer.

STUDER **REVOX**

1425 Elm Hill Pike, Nashville, TN 37210/(615) 254-5651  
Enter No. 61 on Reader Service Card



**A PICTURE ONLY A JVC CAR AUDIO OWNER CAN BELIEVE.**

It may look a little far-fetched. Until you hear it.

Because JVC car audio has truly remarkable sound. And it's a point we'd like to drive home.

JVC has been perfecting home audio technology for more

stereo we make.

What you won't hear is a lot of static. Thanks to JVC's Tuner Noise Control Circuit, interstation noise is eliminated. Our Compu-Tuning automatically moves to the next clean signal, or the one you pre-set, whenever a particular station starts to fade. And locks on electronically with a digital readout.

If 44 watts aren't enough, you can even boost your power output to over 100 watts per channel with optional power amps. There's a full line of

models to choose from. All are alarm ready. And all have JVC quality built right in.

What's more, JVC car audio units fit more late model cars than any other car stereo. Test drive JVC Car Audio at your JVC dealer today.

The sound you hear will make you feel right at home.



KS-RX450

than 25 years. And you can hear that experience in every car

**CAR AUDIO**

**THE GOAL IS PERFECTION.**



# 11th ANNUAL CAR STEREO DIRECTORY

Our Eleventh Annual Car Stereo Directory is, to no one's surprise, the biggest ever. Our selection of specifications and features has not changed very much from last year; the main difference is the first appearance of a question on AM stereo capability. This is, however, the calm before the storm.

Although there are too few car CD players available so far to warrant a section listing them, next year will likely be a different story.

A special vote of thanks to Directory Assistant Frank Lovece, who provided invaluable help in this project.

## RADIOS/TAPE PLAYERS

MANUFACTURER	Model	Price, \$	AMPLIFIER										RADIO				TAPE				
			Average Watts/Channel, per EA RS-409	Power Bandwidth, Hz to kHz, per EA RS-409	THD at Rated Output, % per EA RS-409	Outputs: Preamp (P), Speaker Level (S), Both (Both)	Number of Tones or EQ Controls	FM Sensitivity (dB) (For 30-dB Outgoing)	Alternate Channel Selectivity, dB	FM S/N Ratio, dB	Total Number of Presets	Local/Station Control: Manual (M), Automatic (A)	AM Stereo: Capable? See Code	Noise-Reduction Circuit? See Code	Tape S/N Ratio, dB (With NR if Applicable)	Auto Reverse?	Tape EQ Switch?	In-Dash (I), Under-Dash (U), Convertible (C)	Application Guide Available?	Dimensions, Inches/Notes	
AIWA	CT-X500		8	150-17	0.08	Both	2	20.7	70	12	M		B/C	†	Yes	Yes	I	Yes	6 7/8 x 2 1/8 x 5 7/8; 154 dB without NR.		
	CT-X400		B	150-17	0.08	Both	2	20.7	70	12	M		B	†	Yes	Yes	I	Yes	6 7/8 x 2 1/8 x 5 7/8		
	CT-X300		B	150-17	0.08	Both	2	20.7	70	12	M		B	†	Yes	Yes	I	Yes	6 7/8 x 2 1/8 x 5 7/8		
ALPINE	7263	300.00	8	40-20	0.8	Both	2	16.3	80	60	12	M		B/C	55	Yes	Yes	I	Yes	2 x 7 1/4 x 5 1/4	
	7165	380.00	2.2	70-20	0.8	Both	2	16.3	80	60	12	M		B/C	72	Yes	Yes	I	Yes	2 x 7 x 5 1/2	
	7164	350.00	2.2	70-20	0.8	Both	2	16.3	80	60	12	M		B	64	Yes	Yes	I	Yes	2 x 7 x 5 1/2	
	7162	250.00	2.2	70-20	0.8	Both	2	16.3	80	60	12	M		B	55	Yes	Yes	I	Yes	2 x 7 x 5 1/2	
	7160	180.00	2.2	70-20	0.8	S	1	16.3	80	60	60	M		B	55	Yes	Yes	I	Yes	2 x 7 x 5 1/2	
	7151	200.00	2.2	70-20	0.8	Both	2	16.3	80	60	60	A		B	55	Yes	Yes	I	Yes	2 x 7 x 5 1/2	
	7150	160.00	2.2	70-20	0.8	S	1	16.3	60	60	60	A		B	55	Yes	Yes	I	Yes	2 x 6 1/2 x 4 1/2	
	7146	500.00	2.2	70-20	0.8	Both	2	16.3	80	60	10	M		B	65	Yes	Yes	I	Yes	2 x 7 1/4 x 5 1/2	
	7136	350.00	2.2	70-20	0.8	Both	2	16.3	80	60	10	M		B	65	Yes	Yes	I	Yes	2 x 6 1/4 x 5 1/2	
	7135	300.00	2.2	70-20	0.8	Both	2	16.3	80	60	10	M		B	55	Yes	Yes	I	Yes	2 x 6 1/4 x 5 1/2	
	7171	250.00	2.2	70-20	0.8	Both	2	16.3	80	60	12	M		B	55	Yes	Yes	I	Yes	7 x 2 x 6 1/4	
	7272	370.00	8	40-20	0.8	Both	2	16.3	80	60	12	M		B	64	Yes	Yes	I	Yes	7 x 2 x 6 1/4	
	7273	600.00	8	40-20	0.8	Both	2	16.3	80	60	18	M		B/C	72	Yes	Yes	I	Yes	7 x 2 x 6 1/4	
7374	800.00	8	40-20	0.8	Both	2	16.3	80	60	18	M		A/B/C	86	Yes	Yes	I	Yes	7 x 2 x 6 1/4		
AMERICAN AUDIO	ET-8602AR	249.95	20 x 4	40-18	0.25	Both	2	19	60	55	12	A	M	No	D	50	Yes	Yes	I	Yes	1 3/4 x 7 1/8 x 6 1/8
	ET-8502AR	249.95	25 x 4	40-18	0.3	S	2	19.0	65	55	12	A	No	D	65	Yes	No	I	Yes	1 3/4 x 7 x 6	
	ET-8500AR	269.95	25 x 4	20-20	0.3	S	5	19.0	65	55	12	A	No	D	65	Yes	Yes	I	Yes	1 3/4 x 7 x 6	
	ET-8600AR	229.95	25 x 4	20-20	0.3	S	5	20.0	65	55	0	A	No	No	60	Yes	No	I	Yes	1 3/4 x 7 x 6 1/4	
	ET-8400AR	149.95	6	40-18	0.3	S	1	20.0	65	55	10	A	No	No	60	No	Yes	I	Yes	1 3/4 x 7 x 4 1/4	
	ET-8350AR	159.95	25	40-18	0.3	S	1	20.0	65	55	0	A	No	No	60	Yes	Yes	I	Yes	1 3/4 x 7 x 6	
	ET-8250AR	99.95	25	40-18	0.3	S	1	20.0	60	55	0	M	No	No	60	No	No	I	Yes	1 3/4 x 7 x 4 1/4	
ARA	P-100	189.95	3	60-15	1.5	S	1	16.5	50	60	0	A		No	45	No	No	I	Yes	2 x 7 x 5	
	P-200	209.95	3	60-15	1.0	S	2	16.5	50	60	5	A		No	45	No	No	I	Yes	2 x 7 x 5	
	P-300	229.95	3	60-15	1.0	S	2	16.5	50	60	0	A		B	56	Yes	Yes	I	Yes	2 x 7 x 5	
	P-400	259.95	3	60-15	1.0	S	2	16.5	50	60	5	A		B	56	Yes	Yes	I	Yes	2 x 7 x 5	
	P-500	269.95	3	60-15	1.0	Both	2	16.5	50	60	5	A		B	56	Yes	Yes	I	Yes	2 x 7 x 5	
	PER 600	249.95	3	60-12	2.0	S	1	16.5	60	60	6	M		No	50	Yes	No	I	Yes	2 x 7 x 5	
	PER 700	299.95	12	60-12	2.0	S	2	16.5	60	60	6	M		D	59	Yes	Yes	I	Yes	2 x 7 x 5	
	PER 1000	359.95	3	40-15	1.0	Both	2	16.5	60	60	12	M		B	60	Yes	Yes	I	Yes	2 x 7 x 5	
	PER 1100	499.95	12	60-15	1.0	Both	2	13.5	65	60	12	A		B/D	69	Yes	Yes	I	Yes	2 x 7 x 5	
	PER 3000	499.95	12	60-15	1.0	S	2	13.5	65	60	12	M		B/D	60	Yes	Yes	I	Yes	2 x 7 x 6 1/8	
	AUDIA	DTX1000	499.00			0.4	P	3	12	70	58	10	A		B	E2	No	Yes	I	Yes	7 1/8 x 2 x 4 3/8
TRX100		429.00	11.5	40-20	0.8	Both	3	12	70	58	10	A		B	E2	Yes	Yes	I	Yes	7 1/8 x 2 x 4 3/8	
TRX10		299.00	11.5	40-20	0.8	Both	3	12	70	58	10	A		B	E2	Yes	Yes	I	Yes	7 1/8 x 2 x 4 3/8	
AUDIOVOX/ HI-COMP	HCC-2250	399.95	15	50-20	1	Both	2	11	74	60	12	M		B	61	Yes	Yes	I	Yes	2 x 7 x 5 1/4	
	HCC-2150	369.95	3.5 x 4	100-15	1	Both	2	11	74	60	12	M		D	51	Yes	Yes	I	Yes	2 x 7 x 6 1/4	
	HCC-1250	339.95	13	50-20	1	Both	2	11	74	60	12	M		B	61	Yes	Yes	I	Yes	2 x 6 1/4 x 5 1/8	
	HCC-1150	269.95	13	50-20	1	Both	2	11	74	60	12	M		D	51	Yes	Yes	I	Yes	2 x 6 1/4 x 5 1/8	
	HCC-1050	199.95	3	100-15	1	S	2	12	70	60	12	M		D	57	No	Yes	I	Yes	2 x 6 1/4 x 5 1/8	
AUTOTEK	CSR-5770	400.00	4	20-20	1	Both	2	17.6	90	65	12	M/A	No	B/D		Yes	Yes	†	No	7 x 2 x 5 3/4; 11n-dash, DIN.	
	CSR-5550	360.00	4	20-20	1	Both	2	17.6	90	65	10	M/A	No	B		Yes	Yes	I	No	6 1/4 x 2 x 4 3/4	
	CSR-5670	330.00	4	20-20	1	Both	2	17.6	65	65	12	M/A	No	B/D		Yes	Yes	†	No	7 x 1 3/4 x 5 1/4	
	CSR-5300	300.00	4	20-20	1	Both	2	17.6	65	65	12	M/A	No	B		Yes	Yes	I	No	7 x 1 3/4 x 4 3/4	
	CSR-5200	260.00	4	20-20	1	Both	2	17.6	65	65	12	M/A	No	B		Yes	No	I	No	7 x 1 3/4 x 4 3/4	
	CSR-5100	219.00	4	20-20	1	S	2	17.6	65	65	12	M/A	No	B		No	No	I	No	7 x 1 3/4 x 4 3/4	
	CSR-2100	160.00	4	20-20	1	Both	2	18.4	65	65	0	M	No	B		Yes	No	I	No	7 x 1 3/4 x 5 1/4	
AUTOVOX	Challenger 998	550.00	20	20-20	0.01	P	4	14.7	80	60	12	M/A	No	B	60	No	Yes	C	Yes	6 x 7 x 2	
	Shuttle 1018	580.00	9	20-18	0.01	S	2	14.7	80	60	27	M/A	No	B	60	Yes	No	C	Yes	6 x 7 x 2	
	Shuttle 1028	620.00	20	20-20	0.01	P	4	14.7	80	60	27	M/A	No	B	60	Yes	No	C	Yes	6 x 7 x 2	



# Professional-Amplifier Technology for Your Mobile Sound System



Crown is the world leader in power amplifiers for professional recording studios and sound-reinforcement systems. Our pro-audio technology is now available for car stereophiles in the CMA-1 — Crown Mobile Amplifier.

This high-power amp adapts to a wide range of multichannel automotive sound systems. A switch-selectable format offers the following options:

- 3 channels: 3x100W
- 4 channels: 2x100W plus 2x50W
- 5 channels: 1x100W plus 4x50W

This unusual flexibility allows for 2 channels plus subwoofer, 4 channels, or 4 channels plus subwoofer.

Distortion in the CMA-1 is vanishingly low: 0.05% for the basic 50W rating per channel, 20Hz-20kHz, into a 4-ohm load. Heavy aluminum heat-dissipation fins keep the amp at safe temperatures under the most demanding operating conditions.

The unit's solid reliability is covered by a precedent-setting 2-year limited warranty.

Available only through qualified installers, the Crown CMA-1 can add the quality and impact of a studio monitor amplifier to your mobile audio system.

Authorized dealers:

- Pro-Am Electronics  
4606 Mission Bay Drive  
San Diego, CA 92107
- Car Fidelity, Inc.  
22007 Bassett Street  
Canoga Park, CA 91303  
2410 Wilshire Blvd.  
Santa Monica, CA 90404  
6911 Topanza Canyon Blvd.  
Canoga Park, CA 91303  
617 N. LaBrea Avenue  
Los Angeles, CA 90036  
4684 Lankershim Blvd.  
N. Hollywood, CA 91601

For a complete dealer list or more information, contact the Customer Services Department.



Crown International, 1718 W. Mishawaka Rd., Elkhart, IN 46517 (219) 294-8000.

Enter No. 21 on Reader Service Card

# RADIOS/TAPE PLAYERS

MANUFACTURER	Model	Price, \$	AMPLIFIER										RADIO					TAPE																				
			Average Watts/Channel, per EIA RS-490		Power Bandwidth, Hz to KHz, per EIA RS-490		THD at Rated Output, % per EIA RS-490		Outputs: Preamp (P), Speaker Level (S), Both (Both)		Number of Tone or EQ Controls		FM Sensitivity dB (For 30-dB Quieting)		Alternate Channel Selectivity, dB		FM S/N Ratio, dB		Total Number of Presets		Local/Oscillator Control: Manual (M), Automatic (A)		AM Stereo Capable? See Code		Noise Reduction Circuit?		Tape S/N Ratio, dB (With NR if Applicable)		Auto Reverse?		Tape EQ Switch?		In-Dash (I), Under-Dash (U), Convertible (C)		Application Guide Available?		Dimensions, inches	
			NR Code A = dbx B = Dolby B C = Dolby C D = DNR	AM Stereo Code K = Kahn M = Motorola C-Quam U = Universal O = Other	3	4	3	4	3	4	Both	2	28.1	58	12	M	D	Yes	Yes	Yes	Yes	C	No	7 x 2 x 5 1/8	7 x 1 7/8 x 5 1/4													
ARTHUR FULMER	16-7100	269.95	4	3	3	4	Both	2	28.1	58	12	M	D	Yes	Yes	Yes	Yes	C	No	7 x 2 x 5 1/8	7 x 1 7/8 x 5 1/4																	
	16-7000	229.95	4	3	3	4	S	1	28.1	58	12	M	D	Yes	Yes	Yes	Yes	C	No	7 x 2 x 5 1/8	7 x 1 7/8 x 5 1/4																	
	16-6500	179.95	4	3	3	4	S	1	29.3	53	12	M	D	No	No	No	No	C	No	7 x 2 x 5 1/8	7 x 1 7/8 x 5 1/4																	
	16-5500	149.95	4	3	3	4	Both	2	28.1	50	0		D	Yes	No	No	No	C	No	7 x 2 x 5 1/8	7 x 1 7/8 x 5 1/4																	
	16-5200	119.95	4	3	3	4	S	1	29.3	52	0		D	Yes	No	No	No	C	No	6 1/4 x 1 3/4 x 4 3/4	6 1/4 x 1 3/4 x 4 3/4																	
	16-5100	99.95	4	3	3	4	S	1	29.3	0	0		D	Yes	No	No	No	C	No	7 x 1 5/8 x 4 1/2	7 x 1 5/8 x 4 1/2																	
	16-5000	69.95	4	3	3	4	S	1	29.3	0	0	M	D	No	No	No	No	C	No	7 x 1 5/8 x 4 1/2	7 x 1 5/8 x 4 1/2																	
	16-7200	299.95	16	3	3	4	Both	2	28.1	65	60	12	M	D	Yes	Yes	Yes	Yes	C	No	7 x 1 5/8 x 4 1/2	7 x 1 5/8 x 4 1/2																
	16-5400	119.95	4	3	3	4	Both	1	29.3	65	60	12	M	D	Yes	No	No	No	C	No	7 x 1 5/8 x 4 1/2	7 x 1 5/8 x 4 1/2																
	16-5400H	129.95	16	3	3	4	S	1	29.3	65	60	12	M	D	Yes	No	No	No	C	No	7 x 1 5/8 x 4 1/2	7 x 1 5/8 x 4 1/2																
GRUNDIG	UC410	179.95	3.0	100-20	0.8	S	2	20	60	55	12	M	D	50	Yes	Yes	Yes	I	Yes	7 x 2 x 5 1/8	7 x 2 x 5 1/8																	
	UC411	219.95	3.0	100-20	0.8	S	2	20	60	55	12	M	D	50	Yes	Yes	Yes	I	Yes	7 x 2 x 5 1/8	7 x 2 x 5 1/8																	
	UC420	269.95	3.0	100-20	0.8	Both	2	20	65	55	6	M	D	50	Yes	Yes	Yes	I	Yes	7 x 2 x 5 1/8	7 x 2 x 5 1/8																	
	UC430	299.95	3.0	100-20	0.8	S	2	25	60	50	12	A	D	50	No	No	No	I	Yes	7 x 2 x 4 3/4	7 x 2 x 4 3/4																	
	UC431	249.95	3.0	100-20	0.8	Both	2	17.2	55	56	10	A	D	56	Yes	No	No	I	Yes	7 x 2 x 5 1/8	7 x 2 x 5 1/8																	
	UC432	249.95	3.0	35-20	0.8	S	2	26.8	65	50	12	A	D	50	No	No	No	I	Yes	7 x 2 x 4 1/2	7 x 2 x 4 1/2																	
	FC434	429.95	3.0	100-20	0.8	Both	2	17.6	65	55	12	A	D	55	Yes	Yes	Yes	I	Yes	7 x 2 x 5 1/8	7 x 2 x 5 1/8																	
	UC435	371.95	3.0	35-20	0.8	Both	2	22.4	65	56	12	A	D	60	Yes	No	No	I	Yes	7 x 2 x 4 1/2	7 x 2 x 4 1/2																	
	UC440	529.95	4.0	35-20	0.8	Both	2	17.3	65	60	12	M	B	64	Yes	Yes	Yes	I	Yes	7 1/8 x 2 1/8 x 5 3/8	7 1/8 x 2 1/8 x 5 3/8																	
	FC441	589.95	4.0	35-20	0.8	Both	2	17.3	65	60	12	M	B	64	Yes	Yes	Yes	I	Yes	7 1/8 x 2 1/8 x 5 3/8	7 1/8 x 2 1/8 x 5 3/8																	
HARMAN/KARDON	CH120	245.00				P	2	14.8	65	70	6	M	No	B	64	No	Yes	I	No	2 x 7 x 5 1/8	2 x 7 x 5 1/8																	
	CH140	365.00				P	2	14.8	70	70	6	M	No	B	64	No	Yes	I	No	2 x 7 x 5 1/8	2 x 7 x 5 1/8																	
	CH160	450.00				P	2	14.8	70	70	6	M	No	B/C	70	No	Yes	I	No	2 x 7 x 5 1/8	2 x 7 x 5 1/8																	
JENSEN	ATZ500	519.95	18	50-15	2.5	Both	2	19.2	65		12	A	B/C	70	Yes	Yes	Yes	I	Yes	2 x 7 1/4 x 5 3/8	2 x 7 1/4 x 5 3/8																	
	ATZ300	419.95	7.5	50-15	2.5	Both	2	19.2	65		12	A	B	60	Yes	Yes	Yes	I	Yes	2 x 7 1/4 x 5 3/8	2 x 7 1/4 x 5 3/8																	
	ATZ200	369.95	4	50-15	2.5	Both	2	19.2	65		12	A	B	50	Yes	Yes	Yes	I	Yes	2 x 7 1/4 x 4 3/4	2 x 7 1/4 x 4 3/4																	
	ATZ100	319.95	4	50-15	2.5	Both	2	19.2	65		12	A	B	50	Yes	Yes	Yes	I	Yes	2 x 7 1/4 x 4 3/4	2 x 7 1/4 x 4 3/4																	
	RE980	299.95	4	50-15	2.5	Both	2	19.2	60		12	A	D	50	Yes	Yes	Yes	I	Yes	2 x 7 1/4 x 4 3/4	2 x 7 1/4 x 4 3/4																	
	RE960	274.95	4	50-15	2.5	Both	2	19.2	60		12	A	D	50	Yes	Yes	Yes	I	Yes	2 x 7 1/4 x 4 3/4	2 x 7 1/4 x 4 3/4																	
	RE940	249.95	4	50-15	2.5	Both	2	19.2	60		12	A	D	50	Yes	Yes	Yes	I	Yes	2 x 7 1/4 x 4 3/4	2 x 7 1/4 x 4 3/4																	
	RE920	224.95	4	50-15	2.5	Both	1	19.2	60		12	A	D	50	Yes	Yes	Yes	I	Yes	2 x 7 1/4 x 4 3/4	2 x 7 1/4 x 4 3/4																	
	RE900	199.95	4	50-15	2.5	S	1	19.2	60		12	A	D	50	Yes	Yes	Yes	I	Yes	1 3/4 x 6 3/8 x 4 5/8	1 3/4 x 6 3/8 x 4 5/8																	
JSE	9510	99.95	10		0.01	S	1	16.1	60	50		M		45	No	No	No	I	No	6 1/4 x 1 3/4 x 4 3/4	6 1/4 x 1 3/4 x 4 3/4																	
	9515	129.95	10	50-14	0.01	Both	2	16.1	60	50		M		45	No	No	No	I	No	6 1/4 x 1 3/4 x 4 3/4	6 1/4 x 1 3/4 x 4 3/4																	
	9520	169.95	10	50-14	0.01	S	1	16.1	65	50		M		45	Yes	No	No	I	No	6 1/4 x 1 3/4 x 4 3/4	6 1/4 x 1 3/4 x 4 3/4																	
	9525	199.95	10	50-14	0.01	Both	2	16.1	65	50		M		45	Yes	No	No	I	No	6 1/4 x 1 3/4 x 4 3/4	6 1/4 x 1 3/4 x 4 3/4																	
	9535	299.95	6	50-14	0.01	Both	1	16.1	65	50	12	M		45	Yes	No	No	I	No	6 1/4 x 1 3/4 x 4 3/4	6 1/4 x 1 3/4 x 4 3/4																	
	9555	349.95	6	50-18.5	0.01	Both	2	16.1	65	50	12	M	B	45	Yes	No	No	I	No	6 1/4 x 1 3/4 x 4 3/4	6 1/4 x 1 3/4 x 4 3/4																	
JVC	KS-R07	179.95	3	40-20	0.8	S	2	16.3	65	60	0	M	B	60	No	Yes	Yes	I	Yes	7 x 1 3/4 x 4 3/4	7 x 1 3/4 x 4 3/4																	
	KS-R11	219.95	3	40-20	0.8	Both	2	16.3	65	60	0	M	B	52	Yes	Yes	Yes	I	Yes	7 1/8 x 2 x 5 1/8	7 1/8 x 2 x 5 1/8																	
	KS-R25	279.95	3	40-20	0.8	Both	2	16.3	65	60	15	M	B	52	Yes	Yes	Yes	I	Yes	7 1/8 x 2 x 5 1/8	7 1/8 x 2 x 5 1/8																	
	KS-R44	339.95	3	40-20	0.8	Both	2	16.3	65	60	15	M	B	60	Yes	Yes	Yes	I	Yes	7 1/8 x 2 x 5 1/8	7 1/8 x 2 x 5 1/8																	
	KS-RX105	229.95	8	40-20	0.8	Both	2	16.3	65	60	0	M	B	60	No	Yes	Yes	I	Yes	7 x 1 3/4 x 5 1/8	7 x 1 3/4 x 5 1/8																	
	KS-RX115	259.95	8	40-20	0.8	Both	2	16.3	65	60	0	M	B	60	Yes	Yes	Yes	I	Yes	7 1/8 x 2 x 5 1/8	7 1/8 x 2 x 5 1/8																	
	KS-RX250	339.95	8	40-20	0.8	Both	2	16.3	65	60	20	M	B	60	Yes	Yes	Yes	I	Yes	7 1/8 x 2 x 5 1/8	7 1/8 x 2 x 5 1/8																	
	KS-RX450	399.95	8	40-20	0.8	Both	2	16.3	65	60	20	M	B	60	Yes	Yes	Yes	I	Yes	7 1/8 x 2 x 5 1/8	7 1/8 x 2 x 5 1/8																	
	KS-RX910	649.95	12	40-20	0.8	Both	5	16.3	65	60	12	M	B/C	60	Yes	Yes	Yes	I	Yes	7 1/8 x 3 1/8 x 5 1/8	7 1/8 x 3 1/8 x 5 1/8																	
	KS-C200	569.95		40-20	0.8	P	5	16.3	65	60	12	M	B/C	60	Yes	Yes	Yes	I	Yes	7 x 2 x 4 3/4	7 x 2 x 4 3/4																	
	KENWOOD	KRC-929	729.00				P	2	18.4@	80	70	24	M	A/B/C	86	Yes	Yes	Yes	I	Yes	2 x 7 x 6 1/8	2 x 7 x 6 1/8																
		KRC-9900	599.00				P	2	18.4@	80	70	24	M	A/B/C	86	Yes	Yes	Yes	I	Yes	2 x 7 x 5 3/8	2 x 7 x 5 3/8																
		KRC-8000	459.00	5	50-40	1	Both	2	18.4@	65	70	24	M	B/C	68	Yes	Yes	Yes	I	Yes	2 x 7 x 5 1/8	2 x 7 x 5 1/8																
KRC-626		399.00	5	20-50	1	Both	2	19.0@	65	70	12	M	B/C	72	Yes	Yes	Yes	I	Yes	2 x 7 x 6 5/8	2 x 7 x 6 5/8																	
KRC-6000		379.00	15	50-20	1	Both	2	19.0@	65	70	12	M	B/C	68	Yes	Yes	Yes	I	Yes	2 x 7 x 5 3/8	2 x 7 x 5 3/8																	
KRC-4000		319.00	5	20-20	1	Both	2	19.0@	65	70	12	M	B	64	Yes	Yes	Yes	I	Yes	2 x 7 x 5 3/8	2 x 7 x 5 3/8																	
KRC-512		319.00	5	40-30	1	Both	2	19.0@	65	68	10	M	B	60	Yes	Yes	Yes	I	Yes	1 3/4 x 6 3/8 x 4 3/4	1 3/4 x 6 3/8 x 4 3/4																	
KRC-2000		219.00	5	20-20	1	Both	2	19.0@	65	63	12	M	B	58	Yes	Yes	Yes	I	Yes	2 x 7 x 4 3/4	2 x 7 x 4 3/4																	
KRACO		KF-1190	399.95	15	15-10	10	Both	5	26.8	40	65	10	M	B	85	Yes	Yes	Yes	I	Yes	7 x 5 1/2 x 2	7 x 5 1/2 x 2																
	ETR-1090	399.95	15	15-10	10	Both	2	26.8	40	65	12	A	B	85	Yes	Yes	Yes	I	Yes	7 x 5 1/2 x 2	7 x 5 1/2 x 2																	
	KF-1186	289.95	5	15-10	10	Both	2	26.8	40	60	10	M	D	80	Yes	No	No	I	Yes	7 x 5 1/2 x 2	7 x 5 1/2 x 2																	
	KF-1107	259.95	15	1																																		

# It dramatically broadens FM reception. And completely eliminates tape noise. The Supreme Elite car audio system. Only from Panasonic.

This car audio system automatically helps prevent fading of weak FM stations. Stops interference from unwanted stations. And even goes beyond reducing tape noise. To totally eliminating it.

Ordinary car stereos can take you just so far before they let the FM signal fade. But Panasonic Supreme Elite gives you Hypertuner. So your music comes in longer and stronger than with ordinary car stereo.

Panasonic goes on to give you FM Optimizer circuitry. To further enhance fringe area reception. Impulse Noise Quieting reduces interference caused by other

traffic. There's even electronic tuning with automatic seek/scan. To automatically lock in stations.

## High performance on the highway.

For your tapes, Panasonic gives you Dolby® and dbx®. To not only reduce tape noise, but eliminate it. Completely.

The cassette deck section also gives you auto-reverse and locking fast-forward/rewind. So you can keep your hands on the steering wheel. Instead of on the dashboard.

So why buy an ordinary car stereo system? When you can buy a Panasonic that broadens FM reception and eliminates tape noise.



\*Dolby is a trademark of Dolby Laboratories. \*dbx is a registered trademark of dbx, Inc.

**Panasonic®**  
just slightly ahead of our time.

Enter No. 41 on Reader Service Card

# RADIOS/TAPE PLAYERS

NR Code	Model	Price, \$	AMPLIFIER										RADIO					TAPE					
			Average Watts/Channel, per EIA RS-490	Power Bandwidth, Hz to kHz, per EIA RS-490	THD at Rated Output, % per EIA RS-490	Dynamic Preamp, % per EIA RS-490	Speaker Level (S)	Number of Tone or EQ Controls	FM Sensitivity, dB (For 30-dB Quieting)	Alternate-Channel Selectivity, dB	FM S/N Ratio, dB	Total Number of Presets	Local/Channel Control	AM Stereo Control	Noise-Reduction Circuit?	Tape S/N Ratio, dB (With NR if Applicable)	Auto Reverse?	Tape EQ Switch?	In-Dash (I), Under-Dash (U), Convertible (C)	Application Guide Available?	Dimensions, Inches/Notes		
MANUFACTURER	Model	Price, \$	Average Watts/Channel, per EIA RS-490	Power Bandwidth, Hz to kHz, per EIA RS-490	THD at Rated Output, % per EIA RS-490	Dynamic Preamp, % per EIA RS-490	Speaker Level (S)	Number of Tone or EQ Controls	FM Sensitivity, dB (For 30-dB Quieting)	Alternate-Channel Selectivity, dB	FM S/N Ratio, dB	Total Number of Presets	Local/Channel Control	AM Stereo Control	Noise-Reduction Circuit?	Tape S/N Ratio, dB (With NR if Applicable)	Auto Reverse?	Tape EQ Switch?	In-Dash (I), Under-Dash (U), Convertible (C)	Application Guide Available?	Dimensions, Inches/Notes		
MAJESTIC	MCR84-300	139.95	7		S	1			60	12	M			D	45	No					7 x 2 x 4 7/8		
	MCR84-500	129.95	7		Both	3			60		M			D	45	Yes					7 x 1 3/4 x 4 7/8		
	MCR84-800	219.95	7		Both	3			60	12	M			D	40	Yes					7 x 1 3/4 x 5 3/8		
	MCR2650	139.95	25		S	3			60		M			D	50	Yes	Yes				7 x 1 3/4 x 5		
	MCR4300	179.95	7		S	1			52	12	M			B	50	Yes	Yes				7 1/4 x 2 x 6		
	MCR4900	279.95	25		Both	2				12		M		B/C	50	Yes	Yes					7 x 1 3/4 x 5	
MARANTZ	CAR 322	219.95	4	20-20	0.9	1	15	70	60	60					52	Yes	Yes				1 3/4 x 6 3/4 x 4 3/4		
	CAR 362	239.95	4	20-20	1.0	Both	1	17	60	60	12				50	Yes	Yes				2 1/4 x 7 1/2 x 5 1/4		
	CAR 355	259.95	4.5	20-20	0.9	Both	1	16	60	60	12				50	Yes	Yes				2 x 7 1/8 x 4 3/4		
	CAR 360	299.95	4.5 x 4	20-20	0.9	Both	2	16	60	60	12			B	58	Yes	Yes				2 x 7 1/8 x 4 3/4		
	CAR 372	299.95	10	20-20	1.0	Both	2	17	60	60	12			B	58	Yes	Yes				2 1/4 x 7 1/2 x 5 1/4		
	MAXXIMA	MSX-677	329.00	10	30-20	1.0	Both	2	18	60	56	12	M/A		B	58	Yes	Yes				6 7/8 x 1 7/8 x 5 1/4	
MSX-667		259.00	4	40-20	1.0	Both	2	19	60	53	12	M/A		D	56	Yes	Yes				6 7/8 x 1 7/8 x 5 1/4		
MSX-655		229.00	4	40-20	1.0	S	2	19	60	52	12	M/A		D	53	Yes	Yes				6 7/8 x 1 7/8 x 5 1/4		
MSX-885		399.95	10	30-20	1.0	Both	2	18	60	55	12	M/A			53	Yes					7 x 2 x 5 7/8		
CSC-815		249.00	9	40-20	1.0	Both	2	19	60	52	10	M/A		B	58	Yes	Yes				7 x 2 x 6 3/8		
CSC-615A		179.00	4	50-18	1.0	S	1	19	58	50	10	A		No	50	No					7 x 2 x 4 3/4		
CSC-650A		199.00	4	50-18	1.0	Both	2	19	58	53	5	M		No	50	Yes					7 x 1 1/8 x 4 7/8		
CSC-671		259.00	10	40-20	1.0	Both	2	18	60	53	10	M/A		D	56	Yes	Yes					6 7/8 x 1 7/8 x 5 1/4	
MITSUBISHI		CZ-757 w/ CV-251 Amp	399.95				P	2	16	65	60	12	A		B	59	Yes	Yes				Radio only, 2 1/8 x 7 x 4 3/4	
		CZ-727 w/ CV-241 Amp	269.95				P	2	20	80	64		M		D	55	Yes	Yes				Radio only, 2 x 6 1/4 x 4 3/4	
	RX-740	329.95	3.5	50-20	1	Both	2	16	65	60	10	A		B	59	Yes	Yes				2 1/8 x 7 x 5 1/2		
	RX-737	319.95	3.5	50-20	1	S	2	16	65	60	12	A		B	59	Yes	Yes				2 1/8 x 7 x 4 3/4		
	RX-735II	249.95	3.5	50-20	1	S	1	15	65	60	12	M			55	Yes					2 1/8 x 7 x 4 3/4		
	RX-734	239.95	3.5	50-20	1	Both	2	16	65	60	10	M			50	Yes	No				2 1/8 x 7 x 5 1/2		
	RX-733	229.95	3.5	50-20	1	S	1	16	65	60	10	M			50	No	No				2 1/8 x 7 x 4 3/4		
	RX-731	189.95	3.5	50-20	1	S	1	16	65	60	10	M			50	No	No				2 1/8 x 6 1/4 x 5 1/8		
	RX-707II	199.95	3.5	70-20	1	S	1	22	86	64	5	A			50	Yes					2 x 7 x 4 3/4		
	RX-726II	149.95	3.5	70-20	1	S	1	22	80	64		M			50	Yes	Yes				2 x 6 1/4 x 4 3/4		
	RX-724	129.95	3.5	50-20	1	S	1	22	80	60		M			50	No	Yes				1 3/4 x 7 1/8 x 4 3/8		
	RX-722	99.95	3.5	50-20	1	S	1	20	80	60		M			50	No	No				1 3/4 x 7 1/8 x 4 3/8		
	RX-909	249.95	10	50-20	1	S	2	22	86	64	5	A		D	60	Yes					2 x 7 x 6		
	RX-711	149.95	3.5	50-26	1	S	1	23	65	62	5	M			50	Yes	Yes				2 1/2 x 7 3/8 x 4 3/4		
	GX-111	99.95	6	50-20	1	S	1	23	65	62	5	M			50	Yes	No				2 x 5 1/2 x 5 1/8		
RX-123	749.95	13	25-30	1	S	9	16	65	55	10	M		B	50	Yes	No	U	No			6 x 7 1/2 x 6 3/8		
NAKAMICHI	TD-1200H	1260.00				P	3	20	60	65	10	A		B/C	70	Yes	Yes				2 1/8 x 7 1/8 x 7 1/4; 2 x 7 1/8 x 5 1/4		
	TD-800	890.00				P	3	20	60	65	10	A		B/C	70	No	Yes					2 1/8 x 7 1/8 x 7 1/4; 2 x 7 1/8 x 5 1/4	
	TD-700	790.00				P	3	18	65	65	12	M		B/C	70	No	Yes				2 x 7 x 6 1/2		
	TD-500	595.00				P	3	18	65	65	10	M		B/C	70	No	Yes					2 x 7 x 6 1/2	
PANASONIC	CQ-S744	199.95	7.5						50	65		5			50							6 3/8 x 5 1/4 x 2 1/8	
	CQ-S687	169.95	7.5						50	55		5			50							6 3/8 x 5 1/4 x 2 1/8	
	CQ-S682	169.95	7.5						50	55		5			50							6 3/8 x 5 1/4 x 2 1/8	
	CQ-S668	149.95	7.5						50	55		5			50							6 3/8 x 5 1/4 x 2 1/8	
	CQ-S958	449.95	7.5						50	75	30	10		B	60	Yes						7 x 6 x 2 1/8	
	CQ-S934	349.95	7.5						50	75		12		B	60	Yes						6 3/8 x 5 1/4 x 2 1/8	
	CQ-S884	319.95	7.5						50	75		10		B	60	Yes						6 3/8 x 5 1/4 x 2 1/8	
	CQ-S834	279.95	7.5						50	75		10		B	50	Yes						6 3/8 x 5 1/4 x 2 1/8	
	CQ-S804	249.95	7.5						50	65		5		B	60	Yes						6 3/8 x 5 1/4 x 2 1/8	
	CQ-S774	229.95	7.5						50	65		5		B	60	Yes						6 3/8 x 5 1/4 x 2 1/8	
	CQ-S290	179.95	7.5						50	75	65	10			52	Yes						4 1/8 x 1 1/8 x 1 1/8	
	CQ-E390	229.95	7.5						50	75	65	10			52	Yes						4 1/8 x 1 1/8 x 1 1/8	
	CQ-E370	269.95	7.5						50	75	70	10			52	Yes						4 1/8 x 1 1/8 x 1 1/8	
	CQ-E400	299.95	7.5						50	75	70	10			52	Yes						4 1/8 x 1 1/8 x 1 1/8	
	CQ-6858	119.95	7.5						50	55					50	Yes						4 1/8 x 1 1/8 x 1 1/8	
	CX-1000	84.95	4												45				U				7 x 5 1/4 x 1 3/4
	PHILIPS AUTO AUDIO	AC825	600.00				P	2	24	69		12	M		B	85	No	Yes				7 x 2 x 5 3/4	
	PIONEER	KEH-9000	439.95	†	50-15	5.0	S	5	17.0	70	70	18			B	60	Yes	Yes	††	Yes		2 x 7 1/8 x 5 7/8; †10 watts x 2 or 3.2 watts x 4; ††In-dash, DIN.	
KE-A880		399.95	†	50-15	5.0	Both	2	17.0	70	70	18			B	60	Yes	Yes				2 x 7 1/8 x 5 7/8		
KE-A730		369.95	2.9	50-15	5.0	Both	2	17.0	70	70	18			B/C	67	Yes	Yes				2 x 7 1/8 x 5 3/8		
KE-A630		279.95	2.9	50-15	5.0	Both	2	17.0	70	70	18			B/C	52	Yes	Yes				2 x 7 1/8 x 5 3/8		
KE-A433AM		299.95	2.9	50-15	5.0	S	1	17.0	70	70	18		M		52	No	Yes				2 x 7 1/8 x 5 3/8		
KP-A750		249.95	†	50-15	5.0	Both	2	17.0	70	70	18			B	60	Yes	Yes				2 x 7 1/8 x 5 7/8		
KE-A530		249.95	2.9	50-15	5.0	S	1	17.0	70	70	18			B	60	No	Yes				2 x 7 1/8 x 5 3/8		
KE-A430		219.95	2.9	50-15	5.0	S	1	17.0	70	70	18				52	No	Yes				2 x 7 1/8 x 5 3/8		
KE-A4900		209.95	3.2	50-15	5.0	S	1	17.0	70	70	18				52	No	No	††				2 x 7 1/8 x 5 7/8	
KE-A330		199.95	3.2	50-15	5.0	S	1	17.0	70	70	18				52	No	No					2 x 7 1/8 x 5 3/8	
KP-A600		299.95	2.9	50-15	5.0	S	1	17.0	7														



# I didn't buy my car stereo backwards.

## Why should you?

My car stereo dealer told me if you want clean, clear accurate sound—choose your speakers first. Because if the speakers can't handle it, you won't hear it. No matter what kind of sound your receiver pulls in.

Then he told me: Jensen.<sup>®</sup>

If you want to hear it the way they played it, choose Jensen speakers first. Jensen invented car speakers in the first place. And they're a leader today. Simply because they know how to deliver the goods.

Naturally I got a Jensen receiver to go with my Jensen speakers. Great team, designed to play best together. Makes sense. Makes great sound, too. I want to hear it all. With Jensen, I do.



# JENSEN<sup>®</sup>

When you want it all.

# RADIOS/TAPE PLAYERS

MANUFACTURER	Model	Price \$	AMPLIFIER										RADIO					TAPE						
			Average Watt/Channel, per FIA RS-499	Power Bandwidth, Hz to kHz, per FIA RS-499	THD at Rated Output, % per FIA RS-499	Outputs, Preamp (P), Speaker Level (S), Both (Both)	Number of Tones or EQ Controls (For 50 dB Listening)	FM Sensitivity, dB/Channel	Alternate-Channel Selectivity, dB	Total Number of Presets	Local/Remote Control	AM Stereo Capable? Manual (M), Automatic (A)	Noise-Reduction? See Code	Tape S/N Ratio, dB	Auto Reverse?	Tape EQ Switch?	In-Dash (I), Under-Dash (U), Convertible (C)	Application Guide Available?	Dimensions, Inches, Notes					
PROTON (Continued)	207 212	500.00 390.00	6 x 4, 18 x 2	20-20	0.09 0.3	P Both	2 2	25.2 25.2	70 65	70 65	10 10	M M			B/C B	70 68.5	Yes Yes	Yes Yes	I I					7 1/2 x 2 x 5 1/2 6 1/2 x 2 x 5 1/2
REALISTIC	12-1913 12-1914 12-1911 12-1909 12-1908 12-1902 12-1902 12-1906	149.95 139.95 99.95 249.95 199.95 199.95 109.95	15 12 12 15 12 15 4		10 10 10 10 10 10 10		2 5 2 2 2 2 1	23.3 17.2 23.3 17.2 23.3 25.2 25.2	35 60 35 60 45 45 35	55 60 50 60 50 60 50	0 0 0 12 5 5 0	M M M M M M M			B B B	50 45 45 50 45 50 40	Yes Yes No Yes No Yes Yes	Yes Yes Yes Yes No No No	I I I I I I I					1 3/4 x 7 1/2 x 5 1/2 1 3/4 x 7 1/2 x 5 1/2 1 3/4 x 7 1/2 x 5 1/2 1 3/4 x 7 1/2 x 6 1 3/4 x 7 1/2 x 5 1/2 1 3/4 x 6 1/4 x 4 1/2 1 3/4 x 6 1/4 x 4 1/2
ROADMASTER	RS1500 RS1800 RS2120 RS2520 RS3310	90.00 140.00 225.00 250.00 200.00	20 20 20 20 20 x 4	40-12 30-14 20-14 20-14 30-13	10 10 10 10 10	S S S S S	1 1 1 1 5	11.2 11.2 13 14.8 11.2	50 50 55 55 50	55 60 55 55 60	0 0 5 6 0	M M M A M	No No No No No	No No No No No	B/C B/C B/C B/C B/C	50 55 55 55 55	No No No Yes Yes	No No No No No	I I I I I	No No No No No	No No No No No	No No No No No	1 3/4 x 7 x 5 1 3/4 x 7 x 5 1/2 1 3/4 x 7 x 5 1 3/4 x 7 x 5 1/2 1 3/4 x 7 x 5 1/2	
SANSUI	CX-990 CX-900 CX-910 CX-700 RX-700 RX-710 RX-500 RX-510 RX-4000 RX-4010 RX-3000 RX-3010 RX-2000	519.00 499.00 499.00 399.00 429.00 429.00 299.00 299.00 289.00 289.00 239.00 239.00 199.00				P P P P Both Both S S Both Both S S S	2 2 2 2 3 3 2 2 2 2 2 2 2	14.8 @ 14.8 @	50 50 50 50 50 50 50 50 50 50 50 50 50	70 70 70 70 70 70 70 70 12 12 12 12 12	24 24 24 24 24 24 24 24 A A A A A	M M M M M M M M M M M M M	U U U U U U U U U U U U U	B/C B/C B/C B/C B B B B B B B B B	73 73 73 62 62 62 52 52 52 52 52 52 52	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	I I I I I I I I I I I I I	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	2 x 7 1/2 x 4 1/2 2 x 7 1/2 x 4 1/2 2 x 7 1/2 x 5 1/2 2 x 7 1/2 x 5 1/2 2 x 7 1/2 x 5 1/2 2 x 7 x 5 1/2 2 x 7 1/2 x 5 1/2 2 x 7 x 5 1/2 1 3/4 x 7 x 5 1/4 1 3/4 x 7 x 5 1/2 1 3/4 x 7 x 5 1/4 1 3/4 x 7 x 5 1/2 2 x 7 x 5 1/4			
SANYO	FTE25 FTE20 FTE15 FTE07  FTED6 FTED4 FTU55 FTU45 FTU35 FTU52 FTU42 FTU32 FTU22 FTU12 FTU5	299.95 239.95 199.95 319.95  259.95 229.95 219.95 179.95 149.95 229.95 179.95 149.95 119.95 99.95 3.2	9.5 9.5 9.5 9.5  9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 3.2	50-20 50-20 50-20 50-20  50-20 50-20 50-20 50-20 50-20 50-20 50-20 50-20 50-20 50-20	1 1 1 1  1 1 1 1 1 1 1 1 1 1 5	Both Both Both Both  Both Both Both Both Both Both Both Both Both Both	3 1 1 3  1 3 3 3 3 3 3 1 1 1 1	19.2 19.2 19.2 19.2  19.2 19.2 20.8 20.8 19.2 20.8 20.8 20.8 20.8 24.2 24.2	70 70 70 70  70 70 65 65 65 65 65 65 65 65 65 60	70 70 70 70  70 70 65 65 65 65 65 65 65 65 65 60	12 12 12 12  12 12 5 5 5 5 5 5 5 5 5	M M M M  M M M M M M M M M M M		B/C B B B  B B B B B B B B B	70 60 50 70  60 50 60 60 70 60 50 50 50 50	Yes Yes Yes Yes  Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Yes Yes Yes Yes  Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	I I I I  I I I I I I I I I I	Yes Yes Yes Yes  Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Yes Yes Yes Yes  Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	7 x 2 x 5 1/2 7 x 2 x 5 1/2 7 x 2 x 5 1/2 7 x 2 x 5 1/2  7 x 2 x 5 1/2 7 x 2 x 5 1/2 6 1/2 x 2 x 4 3/4 6 1/2 x 2 x 4 3/4			
SHERWOOD	CRD-90 CRD-95 CRD-101 CRD-130 CRD-150 CRD-180 CRD-301	179.95 199.95 229.95 249.95 299.95 379.95	6 6 20 6 6 20	15-30 15-30 15-30 15-30 15-30 15-30	10 10 10 10 10 10	Both Both Both Both Both Both	2 2 2 2 2 2	20.7 20.7 20.7 14.8 14.8 17.3	65 65 65 65 65 65	65 65 65 10 12 12	0 0 0 0 10 12 12	M M M M M M M	No No No No M M No	B B B B B B B	62 62 62 62 62 62 62	No Yes Yes No Yes Yes Yes	Yes Yes Yes Yes Yes Yes Yes	I I I I I I I	No No No No No No No	No No No No No No No	6 1/2 x 2 x 4 1/2 6 1/2 x 2 x 4 1/2 7 1/2 x 2 x 6 6 1/2 x 2 x 4 1/2 6 1/2 x 2 x 4 1/2 6 1/2 x 2 x 4 1/2 7 1/2 x 2 x 6			
SONY	XR-20 XR-33 XR-33A XR-44 XR-66 XR-80 XR-100 XR-740 XR-780 XR-900	149.95 225.00 250.00 300.00 350.00 429.95 649.95 300.00 400.00 600.00	4 4 4 11 11 11 11 11 11 x 4	150-20 150-20 150-20 30-20 30-20 30-20 150-20 150-20 150-20	1.5 1.5 1.5 1.0 1.0 1.0 1.0 1.0 1.0	S S S Both Both Both Both Both Both	1 2 2 2 2 2 2 3 2 2	23 @ 23 @ 23 @ 23 @ 20 @ 20 @ 20 @ 20 @ 20 @ 20 @ 20 @	65 65 65 65 70 70 70 65 70 70	65 65 66 65 65 65 65 65 65 65	0 18 18 18 18 18 18 18 18 18		U U U U U U U U U U	B B B B B/C B/C B/C B/C B/C B/C	55 55 55 63 63 63 72 55 63 72	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	No Yes Yes Yes Yes Yes Yes Yes Yes Yes	I I I I I I I I I I	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	7 x 2 x 4 3/4 7 x 2 x 5 1/2 7 x 2 x 6 7 x 2 x 5 1/2				

# TO MAKE CASSETTE DECKS SOUND MORE LIKE OPEN REEL, YOU HAVE TO KNOW HOW TO BUILD OPEN REEL DECKS.

Denon has been producing open reel tape and tape recorders for over 25 years. Not simply 1/4" machines, but 24-track 2" studio machines. This open reel technology helped Denon become one of Japan's largest recording companies and a prime supplier of equipment to Japanese recording studios and radio stations.

It also led to the beltless, clutchless Non-slip Reel Drive Motor technology found on all Denon cassette decks including the affordable DR-M11; and the minimum-wow and flutter Closed-loop Dual Capstan system found on Denon's two-head DR-M22 and

three-head DR-M33 and DR-M44. Similarly, the outstanding audio performance of each of these decks can be attributed to Denon's electronics experience building the world's finest hi-fi components.

The net result is the most advanced in an entire range of machines considered by serious recordists to be "the most musical cassette decks available at any price." Proof that no matter how much anyone tells you or charges you, there is simply no substitute for experience.



# DENON

D E S I G N I N T E G R I T Y

Enter No. 23 on Reader Service Card

Denon America, Inc., 27 Law Drive, Fairfield, N.J. 07006 (201) 575-7810

# RADIOS/TAPE PLAYERS

NR Code A = dbx B = Dolby B C = Dolby C D = DNR	AM Stereo Code K = Kahn M = Motorola C-Quam U = Universal D = Other	Model	Price, \$	AMPLIFIER										RADIO				TAPE			
				Average Water Channel, per EIA RS-450	Power Bandwidth, per EIA RS-450	THD at Rated Output, Hz to kHz.	Output Power (P), Speaker Level (S)	Number of Tone or EQ Controls	FM Sensitivity (S) (For 30-dB Quieting)	Alternate Channel Selectivity, dB	FM S/N Ratio, dB	Total Number of Presets	Local/Remote Control	Manual (M), Automatic (A)	Noise Reduction? See Code	Tape S/N Ratio, dB	Auto Reverse?	Tape EQ Switch?	In-Dash (I), Under-Dash (U), Convertible (C)	Application Guide Available?	Dimensions, Inches/ Notes
SPARKOMATIC		SR430	249.95	20	20-20	0.10	S	5	25.2	65	60	10	M	M	D	85	Yes	Yes	I	Yes	7 x 2 x 6
		SR425	179.95	20	40-15	0.10	S	1	14.7	65	60	10	A	M	C	65	No	Yes	I	Yes	7 x 2 x 6
		SR420	159.95	5	60-12	0.10	S	1	28.1	65	60	10	A	M	No	60	No	No	I	Yes	7 x 2 x 5 1/2
		SR315	299.95	20	20-20	0.10	S	5	14.7	65	60	10	A	No	E/C/D	76	Yes	Yes	I	Yes	7 x 1 1/2 x 5 1/2
		SR308	199.95	20	20-20	0.10	S	2	23.3	65	60	10	M	No	C	60	Yes	Yes	I	Yes	7 x 1 1/2 x 4 3/4
		SR314	134.95	5	80-17	0.10	S	1	20.8	55	60	10	A	No	No	55	No	No	I	Yes	7 x 1 1/2 x 4 3/4
		SR338	99.95	5	70-12	0.10	S	1	20.8	50	50	10	A	No	No	55	No	No	I	Yes	7 x 1 1/2 x 4 3/4
		SR307	149.95	20	20-20	0.10	S	5	23.3	65	60	10	A	No	D	50	Yes	Yes	I	Yes	7 x 1 1/2 x 5 1/2
		SR305	99.95	20	20-20	0.10	S	5	23.3	65	38	10	M	No	No	38	No	No	I	Yes	7 x 1 1/2 x 1 3/4
		SR334	89.95	5	75-10	0.10	S	1	29.3	65	60	10	A	No	No	35	Yes	No	I	Yes	6 1/4 x 1 3/4 x 4 3/4
		SR31	79.95	5	75-10	0.10	S	1	29.3	40	40	10	A	No	No	35	No	No	I	Yes	7 x 1 3/4 x 4 1/4
		SR36	69.95	5	75-10	0.10	S	1	32.8	45	60	10	A	No	No	35	No	No	I	Yes	7 x 1 3/4 x 4 1/4
		SR300	49.95	5	75-10	0.10	S	1	29.3	45	45	10	M	No	No	35	No	No	I	Yes	7 x 1 3/4 x 1 3/4
TARGA		HT-1001	69.95	5	80-20	1.0	S	1	16.5	65	60	0	M	No	No	55	No	No	I	Yes	1 3/4 x 6 3/4 x 4 5/8
		HT-1003	99.95	5	80-20	1.0	S	1	16.5	65	60	0	M	No	No	55	Yes	No	I	Yes	1 3/4 x 6 3/4 x 4 5/8
		HT-1004X	109.95	5	80-20	1.0	S	1	16.5	65	60	0	M	No	No	55	Yes	No	I	Yes	1 3/4 x 6 3/4 x 4 5/8
		HT-3000	199.95	5	80-20	1.0	Both	2	16.5	65	60	12	M	No	No	58	Yes	No	I	Yes	1 3/4 x 7 x 5
		HT-3003	239.95	5	80-20	1.0	Both	2	16.5	65	60	12	M	No	D	58	Yes	No	I	Yes	1 3/4 x 7 x 5
		HT-3005	279.95	16	80-20	1.0	Both	2	16.5	65	62	12	A	No	B	62	Yes	Yes	I	Yes	1 3/4 x 7 x 5 1/2
		HT-4002	159.95	5	80-20	1.0	S	1	16.5	65	60	10	M	No	No	55	Yes	No	I	Yes	1 3/4 x 6 3/4 x 4 5/8
		HT-5001	89.95	7	80-20	1.0	S	2	16.5	65	62	0	M	No	No	58	No	Yes	I	Yes	2 x 7 x 5 1/2
		HT-5002	149.95	7	80-20	1.0	S	2	16.5	65	62	0	M	No	No	58	Yes	Yes	I	Yes	2 x 7 x 5 1/2
		HT-6001	149.95	16	80-20	1.0	S	3	16.5	65	62	0	M	No	D	58	Yes	Yes	I	Yes	1 3/4 x 6 3/4 x 4 5/8
		HT-7001	319.95	7	80-20	1.0	Both	2	16.5	65	62	12	M	No	D	62	Yes	Yes	I	Yes	2 x 7 x 6
		Mach I	199.95	5	40-20	0.5	S	1	16.5	70	62	10	A	No	No	58	Yes	No	I	Yes	2 x 7 x 5 1/2
		Mach M	209.95	5	40-20	0.5	S	1	16.5	70	62	5	M	No	No	58	Yes	No	I	Yes	2 x 6 1/2 x 4 3/4
		Mach IR	289.95	16	40-20	0.5	Both	2	16.5	70	62	5	M	No	B	62	Yes	Yes	I	Yes	1 3/4 x 7 x 5 1/2
		Mach II	329.95	5	40-20	0.5	Both	2	16.5	70	62	12	M	No	No	62	Yes	Yes	I	Yes	2 x 6 1/4 x 4 3/4
		Mach IIR	369.95	16	40-20	0.5	Both	2	16.5	70	62	12	M	No	B	62	Yes	Yes	I	Yes	2 x 6 1/4 x 4 3/4
	Mach III	349.95	16	40-20	0.5	Both	2	16.5	70	62	12	M	M	B	62	Yes	Yes	I	Yes	2 x 7 x 5 1/2	
	Mach V	439.95	16	40-20	0.5	Both	2	16.5	70	62	12	M	No	B	62	Yes	Yes	I	Yes	2 x 7 x 5 1/2	
ULTRX		UR80	470.00	15	50-20	0.3	Both	4	14.8	70	80	18	A	A/B/C	85	Yes	Yes	I	Yes	7 x 2 x 5 1/2	
		UR70	420.00	15	50-20	0.3	Both	3	14.8	70	80	12	A	A/B/C	85	Yes	Yes	I	Yes	7 x 2 x 5 1/2	
		UR60	370.00	10	50-20	1	Both	3	14.8	70	80	12	A	A/B	85	Yes	Yes	I	Yes	7 x 2 x 5 1/2	
		UR50	320.00	10	50-20	1	Both	3	14.8	70	80	12	A	A/B	85	Yes	Yes	I	Yes	7 x 2 x 5 1/2	
VECTOR RESEARCH		VM-950	399.95	15	30-18	0.9	Both	2	19	60	60	12	M/A	B	62	Yes	Yes	I	No	2 x 7 x 5 1/2	
		VM-900	299.95	5	30-18	0.9	Both	2	19	60	60	12	M/A	B	62	Yes	Yes	I	No	2 x 6 1/4 x 4 3/4	
		VM-700	199.95	15	30-18	0.9	Both	2	21	60	60	5	M/A	B	62	Yes	Yes	I	No	1 3/4 x 7 x 5 1/2	
		VM-500	149.95	5	40-17	0.9	Both	2	23	50	50	5	M	B	52	Yes	No	I	No	1 3/4 x 6 1/4 x 4 3/4	
YAMAHA		YCT-850	650.00				P	3	17.3	80	65	12	M/A	No	A/B/C	85	Yes	Yes	I	Yes	2 x 7 x 5 1/4
		YCT-650	550.00				P	3	17.3	80	65	10	M/A	No	A/B/C	85	Yes	Yes	I	Yes	2 x 7 x 5 1/4
		YCT-450	350.00				P	3	17.3	80	65	12	M/A	No	B/C	75	Yes	Yes	I	Yes	2 x 7 x 5 1/4
		YCR-950	600.00				Both	3	17.3	80	65	12	M/A	No	B/C	75	Yes	Yes	I	Yes	2 x 7 x 5 1/4
		YCR-750	530.00	3.5	40-18	1	Both	3	17.3	80	65	10	M/A	No	B/C	75	Yes	Yes	I	Yes	2 x 7 x 5 1/4
		YCR-550	400.00	12	30-18	1	Both	3	17.3	80	65	12	M/A	No	B/C	75	Yes	Yes	I	Yes	2 x 7 x 5 1/4
		YCR-350	300.00	12	30-18	1	Both	3	17.3	80	65	12	M	No	B	65	Yes	Yes	I	Yes	2 x 7 x 5 1/4
		YCR-150	250.00	3.5	40-18	1	Both	3	17.3	80	65	10	M	No	B	65	Yes	Yes	I	Yes	2 x 7 x 5 1/4

Full Size  
Sound...

Only 3.3  
Ounces!



New ATH-20 Stereophones with more sound-per-ounce than you can imagine. Enjoy the full, rich bass missing from the ultra-lights. With personalized bass damping control to match each ear. Ounce-for-ounce the best sound is at your Audio-Technica dealer now. Or write for latest catalog today.

ATH-20 \$54.95



**audio-technica**  
1221 Commerce Dr., Stow, OH 44224

# JBL presents the Extended Range/Graphite Series. Home improvements for the car.



In theory at least, a car stereo system should sound terrific. After all, a car is a small space to fill with sound. You know exactly where the listeners will be sitting. And there are only a few locations for the speakers. Unfortunately, most car systems fall short of perfection because most car speakers fall short of perfection.

The Extended Range/Graphite Series from JBL was designed to fulfill the musical potential of any car, at reasonable budget levels. The patented Co-Motional™ design provides the extended

musical range, solving most of the problems of dual driver systems. The unique graphite frame solves most of the problems of the car environment... heat, cold, moisture. They won't twist, won't rust, won't distort. And the slim profile solves installation problems. It's easy.

The results? Big clean sound. As close to living room listening as you could want. Mile after musical mile.



harman international  
8500 Balboa Blvd., P.O. Box 2200  
Northridge, California 91329  
Telephone: (818) 893-8411

Enter No. 29 on Reader Service Card

# AMPS/EQUALIZERS/CROSSOVERS

MANUFACTURER	Model	Price, \$	Preamp (P), Amp (A), Equalizer (E), Active Crossover (C)	Number of EQ Bands	Bass/Cut Range, ± dB	S/N Ratio, dB	Watts/Channel into 4 Ohms, per EIA RS-490	Power Bandwidth, Hz to kHz, per EIA RS-490	THD at Rated Output, %	Input Level: Preamp (P), Speaker (S), Selectable (Sel.)	Fader Control?	Application Guide Available?	Dimensions, Inches	Notes
ADS	P40	159.00	A		87	20, 50 x 1	20-20	0.05	Sel.	No	No	7 1/8 x 1 1/2 x 5 7/8	Bridgeable.	
	P80	259.00	A		90	40	20-20	0.1	Sel.	No	No	11 1/4 x 2 x 6 1/2	As above.	
	P120	329.00	A		90	60, 90 x 1	20-20	0.1	Sel.	No	No	11 1/4 x 2 x 6 1/2	As above.	
	AX2	100.00	C		90			0.05	Sel.	No	No	1 1/8 x 6 1/2 x 3 1/2	With plug-in modules for frequency selection.	
AIWA	AE-X70		P/A/E	7	12	24	20-40	5	P	Yes	No	1 3/8 x 5 7/8 x 5 3/8		
ALPHASONIK	PEQ-7	100.00	E	7	12	75		0.05	Sel.	Yes		1 1/8 x 6 x 4 1/4	Floating or common input ground.	
	EX-2	125.00	C			90		0.01	P	No		1 3/8 x 5 1/4 x 4 1/4		
	AEO-720B	150.00	A/E	7	12	75	20	20-20	1	Sel.	Yes	2 x 6 1/4 x 5	DIN input for Alpine or Kenwood car stereos.	
	A-2018	59.00	A			18	20-20	1	P	No		1 1/4 x 4 x 4 1/4	Bridgeable.	
	A-225	125.00	A			90	25, 50 x 1	20-20	0.05	Sel.	No	2 7/8 x 6 x 6 3/8	As above.	
	A-240B	175.00	A			90	40, 80 x 1	20-20	0.05	Sel.	No	2 7/8 x 7 1/2 x 6 3/8	As above.	
	A-255	250.00	A			85	55, 110 x 1	20-20	0.1	Sel.		2 7/8 x 9 1/2 x 6 3/8	As above.	
	A-265	350.00	A			90	65, 130 x 1	20-20	0.01	Sel.		2 7/8 x 10 5/8 x 6 3/8	As above, Class A.	
	A-2075	370.00	A			95	75, 150 x 1	20-20	0.01	Sel.			As above.	
	A-2125	450.00	A			98	125, 250 x 1	20-20	0.01	P		8 x 2 1/4 x 14	As above.	
	AS-2001	145.00	A/E/C	1	12	85	60 x 1	20-20	0.25	S			5 3/4 x 2 1/4 x 6 1/2	150-Hz crossover, mono bass amp.
AS-1100	250.00	A/E/C	1	12	95	100 x 1	20-20	0.01	Sel.			5 3/4 x 2 1/4 x 9	As above but 160 Hz.	
ALPINE	3211	130.00	P/A/C			80	13	40-120 Hz	0.8	P	No		7 x 1 x 5 1/4	
	3210	110.00	A/E	7	12	75	8	30-20	0.8	Sel.	Yes		7 x 1 x 5 1/4	
	3533	330.00	A			100	60	20-20	0.08	Sel.	No		11 1/8 x 2 x 6 3/4	
	3652	60.00	P/C		6	100				P	No		5 3/8 x 1 x 3 1/2	
	3215	230.00	A/E	7	†	80	13 x 4	40-20	0.8	Sel.	Yes		7 x 1 x 5 7/8	Crossover, 120 Hz.
	3311	180.00	P/E/C	7	†	100				P	Yes		7 x 1 x 4 7/8	†At 60, 125 and 250 Hz, ±18 dB; at 500 Hz, 1 kHz, 3.5 kHz and 10 kHz, ±12 dB.
	3015	400.00	P/E	7	12	85				P	Yes		6 1/4 x 2 x 5 1/2	Stereo/mono subwoofer outputs.
	3650	130.00	P/C			100				P	No		6 1/4 x 1 1/4 x 4 3/4	Spectrum analyzer, automatic volume control, automatic EQ.
3518	160.00	A			100	30	30-20	0.1	P	No		7 7/8 x 3 x 5 7/8	Two-way crossover, six crossover frequencies.	
3516	60.00	A			75	8	30-20	0.8	P	No		6 1/4 x 1 1/4 x 2 3/4		
3512	250.00	A			100	50	30-20	0.1	P	No		7 7/8 x 3 x 7 1/8		
AMERICAN AUDIO	DPB-787W	139.95	A/E/C	10	12	83	50 x 4	20-30	0.5	Sel.	Yes	Yes	1 3/4 x 7 1/8 x 6 1/8	
ARA	PEQ-100	89.95	E	5	12	60			1	Sel.	Yes	Yes	1 x 6 3/8 x 5 3/8	
	PEQ-200	129.95	E	7	12	55			1	Sel.	Yes	Yes	1 x 6 3/8 x 5 3/8	
	PEQ-500	64.95	A/E	7	12	55	14	30-20	1	Sel.	Yes	Yes	1 x 6 1/4 x 5 1/4	
	PA-200	99.95	A			60	14 x 4	40-20	1	Sel.	Yes	Yes	1 1/8 x 5 3/8 x 5 3/4	
	PA-400	39.95	A			60	14	40-20	1	S	Yes	Yes	1 1/2 x 5 7/8 x 4 1/2	
AUDIA	AFX-150	399.00	A/C			90	75 x 4	20-20	0.05	Sel.	No		2 1/2 x 8 x 10	
	AFX-80	289.00	A			90	40 x 4	20-20	0.5	S			9 x 2 1/2 x 8	
	AFX-40	199.00	A			90	20 x 4	20-20	0.5	Sel.			7 x 2 1/2 x 8	
	EQX-7	100.00	E	7	12	80			0.08				5 1/2 x 1 3/4 x 4	Crossover, 80 Hz to 5 kHz.
	ECX-2	99.00	C			80							5 x 4 x 1	
AUDIO CONTROL	EQ-X	299.00	E/C	12	12	106			0.005	Var.	No	No	2 1/4 x 9 1/2 x 6 3/4	Half-octave EQ bands from 45 to 180 Hz and full-octave from 250 Hz to 16 kHz; equalized by installer for each channel; stereo, mono, and inverted mono subwoofer outputs.
AUDIOMOBILE	System 1600	1089.00	P/A/C			100	40 x 4	20-20	0.1	Sel.	Yes			Biamp, includes four satellite speakers and two subwoofers.
	System 1200	789.00	P/A/C			100	20 x 2, 40 x 2	20-20	0.1	Sel.	Yes			Biamp, includes two satellite speakers and two subwoofers.
AUDIOVOX HI-COMP	HCB 860	179.95	A			65	65	30-20	0.3	Sel.	Yes	No	3 3/8 x 7 x 8 1/4	
	HCE 760	149.95	A/E	7	12	65	13	50-20	1	Sel.	Yes	No	1 1/4 x 6 1/4 x 6	Variable echo.
AUTOTEK	A-180	150.00	A			90	25	20-20	0.05	S		No	6 x 6 x 2	Bridgeable.
	A-150	80.00	A			65	16	20-20	0.1	S		No	6 x 4 1/2 x 1	
AUTOVOX	AX-220	100.00	A			70	30	20-20	0.1	Sel.	No	Yes	7 x 3 x 2	
	AX-240	200.00	A			70	60	30-20	0.1	Sel.	No	Yes	8 x 7 x 2	
BEVAQA SOUNDTECH	ST-1075	129.95	P/A/E	10		70	50	40-30	0.25	Sel.	Yes	No		dbx noise reduction.
	ST-30	149.95	A			70	100	40-30	0.25	Sel.	Yes	Yes	3 x 8 1/2 x 11 1/4	Bridgeable.
	ST-7900	99.95	A/E	7		70	75	20-20	0.20	Sel.	No	No		Spectrum display.
BGW SYSTEMS	302 B	250.00	P/E	3	18, 12	77			0.05	S	No	No	1 1/8 x 4 3/8 x 3 1/2	EQ bands at 60 Hz, 180 Hz, and 16 kHz.
	304 B	220.00	C			95			0.05	P	No	No	1 1/8 x 4 3/8 x 3 1/2	Eight crossover frequencies, mono subwoofer output.
	600 B	340.00	A				50 x 1	20-20	0.1	S	No	No	3 3/4 x 7 1/8 x 7	
	602 B	450.00	A			90	75 x 1	20-20	0.1	S	No	No	3 3/4 x 7 x 7 1/2	

# AT LAST.

Harman Kardon's striking new line of car audio products leads you to a higher fidelity on the road. Elevating car audio standards, these dynamic components smoothly outdistance the competition by reflecting the excellence so finely honed by Harman Kardon in their home audio products for over thirty years. Three new in-dash cassette/tuners and three power amplifiers blaze new trails. Each in-dash unit incorporates the renowned Harman Kardon design philosophies that enable them to deliver an exceptional frequency response of 20Hz to 20kHz  $\pm$  3dB. Each amplifier boasts High instantaneous Current Capability, Low Negative Feedback and Ultrawidebandwidth.

The previously unexplored realms of car audio are now within reach, for those tuned to a higher fidelity. From Harman Kardon.

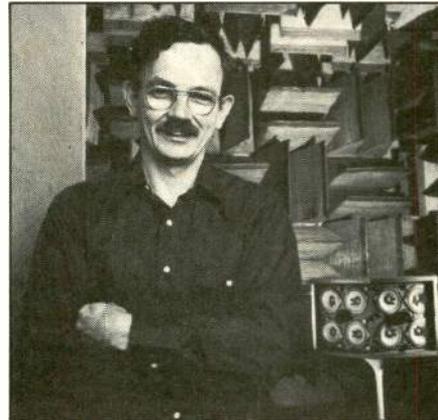


## harman / kardon

240 Crossways Park West, Woodbury, NY 11797; In Canada, Gould Marketing, Montreal.  
For more information call toll-free 1-(800) 633-2252 ext. 250.

# AMPS/EQUALIZERS/CROSSOVERS

MANUFACTURER	Model	Price, \$	Preamp (P), Amp (A), Equalizer (E), Active Crossover (C)	Number of EQ Bands	Boost/Cut Range, ±dB	S/N Ratio, dB	Watts Channel Range, ±dB	Power Bandwidth, Hz to KHz, per IFA RS-430	THD at Rated Output, %	Input Levels: Preamp (P), Speaker (S), Selectable (Sel.)	Fader Control?	Application Guide Available?	Dimensions, Inches	Notes
BLAUPUNKT	BEA 40	119.95	A/E	5	12	80	20	40-20	3	Sel.	Yes	Yes	5 1/2 x 1 1/2 x 5 3/4	Front and rear EQ. Stalk mount.
	BEA 80	169.95	A/E	7	12	80	20 x 4	40-20	3	Sel.	Yes	Yes	5 1/2 x 1 3/4 x 6	
	BEQ MS	99.95	E	5	12	80				Sel.	Yes	Yes	3 3/8 x 1 1/4 x 2 3/8	
	BEQ 80	129.95	E	7	12	80				Sel.	Yes	Yes	5 1/2 x 1 3/4 x 6	
	BEQ FR	179.95	E	18	12	80				Sel.	Yes	Yes	5 1/2 x 1 7/8 x 6	
	BEQ 65	169.95	E	5	12	80				Sel.	Yes	Yes	5 1/2 x 1 7/8 x 6	
	BPA 415A	109.95	A			87	15 x 4	40-20	1	Sel.	No	Yes	5 1/4 x 1 5/8 x 6 3/8	
	BPA 430	279.95	A			90	42 x 4	10-30	1	Sel.	No	Yes	7 1/4 x 2 1/4 x 10 5/8	
BPA 260	279.95	A			90	60	10-30	1	Sel.	No	Yes	7 1/4 x 2 1/4 x 10 5/8		
BON SONIC	EGB 207L		E	7	10									
	EGB 300L		E	7	10									
BOSE	1201 Door Mount	299.00	A			70	25	40-20	0.20	Sel.			8 1/8 x 1 3/4 x 5 3/8	Includes two 4 1/2-inch speakers.
	1201 Rear Deck Mount	349.00	A			70	25	40-20	0.20	Sel.			8 1/8 x 1 3/4 x 5 3/8	Includes two 6 x 9-inch speakers.
	1401 Small Vehicle	496.00	A			70	25 x 4	40-20	0.09	Sel.	Yes		10 x 2 1/2 x 5	Includes four 4 1/2-inch speakers.
	1401 Large Vehicle	549.00	A			70	25 x 4	40-20	0.09	Sel.	Yes		10 x 2 1/2 x 5	Includes two 4 1/2-inch and two 6 x 9-inch speakers.
CLARION	80DAII	99.95	A			75	13.5 x 4	20-20	1.0	Sel.	No	Yes	5 1/2 x 1 1/2 x 6 3/8	
	40DAII	59.95	A			75	13.5	20-20	1.0	Sel.	No	Yes	4 3/4 x 1 1/2 x 6 3/8	
	90DEQA	189.95	A/E/C	9	12	75	13.5	20-20	1	Sel.	Yes	Yes	7 7/8 x 1 5/8 x 6 1/4	
	70DEQA	139.95	A/E	7	12	75	13.5	20-20	1	Sel.	Yes	Yes	6 1/4 x 1 5/8 x 6 1/4	
	50DEQA	99.95	A/E	5	12	75	13.5	20-20	1	Sel.	Yes	Yes	5 1/2 x 1 5/8 x 5 1/8	
	100EQB5	69.95	A/E	5	12	75	13.5	50-15	1	Sel.	Yes	Yes	5 1/2 x 1 5/8 x 5 1/2	
	50EQ	69.95	A/E	5	12	75	13.5	50-15	1	Sel.	Yes	Yes	5 1/2 x 1 5/8 x 4	
CONCORD	HFA-26	124.95	A			86	18	20-20	0.8	P	No	No	1 3/4 x 5 1/2 x 4	
	HFA-51	199.95	A			86	50	20-20	0.5	Sel.	No	No	2 5/8 x 6 1/8 x 8 3/4	
	HFA-54	279.95	A			80	40	20-20	0.05	Sel.	No	No	2 7/8 x 6 3/4 x 9	
	HFA-71	279.95	A			90	70	20-20	0.5	Sel.	No	No	3 1/2 x 8 x 9	
CRAIG	V506	49.95	A/E	5	12	65	12	80-20	5.0	S	Yes	Yes	3 3/8 x 1 1/4 x 5 1/2	
	V507A	69.95	A/E	7	12	80	12	80-20	5.0	S	Yes	Yes	5 7/8 x 1 1/4 x 5 3/4	
CROWN	CMA-1	995.00	A			90	†	20-20	0.1	P	No	No	16 x 14 1/2 x 3 3/8	†100 watts x 3, or 50 watts x 2 plus 100 watts x 2, or 50 watts x 4 plus 100 watts x 1.
CYBERNET	CMS 3050	336.00	A/E/C	5	10	80	50	50-20	0.4	Sel.		No	3 x 7 1/2 x 11 3/8	
DENON	DCE-2200	200.00	E/C	7	12					P	Yes			Crossover, 80/120 Hz. Class A.
	DCA-3250	250.00	A			40	12	20-20	0.08	Sel.			8 3/8 x 2 7/8 x 8 7/8	
	DCA-3100	100.00	A			40	12	20-20	0.05	Sel.			5 7/8 x 1 5/8 x 7 7/8	
EPI	LDA40	119.95	A			86	20	40-20	0.8	P	No		1 3/4 x 5 1/2 x 4	
	LDA100	199.95	A			86	50	20-20	0.8	S	No		3 1/4 x 8 3/4 x 6 1/4	
FUJITSU TEN	QE-231	119.95	P/E	9	12					P	Yes	Yes	5 7/8 x 2 x 4 3/8	
	QM-251	149.95	A			70	50	40-20	0.3	Sel.	No	Yes	5 7/8 x 2 x 6 1/4	
	QM-104	120.00	A			70	22 x 4	20-70	1	P	No	Yes	7 3/4 x 1 5/8 x 5 1/8	
	UM-114	74.95	A			70	25	40-50	1	Sel.	No	Yes	5 1/2 x 1 3/8 x 3 3/8	
	UM-116	29.95	A			70	9	100-15	5	P	No	Yes	3 x 1 x 2	
ARTHUR FULMER	15-0725	49.95	A/E	2		16			5	S	No	No	4 x 1 7/8 x 7	DNR noise reduction, variable echo.
	15-0731	79.95	A/E	5	12	16			5	Sel.	Yes	No	3 3/4 x 1 7/8 x 5 7/8	
	15-0734	139.95	A/E	7	12	36			5	Sel.	Yes	No	6 1/4 x 1 7/8 x 6 1/2	
	15-0736	179.95	A/E	7	12	36			5	Sel.	Yes	No	6 1/4 x 1 7/8 x 6 1/2	
DAVID HAFLER CO.	The Hafler	†	A			110	100	20-20	0.009	Sel.	No	No	10 x 8 x 2 1/8	†\$400.00 to \$450.00.
HARMAN/KARDON	CA205	50.00	A			90	3.5	10-100	0.2	P	No	No	7 1/8 x 1 1/2 x 4 1/4	†50 watts into 2 ohms. †90 watts into 2 ohms.
	CA240	295.00	A/C			72	40†	10-100	0.1	Sel.	No	No	13 x 2 3/4 x 8	
	CA260	400.00	A/C			80	60†	10-100	0.1	Sel.	No	No	15 5/8 x 3 7/8 x 7 7/8	
HIFONICS	Mercury	100.00	A			75	16	20-20	0.1	P				
	Vulcan	225.00	A			95	45	10-32	0.02	P				
	Odin	325.00	A			97	75	10-32	0.02	P				
	Thor	425.00	A			100	115	10-32	0.02	P				
	Zeus	650.00	A			102	250	10-32	0.02	P				
	Calisto	150.00	C			98		10-50	0.01	P				
INFINITY	MRA-150	319.00	A			100	60	20-20	0.25	P	No	No	7 5/8 x 2 1/4 x 10 1/2	Adjustable input level.
JENSEN	EQA5000	139.95	A/E	7	+18, -6	80	20		0.3	Sel.	Yes	No	1 1/2 x 6 x 4 1/2	
	EQA2500	89.95	A/E	5	12	80	15		0.3	Sel.	Yes	No	1 1/2 x 4 7/8 x 4 3/8	
	A35	74.95	A			80	20		0.3	Sel.	No	No	1 3/4 x 4 1/2 x 3 1/4	
JSE	201	49.95	A			60	25	20-20	0.1	Sel.	No	No	4 x 1 x 3 5/8	
	202	109.95	A			60	50	20-20	0.1	Sel.	No	No	5 1/2 x 1 3/8 x 6 1/2	
	203	199.95	A			80	80	20-20	0.1	Sel.	No	No	6 1/2 x 2 1/2 x 9 3/8	
	214	119.95	A/E	5	12	60	25	20-20	0.1	Sel.	Yes	No	5 1/2 x 1 x 6 1/2	
	224	169.95	A/E	7	12	60	50	20-20	0.1	Sel.	Yes	No	6 7/8 x 1 5/8 x 6 1/2	
	234	209.95	A/E	9	12	60	25 x 2, 50 x 2	20-20	0.1	Sel.	Yes	No	6 7/8 x 1 5/8 x 6 1/2	



# Video Soundtracks.

*New paths toward realism.*  
by William P. Schreiber

Manager of Home Products Engineering



Television has been with us for less than four decades. Yet no other single medium has had as much impact on our everyday lives. But while television has certainly changed us, it has also changed *with* us as well.

For example, a lot of us remember when watching TV meant watching a little screen that hid behind doors when not in use. If you were lucky, you had access to three channels and nearly five hours of programming nightly!

Compare that with television today. You can build complete video systems out of

professional grade monitors, VCRs and a host of specialized electronics. You can buy or rent virtually every worthwhile film ever made. You can choose from up to hundreds of channels, thanks to cable and satellite video technology.

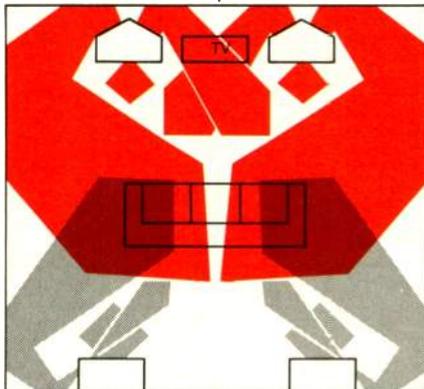
### Big Theater Entertainment

But as far as home video has progressed, watching a movie on a television system is still a limited experience when compared with theater viewing. There's something about being at the movies that brings a film to life. The film's soundtrack and the theater's acoustics are a large part of it—"surround-sound" technology completes the live sensation. In theaters equipped with Dolby Stereo,\* the audience

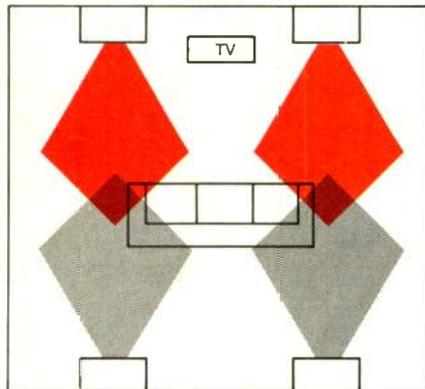
hears lifelike sound through a relatively simple process. First, surround-sound information is recorded (in an encoded form), right into the film's soundtrack. Then, it's decoded in the movie theater by a Dolby processor. Finally, this information is played through speakers located at the

in your living room. And, everyone in the room will hear this effect, regardless of where they're sitting.

Obviously, Bose Direct/Reflecting® speakers can make both music and video soundtracks seem a lot more real. But you can even go a step further with at-home



Bose Direct/Reflecting® speakers deliver stereo everywhere in the room—even close to one speaker.



With conventional speakers, balanced reproduction is limited to the area between and in front of the enclosures.

sides and back of the theater. The result is that the entire audience sits in the middle of an incredibly lifelike, three-dimensional sound field.

### Surround-Sound Realism at Home

With the right equipment, you can create the same sound at home. Bose® Direct/Reflecting® speakers are ideal for this purpose, because their design is based on how sound behaves in areas such as concert halls and theaters. In these environments, you hear a combination of direct sound and reflected sound. Bose invested 20 years in research to create speakers that can accurately reproduce sound the same way. Basically, Bose loudspeakers provide your ears with the critical reflected "cues" you'd hear at a live event, making it sound almost as if the event were occurring

theater sound—because the same encoded surround-sound information that theaters use is present on many videotapes as well. Combine Bose speakers with a surround-sound system (decoder, second amp, and rear speakers) and you'll get a true theater quality, three-dimensional sound field right in your living room!

We invite you to audition Bose loudspeakers at your local dealer. For more information, please write to Bose Corporation, Department AU, 10 Speen Street, Framingham, MA 01701.



\*Dolby Stereo and Dolby are registered trademarks of Dolby Laboratories, Inc.

Covered by patent rights issued and/or pending. Copyright 1985 Bose Corporation. All rights reserved.

# AMPS/EQUALIZERS/CROSSOVERS

MANUFACTURER	Model	Price, \$	Pregain (P), Amp (A), Equalizer (E)	Number of EQ Bands	Boost/Cut Range, dB	S/N Ratio, dB	Watts Channel into 4 Ohms, per EIA RS-430	Power Bandwidth, Hz to kHz, per EIA RS-430	THD at Rated Output, %	Input Levels, Pregain (P), Speaker (S), Selectable (Sel.)	Fader Control?	Application Guide Available?	Dimensions, Inches	Notes
JVC	KSEA50	149.95	A/E	7	12	70	12	40-20	0.8	Sel.	Yes		5 7/8 x 1 1/4 x 6 3/8	
	KSE5	79.95	E	7	12	90				Sel.	No		4 x 1 3/4 x 4	
	KSE7	179.95	E	7	12	90				Sel.	Yes		6 x 1 1/4 x 6	
	KSA150	79.95	A			90	12	40-20	0.8	Sel.	No		6 x 1 x 5 1/2	
	KSA200	199.95	A			90	25	40-20	0.5	Sel.	No		8 3/4 x 3 x 7 7/8	
		269.95	A			90	50	40-20	0.5	Sel.	No		9 1/2 x 3 x 7 7/8	
KENWOOD	KGC-9400	299.00	P/E	7	12	97			0.02	P	Yes	Yes	1 x 7 x 5 7/8	Spectrum analyzer, eight EQ presets.
	KGC-7400	199.00	P/E	7	12	97			0.02	P	Yes	Yes	2 x 6 x 5	
	KGC-4300	139.00	A/E	7	12	92	15	15-60	0.07	Sel.	Yes	Yes	2 x 6 x 5	
	KGC-447	139.00	P/E	5	12	70			0.02	P	Yes	Yes	1 3/4 x 4 5/8 x 3 5/8	
	KAC-901	369.00	A			92	100	20-30	0.03	P	Yes	Yes	11 1/2 x 2 3/4 x 8 1/2	
	KAC-8200	299.00	A			100	75	20-60	0.005	P	Yes	Yes	7 3/4 x 2 3/8 x 7 1/4	
	KAC-7200	199.00	A			98	35	20-60	0.007	P	Yes	Yes	6 x 2 1/8 x 6	
	KAC-887	149.00	A			92	15 x 4	20-30	0.03	P	Yes	Yes	5 1/2 x 2 1/8 x 6 1/4	
KAC-501	85.00	A			92	15	20-50	0.03	Sel.	Yes	Yes	5 x 1 x 6 1/8		
KRACO	KE-6B	99.95	A/E	7	12		20	15-10	10	S	Yes	No	5 x 5 x 1 1/4	
	KE-6	99.95	A/E	5	12		15	15-10	10	S	Yes	No	6 5/8 x 6 1/8 x 1 7/8	
	KE-4	89.95	A/E	5	12		15	12-10	10	S	Yes	No	4 x 4 1/2 x 1 1/4	
LINEAR POWER	2602	399.95	A/C			95	30 x 2, 60 x 1	20-20	0.05	Sel.	No	No	2 7/8 x 8 x 10	Blamplifier, 70-Hz crossover.
	2121	742.95	A/C			95	60 x 2, 120 x 1	20-20	0.15	Sel.	No	No	3 x 9 3/4 x 12	Two adjustable crossovers.
	XO-1	149.95	C	6	9	105				Sel.	No	No	1 3/4 x 5 1/8 x 4 1/2	Preset EQ.
	EQ-1	212.95	E			105				Sel.	No	No	1 3/4 x 5 1/8 x 4 1/2	
	402	165.95	A			95	20	20-20	0.15	Sel.	No	No	5 x 8 3/4 x 1 3/4	
	602	229.95	A			95	30	20-20	0.05	Sel.	No	No	6 1/2 x 8 x 2 1/4	
	1002	309.95	A			95	50	20-20	0.05	Sel.	No	No	3 x 9 3/4 x 9	
	2002	479.95	A			95	100	20-20	0.05	Sel.	No	No	3 x 9 3/4 x 9	
	3001	795.95	A			95	150	20-20	0.05	Sel.	No	No	3 x 9 3/4 x 12	
	5000	1000.00	A				250	20-20	0.05	Sel.	No	No	3 x 9 3/4 x 17	
MAGNAOYNE	LS2001	179.95	A			63	50	10-70	0.05	Sel.	No	No	8 1/4 x 8 1/4 x 2 3/4	Bass EQ.
	LS4001	269.95	A/E	2	6.5	70	100 x 2, 310 x 1	10-80	0.05	Sel.	No	No	11 x 8 1/4 x 2 3/4	
	HP200	99.95	A			55	50	70-18	1.0	Sel.	No	No	8 1/4 x 8 1/4 x 2 3/4	
	EQ62	199.95	P/A/E	7	12	60	30 x 4	20-20	1.0	Sel.	Yes	Yes	† Amp, 5 x 4 3/4 x 1; EQ, 7 3/8 x 4 3/8 x 2.	
	EQ45	119.95	A/E	7	12	60	30	20-20	1.0	Sel.	Yes	Yes	6 1/2 x 5 1/8 x 1 1/2	
MAJESTIC	MEB 5700	119.95	A/E	7	12	65	30	20-20		Sel.	Yes	Yes	6 3/8 x 2 x 6 1/8	RCA line outputs, common/floating ground. RCA line outputs, spectrum display.
	MEB 7200CM	199.95	A/E	7	12	80	30	20-20		Sel.	Yes	Yes	6 3/8 x 2 x 6 1/8	
	MA 150HD	99.95	A			65	75			Sel.	No	No	6 x 6 1/4 x 3 3/4	
	MA 100	29.95	A			25				Sel.	No	No		
	MEB 5610	169.95	A/E	10	12	55	30	20-20		S	Yes	Yes	5 7/8 x 1 5/8 x 6	
	MEB 9120	179.95	A/E	9	12	65	75	20-20		Sel.	Yes	Yes	7 1/2 x 2 x 7	
MEB 6900ET	169.95	A/E	9	12	65	30 x 4	20-20		Sel.	Yes	Yes	6 3/8 x 1 7/8 x 6		
MARANTZ	SA402	99.95	A			30		45-20	1.0	Sel.			3 1/8 x 5 7/8 x 6 1/4	
MAXXIMA	CSA-200	199.00	P/A			70	50	10-40	0.08	Sel.	Yes		8 3/8 x 2 x 8	
MITSUBISHI	CV-231	129.95	A/E	6	12	70	13	25-25	1	Sel.	Yes		1 7/8 x 5 1/2 x 6 1/4	
	CV-251	99.95	A			70	13 x 4	25-25	1	P			1 7/8 x 5 1/2 x 6 1/4	
	CV-241	69.95	A			65	3.5 x 4	50-20	1	P			1 7/8 x 5 1/2 x 4 3/8	
	CY-261	59.95	A			70	14	25-15	1	S			1 7/8 x 5 1/2 x 4 3/8	
MONOLITHIC SOUND	PA 500	259.00	A			50		20-20	0.03	Adj.			2 x 7 7/8 x 5 1/4	MOS-FET. As above. As above. Internal crossover optional. MOS-FET.
	PA 700	379.00	A			70		20-20	0.03	Adj.			2 1/8 x 7 1/8 x 6 5/8	
	PA 1600	499.00	A			100		20-20	0.03	Adj.			2 7/8 x 9 7/8 x 6 5/8	
	PA 1600M	499.00	A			160 x 1		20-20	0.03	Adj.			2 7/8 x 9 7/8 x 6 5/8	
	PA 2400Q	549.00	A			60 x 4		20-20	0.03	Adj.	Opt.		2 7/8 x 12 x 6 5/8	
	PA 4000	799.00	A			200		20-20	0.03	Adj.	Opt.		3 3/8 x 10 x 13 1/8	
	EQ-4	299.00	P/E	4	18	90			0.03	Adj.			1 1/2 x 4 5/8 x 4 1/8	
	EXO-2	199.00	C			90			0.03	Adj.			1 5/8 x 6 1/8 x 3 3/8	
NAKAMICHI	PA-400M	429.00	A			110	140 x 1	5-50	0.002	P	No	No	12 5/8 x 2 1/8 x 6 1/4	L + R summing network. Crossover, 50/70/100/150/220 Hz; Model EC-200H, 1.8/2.5/3.5/4.5/6.0 kHz. †Line amplifier.
	PA-350	390.00	A			110	35 x 4	5-50	0.005	P	No	No	12 5/8 x 2 1/8 x 6 1/4	
	PA-300H	370.00	A			115	75	5-50	0.003	P	No	No	12 5/8 x 2 1/8 x 6 1/4	
	PA-150	198.00	A			100	14 x 4	5-50	0.05	P	No	No	5 7/8 x 1 1/4 x 4 1/2	
	EC-200	195.00	C			105			0.003	P	No	No	4 3/4 x 1 3/8 x 4 1/8	
	LA-50	50.00	†			110			0.003	P	No	No	4 1/2 x 1 1/2 x 3	
ORION	300PRQ	149.00	P/E	3	12	98			0.03	P	No	No	4 1/4 x 3 3/4 x 1 1/4	
	200CRX	149.00	C			98			0.01	P	No	No	7 1/2 x 3 1/4 x 1 1/4	
	240gx	239.00	A			98	40	6-40	0.03	Sel.	No	No	7 x 8 1/2 x 2 5/8	
	280gx	399.00	A			98	80	6-40	0.03	Sel.	No	No	10 x 8 1/2 x 2 5/8	
	2200gx	699.00	A			98	200	6-40	0.03	Sel.	No	No	21 x 8 1/2 x 2 5/8	
PANASONIC	CY-SG100	199.95	A/E			74	25 x 4		1	Sel.			7 x 6 x 2	
	CY-SG50	99.95	A/E				12.5 x 4		1	Sel.				
	CY-SA30	79.95	A				25	20-40		S				
	CY-SB25	69.95	A				25	20-30		S				
	CY-SG60	119.95	A/E			83	12.5 x 4		0.8	Sel.			7 x 5 1/8 x 1	



## FOR THE SHEER LOVE OF MUSIC

There's a big difference between real music and "hi-fi". Unfortunately, as you spend more and more on your stereo system, all you usually end up with is more spectacular "hi-fi". This doesn't have to be the case. With a Linn/Naim system, every additional dollar spent actually results in a musical improvement.

This doesn't mean that a system that can provide *music* in your home must cost a fortune. While the Linn/Naim "Six Pack" system pictured above sells for nearly \$20,000, other Linn/Naim systems start at well under \$2,000. And, for less than a

thousand, substantial improvements can be made to your existing system.

Whether you choose to improve your current system, or start with a complete Linn/Naim system, your Linn dealer, because he fully understands that there is a hierarchy to the system, can see to it that each purchase does indeed bring you more enjoyable music, rather than simply more spectacular "hi-fi".

For additional information on Linn and Naim components and the hierarchy of a hi-fi system, contact your Linn/Naim dealer.

Distributed in the United States and Canada by:  
AUDIOPHILE SYSTEMS, LTD., 6842 HAWTHORN PARK DRIVE, INDIANAPOLIS, INDIANA 46220  
ALDBURN ELECTRONICS, LTD., 50 ROLARK DRIVE, SCARBOROUGH, ONTARIO M1R 4G2

Enter No. 6 on Reader Service Card

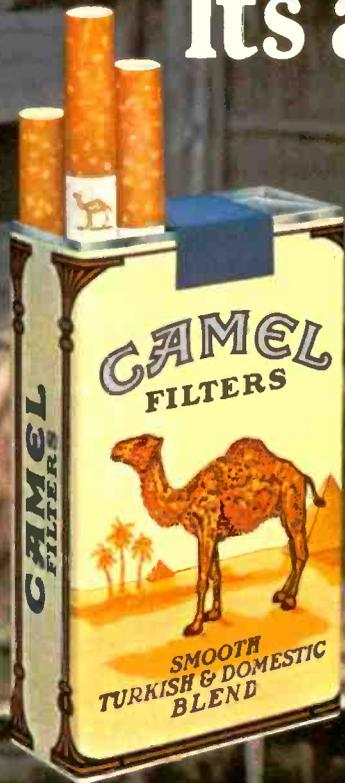
dealer listing is on page 154.

# AMPS/EQUALIZERS/CROSSOVERS

MANUFACTURER	Model	Price, \$	P/E/C	Premix (P), Amp (A), Equalizer (E), Active	Number of EQ Bands	Booster/Col. Range, ± dB	S/N Ratio, dB	Watts/Channel into 4 Ohms, per Ehr. RS-400	Power Bandwidth, Hz to kHz, per EIA RS-400	THD at Rated Output, %/s, per Ehr. RS-400	Input Levels, Selectable (Sel.)	Fader Control?	Application Guide Available?	Dimensions, Inches	Notes
PARASOUND	350EQP 340ECN 100EQB 500EQB 700EQB 400A/B 800A/B	139.95 149.95 99.95 149.95 179.95 129.95 199.95	P/E/C C A/E A/E A/E A A	9 10 7 7	12 12 12 12	80 80 80 80 80 80 80		13 15 40 40 40 40	40-20 30-20 20-20 20-20 20-40	0.25 0.8 0.8 0.8 0.8	Sel. P S Sel. S Sel. S Sel. S	Yes Yes Yes Yes			Crossover at 130 Hz. Bi/triamp selectable.
PHILIPS AUTO AUDIO	EN600 EN220 EN100 EN250 EN2100	300.00 200.00 140.00 350.00 500.00	P/E A C A A	6	12	100 100 100 100 100	20	20-20	0.05 0.1 0.05 0.05	P P P P	Yes		1 3/4 x 6 3/4 x 5 7/8 2 7/8 x 5 1/8 x 7 7/8 5 x 2 x 6 1/2 2 7/8 x 9 3/4 x 7 1/4 2 7/8 x 12 3/4 x 7 1/4		
PIONEER	BP-780 BP-520 GM-A200 GM-A120 GM-5 EQ-003 EQ-001	159.95 109.95 299.95 169.95 79.95 199.95 149.95	A/E S A A A E E	7 7 7 7 7 7	12 12 12 12 12 12	90 70 100 80 70 85 85	12 x 4 10 70 30 10	50-20 50-20 30-20 30-20 30-20	5.0 5.0 0.3 0.3 0.8	Sel. S Sel. S Sel. S Sel. S P P	Yes Yes No No No No Yes	No Yes No No No No No	2 x 5 7/8 x 5 7/8 2 x 5 7/8 x 6 2 3/4 x 9 1/2 x 10 5/8 2 3/4 x 5 7/8 x 8 1/2 1 x 5 7/8 x 6 3/4 1 x 7 1/8 x 5 3/8 1 x 7 1/8 x 5 3/8	With automatic sound levelizer.	
PROTON	222 250 270 271	150.00 300.00 100.00 190.00	A A C P/E/C	7	12 18	90 90 90 90	22 50	20-30 20-30	0.04 0.04 0.05 0.05	Sel. S Sel. S P P	No No No Yes		7 1/2 x 1 1/2 x 4 1/2 10 1/4 x 1 1/4 x 6 1/2 3 7/8 x 1 3/8 x 5 7/8 5 1/4 x 6 3/4 x 1	Bridgeable. Crossover, 75/150 Hz; switchable bass EQ. As above.	
PYLE INDUSTRIES	A100 A200 XSUB1 XSAT1 TXK18 TXK24 TXK37 TXK44	250.00 399.00 59.95 45.95 16.95 17.75 16.95 17.50	A A C C C C C C			100 102	50 100	6-40 6-40	0.02 0.02	P P S S S S S S	Yes Yes Yes Yes Yes Yes Yes Yes		8 1/2 x 7 x 2 1/2 8 1/2 x 10 x 2 1/2 7 x 4 x 1 3/8 7 x 4 x 1 3 x 2 1/2 x 1	Bridgeable, RCA inputs. As above. Subwoofer crossover. Satellite crossover. Tweeter crossover at 4 kHz. As above. As above.	
REALISTIC	12-1870 12-1862 12-1865 12-1868 12-1869	99.95 59.95 54.95 34.95 19.95	A/E A/E A/E A/E A	7 7 5 5 5	12 12 12 12	40 20 20 20 20		60-12 60-15 60-12 60-12 60-12	10 10 10 10 10	Yes Yes No No No	Yes Yes No No No	No No No No No	2 x 6 3/8 x 6 1/2 2 x 5 1/2 x 6 1 1/4 x 5 7/8 x 4 3/4 2 x 5 1/4 x 6 1 x 4 1/4 x 4 3/8		
ROADMASTER	EA400N EA500 EA700N EA1000	50.00 75.00 100.00 100.00	A/E A/E A/E A/E	5 5 7 10	12 12 12 12	80 80 80 85	25 x 4 25 x 4 25 x 4 40 x 4	20-30 20-30 20-30 20-30	10 10 10 10	S S S S	Yes Yes Yes Yes	No No No No	1 x 4 3/8 x 4 3/8 1 1/4 x 4 1/4 x 6 1 1/4 x 4 1/4 x 6 1 1/4 x 5 1/2 x 4 1/4		
ROCKFORD FOSGATE	Punch 40 Punch 75 Punch 150 Power 200 Power 360 Power 650 MOSFET 250 Z OEQ-1	200.00 300.00 420.00 460.00 900.00 1500.00 150.00 250.00 275.00	A/E A/E A/E A A/C A/C P/E P/E E	2 2 2 2 2 2 2 5 5	† † † † † † † ††† †††	80 80 80 80 80 80 80 80 80	20 3.75 75 100 90 x 4, 180 x 2, 125 x 4, 325 x 2	20-20 20-20 20-20 20-20 20-20	0.05 0.05 0.05 0.05 0.05 0.05 0.025 0.02 0.02	Sel. Var. No No No No No No No No	No No No No No No No No No	No No No No No No No No No	1 7/8 x 7 7/8 x 5 1/4 1 7/8 x 7 7/8 x 8 1/4 1 7/8 x 8 1/8 x 8 1/8 1 7/8 x 8 x 9 1/4 2 1/4 x 8 1/4 x 15 1/4 2 3/8 x 8 1/4 x 18 1/2 1 5/8 x 2 3/8 x 4 1 3/4 x 7 x 4 1 1/4 x 4 1/2 x 8 1/2	†Bass, +18 dB; treble, +12 dB; bridgeable. As above. As above. Bridgeable. As above. As above. As above. ††Bass, ±18 dB; treble, ±12 dB. †††Nine EQ bands with switchable center frequencies (eight bands from 31 Hz to 4 kHz, one band at 12 kHz).	
SANSUI	SM-150 SM-100 SM-50 SG-A500	299.00 229.00 99.00 149.00	A A A A/E	7	12	90 90 90 80	15 x 4 45 16 15	1	Sel. S Sel. S Sel. S Sel. S	No No No Yes	Yes Yes Yes Yes		2 7/8 x 7 7/8 x 8 1/2 2 7/8 x 7 7/8 x 8 1/2 1 5/8 x 3 1/2 x 6 1/2		
SANYO	EQZ6210 EQZ10 PA6050 PA6100 PA6110	79.95 129.95 129.95 159.95 179.95	E E A A A	7 7	12 12	70 80 70 70 70	25 50 50	20-20 20-20 20-20	0.05 0.05 0.05	Sel. S Sel. S Sel. S Sel. S	Yes Yes		6 1/2 x 2 x 4 3/4 6 1/2 x 2 x 4 3/4 7 1/2 x 2 1/2 x 8 7 1/2 x 3 3/4 x 7 1/2 7 1/2 x 3 3/4 x 7 1/2	†Motorized.	
SHERWOOD	SCA-240 EOA-260 SCA-2100	79.95 129.95 249.95	A A/E A	7	12	85 85 90	20 20 90	15-35 15-30 10-30	10 10 10	Sel. S Sel. S Sel. S	No Yes No	No No No	6 x 1 1/8 x 6 1/8 6 1/4 x 1 1/8 x 6 3 3/4 x 8 x 9 3/4	Bridgeable.	
SOUNDSTREAM	D200 Class A40 D100 DX1	449.00 350.00 295.00 219.00	A A A C			100 18 50		20-20 20-20 20-20	0.1 0.1 0.1 0.02	Sel. S Sel. S Sel. S P	No No No No	No No No No	2 1/4 x 7 x 11 1/8 2 1/4 x 7 x 6 1/8 2 1/4 x 7 x 6 1/8 1 x 7 x 3 3/8	Dual mono; bridgeable. Class A, MOS-FET. Bridgeable. Separately adjustable high (75/100/150/200 Hz) and low (150 to 250 Hz) crossover frequencies.	
SPARKOMATIC	GE 70 GE 50 LC52	89.95 39.95 19.95	A/E A/E A	7 5	12 12	70 20 20	20 x 4 20 20	20-20 20-20 20-20	80 40 40	Sel. S Sel. S Sel. S	Yes Yes No	Yes Yes Yes	6 1/4 x 2 1/8 x 6 1/4 4 3/4 x 4 3/4 x 1 3/8 4 1/8 x 4 x 1 1/4		

# CAMEL FILTERS

It's a whole new world.



Today's  
Camel Filters,  
surprisingly smooth.



Warning: The Surgeon General Has Determined  
That Cigarette Smoking Is Dangerous to Your Health.

16 mg. "tar", 1.2 mg. nicotine av. per cigarette by FTC method.

# AMPS/EQUALIZERS/CROSSEOVERS

MANUFACTURER	Model	Price, \$	Preamp (P), Amp (A), Equalizer (E), Active	Number of EQ Bands	Boost/Cut Bands	S/N Ratio, dB	Watts Channel Into 4 Ohms, Per EIA RS-490	Power Bandwidth, Hz to kHz, Per EIA RS-490	THD at Rated Output, %	Input Levels: Preamp (P), Speaker (S), Selectable (Sel.)	Fader Control?	Application Guide Available?	Dimensions, Inches	Notes
SPECO	EPB-150	120.95	A/E/C	10	12	75	25-20	0.1		Yes			6 1/2 x 1 1/4 x 5 1/2	
	EPB-100	99.95	A/E/C	7	12	50	25-20	0.1		Yes			5 7/8 x 1 1/8 x 5 1/2	
	EPB-50	79.95	A/E/C	5	12	25	20-20	0.1		Yes			4 3/4 x 1 1/4 x 6 1/2	
TARGA	HT-7000EQ	64.95	A/E	7	12	75	16	20-30	0.25	Sel.	Yes	No	1 x 7 x 4 3/8	
	HT-7100EQ	74.95	A/E	7	12	75	16	20-30	0.25	Sel.	Yes	No	1 1/8 x 6 1/4 x 4 3/4	
	HT-7200EQ	129.95	A/E	7	12	75	32	20-30	0.25	Sel.	Yes	No	1 3/4 x 6 1/4 x 6 1/2	
	HT-240A	194.95	A			85	65	20-30	0.1	Sel.	No	No	3 x 1 1/2 x 6 1/2	
	Mach-AP120	139.95	A			85	32	20-30	0.1	Sel.	No	No	2 x 6 x 6 3/4	
TEI	49-250		A/C			72	25 x 1	20-180 Hz		S	No	Yes	6 1/2 x 7 7/8 x 5 1/2	Subwoofer amp; includes speaker, 7 7/8 x 3 3/4 x 5 3/4.
	49-213		A/E/C	9	12	65	37.5 x 4	20-20	0.01	Sel.	Yes	Yes	7 x 6 3/4 x 1 3/4	
	49-191		A			60	75	20-20	0.01	Sel.	Yes	Yes	6 3/8 x 3 x 6	
	49-192		P/E/C	10	12	60				Sel.	Yes	Yes	6 1/4 x 1 x 5 1/4	Passive EQ. Spectrum analyzer.
	49-215		A/E/C	5	12	65	15 x 4	20-20		S	Yes	Yes	7 x 5 x 2	
49-194		A/E/C	7	12	65	15 x 4	20-20		S	Yes	Yes	7 7/8 x 1 7/8 x 7 1/2		
VECTOR RESEARCH	VM-80	199.95	A			70	20-20	0.9	Sel.	No	No	2 x 7 x 10		
YAMAHA	YGE-600	200.00	E	5	12	95				P	Yes	Yes	6 1/4 x 2 x 4 7/8	Automatic volume level, three memory presets. Crossover, 80 Hz/200 Hz/3.5 kHz. Crossover, 80-200 Hz.
	YGE-400	150.00	E/C	7	12	100				P	Yes	Yes	6 1/2 x 1 1/2 x 5 5/8	Two- or three-way crossover frequencies at 80 Hz, 130 Hz, 200 Hz, 2 kHz, 3.5 kHz and 6 kHz.
	YGA-618	175.00	A/E/C	5	12	90	15	30-20	0.25	P	Yes	Yes	8 1/4 x 1 5/8 x 6 1/2	Input level adjustable.
	YEL-400	100.00	C			115				P	No	Yes	6 1/4 x 1 3/4 x 7 7/8	As above, crossover at 80/200 Hz.
	YPA-200	100.00	A			95	18	20-30	0.5	P	No	Yes	8 3/4 x 1 3/8 x 6 1/2	Input level adjustable, crossover at 200 Hz.
	YPA-400	200.00	A			95	18 x 4	20-30	0.5	P	No	Yes	6 1/4 x 1 3/4 x 7 7/8	
	YPA-500	250.00	A/C			95	50 x 2, 150 x 1	20-30	0.03	P	No	Yes	8 3/8 x 3 x 9 5/8	
YPA-800	350.00	A/C			100	40 x 4, 100 x 2	20-30	0.25	P	No	Yes	6 1/4 x 1 3/4 x 9 7/8		
ZAPCO	System 150	433.00	A			105	80	5-100	0.05	P	No	No	†	†Amp, 5 1/4 x 5 7/8 x 3 3/4 and power supply, 7 x 3 3/8 x 2 1/8.
	System 200	497.00	A			105	100	5-100	0.05	P	No	No	†	
	System 150A	571.00	A			105	80	5-100	0.02	P	No	No	†	
	System 200A	633.00	A			105	100	5-100	0.02	P	No	No	†	
	PX	450.00	P/E/C	4	20	103			0.005	Sel.	No	No	††	††Main unit, 2 x 4 x 6 and power supply, 1 1/4 x 3 x 4 1/2; variable crossover frequency. As above.
	AEX PEQ	333.00 313.00	C P/E	9	18	103 92			0.005 0.05	Sel. Sel.	No No	No No	†† 4 1/4 x 8 3/4 x 1 1/8	

# SPEAKERS

MANUFACTURER	Model	Price \$ (If Sold Individually)	Price \$ (If Sold in Pairs)	Recommended Maximum Power, Watts	Sensitivity, dB SPL (1 Watt/1 Meter)	Impedance, Ohms	Frequency Response, Hz to kHz, ±dB	DRIVERS														
								Subwoofer Only (S), Woofer Only (W), Midrange Only (M), Tweeter Only (T)	Woofer Size, Inches	Whizzer (W), 2-Way (2), 3-Way (3), 4-Way (4)	Angled Drivers (A), Pointable Drivers (P)	Flush Mount (F), Surface Mount (S), Enceinte (C)	Maximum Required Mounting Depth, Inches	Weatherproof?	Application Guide Available?	Notes						
ADS	200CC	134.50		50	88	4	85-20 ±3															
	300CC	174.50		75	90	4	68-20 ±3															
	300I	134.50		100	90	4	50-20 ±3															
	315I	159.50		100	90	4	58-20 ±3															
	320I CS700	199.50 259.00		100 120	91 91	4	58-20 ±3 30-Xover ±3	S	5 1/4 (2) 7 1/2	2	†	††	1 1/2 1 5/8	Yes Yes	No No	No No	†Angled tweeter (pointable with kit); †† flush-mount woofer, surface-mount tweeter; three pieces, including passive crossover. As above. Three pieces, including AX2 active crossover.					

# TAKES A POUNDING AND KEEPS ON SOUNDING



There are really only two things a good car speaker must do well: (1) Withstand the factors of the car's environment; temperature, sunlight, moisture and vibration, and (2) Sound great.

As a result, we're proud to offer a new line of car speakers which have been designed and constructed without compromise. All Cerwin-Vega Car Stereo speakers feature the highest quality construction techniques and materials. The massive, high energy magnet assemblies (5.5 lbs.) far outweigh anything used in competitive speakers, and allow enormous power handling (up to 150 watts) and excellent efficiency.

Cerwin-Vega is also one of a handful of manufacturers using die-cast aluminum for all car speaker frame designs. This rock solid structure ensures precise alignment of all motor parts, and complete resistance to corrosion, warpage, and physical abuse.

We've also been able to eliminate inferior materials like plastic from the design of these speakers; the all-metal grilles are completely impervious to heat, direct sun, and ultraviolet light.

Cerwin-Vega's overall engineering excellence results in car speakers of unequalled power handling, sensitivity, dynamic range, and accuracy. In short, they sound so good, they just might put a dent in the competition!

12250 Montague St., Arleta, CA 91331 (213) 896-0777, Telex No. 662250.

 **Cerwin-Vega!**

*car speakers*



# SPEAKERS

MANUFACTURER	Model	Price, \$ (If Sold Individually)	Price, \$ (If Sold in Pairs)	Recommended Maximum Power, Watts	Sensitivity, dB SPL (1 Watt/1 Meter)	Impedance, Ohms	Frequency Response, Hz to kHz, ±dB	DRIVERS									
								Subwoofer Only (S) Midrange Only (M), Tweeter Only (T)	Woofer Size, Inches	Whizzer (W), Inches	Angled Drivers = A, 2-Way (2), 3-Way (3), 4-Way (4)	Flush Mount (F) Conceivable (C)	Maximum Required Surround Mount (S)	Weatherproofed?	Application Guide Available?	Notes	
AFS KRIKET	8976		224.95	100	95	4	35-20 ± 5		6 x 9	3		F	3 3/4	Yes	No		
	8974		189.95	90	93	4	40-20 ± 5		6 x 9	2		F	3 1/2	No	No		
	8936		169.50	60	94	4	50-20 ± 5		6 x 9	3		F	3 1/4	Yes	No		
	8234		139.95	50	93	4	60-20 ± 5		5 1/4	2		F	2 1/2	Yes	No		
	8232		97.50	50	92	4	60-18 ± 5		5 1/4	2		F	2 1/2	No	No		
	8424		118.50	30	89	4	65-20 ± 5		4	2		F	1 1/2	No	No		
	8422		89.95	25	89	4	65-18 ± 5		4	2		F	1 1/2	No	No		
	2122	39.95	25	90	4	70-18 ± 5		4	2			F	1 1/8	No	No		
	7311	17.50	20	89	8	80-20 ± 5		3 1/2	W			F	1 1/8	No	No		
	8074		159.95	60	93	4	60-20 ± 5		4 x 10	2		F	3 1/8	No	No		
2734	63.95	40	93	8	60-20 ± 5		5 x 7	2			F	2 1/2	No	No			
AIWA	SC-X40			30	90	4	55-20		4	2		F	1 3/8	No	Yes	Two-step tweeter level control. As above.	
	SC-X60			40	90	4	55-20		5 1/4	2		F	1 3/8	No	Yes		
	SC-X90			40	90	4	45-20		6 x 9	3		F	3	No	Yes		
ALPHASONIK	D-6200		150.00	50	92	4	70-25 ± 3		4 1/4	2		C	1 1/2	Yes		With 6-dB/octave crossover; 12-dB/ octave crossover optional.  Grille optional. As above.	
	D-7200		235.00	75	92	4	45-25 ± 3		5 1/4	2		S	2 1/4	Yes			
	W620G	54.00	100	4	4	45-3.5 ± 4	W	6			C		No				
	W625G	54.00	80	4	4	45-5 ± 4	W	6			C		Yes				
	WP6920G	54.00	100	4	4	40-3 ± 4	W	6 x 9			C						
	WP820	54.00	100	4	4	40-3 ± 4	W	8			C		Yes				
	SW6025G	54.00	120	4	4	32-2.5 ± 3		6			C		No				
	SW8030	56.00	150	4	4	28-2.5 ± 3		8			C		No				
	MP55G	26.10	60	4	4	700-6 ± 3	M				C		No				
	T-35	13.30	30	4	4	2.5k-18k ± 3	T				C		Yes				
ALPINE	6393		180.00	100	93	4	40-22 ± 3		6 x 9	3		F	3 1/2			Separate drivers with crossover.  As above.  As above.  †Dual voice-coils, 4 ohms per coil.	
	6391		150.00	100	91	4	30-20 ± 3		6 x 9	3		F	3 3/4				
	6362		100.00	60	91	4	50-21 ± 3		6 1/2	3		F	1 7/8				
	6352		90.00	60	91	4	65-20 ± 3		5 1/4	3		F	1 1/2				
	6254		200.00	100	90	4	50-22 ± 3		5 1/4	2		F, S	1 7/8				
	6253		60.00	40	90	4	60-20 ± 3		5	2		F	1 1/2				
	6236		80.00	60	91	4	50-20 ± 3		5 1/4	2		F	2				
	6217		110.00	60	87	4	65-22 ± 3		4	2		F	1 3/8				
	6216		70.00	40	89	4	60-20 ± 3		4	2		F	1 7/8				
	6214		100.00	60	91	4	60-20 ± 3		4 x 10	2		F	2 1/2				
	6209		100.00	80	93	4	45-25 ± 3		6 x 9	2		F	2 3/8				
	6207		130.00	80	90	4	50-22 ± 3		5 1/4	2		F	1 3/4				
	6205		90.00	60	92	4	45-21 ± 3		6 x 9	2		F	3 3/4				
	6203		80.00	40	90	4	50-20 ± 3		6 1/2	2		F	2 3/8				
	6190		120.00	150	92	4	30-6 ± 3	S	6 x 9	2		F	3 1/2				
	6142		50.00	40	91	4	80-20 ± 3		4 x 6	W		F	1 1/2				
	6141		50.00	20	90	4	80-20 ± 3		4	W		F	1 1/2				
	6130		45.00	20	88	4	30-20 ± 3		3 1/2	W		F	1 1/2				
	6117		100.00	80	89	4	2k-30k ± 3			2		S		No			
	6243		60.00	40	90	4	55-20 ± 3		4 x 6	2		F	1 3/4	No			
6264		120.00	80	91	4	45-22 ± 3		6 1/2	2		F	2 3/8	No				
6293		130.00	100	93	4	40-22 ± 3		6 x 9	2		F	3 1/8	No				
6490		250.00	150	89	4	50-1.5 ± 3	S	6 x 9			S		No				
6170		80.00	100	90	4	35-10 ± 3		7			F	3 3/8	No				
6100		190.00	150	92	4	30-6 ± 3	S	10			F	4 3/8	No				
6191	65.00	60	94	†	35-5 ± 3		S	(2) 6 x 9			F	3 1/2	No				
AR	AR1CS	129.99	100	94	4	38-32		5 1/4	2		F	1 1/4	Yes	No	With crossover.		
	AR1CSJ	99.99	100	94	4	38-32		5 1/4	2		F	2 1/8	Yes	No			
	AR1MS	124.99	75	94	4	95-25		4	2		S		Yes	No			
	AR2CS	99.99	100	94	4	65-32		4	2		F	1 1/8	Yes	No			
	AR3CS	32.99	20	100	4	100-30			W		F	1 3/4	Yes	No			
	AR4CS	59.99	100	97	4	42-27		5 1/4	2		F	2 1/4	Yes	No			
	AR6CS	79.95	70	98	4	33-30		6 x 9	2		F		No	No			
	HFC 1.25	29.99	250	94	8	2k-22k	T				F	3/4	No	No			
	LMFC 5.25	39.99	94	4	4	40-4					F	2 1/4	No	No			
	LFC 8.00	44.99	250	94	8	28-2	S	8			F	3 3/8	No	No			
ARA	6700647		32.95	20	85	6	130-17 ± 6		4	2		F	1 7/8	No	Yes	With adaptor for 4 x 6-inch mounting.	
	6700649		17.95	15	88	6	115-10 ± 6		3 1/4	2		F	1 3/8	No	Yes		
	6700687		34.95	25	90	6	60-20 ± 6		6	W		F	2 1/2	No	Yes		
	6700686		29.95	25	90	6	130-17 ± 6		4	W		F	1 5/8	No	Yes		
	6700638		69.95	40	92	6	50-18 ± 5		6 x 9	3		F	3 3/8	No			
	6700639		59.95	40	90	6	50-17 ± 5		6 x 9	2		F	3 3/8	No			
	6700641		29.95	20	88	6	100-17 ± 6		4 x 6	3		F	2	No			
	6700642		49.95	25	87	6	100-16 ± 6		6	3		F	2 1/2	No			
	6700643		39.95	25	92	6	60-18 ± 6		6	2		F	2 1/2	No			
	6700646		34.95	25	88	6	100-17 ± 6		5 1/4	2		F	1 3/4	No			
AUDIO	CSX-350	90.00	80	87	4	125-10	M				F	1.6	Yes	Yes	With adaptor for 4 x 6-inch mounting.		
	CSX-800	155.00	130	93	4	30-2	S	8			F	3.4	Yes	Yes			
	CSX-650	110.00	110	91	4	35-3	S	6 1/2			F	2.8	Yes	Yes			
	CSX-105	90.00	100	89	4	3k-20k	T	1			C	1	Yes	Yes			
	CSX-695	180.00	100	91	4	40-22		6 x 9	3		F	3.2	Yes	Yes			
	CSX-655	125.00	80	90	4	40-20		6 1/2	2		F	2.5	Yes	Yes			
	CSX-465	90.00	80	92	4	85-21		4	2		F	1.9	Yes	Yes			
	CSX-535	250.00	100	88	4	60-20		5 1/4	2		F	2	Yes	Yes			
	CSX-405	180.00	80	85	4	60-20		4	2		F	1.5	Yes	Yes			
	CSX-402	120.00	80	90	4	80-22		4	2		F	1.5	Yes	Yes			
AUDIO PRO	B2-07	499.95	30 Inc.	105		40-250 Hz	S	4				8	No		With preamp- and speaker-level inputs.		

# The Sound of Nakamichi



Never before has so much technology been concentrated in one modestly priced cassette deck.

No other recorder in its class can claim to possess the three essential ingredients of sonic perfection—the legendary Nakamichi Discrete 3-Head approach to recording, the unique Direct-Drive Asymmetrical Dual-Capstan Damped-Resonance transport, and the most sophisticated wide-range low-distortion electronics in the industry.

*Its name—The Nakamichi BX-300.*

*Its heritage—Nakamichi.*

*Its destiny—Legendary.*

See it...Hear it...You can afford  
The Sound of Nakamichi.



Nakamichi U.S.A. Corporation 19701 South Vermont Ave., Torrance, CA 90502 (213) 538-8150  
In Canada: W. Carsen Co., Ltd., 25 Scarsdale Road, Con Mills, Ontario M3B 3G7



# NO OTHER HI-FI VCR CAN GIVE YOU THIS KIND OF MENU.



tures. In addition to incredible hi-fi sound and remote input capability, you get the flexibility of programming directly through the machine. Four heads provide picture-perfect record, playback and special effects. A cable-ready, 139-channel tuner provides 28-day/8 event programmability; a lighted tape area allows tape usage monitoring.

And if there's a power outage during the night, the VS-603 is one VCR you won't have to reprogram in the morning. Because instead of the normal one hour back-up memory, there's 7-day back-up power.

So if you're looking for the best in VHS hi-fi VCR's, look no further.

AKAI's new VS-603 is really going to open some ears. And eyes.



AKAI's new Hi-Fi VS-603 may well make ordinary VCR programming seem obsolete.

Because now, the combination of convenient full-function wireless remote programming *and* an interactive monitor system allows you to see the *full* menu

of 8 programs. All at *one time*. So there's no waiting for that missed portion to reappear on the display. And no more missed shows due to programming accidents.

What's more, the new AKAI VS-603 comes jam-packed with plenty of other impressive fea-

**AKAI**  
Hi-Fi  **VHS**

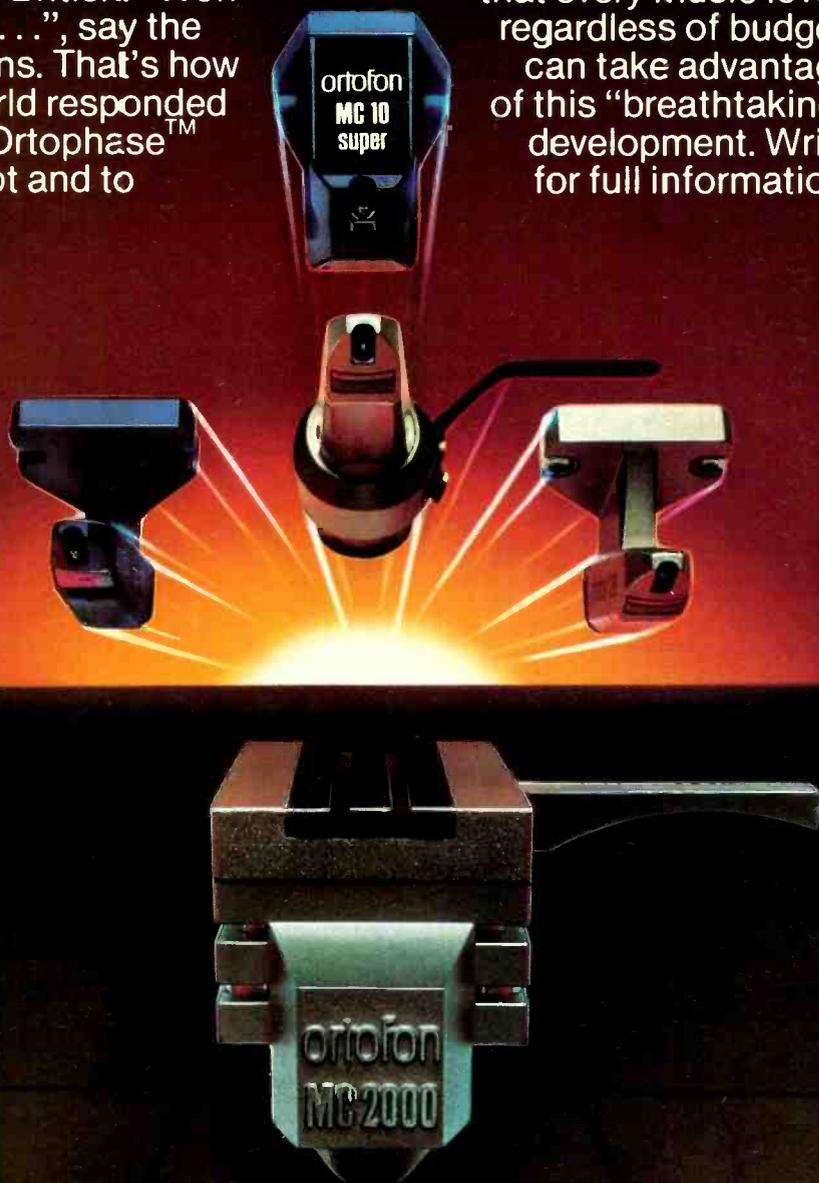


# ORTOPHASE™

And listening can never be the same again.

"Breathtaking . . .", say the U.S. critics. "Habit forming . . .", say the Swedes. "Heavenly . . .", say the Danes. ". . . Cannot fail to delight . . .", say the British. "Wunderbar . . .", say the Germans. That's how the world responded to the Ortophase™ concept and to

the spectacular Ortofon MC2000. Now the Ortophase principle has been incorporated into a full range of moving coil cartridges. This means that every music lover, regardless of budget, can take advantage of this "breathtaking" development. Write for full information.



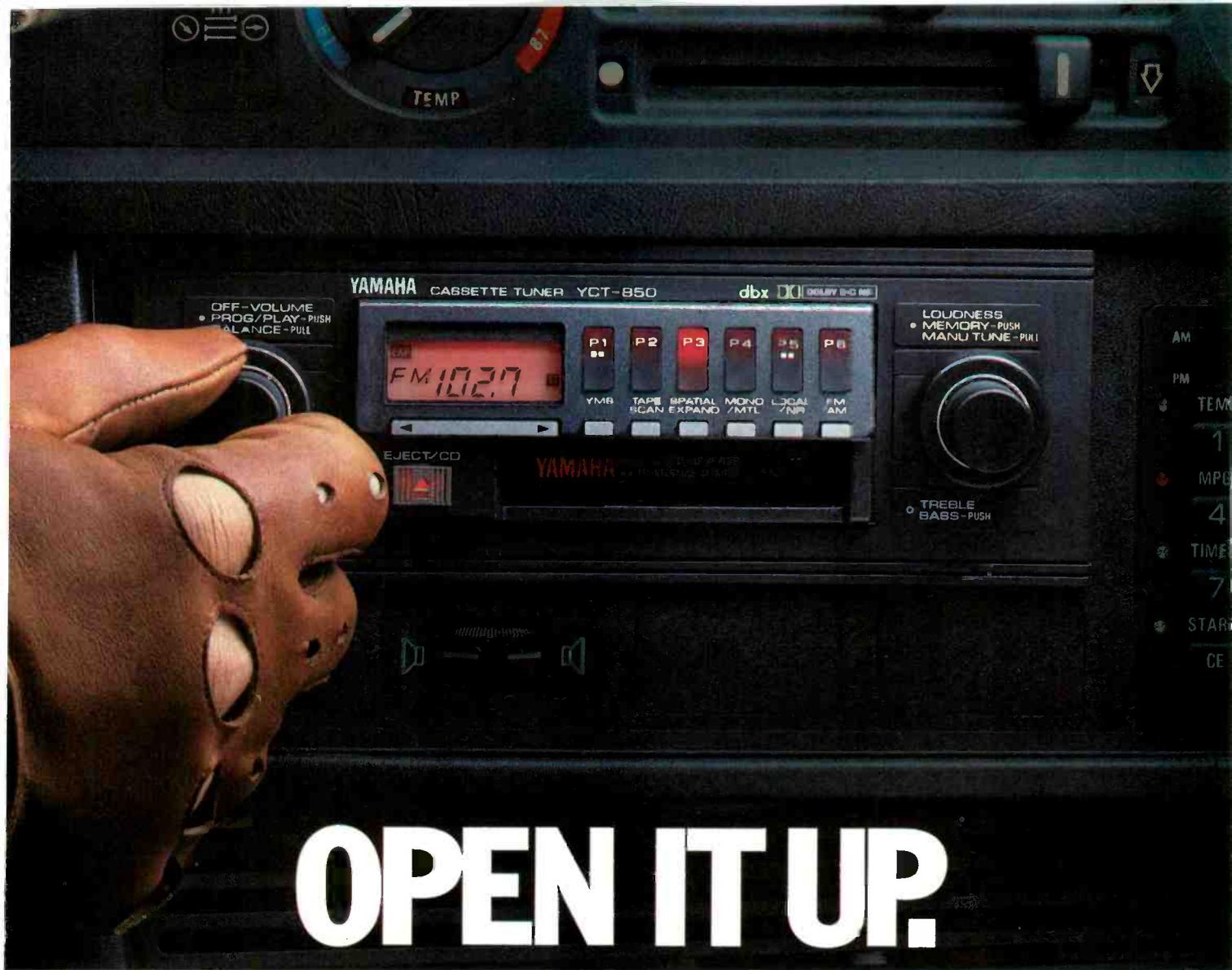
ortofon

122 Dupont Street, Plainview, New York 11803  
Send \$1 for beautiful, Ortofon poster.

Enter No. 40 on Reader Service Card

# SPEAKERS

MANUFACTURER	Model	Price \$ (if Sold Individually)	Price \$ (if Sold in Pairs)	Recommended Maximum Power, Watts	Sensitivity, dB SPL (1 Watt/1 Meter)	Impedance, Ohms	Frequency Response, Hz to kHz, ±dB	DRIVERS									
								Subwoofer Only (S) Midrange Only (M), Tweeter Only (T)	Woofer Size, Inches	Whizzer (W), Inches	Angled Drivers (A), Inches	Flare Mount (F), Convertible (C)	Maximum Required Mounting Depth, Inches	Weatherproofed?	Application Guide Available?	Notes	
CRAIG	V306	26.95	20	88.0	4	90-21 ± 9	3 1/2					F	1 1/8	Yes	Yes		
	V108	21.95	10	93.0	4	100-14 ± 9	4					F	1 1/8	No	Yes		
	V307	44.95	20	86.5	4	80-25	4	W				F	1 1/2	Yes	Yes		
	V324	54.95	25	85.0	4	+6, -10	4	2				F	1 1/2	Yes	Yes		
	V308	44.95	25	92.0	4	72-25 ± 9	5	W				F	1 1/8	Yes	Yes		
	V325	54.95	30	94.5	4	95-20	5	2				F	1 1/8	Yes	Yes		
	V342	54.95	25	91.5	4	+5, -10	5	2				F	1 1/8	Yes	Yes		
	V109	23.95	16	89.0	4	90-17	4 x 6	2				F	1 3/4	Yes	Yes		
	V204	44.95	16	89.0	4	+4, -10	60-21					F	1 3/4	No	Yes		
	V309	57.95	30	91.0	4	+6, -10	62-19 ± 10	6 1/2				F	1 1/2	Yes	Yes		
	V326	64.95	25	89.0	4	70-22 ± 10	6 1/2	W				F	1 1/2	Yes	Yes		
	V327	89.95	50	92.5	4	50-23	6 1/2	2	A			F	2 1/8	Yes	Yes	Bayonet-mount tweeter.	
	V823	129.95	100	91.5	4	+8, -10	82-23	6 1/2	2	P		F	2 3/4	Yes	Yes	As above.	
	V231	47.95	25	89.0	4	+5, -10	85-23	6 1/2	3			F	2 3/8	No	Yes		
	V330	99.95	50	92.5	4	+5, -10	62-24	6 1/2	3	A		F	2 3/8	Yes	Yes	As above.	
	V831	139.95	100	91.5	4	+5, -10	85-24	6 1/2	3	P		F	2 3/4	Yes	Yes	As above.	
	V243	38.95	20	91.0	4	+5, -10	50-14	6 x 9	W			F	2 3/4	No	Yes		
	V364	89.95	50	92.0	4	+4, -10	50-22	6 x 9	2	A		F	2 3/8	Yes	Yes		
	V863	149.95	100	93.0	4	+6, -10	50-21	6 x 9	2	A		F	3	Yes	Yes		
	V253	52.95	50	91.0	4	+3, -10	50-23 ± 10	6 x 9	3			F	3	No	Yes		
V352	104.95	50	92.0	4	+6, -10	50-22	6 x 9	3	A		F	2 3/8	Yes	Yes			
V852	159.95	100	93.0	4	+3, -10	50-21	6 x 9	3	A		F	3	Yes	Yes			
CYBERNET	CSP123	138.00	60	85	8	60-22 ± 3	4	3	P	S	4 3/8	Yes	No				
	CSP603	199.00	110	90	4	60-22 ± 3	6	3	P	F	2 3/8	Yes	No				
DYNAMIC ACOUSTICS	DAT-1	20.00	40	96	4	1.1k-21k	T					C		Yes	No		
	DAT-2	17.00	30	92	4	1.7k-19k	T					F		Yes	No		
	DAT-3	12.00	25	91	4	1.2k-19k	T					F		Yes	No		
	DAM-4010	24.00	40	92	4	85-6	M					C		Yes	No		
	DAM-4510	30.00	50	91	4	140-5	M					C		Yes	No		
	DAM-5010	40.00	50	92	4/8	60-5	M					C		Yes	No		
	DAW-5015	45.00	70	91	4/8	55-2.5	M	5 1/4				C		Yes	No		
	DAW-6510	50.00	60	92	4/8	55-4	W	6 1/2				C		Yes	No		
	DAW-6515	55.00	80	91	4/8	50-2.5	W	6 1/2				C		Yes	No		
	DAW-6915	60.00	100	91	4	55-2.5	W	6 x 9				C		Yes	No		
	DAW-8015	65.00	100	91	4/8	55-2.5	W	8				C		Yes	No		
DCM-1	149.50	50	91	4	90-20	W	4				S		Yes	No			
EGO SYSTEMS	EC401	89.00	40	95	4	50-20 ± 3	4	2		S	1 1/2	Yes	No		Blamp capable.		
	EC501	99.00	40	96	4	50-20 ± 3	5	2		S	1 1/4	Yes	No		As above.		
	EC651	99.00	40	96	4	50-20 ± 3	6 1/2	2		S	1 1/8	Yes	No		As above.		
EPI	LS45	49.95	50	91	4	90-12	5 1/4					F	1 1/4			With spacer.	
	LS55	79.95	50	91	4	90-20	5 1/4	2				F	1 1/2			As above.	
	LS60	89.95	50	94	4	90-20	6 1/2	2				F	1 7/8				
	LS65	119.95	50	94	4	90-20	6 1/2	3				F	1 7/8			Separate drivers.	
	LS70X	199.95	80	88	8	70-20 ± 3	6	2				F	2 1/4				
	LS81	179.95	80	87	4	80-20 ± 3	4 1/2	2				F	1 1/2			With spacer; fits 4 x 10-inch hole.	
	LS80X	250.00	80	88	4	80-20 ± 3	5 1/4	2				F, S	1 3/8			Separate drivers.	
	LS641	300.00	150	87	4	55-20 ± 3	6	3				F	3 3/8			Separate woofer.	
LS841	340.00	150	87	4	45-20 ± 3	8	3				F	4			As above.		
ESS	LS-2	169.00	125	92.5	4	45-22	6 x 9	2				F	2 7/8			Heil tweeter.	
FUJITSU TEN	SG-1211		45	91	4	60-21	5	2	P	C	1 3/8	Yes	Yes				
	SG-1019		45	90	4	80-21	4	2	P	C	1 3/4	Yes	Yes				
	SG-1018		45	90	4	75-21	4	2	P	C	1 1/2	Yes	Yes				
	SG-6905		120	93	4	40-20 ± 3	6 x 9	3	P	C	1 5/8	Yes	Yes				
	SG-6904		120	93	4	40-20	6 x 9	2	P	C	2 7/8	Yes	Yes				
	SG-1623		90	91	4	40-21	6 1/2	3	P	C	2	Yes	Yes				
	SG-1622		60	92	4	55-22	6 1/2	2	A	C	1 1/2	Yes	Yes				
	SG-1621		45	92	4	55-22	6 1/2	2	P	C	1 1/2	Yes	Yes				
	SG-6903	119.95	120	93	4	40-20	6 x 9	3		C	3	Yes	Yes				
	SG-6902	94.95	120	93	4	40-20	6 x 9	2		C	3	Yes	Yes				
	SG-1615	99.95	90	91	4	60-20	6 1/2	3		C	2 5/8	Yes	Yes				
	SG-1614	79.95	90	91	4	60-20	6 1/2	2		C	2 5/8	Yes	Yes				
	SG-1013	69.95	60	90	4	80-20	6 1/2	2		C	1 1/4	Yes	Yes				



# OPEN IT UP.

Most car audio systems can deliver the sound of performance. Enough sound to exceed the human ear's threshold of pain.

But if your taste in music runs the gamut, from the smash of Heavy Metal to the intricate passages of Mozart, volume alone isn't enough. Without sonic excellence, loud sound is just so much musical mush.

PLAY IT GOOD AND LOUD.

Now you can have it both ways with Yamaha car audio. The system that takes some of the world's finest home component performance and puts it on the road.

Yamaha cassette-receivers utilize independent dual microprocessors with over 6K of memory. One precisely controls tape handling. The second fine-tunes signals in difficult reception areas.

Yamaha fully digital power amps provide superior, virtually distortion-free amplification.

And easily cope with such road hazards as voltage, impedance and temperature variations.

Yamaha car speaker systems use titanium carbide in the tweeters and carbon fiber in the woofers. Resulting in unrivaled accuracy.

And unequalled performance.

ALL TOGETHER, A GREAT PERFORMANCE.

Just as important, Yamaha car audio is a total system with no weak links. Because every Yamaha component is designed to complement and enhance the performance of the system as a whole.

The result is sound that's clean and natural, reproduced with full clarity and resonance. Sound that makes the music.

No matter how loud it's played.

 **YAMAHA**

Yamaha Electronics Corporation, USA, P.O. Box 6660, Buena Park, CA 90622

# SPEAKERS

MANUFACTURER	Model	DRIVERS										Notes			
		Price \$ (if Sold Individually)	Price \$ (if Sold in Pairs)	Recommended Maximum Power, Watts	Sensitivity, dB SPL (1 Watt/1 Meter)	Impedance, Ohms	Frequency Response, Hz to kHz, ±dB	Speaker Only (S) Midrange Only (M) Tweeter Only (T)	Woofer Size, Inches	Whizzer (W), 2-Way (2), 3-Way (3), 4-Way (4)	Fused Mount (F) Surface Mount (S)		Maximum Required Mounting Depth, Inches	Weatherproofed?	Application Guide Available?
ARTHUR FULMER	15-9990	149.95	100	4	30-22 ±3		6 x 9	3		F	4 7/8	No	No	Blamp capable. As above.	
	15-9790	119.95	75	4	60-20 ±3		5 1/4	3		F	2 3/4	No	No		
	15-9690	79.95	40	4	40-20 ±3		6 x 9	3		F	4	No	No		
	15-9670	59.95	35	4	40-20 ±3		6 x 9	2		F	3 3/4	No	No		
	15-9490	69.95	30	4	60-20 ±3		5 1/4	3		F	2 3/8	No	No		
	15-9470	49.95	25	4	55-18 ±3		5 1/4	2		F	1 5/8	No	No		
	15-9435	39.95	20	4	70-17 ±3		4	2		F	1 1/2	No	No		
	15-9425	29.95	10	4	80-15 ±3		3 1/2	W		F	1	No	No		
	15-9270	129.95	50	4	50-20 ±3		4	3		S	1	No	No		
	15-9250	69.95	35	4	60-18 ±3		3	2		S		No	No		
	15-9240	24.95	7	4	90-14 ±3		5	W		C	3/8	No	No		
	15-9069	29.95	30	4	40-20 ±3		6 x 9	W		S	3	No	No		
	15-9006	24.95	25	4	65-18 ±3		5 1/4	W		S	2 1/8	No	No		
	GENESIS	AM 135	175.00	60	91	8	60-20 ±4		5 1/4	2	F	1 1/2	Yes		
AM 165		210.00	80	91	8	50-20 ±4		6 1/2	2	F	2 1/4	Yes			
AS 165		240.00	100	91	8	50-20 ±4		6 1/2	2	F	2 1/4	Yes			
GOLD SOUND	GS 4.5	20.00	40.00	60	92	8	90-6 ±3	M		P	2	Yes	Yes		
	GS 5.25	20.00	40.00	60	92	4	80-5 ±3	M		P	2	Yes	Yes		
	GS 6	25.00	50.00	60	92	4/8	45-5 ±3			P	3.2	Yes	Yes		
	GS 6A	30.00	60.00	100	94	4/8	38-2	W		P	3.2	Yes	Yes		
	GS 69A	35.00	70.00	100	94	2/4	34-2	W		P	3.5	Yes	Yes		
	GS 8	40.00	80.00	100	91	4/8	32-2	W		P	3.5	Yes	Yes		
	GS 10	50.00	100.00	120	93	4/8	24-2	W		P	4.2	Yes	Yes		
	GS 4C	65.00	50	91	4	68-20 ±3		4	2	P	2.2	Yes	Yes		
	GS 46C	70.00	50	92	4	60-20 ±3		4 x 6	2	P	3	Yes	Yes		
	GS 46P+	38.00	30	92	4	150-20 ±3		4 x 6	3	P	1.6	Yes	Yes		
	GS 410C	70.00	60	92	4	50-20 ±3		4 x 10	2	P	3.2	Yes	Yes		
	GS 5C	70.00	50	92	4	65-20 ±3		5 1/4	2	P	2.2	Yes	Yes		
	GS 57C	70.00	60	92	4	58-20 ±3		5 x 7	2	P	3	Yes	Yes		
	GS 6C	75.00	60	92	4	45-20 ±3		6 1/2	2	P	3.2	Yes	Yes		
	GS 6AC	118.00	100	94	4/8	38-20 ±3		6 1/2	2	P	3.2	Yes	Yes		
	GS 69C	80.00	60	93	4	40-20 ±3		6 x 9	2	P	3.5	Yes	Yes		
	GS 69AC	124.00	100	94	4	36-20 ±3		6 x 9	2	P	3.5	Yes	Yes		
	GS 8AC	128.00	100	94	4	32-20 ±3		8	2	P	3.5	Yes	Yes		
GS 1	40.00	60	91	6	3k-20k ±3	T			S	1.1	Yes	Yes			
GS 12	65.00	130.00	150	94	4/8	20-2	W		P	4.5	Yes	Yes			
GS 15	95.00	190.00	200	95	4/8	19-1	W		P	5.7	Yes	Yes			
INFINITY	CS-1	289.00	100	87	4	36-32		6 x 9	3		F	3	Yes	No	Separate drivers and crossover; EMIT tweeter. EMIT tweeter. As above. Drop-in replacement. As above. With crossover.
	A693	189.00	70	90	4	40-32		6 x 9	3		F	3	Yes	No	
	A692	129.00	70	90	4	40-18		6 x 9	2		F	3	Yes	No	
	A63	149.00	50	88	4	60-32		6 1/2	3		S	2	Yes	No	
	A62	105.00	50	88	4	60-18		6 1/2	2		S	2	Yes	No	
	A52	105.00	30	88	4	65-18		5	2		S	1 1/2	Yes	No	
	A42	79.00	25	87	4	100-15		4	2		C	1 5/8	Yes	No	
	A462	49.00	20	86	4	100-15		4 x 6	2		C	1 3/4	Yes	No	
	A32	39.00	15	86	4	115-15		3 1/2	2		C	1 1/2	Yes	No	
	EMIT Tweeter	99.00		89	4	4k-32k	T				S		Yes	No	
JAMO	Car 30	34.95	50	87	4	70-14		4				Yes	Yes		
	Car 40	44.95	60	88	4	70-20		4	2			Yes	Yes		
	Car 50	49.95	70	89	4	60-20		5	2			Yes	Yes		
	Car 60	99.95	85	89	4	70-20		4	3			Yes	Yes		
	Car 70	62.95	95	91	4	50-20		6 1/2	2			Yes	Yes		
JBL	2105	65.00	50	94	8	300-15		5			F	1 3/4	No	No	Drop-in replacement. As above. Blamp capable. As above.
	LE8T-H	145.00	50	89	8	35-15		8			F	3 3/8	No	No	
	115H	70.00	50	89	8	60-3.5	W	6 1/2			F	2 1/2	No	No	
	LE10H-1	158.00	150	89	8	30-3		10			F	4 1/2	No	No	
	ER/G 4.5	69.95	60	94	4	90-20		4 1/2	W		F	1 3/4	Yes	Yes	
	ER/G 6.5	99.95	60	92	4	80-22		6 1/2	2	A	F	1 3/4	Yes	Yes	
	ER/G 410	139.95	80	93	4	70-22		4 x 10	2	A	F	3	Yes	Yes	
	ER/G 690	159.95	80	95	4	55-22		6 x 9	2	A	F	3 3/8	Yes	Yes	
	T105	39.95	15	85	4	120-20		3 1/2	W		F	1 1/2	No	Yes	
	T115	49.95	15	88	4	100-20		4 x 6	W		F	1 7/8	No	Yes	
	LT-1	299.95	50	87	4	100-20		5 1/2	2		S		No	No	
	T205	149.95	60	88	4	90-18		4 1/2	2		S	1 7/8	Yes	Yes	
	T420	179.95	75	90	4	70-18		6 1/2	2	A	F	2 1/4	Yes	Yes	
	T425	199.95	75	90	4	70-18		6 1/2	3	A	F	2 1/4	Yes	Yes	
	T540	219.95	100	92	4	40-18		6 x 9	2	A	F	4 3/8	Yes	Yes	
T545	249.95	100	92	4	40-18		6 x 9	3	A	F	4 3/8	Yes	Yes		
JENSEN	J3033	159.95	100	103	4	38-40		6 x 9	3		F	3 3/8	Yes	Yes	Blamp capable. Fits 5 1/4-inch hole. As above. Removable, angled collar. With 20-watt internal amp; switchable EQ curves. As above. Removable, angled collar.
	J1369	84.95	50	100	4	40-16		6 x 9	2		F	2 5/8	Yes	Yes	
	J1365	129.95	50	101	4	40-20		6 x 9	3		F	2 5/8	Yes	Yes	
	J1405	84.95	45	99	4	45-18		4 x 10	2		F	2 5/8	Yes	Yes	
	J1401	129.95	45	99	4	40-20		4 x 10	3		F	2 5/8	Yes	Yes	
	J3023	139.95	75	101	4	52-40		6 1/2	3		F	1 7/8	Yes	Yes	
	J3013	109.95	75	100	4	52-40		6 1/4	2		F	1 7/8	Yes	Yes	
	J3003	89.95	50	98	4	63-40		4 1/2	2		F	1 7/8	Yes	Yes	
	J1283	49.95	30	95	4	65-20		4			F	1 5/8	Yes	Yes	
	J1435	37.95	25	97	4	65-18		4 x 6	W		F	1 1/2	Yes	Yes	
	J1350	32.95	25	90	4/8	80-15		3 1/2	W		F	1 3/8	Yes	Yes	
	J1445	34.95	25	95	4	70-17		4 1/2	W		F	1 3/8	Yes	Yes	
	P/EQ-1	134.95	20	93	4	55-20		4 1/2		A	C	2	Yes	Yes	
	P/EQ-2	154.95	100	94	4	45-20		6 1/2			F	2	Yes	Yes	
	US422	74.95	35	95	4	60-20		4 1/2		A	C		Yes	Yes	
US420	64.95	35	92	4	60-20		4 1/2			C	1 1/2	Yes	Yes		
US620	79.95	55	93	4	50-22		5 1/4			F	1 5/8	Yes	Yes		
US630	114.95	65	94	4	48-40		5 1/4			F	1 5/8	Yes	Yes		

# YOU DESERVE THE BEST



## JET SOUND ELECTRONICS

Backed by years of experience, and miles ahead of other car stereo manufacturers in audio technology, **JSE** has designed an entirely new and unique line of car stereos, amplifiers, equalizer /boosters, and speakers that meets the needs of even the most critical car audio buff.

You pick the road, and **JSE** delivers the sound for your driving pleasure. Equipped with outstanding features,

such as "Electronic Tunning, Music Search, Auto Reverse, Separate Bass and Treble", are just a few of the many functions available on your **JSE** car stereo.

For more information on **JSE** products, see your local dealer, or call **JSE** at 800-421-5632



*We've Got a Winning Formula.*

**JET SOUND ELECTRONICS**

1000 EAST DEL AMO BOULEVARD, CARSON, CAL 90746  
 P.O. BOX 4567, CARSON, CALIFORNIA 90749  
 (213) 637-1001 (800) 421-5632



Enter No. 32 on Reader Service Card



# A Breakthrough in Amplification

The current availability of high performance automotive loudspeakers coupled with high quality sound sources, such as real time cassettes and compact discs, creates a fundamental need for a new breed of mobile amplifier. The Infinity MRA-150 will allow greater recovery of ambience, musical timbre and dynamic range than any competing design; it will provide the power and stability to drive all speakers, including the most inefficient, to satisfying volume levels. There's no longer any reason for the music to get lost in the electronics.

#### SPECIFICATIONS

- 75 watts RMS per channel into 4 ohms at less than 1% THD at 1kHz.
- 60 watts RMS per channel into 4 ohms, 20 Hz - 20 kHz at less than 0.25% THD.
- 90 watts RMS per channel into 2 ohms at less than 1% THD at 1kHz.

#### FEATURES

- Automatic shut-off/recycle circuits protect against dead batteries, short circuits and thermal overload.
- Tightly regulated, pulse width modulated power supply.
- Made in U.S.A.



 **Infinity**®

We get you back to what it's all about. Music.

Infinity Systems, Inc. • 9409 Owensmouth Avenue • Chatsworth, CA 91311 • (818) 709-9400

Enter No. 28 on Reader Service Card

# SPEAKERS

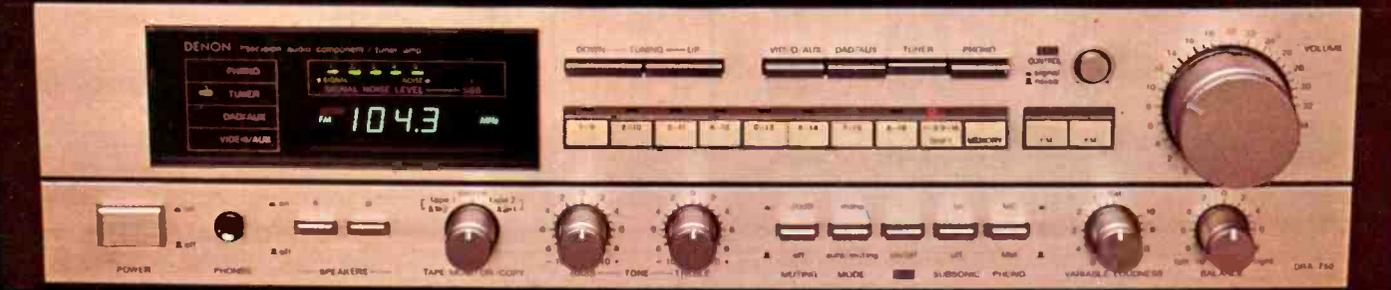
MANUFACTURER	Model	Price, \$ (if Sold Individually)	Price, \$ (if Sold in Pairs)	Recommended Maximum Power, Watts	Sensitivity, db SPL (1 Watt/1 Meter)	Impedance, Ohms	Frequency Response, Hz to kHz, ±dB	DRIVERS									
								Subwoofer Only (S) Woofer Only (W) Woofer Size, Inches	Whizzer (W), 2-Way (2), 3-Way (3), 4-Way (4) Angle Drivers (A) = A, Pointable Drivers (P) = P Flush Mount (F) Surface Mount (S) Compatible (C)	Maximum Required Mounting Depth, Inches	Weatherproofed?	Application Guide Available?	Notes				
MAXXIMA	X-2466	65.00	25	88	4	90-20		4 x 6	2			F	1 3/4	Yes	Yes	GM adaptor. Fits 6 x 9-inch hole.	
	X-2446	60.00	25	88	4	120-20		4	2			F	1 3/4	Yes	Yes		
	X-2571	130.00	60	87	4	90-20		4	2			F	1	Yes	Yes		
	X-1882C	130.00	100	90	4	40-5	W	8				C	3 3/4	Yes	Yes		
	X-2526	70.00	30	88	4	90-20		6 1/2	2			F	1 3/4	Yes	Yes		
	X-3692	150.00	100	90	4	80-20		6 x 9	3			F	3 3/4	Yes	Yes		
MITSUBISHI	SX-20EM	99.95	30	88	4	90-20		4	2			S	3 7/8	No	Yes		
	SG-69TB	99.95	100	90	4	70-14		6 x 9	3			F	1 1/2	No	Yes		
	SG-46CB	39.95	25		4	90-18		4 x 6	2			F	1 1/2	No	Yes		
	SG-13CD	79.95	30	90	4	115-18		5 1/4	2			F	1 1/2	No	Yes		
	SG-10CB	69.95	60		4	100-20		4	2			F	1 3/8	No	Yes		
	SG-10CE	49.95	30	89	4	120-18		4	2			F	1 3/8	Yes	Yes		
	SG-10WE	39.95	30	89	4	120-17		4	W			F	1 3/4	Yes	Yes		
	SG-13WD	49.95	30	88	4	120-16		5 1/4	W			F	1	Yes	Yes		
MONOLITHIC	W-700	59.00	128.00	100	90	8	35-3	W	7				3 7/8	Yes			
MOREL ACDUSTICS	Integra-1 II	156.00	100	92	4	45-25 ±3		6	2			S	2 1/2			Biamp capable. As above.	
	Integra-2 II	168.00	120	93	4	35-25 ±3		8	2			S	2 7/8				
	MDT-101	84.00	100	92	8	1.2k-25k ±3						S	1 5/8				
	CDM-75	159.00	100	93	4	300-5 ±3	T					S	2 1/2				
	MCW-160	110.00	150	90	4	45-5 ±3	W	6				S	2				
	MCW-220	118.00	150	91	4	35-5 ±3	W	8				S	2 1/8				
	Coax-160	118.00	100	93	4	35-20 ±3	W	6	2			S	2				
	CR-7	395.00	125	89	4	70-25 ±3		6	2	A			S	2			
MTX	4.5	119.50	30	92	4	90-20 ±3		4 1/2	2			F	1 3/4	Yes			
	5.3	129.50	30	94	4	75-20 ±3		5 1/4	2			F	1 7/8	Yes			
	6.5	139.50	30	91	4	60-20 ±3		6 1/2	2			F	2 1/2	Yes			
	6.9	139.50	30	93	4	55-20 ±3		6 x 9	2			F	3	Yes			
	7.0	169.50	75	89	4	45-20 ±3		6 x 9	2			F	3 3/4	Yes			
	Micro 100B	169.50	50	85	4	75-20 ±3		4	2		P	S	4 1/4	Yes			
	BX 31	249.00	200	95	4	40-2	S	(4) 6 1/2				S		No	Yes		
	BX 41	249.00	200	95	4	40-2	S	(4) 6 1/2				S		No	Yes		
	BX 41S	249.00	200	95	4	40-2	S	(4) 6 1/2				S		No	Yes		
	MP-46	139.95	30	97	4	200-2			2			S		No	Yes		
NAKAMICHI	SP-400	390.00	80	85	4	50-22		5 1/4	3			F	1 1/4	No	No	With external crossover. Selectable woofer roll-off points.	
	SP-300	359.00	80	86	4	50-22		5 1/8	2	A/P		F	1 3/8	Yes	No		
	SP-80	225.00	160	92	4	30-1	S	7 7/8				F	3 3/8	Yes	No		
	SP-50	145.00	80	87	4	50-6		5 1/4				F	1 1/2	Yes	No		
	SP-10	175.00	40	86	4	2.5k-22k	T					F		Yes	No		
PANASONIC	EAB-064	54.95	30	92	4	40-20		6 1/2									
	EAB-045	64.95	30		4	50-22		4									
	EAB-065	74.95	30		4	35-22		6 1/2									
	EAB-411	64.95	10		4	60-20		4 x 10									
	EAB-T50	49.95	25	89	4	50-16		5				1					
	EAB-T60	59.95	25	91	4	40-10		6 1/2									
	EAB-T65	79.95	25	92	4	40-22		6 1/2				1.4	Yes				
	EAB-694	89.95	80	94.5	4	30-22		6 x 9									
	EAB-043	49.95	25	92	4	50-22		4									
	EAB-911	39.95	10		4	70-15		5									
	EAB-030	29.95	10		4			3 1/2									
	EAB-049	69.95	30		4	50-25		4									
	EAB-063	84.95	10		4	40-20		6 1/2									
	EAB-062	74.95	10		4	45-20		6 1/2									
	EAB-415	79.95	20		4			4 x 10									
	EAB-W60	99.95	75			30-75		6									
	EAB-G40	69.95	60			150-25		4									
	EAB-69A	89.95	25		4			6 x 9									
EAB-69T	119.95	100		4	30-22		6 x 9										
EAB-061	59.95			4	45-20		6 1/2	W									
EAB-915	39.95	10			50-15								Yes				
PARASOUND	SX40	44.50	40	88	4	80-20 ±4		4				F	1 1/2	Yes		Plate speaker. Fits 6 x 9-inch hole.	
	SCX50	69.95	50	90	4	75-20 ±4		5 1/4	2			F	1 1/2	Yes			
	STH96	129.95	60	94	4	60-22 ±4		6 x 9	3			F	3	Yes			
	CMs250	149.95	60	90	4	65-22 ±4		4	2			C	1	Yes			
	SW80	169.95	100	92	4	35-600 Hz ±4	S	8				C	4				
	CRs220	99.95	60	91	4	70-20 ±4		4	2			S					
CMs330	199.95	80	90	4	60-22 ±4		4	2			S						
PEERLESS	TP165F	33.00	80	89	4/8	50-4.5		6 1/2				F	3 1/4	Yes	No		
	TX205F	37.00	80	90.5	4/8	40-4		8				F	3 3/4	Yes	No		
	TO125F	26.00	50	87	4/8	55-5		5				F	2 5/8	Yes	No		
	TO115F	24.00	50	88	4	60-5		4 1/2				F	2 1/2	Yes	No		
	LK10	18.00	100	90	4/8	1.5k-18k	T					F	1	Yes	No		
	KD10	19.50	100	91	4/8	1.5k-20k	T					F	1	Yes	No		
	TX255F	43.00	100	88	4/8	30-3.5		10				F	1 1/8	Yes	No		
	TO255F	52.00	150	90	8	30-2.5		10				F	4 3/4	Yes	No		
	TA305F	62.50	200	89.5	8	30-2		12				F	5	Yes	No		
													F	5 3/8	Yes		No
PHILIPS AUTO AUDIO (Continued)	EN6500	120.00	150	94	4	60-5	S	6 1/2				F	2 3/4				
	EN6900	140.00	200	94	4	48-2	S	6 x 9				F	6 3/8				
	EN8000	150.00	200	94	4	43-3	S	8				F	8				
	EN8241	100.00	60	90	4	80-20		4	2			S	3 3/4				

# DENON RECEIVERS DO NOT COMPROMISE FIDELITY FOR CONVENIENCE.

Most receivers are designed as if the person desiring a compact, convenient component obviously cares less about sound quality. The DRA-Series Receivers, like all Denon products, place sonic quality above all. Their power sections incorporate Non-Switching Class-A circuitry with no negative feedback on the DRA-750 and heavy duty power supplies, temperature-controlled by liquid-cooled heat sinks. Infinitely variable loudness control now ensures full listening pleasure at all volume levels.

The tuner section stores up to 16 AM or FM stations or any combination thereof (DRA-350; 5 AM/FM preset memory tuning). The DRA-750 incorporates Denon's exclusive Super Searcher tuning circuitry which eliminates the principle causes of distortion without sacrificing stereo separation.

Whether you choose a 70W/CH DRA-750, a 50W/CH DRA-550 or a 36W/CH DRA-350, its uncompromised performance will convince you that Denon products share more than name alone.



# DENON

D E S I G N I N T E G R I T Y

Side panels included on DRA-750 only.

Denon America, Inc., 27 Law Drive, Fairfield, N.J. 07006 (201) 575-7810

Enter No. 24 on Reader Service Card



# Perfect bass...Perfect treble... Perfect sound...forever

**ROTEL** introduces a refreshing new range of audio equipment designed exclusively to appeal to hi fi enthusiasts. Its acceptance in the UK, where Rotel was designed and conceived, is overwhelming.

**HI FI TODAY** says "Rotel have engineered some outstanding products which offer amazing sound and remarkable value".

**NEW HI FI SOUND** says "The sound was open, lively, detailed and enjoyable to listen to, and as for the RA820B amplifier, well, it was a real gem".

**WHAT HI FI** says "The most obvious ability of Rotel is the way it allows music to live and breathe".

**HI FI CHOICE** says "The Rotel system stands out in its ability to play records properly. The stereo soundstage is well defined, and with a good cartridge there is clarity, precision, and evenness of reproduction that allows the music to sound lively and vivid...Quite clearly, its performance is something special".

Listen to Rotel yourself and let's hear what **YOU** have to say.



# ROTEL

P.O. Box 653, Buffalo N.Y. 14240 U.S.A. (416) 297-0599

Enter No. 47 on Reader Service Card

dealer listing is on page 148.

# SPEAKERS

MANUFACTURER	Model	Price, \$ (If Sold Individually)	Price, \$ (If Sold in Pairs)	Recommended Maximum Power, Watts	Sensitivity, dB SPL (1 Watt/1 Meter)	Impedance, Ohms	Frequency Response, Hz to kHz, ±dB	DRIVERS													
								Subwoofer Only (S) Woofer Only (W) Tweeter Only (T)	Woofer Size, Inches	Wizzer (W), 2-Way (2), 3-Way (3), 4-Way (4)	Angled Drivers (A) = A, Pinnable Drivers (P)	Flush Mount (F) Surface Mount (S)	Maximum Required Mounting Depth, Inches	Weatherproofed?	Application Guide Available?	Notes					
PROTON (Continued)	299	90.00	150	95	4	20-400 Hz ±5	S	12													
	283		80.00	40	91	4	60-20 ±5		4 1/2	2			F	2							
	284		90.00	60	91	4	50-20 ±5		5 1/4	2	A		F	2 1/2							
	285		190.00	80	89	4	50-20 ±5		5 1/4	2			F	2							
	286		150.00	40	88	4	60-20 ±5		4 1/2	2			F	1 1/4							
	287		100.00	60	92	4	60-20 ±5		6 1/2	2	A		F	2							
PYLE INDUSTRIES	K-HS100A		230.95	80	90.0	4	50-20 ±3		4	2			S		Yes	Yes					
	K-HS150P		225.95	80	90.0	4	50-20 ±3		4	2			S		Yes	Yes					
	K-HP523A		190.95	80	92.0	4	45-20 ±3		5 1/4	2			F	1 1/8	Yes	Yes					
	K-KP43A		160.95	80	91.0	4	200-20 ±3		4	2			F	3/4	Yes	Yes					
	P355W	23.95	59.95	40	89.0	4/8	90-18 ±3		3 1/2	W			F	1 3/4	Yes	Yes					
	355W	22.95	58.98	40	89.0	4/8	90-18 ±3		3 1/2	W			F	1 1/2	Yes	Yes					
	P499	25.95	75.95	50	91.0	4/8	70-18 ±3		4				F	1 3/4	Yes	Yes					
	499	24.95	73.95	50	91.0	4/8	70-18 ±3		4				F	1 3/4	Yes	Yes					
	P455R	45.95	117.95	50	91.0	4	60-20 ±3		4 1/2	2			F	1	Yes	Yes					
	4599	25.50	76.95	50	91.0	4/8	60-18 ±3		4 1/2				F	1 3/4	Yes	Yes					
	P465R	47.95	110.95	50	91.0	4	70-20 ±3		4 x 6	2			F	1 3/4	Yes	Yes					
	P465R/M	48.95	111.95	50	91.0	4	70-20 ±3		4 x 6	2			F	1 3/4	Yes	Yes					
	465R	46.95	107.95	50	91.0	4	70-20 ±3		4 x 6	2			F	1 3/4	Yes	Yes					
	465W	24.95	64.95	50	91.0	4/8	70-18 ±3		4 x 6	W			F	1 3/4	Yes	Yes					
	465W/M	25.95	65.95	50	91.0	4/8	70-18 ±3		4 x 6	W			F	1 3/4	Yes	Yes					
	5216D	50.95	129.95	70	92.0	4	55-20 ±3		5 1/4	2			F	1 5/8	Yes	Yes					
	5210W	26.95	84.95	60	91.0	4/8	55-18 ±3		5 1/4	W			F	1 3/8	Yes	Yes					
	5710D	46.95	70	92.0	4	60-20 ±3		5 x 7	2	W			F	2 3/8	Yes	Yes					
	5710W	28.95	70	92.0	4/8	60-18 ±3		5 x 7	2	W			F	2 3/8	Yes	Yes					
	610R	44.95	116.95	60	91.0	4	60-20 ±3		6	2			F	1 7/8	Yes	Yes					
	610W	25.95	75.95	60	91.0	4/8	70-18 ±3		6	W			F	1 7/8	Yes	Yes					
	P6510D	48.95	125.95	70	92.0	4	55-20 ±3		6 1/2	2			F	2 1/4	Yes	Yes					
	S656R	49.95	128.95	50	90.0	4	65-20 ±3		6 1/2	2			F	1 9/8	Yes	Yes					
	6810D	47.95	80	92.0	4	60-20 ±3		6 x 8	2	2			F	2 1/2	Yes	Yes					
	S6910D	51.95	134.95	80	93.0	4	50-20 ±3		6 x 9	2			F	1 3/4	Yes	Yes					
	6910T	49.95	139.95	90	93.0	4	45-20 ±3		6 x 9	2			F	3 1/4	Yes	Yes					
	6910W	29.95	85.95	90	93.0	4/8	45-18 ±3		6 x 9	W			F	3	Yes	Yes					
	P6920D	72.95	175.95	130	94.0	4	40-20 ±3		6 x 9	2			F	3 1/2	Yes	Yes	Biamp capable.				
	6918D	70.95	167.95	100	94.0	4	40-20 ±3		6 x 9	2			F	3 1/2	Yes	Yes	As above.				
	6920T	59.95	159.95	130	94.0	4	40-20 ±3		6 x 9	2			F	3 1/2	Yes	Yes					
	6929D	82.95	194.95	140	95.0	4	40-20 ±3		6 x 9	2			F	3 5/8	Yes	Yes	As above.				
	P4116D	54.95	139.95	80	94.0	4	55-20 ±3		4 x 10	2			F	3 1/8	Yes	Yes					
	4116D	52.95	137.95	80	94.0	4	55-20 ±3		4 x 10	2			F	3 1/8	Yes	Yes					
	4110W	28.50	86.95	70	92.0	4/8	55-18 ±3		4 x 10	W			F	2 7/8	Yes	Yes					
	WP5216/4	33.95	80	92.0	4	50-8 ±3		5 1/4	W				F	2 3/4	Yes	Yes					
	WP6520/4	40.95	120	92.0	4	40-6 ±3		6 1/2	W				F	3 1/4	Yes	Yes					
	WP6920/4	42.95	140	94.0	4	30-5.5 ±3		6 x 9	W				F	3 3/4	Yes	Yes					
	WP820/4	43.95	140	94.0	4	30-5.5 ±3		8	W				F	3 7/8	Yes	Yes					
	WP1020/4	48.95	150	95.0	4	25-5 ±3		10	W				F	4 3/8	Yes	Yes					
	WP5216	32.95	80	92.0	8	50-8.5 ±3		5 1/4	W				F	2 3/4	Yes	Yes					
	WP6520	39.95	120	92.0	8	40-6.5 ±3		6 1/2	W				F	3 1/4	Yes	Yes					
	WP820	42.95	140	94.0	8	30-6 ±3		8	W				F	3 7/8	Yes	Yes					
	WP1020	47.95	150	95.0	8	25-5.5 ±3		10	W				F	4 3/8	Yes	Yes					
	W45S	27.95	60	90.0	4	55-4 ±3		4	W				F	1 7/8	Yes	Yes					
	W52165S	36.95	90	91.0	4	30-3 ±3		5 1/4	W				F	2 3/4	Yes	Yes					
	W6517S	39.95	120	91.0	4	25-2.5 ±3		6 1/2	W				F	3 1/8	Yes	Yes					
	W6920S	42.95	140	93.0	4	20-1.5 ±3		6 x 9	W				F	3 3/4	Yes	Yes					
	W820S	41.95	140	93.0	4	20-1.5 ±3		8	W				F	3 7/8	Yes	Yes					
	W1020S	47.95	150	93.0	4	20-1 ±3		10	W				F	4 3/8	Yes	Yes					
	W6518/4	39.95	90	92.0	4	40-7 ±3		6 1/2	W				F	3 1/4	Yes	Yes					
	W6918/4	41.95	110	94.0	4	45-7.5 ±3		6 x 9	W				F	3 3/4	Yes	Yes					
	W818/4	41.95	110	94.0	4	30-6.5 ±3		8	W				F	3 7/8	Yes	Yes					
	W6520/4	38.95	120	92.0	4	40-6 ±3		6 1/2	W				F	3 1/4	Yes	Yes					
	W6929/4	49.95	150	95.0	4	30-5.5 ±3		6 x 9	W				F	3 7/8	Yes	Yes					
	W820/4	40.95	140	94.0	4	30-5.5 ±3		8	W				F	3 7/8	Yes	Yes					
	W830/4	53.95	160	94.0	4	30-3 ±3		8	W				F	4 1/8	Yes	Yes					
	W1020/4	45.95	150	95.0	4	25-5 ±3		10	W				F	4 3/8	Yes	Yes					
	W1030/4	58.95	170	95.0	4	25-3 ±3		10	W				F	4 5/8	Yes	Yes					
	W6520	37.95	120	92.0	8	40-6.5 ±3		6 1/2	W				F	3 1/4	Yes	Yes					
	W6929	48.95	150	95.0	8	30-6 ±3		6 x 9	W				F	3 7/8	Yes	Yes					
	W820	39.95	140	94.0	8	30-6 ±3		8	W				F	3 7/8	Yes	Yes					
	W830	52.95	160	94.0	8	30-3.5 ±3		8	W				F	4 1/8	Yes	Yes					
	W1020	44.95	150	95.0	8	25-5.5 ±3		10	W				F	4 3/8	Yes	Yes					
	W1030	57.95	170	95.0	8	25-3.5 ±3		10	W				F	4 5/8	Yes	Yes					
	W6520D	43.95	120	90.0	4	35-4 ±3		6 1/2	S				F	3 1/4	Yes	Yes	Dual voice-coils.				
	W6929D	54.95	150	93.0	4	25-3.5 ±3		6 x 9	S				F	3 7/8	Yes	Yes	As above.				
	W829D	54.95	150	93.0	4	25-3.5 ±3		8	S				F	4 1/8	Yes	Yes	As above.				
	W1030D	63.95	170	93.0	4	20-2 ±3		10	S				F	4 5/8	Yes	Yes	As above.				
	K-TP3546		65.95	80	94.0	8	4k-20k ±3		T				F	1	Yes	Yes	Fits 3 1/2- or 4 x 6-inch holes.				
	K-MTP46		89.95	60	90.0	4	200-20 ±3		4 x b	2			F	1 1/2	Yes	Yes					

SURE'S UP!  
JUNE 1ST

TELARC  
DIGITAL



CD-80112

DG-10112

COMPACT  
disc  
DIGITAL AUDIO

TELARC<sup>®</sup>  
DIGITAL

Telarc underwrites  
'Audiophile Audition,'  
broadcast live Sundays on  
many National Public Radio  
stations. Check your local  
NPR listings for time.

# SPEAKERS

MANUFACTURER	Model	Price, \$ (if Sold Individually)	Price, \$ (if Sold in Pairs)	Recommended Maximum Power, Watts	Sensitivity, dB SPL (1 Watt/1 Meter)	Impedance, Ohms	Frequency Response, Hz to KHz, ±dB	Subwoofer only (S) Woofer only (W) Midrange (M) Tweeter only (T)	Woofer Size, Inches	Whizzer (W), 2-Way (2), 3-Way (3), 4-Way (4)	DRIVERS				Weatherproofed?	Application Guide Available?	Notes
											Planar Mount (P) Surface Mount (S)	Maximum Required Mounting Depth, Inches	Maximum Power (P)	Notes			
REALISTIC	12-1854	69.95	40	8	100-15 ±3		5 1/4				S	1 3/4					
	12-1857	99.95	60	8	60-18 ±3		6 x 9				F	3 3/4	Yes				
	12-1701	29.95	15	8	190-20 ±3		3				F						
	12-1855	29.95	20	8	120-10 ±3		5 1/4				F	1 1/4	Yes				
	12-1856	59.95	30	8	80-16 ±3		5 1/4				F	3 3/4					
	12-1702	17.95	10	8	80-12 ±3		5 1/4				F	1 1/4					
ROADMASTER	RS500N	20.00	25	89	4	80-15 ±10		5 1/4	W		F	1 3/4	Yes	No			
	RS510N	36.00	25	86	4	60-17 ±10		5 1/4	2		F	1 7/8	Yes	No			
	RS520N	40.00	25	86	4	60-18 ±10		5 1/4	3		F	1 7/8	Yes	No			
	RS630	40.00	30	93	4	60-19 ±10		6 1/2	3		F	2 1/4	Yes	No			
	RS900	42.00	30	95	4	40-22 ±10		6 x 9	3		F	3	Yes	No			
	SANSUI	SB-F707	269.00	100	93	4	28-22		8	3	A	F	3		Yes		
SB-F703		199.00	80	92	4	28-22		6 1/2	3	A	F	2 5/8		Yes			
SB-693		149.00	80	93	4	30-22		6 x 9	3		F	2 7/8		Yes			
SB-692		119.00	80	93	4	30-20		6 x 9	2		F	2 7/8		Yes			
SB-165		99.00	80	90	4	40-21		6 1/2	2		F	2 1/4		Yes			
SB-690		89.00	70	92	4	35-20		6 x 9	2		F	3 5/8		Yes			
SB-160		109.00	30	90	4	40-20		6 1/2	2		F	1 3/8		Yes			
SB-135		109.00	40	90	4	48-21		5 1/4	3		F	1 3/8		Yes			
SB-105		89.00	30	90	4	50-20		4	2		F	1 1/4		Yes			
SB-100		59.00	25	90	4	50-20		4	W		F	1		Yes			
SB-1160		69.00	35	90	4	40-20		6 1/2	2		F	1 3/8		Yes			
SB-1130		55.00	40	89	4	50-20		5 1/4	2		F	1 3/8		Yes			
SB-1100		39.00	45	88	4	50-19		4	W		F	1	Yes	Yes			
SB-D50		35.00	20	89	4	95-20		3 1/2	W		F	1 7/8		Yes			
SB-D460		39.00	45	90	4	60-19		4 x 6	W		F	1 7/8		Yes			
SB-X907		449.00	110	88	4	43-22		5	3		S			Yes			
SB-X903	239.00	80	88	4	55-21		5	3		S			Yes				
SANYO	SP41A	19.95	10		4	80-15 ±3		4	W		F	1 5/8	Yes				
	SP42A	34.95	20		4	80-20 ±3		4	2		F	1 7/8	Yes				
	SP24A	39.95	20		4	80-20 ±3		4 x 6	2		F	1 3/4					
	SP16A	59.95	40		4	80-17 ±3		4 x 10	2		F	3					
	SP57	49.95	40	93	4	80-17 ±3		5 x 7	2		F	2					
	SP30	24.95	20	88	4	90-20 ±3		3 1/2	W		F	1 1/2					
	SP62A	24.95	20		4	70-15 ±3		6 1/2			F	1 1/4	Yes				
	SP64A	44.95	20		4	60-12 ±3		6 1/2	2		F	1 3/8	Yes				
	SP92A	69.95	40		4	55-17 ±3		6 x 9	2		F	4					
	SP94A	79.95	40		4	55-20 ±3		6 x 9	3		F	3 3/4					
	SP89A	99.95	40		4	80-20 ±3		4	2		S						
	FSP402	79.95	40	89	4	75-20 ±3		4	2		F	1 7/8	Yes				
	FSP652	89.95	40	92	4	65-20 ±3		6 1/2	2		F	1 7/8	Yes				
	FSP693	149.95	80	92	4	40-20 ±3		6 x 9	3	A	F	3					
SAS	Bazooka	199.95	100	98	4	45-1.5 ±3	W	6 1/2			S		Yes	No		For pickups and hatchbacks.	
	SAS-T62																
SFI	Alpha	300.00	150	87	4	30-20 ±3		(2) 6 1/2 x 6 1/2			S		Yes	No		Planar drivers.	
	Omega	450.00	200	89	4	20-20 ±3		(4) 6 1/2 x 6 1/2			S		Yes	No		As above.	
SHERWOOD	CS-69X2	149.95	75	91	4	40-20 ±3		6 x 9	2		C	2 3/4	Yes	No			
SONY	XS-311S	60.00	25	92	4	45-22		5 1/4	W		F	1 1/8	No	Yes			
	XS-315S	70.00	25	92	4	50-22		5 1/4	2		F	1 1/8	No	Yes			
	XS-615S	80.00	25	92	4	35-22		6 1/2	2		F	1 3/4	No	Yes			
	XS-695S	110.00	50	92	4	35-22		6 x 9	2		F	2 1/2	No	Yes			
	SPARKOMATIC	ASK3000	79.95	25	92	22	80-20 ±3		4	2	P	F	2 3/4	Yes	Yes		Blamped.
ASK3010		99.95	25	92	22	80-20 ±3		4	2	P	F	2 3/4	No	Yes		As above.	
ASK3015		99.95	25	92	22	80-20 ±3		4	2	A	S		No	Yes		As above.	
ASK3030		59.95	25	92	22	50-250 Hz ±3	S	4		A	C	2 3/4	No	Yes		With internal amp.	
SK6950		66.95	200	92	4	50-20 ±3		6 x 9	4	A	F	4	No	Yes			
SK6922T		33.95	80	96.6	4	30-17 ±3		6 x 9	3	A	F	3 1/2	No	Yes			
SK6920C		32.95	50	95.3	6	30-15 ±3		6 x 9	2	A	F	3 5/8	No	Yes			
SK650		59.95	200	92	4	70-20 ±3		6	4	A	F	2 3/4	No	Yes			
SK622T		35.95	80	96.6	4	50-17 ±3		6	3	A	F	2 3/4	No	Yes			
SK620C		28.95	50	95	6	50-15 ±3		6	2	A	F	2 3/4	No	Yes			
SK40D		21.95	40	86	4	90-15 ±3		4	W	A	F	1 3/4	No	Yes			
SK410		22.95	40	86	4	90-15 ±3		4	W	A	S	5	No	Yes			
ASK4000		129.95	60	92	22	30-20 ±3		4	2	A	S		No	Yes		Blamped, separate drivers.	
ASK4010		179.95	60	92	22	30-20 ±3		(2) 4		P	S		No	Yes		As above.	
ASK4020		199.95	60	92	22	30-20 ±3		6		P	S		No	Yes		As above.	
ASK4030		99.95	80	92	22	30-250 Hz	S	(4) 4		A	S		No	Yes		With internal amp.	
SK520C		39.95	50	95	8	60-15 ±3		4	2	A	S	5 1/2	No	Yes			
SK415		24.95	40	86	8	90-15 ±3		4	W	P	S		No	Yes		For pickup trucks.	
SK313	11.95	10	85	8	125-8 ±3		3		A	S	5 1/2	No	Yes				
SK355	11.95	10	88	8	100-10 ±3		3 1/2	W	A	F	1 3/4	No	Yes				
SK692	19.95	50	96.6	4	30-15 ±3		6 x 9	2	A	F	3 5/8	No	Yes				
SK693	24.95	80	95.3	4	30-17 ±3		6 x 9	3	A	F	3 5/8	No	Yes				

# SPEAKERS

MANUFACTURER	Model	Price \$ (If Sold Individually)	Price \$ (If Sold in Pairs)	Recommended Maximum Power, Watts	Sensitivity, dB SPL (1 Watt/1 Meter)	Impedance, Ohms	Frequency Response, Hz to kHz, ±dB	DRIVERS									
								Subwoofer Only (S), Woofer Only (W), Midrange Only (M), Tweeter Only (T)	Woofer Size, Inches	Wizzer (W), 2-Way (2), 3-Way (3), 4-Way (4)	Angled Driver(s) = A, Pointable Driver(s) = P	Flush Mount (F), Surface Mount (S)	Maximum Required Mounting Depth, Inches	Weatherproofed?	Application Guide Available?	Notes	
SPECO	SK6925TD	98.00	120	89	4	30-20 ± 3	6 x 9	3	P	F	4	Yes	Yes	Blamp capable, kit.			
	DMS-3	119.00	100	88	4/8	55-20 ± 3	4	3	P	S		Yes	Yes				
	DMS-2	89.00	60	86	4/8	60-20	3 1/2	2	P	S		Yes	Yes				
	SK6920Q	89.00	80	87	4	50-20	6 x 9	4	P	F	4	Yes	Yes				
	SK6920T	79.00	60	89	4	50-20	6 x 9	3	P	F	3 1/2	Yes	Yes				
	SK6920C	69.00	50	88	4	50-20	6 x 9	2	P	F	3 1/2	Yes	Yes				
	SK4C10	69.00	40	88	4	50-20	4	2	P	F	1 1/2	No	No				
	SK4120C	79.95	50	86	4	50-20 ± 3	4 x 10	2	P	F	3	No	Yes				
	SK5120T	89.95	60	88	4	80-20 ± 3	5 1/4	3	P	F	2 1/4	No	Yes				
	SK5A5SC	59.95	40	84	4	120-18 ± 3	5	2	P	F	1 1/4	No	Yes				
	SK5A5S	39.95	40	84	4	110-10 ± 3	5	2	P	F	1 1/4	No	Yes				
	WC5110A	59.95	40	86	8	50-15 ± 3	5 1/4	2	A	S/C	1 1/8	Yes	Yes				
	WC5110C	44.95	40	86	8	50-15	5 1/4	W	A	S/C	1 1/8	Yes	Yes				
	SK4A10	54.95	30	87	4	30-17 ± 3	4	W	A	F	1 1/2	No	Yes				
SK5110C	39.95	30	85	4	50-20	4	2	P	F	2	No	Yes					
SK5120C	49.95	40	87	4	50-20	4	2	P	F	2 1/2	No	Yes					
STILL WATER DESIGNS	Kicker	250.00	100	88	4	40-20	(2) 6 1/2	2	A	S	6 1/2	Yes	Yes	Mounts behind seat in pickups. †13 1/2 inches. Mounts behind seat in mini-pickups. Mounts behind seat in standard pickups. Mounts on rear deck in cars, ceiling mount in vans, behind seat in pickups.			
	Kicker II	250.00	100	88	4	40-20	(2) 6 1/2	2	A	S	6 1/2	Yes	Yes				
	Slide-Kicks	270.00	100	88	4	40-20	6 1/2	2	A	S	6 1/2	Yes	Yes				
	Super-Kicks	325.00	150	88	4	38-20	8	2	A	S	6 1/2	Yes	Yes				
Classic	199.95	75	88	4	50-20	(2) 5	2	A	S	6	Yes	Yes					
TARGA	Mach-10C	33.95	40	91	4	80-20 ± 5	3 1/2	2	F	1 1/2	Yes	No					
	Mach-20C	45.95	50	91	4	80-20 ± 5	4	2	F	1 1/2	Yes	No					
	Mach-30C	53.95	50	91	4	80-20 ± 5	4 x 6	2	F	1 1/2	Yes	No					
	Mach-40C	63.95	80	94	4	55-20 ± 5	5 1/2	2	F	2	Yes	No					
	Mach-50C	69.95	90	94	4	55-20 ± 5	5 1/2	3	F	2 1/4	Yes	No					
	Mach-60C	77.95	120	94	4	50-20 ± 5	6 x 9	2	F	3 1/4	Yes	No					
	Mach-70C	83.95	130	94	4	50-20 ± 5	6 x 9	3	F	3 3/4	Yes	No					
	TECHNICS	SB-F10	220.00	60	86	4/8	†	4 3/4	3	A/P	S	6 1/8		No	No	†-10 dB at 75 Hz and 33 kHz. †-10 dB at 90 Hz and 33 kHz.	
SB-F30		340.00	60	86	4/8	†	4 3/4	3	A/P	S	6 1/8	No	No				
VISONIK	D5001	117.00	234.00	60	82	4	50-25	4	2	S	1 1/2	Yes	Yes	†Flush-mount woofer, surface-mount tweeter.			
	D5202	80.00	160.00	80	85	4	50-20	4	2	F	1 1/2	Yes	Yes				
	D7200	117.00	234.00	100	88	4	50-20	5 1/4	2	†	2 1/4	Yes	Yes				
YAMAHA	YCS-350	40.00	40	90	4	70-20	3 1/2	W		F	1 3/4	Yes	Yes	Drop-in replacement.			
	YCS-400	60.00	60	90	4	60-20	4	W		F	1 1/4	Yes	Yes				
	YCS-460	80.00	40	90	4	60-20	4 x 6	2	F	1 1/4	Yes	Yes					
	YCS-530H	200.00	100	88	4	60-20	5	2	F	1 1/4	Yes	Yes	As above.				
	YCS-600	100.00	100	90	4	50-20	6 1/2	2	A	F	2 1/4	Yes		Yes			
	YCS-601	160.00	100	89	4	50-20	6 1/2	2	A	F	2 1/4	Yes	Yes	With spacer.			
	YCS-690	140.00	120	91	4	40-20	6 x 9	2	A	F	2 1/4	Yes	Yes				
	YCS-691	180.00	120	91	4	35-20	6 x 9	2	A	F	2 1/4	Yes	Yes				
	YCS-300	90.00	40	90	4	3.5k-20k	T				F	3/4	Yes	Yes	As above.		
	YCS-500	85.00	100	90	4	50-10	5			F	2 1/4	Yes	Yes				
	YCS-602	100.00	120	90	4	40-10	6 1/2			F	2 1/4	Yes	Yes				
	YCS-800	315.00	200	92	4	20-1	S	8		F	3 1/2	Yes	Yes				

spring' fe' ver, an uneasy, restless feeling commonly associated with the beginning of spring.

Winter's gone and taken the fast pace away for a while. You want to make the most of your own time, now that you've earned it. Go ahead and day dream. Take some time to dream of those summer months ahead... of bikinis, boats, bonfires, Hot Cars and HEAVY SOUND. You want a summer that you'll never forget? This year you can go for it.

This year, there's Orion.



MADE IN U.S.A.  
**ORION**

(602) 948-7356



Engineering expertise never comes easy. It's acquired over time through dedication, and it's Mitsubishi's undaunted benchmark for quality.

We apply that expertise to every product we develop. We apply our signature only when a product satisfies the strictest design and performance criteria.

Through advanced manufacturing techniques and rigid testing, every car audio product we produce stands for unprecedented quality, reliability and performance. The Diamond Collection™ is a car audio triumph. It's a select group of products that offer the optimum in critical car audio listening.

It's no accident that unequalled manufacturing expertise and sophisticated engineering prowess have been combined. It's a matter of breeding and that's a matter of Mitsubishi.

**PERFORMANCE  
IS A MATTER  
OF BREEDING.**

**ENGINEERING  
IS A MATTER  
OF MITSUBISHI.**



# COMPANY ADDRESSES

<p><b>ADS</b> One Progress Way Wilmington, Mass. 01887</p> <p><b>Afs Kriket</b> 6024 West 79th St. Indianapolis, Ind. 46278</p> <p><b>Aiwa</b> 35 Oxford Dr. Moonachie, N.J. 07074</p> <p><b>Alphasonik</b> 701 Heinz St. Berkeley, Cal. 94710</p> <p><b>Alpine</b> 19145 Gramercy Pl. Torrance, Cal. 90501</p> <p><b>American Audio</b> Mobile Sound Div. 636 Forbes Blvd. South San Francisco, Cal 94080</p> <p><b>Anglo-American Audio</b> P.O. Box 653 Buffalo, N.Y. 14240</p> <p><b>AR</b> 10 American Dr. Norwood, Mass. 02062</p> <p><b>ARA Manufacturing</b> P.O. Box 534002 Grand Prairie, Tex. 75053</p> <p><b>Audia</b> See Clarion</p> <p><b>Audio Control</b> P.O. Box 3199 Lynnwood, Wash. 98036</p> <p><b>AudioMobile</b> 1500 Executive Dr Elgin, Ill. 60120</p> <p><b>Audio Pro</b> See Sonic Research</p> <p><b>AudioSource</b> 1185 Chess Dr. Foster City, Cal. 94404</p> <p><b>Audiovox/Hi-Comp</b> 150 Marcus Blvd. Hauppauge, N.Y. 11787</p> <p><b>Autotek</b> 1447 North Carolan Ave Burlingame, Cal. 94010</p> <p><b>Autovox</b> R.I.S.S. 425 Sherman Ave Palo Alto, Cal. 94306</p> <p><b>Babb Audio</b> 3230-A Towerwood Farmers Branch, Tex. 75234</p> <p><b>Becker Electronics</b> Route 145 East Durham, N.Y. 12423</p> <p><b>Becker-Swan</b> P.O. Box 444 Catskill, N.Y. 12414</p> <p><b>Bevada Soundtech</b> 8743 Shirley Ave. Northridge, Cal. 91324</p>	<p><b>BGW Systems</b> 13130 South Yukon Ave. Hawthorne, Cal. 90250</p> <p><b>Blaupunkt</b> 2800 South 25th Ave. Broadview, Ill. 60153</p> <p><b>Bon Sonic</b> 39 West 28th St. New York, N.Y. 10001</p> <p><b>Bose</b> 100 The Mountain Rd Framingham, Mass. 01701</p> <p><b>Boston Acoustics</b> 247 Lynnfield St. Peabody, Mass. 01960</p> <p><b>B &amp; W</b> See Anglo-American Audio</p> <p><b>Canton</b> 254 First Ave North Minneapolis, Minn. 55401</p> <p><b>Carver</b> P.O. Box 1237 Lynnwood, Wash. 98036</p> <p><b>Cerwin-Vega</b> 12250 Montague St. Arleta, Cal. 91331</p> <p><b>Clarion</b> 5500 Rosecrans Ave. Lawndale, Cal. 90260</p> <p><b>Clements Audio Systems</b> 4354 Spring Valley Rd. Dallas, Tex. 75244</p> <p><b>Concord Systems</b> 6025 Yolanda Ave Tarzana, Cal. 91356</p> <p><b>Craig</b> 921 West Artesia Blvd. Compton, Cal. 90220</p> <p><b>Crown International</b> 1718 West Mishawaka Rd Elkhart, Ind. 46517</p> <p><b>Cybernet</b> 7 Powder Horn Dr Warren, N.J. 07060</p> <p><b>Denon</b> 27 Law Dr Fairfield, N.J. 07006</p> <p><b>Dynamic Acoustics</b> P.O. Box 646 San Ramon, Cal. 94583</p> <p><b>Ego Systems</b> 50 Werman Court Plainview, N.Y. 11803</p> <p><b>EPI</b> Epicure Products 25 Hale St Newburyport, Mass. 01950</p> <p><b>ESS Laboratory</b> 16022 Arminta Ave Van Nuys, Cal. 91406</p> <p><b>Fujitsu Ten</b> 19281 Pacific Gateway Dr Torrance, Cal. 90502</p>	<p><b>Arthur Fulmer</b> P.O. Box 177 Memphis, Tenn. 38018</p> <p><b>Genesis Physics</b> Newington Park Newington, N.H. 03801</p> <p><b>Gold Sound</b> P.O. Box 141 Englewood, Colo. 80110</p> <p><b>Grundig</b> c/o GR Electronic Glenpointe Center East Teaneck, N.J. 07666</p> <p><b>David Haffler Co.</b> 5910 Crescent Blvd. Pennsauken, N.J. 08109</p> <p><b>Harman/Kardon</b> 240 Crossways Park West Woodbury, N.Y. 11797</p> <p><b>Hi-Comp</b> See Audiovox</p> <p><b>Hifonics</b> 845 Broad Ave. Ridgefield, N.J. 07657</p> <p><b>Infinity Systems</b> 9409 Owensmouth Ave Chatsworth, Cal. 91311</p> <p><b>Jamo</b> 425 Huehl Rd. Northbrook, Ill. 60062</p> <p><b>JBL</b> 8500 Balboa Blvd Northridge, Cal. 91329</p> <p><b>Jensen</b> 4136 North United Pkwy. Schiller Park, Ill. 60176</p> <p><b>JSE</b> Jet Sound Electronics P.O. Box 4567 Carson, Cal. 90749</p> <p><b>JVC</b> 41 Slater Dr Elmwood Park, N.J. 07407</p> <p><b>KEF</b> 695 Oak Grove Ave. Menlo Park, Cal. 94025</p> <p><b>Kenwood</b> 1315 East Watsoncenter Rd Carson, Cal. 90745</p> <p><b>Kraco</b> 505 East Euclid Ave Compton, Cal. 90224</p> <p><b>Linear Power</b> 11545 D Ave. Auburn, Cal. 95603</p> <p><b>Lirpa Labs</b> Main and Elm Sts New York, N.Y. 10101</p> <p><b>Magnadyne</b> Box 5365 Carson, Cal. 90749</p> <p><b>Magnum</b> 11543 Tuxford St. Sun Valley, Cal. 91352</p>	<p><b>Majestic Electronics</b> 14614 Lanark St Panorama City, Cal. 91042</p> <p><b>Marantz</b> 20525 Nordhoff St. Chatsworth, Cal. 91311</p> <p><b>Maxxima</b> 137 Express St. Plainview, N.Y. 11703</p> <p><b>Mitsubishi</b> 799 North Bierman Circle Mt Prospect, Ill. 60056</p> <p><b>Monolithic Sound</b> P.O. Box 385 Woodland Hills, Cal. 91365</p> <p><b>Morel Acoustics</b> 414 Harvard St Brookline, Mass. 02146</p> <p><b>MTX</b> One Mitek Plaza Winslow, Ill. 61089</p> <p><b>Nakamichi U.S.A Corp.</b> 19701 South Vermont Ave. Torrance, Cal. 90502</p> <p><b>Orion Industries</b> 306 South River Dr Tempe, Ariz. 85281</p> <p><b>Panasonic</b> One Panasonic Way Secaucus, N.J. 07094</p> <p><b>Parasound</b> Wharfside 680 Beach St San Francisco, Cal. 94109</p> <p><b>Peerless Audio</b> 40 Jytek Dr Leominster, Mass. 01453</p> <p><b>Philips Auto Audio</b> 230 Duffy Ave Hicksville, N.Y. 11802</p> <p><b>Pioneer</b> P.O. Box 1720 Long Beach, Cal. 90801</p> <p><b>Polk Audio</b> 1915 Annapolis Rd. Baltimore, Md. 21230</p> <p><b>Polydax Speaker</b> Two Park Avenue New York, N.Y. 10016</p> <p><b>Proton</b> 737 West Artesia Blvd Compton, Cal. 90220</p> <p><b>Pyle Industries</b> 501 Center St Huntington, Ind. 46750</p> <p><b>Realistic</b> Radio Shack 1700 One Tandy Center Fort Worth, Tex. 76102</p> <p><b>Roadmaster</b> Royal Sound 200 Industrial Way West Eatontown, N.J. 07724</p>	<p><b>Rockford Fosgate</b> 613 South Rockford Dr Tempe, Ariz. 85281</p> <p><b>Sansui</b> 1250 Valley Brook Ave. Lyndhurst, N.J. 07071</p> <p><b>Sanyo</b> 1200 West Artesia Blvd. Compton, Cal. 90220</p> <p><b>SAS</b> Southern Audio Services P.O. Box 1515 Denham Springs, La. 70727</p> <p><b>SFI</b> Sawafuji 23440 Hawthorne Blvd. Torrance, Cal. 90505</p> <p><b>Sherwood</b> 13845 Artesia Blvd. Cerritos, Cal. 90701</p> <p><b>Sonic Research</b> 27 Sugar Hollow Rd. Danbury, Conn. 06810</p> <p><b>Sony</b> Sony Dr Park Ridge, N.J. 07656</p> <p><b>Soundstream Technologies</b> 2700 Neilson Way Suite 1722 Santa Monica, Cal. 90405</p> <p><b>Sparkomatic</b> Routes 6 and 209 Milford, Pa. 18337</p> <p><b>SPECO</b> P.O. Box 624 Lindenhurst, N.Y. 11757</p> <p><b>Stillwater Designs</b> 1212 South Main Stillwater, Okla. 74074</p> <p><b>Targa</b> 11307 South Shoemaker Ave. Sante Fe Springs, Cal. 90670</p> <p><b>Technics</b> One Panasonic Way Secaucus, N.J. 07094</p> <p><b>TEI Electronics</b> 570 West 18th St. Hialeah, Fla. 33010</p> <p><b>ULTRX</b> 1200 West Artesia Blvd. Compton, Cal. 90220</p> <p><b>Vector Research</b> 20600 Nordhoff St. Chatsworth, Cal. 91311</p> <p><b>Visonik</b> See Hifonics</p> <p><b>Yamaha</b> 6660 Orangethorpe Ave. Buena Park, Cal. 90620</p> <p><b>Zapco</b> Zeff Advanced Products 2549 Yosemite Blvd Suite E Modesto, Cal. 95354</p>
---	--	---	--	---

EDWARD TATNALL CANBY

## SYMPHONY FOR THE DEVIL

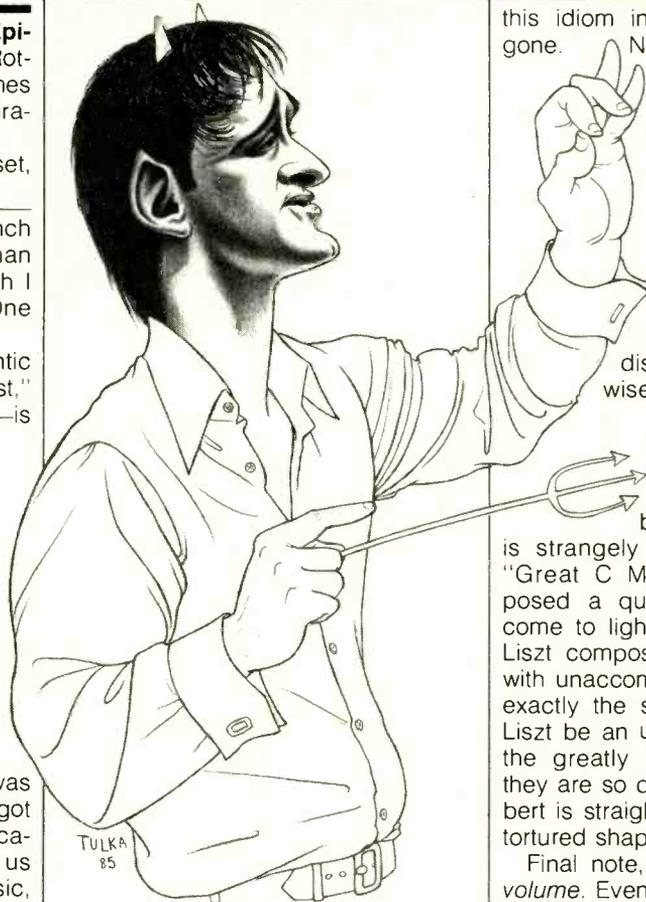
**Liszt: Faust Symphony; Two Episodes After Lenau's Faust.** The Rotterdam Philharmonic Orchestra, James Conlon. The Philharmonic Choir of Bratislava; John Aler, tenor.  
**Erato 751582**, digital, two-record set, \$21.98.

The text on the cover of this French RCA import is actually in German ("eine Faust-Symphonie . . .") which I have translated for simplicity. One world, but too many tongues.

The "Faust Symphony," a gigantic piece in three movements—"Faust," "Gretchen," and "Mephistopheles"—is one of the great works of musical thought from the mid-19th century. It's an all-out, rip-roaring thriller but too long, too deep and too unsettling for earlier ears than ours. It has all the trimmings, all right! But listen to the very opening melody, brooding and ominous: In just 12 notes it covers all 12 tones of the chromatic scale in weird, augmented intervals—undoubtedly the first tune of *that* sort, so widespread in the 20th century. This was some 60 years before Schoenberg got around to the same idea. The implications of those first notes carry us through more than an hour of music, from vast bombast to sweet and pure melody and that skittery, high-voltage "devil music," conjuring demons and hobgoblins and hellfire, that the 19th century so loved. It has everything. But only now can we realize how far ahead Liszt leapfrogged, even beyond Richard Wagner, into much later thinking. Now, we can hear it.

Curiously, I think first of today's advanced jazz composers. This is where *they* are at, very specially, among today's composers. Jazzmen of the Wynton Marsalis generation will be astonished at the tone relationships and the sequences of harmony that Liszt put down on paper so long ago. He is one of them! Though the sound is hardly jazz.

This is music, then, to challenge both the musical mind and, needless to say, the equipment that records it, as well as the hi-fi that reproduces it for you in your own listening spot. The recording challenge is beautifully met in French digital. There's a fine crisp-



ness, superb lower strings with a gutsy, stringy edge, good brass, shiny woodwinds—these last a bit close in the miking but not unpleasantly so. The all-male chorus—there has to be a chorus to end any such work as this, à la Beethoven's Ninth—sings behind the orchestra, as it should; the tenor solo (all this comes near the end) is "on stage" at some distance, which is good. Otherwise he would be overpowering.

Performance? Beautifully exact and carefully prepared, with a feeling of real dedication throughout. These people have worked hard and let us know it. But I sense that this new generation of players, under a young conductor, is not entirely understanding of all of Liszt's complexities of harmony and emotion. I heard this work back on 78s an age ago—I remember the very place and the bright blue records, probably Columbia imports—in a time when the grand old conductors knew

this idiom intimately. Well, they are gone.

Now we must "rediscover" Liszt, and it is not easy. James Conlon and the Rotterdam players miss some of the notable moments, sudden harmonic changes, deliciously poignant morsels of melody, here played impeccably but as though they weren't anything special. A mild disappointment in an otherwise admirable performance.

An extra note for those with knowledge of the keyboard: That ominous opening, the brooding 12-tone melody, is strangely like that of Schubert's "Great C Major Symphony," composed a quarter-century earlier but come to light for the first time when Liszt composed "Faust." Both begin with unaccompanied melodies and in exactly the same rhythm. Could the Liszt be an unconscious reference to the greatly revered Schubert? Still, they are so different; where the Schubert is straightforward, Liszt's takes a tortured shape.

Final note, a warning: *Start at low volume*. Even on LP, I had to jump up and turn it down after the ominous beginning passages. No CD yet (as of this writing), but it will surely come soon. The warning should be on the outside package, or you will blow things wide open.

**Varèse: Ecuatorial; Déserts; Intégrales; Hyperprism; Octandre; Offrandes; Density 21.5.** Ensemble Intercontemporain, Pierre Boulez.  
**CBS M 39053.**

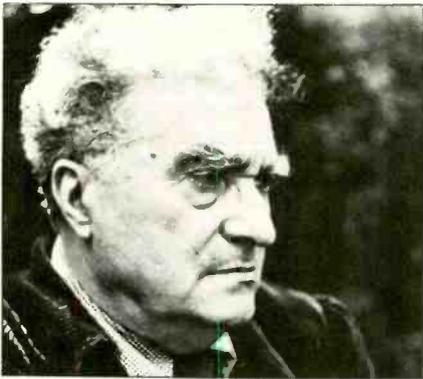
What a Varèse panoply! Here are most of the major works of this extraordinary French-born composer, who lived in New York for many years. All, except the portions of "Déserts" taped from 1949 to 1954, seem to be newly recorded with the steely Boulez, late of the New York Philharmonic and now generally in charge of all things musically modern in France. The record follows a spate of Varèse that came out here when Boulez was still in New York, including orchestral works that

Illustration: Rick Tulka

# SILENT PARTNERS IN GREATNESS.

would never otherwise have had a chance for major recording. We owe a lot to Boulez.

It is strange to remember that I was a casual friend of this man Varèse, at first thinking he was only an odd eccentric and a very poor conductor of German Baroque choral music, of all things—Heinrich Schutz! But matters changed in 1956 when I got involved with the first performances of "Déserts," on this disc an enormous piece that alternates segments for orchestra and long, taped sequences put together from recorded factory sounds. My role was to supply common sense—I turned around the huge Voice of the Theatre speaker systems to reflect off nearby walls, instead of mowing down the first dozen rows of the audience with 120-dB blasts! Varèse meekly followed my suggestions; he was the most gracious and modest of souls, as gentle as a lamb, for all the terrific intensity underneath. And so a few more ears were saved for future fi.



Edgard Varèse

Edgard Varèse does seem more and more to be emerging as one of the most important voices of 20th-century music, or "organized sound" as he called it. If you want to know why, just allow yourself to be knocked flat by the incredibly dissonant, high-power screams of agony this man invoked from perfectly ordinary, conventional musical instruments like flutes, trumpets, oboes, Chinese blocks, and assorted drums. It is music—or organized sound—such as no man (or woman) has ever before written, or ever will again! Enough said, and more power to CBS Records for continuing to explore Varèse's sonic output in recorded form.

You'll never hear their presence on a recording they've made, but you would certainly notice if their contributions were missing.

The instrument they play is the recording studio or the concert hall. And without the talent and expertise of producers, music editors and recording engineers, even the finest performance could easily fall short by the time it reaches your home.

Whether it's a star-studded extravaganza of world-renowned artists or a debut by a promising new talent, these professionals dedicate themselves to providing the best sound quality humanly—and technologically—possible.

CBS Masterworks is proud to direct your attention to the accomplishments of the people behind the scenes and behind the sounds.

They are true artists in every sense of the word.



*FRONT (left to right): Engineers Ray Moore, Bud Graham. MIDDLE ROW: Music Editor Gary Schultz, Producers Sam Carter, David Mottley, Steve Epstein (1985 Grammy Winner—Classical Producer Of The Year), Engineer Marty Greenblatt. BACK ROW: Engineers Larry Keyes, Hank Altman, Vlado Meller, John Johnson.*

"CBS," "Masterworks," and the CBS eye logo are trademarks of CBS Inc. © 1985 CBS Inc.

# MASTERWORKS



## POWER-DRIVEN

**Eliminator:** ZZ Top  
Warner Bros. 9 23774-2.

God-fearin' mamas send their daughters down to the storm cellar and nail the door shut when ZZ Top roars into town in their trademark, fiery-red roadster. This time, ZZ's mode of transportation is a red-hot Compact Disc of their smash 1983 album, *Eliminator*. These three hard-rockin', good-timin', bad-talkin' Texas boys—Billy Gibbons on lead guitar, Dusty Hill on bass, and Frank Beard (the beardless one) on drums—slam their way through 11 cuts of power-driven guitar boogie and leave behind nothing but a big cloud of dirt-road dust.

Four of these cuts have been made notorious by memorable videos employing ZZ's highly recognizable symbols. "TV Dinners" and the so-called ZZ Trilogy—"Gimme All Your Lovin'," "Sharp-Dressed Man," and "Legs"—all feature ZZ's lightning-bolt-shaped silver key chain; the Trilogy further features a trio of breathtakingly beautiful women with long, gorgeous gams who show up in ZZ's red roadster and generally shake up local life while the band members beam their approval and tear into their instruments. The audios are as memorable as the videos.

Don't let the ear-filling, electronic, fuzz-tone quality of these numbers on

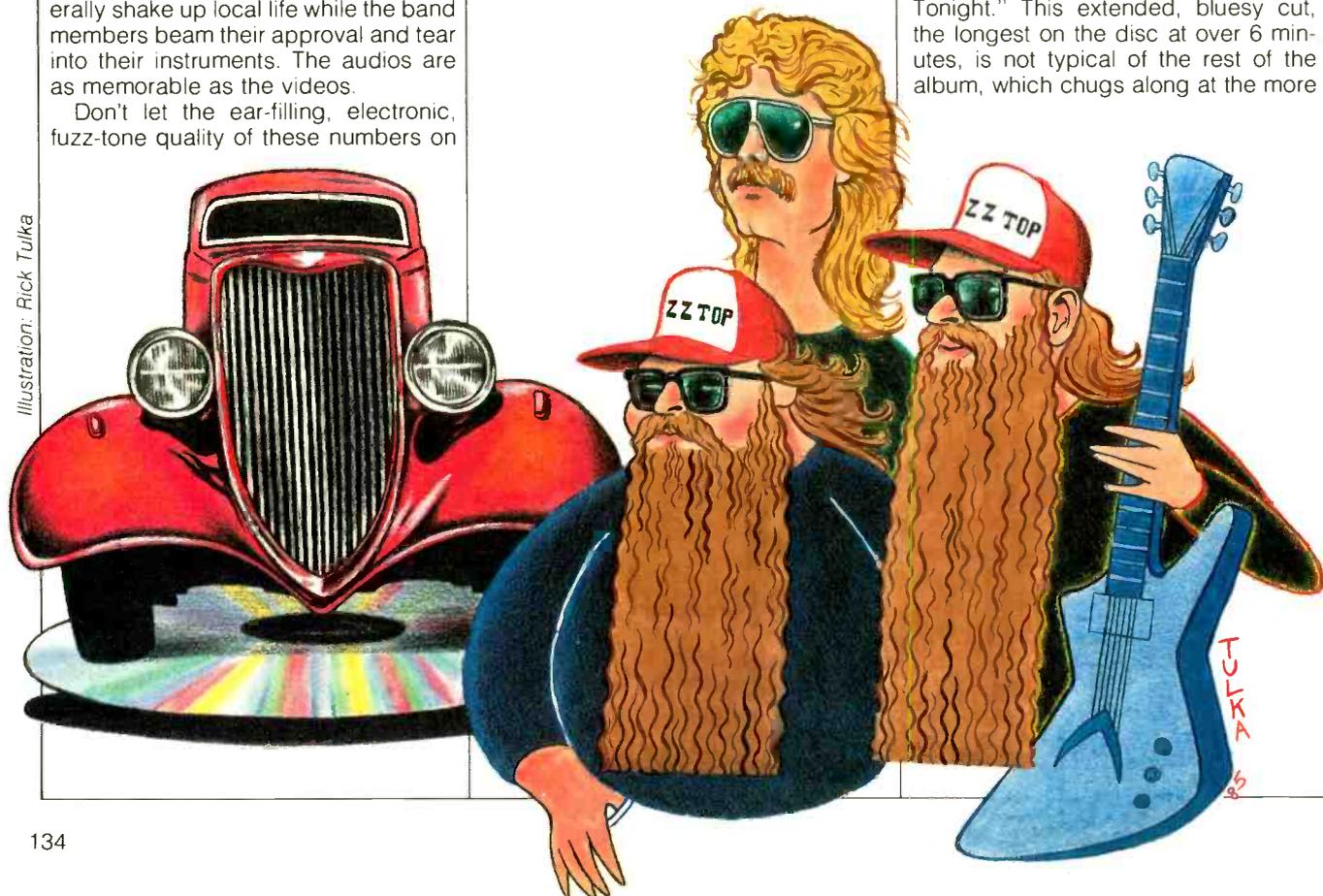
the *Eliminator* CD fool you into thinking this is a poor recording or bad production job; that's just ZZ's style. The power trio tends to spread guitar notes into aural space like a leaking tanker spreads oil on quiet waters; nothing in its path is left untouched. From the moment the drum kicks in out of CD silence on the opening cut ("Gimme All Your Lovin' ") and Billy Gibbons' guitar begins to wail, there isn't a millisecond of quiet space until the song fades to an end almost 4 minutes later. The production on this one, as on several other cuts on the disc, is pretty straightforward, with instruments massed in the phantom center channel and considerable loss of spatial presence due to the blurring effect of the fuzz-tone electronics.

Lest you don't believe me and question the competence of producer Bill Ham or recording engineers Terry Manning and Bob Ludwig at this point, just direct your laser beam two cuts ahead to "Sharp-Dressed Man" or six cuts forward to "Thug." On the former, the fuzz-tone guitar cloud fills all channels in the opening moments until it is

cleanly pierced by a breathy vocal "ahh" and a crisp, basso-profundo "yeah" in the center foreground. The drums have a solid, big-bottomed presence on this cut, and at one point they are cleanly lifted from the center channel and placed briefly on the left, then on the right for a superb one-time accent. "Thug" shows off a sophisticated hand in the production booth with its extraordinary special effects. The sound of a strange electronic insect soars crazily from channel to channel, increasing in volume until it seems to fly directly into the listener's brain. A wonderful, liquid, garbage-can percussion effect is split between right and left channels. There is absolutely no electronic fuzziness here, and the vocals hang cleanly in the phantom center. Although the skimpy liner notes credit no synthesizers, I find it hard to believe that these extraordinary effects were pumped out of mere electric guitars. If so, Gibbons is even more of a genius than Jimi Hendrix claimed he was over a decade ago.

Another highlight is Gibbons' guitar in a slow, sultry burn on "I Need You Tonight." This extended, bluesy cut, the longest on the disc at over 6 minutes, is not typical of the rest of the album, which chugs along at the more

Illustration: Rick Tulka



usual breakneck pace set by Frank Beard's nonstop drum kit.

A couple of dead-stop endings (on "Bad Girl" and "TV Dinners") show off this CD's remarkable quietness as well as the high quality of the original recording that was translated to the digital medium. *Eliminator* was made to be cranked up to the max, and this little CD will allow you to take the volume as far as your system can go. So rev up that motor and let ZZ roar right out of your living-room speakers. Soon girls will be clawing their way out of storm cellars all over town, and you'll be having yourself one hell of a high-powered party.

*Paulette Weiss*

**Transformer:** Lou Reed  
RCA PCD 14807.

Lou Reed's flat, monotone vocals are brought intimately close to the ear on this clean Compact Disc. Listeners who are Reedophiles will enjoy the experience; those who aren't may well resent the intrusion.

*Transformer* is the post-Velvet Underground album that brought Reed recognition as a solo performer in 1972. It marked the beginning of his open experimentation with sexual identities under the guidance of David Bowie, who, together with Mick Ronson, produced the original LP. Hand-in-hand with Bowie, Reed took his "Walk on the Wild Side" on this disc, strolling right up the pop charts into the Top Ten. This cut, a musical exposé of the '60s activities of the Andy Warhol underground, is a revelation in the CD format. It is clear and crisp, the acoustic guitars split cleanly into left and right channels, the bass strong but subdued at center background, Reed's voice intimately placed front-and-center. Most impressive, however, is the presentation of the female chorus. Reed conjures them up with the lyric line, "And the colored girls say, 'Doo, da doo, da doo, doo-doo-doo doo . . .'" and they appear, distant at first, split between right and left channels. Gradually, their

voices grow closer with each repetition of the chorus, giving a very strong aural impression that they are walking directly toward the mikes. It's a clever production technique, and one which admirably makes the song's theme concrete.

The production on this 11-cut album is generally good, and at its best (surprisingly) when Reed's voice is the focal point. Despite his obvious vocal limitations, there is something fascinating about his delivery of those strange, tongue-in-cheek lyrics about weird and decadent characters. For the most

part, his voice is recorded way up front and dead center. Supporting instruments have excellent spatial definition and clarity; the acoustic piano on "Perfect Day," for instance, has marvelous presence, as does the centered electric bass in "Walk on the Wild Side," the crisp finger-snaps on "Satellite of Love," and the delightful, hokey tuba on "Make Up" and "Goodnight Ladies." Monotonous as it may be, when Reed's voice is pulled too far back in the mix a certain vital spark is lost, as in "Vicious," the album's opener. This cut has a lifeless quality resulting from burying Reed's voice deep in mid-ground instrumentation.

This is a flawed but fascinating CD, a must for those in any way interested in the early works of this influential artist who is widely regarded as the grand old man of the punk movement.

*Paulette Weiss*

*Lou Reed*



**Muddy Waters on Chess,  
"1948-1951," Vol. I  
Vogue/Chess VG651 600052.**

Chicago blues great Muddy Waters, born McKinley Morganfield in 1915, recorded his first successful discs for the venerable Chess label back in 1948.

This French-import Compact Disc on the Vogue label covers the Chess period from that year until 1951, when his first band jelled into a stable performing unit. It includes some of his classic performances of that era, such as "I Can't Be Satisfied (Looking for My Baby)" with Big Crawford on bass, and "Honey Bee" with Little Walter on harmonica, Jimmy Rogers on second guitar, and Big Crawford on bass again. (However, it leaves out some of his other well-known numbers from that same period, among them "Rollin' Stone"—from which the now-famous rock band took its name—and "I Feel Like Going Home.") All the cuts here were recorded in Chicago, and all are treasurable souvenirs of the late bluesman's work.

Muddy's talents are self-evident, his distinctive bottleneck electric guitar skillfully supporting his soulful yet dig-

The precious remains of these Muddy Waters performances are preserved in a format that will suffer no further deterioration.

Muddy Waters



nified vocals throughout the 20 selections on this generous, single CD. Although it is easy to assess the great bluesman's skills here, it is difficult to judge the recording in terms of CD technology. These original recordings are unsophisticated in approach: Often, a microphone was simply plunked down in front of the performers while they played. Muddy's voice and guitar are usually strong and clear in the foreground, but balances vary widely from cut to cut. Vocals are skewed to the left or right, and, on the earliest sessions, drums and piano appear in the distant background. The recordings up until 1950 exhibit extreme surface noise, as though a copy were made from an old, scratched disc (this probably was the case, an old disc being the only remaining source for this three-decade-old material). It also sounds as though many of these recordings were "electronically enhanced" for stereo, a process that has given them a strange, artificial echo and a totally unnatural-

sounding split between left and right channels. There is no information in the liner notes about the preservation or processing of this disc, a major oversight in view of the historic nature of the recordings.

From 1950's "Louisiana Blues" on, the material shows a marked improvement in recording technique. Balances are better, the instrumentals are more naturally centered, and that distracting

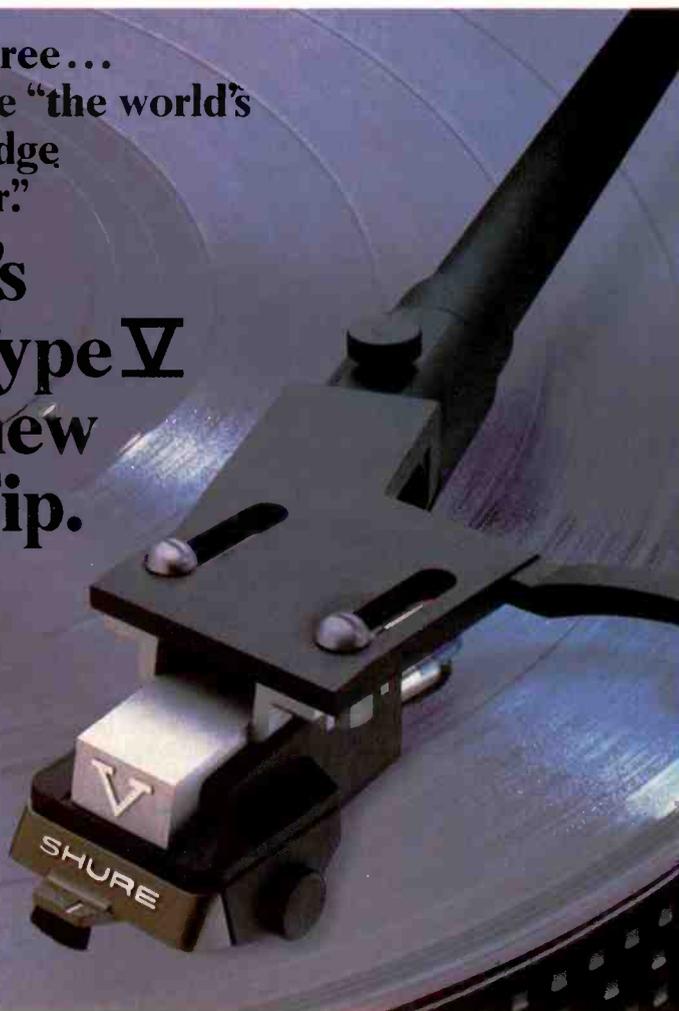
artificial echo has been eliminated. Nevertheless, this is one of those cases where the clarity of digital recording serves to spotlight the flaws of the original analog method. This CD does provide an invaluable service, though, encoding the precious remains of Muddy Waters' performances in a format that will suffer no further deterioration. Despite its obvious imperfections *Muddy Waters on Chess, "1948-1951," Vol. 1* deserves a place in any serious blues record collection.

Paulette Weiss

*Editor's Note:* We'd love to give credit to the importer who brought in this CD we purchased at Tower Records' main store in New York. However, Tower says, "Polygram," who says "Ain't us," and the Compact Disc Group says "Don't know. Besides, 'import' is a dirty word." The jewel-box copy insert shows four other CDs: *The Best of Chuck Berry*, No. 600033; *Big Bill Blues* by Bill Broonzy, No. 600041; *The*

Experts agree...  
we've made "the world's  
best cartridge  
even better."

Shure's  
V15 Type V  
with new  
MR Tip.



"We were hardly surprised to find that the V15 Type V-MR is a sterling performer...with unsurpassed clarity and freedom from distortion...Shure has made one of the world's best cartridges even better."

High Fidelity Magazine

"Shure's new V15 Type V-MR actually provides a substantial improvement in the tracking ability of what was already the best tracking cartridge we know of."

Stereo Review Magazine

"This time Shure has really come through... What you get is...detail, especially at high frequencies. There's a wonderful bloom around the music, and it's natural, not hyped!"

Stereophile Magazine

The Shure V15 Type V-MR—no other component can bring so much sound out of your system for so little money. A combination of the revolutionary Micro-Ridge Tip and Shure's extraordinary Beryllium Stylus Shank, this cartridge has redefined the upper limits of high-frequency trackability.

**SHURE**

You'll hear more from us.

Enter No. 50 on Reader Service Card

The power and majesty of the organ played by Simon Preston are truly awesome, and the sonority of the pedals is stunning in its impact.

*London Howlin' Wolf Sessions*, which features Eric Clapton, Steve Winwood, Bill Wyman and Charlie Watts, No. 600051, and a second volume of Muddy on Chess, dated from 1952 through 1959, No. 600059. Now, if I get on an "RR" subway, I can get off at 8th Street and... —E.P.

**Widor: Symphony No. 5; Vierne: Carillon de Westminster.** Simon Preston, organ.  
**Deutsche Grammophon 413 438-2 GH.**

I have been playing Compact Discs using my mighty new B & W 808 monitor speakers, and such is the dynamic expression afforded by these speakers that much music takes on a new dimension.

Case in point is this DGG recording of famed organist Simon Preston playing in Westminster Abbey in London. Preston performs the delightful "Carillon de Westminster" of Vierne and Wi-



Simon Preston

dor's "Symphony No. 5." Most people are familiar with the toccata of this piece, but not with the rest of the Widor symphony.

DGG has had some bad press on the quality of their CD recordings, but in this instance they have done a great job in capturing the essential qualities of this great organ. As played on the 808s, the power and majesty of the organ are awesome, with the sonority of the pedals stunning in impact. Preston does his usual masterful job, and his Widor toccata is fierce and exciting. A must for organ buffs. *Bert Whyte*

**Storm:** Maynard Ferguson  
**Nautlius Super Discs NR57 DIDZ 10011.**

I did the first stereo recording of Maynard Ferguson when he was with Stan Kenton in 1951 at the Blue Note nightclub in Chicago. As a youngster back then, he was noted for the stratospherically high notes he could play on his trumpet. As any trumpet player can tell you, playing in the very high registers is both difficult and taxing.

Incredibly, 34 years later, this CD recording of Ferguson is vividly audible proof that he has not lost his lip and can still go into orbit with his high notes. Here he fronts an outstanding big band and plays such well-known pieces as "Take the A Train," "As Time Goes By" and "Sesame Street," as well as some lesser known ones.

The music was recorded "live to two track" on Soundstream Digital, and, in spite of the difficulties of technique, balances are good. There is plenty of

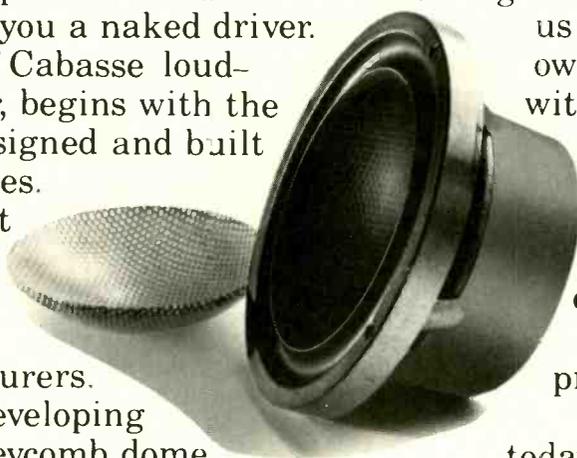
# AU NATURAL

Most speaker companies would be ashamed to show you a naked driver.

The musicality of Cabasse loudspeakers, however, begins with the superb drivers designed and built in our own factories.

In fact, we are not even content to buy the materials available to all speaker manufacturers.

We spent years developing the exclusive honeycomb dome material used in the mid-bass unit pictured here at our research facility in Brest, France.



Pioneering technology has enabled

us to combine nature's own honeycomb design with the most naturally

rigid shape, the dome, to produce low mass speaker cones that do not

distort their shape — or the sound they produce — even when

driven very hard by today's dynamic musical sources. The good sound of

Cabasse loudspeakers begins at the beginning, naturally.

 Cabasse

Exclusive U.S. Distributor

**MIDRIGAL**  
LTD.

P.O. Box 781 Middletown, CT 06457

You may audition Cabasse loudspeakers at Lyric Hi-Fi in New York and Beverly Stereo in Los Angeles.



Julius LaRosa, Michael Mark, Mel Torme, Marlene Ver Planck and Marty Nelson

Many fine musicians took part in this Compact Disc of Glenn Miller songs. I was thrilled to hear all the great tunes in glorious, clean sound.

with excellent internal balances and good definition. Here the engineers have chosen to play it straight and not indulge in creative percussion. Thus, the scoring and Hogwood's dynamics are followed scrupulously—which is not to say that the sound is dull. In fact, these are sprightly, well-paced performances that are marked by the always superb playing and musicianship of the Academy. *Bert Whyte*

**In the Digital Mood:** The Glenn Miller Orchestra  
GRP Records GRP-D-9502.

This CD was a major undertaking; the bandleader, Larry O'Brien, heads up the official Glenn Miller Orchestra. Thus, the charts on all the familiar numbers are the original and authentic arrangements. Many well-known musicians participated, as well as such vocal luminaries as Julius LaRosa, Mel Torme and Marlene Ver Planck. This CD was recorded at A & R Studios in New York, with Larry Rosen and Dave Grusin doing the mixing. Once again, my associate Frank Dickinson was the digital engineer, and I heard this master tape, mixed down from the 3M 32-track recorder to the JVC digital mastering system, at Frank's studio. A slight amount of equalization was used in the CD recording.

All the great numbers are here, including "In the Mood," "Chattanooga Choo Choo," "American Patrol," "String of Pearls," "Little Brown Jug," "Kalamazoo," "Tuxedo Junction," "St. Louis Blues March," "Pennsylvania 6-5000," and "Moonlight Serenade."

Needless to say, using the original arrangements it is strictly nostalgia time. But what a difference in sound! Remembering the sound of the old Glenn Miller recordings, I was thrilled to hear these great tunes in glorious, super-clean, digital sound. The performances are very upbeat, superbly played in the Glenn Miller style. To put a point on it—they are authentic, the CD becoming a magic time machine that takes me back to the Glenn Island Casino in New York, where sweet young things whirled around the dance floor entranced by the romantic Miller music. Ah, well. It's hell to get old!

*Bert Whyte*

big-band blast, with the sound very clean and placed in a moderately spacious acoustic perspective. Maynard's players call him Admiral, and he is unquestionably ruler of the high Cs! *Bert Whyte*

**Beethoven: Piano Concertos Nos. 2 and 4.** The Vienna Philharmonic Orchestra, Zubin Mehta; Vladimir Ashkenazy, piano.  
London 411 901-2.

If you are a devotee of the Beethoven piano concertos, this CD is for you. The performance of Ashkenazy is simply thrilling—a brilliant traversal of the Second and Fourth Piano Concertos, played with passionate intensity yet displaying great lyrical insight. Ashkenazy's touch is incredibly clean, with precise articulation. Zubin Mehta is *en rapport* with Ashkenazy, and the great Vienna Philharmonic Orchestra displays its rich tonal resources.

The sound is marvelous. The piano is ideally placed, just forward of the orchestra. Piano transients are pristine clean, and the piano itself is rich and resonant with an especially sonorous bass end. The sound of the orchestra is very well-delineated, yet it has massive weight in the great climaxes. String tone is smooth throughout. If you want to hear the greatness of this CD, just listen to the rondo vivace finale of the Fourth Concerto. Breathtaking! *Bert Whyte*

**For Duke:** Bill Berry and His Ellington All-Stars  
RealTime RT 1001.

M & K RealTime records got into CD production early in the game and then sort of dropped out of sight. Now they are back with one of their most well-known recordings, *For Duke*, which originally was a direct-to-disc project.

This CD is derived from the analog, reference master tape that was made at the recording sessions.

Bill Berry leads the Ellington All-Stars in a number of the Duke's works, pretty well dressed up in Ellington-style arrangements. The disc opens with the immortal "Take the A Train," continues with "Mood Indigo" and goes on to "Things Ain't What They Used to Be," "Perdido," "Satin Doll," "I've Got It Bad and That Ain't Good," "I Let a Song Go Out of My Heart," and finally the infrequently played "Cotton Tail." A slight amount of tape hiss attests to the recording's analog origin. However, the close-up recording is very clean, with fine transient response on percussion, piano and string bass. The sound is wide-range and open, and the performances are all good, hewing very close to the Ellington tradition.

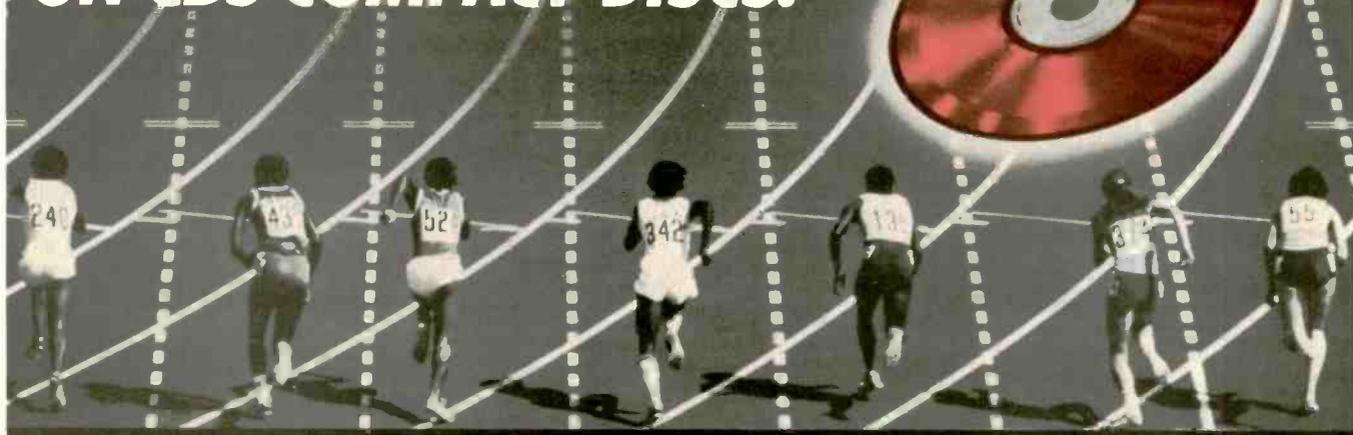
*Bert Whyte*

**Haydn: Symphonies No. 104 and No. 100.** The Academy of Ancient Music; Christopher Hogwood, fortepiano.  
L'Oiseau-Lyre 411 833-2.

Christopher Hogwood leaves his usual Christ Church, Oxford, recording venue and takes his Academy of Ancient Music orchestra to Kingsway Hall in London. In this favorite locale of the London/Decca label, Hogwood has recorded the Haydn Symphony No. 104 and the popular "Military" Symphony No. 100. Years ago, at the dawn of the LP era, Westminster Records became famous on the strength of their hi-fi recording of the "Military" symphony, with overemphasized but exciting cymbal clashes and tympani beats in the score.

John Dunkerly (who gives us those marvelous Montreal Symphony/Charles Dutoit recordings) and Simon Eadon were the engineers. The sound is very full in a warm, ambient field,

# THIS MONTH'S BIG EVENTS ON CBS COMPACT DISCS.



## MAY

5

Vol. II

**NEIL  
DIAMOND**  
12 GREATEST  
HITS

7

8

**RICHARD CLAYDERMAN**  
AMOUR

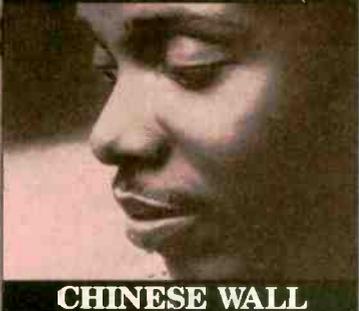


**PERAHIA  
BEETHOVEN**  
SONATA NO. 23, OP. 57  
"APPASSIONATA"  
SONATA NO. 7, OP. 10, NO. 3



**PHILIP BAILEY**

15



**CHINESE WALL**

**Chet Atkins, C.G.P.**  
**Stay Tuned**

20

**JUST RELEASED!**

PINK FLOYD "The Final Cut"  
PINK FLOYD "Wish You Were Here"  
ELC OD, SWEAT & TEARS "Greatest Hits"  
R. STRAUSS: Four Last Songs  
Kiri Te Kanawa  
TCHAIKOVSKY: Sym. No. 6 "Pathetique"  
Lorin Maazel

BERLIOZ  
SYMPHONIE FANTASTIQUE  
BERLINER  
PHILHARMONIKER  
DANIEL BARENBOIM

22



— FEATURING —

George Benson • Larry Carlton  
Earl Klugh • David Hungate  
Mark Knopfler • Jeff Porcaro  
Steve Lukather

**DIGITALLY MIXED**

Enjoy today's revolution in sound with CBS Compact Discs. Our rapidly-growing catalog features hundreds of titles by superstar artists in all categories of music. Ask for a free copy wherever Compact Discs are sold.

COMPACT  
**disc**  
DIGITAL AUDIO

"CBS" is a trademark of CBS Inc. © 1985 CBS Inc.

Enter No. 18 on Reader Service Card

# ROCK/POP RECORDINGS

MICHAEL TEARSON  
JON & SALLY TIVEN

## MOVING VAN

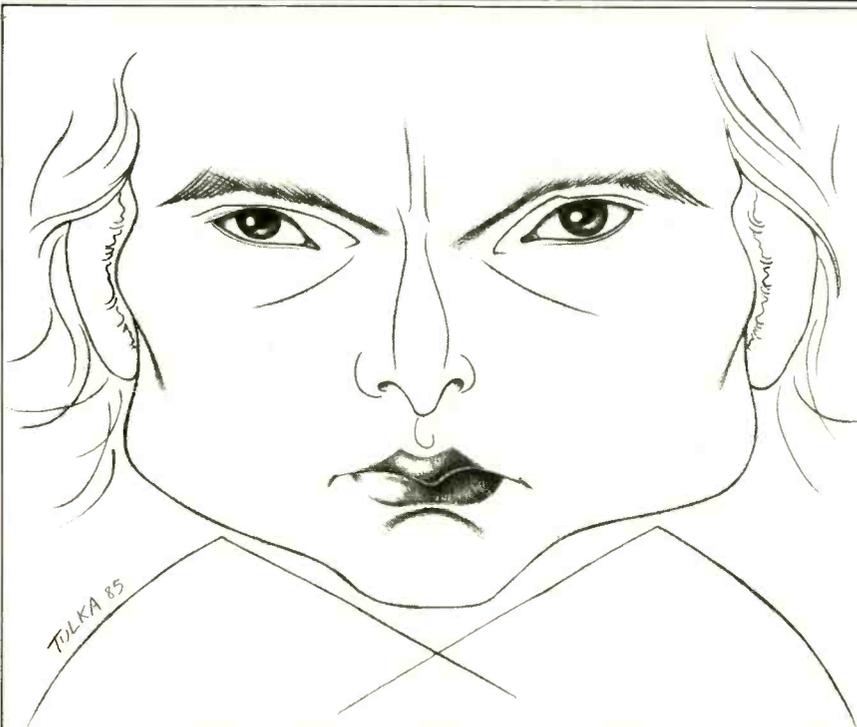


Illustration: Rick Tulka

**A Sense of Wonder:** Van Morrison  
Mercury 822 895-1 M-1, \$8.98.

Sound: B Performance: A

*A Sense of Wonder* is, quite simply, the best album Van Morrison has made in years. It recaptures a lot of the fire unheard from the Belfast cowboy for far too long. There is magic happening anew in Van's music.

Many sides of Van Morrison surface here. "Tore Down à la Rimbaud," which is about severe writer's block and "the dark night of the soul," has a rollicking feel akin to "Like a Rolling Stone." The title track is reminiscent of the hypnotic mysticism of the *Astral Weeks* album, while "Boffyflow and Spike" could have been a traditional Irish reel. Mose Allison's "If You Only Knew" and Ray Charles' "What Would I Do Without You" are both tributes to musicians who have always been in Van's pantheon of heroes. Each has a strong R&B thrust, with a bit more jazz and coolness in the Mose Allison song and a lot of torch in the Ray Charles piece. The Adrian Mitchell/Mike Westbrook composition, "Let the Slave," a powerful setting of a very spiritual dirge, incorporates the William Blake poem "The Price of Experience," pay-

ing homage to another of Morrison's heroes. The instrumental "Evening Meditation" packs similar power without words. Reverence is the tone of "The Master's Eyes," while "Ancient of Days" and "A New Kind of Man" recall vintage Van Morrison pieces that could have come from no one else.

The band sounds very much like the one on the classic *Moondance* album and others of that time, featuring a sweet, sweet sax now played by the very classy Pee Wee Ellis. The overall sound is sweet, too, with lovely stereo effects appropriately deployed. Jim Stern's engineering of Morrison's production is spot on.

There really is a sense of wonder and joy permeating this album. *A Sense of Wonder* emerges as a most satisfying and pleasurable experience and a source of great warmth. Welcome back, Van. *Michael Tearson*

**Crazy from the Heat:** David Lee Roth  
Warner Bros. 25221B, \$5.99 (12-inch EP).

Sound: B Performance: B+

Simply because David Lee Roth's vocals are ridiculous on a heavy-metal

record doesn't mean that the guy can't sing, and this solo album is designed to exonerate him from charges of musical incompetence. Roth gives a great interview, and as far as being a noteworthy performer and stage personality, there never has been much question of his dynamism, but his own pipes have been subject to some skepticism. Whereas someone like Billy Squier can get away with a limited vocal range simply because of its high register, Roth's growl is down an octave or so from his peers'. With his regular group, Van Halen, the result is a heavy thrash of guitars and drum reverb trying to stay out of the way of his unseemly half-talk delivery. It's no wonder that he spends more time telling stories onstage than singing—in reality, his voice is out of place in a group like Van Halen.

On his own album, however, Roth has chosen songs that are anything but metallic, and he is right at home. His simulation of Mike Love's whine on "California Girls" is spot on, the new reading of The Lovin' Spoonful's "Coconut Grove" perfectly appropriate. The other side of this EP is only mediocre, as Roth tackles Dan Hartman's "Easy Street" and a medley of a couple of old standards, "Just a Gigolo" and "I Ain't Got Nobody." But the fact that the guy can sing at all is enough of a surprise; maybe someday he'll join a lounge group and won't have to compete anymore with the din of a hard-rock combo. *Jon & Sally Tiven*



**United States Live:** Laurie Anderson  
**Warner Bros. 29192-1**, five-record  
set, \$29.95.

Sound: C+      Performance: Unique

*United States Live* is a mammoth work, covering five discs and well over 4½ hours of playing time. It is a rambling, quirky presentation combining songs and stories, sound effects and electronics, elaborate instrumentation and excellent players.

Laurie Anderson is a remarkable artist, doing things with sound and music that really can't be categorized, unless you call "experimental" a category. Commerciality doesn't even enter into the thinking here.

The contents do include a good amount of Anderson's previously released material. All of the *Big Science* album, two selections from *Mister Heartbreak* and the flip side of "O Superman," "Walking the Dog," are all part of *United States Live*.

This album is about a lot of things. It is about language and communication, what they are and how they work; what people do and don't do with them. Things like what telephone-answering devices really signify. How people can talk the same language and not understand a word each other is saying. For example, there's the story of an Englishman and a Georgia waitress. He asks what grits are and she replies 50¢. He asks again and she says they are extra. He says he'll take them.

There's something about the work, its size and scope and peculiar American-ness, that reminds me of Walt Whitman's "Song of Myself," which also was massive and difficult and controversial. Each work had similar problems with the media of its time, which had no idea about how to deal with it. I can't imagine anyone other than a very adventurous college-radio programmer putting even a part of this fascinating material on the air.

The recording quality of the set is very nice, especially considering the length of the album sides, most of which are 26 to 28 minutes but do range up to 33. There is a good feel for the hall's ambience and for the audience's reactions. Anderson's use of a Harmonizer to raise and lower the pitch of her voice is especially fascinating,

as it extends the characters she can portray in monolog or conversation.

If I had a complaint when first hearing the album, it was that no libretto was included in the package. I later became aware that one does exist separately—a book edition of *United States* that Harper & Row has published under its Colophon imprint. It is made up mostly of photographs that illustrate what was happening on stage and reproduce the video

screens with Anderson's words. Printed on heavy, glossy stock, it is not an inexpensive book (listing for \$19.95, paperbound), but the handsome edition proves to be a very valuable adjunct to the recording.

I must face it head on: Laurie Anderson's work, especially the demanding and difficult *United States Live*, is not for everyone. But if you like adventure and thoughtful, provocative material, and you are prepared to devote the



Big Country



necessary time and attention and patience, you might have a wonderful time with this set and find a lot of humor and pathos along the way. I wound up playing it one side, or occasionally two sides, at a time just so I could absorb all that was going on more comprehensively, and I've had a lot of fun doing it. *Michael Tearson*

**Steeltown:** Big Country  
Mercury 822 831 M-1, \$8.98.

Sound: D Performance: C-

Going into their second album, Big Country faces a classic dilemma. When a band makes a strong and fast impact with a highly distinctive sound, particularly on a debut album, they

must beware of getting trapped in that sound. This time around the band's music feels cluttered to the point of directionlessness. I really loved Big Country's debut, but *Steeltown* has only frustrated me. *Michael Tearson*

**Sapphire:** John Martyn  
Island 90248-1, \$8.98.

Sound: B- Performance: B-

With *Sapphire*, John Martyn returns to form—and his original record label—following two shots at the pop mainstream. It was recorded at Compass Point Studios in Nassau, the Bahamas, and it fairly brims with sunshine in its sound.

Martyn possesses a fascinating, smoky voice; a brilliant, nervy guitar style, and a totally idiosyncratic approach to music. His sound is sexy and seductive, and romantic in the grand, poetic sense as well, something that accounts for his charming cover of "Over the Rainbow."



**HEIL AIR-MOTION TRANSFORMER  
TRANSFORMER AUTOMOTIVE  
LOUDSPEAKER SYSTEM**

Sound  
as  
Clear  
as  
Light



The New **ESS 6"X9" LS-2** Automotive Loudspeaker features the distinguished "Heil Air-Motion Transformer" are for car owners who want maximum performance from their car stereo system.

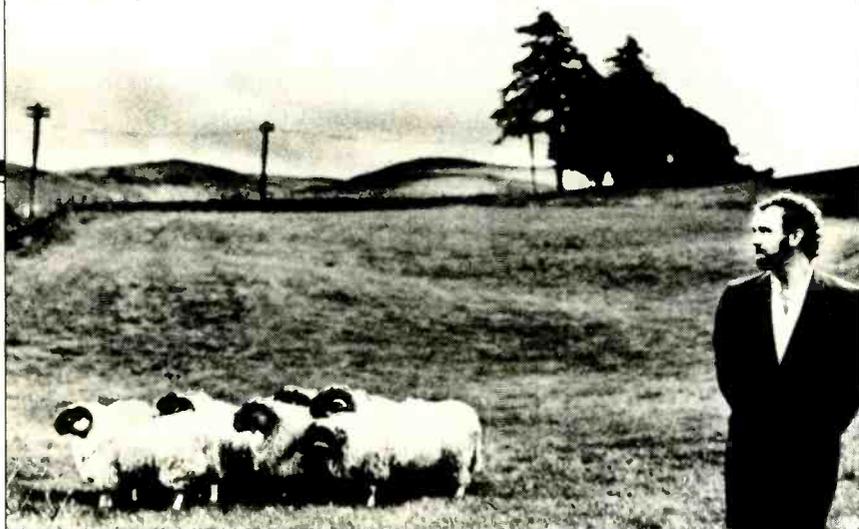
Home quality sound for the road, and powerful. Perfect performance in any automotive environment. The New **ESS LS-2** auto speakers delivers 100 watts per channel power capacity.

For more information see your local dealer, or call **ESS** at (619)362-4102



**LABORATORY, INC., 9613 OATES DRIVE,  
SACRAMENTO, CA. 95827**

John Martyn



*Sapphire* is an album of very adult music. It is jazzy and bubbly and subtle, very much island music with lots of crisscrossed textures that deepen the listening experience with repetition. If there is a drawback to *Sapphire*, it is the inherent difficulty in Martyn's music; he is never simple or totally direct. This is why he has remained relatively obscure despite nearly 15 years of excellent albums; they really fit no category well and so fall through the cracks of traditional radio formats, finding a home nowhere.

*Sapphire* is, then, the newest classy-yet-challenging album in a long line from John Martyn. Give him a try for some decidedly nonordinary sounds.

Michael Tearson

**Packet of Three:** Steve Marriott  
**Aura AUL 729**, U.K. import, \$8.98.

Sound: B Performance: B

True, it would be great to say that this is the return-to-form album we've

all been waiting for from Marriott, but in reality what we have here is simply a workmanlike record. The road rat is back in the clubs after reforming Humble Pie and The Small Faces, and this album is evidence enough that the guy still has incredible vocal and guitar chops left. Unquestionably one of the original talents of rock 'n' roll—both his voice and guitar are so distinctive that no one could help but recognize him—here in the bottom of the seventh in-

ning he's happy with a walk when he needs a home run. Two songs apiece from The Small Faces and Humble Pie repertoires, Elvis' "All Shook Up," Eddie Boyd's blues standard, "Five Long Years," and Creedence's "Bad Moon Rising" make for interesting, but not exceptional, performances.

The album is a live one, and the amount of sound emerging from this sole, diminutive figure (backed by two other musicians, Fallon on drums and

# Discwasher.<sup>®</sup> The clear choice for record care.

Where do you turn to get the best sound from your records? The answer is clear. To the Discwasher D4+™ Record Care System. Its scientific design uses a unique fluid and directional micro-fiber pad to clean

records *safely*. Without leaving residues behind. And the SC-2™ Stylus Care System loosens and wipes away damaging stylus contaminants. All to keep your records playing clean and clear.

You can trust Discwasher. **The clear choice for tape and video care, too.**

Discwasher, leader in the technology of audio and video care products, also provides advanced systems for cleaning tape decks and VCR's.



*The sound and sight come through clean and clear.*

**discwasher**

©1985 Discwasher  
A DIVISION OF INTERNATIONAL JENSEN INC.

1407 North Providence Road, P.O. Box 6021, Columbia, MO 65205

Enter No. 25 on Reader Service Card



Even if you play *Maverick* softly, it will assault you with its exuberance and energy. Subtlety has never been part of the Thorogood equation.

Jimmy Leverton on bass) is massive. However, it's time that Marriott wrote some new songs or teamed up with some songwriters who could bring out the best in him. This record is entertaining for old fans, but it will win him few new ones. Let's face it, he's worthy of better. *Jon & Sally Tiven*

**Maverick:** George Thorogood and The Destroyers

**EMI America ST-17145, \$8.98.**

Sound: B Performance: A-

No surprises here. George Thorogood and The Destroyers have struck again with *Maverick*, a wall-to-wall rock 'n' roll party with a healthy dose of the blues tossed in for flavor.

You want mellow? You want smooth? Well, then, you want something else because George and The Destroyers are one of the rudest, hardest-driving rock 'n' roll bands anywhere. This time around they've recruited Stax/Volt veteran engineer Terry Manning to record and coproduce, and he has done a swell job. Even if you play the album softly (despite Thorogood's warning that "to be fully enjoyed this record should be played at maximum volume"), it will assault you with its exuberance and energy. Subtlety? That's never been part of the Thorogood equation, but *somebody's* got to go out playing rock for keeps, don't they?

As on *Bad to the Bone*, George mixes original songs with gems from rock 'n' roll history. Here the gems include Johnny Otis' "Willie and the

Hand Jive," Carl Perkins' "Dixie Fried," John Lee Hooker's "Crawling King Snake," Fats Domino's "What a Price," and two from Thorogood guru Chuck Berry—"(Let's) Go Go Go" and the most complete "Memphis, Tennessee" I've ever heard. Of the originals, "I Drink Alone" and "Long Gone" are the standout compositions.

Thorogood's albums regularly have a few throwaways, but mercifully there is only one on *Maverick*. It is the title song, the theme from the old TV series, and it occupies the last track here.

*Maverick* is solid fun and has great spirit. So what are you waiting for? Roll back the rug, turn up the volume, and start the party. *Michael Tearson*

**POV:** Utopia  
**Jem PB 6044, \$8.98.**

Sound: B Performance: B+

Todd Rundgren has had a long and distinguished career in the pop-music field as an artist, producer, and video creator. His band, Utopia, is a fine mating of well-matched personalities and players—Kasim Sulton, Roger Powell and Willie Wilcox are all something special on their instruments, and fine songwriters too. Rundgren's had a couple of hits in his own right and has produced even more for other people (Meatloaf, The Tubes). His own musical style was ripped-off whole by Hall and Oates and turned into a million-dollar business establishment. So why can't he get arrested on rock radio?

His lyrics are not quite the teen-angst fodder that Hall and Oates regularly provide, and sometimes this distances Rundgren from his potential audience. He also enjoys the image of a quirky, eccentric, and cultish artist who doesn't seem particularly eager to enter the mass market that he's groomed others for.

As for *POV*, it's far above standard for Todd and Utopia—much better produced, less self-indulgent—and even Todd's guitar playing seems way above par. The songs are more like rock songs, and it sounds like these guys are actually trying to come up with a "radio record." Who knows, they might finally pop this time—good work is occasionally rewarded.

*Jon & Sally Tiven*

**The Ballad of Sally Rose:** Emmylou Harris  
**Warner Bros. 25205-1, \$8.98.**

Sound: B Performance: A+

*The Ballad of Sally Rose* is surely, for Emmylou Harris herself, the most important album she has made. It is the first on which she has had a hand in writing all the songs and also her first shot at coproducing. In both roles she is assisted by Paul Kennerley, whose songs she has been singing for several years now.

The album is a conceptual song cycle that Emmylou has taken great pains to point out is not autobiographical. It tells the story of Sally Rose, a country-and-western singer who grew up poor and wild on a South Dakota Indian reservation in "the valley in the shadow of Roosevelt's nose." She leaves to sing, hooks up with The Singer and his band, attracts attention on her own, and eventually goes to the city to follow her own star. This leaves her unfulfilled. She decides to return to The Singer, but he is killed on the highway before she can reach him. So Sally Rose picks up the pieces and makes her name singing his songs; she does well enough to purchase radio station KSOS, which she will use to broadcast his message "24 hours of every day."





# "We listened to Bose, B.E.S., and JBL. That's why we chose B.E.S."

*Terry Martell*

Faye & Terry Martell Salt Lake City, Utah

The songs are marvelous. Together they tell a story, but they stand alone quite well, too. There is a lot of C&W history contained in these songs; they quote such classics as "Six Days on the Road," Johnny Cash's "Ring of Fire," and The Carter Family's "You Are My Flower" and "Wildwood Flower." The melodies also seem to evoke other specific songs that have come before. For instance, the opener, "The Ballad of Sally Rose," reminds me of Woody Guthrie's "Deportees." "Rhythm Guitar," which describes how Sally hooked up with the band, sure sounds a lot like Bill Monroe's "Uncle Pen," which has a similar theme. The finale, "Sweet Chariot," feels a lot like Emmylou's tribute to her mentor Gram Parsons in its resemblance to his "Boulder to Birmingham." Such allusions to other songwriters' pieces don't intrude at all. Quite the opposite, they add to the album's aura of authenticity.

The performances on *Sally Rose* are the most committed I can remember on an Emmylou Harris album, another clear sign of the project's importance to the artist. The players are top-flight musicians, most of whom have appeared on Emmylou's other albums, and they have given their best here. The arrangements are complete, beautifully thought-out, and brilliantly executed. Special mention for meritorious service should go to the harmony singing corps of Linda Ronstadt, Dolly Parton, Gail Davies, Vince Gill, and Barbara Cowart. They, too, give their best in fleshing out the songs while never distracting from Emmylou's voice out in front.

The sound of the album is beautifully wrought, too, rich and full but never lapsing into lush. Credit goes to Donovan Cowart's engineering and Glenn Meadows' lovely, digital mastering job.

It is always a special thrill for me to hear an artist whom I have long admired make a quantum leap, and Emmylou Harris has done just that. By writing and producing herself she has taken a firmer grip on her own destiny than she has done in years. Her confidence and commitment have never been stronger, leading inevitably to her best record ever.

*The Ballad of Sally Rose* is a very early contender for my "best of '85" list.  
*Michael Tearson*

"We shopped the best-selling brands of speakers. But we were strongly influenced by the overall sound and ease of room placement of B.E.S. Besides that, my wife liked them."

B.E.S. invites you to hear the finest of conventional "box" speakers and the "reflecting" kind—plus the Wrap-Around Sound of B.E.S. We're confident you'll choose B.E.S., with its slim, sculptured look and its stereo imaging that follows you everywhere.

For your B.E.S. dealer's address, call toll-free 1-800-592-4644.



## B.E.S. Speakers

Wrap-Around Sound—superb stereo everywhere

© 1985 B.E.S., 345 Fischer St., Costa Mesa, CA 92626 • (714) 549-3833

Enter No. 11 on Reader Service Card

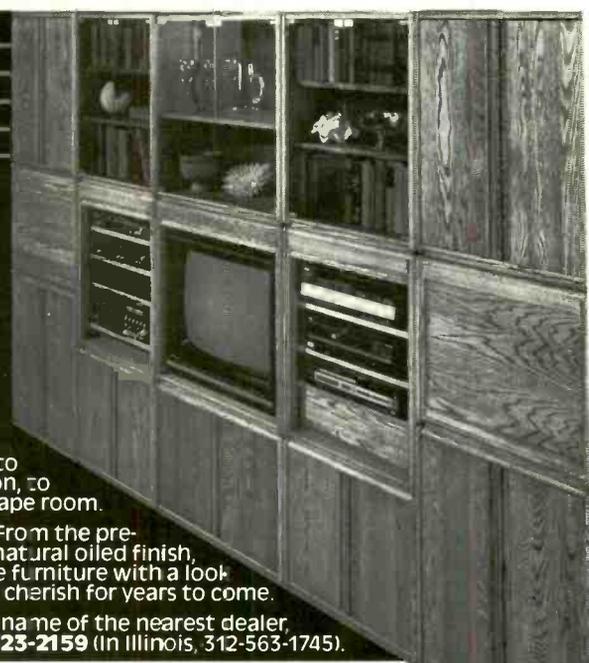
### Sound Principles

**HIGH PERFORMANCE.** Designed to maximize the performance of your audio and video equipment, all CWD modular component cabinets are handcrafted and lovingly hand-finished from select natural hardwoods.

**TOTAL FLEXIBILITY.** Add as your system grows; arrange and rearrange our cabinets to almost any configuration, to fit almost any size or shape room.

**REMARKABLE QUALITY.** From the precision hardware to the natural oiled finish, all CWD cabinets are fine furniture with a look and style you'll love and cherish for years to come.

See for yourself. For the name of the nearest dealer, **CALL TOLL FREE 1-800-323-2159** (In Illinois, 312-563-1745).



CWD<sup>®</sup>  
CUSTOM WOODWORK & DESIGN INC.

The cabinet system shown above in Dark Oak features solid wood, glass and roll wood doors and interior lights. Also in Natural Oak and Natural American Walnut.



High performance modular furniture that keeps pace with your electronic system

## CLASSIFIED ADVERTISING RATES

**BUSINESS ADS**—\$1.40 per word, MINIMUM charge PER AD, PER INSERTION \$33. All centered or spaced lines \$11.

**NON BUSINESS ADS**—95¢ per word, MINIMUM charge PER AD, PER INSERTION \$17. All centered or spaced lines at \$9.

**ALL LINE ADS**—First line set in bold face type at no extra charge. Additional words set in bold face at \$1.65 extra per word. One point ruled box is \$12.

**CLASSIFIED LINE ADS ARE PAYABLE IN ADVANCE BY CHECK OR MONEY ORDER ONLY.** (Sorry, we cannot accept credit cards or bill for line advertising.) ALL LINE ORDERS should be mailed to:

AUDIO/CBS Magazines  
P.O. Box 9125  
Dept. 346V  
Stamford, CT 06925

**ORDERS WILL NOT BE PROCESSED WITHOUT ACCOMPANYING CHECK OR MONEY ORDER FOR FULL AMOUNT.**

**CLOSING DATE**—First of month two months preceding the cover date. If the first of the month falls on a weekend or holiday, the closing date is the last business day preceding the first. **ADS RECEIVED AFTER THE CLOSING DATE WILL BE HELD FOR THE NEXT ISSUE UNLESS OTHERWISE STATED.**

**FREQUENCY DISCOUNTS**—3 times less 5%, 6 times less 15%, 12 times less 20%. These discounts apply to line ads only. Ads submitted for a three-time frequency are unchangeable. Frequency discounts not fulfilled will be short-rated accordingly. Agency discounts do not apply to line advertising.

**BLIND ADS**—Audio box numbers may be used at \$6 extra for handling and postage.

**GENERAL INFORMATION**—Ad copy must be type-written or printed legibly. The publisher in his sole discretion reserves the right to reject any ad copy he deems inappropriate. **ALL ADVERTISERS MUST SUPPLY:** Complete name, Company name, Full street address (P.O. Box numbers are insufficient) and telephone number. Classified **LINE ADS** are not acknowledged and do not carry Reader Service Card Numbers. **AGENCY DISCOUNTS** do not apply to line advertising. **FREQUENCY DISCOUNTS** not fulfilled will be short rated accordingly. Only those advertisers who have prepaid for their entire contract time will be **RATE PROTECTED** for the duration of that contract, in the event of a rate increase.

### CLASSIFIED DISPLAY RATES

1 col x 1 inch	\$275
1 col x 2 inches	\$435
1 col x 3 inches	\$622
2 cols. x 1 inch	\$495
2 cols. x 2 inches	\$836

One column width is 2 1/8". Two columns wide is 4 1/4". For larger display ad rates and 6, 12, 18 and 24 times frequency rates call (212) 719-6338.

**DISPLAY ADVERTISERS** should make space reservation on or before the closing date. Ad material (film or velox) may follow by the tenth. **DISPLAY ADVERTISERS MUST SUPPLY COMPLETE FILM NEGATIVE READY FOR PRINTING OR VELOX. PRODUCTION CHARGES WILL BE ASSESSED ON ANY AD REQUIRING ADDITIONAL PREPARATION.**

**ALL DISPLAY CORRESPONDENCE** should be sent to:

Laura J. Lo Vecchio  
AUDIO MAGAZINE  
1515 Broadway  
New York, NY 10036

**FOR ANY ADDITIONAL INFORMATION,** contact Laura directly at (212) 719-6338.

## EXCEPTIONAL

loudspeakers from

## EUPHONIC AUDIO

RR1 Box 266 New Egypt, N.J. 08533 201-929-2613

### ATTENTION READERS:

Please note that only retailers who are authorized by manufacturers to sell their product lines are listed under the heading "AUTHORIZED DEALERS." This particular category is further subdivided into the geographic areas which these dealers serve.

Ads placed by private individuals, manufacturers and retailers can be found in specific categories, i.e., AMPS, PREAMPS. (The letters AD in bold face type at the end of an ad means AUTHORIZED DEALER.) We hope this will allow you to easily locate a specific product or service.

### Audiophile's Corner

#### THE INCREDIBLE TRANSFORMATION

Interlink Reference<sup>®</sup> from Monster Cable

Improves your sound system like no other component that you can add. Featuring Monster's "bandwidth balanced™" system of three "wire networks", Interlink Reference gets the maximum sound out of all your components. Available for audition at:

ESOTERIC AUDIO 27861 Orchard Lake Rd.  
Farmington Hills, MI (313) 553-8240

### AUTHORIZED DEALERS

### NATIONAL

**ABBIE'S AUDIO NOW OFFERS CLEMENTS AUDIO.** Berning, B&K, Futterman, Moscode, Threshold, Klyne, Lazarus, VSP, Tandberg, Goetz, Watkins, JSE, Spica, Robertson, M&K, Heybrook, VPI, Souther, AR, Premier, Sumiko, Audioquest, Accuphase, Talisman, Promethean Green, Monster Cable, Discrete Technology, and others. Good used equipment, newsletter, 302 E. High St., Waynesburg, PA 15370. 412-852-1134.

# IF YOU ARE OBSESSIVE ABOUT DIGITAL AUDIO, WELCOME TO THE CLUB.

It's the Sony Digital Audio Club. The world's first club dedicated to creating awareness and understanding of the remarkable technology behind compact disc players—from the company that's most qualified to provide it.

This year, to welcome you to the club, you'll receive special promotions on compact discs; discounts on digital accessories; the club's quarterly newsletter, "The Sony Pulse"; The Sony Book of Digital Audio Technology (with over 300 pages of facts and details); a 30" x 40" digital audio poster; a digitally-recorded compact disc; and extensive information about the latest advances in digital prod-

ucts from Sony—the leader in digital audio.

To become a member, simply mail the coupon below, along with a check or money order for \$15\* to Sony Digital Audio Club, Post Office Box 161, Lowell, Massachusetts 01852.\*\*

And join the thousands of people who are already well on their way to satisfying their obsessions.

**SONY**

THE LEADER IN DIGITAL AUDIO.™

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

AM 5/85

\*\$3.00 additional for postage and handling outside the U.S. \*\* Please allow 4-6 weeks for delivery.

**AUTHORIZED DEALERS**

**NATIONAL**

**A BRAND NEW WONDER CAP!!**

A TOTALLY NEW DESIGN from IAR research. It's bigger, it's far better—and it costs LESS! How much better does it really sound, compared to our old Wonder Cap? Excited users have said: **SPECTACULAR! UNBELIEVABLE!** What will you say when you hear the NEW IAR Wonder Caps® in your own electronics and speakers? Write for FREE application notes and order forms.

IAR/TRT  
VISTA, CA 92083

**ACOUSTAT AND PS AUDIO—SUPERB!**

Free shipping! Fast service! Also Nakamichi, Thorens, Talisman, Audire, Haller, Klipsch, Adcom, Mitsubishi, SAE, compact digital players. READ BROTHERS STEREO, 593 King Street, Charleston, South Carolina 29403. (803) 723-7276.

**ALCHEMIST & TALISMAN MOVING COIL CARTRIDGES IN STOCK! ORDER TOLL FREE 1-800-222-3465 VISA/MC/COD WELCOME! CALL US LAST! HCM AUDIO, 1600BB MANGROVE, CHICO, CA 95926 1-916-345-1341**

**APPALLING? ISN'T IT?**

How many esoteric audio products look and feel as if they were made by orangutans with screwdrivers. If you are fed up with sacrificing reliability, aesthetics and quality of construction to obtain purer sound, don't despair!

There are many high-end audio components built by small yet solid professional companies which not only express the utmost in musicality but also reflect the high level of design integrity, craftsmanship and quality control. At Sound By Singer we select and blend only such components into systems designed to extract the most music from your audio dollars.

ACOUSTAT • ADCOM • AKROYD • APOGEE • AUDIO-QUEST • AUDIO NOTE • AUDIO INTERFACE • AUDIO VOIS • B&K • BERNING • BEVERIDGE • COUNTER-POINT • CWD • DYNAVECTOR • FUSELIER • GRACE • GRADO • KISEIKI • KLOSS • KOETSU • KRELL • LINN SONDEK • LIVEWIRE • MC LAREN • MONSTER CABLE • NAIM AUDIO • NITTY GRITTY • NOVAK • NYAL (MOSCODE) • PRECISION FIDELITY • PROAC • PROTON • RANDALL RESEARCH • RAUNA • REGA • ROBERTSON • SNELL ACOUSTICS • STAX • SYMDEX • SYRINX • TALISMAN

**SOUND BY SINGER**

165 E. 33RD STREET  
New York, NY 10016  
(212) 683-0925  
WE SHIP ANYWHERE



**A SINGER'S DREAM!**

**REMOVES VOCALS FROM RECORDS!**

Our VOCAL ELIMINATOR can remove most or virtually all of a lead vocal from a standard stereo record and leave most of the background untouched! Record with your voice or perform live with the backgrounds. Used in Professional Performance yet connects easily to a home component stereo system. Not an equalizer! We can prove it works over the phone. Write or call for a free brochure and demo record.

Write to: **LT Sound, Dept. AU, PO Box 338 Stone Mountain, GA 30086**  
In Georgia Call (404)493-1258

**TOLL FREE: 1-800-241-3005 — Ext. 43**

**AUTHORIZED DEALERS**

**NATIONAL**

**ATTENTION: BERNING, AR TURNTABLE, SOTA, SHINON, KOETSU, ELECTRON KINETICS, STAX, FULTON, PETERSON, DYNAVECTOR, GOETZ, MUSIC & SOUND, WALKER, AUDIBLE ILLUSIONS, DENON CARTRIDGES, ALPHA, ZETA, ALPHASON, BRB, OTHERS.** 713-7284343 MAURY CORB.

**ATTENTION DYNA, HAFLER, CROWN OWNERS**

Frank Van Alstine and Associates engineer complete new Transcendence power mos-fet amplifier and precision fet preamp designs to interface with your existing chassis. Original circuits, and their problems, are discarded. Obtain superior performance without buying expensive new hardware. Learn why "underground" magazines claim our rebuilt Dyna 150 is a best buy, our MOS-FET 120B sounds like 150 watts, our FM-5 circuits sound best, and our preamps play music. Call or write for free catalogue and sample Audio Basics monthly newsletter. We ship worldwide. Jensens Stereo Shop, 2202 River Hills Drive, Burnsville, Minnesota 55337 (612) 890-3517.

**AUDIO CLASSICS INVITES YOU TO EXPERIENCE THE MUSICAL DIFFERENCE.** Dealer for: Goldmund, Berning, Merrill, Pink Triangle, Souther, Koetsu, Quicksilver, JSE Infinite Slope, Accuphase, Alphason, Syrinx, Swiss Physics, Odyssey, Precision Fidelity, Jadis, Shinon, Plasma-tronics, Triplanar, Tiptoes, Onyx Audio, Elite Rock, Straight Wire, Wingate Audio, Spectrum, Kindel, Lead Balloon, RAM tubes, Beard, Music and Sound, Fidelity Research, Veritas, Promethean Green, Sondex, Peterson, Well Tempered Lab, Lazarus, and more. Ask for our list of used and demo equipment. AUDIO CLASSICS INC., Oklahoma City, Oklahoma, (405) 842-3033.

**Quality Tapes**

**THIS MONTH'S SUPER SPECIALS**

TDK		MAXELL			
SA 90	1.69	SA-X 90	2.39	UDXL II 90	1.85
SA 60	1.59	SA-X 60	2.29	UDXL II 60	1.75
AD 90	1.79	HX-5 90	4.15	XL II-5 90	2.39
AD 60	1.45	HX-5 60	3.85	MX 90	3.99
D 90	1.09	MA 90	4.19	UD-S I or II 90	1.99
D 60	0.99	MA-R 90	5.75	LN 90	1.15
HD-01 D'MAG	12.49	CX 35-90B 7 RL	6.49	UD 35-90 7 RL	4.89
				XU 35-90B 7	6.39
SONY				FUJI	
UCX-S 90	1.89	HF 90	1.05	FR METAL 90	3.39
HF-S 90	1.79	HF 60	.95	FR II 90	1.89
TEAC reel to reel in cassette				VIDEO TAPES	
CDC 90	2.99	CRC 90 (H.B.)	3.29	TDK, MAXELL, SONY	
DISC WASHER				T-120/L-750	4.99
DISKIT	32.49	DISCSET	14.49	T-120/L-750 HG	6.99
Rec Care Sys	9.49	Tape Care Set	9.49		
16 oz. Refill	9.99	D'MAG	12.49		

**CALL NOW: 718-434-3417 OR ORDER BY MAIL**  
Shipping cost is only \$4.50 for any order in USA.  
COD costs \$2.00 more. No extra charge for VISA/MC.

**QUALITY TAPES**

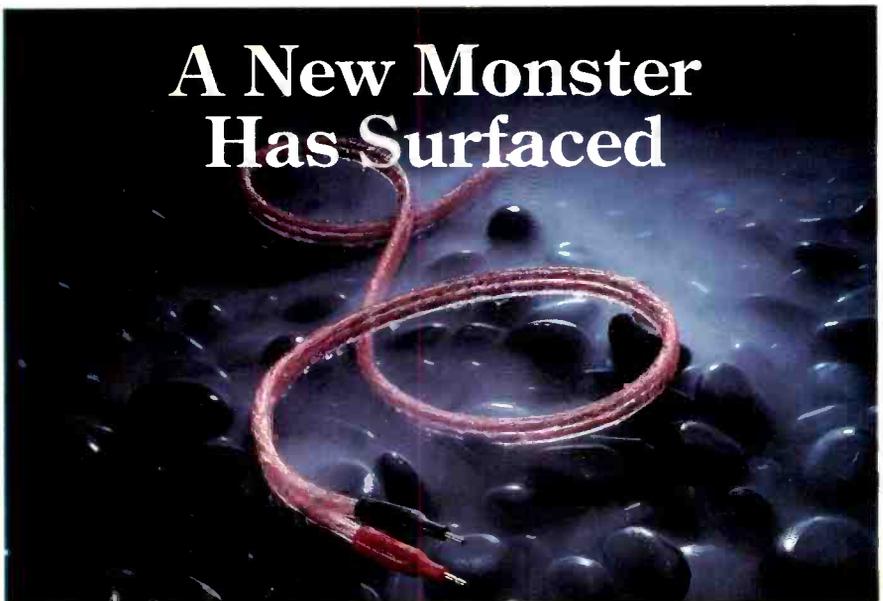
864 East 7th Street, Dept. A 5, Brooklyn, NY 11230

**AUTHORIZED DEALERS**

**NATIONAL**

**DESERT WAIL NOW LIVES** in Los Angeles. We are evermore bound by the glory of music and our choice of components is determined by how accurately they reflect its image. We may not sell all the worthwhile equipment, but all the equipment we sell is worthwhile. 1840 S. Gaffey, San Pedro, CA 90731. (213) 832-5188.

**A New Monster Has Surfaced**



Monster speaker cable with its new wiring for better sound.

Monster Cable never fails to impress. Great bass, extended highs, and increased dynamic range. It's rightfully become the standard of the audio industry, providing big sonic improvements for little money. Just ask a friend who has a pair. **Now introducing the New Monster . . .**

**Higher performance, same low cost.** Our latest research in to the electromagnetic behavior of audio signals has led to an updated design of the original Monster. The results are impressive. Improved clarity, even better bass, and superb imaging that cannot be matched by

any competitor . . . at many times the price. If you currently own Monster Cable, we invite you to audition the New Monster. And if you do not yet have the Monster in your system, old or new . . . then you're in for a very pleasant sonic experience.

**MONSTER CABLE**

Call or write for the Monster Dealer nearest you.

Monster Cable® Products, Inc.  
101 Townsend, San Francisco, CA 94107  
415 777-1355 Telex: 470584 MGSYUI



**Authorized Dealers**

- ALA. Lives Audio Birmingham
- ALAS Shmex's Audio Anchorage
- Hy Tech Electronics Juno
- ARIZ. Hi-Fi Sales Inc. Mesa
- Hasser's Audio Video Phoenix
- Sound Advice Phoenix
- Wilson Audio Inc. Tucson
- CA. Greg Sound Altamira
- Henry Radio Anaheim
- Beverly Hills Mobile Sound Beverly Hills
- The Sounding Board Berkeley
- Golden Ear Chico
- Omega High Fidelity Claremont
- Marcom Radio Inc. Glendale
- Audio Command Los Angeles
- Christopher Hansen Los Angeles
- Henry Radio Los Angeles
- Monterey Stereo Monterey
- Gene Rubin Audio Monterey Park
- Audio Centre Northridge
- The Audible Difference Palis Alto
- Brewer Sound Center San Diego
- Sound Company San Diego
- Harmony Stereo San Francisco
- House of Music San Francisco
- Stereo Plus San Francisco
- Audio Centre-Audio Gallery Los Angeles
- Audio Concepts Long Beach
- Optimal Enchantment Santa Monica
- Electronic Entertainment Los Angeles
- Sound Images Los Angeles
- Century Stereo San Jose
- Catana Sound San Rafael
- Jonas Miller Sound Santa Monica
- E Dorado Audio South Lake Tahoe
- Audio Den Van Nuys
- COLD Boulder Sound Gallery Boulder
- Listen Up Boulder
- C & S Audio Colorado Springs
- Boulder Sound Gallery Denver
- Listen Up Denver
- Audio Alternative Fort Collins
- Mountain Music Vail
- CONN. Sounds Incredible Brookfield
- Sound Source Audio Fairfield
- Tweeter Etc. New Haven
- Sound Advice Norwich
- Audiocom Inc. Old Greenwich
- Stereo Shop Inc. Hartford
- C & M Myer Emco Washington
- FLA. Pyramo Audio Clearwater
- Audio Group of Fort Pierce Fort Pierce
- Audio Etc. Jacksonville
- Cartonics Miami
- Las Fabricas Miami
- Market Place Electric Orlando
- Audio Gallery Sarasota
- Monte's Rolling Sound Tampa
- Sound Gallery Titusville
- GA Georgia Music Macon
- HAWAII High Audio Hilo
- Audio Design Honolulu
- ILL. Stereo Systems Aurora
- Audio Musicale Belleville
- Glenn Poor's Audio Video Champaign
- Pauli Health Audio Chicago
- Audio Enterprises Chicago His
- Audio Consultants Evanston
- Audio Consultants Hinsdale
- Stereo Systems Joliet
- Audio Consultants Libertyville
- Glenn Poor's Audio Normal
- Audio Labs Springfield Valley
- Stereo Systems Naperville
- Classic Stereo South Bend
- Classic Stereo West Fort Wayne
- Classic Stereo Marion
- OWA The Audio Room Cedar Rapids
- Audio Odyssey Davenport
- Audio Labs Des Moines
- KANS. Keri's Gramophones Lawrence
- Audio Mart Leawood
- Custom Sound Wichita
- PA. Pauli Kadar Home and Commercial
- Baton Rouge
- Audio Systems Inc. Lafayette
- Wilson Audio New Orleans
- ME. New England Music Co. Portland
- MD. Myer Emco Rockville
- Voyager Automotive Rockville
- MASS. Goodwin Music Systems Cambridge
- Sale & Sound Chicopee
- Natural Sound Framingham
- Nantucket Sound Haverhill
- Sound & Music Northampton
- Audio Concepts N. Attleboro
- Cartunes Inc. Waretown
- The Music Box Weymouth
- MICH. Birmingham Auto Sound
- Birmingham
- Almas Hi-Fi Stereo Dearborn
- Classic Stereo Grand Rapids
- Pointe Electronics, Pousse Point
- Stereo Center Inc. Flint
- Stereo Center Inc. Ann Arbor
- MINN. Jensens Stereo Shop Burnsville
- MO. House of Sound Springfield
- Audio Rocky Mountain Hi-Fi Great Falls
- Electronic Paris Missoula
- NEBR. Sound Dimensions Lincoln
- Custom Electronics Corp. Omaha
- NEV. The Upper Ear Las Vegas
- N. H. Auto Sounds of New Hampshire Exeter
- Camera Shop of Hanover Hanover
- Camous Hi-Fi Manchester
- N. J. Sound Works Cherry Hill
- Udo's Automotive Corp. Englewood
- Professional Audio Consultants Millburn
- Sight & Sound Inc. Morristown
- Leonard Radio of New Jersey Parsippany
- Rolling Tone Ramsey
- Suati's Audio Westfield
- Contkin Audio Wyckoff
- Atlantic Stereo E. Brunswick
- N. M. Hudson's Audio Center Albuquerque
- Beason's Inc. Carlsbad
- The Candy Man Sante Fe
- N. Y. Transcendental Audio Ltd. Amherst
- Uncorn Audio Balaw
- Innovative Audio Brooklyn
- Rogers Stereo Freeport
- Audio Breakthroughs Huntington
- Bobby D's Auto World Huntington
- TECH Hi-Fi Ithaca
- Audio Breakthroughs Manhattan
- Sound Concepts Mt. Kisco
- Ear Drum Nanuet
- N. C. Mobile Sound Authority Durham
- Autophonics Inc. Greensboro
- Audio Showcase Morganton
- Audio Concepts Winston-Salem
- L & J Electronics Statesville
- OHIO One Sound Akron
- Palmers's Stereo Center Columbus
- B & B Appliances Co. Inc. Middleburg
- Jameson's Toledo
- Stereo Don Wheelers Dayton
- Classic Stereo Lima
- Electronics Ltd. Warren
- OKLA. Audio Dimensions Oklahoma
- The Photograph Ltd. Tulsa
- Gramophone Norman
- ORE. Chelsea Audio Beaverton
- Oregon Typewriter Eugene
- PA. House of Records Erie
- Audiobid Stereo Center Fairless Hills
- Video Sound Gallery Pittsburg
- The Stereo Store State College
- Audio Clinic York
- GN T Stereo Lancaster
- PA. Music Peddler Morgantown
- Don Jones Custom Stereo Greenville
- TENN. The Sound Room Johnson City
- Lindsay Ward Knoxville
- Portland Music Audio Inc. Memphis
- Del'nive Audio Inc. Austin
- Arnold & Morgan Music Co. Garland
- B & M Electronics Inc. Houston
- Sheffield Audio Houston
- Showerly Stereo McAlester
- Audio Works Nicotriches
- Electronic Service Center Odessa
- Audio Source San Antonio
- VT. Audio Den South Burlington
- M. Myer Emco Falls Church
- WASH. Evergreen Audio Bremerton
- Delphinive Audio Seattle
- Northwest Sound Seattle
- Stereo Shoppe Tacoma
- Holtman Music Spokane
- WA. Hi-Fi Electronics Green Bay
- Specialized Sound Systems Corp. Madison
- Sound Seller Manette
- Salton I. Wacoquin Rapids
- The Audio Works Waukegan
- CAR. SPEAKER DEALERS ONLY
- Car Fidelity Canoga Park Ca
- House of Natural Sound Glendale Ca
- Paris Audio Los Angeles Ca
- Sound Images Los Angeles Ca
- A B Car Stereo Huntington NY

**AUTHORIZED DEALERS**

**NATIONAL**

**AUDIO DOCTOR NEEDS YOUR USED EQUIPMENT.** Best trades offered on Acoustat, AR, Berning, B&K, Classé, Clements, Discrete Technology, Duntech, Futerman, Goetz, Hafler, JSE, Kindel, Magnavox CD, Michell, Lazarus, MFA, Moscode, Mordaunt-Short, McLaren, Mapleknoll, M&K, MCM Systems, Micro-Seiki, P.S., Quicksilver, Rauna, Rexco, Robertson, Snell, Sota, Spender, Spica, Stax, Symdex, Superphon, Tannoy, VPI, Watkins, all tonearms, accessories, cartridges, and more. Newsletters. Visa-MC-DO. AUDIO DOCTOR, 220 Willow, Box 390, Buffalo, Missouri 65622. 417-345-7245 anytime.

**CALL TOLL FREE 1-800-826-0520 FOR ACOUSTAT, DAHLQUIST, NAD, HAFLER, DENON, dbx, 3D, PROTON, TANDBERG, BELLES, ORACLE, M&K, GRADO, NITTY GRITTY, AUDIOQUEST, DUNTEC, MONSTER, CWD, B&W, DCM, THORENS, VSP, STAX, SOTA, GRACE, ASTATIC, PROAC, DYNAVECTOR, TALISMAN. THE SOUND SELLER, 1706 MAIN ST., MARINETTE, WI 54143. (715) 735-9002.**

**ESOTERIC AUDIO FARMINGTON HILLS, MICH.** Meridian MCD, VPI, Sumiko MMT Monster Interlink tosem cables, Monster Interlink reference, Conrad-Johnson, Copland, Electrocompaniet, Kinergetics, Rotel, Harman Kardon Video, Monster Cable, Powerline 2, MH750, Talisman, Accuphase, Alpha 1-2, Koetsu Kindel, Spica, Thiel. **AD**

**ESOTERIC AUDIO FARMINGTON HILLS, MICHIGAN.** Electrocompaniet dual mono amps huge power reserves and refinement. **AD**

**ESOTERIC AUDIO FARMINGTON HILLS, MICH.** 1-313-553-8240. Noon to 7PM M, T, Th, F EST. Noon to 5PM Wed. Previously owned exotic audio equipment bought and sold. Call for quotations.

**EXCEPTIONAL AUDIO REPRODUCTION SYSTEMS** REGA, HEYBROOK, LOGIC, THORENS, AR, DUAL turntables; ZETA, REGA, PREMIER, LOGIC, GRACE tonearms; ADCOM, ARCAM, AUDIRE, CREEK, KENWOOD BASIC, KYOCERA, ROTEL, SHERWOOD, VSP LABS electronics; FRIED, HEYBROOK, MORDAUNT-SHORT, MAS, REGA, WATKINS loudspeakers; TALISMAN, SUPLEX, GRADO & SIGNATURE, PROMETHEAN, REGA, PREMIER, ARCAM cartridges; AUDIOQUEST, DECCA, NITTY GRITTY, THE PIG, LIVEWIRE and other accessories. EARS, P. O. BOX 658-U, W. COVINA, CA 91790. 818/961-6158 EVENINGS, WEEKENDS. MC/VISA. MANY MONTHLY SPECIALS! (SEND STAMP)

**GENE RUBIN AUDIO—LOS ANGELES:** LINN, NAIM, REGA, THORENS, AR, HAFLER, CREEK, ROTEL, CONRAD-JOHNSON, WHARFEDALE, CELESTION, STAX, SPENDER, AKROYD, B&W, PRECISION FIDELITY & MORE. PRE-PAID SHIPPING (818) 571-1299 (PAC. TIME.)

**AUTHORIZED DEALERS**

**NATIONAL**

**HAFLER—NEW AMPLIFIER**

We stock all of the following components: DH-100K \$175.00, DH-100A \$225.00, DH-110K \$360.00, DH-110A \$440.00, DH-112 \$75.00, NEW DH-120 AMPLIFIER: DH-120K \$260.00, DH-120A \$340.00, DH-160K \$275.00, DH-160A \$375.00, DH-220K \$400.00, DH-220KE \$410.00, DH-220A \$500.00, DH-220AE \$510.00, DH-330K \$385.00, DH-330A \$460.00, DH-500K \$675.00, DH-500KE \$695.00, DH-500A \$850.00, DH-500AE \$870.00. Accessories too! Three year warranty on assembled units. FREE SHIPPING to all fifty states, PR and APO/FPO. WORLDWIDE EXPORTING. Visa and Master-Card honored. OXFORD AUDIO CONSULTANTS, INC., Box 145, Oxford, OH 45056-0145, 513-523-3333, TLX427791.

**KEITH ELLIS AUDIO IN SOUTHEASTERN PENNSYLVANIA**

A classic audio showroom with components in the classic tradition. One of the most pleasant buying experiences you will ever have.

Featuring

**GOETZ, GOLDBUG, ZETA, PINK TRIANGLE, MOSCODE, FUTTERMAN, TALISMAN, MISSION, STRAIGHTWIRE, SOUTHER, DECCA, AND MORE.**

215-348-2151

3659 Old Easton Rd, Doylestown, PA 18901

**MUSICAL IMAGES OF KENTUCKY**

Rotel, Sumo, PS Audio, McLaren, NYAL Moscode, Quicksilver, Crown, Berning, Magus, Lazarus, AR-Connoisseur, Mordaunt Short, MCM, Goetz, Micro-Seiki, AR, MAS, Maplenoll, Rock, Audioquest, SAEC, Alphonson, Grado, Shinson, Alpha, VGL, Koetsu, Discrete Technology, Music Link, others. Newsletter. 11027 Buckeye Trace, Goshen, KY. 40026 (502) 228-3200. **AD**

**MUSIC BY DESIGN HAS POLYPHASORS**

Music by Design creates exceptional music systems from the finest components available. ATHENA Polyphasors are part of the process for the very best systems. 107 CALEDONIA ST. SAUSALITO, CA. (415) 332-2142

**NITTY GRITTY RECORD CLEANING MACHINES & SUPPLIES.** BEST PRICES. MOST ITEMS IN STOCK. ORDER TOLL FREE 1-800-222-3465. FOR OTHER INFORMATION CALL 1-916-345-1341. HCM AUDIO, 1600BB MANGROVE, CHICO, CA 95926

**ORDER SUMIKO PRODUCTS TOLL FREE 1-800-222-3465.** GRACE TONEARMS, CARTRIDGES, REPLACEMENT STYLII. PREMIER TONEARMS. DENNESEN SOUNDTRACKTOR. TWECK. LOWEST PRICES. VISA/MC/DO WELCOME! HCM AUDIO, 1600BB MANGROVE, CHICO, CA 95926 1-916-345-1341

**ROTEL**

**Authorized Dealers**

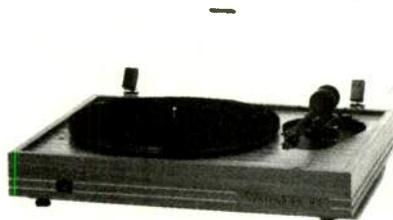
- ALA. Sound Stage Inc. Huntsville
- ALAS. Hy Tech Electronics Juno
- ARIZ. The Listening Post Temp
- CA. D & B Audio Inc. Berkeley
- Audio Basics Claremont
- Musical Images Fresno
- Havens & Hardesty Audio Systems Huntington Beach
- Stereo Horizons La Jolla
- Christopher Hansen Ltd. Los Angeles
- Gene Rubin Audio Monterey Park
- Absolute Audio Orange
- Kroll's Darnard
- Stereo Design San Diego
- House of Music San Francisco
- Stereo Plus San Francisco
- Optimal Enchantment Santa Monica
- Exceptional Audio West Covina
- Absolute Audio Woodland Hills
- COLD Boulder Sound Gallery Boulder
- Audio Alternative Fort Collins
- CONN. Audio Etc. New Haven
- FLA. Audio 2000 Electronics Fort Lauderdale
- Audio Encounters Hollywood
- Audio Plus Miami
- ILL. Stereo Systems Aurora
- Glenn Poor's Audio Video Champaign
- Victor's Stereo Chicago
- Audio Enterprises Chicago His
- Stereo Systems Joliet
- Victor's Stereo Morton Grove
- Stereo Systems Naperville
- Glenn Poor's Audio Video Normal
- IN. Sound Productions Carmel
- LA. Wilson Audio New Orleans
- ME. New England Music Co. Portland
- MD. Myer Emco Rockville
- MASS. Sale & Sound Chicopee
- Sound & Music Northampton
- MICH. Esoteric Audio Farmington Hills
- Steeleeks Audio Shop Grand Rapids
- Absolute Sound Royal Oak
- MINN. Audio Precision Minneapolis
- M. H. Hanover Audio Inc. Hanover
- Interface Keene
- Soundsystem Portsmouth
- N. J. Audio Nexus Berkeley Heights
- A. C. Recording Raritan
- Samman's Electronics Inc. Wayne
- S. Y. Truth in Sound Irasopon
- Stereo One E. Rochester
- Ears Nova Inc. GreatReck
- Eartrum Stereo Nanuet
- New Palitz Audio New Palitz
- Audio I (King) Salton New York
- Borgers's Audio New York
- Jems Sound Inc. New York
- Precision Audio New York
- Thalia Hi-Fi New York
- Alpha Stereo Plattsburg
- Gala Sound Rochester
- Rockville Hi-Fi Center Rockville Centre
- N. C. Sound One Asheville
- Audio-Advice Raleigh
- OHIO Stereo Showcase Centerville
- S. C. Don Jones Custom Stereo Greenville
- TECH K-S S. Sound Nashville
- TEX. Audio Pro Philes Inc. Houston
- VT. Laser-Land Inc. Essex Junction
- WASH. Audimar Bellevue
- Optimum Sound Seattle
- WIS. Specialized Sound Systems Corp. Madison
- Audio Video Exchange Menasha
- The Audioworks Washburn

**SYSTEMDEK IIX**

The **SYSTEMDEK IIX** represents the ultimate value/performance combination in turntables available today. This is accomplished by including such features as: oil-pump bearing, glass platter, lamb's wool record mat, 24 pole synchronous motor, belt drive, interchangeable arm board, real-wood base built about a steel frame and a unique 3-point hung suspension which allows quick and easy adjustment, even while a record is playing! All this at a surprisingly affordable price.

The **SYSTEMDEK IIX** is available; without tonearm, fitted with a Profile II (as shown); or Profile IIS tonearm.

Please write for further information.



DISTRIBUTED BY:  
**PRO-ACOUSTICS INC.**

**IN CANADA:**  
16877 Hymus Blvd.  
Kirkland, Quebec  
H9H 3L4

**IN USA:**  
Waterfront Plaza  
Newport, Vermont  
05855

## AUTHORIZED DEALERS

### NATIONAL

ORDER TOLL FREE! 1-800-222-3465 ALCHEMIST ★ AR ★ AUDIOQUEST ★ AMBER ★ B&W ★ DYNAVECTOR ★ GRACE ★ GRADO ★ H/K ★ HAFLER ★ LAST ★ LIVEWIRE ★ MONSTER ★ NITTY GRITTY ★ PREMIER ★ SHURE ★ SOTA ★ SAEC ★ SPICA ★ STAX ★ SUPERPHON ★ THORENS ★ TALISMAN ★ PLUS RECORD CARE, ACCESSORIES, CABLES, AND MUSICAL CONCEPTS HAFLER MODIFICATION KITS. CALL FOR LOWEST PRICES AND FRIENDLY ADVICE. FREE CATALOG. VISA/MC/COD WELCOME. HCM AUDIO, 1600BB MANGROVE, CHICO, CA 95926 FOR ORDERS ONLY CALL 1-800-222-3465, FOR ALL OTHER INFORMATION CALL 1-916-345-1341

### OXFORD AUDIO CONSULTANTS, INC.

For nearly ten years, we have been serving the audio cognoscenti, from our pastoral setting here in Oxford, Ohio, with excellent services, superb products and succinct, expert advice. We reach customers not only in Ohio, Kentucky and Indiana but throughout the United States, Puerto Rico and in countries all over the world. OAC specializes in accurate high quality audio components. Our product lines include AKG, Audionics, Dennesen, Hafler, Janis, Linn, Naim, Spondor, Vandersteen and Walker. Demonstrations are given by appointment in our single speaker demonstration room. Most orders are shipped by the next business day. We pay for shipping and insurance on orders shipped to the fifty states, Puerto Rico and APO/FPO. Our extensive export facility ships worldwide. OXFORD AUDIO CONSULTANTS, INC., Box 145, Oxford, OH 45056-0145, 513-523-3333, TLX427791.

**SPICA SPEAKERS, CHICAGO & ARCICI STANDS—SIMPLY THE BEST.** Authorized dealer, personalized service, free shipping. Call for audition/prices. Mobile Recording Company, Carmel, IN. (317)-846-5308, 5-10 PM.

UHER, Sennheiser, Sony, AKG, (Shure), Electro-Voice, Audio-Technica, Beyer-Dynamic, etc. Portable Recorders, Microphones, Mixers Carpenter (GHP), P.O. Box 1321, Meadville, Pa. 16335-0821

### WEST

**PRESTO AUDIO OFFERS:** Conrad-Johnson, BEL, ProAc, Chapman, Belles Research, Adcom, VPI, Souther, Zeta, Soundex Panels, Nova, Alpha 1&2, VSP Labs, Gyrotec, Dual, Teac, Goldbug and more. New and Used. Best prices. Free shipping. 3125 Williamsburg Dr., San Jose, CA 95117, (408) 378-8283. Write for special.

# Randall Research Cable Systems

... the indispensable component

17925-A SKY PARK CIRCLE • IRVINE, CA 92714 • (714) 261-9141 • TELEX 382175

## AUTHORIZED DEALERS

### WEST

SANTA ROSA, CALIF. THE BEST IN AUDIO AND VIDEO. Professional staff. Carver, Denon, ADS, H-K, Proton, Sony, NEC, and lots more. Video Experience, 458 B St., Santa Rosa, CA 95401. (707) 542-6610.

### NEW ENGLAND

**AUDIO CLASSICS BY CHARLES ST GEORGE IN RI.** GOETZ loudspeakers are a must addition! Other Fine components by Alchemist, Croft, Goldbug, Grado, Hitachi, H-K, Kindel, LAST, Lazarus, Michell, PS, Ray Lumley, Souther, Sumiko, Systemdek, Talisman, Tweek, Veritas, VPI, Zeta. Ring (401) 722-0300.

### GOODWIN'S MUSIC SYSTEMS

In New England, Goodwin's is recognized as the leader in high performance audio. Along with the finest in components, we can provide the most sophisticated custom installation tailored to your individual needs. We offer:

Mark Levinson, Spectral, Magneplanar, Apogee, Soundlab, Quad, Entec, Goldmund, Linn, Tandberg, Nakamichi, Bryston, Hafler, Adcom, Celestion SL, Eminent Technology, Nitty Gritty, Walker, AR, Ariston, Thorens, Infinity, H-K, Proton, B & W, Camber, Essence, Janis, Velodyne, Koetsu, Van den Hul, Audio-Quest, Monster, Favorite, Stax, Astatic & Grace.

Goodwin's Music Systems, 16 Eliot St., Harvard Square, Cambridge, MA 02138 Tel. 617-492-1140



## MOSCODE TUBE CIRCUITRY

In the late 1970's Julius Futterman was the first man to synthesize tubes and mosfets. Based on his original research we have completed the development of **Moscode Tube Circuitry**.

There are 4 different **Moscode Tube Amplifiers** from 90 watts per channel (\$599) to 800 watts per channel (\$3,000). Have you ever heard a tube amplifier that can produce 1600 watts?

What about a **Moscode Minuet Tube Preamp** with 80 db of gain so you can use a moving coil cartridge without a head amp and is absurdly quiet for \$600. Of course, there are two other **Moscode Tube Preamps** that cost \$999 and \$1599. You say that even these two beauties are too rich for your blood.

What about **IT** which is a **Moscode Tube Front End** that has 80 db of gain that you use as a phono front end for your receiver or transistor preamp. You simply plug your turntable into **IT** then plug **IT** into your AUX input and *viola* you are now listening to the most glorious tube preamp. You will improve any of your transistor equipment with **IT**, and being that **IT** cost only \$169 any struggling musician or cynical music lover can discover the profound beauty of tube electronics and not have to go into massive consumer debt.

As a side note you should be aware that we also have a new **Moscode Tube FM Tuner** called **Moscode Major Armstrong**. For more information reach out to us at:

### NEW YORK AUDIO LABORATORIES

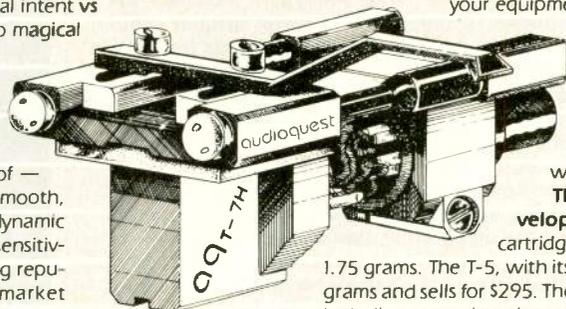
33 North Riverside Avenue  
Croton-On-Hudson, NY 10520 • 914-271-5147

# MUSIC OR MAGIC . . . ?

When developing a new product many decisions must be made and many different parameters must be balanced. The **best** audio equipment is the result of someone listening very carefully and being very sensitive to the notion of musical intent vs information processing. There are no magical solutions, alchemy isn't the answer.

If we wanted to sound trendy we would call our approach "holistic".

The new **AQ T-5 and AQ T-7 moving coil cartridges** have a musical balance we are very proud of — a combination of superior tracking, smooth, clean, fast, neutral sound, high dynamic contrast and a minimum of tone arm sensitivity. AudioQuest has earned its strong reputation in the quality cartridge market



with its high output moving coils. Almost single-handedly, AQ has made most preamps and transformers obsolete. The AQ T-5 and T-7 are available in 3 output levels so you can choose the best one for your equipment. The T-5H and T-7H have an output

of 2.2mV for all normal phono inputs. The T-5M and T-7M are 1.1mV

and are perfect for "high gain" preamps (which includes almost all current tube units). The T-5L and T-7L are .22mV and should be used

when a top quality MC input is available.

The **AQ T-5 and T-7 use a specially developed tapered titanium cantilever**. Both cartridges have a compliance of 12 and track at

1.75 grams. The T-5, with its solid brass mounting plate, weighs 8.8 grams and sells for \$295. The T-7 has a solid sapphire support system including mounting plate, weighs 6.9 grams and sells for \$495. The AQ M-1 induced magnet cartridge at \$95 and the AQ MC-3 high output MC at \$145 also set value standards that can't be matched.

**aq** audioquest

AudioQuest brings your system to life!

412 N. Coast Highway, #B-360, Laguna Beach, California 92651 714/720-1995

# Stereophile

SAVVY EQUIPMENT REPORTS AND SPIRITED EDITORIAL CONTENT  
Send \$20 for 10 issues. Stereophile 1107c Early Street, Santa Fe, NM 87501 or  
Call toll-free 800/821-3528

## AUTHORIZED DEALERS

### NEW ENGLAND

**Home of High End Values**  
Interfacing the finest equipment to meet your needs and budget.  
Save on Audiophile Accessories & Records  
Expert Service • Trade ins • FREE Shipping • MC/VISA  
Write for Newsletter  
**AUDIO VISION**  
40 Mass. Ave., Lexington, MA 02173  
(617) 863-5221

**BRITISH INVADE LEXINGTON, MASSACHUSETTS.** The "revolutionary" MISSION CD player, speakers, and electronics have landed; along with the highly acclaimed (budget audiophile) products from ROTEL and the REVOLVER turntable/Linn LVX tonearm and cartridge package. The superlative ALPHASON tonearm and PROAC speakers must be heard! CALL AUDIO VISION, 40 Massachusetts Ave., Lexington, MA 02173. 617-863-5221. Stoneham store—617-438-4355.

## AUTHORIZED DEALERS

### NEW ENGLAND

**BOSTON, BURLINGTON & HARTFORD**  
Scientific Stereo will demonstrate and precisely install Creek ("Beats the NAD and Rotel hands down."—Flat Response), CJ Walker, Grado Signature, Monster Cable, Soundcraftsmen, Spica, Tiptoes and Wharfedale Diamond ("Loudspeaker of the Year") within this geographic triangle. Why settle for brown boxes? 11 Garage Rd., Sunderland, Mass. 413-665-3980.

## MIDDLE ATLANTIC

**ALTERNATIVE AUDIO:** Home of fine audio values. JSE/Infinite Slope, Spica, 3D, PS Audio, Precision Fidelity, Electron Kinetics, B&K, Creek, C.J. Walker, VPI, Discrete Technology, Kimber, Accuphase, Grado, Tweek, Tip Toes, Massapequa, LI, NY (516) 541-7025. Please call for an appointment.

## AUTHORIZED DEALERS

### MIDDLE ATLANTIC

Visit a Showcase of Audio Video Values in N.Y.C.-L.I.-Metro Area  
ADS-BES-OCM-STAR-GRADO-ALPINE-ORACLE-AMBER-ADCOM-SIGNEE-FOSTER-DEWON-LUZMAN-ALLISON-PYRAMID-ROSS-TALGAM-PROTON-AUDIO-PRO-3D-ACUSTICS-AUDIOCONTROL-UNICO-BOY-BANES-DOLBYSEN  
Call for hours: (718) 961-9888 No mail orders  
173 Broadway, New York City, NY 10007  
(N.W. corner of B'way & Cortlandt. Our flight up entrance on Cortlandt.)  
184-10 Horace Harding Express, Fresh Meadows, NY 11365  
East 25 L.I.E., 1 Utopia Plaza (Three blocks from Bloomingdale's)  
**MONTE STACE AUDIO VIDEO**

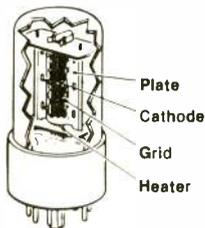
**HAL'S STEREO & VIDEO CENTER.** Established 38 years. ADS, Boston Acoustics, Conrad Johnson, Perreaux, Sota, Sumiko, Magnepan, Monster Cable, Morkoff, KEF, Denon, Nakamichi, Proton, Yamaha and Mitsubishi Video, McIntosh. U.S. Rt. 1 & Texas Ave., Trenton, N.J. 08648 (609) 883-6338

**AUDIO CONNECTION**  
in Northern New Jersey  
**TURNABLES:** Goldmund, Merrill, Heybrook, VPI Industries, Systemdek, Harman Kardon  
**TONEARMS:** Eminent Technology, Goldmund, Lurne, Grado, Souther SLA-3i  
**CARTRIDGES:** Alpha, AudioQuest, Decca vdHul, Garratt Decca, Grado, Promethean  
**ELECTRONICS:** (tube) Jadis, Melos, MFA Systems, Audible Illusions, Quicksilver  
**(SOLID STATE)** Electrocompaniet, Leach LSR&D, FM Acoustics, Magnum, PS Audio  
**SPEAKERS:** Fuselier, Heybrook, Kindel, Rauna, Spondor, Spica, 3D, Vandersteen  
**ACCESSORIES:** Goldmund mat/clamp, LiveWire, Last, Randall, Kinergetics, Kimber Kable, Sims Vibration Eng, Sonex, Tiptoes, Tweek, VPI  
1-201-239-1799  
615 Bloomfield Ave., Verona NJ 07044  
**AUDIO CONNECTION** also has for sale: occasional close-outs, some used equipment and display pieces. Single speaker demonstration; record cleaning; audiophile discs. **HOURS:** Mon, Tues, Fri 12 to 7, Thurs 12-9, Sat 11-6. Please, call for an appointment!

## FOREIGN

**RESPONSIBLE PERSONAL EXPORT SERVICE** from England by low-cost weekly airfreight service to all major US airports. We specialise in all top equipment and particularly loudspeakers by B & W, Celestion, Heybrook, KEF, Mission, Quad, Rogers, Spondor, Tannoy etc. Write, telephone or telex for quotation or visit us whilst you are in London. (Please no Naim or Linn enquiries.) Unilet Hi Fi, 35 High Street, New Malden, Surrey KT3 4BY, England. Telephone (1) 942 9567. Telex 8814591. Mastercharge and Visa welcome.

## UNDERSTANDING TUBE ELECTRONICS



Why in the last quarter of the twentieth century is the most expensive state of the art equipment still made with tubes? Here is an interesting electrical conundrum. There is only one reason that tubes still survive—they are the most ideal audio devices. Beside being linear and requiring the simplest circuits to optimize performance tubes have a unique characteristic. Tubes inherent in their electrical nature tend to produce a larger proportion of even than odd order harmonics. **BIG DEAL.** Quite right. You see when you examine real live music you find that music has a certain proportion

of even and odd order harmonics. Transistors, because they tend to produce a higher proportion of odd order harmonics, give music an unnatural glassy two dimensional quality. Tubes, because they preserve the *Natural Harmonics* of real music, create music with the most vivid live quality. Nothing you can do to a transistor will give it the natural harmonic quality of tubes.

Why don't more music lovers own tube gear? The answer is quite simple. Tube gear is expensive. How many are wealthy or insane enough to own our \$10,000 **Julius Futterman OTL Amplifiers**? Or our \$4000 tube preamp that has a 25-watt tube amplifier as a power supply?

Would you like to read a 150 page book devoted to the discussion of tube electronics which includes an easy to understand **TUBE PRIMER**? Included are essays, technical discussions, diagrams, schematics, reviews, articles from Japan and pictures of tube equipment that make *Playboy* center folds look like Miss Piggy. **UNDERSTANDING TUBE ELECTRONICS** is 150 pages of high audio drama that frankly discusses the benefits of the most perfect audio circuitry—tubes. This book is written in the style of Shakespeare, Byron, Yeats and street rap.

While we think you will get a millionaire's education for the price of the book, we will also introduce to you a new form of audio technology called **Moscode Tube Circuitry** that is the synthesis of tubes and mosfets which permits for the first time affordable state of the tube gear—without reliability problems. This new hybrid technology is the result of the pioneering research of **Julius Futterman** performed in the 1970's. The story is one of the great adventures of the audio industry.

You owe it to yourself to get an education on the expensive spread especially now that it is affordable.

We will rush you **UNDERSTANDING TUBE ELECTRONICS** for only \$6.95 (for foreign shipment please add \$4 US currency). We accept VISA & MASTERCARD.

### NEW YORK AUDIO LABORATORIES

33 NORTH RIVERSIDE AVENUE., CROTON-ON-HUDSON, NY 10510 • 914-271-5147

**Listen...**

**Before You Buy!**

- Time Delay
- Reverberation
- Crossovers
- Noise Reduction
- Compressor/Limiters
- Expanders
- Spectrum Analyzers
- Parametric EQ

Don't have regrets about paying too much for a lesser product. In demos and comparisons, we'll show you why we're Better! Our Factory Direct sales allow us to produce a Superior product and offer it to you at a Lower price. Call or write for a free full length Demo Album and 24 page brochure. Write to: **LT Sound, Dept. A-3, P O Box 338 Stone Mountain, GA 30086** In Georgia Call (404)493-1258  
**TOLL FREE: 1-800-241-3005—Ext. 18**

## AUTHORIZED DEALERS

### SOUTHWEST

**C.F. AUDIO—MICRO SEIKI** turntables are truly the world's finest sounding and most well-built turntables available today. **SAEC** tonearms are the number one choice among Japanese Audiophiles. **ENTRE, HIGHPHONIC, SAEC** cartridges plus many more. Moving Flux crts. \$35. **OR-SONIC** headshells and accessories. **MCM SYSTEMS, CLEMENTS** speakers. **HITACHI LINEAR CRYSTAL** Speaker wire (2-cond. \$2.50 ft., 4-cond. \$3.50 ft.) and Interconnects (.5 mtr. \$28 pr., 1.0 mtr. \$38 pr., 1.5 mtr. \$45 pr., 2.0 mtr. \$50 pr., raw twinaxial cable \$5.50 ft.) in stock. **N.Y. AUDIO LABS** (Futterman) **MOSCODE** amps, preamps and FM tuner. Excellent discounts on many items. **MICRO BL-99 Vacuum It**—List \$995 Now \$795, w/SAEC 4C7/23 arm—Total List \$1490 Now \$1150. **MICRO RX-1500 Basic**—List \$795—Now \$650. **RX-155VG**—List \$1495 Now \$1195. Free color brochures available. **WE SHIP ANYWHERE.** VISA, MC. **C.F. AUDIO**, 415 W. Imperial Hwy, LaHabra, CA 90631. Phones (213) 691-0967, (714) 871-5670.

### AMPS/PREAMPS

#### QUALITY AND VALUE

Amplifiers • Preampifiers • Tuners

Coming...the best CD Player



6029 RESEDA BOULEVARD • TARZANA, CA 91356  
(818) 345-2851

#### ACOUSTAT SERVO CHARGE AMPLIFIER REVISION

ALL VACUUM TUBE, Polypro Caps, MF R's, Dual Regulation, New Epoxy PCB, & More. Definitive / Dynamic / Precisely Imaged. 100 % Warranty. \$1200 + Old Amps. Also: COMPLETE VACUUM TUBE PREAMP REVISIONS—AR, CJ, Marantz, etc. \$600. Write (incl. Phone #): Curcio, PO Box 10503, State College, PA 16805-0503.

AMERICA'S LARGEST dealers in HIGH END USED stereo. We BUY by PHONE. STEREO EXCHANGE 687A Broadway, between 3rd and 4th St. (opposite Tower Records) NYC 10012. (212) 505-1111 and (800) 833-0071.

ELECTRON KINETICS EAGLE 7A serial #90. Mint condition (retail \$3,950) \$1,800. 214-754-1237 days. 214-424-9470 eves & weekends.

## DALLAS

AR	Nitty Gritty
Acoustat	Orkyo
Audible Illusions	PS Audio
Audio Source	ProAc
Audioquest	Randall Research
Belles	Reference Recordings
CJ Walker	Robertson
Conrad-Johnson	Sheffield
Electrocompaniet	SOTA
Grace	Sonographe
Grado	Souther
Harman-Kardon	Spica
Kimber Kable	Sumiko Products
Live Wire	Talisman
Magnepan	Thiel
MAS	Threshold
Monster Cable	VPI

**Omni Sound**  
4833 Keller Springs Rd.  
Dallas, Texas 75248  
(214) 931-6664

# PS AUDIO BULLETIN



**THE SOURCE** is now available! Full function, mc-ready, this incredible sounding budget preampifier will offer

more musical pleasure per dollar than any other unit on the market. \$329. solderless kit: \$419 assembled

**IIC + DM** modification kits are now available. Easy in-home installation. Convert your IIC + to the DM standard for just \$50

**IVH's** are now in better supply. This sought-after preampifier is now easier to get. please see your local dealer for details

**REFERENCE B** audio cables will let you hear what your equipment has to offer and they're just \$20!

PS AUDIO • 3130 SKYWAY DRIVE • SANTA MARIA, CA 93455 • (805) 928-2631

### AMPS/PREAMPS

**ATTENTION DYNACO OWNERS:** Musical Concepts will soon bring our outstanding modification expertise to several Dynaco models. Our first offering is the outstanding MC-1 preamp circuit board, adapted to the Dynaco PAT-4 and PAT-5. This is a dual mono preamp on a single board with twin LIPS power supplies. Estimated pricing \$249/kit, \$329 installed. These preamps will challenge the finest. Write for brochure. Musical Concepts, 1060 Fifth Plaza, Florissant, MO 63031. 314-831-1822 (1-4pm EST). P.S. Can a Dyna MK III compete with the best tube amps? Maybe so—tuned!

**DB SYSTEMS DB-5 TONE CONTROL**—For people who hate tone controls. Corrects tonal balance of imperfect recordings. Less than 0.0008% THD, five year warranty. DB SYSTEMS. Rindge Center, NH 03461. (603) 899-5121.

### GREENFIELD EQUIPMENT

Audio systems dedicated to the presentation of the art form.

#### THE MUSIC.

ACCUPHASE • ADCOM • ARISTON • AUDIO INTERFACE • BEVERIDGE • BERNING • CLASSE' AUDIO • COUNTERPOINT • DISTECH • DYNAVECTOR • EAR ELECTROCOMPANIE • ELECTRON KINETICS • ENTEC • GRACE • GRADO • HAFNER • ITC • JSE • KISEKI • KIMBER KABLE • KLYNE • KOETSU • NEC • ORSONIC • PRECISION FIDELITY • PROFILE • REGA • SPECTRUM • SIDEREAL AKUSTIC • SOUTHER • SPICA • STAX • SUPEX • THORENS • TRIAD • VPI • VSP LABS • VAN DEN HUL

Auditions by appointment • Shipping and export facilities

7805 Greenfield Street • River Forest, Illinois 60305

312/771-4660

## ORIGINAL MASTER RECORDING™ HIGH FIDELITY CASSETTES

### Hear The Difference!

Listening to music in your car (or at home or even on your portable) will never be the same. Each Original Master Recording High Fidelity Cassette is transferred direct from the recording artist's original master tape for absolute sonic accuracy. Each is reproduced in "real-time" (not high speed duplicated) onto pure chromium dioxide tape and encased in our exclusive state-of-the-art cassette shell. We guarantee they are the most spectacular-sounding pre-recorded cassettes you've ever heard.

#### YOUR FAVORITE ARTISTS

There's a large selection to choose from, with new releases monthly. Including such artists as: The Beatles, Frank Sinatra, Huey Lewis, Linda Ronstadt, The Chicago Symphony, Duran Duran, Hall & Oates and many more.



For the name of a store near you, call toll-free 300-423-5759.

## MUSIC, NOT JUST SOUND.

Our equipment is designed to reveal the full range of music. Hear it all at Chestnut Hill Audio: Accuphase, Acoustic Electronics, Amber, Apature, Apogee, Audio Pro, Audioquest, B&K Components, Berning, CWD, Counterpoint, DB, Denon, Duntech, Dynavector, EMT, Entec, Euphonic, Fourier, Grace, Hafler, Janis, Koetsu, Kiseki, Krell, LAST, Linn Sondek, Live Wire, Mark Levinson, J.A. Michell, Monster Cable, Music Reference, Naim, Oracle, Origin, Pioneer Video, Proton, Pyramid, Quad, RGR, Rogers, Signet, Sony, Souther, Spectral, Spendor, Symdex, Syrinx, Talisman, Tandberg, Thorens, 3D Acoustics, VPI, VSP Labs, Vandersteen, Zeta. We are located at 311 Cherry Street, Philadelphia, Pa. 19106 (215) 923-3035.

## CHESTNUT HILL AUDIO LTD.

### AMPS/PREAMPS

## ELEVEN ALIVE SYSTEM

(ABOUT \$11,500)

Turntable: Linn Sondek Lp-12  
Tonearm: Syrinx PU-3  
Cartridge: Koetsu Black  
Tuner: Adcom GFT-1A  
Preamp: Krell PAM 3  
Amp: Krell KSA-100  
Speakers: Apogee Scintilla's

## SOUND BY SINGER

165 E. 33rd Street  
New York, NY 10016  
(212) 683-0925

### HAFLER IN THE SOUTH!

In stock, the superb Hafler pre-amps, amplifiers, tuner and equalizer. Immediate FREE shipping. Also Acoustat, Adcom, Audire, Conrad-Johnson, Dynavector, Fried, Klipsch, Mirage, Nakamichi, PS, SAE, Talisman, Thorens, compact digital players. READ BROTHERS STEREO, 593 King Street, Charleston, South Carolina 29403. (803) 723-7276. AD

## AudioVisions

Featuring State Of The Art Technology,  
Combined With Truly Old-Fashioned Hospitality.

### electronics

BELLES • BRYSTON • DENON • KLYNE • LUXMAN • S.A.E.

### loudspeakers

ALLISON • DESIGN ACOUSTICS • ENERGY  
I.T.C. • MARIAH • M & K • SNELL • THIEL

### turntables, cartridges, tape decks

ACCUPHASE • ADCOM • AUDIOQUEST • DENON  
DYNAVECTOR • GRACE • GRADO • KOETSU  
ORACLE • REVOLVER • SOTA • SUMIKO • THORENS

### ANNUAL DEMO SALE

Our demo offerings are all well-recognized very desirable CURRENT (not discontinued) models, in EXCELLENT condition, with all packaging, owner's manuals, and full warranties. (All sales final.)

ALLISON: 8, oak, 3-way, unique true bookshelf design (new \$690/pair)...\$490

BELLES DMC preamp (new \$440)...\$318

BELLES I amp., 80 watts/ch (new \$675)...\$485

DYNAVECTOR 6Z moving coil transformer (new \$189)...\$150

KOETSU moving coil transformer, bargain!, test report states "excellent...significantly better than anything auditioned...a 'safe bet' that works well with every cartridge." With a transformer, you can listen to m.c. cartridges with NO noise: NO hum, NO hiss! (new \$800)...\$560

M & K Satellite 2B, walnut (new \$495/pair)...\$395

PREMIERE (Sumiko) MMT tonearm (new \$225)...\$145

S.A.E. T-6 (AM/FM) tuner (new \$329)...\$189

### DEALERS TAKE NOTE...

AUDIO AUTHORITY switching systems (switch amps, preamps, spkrs., even turntables) substantial savings, well below the manufacturer's prices. Brand new. Call...

1067 MONTAUK HIGHWAY, WEST BABYLON  
NEW YORK 11704 (516) 661-3355

### AMPS/PREAMPS

HARMAN/KARDON, NAKAMICHI, TANDBERG, CROWN, REVOX, HAFLER, CARVER, NAD, DBX, ELECTRO-VOICE AND OTHER QUALITY COMPONENTS. BEST PRICES—PROFESSIONAL CONSULTATION. ALL PRODUCTS COVERED BY USA MANUFACTURER'S WARRANTY. AMERISOUND SALES, INC.; P.O. BOX 24009, JACKSONVILLE, FL 32241. EAST: (904) 262-4000; WEST: (818) 840-0878.

MARANTZ MODEL 7 TUBE PREAMPLIFIER—UPDATED MODIFICATIONS by original Chief Engineer. Write or call Sid Smith 413 Littleworth Lane, Sea Cliff, NY 11579 (516) 671-6449

MCINTOSH AUDIO EQUIPMENT—All types—tubes & transistor—electronics & speakers—bought—sold—traded. S.D.R. P.O. Box 176, Walton, NY 13856, 607-865-7200.

MCINTOSH MC3500, TUBE, MONO, PAIR in absolutely mint condition, factory certified and serviced. Send offers to Audio Magazine, Classified Box No. 485, 1515 Broadway, New York, NY 10036.

MUSICAL CONCEPTS CONTINUES TO OFFER THE FINEST Hafler Modifications. M-110SN makes the Hafler 110 sound like \$3000. Our latest M-200D and M-220L/500 amplifier mods will convince the tube lovers that solid state is here! We have toroid transformer, dual mono conversions for Hafler DH-200/220/500. Make a Hafler 101 sound like \$3000! Try our M-101 SuperMod III for only \$145/kit write for brochure. Musical Concepts, 1060 Fifth Plaza, Florissant, MO 63031, 314-831-1822 (1-4pm EST).

PRECISION FIDELITY—The latest in tube hybrid technology. Model M-8 amplifier \$1000., C-8 preamplifier \$750. Available at Landes Audio, Rt. 24, Chester Mall, Chester, N.J. 07930 201-879-6889.

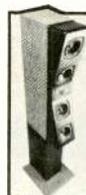
PS AUDIO'S INCREDIBLE PSIV CHALLENGES every preamplifier. Audio Nexus, NJ (201) 464-8238, (201) 730-2409. AD

### AMPS/PREAMPS

QUICKSILVER MONO TUBE AMPS: SUPERBLY MUSICAL, AFFORDABLY PRICED. AVAILABLE NOW IN NORTH-EAST OHIO AT NOTES FROM THE UNDERGROUND, BOX 149 PENINSULA, OHIO 44264 (216 657 2038) EVENINGS

THE PERFECT MOVING COIL AMPLIFIER. Continuum Electronics Low Impedance RIAA Cartridge Amplifier is specifically designed as a moving coil phono stage avoiding the compromising two-stage systems used in virtually all current preamps. For additional information, Write: Continuum Electronics, 1747 35th St., Sacramento, CA 95816, or Call: (916) 451-7871

### LOUDSPEAKERS



## BENNETT SOUND CORPORATION

A whole new generation of amplified speakers

P.O. BOX 565  
RESEDA, CA 91335  
(818) 345-1608



ACCURATE & AFFORDABLE, OVER 30 PROVEN DESIGNS for audiophiles, speaker kits for home, car, sub-woofer & pro. JBL, AUDAX, SEAS, HAFLER, polypropylene drivers & crossovers, \$2.00 Gold Sound, Box 141A, Englewood, CO 80151.

ALTEC AND JBL FOR SALE, clean quality used components, some new, woofers, compression drivers, horns, crossovers, best prices call Terry Eakins 913-897-2324 7PM to 11PM Central Standard Time 7 days a week

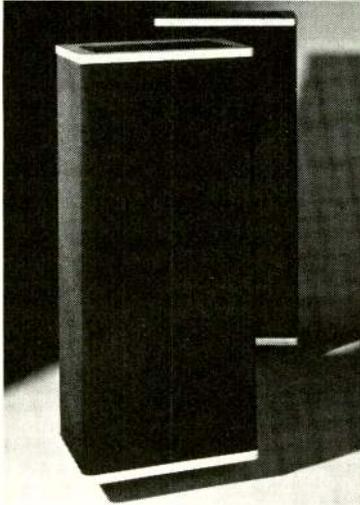
AMERICA'S LARGEST dealers in HIGH END USED stereo. We BUY by PHONE. STEREO EXCHANGE 687A Broadway, between 3rd and 4th St. (opposite Tower Records) NYC 10012. (212) 505-1111 and (800) 833-0071.

ARE THE BEST LOUDSPEAKERS really available only by mail? Send one dollar for our 60 page color catalog. Acoustic Interface, POB 6632, Santa Barbara, CA 93160.

ARE YOUR ADVENT WOOFERS FALLING APART? We rebuild Advent "12 inch" woofers to like-new condition for \$40 each plus shipping. UNIVERSAL SOUND, 2253 Ringling Blvd., Sarasota, FL 33577 (813) 953-5363.

ATTENTION—All of you who think Acoustat and Magnepans are good. Let Abbie's Audio sell you a Ribbon speaker that's a class above all others. Clements Audio the best Ribbon speaker on the market today. Abbie's Audio, 412-852-1134.

## VANDERSTEEN AUDIO DIMENSIONAL PURITY



MODEL 2C

Vandersteen Audio was founded in 1977 with the commitment to offer always the finest in music reproduction for the dollar. Toward this goal there will always be a high degree of pride, love, and personal satisfaction involved in each piece before it leaves our facilities. Your Vandersteen dealer shares in this commitment, and has been carefully selected for his ability to deal with the complex task of assembling a musically satisfying system. Although sometimes hard to find, he is well worth seeking out.

Write or call for a brochure and the name of your nearest dealer.

VANDERSTEEN AUDIO  
116 WEST FOURTH STREET  
HANFORD, CALIFORNIA 93230 USA  
(209) 582-0324

MAY 1985

This card expires July 31, 1985

# READER INQUIRY CARD

Circle the appropriate number for additional product information.

- |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  |
| 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  |
| 31  | 32  | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45  |
| 46  | 47  | 48  | 49  | 50  | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  |
| 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  | 70  | 71  | 72  | 73  | 74  | 75  |
| 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  |
| 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99  | 100 | 101 | 102 | 103 | 104 | 105 |
| 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 |
| 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 |
| 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 |

## READER FEEDBACK

**A** I would like to see more of the following types of articles in AUDIO:

- |  |  |
|--|--|
| 1 <input type="checkbox"/> Construction projects | 5 <input type="checkbox"/> Car Stereo                  |
| 2 <input type="checkbox"/> Theoretical Analyses  | 6 <input type="checkbox"/> Music/recording information |
| 3 <input type="checkbox"/> Interviews            | 7 <input type="checkbox"/> Equipment profiles          |
| 4 <input type="checkbox"/> Other _____           | 8 <input type="checkbox"/> New Product Write Ups       |
| _____  | 9 <input type="checkbox"/> Professional Equipment      |

**Record Reviews in AUDIO should include:**

- |  |       |   |       |
|--|-------|---|-------|
| MORE   | FEWER | MORE  | FEWER |
| <b>B</b> 1 <input type="checkbox"/> Audiophile..... 2 <input type="checkbox"/> |       | <b>D</b> 1 <input type="checkbox"/> Classical..... 2 <input type="checkbox"/>   |       |
| <b>C</b> 1 <input type="checkbox"/> Pop/rock..... 2 <input type="checkbox"/>   |       | <b>E</b> 1 <input type="checkbox"/> Compact Discs... 2 <input type="checkbox"/> |       |

Are you a current subscriber to AUDIO MAGAZINE?  Yes  No

Name (Please Print) \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

MAY 1985

This card expires July 31, 1985

# READER INQUIRY CARD

Circle the appropriate number for additional product information.

- |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  |
| 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  |
| 31  | 32  | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45  |
| 46  | 47  | 48  | 49  | 50  | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  |
| 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  | 70  | 71  | 72  | 73  | 74  | 75  |
| 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  |
| 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99  | 100 | 101 | 102 | 103 | 104 | 105 |
| 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 |
| 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 |
| 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 |

## READER FEEDBACK

**A** I would like to see more of the following types of articles in AUDIO:

- |  |  |
|--|--|
| 1 <input type="checkbox"/> Construction projects | 5 <input type="checkbox"/> Car Stereo                  |
| 2 <input type="checkbox"/> Theoretical Analyses  | 6 <input type="checkbox"/> Music/recording information |
| 3 <input type="checkbox"/> Interviews            | 7 <input type="checkbox"/> Equipment profiles          |
| 4 <input type="checkbox"/> Other _____           | 8 <input type="checkbox"/> New Product Write Ups       |
| _____  | 9 <input type="checkbox"/> Professional Equipment      |

**Record Reviews in AUDIO should include:**

- |  |       |   |       |
|--|-------|---|-------|
| MORE   | FEWER | MORE  | FEWER |
| <b>B</b> 1 <input type="checkbox"/> Audiophile..... 2 <input type="checkbox"/> |       | <b>D</b> 1 <input type="checkbox"/> Classical..... 2 <input type="checkbox"/>   |       |
| <b>C</b> 1 <input type="checkbox"/> Pop/rock..... 2 <input type="checkbox"/>   |       | <b>E</b> 1 <input type="checkbox"/> Compact Discs... 2 <input type="checkbox"/> |       |

Are you a current subscriber to AUDIO MAGAZINE?  Yes  No

Name (Please Print) \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY CARD**

FIRST CLASS

PERMIT NO. 58

DALTON, MA

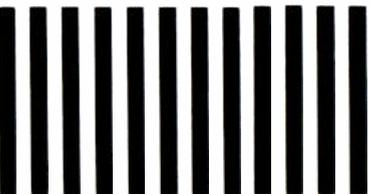
POSTAGE WILL BE PAID BY ADDRESSEE



Reader Service Management Dept.

P.O. Box 354

Dalton, MA 01227-9981



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY CARD**

FIRST CLASS

PERMIT NO. 58

DALTON, MA

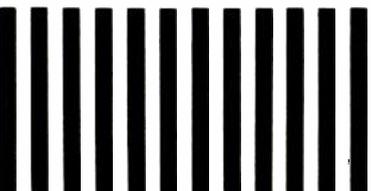
POSTAGE WILL BE PAID BY ADDRESSEE



Reader Service Management Dept.

P.O. Box 354

Dalton, MA 01227-9981



## LOUDSPEAKERS

**A&S OFFERS THE WIDEST SELECTION** of European and American speaker kits and raw drivers including Dynaudio, Fried, Audax, Falcon-Acoustics, SEAS, Peerless, Morel, Dalesford/Cambridge, Jordan, Philips, Becker, Pyle, JVC. Featuring custom auto speaker systems, Morel Integra and the "Avery Dark 10". Free catalog. A&S SPEAKERS, Box 7462A, Denver, CO 80207. (303) 399-8609.

**AT LAST, HI-FI SPEAKERS FOR PROFESSIONALS!** JSE INFINITE SLOPE: 100 dB/octave crossovers! Phase Shift Bass Loading patent! 300W tweeters! Lifetime Transferable Warranty! Perfectly matched with VSP or Belles amplifiers. TONMEISTER RECORDING—exclusive Washington DC dealer (301) 229-1664. Box 125 Glenecho, MD 20812.

**ATTENTION AUDIOPHILES: JSE INFINITE SLOPE LOUDSPEAKERS** Models 1 and 2 with a Lifetime Transferable Warranty are available with us. Inquire about our 7 day auditioning program. Sound Unlimited, 178 Main St., Bristol, Conn., 06010. (203) 584-0131.

**BRITISH LOUDSPEAKER**—Imported by Terpsichore Imports, Rt. 24 Chester Mall, Chester, N.J. 07930 201-674-4000. From Cambridge, England, a highly regarded small speaker with an unusually boxless sound. A quality wood finish with fine English craftsmanship. \$250. pair. Seeking Manufacturers reps.

**DAYTON WRIGHT'S INCREDIBLE LCM-1 LOUDSPEAKER:** World's finest minimonitor. Audio Nexus, NJ, (201) 464-8238, (201) 730-2409. **AD**

**DAYTON-WRIGHT XG-10 LOUDSPEAKERS.** Perfect working condition \$1000 or b/o or trade. Miami—Key West area (305) 296-8158.

**DIMENSIONS UNHEARD NC-1 LOUDSPEAKER** images so vividly it's almost unsettling. Time aligned. Phase coherent. Transient perfect. Hand-built polypropylene woofers coupled to European dome drivers by a FFT optimized crossover. Ten year warranty! RTRD, 2105 Claremont, Springfield, IL 62703 (217) 529-8793.

**ELECTRO-VOICE AUTHORIZED DEALER**—Components, Interface, stage, studio and PA speakers, microphones. The 15" woofer system components with tweeters and midrange horns cost under \$600/pair (drives only) at our low prices. Our new price list is available free. Rick Marder, (201) 561-8123.

**HIGH-END SPEAKERS! SAVE 40%** on esoteric speaker systems. Fast service. Visa/MC. RTRD, 2105 Claremont, Springfield, IL 62703.

**FOCAL LOUDSPEAKERS AND KITS FROM FRANCE** Featuring: Neoflex cones, Fiberglass domes, Flatwound wire, Active or passive crossovers, Compound woofer systems. Extensive design parameters. Available in the US from **MADISOUND SPEAKER COMPONENTS** 8982 Tablebluff, Box 4283, Madison, Wisconsin 53711, 608-767-2673.

**FRIED LOUDSPEAKERS: LEGENDARY. AUDIO NEXUS** has them all. NJ, (201) 464-8238, (201) 730-2409. **AD**

### FRIED SPEAKERS & KITS

State-of-the-art sound. Try our prices! Free shipping. Also Nakamichi, Haller, SAE, Audire, Mitsubishi, Adcom, Dynavector, compact digital players. **READ BROTHERS STEREO**, 593 King Street, Charleston, South Carolina 29403. (803) 723-7276. **AD**

**GOETZ GRAND MASTER** speakers as seen in Jan. '85 Audio, page 189. \$1995 O.B.O. (\$2695). Jerry (305) 788-6913 (Fl) eves.

**HARMAN/KARDON, NAKAMICHI, TANDBERG, CROWN, REVOX, HAFNER, CARVER, NAD, DBX, ELECTRO-VOICE AND OTHER QUALITY COMPONENTS. BEST PRICES—PROFESSIONAL CONSULTATION. ALL PRODUCTS COVERED BY USA MANUFACTURER'S WARRANTY.** AMERISOUND SALES, INC.; P.O. BOX 24009, JACKSONVILLE, FL 32241. EAST: (904) 262-4000; WEST: (818) 840-0878.

## LOUDSPEAKERS

**J.B.L. USED SPEAKERS, COMPONENTS, LITERATURE,** and blueprints. Bought, Sold, and Traded. 313-229-5191. Aft. 7 PM EST.

**JSE INFINITE SLOPE LOUDSPEAKERS** Hear your music at last! Now, unique and technologically advanced crossovers deliver unparalleled clarity, smoothness, dynamics. Call AUDIO NEXUS, NJ, (201) 464-8238, (201) 730-2409 for copies of Sensible Sound's rave reviews. **AD**

**LOUDSPEAKER COMPONENTS—KITS,** Audax, Dynaudio, Eclipse, Focal, Foster, Peerless, Morel, Vifa, SIARE, and more! New catalog, 50c. Meniscus Systems, 3275W Gladiola, Wyoming, Michigan 49509

### MAGNEPAN IIB OWNERS

New plug-in crossover lowers distortion, improves instrument and voice detail for a better image. Increases both dynamic range and bass definition. Delivers the quality of bi-amplification at much lower cost. Attaches in seconds. 20 day trial, money back guarantee. \$229.00 Visa or Mastercard accepted. For complete details contact DSA Marketing, 6440 N. Ridgeway Ave, Lincolnwood, IL 60645, 1-312-673-7003.

**PROAC LOUDSPEAKERS:** The famous Tablette, which Harry Pearson, Editor of The Absolute Sound, calls "the best small speaker since the BBC LS3/5A" now has a bigger brother—the Extended Bass Tablette. ProAc also makes the incredible Studio 3 and Studio 2 monitors. Write: MODERN AUDIO, 2888 BLUFF, BOULDER, COLO. 80301. 303-449-1440.

**SPEAKER BUILDING HEADQUARTERS** save 50-75%. Esoteric kits including compound subwoofers, ribbon systems. World class from Dynaudio, Strathern, IAR Wondercaps, Chateauroux polypropylene, and the awesome Gold Ribbon 3.0. Phase and amplitude correct active crossovers by Shadow. All the finest in stock at guaranteed lowest prices with excellent service! Catalog \$2. refundable. Audio Concepts, 1631 Caledonia St., La Crosse WI 54602 (608) 781-2110.

**VANDERSTEEN 2B'S WITH STANDS** and Monster Cable. Excellent condition with original cartons, \$600. 518-827-4085 after 6:00 pm EST.

## EXTRAORDINARY PRODUCTS

Triplanar Tonearm, Phoenix Preamplifier, Klyne Oracle & SOTA Regulated Power Supplies, Tiptoes, Tonearm Termination Box, MacMod Tonearm & Interconnect Cables, MacMod Crossover, MacMod Subwoofer

## EXCEPTIONAL MODIFICATIONS

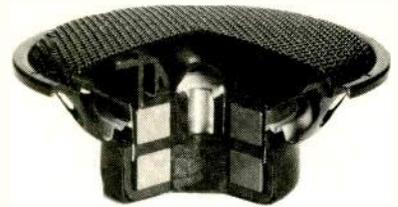
QUAD 405 amplifiers, Ittok, Mission, SME & Technics EPA-100 tonearms, Bedini, Belles & Spatial preamplifiers, QUAD 63, Rogers Studio 1 & LS3/5A speakers

Request a complete catalog from The Mod Squad, 542 Coast Highway 101, Leucadia, CA 92024.

(619) 436-7666

*The Mod Squad*

# MOREL INTEGRA



MOREL'S "INTEGRA" AUTO FIDELITY loudspeakers provide the perfect solution to high-quality sound reproduction in the car. Morel's system differs from conventional coaxial systems which use two separate drivers that have to be mounted mechanically together. The "Integra" concept is based on a two-way coaxial system consisting of two magnets - one for the dome tweeter and one for the woofer - integrated on a single axis. Similar in their high power-handling and excellent sound to the Morel driver units for home loudspeakers, the Morel Integra auto fidelity loudspeakers are durable and rugged enough for use in any type of vehicle.

### INTEGRA - 1 MkII

Integrated 2-way 6" / Dome Tweeter (Adapted for bi-amp)

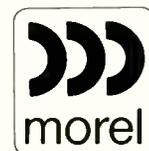
Power Handling Capacity	..... 100 Watts RMS
Frequency Response	..... 45-25000 Hz
Woofer Type	..... 6" Dia. 3" Aluminum voice coil
Tweeter Type	..... Soft dome. Aluminum voice coil
Ferrofluid Cooling/Damping	..... Yes
Impedance	..... 4 ohms
Sensitivity 1W/1M	..... 91 db
Magnetic Structure Weight	..... 2.3 lbs./1.05 Kgs.
Dimensions	..... 160mm/6 1/4" Dia. 67mm/2 1/2" Depth
Mounting Depth	..... 53mm/2 1/4"
Net Weight	..... 2.85 lbs./1.3 Kgs.
Front Grill	..... Integral metal grill

### INTEGRA - 2 MkII

Integrated 2-way 8" / Dome Tweeter (Adapted for bi-amp)

Power Handling Capacity	..... 120 Watts RMS
Frequency Response	..... 35-25000 Hz
Woofer Type	..... 8" Dia. 3" Aluminum voice coil
Tweeter Type	..... Soft dome. Aluminum voice coil
Ferrofluid Cooling/Damping	..... Yes
Impedance	..... 4 ohms
Sensitivity 1W/1M	..... 92 db
Magnetic Structure Weight	..... 2.3 lbs./1.05 Kgs.
Dimensions	..... 220mm/8 1/2" Dia. 75mm/3" Depth
Mounting Depth	..... 57mm/2 1/4"
Net Weight	..... 3.3 lbs./1.5 Kgs.
Front Grill	..... Integral metal grill

Please write for details:



### morel acoustic usa

414 harvard street, brookline, mass. 02146  
u.s.a. tel. (617) 277-6663

### morel acoustic ltd

industrial area b, p.o.b. 140, ness ziona  
70 451 israel. tel. 054-70796, telex 361951

# Authorized Linn/Naim Dealers

Here is a list of a few good dealers that won't try to TALK you into believing that they are "experts". They can, and will, actually demonstrate the differences in components under conditions that will allow you to make a sensible decision.

## ALABAMA

Audition, Homewood  
Campbell Audio & Video, Huntsville

## ARIZONA

Listening Post, Tempe

## CALIFORNIA

Audio Basics, Claremont  
Classic Audio, Encinitas  
Musical Images, Fresno  
Havens & Hardesty, Huntington Beach  
Christopher Hansen, Los Angeles  
Gene Rubin Audio, Monterey Park  
Audible Difference, Palo Alto  
Keith Yates Audio, Sacramento  
Stereo Design, San Diego  
House of Music, San Francisco

## COLORADO

Audio Alternative, Fort Collins

## FLORIDA

Sound Components, Coral Gables  
Sound Components, Fort Lauderdale  
Sound Source, Marathon  
Audio Gallery, Miami  
Audio Gallery, Sarasota  
Audio Visions, Tampa

## HAWAII

Audio Shoppe, Honolulu

## ILLINOIS

Pro Musica, Chicago  
Victor's Stereo, Chicago  
Victor's Stereo, Morton Grove  
Sound Choice, Lisle  
Absolute Audio Systems, Rockford

## INDIANA

Audiotrend, Evansville  
Hi-Fi Gallery, Indianapolis

## MASSACHUSETTS

Matrix Audio & Video, West Hatfield

## MICHIGAN

Absolute Sound, Ann Arbor  
Sound Room, Grand Rapids

## MISSOURI

Audio Renaissance, Kansas City  
Music Systems, St. Louis

## NORTH CAROLINA

Audio Salon, Charlotte  
Stereo Sound, Chapel Hill  
Stereo Sound, Greensboro  
Stereo Sound, Raleigh

## NEBRASKA

Sound Environment, Lincoln  
Sound Environment, Omaha

## NEW JERSEY

CSA Audio Design, Upper Montclair

## NEW YORK

Ears Nova, Great Neck  
Innovative Audio, Brooklyn  
Sound by Singer, New York  
Stereo One, East Rochester

## OHIO

Stereo Showcase, Dayton  
Oxford Audio, Oxford

## OKLAHOMA

Audio Dimensions, Oklahoma City

## PUERTO RICO

Precision Audio, Rio Piedras

## SOUTH CAROLINA

British American Sound, Charleston

## TEXAS

High Bias, Austin  
Audio Distinctions, Corpus Christi  
Audio Concepts, Houston  
Concert Sound, San Antonio

## VIRGINIA

High-C Stereo, Leesburg  
Listener's Shop, McLean

## WASHINGTON

Definitive Audio, Seattle

## LOUDSPEAKERS

**TANGENT ACOUSTICS**—Imported by Terpsichore Imports, Rt. 24, Chester, N.J. 07930 201-674-4000. One of the finest British loud-speakers available. Models range from \$400. Model RS-4, long considered one of the finest full range British loudspeakers available at \$795. a pair. Current technology upgrades available on all Tangent models.

### VANDERSTEEN 2C

For the lowest price anywhere, call **ORPHEUS AUDIO**, N.Y. (516) 676-5082.

## RECEIVERS

**HARMAN/KARDON, NAKAMICHI, TANDBERG, CROWN, REVOX, HAFNER, CARVER, NAD, DBX, ELECTRO-VOICE AND OTHER QUALITY COMPONENTS. BEST PRICES—PROFESSIONAL CONSULTATION. ALL PRODUCTS COVERED BY USA MANUFACTURER'S WARRANTY. AMERISOUND SALES, INC.; P.O. BOX 24009, JACKSONVILLE, FL 32241. EAST: (904) 262-4000; WEST: (818) 840-0878.**

## TUNERS

**CARVER TX-11 FM SUPER TUNER** in absolutely perfect condition \$350.00 (212) 541-4737 evenings/weekends.

**HARMAN/KARDON, NAKAMICHI, TANDBERG, CROWN, REVOX, HAFNER, CARVER, NAD, DBX, ELECTRO-VOICE AND OTHER QUALITY COMPONENTS. BEST PRICES—PROFESSIONAL CONSULTATION. ALL PRODUCTS COVERED BY USA MANUFACTURER'S WARRANTY. AMERISOUND SALES, INC.; P.O. BOX 24009, JACKSONVILLE, FL 32241. EAST: (904) 262-4000; WEST: (818) 840-0878.**

## TURNTABLES

**AMERICA'S LARGEST** dealers in **HIGH END USED** stereo. We **BUY** by **PHONE. STEREO EXCHANGE** 687A Broadway, between 3rd and 4th St. (opposite Tower Records) NYC 10012. (212) 505-1111 and (800) 833-0071.

**AR TURNTABLES WITH SAEC** and other Japanese tonearms—superior combinations at affordable prices. Free details: Shadow Audio P.O. Box 31672, Omaha, NE 68123-9998

**SOTA SAPPHIRE AND STAR SAPPHIRE: EXQUISITE SOUND** from the crown jewels of turntables. Audio Nexus, NJ, (201) 464-8238, (201) 730-2409. **AD**

**SOTA TURNTABLES**—Star & Sapphire available at Landes Audio, Rt. 24, Chester, N.J. 07930 201-879-6889

## TURNTABLES

**DRAMATICALLY IMPROVE YOUR "NEW" AR TURNTABLE.** We guarantee the following products to improve your AR's transparency, detail and smoothness or we will refund the purchase price.

- 1) AudioQuest Sorbothene Mat ..... 35.00
- 2) Predrilled Aluminum Armboards  
MMT, Linn, or AR arms ..... 30.00  
All others ..... please call
- 3) Hum-shielding for AR motors:  
HS Kit ..... 9.00

The Audio Advisor, Inc. Box 6202 Grand Rapids, MI. 49506 (616) 451-3868. Shipping: \$3.00/Item

**HARMAN/KARDON, NAKAMICHI, TANDBERG, CROWN, REVOX, HAFNER, CARVER, NAD, DBX, ELECTRO-VOICE AND OTHER QUALITY COMPONENTS. BEST PRICES—PROFESSIONAL CONSULTATION. ALL PRODUCTS COVERED BY USA MANUFACTURER'S WARRANTY. AMERISOUND SALES, INC.; P.O. BOX 24009, JACKSONVILLE, FL 32241. EAST: (904) 262-4000; WEST: (818) 840-0878.**

### MERRILL AR MODIFICATIONS

Tonearm Replacement Subchassis Kit for old AR \$85.00—Subchassis for sonic improvement of AR-XE with adjustable feet \$95. Following modifications are for all models: Platter Coating \$10. Replacement Spindle \$25. Spring Kit \$8. High Torque Motor \$45. Platter Balancing Service \$10. Replacement inner and outer platters \$135 for all AR-XA, AR-XB, and AR-XE turntables. **UNDERGROUND SOUND**, 2125 Central Ave., Memphis, TN 38104 (901) 272-1275.

### MERRILL TURNTABLE

Features: Beautiful solid oak base. A tunable, three-point Constant Resonance Suspension System. A subchassis designed to absorb tonearm release energy. Supplied with an inner gravity clamp and outer periphery record clamp. For more information contact **UNDERGROUND SOUND**, 2125 Central Ave., Memphis, TN 38104. (901) 272-1275.

**SOTA SAPPHIRE TURNTABLE WITH MOUNTED** Linn LVX arm. In absolutely perfect condition \$700. (212) 541-4737 evenings W/E.

## MULTI COMPONENTS

**AMERICA'S LARGEST** dealers in **HIGH END USED** stereo. We **BUY** by **PHONE. STEREO EXCHANGE** 687A Broadway, between 3rd and 4th St. (opposite Tower Records) NYC 10012. (212) 505-1111 and (800) 833-0071.

**APOGEE SPEAKERS**, new Krell KRS-1 mono preamp; 200, 100, direct drive amps, crossover, Sony PCM 701, Tandberg 3001A tuner, (201) 746-2794

Prompt Insured Shipments

## GUARANTEED SAVINGS

"Why Settle For Less When You Can Own The Best"

- Professional Advice •
- FREE Delivery & Set Up
- Relaxed "NO RUSH" Showroom •
- Financing Available
- Trade-ins Accepted •
- Custom Installation & Repairs

**FEATURING OVER 60 BRANDS INCLUDING:**

- ADS •
- Advent •
- Aiwa •
- AKG •
- Alpine •
- Amber •
- AR •
- Audio Control •
- Audio Source •
- Blaupunkt •
- Bose •
- Celestion •
- Concord •
- DBX •
- Denon •
- Dual •
- Dynavector •
- Energy Loudspeaker •
- Grace •
- Grado •
- Harman/Kardon •
- JBL •
- Kyocera •
- Mitsubishi •
- Onkyo •
- Ortofon •
- Pyramid •
- Robertson Audio •
- Scott •
- Sherwood •
- Signet •
- SoundCraftsmen •
- Sony •
- Sound Dynamics •
- Systemdek •
- Tandberg •
- Thorens •
- Warfedale/Diamond •
- C.J. Walker •
- And More...

**CAR STEREO**

- ADS •
- Alpine •
- Alphasonik •
- Altec •
- Blaupunkt •
- Clarion/Audia •
- Concord •
- JVC •
- AFS/KRIKET •
- Phillips •
- Sherwood •
- Sony •
- Ungobox •
- And More...

Call or Write **Harold Minto**, Proprietor

performance audio/video

365 South Bayview Ave. (Corner Atlantic Ave.) • Freeport, Long Island, New York 11520

MC Tel. **(516) 378-4389** Retail  
VISA Just 35 min. from Manhattan by car or railroad. Mailorder  
AMEX Showroom Hours: Mon.-Fri. 12 noon to 7 p.m. Sat. 11 a.m. to 6 p.m. Export

# audiophile systems LTD.

6842 Hawthorn Park Drive  
Indianapolis, Indiana 46220

## MULTI COMPONENTS

**ACCURATE AFFORDABLE AUDIOPHILE EQUIPMENT AT GREAT PRICES! WE CONCENTRATE ON COST-EFFECTIVE AUDIOPHILE PRODUCTS AND HOW TO GET THE MOST OUT OF THEM. GREAT SELECTION INCLUDING ACCESSORIES, CABLES, AND RECORD CARE PRODUCTS. SPECIALISTS IN TURNTABLES, TONEARMS, CARTRIDGES. GOOD HONEST ADVICE AVAILABLE. CALL OR WRITE FOR OUR FREE NEWSLETTER. HCM AUDIO, 1600BB MANGROVE, CHICO, CA 95926, (916) 345-1341**

**BOSE SYSTEM 901-III W/STANDS, \$575. Carver M-400, \$225. Hafler DH-110A, \$225. Yamaha CR-840 receiver (60w/ch), \$225. (603) 542-7151, weekends.**

**CLASSÉ DR-2 AMP \$1375, Goldmund Dialogue speakers \$2250/pr. All mint condition. (415) 621-5967 evenings.**

**CONRAD JOHNSON PREMIERE 4 amplifier \$1800; Audio Research D110 amplifier \$795; Revox A-700 recorder \$1400; Sprinx PU-3 arm \$420; Magnaplaner Bass panels \$500 402-779-2589**

**CROWN IC-150, CROWN PL-3, CROWN FM-1, Electro-Voice Sentry III, \$3750. Perfect condition. Revox A77 1/2-track \$750 Akai GXC-570 glass ferrite head \$600. 317-855-5198.**

**ELECTRONIC REPRESENTATIVES NEEDED!! UNLIMITED PROFIT POTENTIAL! LOWEST POSSIBLE PRICES!! OVER 100 BRANDS! AUDIO—VIDEO—CAR STEREO & COMPUTERS! —ELECTRONIC EXPERTS, 1000 ORANGE AVE., WEST HAVEN, CT 06516**

**HARMAN/KARDON, NAKAMICHI, TANDBERG, CROWN, REVOX, HAFLER, CARVER, NAD, DBX, ELECTRO-VOICE AND OTHER QUALITY COMPONENTS. BEST PRICES—PROFESSIONAL CONSULTATION. ALL PRODUCTS COVERED BY USA MANUFACTURER'S WARRANTY. AMERISOUND SALES, INC.; P.O. BOX 24009, JACKSONVILLE, FL 32241. EAST: (904) 262-4000; WEST: (818) 840-0878.**

## LUCKY 16 SYSTEM

(ABOUT \$1650)

Turntable: Rega 3  
Amplifier: Audio Vois Integrated  
Tuner: Adcom GFT-2  
Speakers: Akroyd A-25

## SOUND BY SINGER

165 E. 33rd Street  
New York, NY 10016  
(212) 683-0925

**MOUNTAIN AUDIO TAKES TRADES.** Berning, VSP, Superphon, Randall, Rauna, Goetz. Demo Goetz Speakers at substantial savings. Used equipment. 30 Columbia Ave., Cranford, NJ 07016. 201-272-2217.

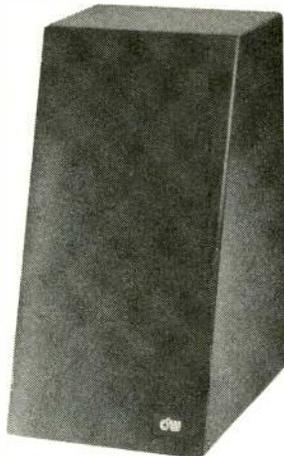
# THE UNSPEAKER

- No artificial sweeteners, artificial flavors or colorants added.
- The First Minimum Periodicity Loudspeaker System.
- Minimum Periodicity is a new measurement and design technique from Dayton Wright Research.

**dw**  
DAYTON  
WRIGHT

THE DAYTON WRIGHT GROUP LIMITED  
97 NewKirk Road North, Richmond Hill, Ont. M4C 3G4 (416) 884-8586

LCM 1



## THE PEOPLE TO LISTEN TO:

knowledge, individual attention plus the names you want most in audio/video.

• ACOUSTAR • ACOUSTIC ELECTRONICS • AUDIO RESEARCH • B&D • DENON  
• Boston Acoustics • ADS • COUNTERPOINT • CARVER • DUNTECH • HAFLER  
• Discrete Technology • KYOCERA • JENSEN VIDEO • PS AUDIO • Alphason  
• Koetsu • Dahlquist • GRADO • LINN SONDEK • PROAC • SONOGRAPHE  
• REGA • Signet • THIEL • Naim • Koetsu • Grace

# CSA

## AUDIO/VIDEO

201/744-0600  
upper montclair, n.j.

AUTHORIZED DEALER

## MULTI COMPONENTS

**MCINTOSH MC-75'S \$1,000-\$900 several pair, MC-275 \$1,000, MI-3 audioscope \$700, MC-240 \$425, MC-225 \$350, MR-77 mint \$450, MI-75 \$500, MR-71 w/cabinet \$350, MR-67 w/cabinet \$225, 1900 w/cabinet \$600, MX-110 w/cabinet \$500-\$400 several. Onkyo TX35 sealed \$200, TX-25 \$150. Kenwood KC-6060A \$200, Pioneer SD1100 \$600. Marantz 7T preamp \$165. 2 pair KLH-9 electrostatics w/original cartons \$850 each pair. KLH 1 absolutely pristine w/original cartons \$1,000. Braun PS-500 table \$135. Hitachi DA-1000 \$400. Sony Ferrichrome elcaset tape \$11 Teac AL-700 elcaset machines factory sealed originally \$1,100 now \$299, mint Sony EL-7 \$299, EL-4 mint \$139. RX10 DBX for elcaset factory sealed \$225, 234 Syncast new \$750, demo \$700, MB-20 meter bridge \$100. Mitsubishi LT-30 sealed \$370, DA-M30 meter (demo) \$150, DA-F30 (demo) \$250, DA-R8 (demo) \$150, mini system: MT-04, MA-04, MF-04, MP-04 \$666. Acoustic Research 2AX \$125. Klipsch Cornwalls unfinished \$550. Advent 500 SoundSpace delay \$375. Lux L-110 integrated amp \$550. Sansui QSD-1 \$500. EV 7445 quad encoder \$500. Revox B77 \$825, B790 turntable \$450. Phase Linear 3000MK2 preamp \$175. Pioneer RTU22 perfect 4 Channel high speed \$1,500 including half track block, laser video players: LD700 \$600 demo, VP1000 \$300, new video discs 40-60% off. DBX 224 \$225, 400 \$200. Burwen TNE7000 \$275. Many Scott, Fisher, Dual, tubed preamps, power-amps, tuners, tables, receivers must liquidate. Ortofon STM72 transformer \$25. 1,000 prerecorded r/r \$6-7 most factory sealed, 1/2 track \$20. 5,000 original service manuals. Want collections pre-recorded r/r, Pioneer TAU-11, JT-2044T, McIntosh, Marantz (tube) units, Quad r/r tapes, Sansui QS units, Sony, Teac, Dolby units many oddball pieces, accessories. I'm looking for high quality units to sell on consignment using database with thousands of customers. Everything money back guaranty. Shipping worldwide Martin Gasman 779 Worcester Street Wellesley Mass. 02181 phone: 617-CEL-TICS, 617-235-8427.**

**MCINTOSH SOLID STATE COMPONENTS.** Bought, Sold, and Traded. Also wanted Mac 3500 or MI 350 for personal use. 313-229-5191 Aft. 7PM EST.

**MCINTOSH 60W. TUBE AMPS (PR.)** mint, Acrosound UL II 60w. tube amps pr./nice. Meridian CD player (latest) new in box, perfect mint. Marantz 8B stereo tube amp, superb collection of high-end tubes, etc., other Marantz units. 406-222-7404 late eves., early morns, all reas., negotiable.

**SANSUI AVG 99X AMP; TUD 99X tuner.** Inf Slope speakers. 215-567-4626.

## KIMBER KABLE

### HIGH PERFORMANCE SPEAKER WIRE

*Strong in the West, headin' East.*

### ASK YOUR DEALER

Manufactured by:

RKB Industrial, Inc.  
2058 Harrison Blvd.  
Ogden, Utah 84401  
(801) 621-5530

## In New England...



The knowledge, creativity and dependability you expect from a dealer who represents these and other major manufacturers.

Alpha	Oracle
Astatic	Plexus
Audio-Interface	Robertson
Audio Pro	Signet
Audioquest	Snell
Belles Research	Sonographe
Boston Acoustics	SOTA
Bryston	Souther
Carver	Spica
Counterpoint	Stax
Denon	Sumiko
Dynavector	Talisman
ESB	Tandberg
Grace	Threshold
Keith Monks	Vandersteen
Magnepan	VPI
Martin Logan	and more...
Mission	<b>VIDEO</b>
Mod Squad	NEC
Morel	Pioneer
Niles	Proton

5 listening rooms... New England's largest audiophile record dealer... Keith Monks record cleaning... Custom cabinetry... In-store service... All shipments pre-paid and insured in the continental U.S.  
MC/VISA/AMEX/ Take 5 Charge

# TAKE 5 AUDIO

105 Whitney Ave., New Haven, CT 06510  
(203) 777-1750  
Mon., Tue., Wed., Fri. 10-6, Thurs. 10-8, Sat. 10-5

Luxman  
Harmon Kardon  
Tandberg  
Boston Acoustics  
Audio Control  
Sherwood  
Hitachi  
Denon  
Revox  
Onkyo  
Ortofon  
Hafler  
Thorens

ADS  
AIWA  
Grace  
M&K  
B&O  
SME  
& Many More

**Get It Free!**

We Deliver FREE  
Anywhere in the  
Continental USA!

**the SOUND Approach**

6067 Jericho Tpke., Commack, NY 11725  
Charge it...Call 516-499-7680

### MULTI COMPONENTS

**NEW AR TURNTABLE WITH NEW** Dynavector 23-RS \$500, Carver C-9 \$175, Sansui CA-f1 preamp \$200, Sansui BA-f1 power amp \$375, Sansui TU-57 tuner \$135, Altec Lansing 208-B loudspeakers \$100. Speaker components call for prices. E.S. time (803) 248-4316, (803) 248-2672.

**QUAD ESL-63 ELECTROSTATICS, QUAD 405-2, 34, FM-4.** Brand new, perfect. Cost \$4200. Sacrifice: \$3500/best offer. 702-348-6154 (Reno)

**SUMIKO MDC-800 TONEARM, TANDBERG 3001A TUNER, McMod Oracle power supply, Spica TC-50 speakers.** (Please call for information on custom stands that are included.) Call Chris (313) 824-1558.

### MULTI COMPONENTS

#### MORE WITH FOUR SYSTEM (UNDER \$4300)

Turntable: Linn Sondek Lp-12  
Tonearm: Linn Basik LV-X-Plus  
Cartridge: Talisman 1A  
Tuner: Adcom GFT1-A  
Preamp: Counterpoint SA-7  
Amplifier: Robertson 4010  
Speakers: Fuselier 5

#### SOUND BY SINGER

165 E. 33rd Street  
New York, NY 10016  
(212) 683-0925

AD

**THE POUND HAS FALLEN.** Due to the strength of the dollar we can offer British Audio gear at substantial discounts over current retail. Sample prices: Linn Sondek turntable, \$678.; Linn Itok tonearm, \$430.; Rega RB300 tonearm, \$147.50; Meridian MCD, \$625.; Celestion SL-600, \$1,080. Prices subject to periodic change due to currency fluctuations. Send SASE for full price and information sheet. Phone operated only Monday and Wednesday 6:00 p.m. to 9:00 p.m., Saturday 3:00 p.m. to 6:00 p.m. Central time. **Sterling Audio Imports, Inc.**, 121 Deckbar Avenue, New Orleans, Louisiana 70121; (504) 832-1402.

**WE WANT TO BUY YOUR USED STEREO COMPONENTS! AUDIO EXCHANGE—The World's Leading Stereo Trader Since 1951—PAYS TOP DOLLAR!** Call our Buying Hot Line—(212) 777-1715—TODAY!

### MULTI COMPONENTS

#### START WITH SEPARATES SYSTEM 1 (UNDER \$2700)

Turntable: Rega Planar 3  
Cartridge: Adcom XC/LT II  
Preamp: Adcom GFP-1A  
Tuner: Adcom GFT1-A  
Amplifier: Adcom GFA-2  
Speakers: Snell Type E II

#### SOUND BY SINGER

165 E. 33rd Street  
New York, NY 10016  
(212) 683-0925

AD

**USED EQUIPMENT:** ARC D-120R \$995, ARC D-52B \$550, Acoustat Monitor III/servos \$1000, Acoustat III \$750, Acoustat III m \$1150, Tympani III A's \$900, JSE 1's \$600, Conrad Johnson Premier III \$1850, CJ Premier IV \$1995, Mission 770's \$550, CJ MV45A \$495, Win-Labs turntable \$1500, Counterpoint SA-5 \$950, Counterpoint SA-6 \$250, Ohm Walsh 4's \$995, VSP Straight wire \$495, DCM Time Windows \$465, Dahlquist subwoofer \$165, ARC EC-4 \$250, ARC EC-21 \$450, and more. **AUDIO DOCTOR**, 417-345-7245 anytime.

**21ST CENTURY AUDIO LTD** For all of your high end audio needs at reasonable prices. Top brands such as Argent, Belles, C-J, DCM, Eagle, Grado, Pentagram, Perreux, Pyramid, SOTA, Spica, Stax, VPI and much more. Plus Computer and video items too many to mention. Call or write to 5041-Rising Sun Ave, Phila., Pa. 19120. (215) 324-4457. MC, VISA, Diners Club, & Carte Blanche welcomed.

### TAPE RECORDERS

**AMERICA'S LARGEST dealers in HIGH END USED stereo.** We BUY by PHONE. **STEREO EXCHANGE** 687A Broadway, between 3rd and 4th St. (opposite Tower Records) NYC 10012. (212) 505-1111 and (800) 833-0071.

**HARMAN/KARDON, NAKAMICHI, TANDBERG, CROWN, REVOX, HAFLER, CARVER, NAD, DBX, ELECTRO-VOICE AND OTHER QUALITY COMPONENTS. BEST PRICES—PROFESSIONAL CONSULTATION. ALL PRODUCTS COVERED BY USA MANUFACTURER'S WARRANTY.** AMERISOUND SALES, INC.; P.O. BOX 24009, JACKSONVILLE, FL 32241. EAST: (904) 262-4000; WEST: (818) 840-0878.

### CARTRIDGES/TONEARMS



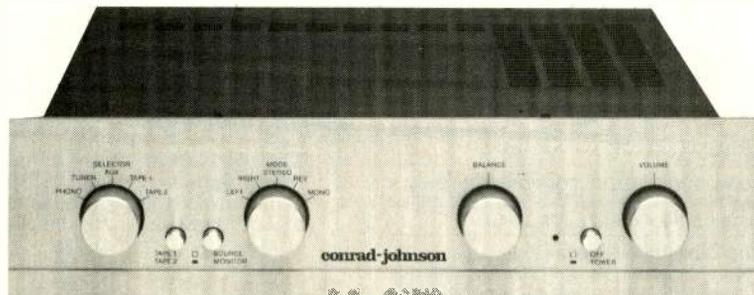
**SOUTHERN ENGINEERING CORPORATION**  
429 A York Street, Canton, Massachusetts 02021

**AWAITING YOUR VERITAS -AUDITION-**  
**THE NEW INTERNATIONAL SOUTHER-SUCHY INTEGRATED M/C CARTRIDGE/TONEARM**

#### HELIUS DESIGNS

Imported by Terpsichore Imports, Chester Mall, Chester, N.J., 201-674-4000. Manufacturer's reps being sought. Current retail "Orion" \$900, "Aureus" \$500, "Scorpio II" \$285. Hand-built British tonearms with tetrahedral ball race bearings. Simply nothing better.

**KOETSU** announces new models and a new distributor for the U.S. The Black GOLD LINE, the ROSEWOOD, the ROSEWOOD SIGNATURE, and the ONYX SIGNATURE are now available for audition. **SOLE U.S. agent: ASSEMBLAGE**, P.O. Box 815, Branford, CT 06405 or call (203) 488-8099.



Continuing a tradition of excellence, the conrad-johnson PV5 preamplifier embodies the current state of art and technology in audio circuit design. In concert with its companion amplifier, the MV75, it is capable of breathtaking reproduction of live musical experiences.

Information on our broad range of vacuum tube components is available on request.

**conrad-johnson design, inc.**  
**1474 Pathfinder La., McLean, VA 22101**

## CARTRIDGES/TONEARMS

**SYRINX AUDIO LIMITED** announces the new PU-3 MK II featuring an all-new main bearing assembly, revised cueing mechanism and available in a choice of output cable configurations. **SOLE U.S. AGENT: ASSEMBLAGE, P.O. Box 815, Branford, CT 06405** or call (203) 488-8099.

## TUBE EQUIPMENT

**ELECTRON TUBE SALES 6DJ8 6AN8A 6CA7 6L6GC 6550A EL34 KT77 KT88 EF86** Same day shipping from stock Industrial Tube Distributors since 1947. 4000 Types in stock. A R S Electronics, 7110 DeCelis Place, Van Nuys, Ca. 91406, (818) 997-6200

**EXCLUSIVE US DISTRIBUTION FOR SIEMENS.** Also Telefunken, GE, Amperex, Gold Lion & more. New or high grade tubes can be your cheapest sonic improvement. Consultant/supplier to manufacturers/dealers/clubs/individuals. Call for price & availability. Douglas Kent Smith Audio Consulting, 1792 Perrysville Ave., Pittsburgh, PA 15212 (412) 322-1693

**FUTTERMAN OTL AMPLIFIERS**—The ultimate tube amplifier with no reservations. No output transformer, no transformer coloration. The purest sound we have yet experienced. LANDES AUDIO, Rt. 24, Chester Mall, Chester, N.J. 07930 201-879-6889.

**MOSCODE TUBE AMPLIFIERS**—A synthesis of tubes and MOSFETS in order to create cost effective tube electronics. One of the true marvels of this year. Tube liquidity with better than transistor punch in the bass. 150 per channel with 8db of headroom!!! Only \$900. 300 per channel with 8db of headroom!!! Only \$1600. LANDES AUDIO, Rt. 24, Chester Mall, Chester, N.J. 07930 201-879-6889

**NEW TUBES, AT 70-90% OFF** manufacturer's list price. Send for free list of 1000 types. Antique Electronic Supply, 1725A W. University, Tempe, AZ 85281.

**WANTED: MCINTOSH, MARANTZ, ARC, BERNING, QUAD, WESTERN ELECTRIC, KRELL, LEVINSON, LEAK, TANNON, JBL, ETC. (SOLID STATE & TUBE).** 713-7284343. MAURY CORB, 11122 ATWELL, HOUSTON, TEXAS 77096

## PARTS/ACCESSORIES

**ELECTRONIC CROSSOVERS:** 6, 12, 18dB/octave. Kits from \$116. Transient-Perfect Crossover, \$175. Subsonic Filters, Bandpass Filters from \$25. Free Folder w/reviews. ACE AUDIO CO., 532-5th Street, East Northport, NY 11731-2399. (516) 757-8990.

**GOLD LION, "INDIA," TELEFUNKEN TUBES.** Cramolin, fidelity research, Hartley, Kimber Kable, PS Audio, Precision Fidelity, Sheffield, SONEK, Superphon, VPI. VECTOR ELECTRONICS, 1653 SE Marion, Portland, OR 97202. VISA, MASTERCARD, AMERICAN EXPRESS. (503) 233-2603.

## DIAL Q FOR AUDIO!

COMPETITIVE. LOW PRICES ON NEW AUDIO & VIDEO PRODUCTS.

**617-547-2727**



BOB HEENAN

BUY SELL TRADE CONSIGN  
BROKER RENTAL NEW & USED

SONY	SOUND CONCEPTS	MONSTER CABLE
PIONEER	DESKTOP	STAX
TECHNICS	INNOTECH	SPENDOR
AIR	VANMIRE WIRE	SOUTHER
DUAL	KSEKI	DYNAVECTOR
THORENS	KLYNE	APARTURE
MAGNAVOX	SUPRA	CARTALIGN
PHILIPS	SUMIKO	LAST
HAFNER	CRAMOLIN	PREMIER
PS AUDIO	NAGAOYA	GRADO
KRELL	LEVITATION	GRICE
DBX	JAVIS	OB SYSTEMS
PIRAMID	ACOLUSTAT	SONEK
FRIED	AUDIOSOURCE	EUPHONIC AUDIO
DOTA	DENON	ADCOM

COMPACT DISCS	EQUALIZERS	TAPE DECKS
COMPACT DISC PLAYERS	CONSULTATIONS	PORTABLE STEREOS
RECEIVERS	CUSTOM INSTALLATIONS	INTERCONNECT CABLES
BETA HI-FI/VHS HI-FI	APPRAISALS	RECORD CLEANING PRODUCTS
LASER DISC PLAYERS	EXPORT/IMPORT	AUDIOPHILE MAGAZINES
SPEAKERS	BROKERAGE	SPEAKER WIRE
AMPLIFIERS	CONSIGNMENT	NOISE REDUCTION SYSTEMS

THE FINEST SELECTION OF NEW/USED EQUIPMENT IN AMERICA

95 VASSAR ST.  
CAMBRIDGE, MA  
02139



MON FRI 10-7  
SATURDAY 10-5

## PARTS/ACCESSORIES

**LOW DCR AIR CORE INDUCTORS ARE OUR ONLY PRODUCT!** Wide selection of coils wound with twelve and sixteen gauge wire! Custom orders welcome! Lowest prices! Rush C.O.D. orders accommodated! Free Information! Wilsonics, 2111-M 30th Street, Suite 1138, Boulder, Colorado 80301, (303) 530-1067 evenings

**PETERSON PRESENTS EMERALD™**—a unique, air-dielectric, advanced-technology interconnect and Tonearm Cable System of incomparable transparency and musicality. Peterson interconnects have been setting performance and quality standards since 1979, and EMERALD™ continues that tradition. Find out how our experience and established competence can stunningly and cost-effectively improve your music system. Contact us for complete product information, available dealers, and no-risk trial terms. PETERSON AUDIO, Dept. AM, 13665 SW Garrett Court, Tigard, OR 97223. (503) 639-2401. Dealer inquiries invited.

**THE BEST ESOTERIC CABLE?** We sell Randall Research, Straight Wire and Discrete Technology. We have studied each cable and know the differences. Call for details. Audio Advisor, Inc. 616-451-3868. Box 6202, Grand Rapids, MI 49506.

## CD PLAYERS

**HARMAN/KARDON, NAKAMICHI, TANDBERG, CROWN, REVOX, HAFNER, CARVER, NAD, DBX, ELECTRO-VOICE AND OTHER QUALITY COMPONENTS. BEST PRICES—PROFESSIONAL CONSULTATION. ALL PRODUCTS COVERED BY USA MANUFACTURER'S WARRANTY. AMERISOUND SALES, INC.; P.O. BOX 24009, JACKSONVILLE, FL 32241. EAST: (904) 262-4000; WEST: (818) 840-0878.**

**LUXMAN DX-103, CD PLAYER,** employing Lux's Duo-Beta circuitry for a harmonious analog section. Frank Jr. (518) 563-8105.

## BLANK TAPE

**AMPEX PROFESSIONAL SERIES AUDIO TAPE SALE.** High quality open reel 1800' or 2400' on 7" reels, used once. Case of 40, \$45.00. 10 1/2 X 3600' and Cassettes. MC/Visa. Valtech Electronics, Box 6A, Richboro, PA 18954 (215) 322-4866.



# Even an APT can be improved.

Reflecting APT's continuing commitment to our customers and the lasting value of our products, we are pleased to announce update modifications on both the classic HP pre-amplifier and A1 power amplifier.

These modifications represent a modest investment in retaining the highest standards of performance at a small fraction of the original cost of your equipment. At \$75 for the A1 and \$99 for the HP, an extended one year warranty is included. A moving coil headamp can be added to the HP for an additional \$135.

A p t

APT Corporation

176 Walker Street  
Lowell, MA 01854  
617-458-7675

T.M.

# DYNAMIC ACUSTIC

## Dynam™ separates

OUR CONCERN IS A SOUND COMPANY

**HIGH DEFINITION COMPONENT AUTO SPEAKER SYSTEMS**  
Designed specifically for car stereo! Very high efficiency and high power handling, aluminum voice coils and advanced polypropylene cone materials in 4" through 8" models with a full complement of precisely calculated crossover networks! Die-cast mini speakers fully compatible with all our woofers! The most advanced, innovative, and most exciting car stereo program available! Contact us now!

**P.O. BOX 646, SAN RAMON, CA 94583 (415) 820-5765**

## BLANK TAPE

TAPE WORLD		TOLL FREE 1-800-248-8000	
TKR	MAXELL	TKR	MAXELL
MA-90 6.00	MA-90 4.50	TKR 1120L1750	5.20
MA-80 4.19	XLI90 2.40	TKR 1120L1750G	6.00
SAL-90 2.68	XLI90 1.80	TKR 1120L1750	5.20
AD-90 2.56	XLI90 1.75	TKR 1120L1750 PRO	10.40
SA-90 1.75	UD90 1.70	TKR 1120L1750G	10.40
SA-90 1.60	UD90 1.60	TKR 1120L1750G	10.40
AD-90 1.81	L90 1.15	TKR 1120L1750G	10.40
AD-90 1.48	L90 1.05	TKR 1120L1750G	10.40
D-90 1.00	KL90B08 0.49	TKR 1120L1750G	10.40
D-90 99	UD2980 4.80	TKR 1120L1750G	10.40

WE WILL BEAT ANY COMPETITOR'S PRICE OF THE TOTAL ORDER INCLUDING ALL SHIPPING AND HANDLING CHARGES BY 1%.

VISA, MC No extra charge. COD add \$3.95 PA add sales tax. Schedule and Dept. on PD. Orders shipped in 48 hours. Give us a try. 30-FX, \$20-\$50.

220 Spring St. Box 361 Butler, PA 16001 412-283-8821

**SAVE MONEY AND GET MAXIMUM FIDELITY** stereo copying. Record using professional duplicator cassettes. Same top grade tape you pay more than double for in regular consumer packaging. Results guaranteed or your money back. Economy packed without labels or outer plastic boxes. White bodies, concentrically balanced hubs, rollers. Five screws. SLX 30Hz to 15KHz C60 35¢, C90 46¢. XDS 20Hz to 22KHz C60 48¢, C90 64¢. Use Visa, Mastercharge, American Express or check. Ten year guarantee or replacement free. Add freight, \$2 up to \$40 purchase, 5% on orders over \$40. Field Magnetics, Inc. 5865 SW21 Street, Dept. 105, Hollywood Florida 33023. 305 962-0707.

## PRERECORDED TAPE

**DIRECT-TO-TAPE RECORDINGS:** REAL TIME DUPLICATED REELS (2/4 track, Dolby B/C, TypeX), CASSETTES, PCM DIGITAL CASSETTES, and BETA HIFI AUDIO from MASTER TAPES. We also sell CD's. SEND \$1.00 for CATALOG and NEWSLETTER. Direct-to-Tape Recording, 14-R Station Avenue, Haddon Heights, NJ 08035.

## COMPACT DISCS

**CD/MATE THE LATEST IN COMPACT DISC** accessories allows portability plus safe, durable protection for six compact discs. Only one inch thick, CD/MATE is made of durable nylon w/velor lining and velcro® closure. CD/MATE's light weight, compact design eliminates the need for bulky plastic boxes. Available for only \$12.95 plus \$2. shipping and handling in black, red and blue from Shore Brothers Ltd., Box A 2323 Corinth Ave., Los Angeles, CA 90064.

**ROGER'S FRIENDS**

Just love his prices on:

**COMPACT DISC PLAYERS**  
**BETA HIFI • VHS HIFI • VIDEO**  
**AUDIO • TELEVISION • TAPE**  
**and ACCESSORIES!!!**

**1-800-225-8656**

AIWA • AKAI • BLAUPUNKT • COMMODORE •  
 CODE-A-PHONE • DISCWASHER • HITACHI •  
 JENSEN • JVC • MARANTZ • NUMARK • CANON  
 PANASONIC • **CALL FOR QUOTES!** JBL • QUASAR  
 SHERWOOD • RCA • SANYO  
 RECOTON • THORENS • VIDICRAFT • ZENITH •  
 SONY • TEAC • TECHNICS • TOSHIBA • SHARP

**CALL ROGER!**

**WORLD WIDE ELECTRONICS DISTRIBUTORS**  
 240 Ivory Street, Braintree, MA 02184

**MAIL ORDER:** for rapid service, send certified check or money order. All prices reflect cash discount. MC/VISA add 3% for handling. PERSONAL CHECKS REQUIRE APPROX 14 DAYS FOR CLEARING. Add \$7 shipping & handling charge for orders under \$100. 7% for orders over \$100. No COD. Mass residents add 5% sales tax.

**MASS ORDERS (617) 843-7350**

## COMPACT DISCS



### New England Compact Disc Headquarters

Acoustat • AR • Boston Acoustics • B&W • Carver  
 Celestion • Demon • Dual • Fried • Hafler  
 Harmon/Leonard • Onkyo Integra • Ortofon  
 Pyramid • Shure • Sony ES • Stanton • Thorens  
**Sound & Music**  
 92 King St., Northampton, MA 01354-9547

**AUDIO DISCOUNTS OFFERS A LARGE** selection of CD players at discount prices. For more information Mon. thru Sat. please call 301-593-8833. Audio Discounts, 1026 McConeny Avenue, Silver Spring, MD 20901. We honor Visa & M/C. **AD**

### COMPACT DIGITAL DISCS AND PLAYERS!

In stock! Fast, FREE shipping. Also: Mitsubishi, Klipsch, Nakamichi, Telarc, more (see our Hafler ad). **READ BROTHERS STEREO**, 593 King Street, Charleston, South Carolina 29403. (803) 723-7276. **AD**

## COMPACT DISCS AND ACCESSORIES

7 DAYS A WEEK — FREE CATALOG  
 CALL TOLL FREE  
**1-800-ALL DISC**  
 IN CONN. CALL 1-452-0203  
**ALL DISC MUSIC, INC.**  
 133 WHEELER RD. MONROE, CT 06468

**GET ORGANIZED.** Beautiful solid oak CD storage system. Holds 75 CD's. Three shelves. Handsome finish. 11" wide, 15" high. Unconditional guarantee. High quality without the high price. Only \$19.95 complete or send for brochure. Dealer inquiries invited. The Oak People, 5503 17th N.W. B205-A1, Seattle, WA 98107.

## JAZZ CDS

**RECORDED TOTALLY DIGITAL.** Free catalog DMP, Box 2317, NY, NY 10185.

## Ethel Enterprises

**CD'S EXCLUSIVELY**  
*Over 1100 Classical, Opera & Jazz Titles in stock.*

*Detailed Catalog \$1*

P.O. Box 3301, Dept. A  
 Falls Church, VA 22043

## Electrified Discounters

**203-937-0106**

**Lowest Possible Prices!!**

**MOST MAJOR AUDIO BRANDS!!**

**CD'S — HI-END AUDIO — CAR PRODUCT**

**COMPUTERS — (HARDWARE-SOFTWARE) — VIDEO**

**FULL WARRANTY — FAST DELIVERY**

**SEND FOR OUR CATALOGS!!**



996 ORANGE AVE.  
 WEST HAVEN, CT. 06516



## COMPACT DISCS

**IMPORT, AUDIOPHILE, and USED** compact discs. Many hard to find Japanese, European, and small-label CD's in stock at discount prices. Ask for free newsletter, or send \$2 for complete catalog with over 3,000 titles. **SUPER-SOUND**, P.O. BOX 7082-A, Forest Park IL 60130. Phone (312) 366-1300.

## AUDIOPHILE RECORDS

- **ALL THE AUDIOPHILE LABELS:** Sheffield, Reference, Proprius, Meridian etc.
- We will **BEAT** any catalog price by \$1 per LP.
- **FRESH AIRE'S** \$12.00 each. Thousands of Japanese import bargains.

Send \$1.00 for new 1985 catalog to: **SUPERSOUND**, P.O. BOX 7082-X, Forest Park IL. 60130. Phone (312) 366-1300 12-5 pm.

**DISCOUNTED PRICES** on all Audiophile recordings: Featuring Mobile, Reference, Sheffield, Wilson, plus CD's, Last cleaners, VPI and more at **HUGE** savings. **FREE** catalog: **CLASS-A-UNDERGROUND**, 35 North Greenbush Road, West Nyack, NY, 10994 or call (914) 638-4089 (10-4 EST). **QUICK** delivery, Visa/Mastercard.

**MOBILE FIDELITY:** Rare, out-of-print unopened copies UHQ: Beatles—Sgt. Pepper's, Supertramp—Crime of the Century, more. Offers (919) 584-3509.

### OUT-OF-PRINT MOBILE FIDELITY

Former **MFSL** employee selling factory sealed **SINGLE** discs, **DOUBLE** discs, **UHQ'S** and **COLLECTIONS**. Call **BOB (818) 845-9236**. Nights PST, Weekends.

### REFERENCE RECORDINGS

The long wait is over! It's been thirty years since Mercury Records, in the golden days of Living Presence mono, introduced to an astonished audio community Respighi's orchestral spectacular, "CHURCH WINDOWS." Now at last this monumental work for large orchestra, organ and tam-tam has been given the Prof. Johnson super-analogue audiophile treatment on RR-15. Keith Clark conducts The Pacific Symphony in this first recording to do the work full sonic and musical justice. Also new, on RR-16, the CHICAGO PRO MUSICA, principal players from the renowned Chicago Symphony Orchestra, bring you William Walton's whimsical music from "FACADE"—the first recording of an instrumental suite in the composer's original scoring, along with Strauss' "Till Eulenspiegel" in a chamber version, and more. The Chicago recordings were made in the magical acoustics of Medinah Temple, and, we think, are Keith Johnson's best work to date. RR-15 and RR-16 are 45 rpm premium-quality pressings in deluxe, double-fold jackets, available now at your local RR dealer or directly from us at \$16.98 each, postpaid in US, Visa/MC welcome. Reference Recordings, Box 77225X, San Francisco, CA 94107. Call free: 800-621-0854 ext. 107, or 408-745-7159. Dealer inquiries invited!

**SHEFFIELD LAB, LINCOLN MAYORGA** "Missing Line" and Dave Crusin "Discovered again." Factory sealed \$450 each. Craig 303-530-1067, Eves.

## RECORDS

**FRANK SINATRA CONDUCTS THE MUSIC OF ALEC WILDER.** EXTREMELY RARE INSTRUMENTAL COLUMBIA DISC. MINT CONDITION. \$5000. 601-649-8369.

**PROTECT YOUR LPS.** Poly sleeves 13¢. Polyline paper 16¢. Cardboard jackets 40¢. Postage \$2.50. We buy and sell like new lp's, prerecorded reel tapes and cassettes. Catalog \$3.00. House of Records, Box 323, Hillburn, NY 10931.

**RECORD CLEANER—A+** Generic Anti-Static Record Cleaner Fluid offered by a major supplier of record cleaner products. Guaranteed. 8 oz. bottle only \$4.95 Post Paid. D-MAG Inc., 6746 White Dr., West Palm Beach, Fla 33407

## VIDEO EQUIPMENT

**CONVERT OVERSEAS VIDEOTAPES, PAL, SECAM.** to American system, vice versa. 110-220 Audio, Video-recorders, Televisions, discounted. Apple Audio, 74-18, 37th Avenue, Jacksonheights, New York. (718) 507-5800.

## WANTED TO BUY

AMERICA'S LARGEST dealers in HIGH END USED stereo. We BUY by PHONE. STEREO EXCHANGE 687A Broadway, between 3rd and 4th St. (opposite Tower Records) NYC 10012. (212) 505-1111 and (800) 833-0071.

MCINTOSH, MARANTZ, QUAD, TUBE AMPS. Garrard 301, Thorens TD-124. Old Tannoy/Jensen/Altec/JBL Speakers & Raw Drivers. Hartsfields, Patricians. Western Electric Equipment. Tel: 818/576-2642. David Yo, POBx 832, Monterey Park, Ca. 91754.

PYRAMID SPEAKER. Need Metronow 8W bass module only. Prefer new. 212-685-4460 Business hours.

SEQUERRA FM SCHEMATICS/ALIGNMENT procedures, will pay up to \$100 for complete set; Pioneer SD1000, SD1100, (818) 709-1662.

WANTED TO BUY: NAKAMICHI 620 AMP and 610 preamp, working condition. Call James collect H-919-847-8566, W-919-781-4139.

## SERVICES

### 72 Hour VCR & Stereo REPAIR SERVICE

Yes—72 hr. quick service on amps, receivers, cassette decks, & VCRs, 100 day complete warranty. Call 1-800-645-5252 for instructions and shipping.

#### ALPHA-TECH ELECTRONICS

1411 S. Big Bend • St. Louis, MO 63117

AUDIO PULSE SERVICE. Factory trained technicians. Write us about Model One update kits. White Labs, 10528 Lower Azusa Rd., Suite 192A, El Monte, CA 91731. (818) 446-5346.

AUDIO PULSE SPECIALISTS. Repairs—Modifications—Updates—Sales. WALT'S AUDIO SERVICE, 111 East Rialto Ave., Rialto, Calif. 92376. (714) 875-0776.

## COMPUTER SOFTWARE

IBM PC/XT PROGRAM TO TRACK RECORDS/TAPES. Store up to 32,000 records. Requires 128K or more Memory, DOS 2.10, BASICA. \$79.95. Information: MICROWARE ASSOCIATES-A, 763 Taft Drive, Suite G, Arlington, Texas 76011

## MISCELLANEOUS

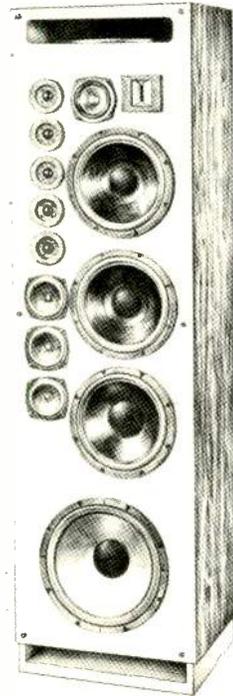
ABARGAIN: Stax Prof LAMBDA/Amp \$519, Prof SRM1/2 \$375, SRM1/2 \$285, Sigma \$199. LAMBDA \$162, SRX/3 \$129, SRD7 \$68, SRE15 \$25; Grace F9E \$99, F9E Ruby \$155, F9E Stylus \$57. Ruby Stylus \$109, 707 II (B) \$119, 747 \$135; Accuphase AC-2 \$255, AC3 \$229; Linn ITTOK \$385; Technics Stylus Gauge \$49, EPA250 \$269, EPA500 \$275, 205CMK4 \$159, EPC100CMK4 \$285; Denon 103C \$125, 103D \$165, DL303 \$199, Demo DL-103D \$99, ELEC Styl. CLNR \$38; Dynavector 23RS (MR) \$165, 17DS \$345, 17DII \$159, 20BII \$155, 10X \$85; Koetsu Black \$445; FR64FX \$299, 64S \$385, FR1MK3F \$115; Orsonic AV101B \$21; CD Disc \$9.95 pp; Hitachi Intercon 3' \$30, 4 1/2' \$40; all unused, full mfg warranty & stylus included; Box 6312 L.I.C., NY 11106 (212) 619-2888 day, (718) 784-2939 eve, (305) 487-1048 all day.

SONY PCM UNITS: PCMF1 \$1599; PCM501ES \$649. Catalog of over 50 PCM recordings (Beta/VHS) \$1.00. Send check/money order: DIRECT-TO-TAPE RECORDING COMPANY, 14 Station, Haddon Heights, NJ 08035 609-547-6890.

AUDIO, VIDEO AND AUTO-SOUND AT UNHEARD-OF-PRICES!! Now you can own the finest in Audio, Video and Auto sound including the esoterics at incredible prices. DIRECT SIGHT AND SOUND (the expanded Direct Sound Marketing) provides sensible expert advice, complete service facilities and factory-fresh components on an in-stock basis. Call (404) 233-9500 or send for our FREE catalog to DIRECT SIGHT AND SOUND, 3095 Bolling Way, Dept. #A Atlanta, Georgia 30305 MC/VISA/AMEX accepted.

HARMAN/KARDON, NAKAMICHI, TANDBERG, CROWN, REVOX, HAFNER, CARVER, NAD, DBX, ELECTRO-VOICE AND OTHER QUALITY COMPONENTS. BEST PRICES—PROFESSIONAL CONSULTATION. ALL PRODUCTS COVERED BY USA MANUFACTURER'S WARRANTY. AMERISOUND SALES, INC.; P.O. BOX 24009, JACKSONVILLE, FL 32241. EAST: (904) 262-4000; WEST: (818) 840-0878.

## LOWEST LOUDSPEAKER DISTORTION



The VMPS Super Tower IIa/R \$599ea black kit, \$1199ea oak or walnut kit, \$1499ea black as sem. \$1699ea assem. in finishes. 75 x 21 1/2 x 17. HxWxD. 300 lbs.

Five years after its introduction, the VMPS Super Tower IIa/R still stands alone as the high fidelity speaker system with the lowest total harmonic distortion (no more than 0.25% 20Hz-30kHz/1W drive), widest bandwidth (17Hz-50kHz, -3dB), and greatest dynamic range (100dB/1W/1m sensitivity, 132dB/1m max undistorted output) available. At its price—unchanged since 1980—and with performance improved in every area, the STIIa/R remains an outstanding bargain in today's inflated audio marketplace.

The latest addition to its roster of high performance features is the QSO Holosonic image enhancement circuitry, which generates a completely boxless, dramatically three-dimensional stereo image true to the phase and ambient information in the signal source. QSO Holosonics are also available in the VMPS Tower II (\$419ea kit, \$599ea assem), Super Tower/R (\$679ea kit, \$969ea assem), and Widerange Ribbon (\$5995-\$7500) speaker systems. And don't forget the floor-standing MiniTower II (\$309ea kit, \$439ea assem), our famous Subwoofer (\$250ea kit, \$375ea assem), and John Curl-designed Model 2 Electronic Crossover (\$449) Kits are supplied with fully assembled cabinets and all prices include free shipping in USA. Write for brochures and test reports, and watch for upcoming reviews of QSO Holosonics in the major audio publications.

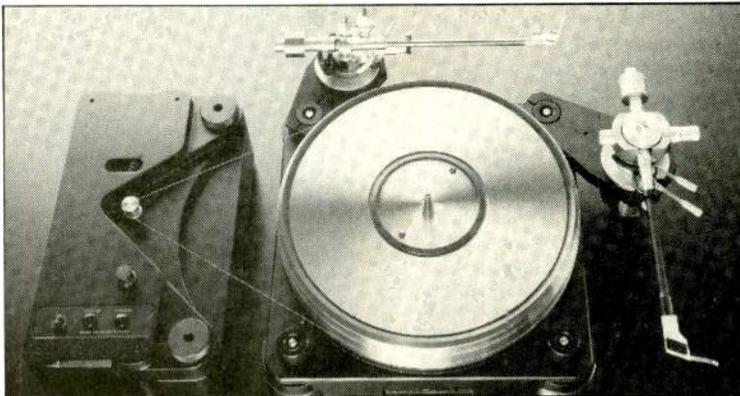
## VMPS AUDIO PRODUCTS

div. Itone Audio  
1016 Contra Costa Dr El Cerrito CA 94530  
(415) 526-7084

Hear VMPS at: The Listening Studio, Boston; C&S Audio, Colorado Springs, Co; Stereo Unlimited, San Diego Ca; Efficient Stereo, Torrance Ca; Stereotown, Brookings SD; Missoula Trumpet Sales, Missoula Mt; Walker Audio, San Angelo Tx; The Long Ear, Big Bear Lake Ca; Itone Audio, El Cerrito Ca; Sounds Unique, San Jose Ca; Eclectic Audio, Livermore Ca; Arthur Morgan (rep), Altamonte Springs Fl; Praise Audio, Powder Springs, Ge.

## MICRO SEIKI TURNTABLES

SIMPLY THE BEST BELT DRIVE TURNTABLE SYSTEMS AVAILABLE



AT LAST! MICRO SEIKI JAPAN INTRODUCES ITS FULL LINE OF HIGH-END TURNTABLE SYSTEMS TO U.S. AUDIOPHILES

Illustrated: the Micro Seiki RX-1500VG, shown here mounted with two tonearms (four are possible). Platter: 20 lb bronze platter. Record hold-down: light force vacuum system. Frame: massive 36 lb non-resonant metal alloy. Motor: outboard belt-drive DC servo. Inertia moment: 3,000 lb/cm<sup>2</sup>. Total system weight: 100 lb. U.S. list \$1,495 (without tonearm).

Other versions also available: the 1500FVG, an air-bearing vacuum model where the bronze platter floats on a thin, 0.3mm layer of air—U.S. list \$1,995. The RX-1500 Basic, an aluminum platter version with no air-bearing or vacuum functions—U.S. list \$795.

And introducing: The Ultimate Analog Turntable System, The SZ-1T/SZ-1M. Specifications: 132 lb non-resonant zinc alloy frame. Platter: 48 lb air-bearing, vacuum, bronze platter. Motor: outboard 44 lb hysteresis synchronous air-bearing phono-motor. Inertia moment: 25 tons/cm<sup>2</sup>. Total system weight: 240 lb. U.S. list \$10,000.

FOR COLOR BROCHURE AND DEALERS INQUIRIES, WRITE:  
MICRO SEIKI USA, P.O. BOX 69A97, LOS ANGELES, CA 90069



# To Find Out Where Audio Is Going, You Should Know Where We've Been.



Over the last ten years, Onkyo has been responsible for many audio innovations that have since become industry standards.

Tuner technology, for example. Onkyo pioneered affordable Quartz digitally synthesized tuning in 1975, and followed it two years later with Quartz & Servo locked tuning. Last year, we developed our Automatic Precision Reception System, an on board microprocessor that automatically controls all critical tuner functions, and introduced the first receiver, our Integra TX-85, with dbx<sup>+</sup> and

Dynamic Bass Expander.

In cassette decks, Onkyo technology has always been at the forefront. We introduced the first cassette decks with bias adjustments (Accubias) to insure perfect recording with any tape formulation. Subsequently, we were first in the industry with high speed dubbing decks, real time counters, cassette receivers, and a deck with all noise reduction systems—Dolby B-C, HX Pro<sup>\*</sup>, dbx<sup>+</sup>.

Amplification has, in recent years, become another Onkyo hallmark. Our Super Servo, Linear Switching

and Delta Power Supply circuitries created the first amplifiers with wide dynamic range and low impedance drive capability. Soon to be introduced in 1985 is our new *Real Phase Amplifier Technology*, which utilizes main and secondary power transformers to facilitate distortion-free handling of any speaker impedance load, even down to 2 ohms.

Onkyo is proud to be celebrating ten years of sound achievements. Experience superb Onkyo performance for yourself by visiting your Onkyo dealer today.

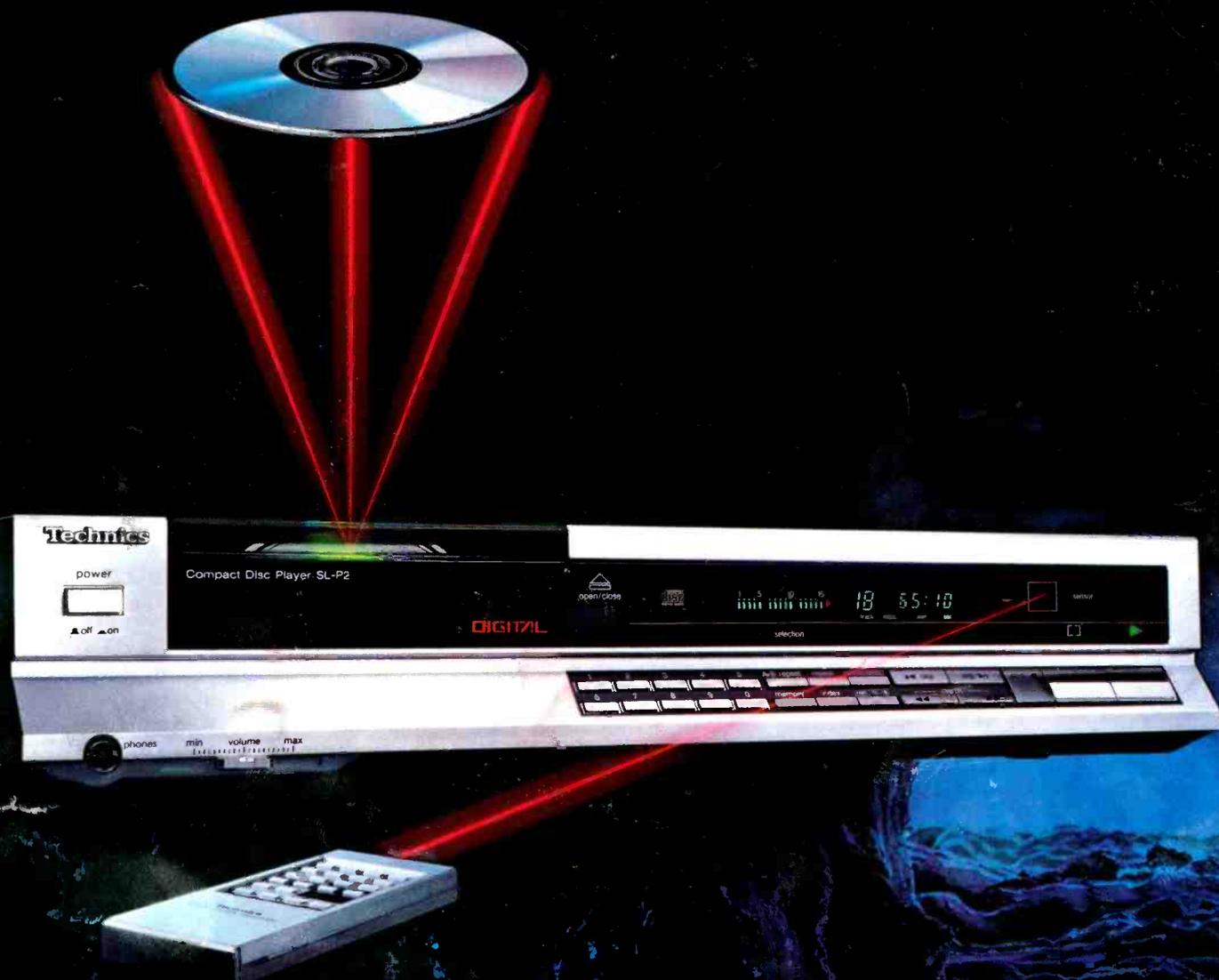
Artistry in Sound

# ONKYO<sup>®</sup>

200 Williams Drive, Ramsey, NJ 07446 (201) 825-7950

<sup>\*</sup>Dolby is a registered trademark of Dolby Laboratories, Inc.  
<sup>+</sup>dbx is a registered trademark of dbx Inc.

Enter No. 38 on Reader Service Card



## Introducing a slight improvement on perfection. The new Technics Compact Disc Players.

Technics compact disc players. And the compact disc. Together they've given you what no conventional audio system can: the perfection of musical reality. Instead of the conventional stylus, Technics compact disc players use lasers and computers. So there's none of the noise. None of the distortion. And none of the wear and tear that affects ordinary records.

With Technics, what you hear is not just a reproduction of a performance, but a re-creation of it: perfection.

But occasionally even the musical perfection of a compact disc can be marred by fingerprints, dust or scratches. So the new Technics SL-P2 compact disc player has improvements like an advanced error correction system. This system has been designed to compensate for those imperfections. To help ensure that the sound you hear is still completely flawless.

COMPACT  
disc  
DIGITAL AUDIO

You also get sophisticated, convenient controls for accurate, rapid response to your commands: 15-step Random Access Programming so you can play any selection. In any order. Auto Music Scan lets you sample the first few seconds of each song. Automatically. Full information fluorescent displays let you keep track of tracks, playing time and other player functions.

And all of this can be controlled from across the room with Technics wireless, infrared remote control.

So enjoy an improvement on perfection. With the full range of Technics compact disc players. Including the SL-P2, SL-P3 and very affordable SL-P1.

The digital revolution continues at Technics. Perfectly.

Enter No. 57 on Reader Service Card

**Technics**  
The science of sound